

The Generation of an Innovation Climate Typology for Pharmaceutical IS Stakeholders – a CASE STUDY

A thesis submitted to The University of Manchester for the degree of
Doctor of Business Administration
in the Faculty of Humanities

2017

Michael Meighu

michael.meighu@postgrad.manchester.ac.uk, meighu@mac.com

linked in: <https://www.linkedin.com/in/michaelmeighu>

Innovation, Management and Policy Division.

Alliance Manchester Business School.

Table of Contents

List of Figures	7
List of Tables	8
List of Abbreviations	10
Chapter 1 – Introduction and Area of Concern	16
1.0 Introduction	16
1.0.1 An industry in crisis?	16
1.0.2 Not all new drugs are of equal innovative value	18
1.0.3 The drug lifecycle – an overview.....	20
1.0.3.1 Drug discovery phase	22
1.0.3.2 Preclinical testing	22
1.0.3.3 Clinical studies.....	22
1.0.3.4 FDA / regulatory review and approval.....	23
1.0.3.5 Manufacturing and supply chain	23
1.0.3.6 Post approval safety studies / phase IV / research and monitoring.....	24
1.0.4 The creativity and innovation roles of IS stakeholders in drug companies	24
1.0.4.1 Opportunities for IS improvements	25
1.0.4.2 The role of IS stakeholders in case study context.....	26
1.0.4.2.1 IS facilitating innovation in Pharmaceutical Manufacturing.....	27
1.0.4.3 Technology opportunities to improve the drug lifecycle.....	29
1.0.5 Succinct statement of ‘area of concern’	35
1.1 Literature Audit / Gap in the literature.....	35
1.1.1 Recommendations of authors for contribution of thesis	41
1.2 Background of the Author	42
1.3 Industrial Sponsors.....	42
1.4 Structure of the Thesis.....	43
1.5 Summary of chapter	44
Chapter 2: Purpose and Objectives	46
2.0 Introduction	46
2.1 The Research Aims.....	46
2.2 Objectives.....	46
2.2.1 Objective 1	47
2.2.2 Objective 2	47
2.2.3 Objective 3	47
2.2.4 Objective 4	48
Chapter 3: Literature Review	49

3.0	Introduction and approach to literature review.....	49
3.1	Definitions of innovation and creativity	50
3.1.1	Creativity	50
3.1.2	Innovation	54
3.1.3	Relationship between creativity and innovation	57
3.2	Significance of creativity and organizational innovation to business practice	58
3.3	The Creative act	60
3.3.1	Creative thought	61
3.3.2	Motivation.....	63
3.3.3	Disposition	64
3.3.4	Affect.....	68
3.3.5	Development.....	70
3.3.6	Creative Climates	71
3.4	Attributes enablers to organizational creativity and innovation.....	74
3.4.1	Group level creativity	76
3.4.1.1	Leadership, what is its relevance to creative climates?.....	77
3.4.1.2	Creative Processes	78
3.4.1.3	Group Structure	80
3.4.1.3.1	Team size and team co-ordination	80
3.4.1.3.2	Diversity	81
3.4.1.3.3	Balance of adaptors to creators.....	81
3.4.2	Organizational level creativity.....	82
3.4.2.1	Evaluation and control	82
3.4.2.2	Resources.....	85
3.4.2.3	Advocacy	86
3.4.2.4	Organizational knowledge and experience.....	86
3.4.2.4.1	The SECI model – enabling knowledge management and creation.	88
3.5	Justification to focus on organizational level creativity.....	91
3.6	Theoretical Framework.....	92
3.6.1	Theoretical factor models for creativity	92
3.6.2	Proposed conceptual framework.....	96
3.6.2.1	Validity of proposed theoretical framework.....	98
3.6.2.1.1	Testing validity against literature taxonomies	98
3.6.2.1.2	Testing validity via meta-analysis.....	100
3.6.2.1.3	Limitation and opportunity of applicability of theoretical framework.....	103
3.7	Mapping of proposed climate to attributes, and psychometric instruments	103
3.7.1	Fit of concept model to multi-level attributes.....	103

3.7.2	Mapping conceptual framework to psychometric measurement tools.....	107
3.7.2.1	CCQ - Creative Climate Questionnaire.....	108
3.7.2.2	KEYS – Assessing the Work Environment for Creativity.....	108
3.7.2.3	SSSI – Siegel Scale of Support for Innovation	109
3.7.2.4	TCI – Team Climate Inventory.....	110
3.8	Chapter Summary	111
Chapter 4: Dimension descriptors in the workplace		112
4.0	Introduction	112
4.1	Dimension 1: Work Autonomy and Challenge.....	112
4.1.1	Concept discussion.....	112
4.1.2	Challenge / Job Complexity.....	113
4.1.3	Autonomy.....	115
4.2	Dimension 2: Positive Member Exchange	119
4.2.1	Concept Discussion	119
4.2.2	Positive Peer Group	119
4.2.3	Intellectual Stimulation.....	126
4.2.4	Positive Interpersonal Exchange.....	129
4.3	Dimension 3: Leadership Influence and Direction.....	131
4.3.1	Concept discussion.....	131
4.3.2	Positive Supervisor Relations.....	131
4.3.3	Mission Clarity.....	135
4.3.4	Participation / Engagement	137
4.4	Dimension 4: Organizational Support.....	140
4.4.1	Concept Discussion	140
4.4.2	Resources.....	140
4.4.3	Top management support	143
4.4.4	Reward orientation	144
4.5	Dimension 5: Organizational Integration and Extension	146
4.5.1	Concept discussion.....	146
4.5.2	Organizational Integration.....	146
4.5.3	Flexibility and risk taking.....	149
4.6	Summary of chapter	150
Chapter 5: Research Methodology		151
5.0	Introduction	151
5.1	The research questions and their nature.....	152
5.1.2	The foundation of the enquiry.....	152
5.2	Ontological and epistemological positioning.....	154

5.2.1	Ontological positioning.....	154
5.2.1.1	Objectivism or realism	154
5.2.1.2	Relativism.....	155
5.2.1.3	Nominalism	155
5.2.2	Epistemological positioning	155
5.2.2.1	Positivism and realism	156
5.2.2.2	Social constructionism, relativism, nominalism, and interpretative research.	157
5.2.3	The ontological and epistemological position stated.	158
5.3	Research design	158
5.3.1	Research methods.....	159
5.3.1.1	Application descriptions.....	160
5.3.1.2	Action research	160
5.3.1.3	Case study	160
5.3.1.4	Multiple or single case study	162
5.3.1.5	The proposition.....	163
5.3.1.6	Unit of analysis.....	163
5.3.2	Qualitative, quantitative or mixed methods for case study?	163
5.3.3	Qualitative methodology path.....	166
5.3.3.1	Template analysis.....	167
5.3.3.2	Sample across business unit.	170
5.3.3.3	Semi-structured Interviews and the dramaturgical model.....	170
5.3.3.4	Interviews – semi structure	174
5.3.3.5	Initial sample and pilot.....	175
5.3.3.6	The structure of the semi-structure interview	175
5.3.3.7	Paraphrasing, reliability and exploration.....	176
5.3.3.8	Transcriptions.....	177
5.3.4	Analysis	177
5.3.4.1	Coding (using NVivo10).....	180
5.3.4.2	Memos, field notes, observations and other supportive documentation.....	181
5.3.4.3	Coding approach	181
5.3.4.4	Saturation of case study nodes.....	182
5.3.4.5	Coding for circular relationships, context and process.....	182
5.3.4.6	Validity, reliability, authenticity	183
5.4.	Summary - 10-point framework.....	183
Chapter 6:	Findings and results	185
6.0	Introduction	185
6.1	Overview of main results	186

6.2	Case study context	190
6.3	Verification of the terms creativity and innovation.....	190
6.4	Concept mappings.	192
6.4.1	Work Autonomy and Challenge	193
6.4.2	Positive Member Exchange.....	197
6.4.3	Leadership influence and direction.....	208
6.4.4	Organizational Support	213
6.4.5	Organizational integration and extension	216
Chapter 7: Discussions and Conclusion.....		223
7.0	Introduction	223
7.1	Theoretical contributions – testing and adding meaning to a theoretical framework.....	223
7.2	Contributions to practise – a soft ‘a priori’ template for practitioners	224
7.2.1	Applicability Use Case 1	226
7.2.2	Applicability Use Case 2	227
7.3	Limitations of the research	228
7.3.1	Single Case Study	228
7.3.2	Limitations of perception data.....	229
7.3.3	Variation in literature’s creative dimensions.....	229
7.3.4	Interconnections between the dimensions	230
7.4	Discussion and recommendations on dimensions.....	231
7.4.1	Dimension 1	231
7.4.2	Dimension 2	233
7.4.3	Dimension 3	235
7.4.4	Dimension 4	237
7.4.5	Dimension 5	239
7.5	Recommended for further study and development: mechanisms for enablement ..	241
7.5.1	Incubation with idea time allocation and correct team size	241
7.5.2	Knowledge management and creation (SECI model)	246
7.6	Final conclusions and remarks.....	249

APPENDIX A - Completed derived expanded typology for Case Study Company

APPENDIX B – Interview Strategy and Semi-Structured Interview guidelines

APPENDIX C – Raw organizational climate nodes NVivo

APPENDIX D – Identified case-study relationships NVivo

Main text word count: 72637

List of Figures

Figure 1.	Risk versus benefits for drug innovations.....	19
Figure 2.	Overview of the Drug Lifecycle.....	21
Figure 3.	Roche: What it takes to create a new medicine.....	25
Figure 4.	Gartner’s Hype Cycle.....	31
Figure 5.	Contribution of thesis to the literature. Volume of previous studies.....	41
Figure 7.	Flow and analysis of contribution to knowledge.....	49
Figure 8.	Sternberg (2006) Propulsion model of creativity.....	53
Figure 9.	Multi-level lens to view climate (Mumford & Hunter, 2005).....	76
Figure 10.	Individual or small group creativity (T. M. Amabile, 1988).....	78
Figure 11.	Relationship for information, knowledge, and innovation (Hunter et al., 2005).....	88
Figure 12.	SECI model (I. Nonaka, 1994).....	89
Figure 13.	Creative Ecosystem Model (West & Sacramento, 2012).....	120
Figure 14.	The trunk and branch of a tree metaphor.....	151
Figure 15.	Overall framework for the case study analysis.....	169
Figure 16.	Template development workflow.....	179
Figure 17.	Practical value of research to innovation managers in Pharma IS.....	189
Figure 18.	Rich picture displaying case study concepts to trust.....	207
Figure 19.	Case study rich picture for the effects of operational silos.....	222
Figure 20.	“Mess” or systems approach map for “baby steps innovation”.....	231
Figure 21.	Rich picture displaying case study concepts relating to incubation.....	243
Figure 22.	Rich picture displaying case study concepts attached to “Time”.....	245
Figure 23.	Integrative nature of the SECI model to the IS organization.....	248

List of Tables

Table 1.	Literature suggested strategies for innovating drug product.....	35
Table 2.	Journal search for keywords.	39
Table 3.	Additional database searches for literature research	40
Table 4.	Structure of thesis.....	44
Table 5.	Select literature samples of the definition of creativity	51
Table 6.	Select literature samples of the definition of innovation.....	55
Table 7.	Selected literature views on the relevance of innovation on competitiveness.	60
Table 8.	Individual qualities that promote creativity (T. M. Amabile, 1988).....	65
Table 9.	Individual qualities that inhibit creativity (T. M. Amabile, 1988).	65
Table 10.	Individual level creativity characteristics (Mumford & Hunter, 2005)	66
Table 11.	Creativity and personality traits (sample), (Barron & Harrington, 1981)	67
Table 12.	Composite Creative Personality Disposition Factors (Harrington, 1975)	68
Table 13.	Creative processes as identified in the literature	79
Table 14.	Proposed 5 dimension typology model (Hunter, 2016).....	96
Table 15.	Examples of extant creative climate taxonomies	100
Table 16.	Meta-Analysis of Dimensions from literature.....	101
Table 17.	Most and least significant dimensions (meta-analysis review)	102
Table 18.	Mapping of proposed conceptual framework to multi-level attributes.....	106
Table 19.	Coverage of the CCQ with the proposed classification.....	108
Table 20.	Coverage of the KEYS with the proposed classification.....	109
Table 21.	Coverage of the SSSI with the proposed classification.	110
Table 22.	Coverage of the TCI with the proposed classification.....	110
Table 23.	Descriptors for job complexity and challenge.	115
Table 24.	Descriptors for autonomy.....	118
Table 25.	Descriptors for positive peer group.....	126
Table 26.	Descriptors for intellectual stimulation.	129
Table 27.	Descriptors for positive interpersonal exchange.....	130
Table 28.	Descriptors of positive supervisor relations.	134
Table 29.	Descriptors for mission clarity.	137
Table 30.	Descriptors of participation.	139
Table 31.	Descriptors for resources.....	143
Table 32.	Descriptors for top management support.....	144
Table 33.	Descriptors from reward orientation.....	145
Table 34.	Descriptors for organizational integration.....	148
Table 35.	Descriptors for flexibility and risk taking.	150
Table 36.	Compatibility of philosophical positioning to research question.	159
Table 37.	Characteristics of case study approach.	161
Table 38.	Participants in case study.....	170
Table 39.	Dramaturgical Model mapped against execution.....	174
Table 40.	Literature types of interviews.....	175
Table 41.	Analysis and presentation workflow.....	178
Table 42.	10 point summary table for qualitative research.	184
Table 43.	‘a Priori’ Template Analysis.....	185
Table 44.	Overview of main results and new knowledge generated	188
Table 45.	Case study perceptions of creativity and innovation meanings	191
Table 46.	Work Autonomy and Challenge – Summary of thick descriptions	195

Table 47.	Autonomy – Summary of thick descriptions.....	197
Table 48.	Positive Member Exchange – Summary of thick descriptions	202
Table 49.	Intellectual Stimulation – Summary of thick descriptions	205
Table 50.	Positive Interpersonal Exchange – Summary of thick descriptions	206
Table 51.	Positive Supervisor Relations – Summary of thick descriptions	210
Table 52.	Mission Clarity – Summary of thick descriptions.....	211
Table 53.	Participation – Summary of thick descriptions.....	212
Table 54.	Resources – Summary of thick descriptions	214
Table 55.	Top Management Support – Summary of thick descriptions	215
Table 56.	Rewards – Summary of thick descriptions.....	216
Table 57.	Organizational Integration and Extension – Summary of thick descriptions.....	219
Table 58.	Flexibility and Risk Taking – Summary of thick descriptions.....	221

List of Abbreviations

CCQ	Creative Climate Questionnaire
CFA	Confirmatory Factor Analysis
eTMF	Electronic Trial Master File
FDA	Food and Drug Administration
FPP	IS organization at client site
GMP	Good Manufacturing Practice
INDA	Investigational New Drug Application
IRB	Independent Review Board
KEYS	Assessing the Work Environment for Creativity
LCM	Life Cycle Management
MES	Master Execution System
NBE	New Biological Entity
NDA	New Drug Application
NME	New Molecular Entity
PAT	Process Automation Technology
PD	Pharmaceutical Development
PI	Phase I in Drug Development
PII	Phase II in Drug Development
PIII	Phase III in Drug Development
PIV	Phase IV in Drug Development
PT	Manufacturing
R&D	Research and Development
SECI	Knowledge Creation model
SSSI	Siegel Scale of Support for Innovation
→	'Mapped to'

The University of Manchester

Michael Meighu

Doctor of Business Administration

The Generation of an Innovation Climate Typology for Pharmaceutical IS
Stakeholders – a Case Study

2017

ABSTRACT

This study is a qualitative exploration on the innovation climate within an IS department of a Top 5 Global drug company to develop a comprehensive creative climate taxonomy. 35 innovation stakeholders were interviewed spanning a cross section of the IS function providing a rich view of creative enablers and impediments with the aim of leveraging technology to develop and deliver better medicines. Semi-structured interviews adopting the dramaturgical model were used.

An extensive review of the literature was performed which produced an a priori innovation climate typology as the theoretical framework, which was then applied to a case study dataset. The output is an empirical testing of the extant innovation climate typology. A good fit was found. In addition, the contributions from this case study data expands the theoretical framework to produce a more focused niche typology with thick descriptions as support. The 13-level literature classification taxonomy was tested and enlarged to 172 sub classifications providing richer understandings and two mechanisms for climate enablement were recommended.

The output of this thesis can be used by innovation managers in Pharma IS Organizations, as they try to leverage innovation to meet the demands of their challenging business environment. The enhanced typology presents a soft 'a priori' template mechanism in which practitioners can view and articulate climates (in Pharma IS departments), which has been identified as a key driver for innovative output. Organizational creativity is not a naturally occurring dynamic, as individuals are inhibited by many human instincts such as personality conflicts, herding of knowledge, competition, and personality profiles. Both enablers and inhibitors are explored.

Declaration

I, Michael Meighu, declare that no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Copyright Statement

- i. The author of this thesis (including any appendices and/or schedules to this thesis) owns certain copyright or related rights in it (the "Copyright") and he has given The University of Manchester certain rights to use such Copyright, including for administrative purposes.
- ii. Copies of this thesis, either in full or in extracts and whether in hard or electronic copy, may be made only in accordance with the Copyright, Designs and Patents Act 1988 (as amended) and regulations issued under it or, where appropriate, in accordance Presentation of Theses Policy You are required to submit your thesis electronically Page 11 of 25 with licensing agreements which the University has from time to time. This page must form part of any such copies made.
- iii. The ownership of certain Copyright, patents, designs, trademarks and other intellectual property (the "Intellectual Property") and any reproductions of copyright works in the thesis, for example graphs and tables ("Reproductions"), which may be described in this thesis, may not be owned by the author and may be owned by third parties. Such Intellectual Property and Reproductions cannot and must not be made available for use without the prior written permission of the owner(s) of the relevant Intellectual Property and/or Reproductions.
- iv. Further information on the conditions under which disclosure, publication and commercialisation of this thesis, the Copyright and any Intellectual Property and/or Reproductions described in it may take place is available in the University IP Policy (see <http://documents.manchester.ac.uk/DocuInfo.aspx?DocID=24420>), in any

relevant Thesis restriction declarations deposited in the University Library,
The University Library's regulations (see
<http://www.library.manchester.ac.uk/about/regulations/>) and in The
University's policy on Presentation of Theses

Dedicated to my father Donald and his grandson Elvan. Two generations apart, and always motivating me to push myself to places I thought I could never go.

ACKNOWLEDGEMENTS

Writing a doctorate level thesis is not an easy endeavour. Luckily it is an experience that happens only once in a lifetime. Without the help of the following folks, this knowledge journey just would not have been possible. My sincerest thanks to:

- 1) My supervisor Professor Trevor Wood-Harper. His guidance assured that I remained focused on the research question, didn't get lost in the many doors that opened during the journey;
- 2) Louis-Martin Deslandes for his bouncing of ideas and scientific mindset;
- 3) M. Cottingham. from the case study organization who helped conceptualize the area of concern and the research questions;
- 4) M. Wittig from the case study organization who organized the research data gathering;
- 5) D. Murray formerly of the case study organization who sponsored the project;
- 6) P. Schissel, head of IS at the case study organization who granted access;
- 7) All of the field stakeholders for their participation;
- 8) Marc Sniukas and John Dobson for sharing their thesis writing experiences;
- 9) My work supervisor Jim Kane for his support;
- 10) And finally, all those who kept asking, "You're still writing that thing?"

Chapter 1 – Introduction and Area of Concern

1.0 Introduction

“The urge to merge (in the drug industry) has been driven by a failure to innovate at the required rate” - Horrobin (2000)

1.0.1 An industry in crisis?

In 2011, the drug industry began to experience what was dubbed the “patent cliff”. Innovation from traditional drug producers began drying up, and a large section of patented drugs fell off patent protection. Pammolli, Magazzini, and Riccaboni (2011) estimates this decade’s (2010 to 2020) patent cliff to be the worse proprietary loss for the pharmaceutical industry in its history. Between 2009 and 2014, \$120bn (US) was lost due to a lack of new innovations, and current forecast estimates that a further \$215bn (US) will be lost during 2015 to 2020 (VanEck, 2016). A lack of innovation to replace loss patents in a large pharmaceutical company, not only causes a drop in sales, but a sudden shock due to the rate of decline (Ho, 2014). For example, Khanna (2012) documents that when the patent protection for the Pfizer drug Lipitor fell off patent in 2011, sales of Lipitor dropped 71% and Pfizer’s overall revenues dropped by 7% (Rappeport, 2012). Another patent cliff example is Elli Lilly’s antidepressant drug Prozac, which lost 70% of its market share within 6 months of losing its patent (Ho, 2014). Paul et al. (2010) estimates that for every \$1US lost in declining product revenues due to patent expirations, large-cap pharmaceuticals currently replace on average 26 cents with new product revenues (2012 figures).

In 2000, Horrobin (2000) estimated that in order to sustain average industry growth, a pharmaceutical company should introduce per year one new product with sales approximately \$500M (US) for every 1 to 1.5% global market share. In 2000, the same author estimated that the industry as a whole, needed to produce and get to market between 70 to 100 new chemical entities every year just to maintain its positions, although it was hovering around 40. A report, “Changing Patterns of Pharmaceutical

Innovation” (NIHCM, 2002), concluded that from 1989 to 2000, only 15% of new drugs were highly innovative and that the percentage of new drugs, that are considered truly innovative, (i.e. a new molecule versus a modification of an existing molecule), was decreasing over time. In 2009, of the 24 new drugs approved by the FDA, 10 were produced by large pharma, and only 17% could be considered ‘first in class’ or NME (New Molecule Entities). This was the lowest figure since 1983 (Paul et al., 2010). Goodman (2009) writes, “R&D costs, along with generic competition and price controls, are dramatically undermining the profitability of big pharma.” Frank (2007) adds pressures from large scale purchasers to the list undermining the profitability of pharma companies. Most large pharmaceutical companies are not reaching their innovation throughput targets, and the result has been an increased amount of merges and acquisitions in an attempt to make up the shortfall (Paul et al., 2010).

Described more poignantly, Pammolli et al. (2011) writes, “the drug industry is currently experiencing a crisis in the development of innovative new drugs”. Innovation, according to Horrobin (2000) is at the heart of pharmaceutical sustainability.

As an industry matures, scholars have proposed that past R&D efforts may exhaust the easy targets, therefore raising the bar for success (Segerstrom, 1998). Most of the drug innovation gains occurred before 1975 (NIHCM, 2002), which does not necessarily imply that significant advances have not occurred in the last generation, but the communication is that drug innovation is an uphill struggle as opposed to low-hanging fruit. As highlighted by Hu (2007):

“Most of the easy wins have already been made...Now we are into more indirect ways of treating diseases: stopping tumours from growing by preventing their ability to get blood supply. These are much more complicated. This is not to belittle the advances so far, but things are getting difficult.” - Lars Rebien Sorenson, CEO of Norvo Nordisk.

The overarching argument is that, in the drug arena, R&D productivity challenges have taken root and are seemingly difficult to overcome. In addition to the maturity of the niche, Drews (1998) suggests several key drivers complicating innovation: (1) the increasing base costs in developing new drugs, (2) increases in total R&D expenditure,

(3) the constant or even declining rate of the introduction of new molecule entities (NME) into the market, and (4) a climb in the attrition rates in late-phase clinical trials. It is the hope of several authors (Helpman, 1998; Pammolli et al., 2011) that the pharmaceutical innovation drought or R&D productivity crisis is a temporary phenomenon, as technology can reduce the time lag between investment and outcome and raise productivity.

In summary, the drug patent cliff has transformed the drug industry from “thriving” to “surviving” (Khanna, 2012). This has caused a recalibration of the industry, and a survival search for NME (New Molecule Entities) and NBE (New Biological Entities) in order to improve the pipeline for the future. Large drug organizations have been making efforts to reduce costs, expenses, and find viable options to replace their blockbuster products. For example, from the period 2008 to 2012, 200,000 jobs were eliminated in the top ten pharmaceutical companies (Khanna, 2012). Pressures also include outsourcing to lower wage countries (Frantz, 2006). As explicitly expressed by Cardinal (2001), “the foundation of competitive advantage in the pharmaceutical industry lies in successful innovation.”

1.0.2 Not all new drugs are of equal innovative value

Having presented the view that one antidote of declining revenues for drug producers is to increase patent registration, the presence of new drugs (and patents) in the pipeline of a producer does not automatically fill the gap of any potential revenues from an upcoming patent loss (Ho, 2014). As in any industry the type of innovation potentially determines success in the marketplace. For the drug industry, an incremental change in a molecule in an already competitive arena for a disease, will yield a different result for a breakthrough new molecule for a high-yielding disease that is not yet tapped. In Figure 1, Khanna (2012) describes these nuances of various types of drug innovation mapped against costs and rewards.

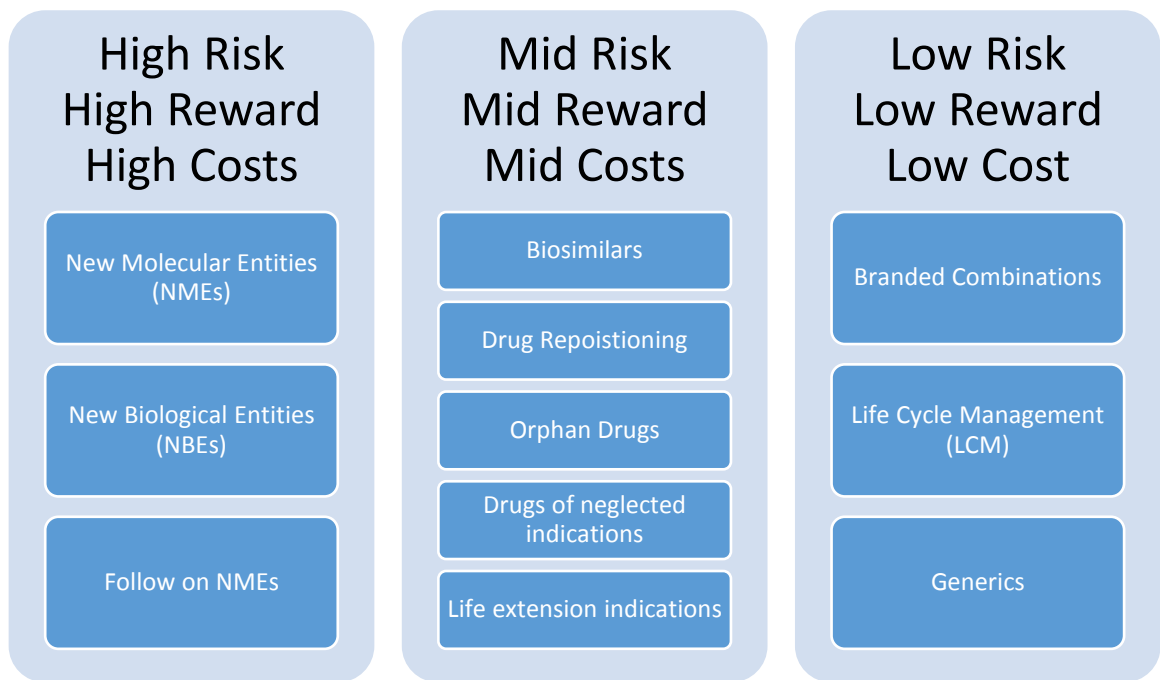


Figure 1. Risk versus benefits for drug innovations

As an illustration, according to NIHCM (2002), between 1989 and 2000, of the 1035 new drugs that were approved by the FDA, only 15% were approved as New Molecular Entities (NMEs). Examples were Viagra, Fosamax, and Actos. These would be considered truly innovative. 46% of new drugs approved, were spin offs of already available active ingredients, therefore a new dosage form, or method of administration, or the addition of another approved active ingredient. These would be considered modest innovations. Juliano (2013) states, “real advances in medicine come from new molecular entities (NMEs), and it is in this arena that the failure of the currently model of drug discovery and development in major drug companies is most apparent.” According to Paul et al. (2010) new molecular entities approved globally by regulatory agencies, were down 50% over the 2005 to 2010 period, compared to the 1999 to 2004 period.

Having presented literature views on the state of innovation within the Pharmaceutical and Biotechnology Industries, a brief overview of the drug development process and lifecycle is pertinent, within the view of discussing potential opportunities to improve innovation.

1.0.3 The drug lifecycle – an overview

Bringing a drug to market is a complicated, time consuming and an elaborate process (A. M. Lilleoere & Holme Hansen, 2011). It is also expensive. Estimates from 2000 to the early 2010s put the development cost to bring a drug to market at \$1.3 billion (US) with an annual rate of increase of 8.5% above general inflation (J. A. DiMasi, Grabowski, & Hansen, 2016). According to the Food and Drug Administration (FDA, 2014), a patent validity for a new drug entity is 20 years from the time of first registration. This means that all of the development costs, clinical evaluations, and marketing activities, are purely cash consumptions, as revenue is not generated until the commercial product is approved for human consumption (FDA, 2014). According to Chung (2011), the average time from registration to approval in the 00s was roughly 8 years; however Pharma (2016) estimates the figure to be between 10 and 15 years. This means that under current variables, a company has approximately 5 to 12 years to recoup development costs, and generate profit.

Figure 2, presents an overall view of the cradle to grave commonly referred stages of a drug lifecycle (FDA, 2015). The next section discusses the overview of these phases (FDA, 2015; Pharma, 2016), with the aim of establishing a context of the role of technology to possibly solve pain points and improve innovation opportunities.

Providing a in-depth account of the pharmaceutical industry and its many components is not the scope of this thesis. The industry descriptive information is presented within the context of the area of concern, and the research questions.

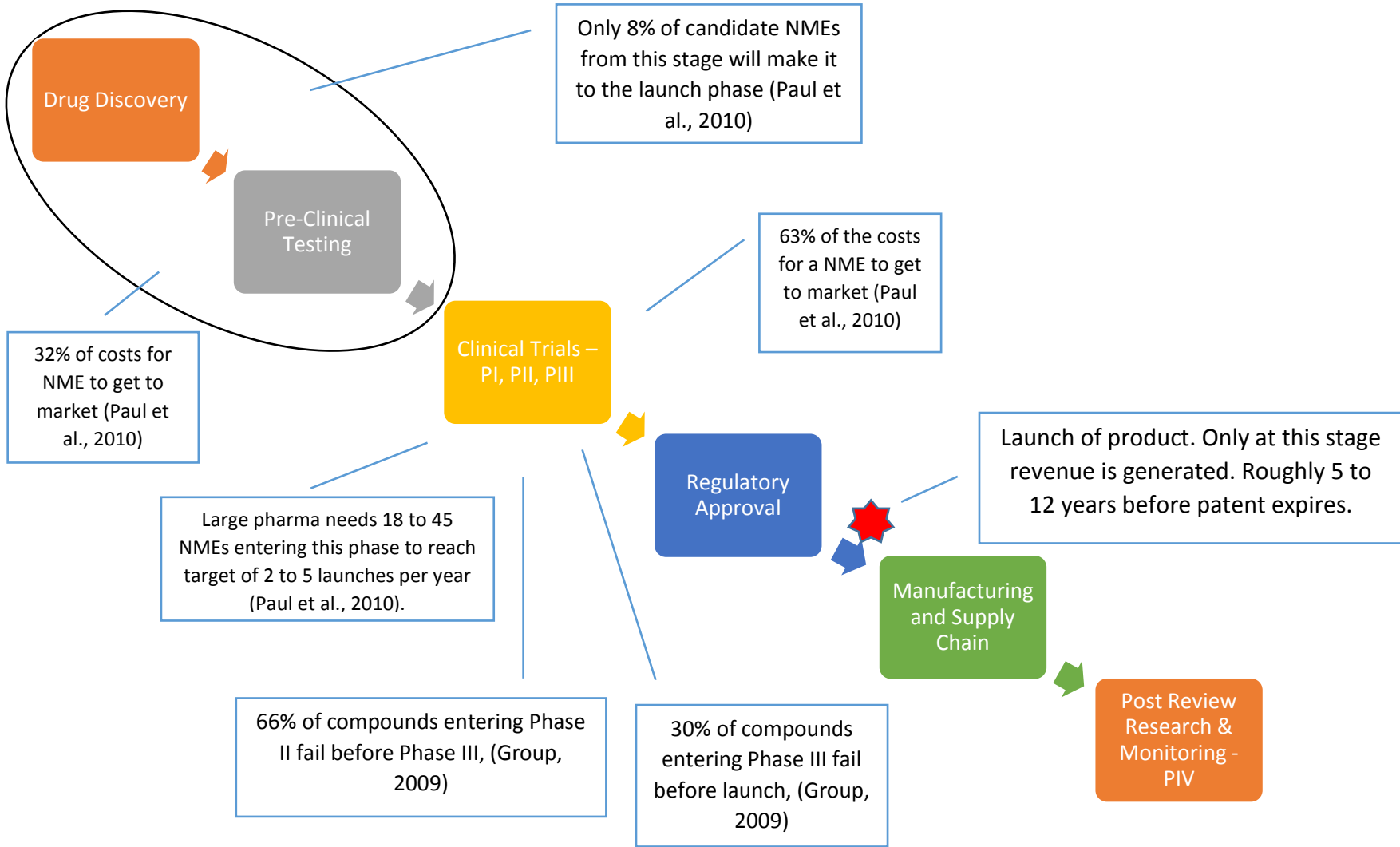


Figure 2. Overview of the Drug Lifecycle

1.0.3.1 Drug discovery phase

The first stage of drug development is the discovery and screening of thousands of potential chemical entities or drug candidates matched against disease areas. By understanding the diseases and gene targets, researchers are able to fine tune chemical entities to address certain targets for a therapeutic effect. The stated objective of this stage as stated by Pharma (2016) is “to look for a promising compound to affect a target and eventually become a medicine”. Most, 90%+, of the drug candidates at this stage fail to make it though the pipeline (Pharma, 2016).

1.0.3.2 Preclinical testing

Once promising candidate drugs have been identified in what is referred to as the lead optimization phase, tests in the laboratory and animals are carried out, with the objective of gaining further insights into its safety and efficacy before it is contemplated to be administered to humans. This process can take several years and further screens out non-promising candidates. As described by Paul et al. (2010), 32% of the drug development costs occurs in the Drug Discovery and Pre-Clinical Phases.

1.0.3.3 Clinical studies

Having successfully identified potential drugs, and conducted pre-clinical and animal tests, having taken a decision to move forward, an Investigational New Drug Application (INDA) is filed with the relevant health authorities (for example the Food and Drug Administration in the US). This filing outlines the previous non-clinical studies results, and the strategies to move forward, specifically testing in humans and documenting safety and efficacy. A typical structure consisting of an independent review board (IRB) is set up composing of physicians, researchers, and members of the general public, to ensure independence, confidence in ethics etc. Clinical studies are categorized in three stages, designed to optimize graduating patient safety and efficacy. These three stages are described as:

- 1) *Phase I*. In this phase, the candidate drug is tested in a small sample of humans. Usually a group of 100 or less. These are healthy volunteers and the

study phase is designed to study the drug candidates' safety and its metabolic characteristics.

- 2) *Phase II*. Once Phase I conclusions have been reviewed, and approval to continue is obtained from the regulatory agency, this phase focuses on taking the drug candidate to wider cohort of humans, usually approximately 100 to 500. In this phase the drug is introduced to patients with the disease the drug is targeting. The output of this phase is similarly focused on understanding the drugs safety aspects, and its efficacy prospects. Optimal dosing, and side effects are also studied in this phase.
- 3) *Phase III*. Once Phase II is completed, reviewed, and regulatory approval is received to proceed, the drug is introduced to a wider group of patients, usually in the thousands. The overarching outcome of this stage of the study is to document the safety and efficacy observations via statistically significant information, and to determine the overall benefits to risk ratio.

J. A. DiMasi et al. (2016) estimates that only 12% of candidate drugs that enter clinical trials are eventually approved for human consumption. Paul et al. (2010) estimates that 63% of the costs of bringing a drug to market occurs in these three clinical trials phases (I, II, and III).

1.0.3.4 FDA / regulatory review and approval

Upon a successful completion of the clinical trial phase, the company involved submits a New Drug Application (NDA), to the regulatory agency (for example the FDA), who analyzes the findings and grants a licence to sell that particular drug. The licence is granted within the parameters of the results gathered from the clinical trial activities and also upon proposals for manufacturing and distribution. In some cases the FDA (and other regulatory) authorities require further studies, analysis etc., before a licence is granted, based on their own scientific evaluations.

1.0.3.5 Manufacturing and supply chain

The objective of developing and obtaining an approval for a drug is to manufacture it in mass quantities and supply it for human consumption and to generate profit. At this

phase, the best and most cost-effective manufacturing methods are identified and developed, along with what was agreed with the regulatory agency. Manufacturing facilities, are developed to what the industry terms as Good Manufacturing Practices (GMP), which is essentially a framework to ensure that what is delivered to the patients matches the expectations of what was filed with the Regulatory agencies (FDA, 2015).

1.0.3.6 Post approval safety studies / phase IV / research and monitoring

Once the approved drug is in the marketplace and being administered to patients on a wide scale, there is a regulatory framework and requirement set up to continuously monitor the drugs safety and efficacy over a commercial sample of human consumers. These data would include evaluations of longer-term effects of the drug not possible in Phase I, II, and III, as well as fine-tuning administration, labelling, and other newly formed information about the drug in question (FDA, 2015).

Having briefly discussed the overall drug development and supply process, attention is now moved to a possible role of technology for addressing some of the challenges described in the previous sections.

1.0.4 The creativity and innovation roles of IS stakeholders in drug companies

“Among all the challenges faced by the pharmaceutical industry, improving productivity (and innovation) remains the most important. The environmental factors that are reducing the industry’s profitability can only be mitigated by substantially and sustainably increasing the number and quality of innovative, as well as cost effective new medicines.” Paul et al. (2010)

As presented earlier, there is considerable discussion in the literature about the need for innovation in the pharmaceutical industry and that the lack of it has led to several

layers of problems. It is pertinent in the outset to explore the role and opportunities of IS (Information Systems) in improving innovation in the pharmaceutical industry.

1.0.4.1 Opportunities for IS improvements

In its 2011 Annual Report, one of the Top 5 Global drug research and manufacturer Roche, suggested that the work involved in developing and bringing a drug to market approximated to 7,000,000 hours of work, covering 423 different researchers (displaced globally), involving over 6500 experiments, and taking approximately 12 years (see Figure 3).



Figure 3. Roche: What it takes to create a new medicine.

This represents a considerable amount of data that has to be turned into information and into contextual knowledge over numerous stakeholders and geographic locations.

The literature discusses several opportunities and analysis for the improvement of the challenges met in Figure 3. For example, Paul et al. (2010) recommends that a focus on Phases II and III of a clinical study can be a source of possible productivity gains, since this area accounts for over 60% of the development costs (see Figure 2). Paul et al. (2010) estimate that if an improvement in the technical probability of success for compounds moving from phase II to phase III improves from the current 34%, (i.e. 66% of compounds entering Phase II fail prior to Phase III) to 50% then the cost per NME decreases by 25% to \$1.33Bn (US). Similarly, if an improvement in Phase III moves from the current 70%, to 80% then the cost of a NME will be reduced by 12% to \$1.56bn (US). Unfortunately, according to (Kola & Landis, 2004), both Phase II and

Phase III industry attrition rates are falling. According to Paul et al. (2010) given the falling attrition rates, maintaining a sufficient NME pipeline, while simultaneously reducing costs and cycle times, is vital for improving pharmaceutical efficiency which further supports the argument for creativity and innovation.

The following section discusses the role of IS and IS Stakeholders in leveraging technology to solve potential business problems and innovation opportunities across the drug life-cycle.

1.0.4.2 The role of IS stakeholders in case study context

Organizations refer to their management information system functional area by several names, which includes the Management Information Systems (MIS) department, Information Systems (IS) Department, the Information Technology Department, Information Services Department, etc. (Rainer, 2013). Regardless of the name, this functional area as stated by (Rainer, 2013), “deals with the planning for, the development, management, and use of information tools to help people perform all the tasks related to information processing and management”.

In the case study organization, the department in which this research was conducted is referred to as the “Informatics Group”. As stated by Joshi, Kulkarni, and Athavale (2013), “the focus of Business Informatics within an organization setting is not just about understanding business requirements, but using IT capabilities to come up with game-changing solutions”. Implied by this view, and what is argued in this thesis is that the ‘stakeholders’ for IS are not simply software engineers and solution architects, operating in a silo, but they exist in a wider integrated cohort of interactive stakeholders involving non-technical business users. This view is supported by Bennetts, Wood-Harper, and Mills (2000) who in arguing for a system based approach to information systems development in order to mitigate system failure, suggests that software creation is a social process. Bennetts et al. (2000) suggests that technology subject matter experts (SMEs) should be seen as facilitators rather than as technical technocrats simply delivering on user requirements.

The focus of this thesis is on the climate supporting the human level social processes and the relationship dynamics within the IS Stakeholder cohort, in order to identify, develop, and adapt IS to address business problems and opportunities. The following case study gives an example.

1.0.4.2.1 IS facilitating innovation in Pharmaceutical Manufacturing.

Manufacturing drug product is regulated by a complex set of rules and guidelines designed to reduce composition variation in the drug product, and to ensure that what was registered with the respective regulatory is indeed what is delivered to the end patient. This complex set of drug manufacturing guidelines and requirements are collectively known as GMP (Good Manufacturing Practices). They are covered by the Code of Federal Regulations (CFR) and can be found via <https://www.fda.gov/>¹.

Within the GMP regulations there are stringent requirements for detailed documentation and accountability for the manufacturing process, including, who did exactly what, where and when, what were the observed process parameters, the yields attained, and which quality control checks were performed. Each stage of the process requires counter signatures for verifications, and the overall delivery requires management review and signatures. Historically these requirements and processes produced an enormous amount of paper work, and posed several business challenges including long cycle times which translated into larger and costlier warehouse space, more rejected material, and inflated overhead costs.

Within this organization, specialists in the IS function were aware of (then) new tablet technology being used in hospitals from the medical affairs department with their interactions with doctors, etc. Being also aware of the problems faced within the manufacturing areas of the business, IS specialists asked the question, “why can’t this technology be developed for re-use within manufacturing in order to solve those contextual business problems?” The IS specialists therefore acted as an idea hub and

¹ CFR Guidelines are developed in co-ordination with other regulatory guidelines such as Health Canada and European Medicine Agency

link, leveraging the potential re-use of a technology, and facilitated conversations with the manufacturing business. The IS specialists' role and tasks involved:

- 1) Introducing the opportunity of solving GMP business problems with technology re-use from one area of the business to another area of the business;
- 2) Developing Proof of Concepts (POC) of the ideas generated;
- 3) Facilitating with the business, requirements and development;
- 4) Developing with the business a business case for capital investment;
- 5) Performing change management activities in order ensure success with the technology in the workplace.

The final solution that was put into practice, was a combination of custom developments of applications on tablets in order to execute paperless instructions and manufacturing, calculating yields, etc., and regulatory requirements around electronic sign-offs. The benefits included:

- 1) Reduction and elimination of the use of paper in various parts of the manufacturing processes;
- 2) Better monitoring of process parameters;
- 3) Regulated compliance electronic approvals eliminating approximately three days of cycle time;
- 4) Proportionate (to point 3) reduction of warehouse capacity needs to store material.

This "re-use" of technology is considered to be creative and innovative because within the manufacturing context the solution was something new that works (Boden, 2004).

To achieve this level of innovation, the IS department and stakeholders, played a crucial role in vision setting and facilitation as outlined above. It is worth noting that the re-use of tablet technology within this case study example has since been expanded to other distinct areas of the drug lifecycle including clinical studies, marketing, pharmacovigilance, and supply chain management, solving business problems and innovation opportunities unique to those processes.

1.0.4.3 Technology opportunities to improve the drug lifecycle

By definition, creativity and innovation encompass something new that is useful and works². It is argued in this section that there is an explicit link between exploratory technology and current pain points identified by the literature in the drug lifecycle for innovative improvements.

The Gartner Group (www.gartner.com) performs and publishes an annual commercially available analysis of trends in the technology marketplace, which they have labelled 'the Hype Cycle'. Gartner plots technologies trend expectations versus time in the Life Science domain. The phases of Gartner's Hype cycle (see Figure 4) covers:

- Innovation Trigger. This phase seeks to display non-mature technologies, still within their conceptual and exploratory phases, trying to seek traction within the business areas addressing business problems. These are exploratory technologies that are collaborating with business entities in order to identify and develop use cases. They can be technologies that are new in development themselves, or technologies that are used in other industrial applications, and are being experimented on within the drug domain business processes and needs. For example, 'Semantic Enhancement Technologies' or 'Content Intelligence' technologies are technologies that read documents and other forms of content, and based on pre-developed algorithms and pre-defined semantic models, predicts the themes of the content and attaches these themes as metadata which then accelerates findability and retractability in drug development. At the time of writing, these technologies have a limited foot-print in the Pharmaceutical area, but there are several innovative projects evaluating the applicability of these technologies within this industry domain, which may involve co-development of the product to address business challenges and to add innovative value.
- Peak of inflated expectations. This phase aims to demonstrate exploratory technologies for which there has been a considerable amount of industry discussions around possible benefits and inflated expectations set. An example

² These definitions will be explored further in Chapter 3 – Literature Review.

of this can be the current hype around IBM's Watson (<https://www.ibm.com/watson/>) and the use of Artificial Intelligence (AI) for use within the drug lifecycle. At the time of writing, there is only one pilot project for the co-development of IBM-Watson in the drug development space³. Based on these co-developments and publishing of case study results, the mapping theme of the innovative technology to solve a particular set of business problems or innovation opportunities, will either meet the hyped expectations and continue to further and new usage within the industry, or be scaled back or withdraw completely. Lessons learnt from failures may also find its way into new product co-partnerships and developments.

- Trough of Disillusionment. This phase aims to demonstrate the technologies that fall off due to not meeting expectations during co-development phases. Expectations and use cases are fine tuned.
- Slope of enlightenment. This phase aims to demonstrate exploratory and maturing technologies that have begun to demonstrate return on investments (ROI) and attractive use case applicability. Technologies that progress through this phase begin to expand co-development projects, and communication campaigns with clear benefits to business case opportunities.
- Plateau of productivity. This phase aims to demonstrate mature products that have been developed and marketed as “turnkey solutions”, i.e. solutions that are developed, require minimal modification, and can address specific business problems and opportunities with good and well-defined ROIs. Examples may include Electronic Document Management Systems, and Supply Chain Management Systems.

An example of Gartner's hype-cycle (for 2013) can be found in Figure 4.

³ http://www.celgene.com/press_release/celgene-ibm-watson-health-collaboration/



Figure 4. Gartner’s Hype Cycle

Gartner’s Hype Cycle in Figure 4 presents commercially available solutions in co-development, etc., but does not cover custom technology developments occurring within IS departments of drug companies, or custom project that aims to combine several subcomponents on the market. For example, a particular company may have an IS custom development project around clinical development, that combines and integrates various tools through Application Program Interfaces (APIs) in collaboration with the business needs and combined via an IS custom tool. Therefore, the real picture of innovation opportunities supported by innovative IS, is richer than what is presented in Figure 4. Innovation by definition is about “something novel that works” (to be discussed in Chapter 3), and hence planning horizons are in an expected state of flux, to the constant enrichment of ideas, etc.

The argument in this section is that technology co-development and collaborations in the drug industry present opportunities to solve business problems and improve innovation. Table 1 further presents some literature discussions focused on innovation opportunities and proposals for improving drug development and manufacture. These innovation opportunities (column 3) are mapped with current development technology suggestions (column 4) as identified in the Hype Cycle (Figure 4), with the

aim of demonstrating and arguing the role of IS in pharmaceutical innovation across the drug lifecycle.

Phase of drug lifecycle	Reference	Innovation Opportunities	Developing Technologies (Shanler, 2015)
Drug discovery	(Paul et al., 2010);	Failures of drug candidates in Phase II or III are usually the costliest in the development process. The proposal is to use advances in genomics, imaging, RNAi technologies, and advance animal models in better screening potential candidates.	<ul style="list-style-type: none"> • Genomics Medicine • Cloud-Based Drug Discovery Platform • Big Data in R&D • Innovation Management Technology for Product Development
Drug Discovery / pre-Clinical	(Paul et al., 2010)	Increasing the work in progress (WIP) of molecules to offset higher attrition rates, without finding affordable and more efficient ways of processing molecules would lead higher costs, and high cycle times overall.	<ul style="list-style-type: none"> • Enterprise Laboratory Informatics • R&D Analytics
Drug Discovery / Pre-Clinical	(Paul et al., 2010)	Transforming R&D enterprise from a traditional “owned”, operated and fully controlled by large Pharmaceuticals (FIPCo) model, to a Fully Integrated Pharmaceutical Network (FIPNet) model. Opportunity to partner with virtually all elements of R&D through a coordinated and global network which can substantially improve (if managed effectively) productivity and affordability,	<ul style="list-style-type: none"> • R&D Cloud Collaboration • Cloud-Based Drug Discovery Platform • Semantic Knowledge Graphing

		enhancing the pipeline from early discovery through to launch.	
Clinical Trials Phase II & III	(Paul et al., 2010)	Tailored therapeutics which is the identification of biomarkers ⁴ . Biomarkers can be used to select the correct patients, right dose, and duration of treatment, to avoid risks of adverse events. Use to biomarkers will have a positive effect on the probability of technical success in clinical development.	<ul style="list-style-type: none"> • Nanomedicine • 3D Bioprinting for Life Science R&D
Clinical Trails Phase II and III	(J. A. DiMasi et al., 2016; Paul et al., 2010);	Reducing cycle time of Phase II and Phase III by 50% is estimated to reduce the cost of a NME by approximately \$200M (US).	<ul style="list-style-type: none"> • Wearable Devices for Clinical Trials • Semantic Knowledge Graphing • Clinical Resource Management • E-Clinical • Electronic Laboratory Notebook
Clinical Trials Phase II and III	(Paul et al., 2010)	Reducing cycle time in Regulatory preparation and correspondence.	<ul style="list-style-type: none"> • eTMF (Electronic Trial Master File) • Global Regulatory Information Management Systems
Manufacturing and Supply Chain	(Paul et al., 2010; Pyzdek, 2003);	Predictable manufacturing and supply chain systems can improve the quality of drug supply, its consistency, and a reduction in cycle time.	<ul style="list-style-type: none"> • Track and Trace and Serialization for Life Sciences • PAT (Process Automation Technology) • Model-Based Manufacturing

⁴ Biomarkers: a measurable substance in an organism whose presence is indicative of some phenomenon such as disease, infection, or environmental exposure.

			<ul style="list-style-type: none"> • Quality Process Management Applications • Structured Content and Product Label Management • Electronic Batch Records • MES (Master Execution Systems) Applications for Process Manufacturing
Phase II and Phase III Clinical Development	Maca; (Paul et al., 2010)	Use of adaptive and seamless Phase II and Phase III study designs to reduce clinical development cycle time and eliminating non value wait time between phases of development.	<ul style="list-style-type: none"> • E-Clinical • Key Opinion Leader Management • SaaS-LIMS
Phases I to IV	(Paul et al., 2010)	Costs associated with development and supply of product can be attributed to three categories: direct spend on value adding tasks, non-value adding tasks, and overheads. Opportunities lay in embracing new technologies, improved efficiencies, outsourcing etc.	<ul style="list-style-type: none"> • Process Monitoring technology • Pharmacovigilance
Phase I and II	(Joseph A. DiMasi, Hansen, & Grabowski, 2003; Paul et al., 2010)	Better target validation and early POC (Proof of Concept) studies, or “quick win, fast fail”, can increase the technical success probability in Phase II to as much as 50%. This strategy is focused on moving attrition from	<ul style="list-style-type: none"> • R&D Analytics

		Phase III and II into phase I.	
--	--	--------------------------------	--

Table 1. Literature suggested strategies for innovating drug product.

As mapped in Table 1 there is a strong argument that innovative technology, particularly exploratory technology, i.e. technology either custom made by IS departments in Pharma companies, technology that is in co-development with vendors, or technologies with a footprint in other industries but are being re-fitted to solve Pharma specific business problems and opportunities, has a role in Pharmaceutical Innovation that will contribute in various forms to innovation in the drug life cycle.

1.0.5 Succinct statement of ‘area of concern’

The previous sections discussed the current issue of a lack of sufficient innovation, via the decrease in New Molecule Entities (NMEs) in the pharmaceutical / drug-producing industries, mainly large drug companies. The discussion evolved into a high-level examination of possible uses of technology in order to improve innovation within the drug life-cycle. According to T. M. Amabile (1988) and Sharma (1999) creative environments and innovation do not come naturally, but has to be designed. The overarching area of concern stated is:

How can creative climates be better understood within a pharmaceutical IS organization with the aim of improving the adaptation of technology for better drug product delivery.

The next section discusses a literature audit available with improving innovation climates in pharma with reference to teams, etc., and further searches for literature that is focused on Pharma IS departments.

1.1 Literature Audit / Gap in the literature

Wood-Harper (2015) indicates that it is important to place the literature review within a historical context in order to build the contribution of the thesis. This section

provides a brief history of the domain in the literature, followed by the identification of a literature gap.

According to T. M. Amabile (1997), creativity is the generation of new ideas, and innovation is the translation of those ideas into useful new products, services, processes etc. It usually arises as a function of an interaction between a person and a situation (Scott & Bruce, 1994). T. M. Amabile (1997) states that “individual level creativity and organizational innovation are closely interlocked systems. Individual level creativity is the most crucial element of organizational innovation, but it is not by itself sufficient. Features of an organization can be the most crucial determinants of an individual’s creativity at any point in time.”

The argument from these perspectives, is that if innovation is an expectation of an organization, then an understanding of the innovation friendly mechanics of its climate must be understood. According to Carr, Schmidt, Ford, and DeShon (2003), climate perceptions are seen as a critical determinant of individual behaviour in organizations, mediating the relationships between objectives and individual responses.

Traditionally, creative research began with studies focused on the individual (Witt & Beorkrem, 1989). This is because ultimately it is people, individuals who create, and as a result, individual level studies dominated the literature landscape (Mumford, 2003). According to Albert (1999) studies in creativity were rare before 1950. These authors suggest that the modern systematic study of creativity began with Guilford (1950), who sought to change the construct that creativity was to be accounted solely by high intellect and IQ. Guilford (1950) proposed a hypothesis of “creativity patterns” for the individual which included: (1) sensitivity of problems, (2) ideation frequency, (3) flexibility of set, (4) ideation novelty, (5) synthesizing ability, (6) reorganizing or redefining ability, (7) span of ideational structure, and (8) evaluation ability.

According to Mumford (2003) who states, “creative thought and the creative personality, fascinated students in creativity”, and this evolved to a study of situational influences, with an early examination by T. I. Lubart (1999) of cultural (eastern and western) interpretations and manifestations of creativity. This perspective evolved into an examination of specific structural variables that promote or inhibit creativity by

Csikszentmihalyi (1999). According to Mumford (2003) it was around this period that situational studies for creativity began to be conducted.

With a premium being placed on creativity due to changing business dynamics, according to Hunter, Bedell, and Mumford (2005), researchers responded with a persistent exploration of environmental factors related to creative production. Mumford and Hunter (2005) analyzed over 200 articles pertaining to creativity and innovation, exploring influences of creative performance at the individual, group, and organizational levels. To be discussed in the following sections, Hunter et al. (2005) identified over 40 unique literature conceptualizations and theoretical frameworks of creative climate within organizations.

Given the richness of the creative environment work in the literature, this question arises: what is the contribution of this thesis, and where is the gap in the literature?

As indicated by George (2007), creativity in itself is somewhat elusive and creativity research is proceeding in anything but a linear fashion. George (2007) uses a metaphor to describe this domain, as “new buds on a tree that seems to sprout in random directions, that nonetheless have some underlying order that could be discerned”. Creativity research, as stated by George (2007), is “developing in a variety of directions that, while building from a common ground of literature, are not necessarily reflective of a unified paradigmatic thrust”.

There are several gaps in the literature that will now be addressed.

George (2007) proposes that the granular dynamics of creativity varies from function to function, and industry to industry. George (2007) poses a question, “Think about the jobs and workdays of production workers, nurses, secretaries, physicians, lawyers, college professors, stock brokers, advertising executives, engineers, and chefs. The potential for creativity resides in each of these jobs and for each of these types of jobholders. Will the same casual factors and processes contribute to creativity in the same ways in these various contexts? Clearly this is an important issue for future theorizing and research to address.” According to Vorisek, Pour, and Buchalcevova (2015), many scholars support the perspective that Business Informatics (BI) be managed specific to its domain and requirements, which includes culture and climate.

According to Hunter, Bedell, and Mumford (2007) the main journals that frequently publish articles on climate, creativity and innovation are captured in Table 2. Keyword searches containing the words, “Biotechnology”, “Pharmaceutical”, “Drugs”, “Pharma”, “IS”, “Information Systems”, “IT”, and “Information Technology”, to determine previous climate research conducted with the Pharmaceutical domain, were conducted on each of the key journals and reported in Table 2.

Journals (Hunter et al., 2007)	Keyword search results
1) Creativity Research Journal	No articles reported
2) Journal of Creative Behaviour	No relevant articles reported
3) Organizational Behaviour and Human Decision Processes	No relevant articles reported
4) Journal of Applied Psychology	One article reported entitled: “Heard It Through the Grapevine: Indirect Networks and Employee Creativity”, by Hirst, Van Knippenberg, Zhou, Quintane, and Zhu (2015). This is a study within the sales division of a Chinese Pharmaceutical company and the impact of social networks on creativity. Not directly relevant to this research question.
5) Academy of Management Review	No relevant articles reported
6) Academy of Management Journal	Relevant articles found: <ul style="list-style-type: none"> • COORDINATING KNOWLEDGE CREATION IN MULTIDISCIPLINARY TEAMS: EVIDENCE FROM EARLY-STAGE DRUG DISCOVERY (Ben-Menahem, von Krogh, Erden, & Schneider, 2016). This paper did not deal with climate models or the IS aspects of innovation, but is useful for references.
7) Journal of Organizational Behaviour	Relevant articles found: <ul style="list-style-type: none"> • <i>When creativity enhances sales effectiveness: The moderating role of leader-member exchange</i>, (Martinaityte & Sacramento, 2013). This article focused on creativity and sales within a sample from the insurance and pharmaceutical sectors.
8) R&D Management	Relevant articles found: <ul style="list-style-type: none"> • <i>Explorative search for a high-impact innovation: the role of technological status in the global pharmaceutical industry</i>, (Kim & Park, 2013).

	<p>This research focused on the role of a drug company's "technology status", and suggested that the higher the technology status the more potential the organizations innovation output can be.</p> <ul style="list-style-type: none"> • <i>Drivers of organizational creativity: a path model of creative climate in pharmaceutical R&D</i>, (Sundgren, Dimenas, Gustafsson, & Selart, 2005). <p>Relevant article which focused on creative climate within Pharmaceutical R&D. Focus was on information sharing and motivation.</p>
9) Creativity and Innovation Management	No relevant article reported.

Table 2. Journal search for keywords.

From Table 2, there is evidence of research being conducted, on creativity and innovation within the drug development process. However, there was no reported research conducted on the IS organization that supports the development and deployment of technology.

In addition to the key journal searches, a database search was also carried out using the same keyword searches as Table 3, in addition to the keywords "innovation", "knowledge", and "creativity" via the following sources (Easterby-Smith, 2015):

Source	Results found
1) Google Scholar	Same reported results as found in Table 2
2) SRRN. http://www.ssrn.com/en	No relevant article found
3) https://bam.ac.uk	No relevant article found
4) http://euram-online.org	No relevant article found
5) http://ethos.bl.uk/home.do	<i>Managing innovation in IT-based, project-led organizations: a pharmaceutical case study</i> (Kofinas, 2008). This thesis focused on the project management and structures aspects of implementing IT for radical innovation in drug development. Restricted access thesis.
6) http://search.proquest.com/pqdtft	<i>The process of developing innovative capabilities in biotechnology: the case of UK firms</i> , (Simba, 2014). This thesis examined the development and benefits of biotechnology clusters in the UK, and its effects on improving innovation capabilities.

	<i>Enhancing pharmaceutical innovation through the use of knowledge management</i> , (T. W. Parsons, 2007). This thesis developed and evaluated the use of a Knowledge Management model in order to improve Innovation within R&D drug development.
7) http://www.dart-europe.eu/basic-search.php	<i>Innovation in the Pharmaceutical Industry: Evidence from Drug Introductions in the U.S.</i> (Pattikawa, 2007). This thesis focused on providing an in-depth view of the performance of pharmaceutical companies in the United States in terms of innovation. It also asked the question concerning the role of advertising in new product introduction, and what the economic drivers behind product extension were.
8) http://www.ndltd.org	<i>Determinants and Effects of Innovation: An Empirical Analysis</i> , (Gamba, 2015). This thesis focused on the impact of Intellectual Property Rights on Innovation in the Pharmaceutical sector. In addition, a correlation between innovation, export, productivity and financial constraint was presented at the firm level. Finally, the role of domestic innovation in attracting Foreign Direct Investments was estimated. Thesis currently under an embargo.

Table 3. Additional database searches for literature research

As can be evaluated from Table 2 and Table 3 a gap exists in the literature in terms of creative and innovation climates for the development and adaptation of IS systems within Pharma IS organizations. Golden-Biddle (2007) suggests that the contribution of this thesis falls within the category “problematizing the literature as incomplete”. That is, the proposition of this thesis is that the extant literature is not fully finished, and does not cover Pharmaceutical IS organization systems in terms of climate and innovation frameworks, see Figure 5.

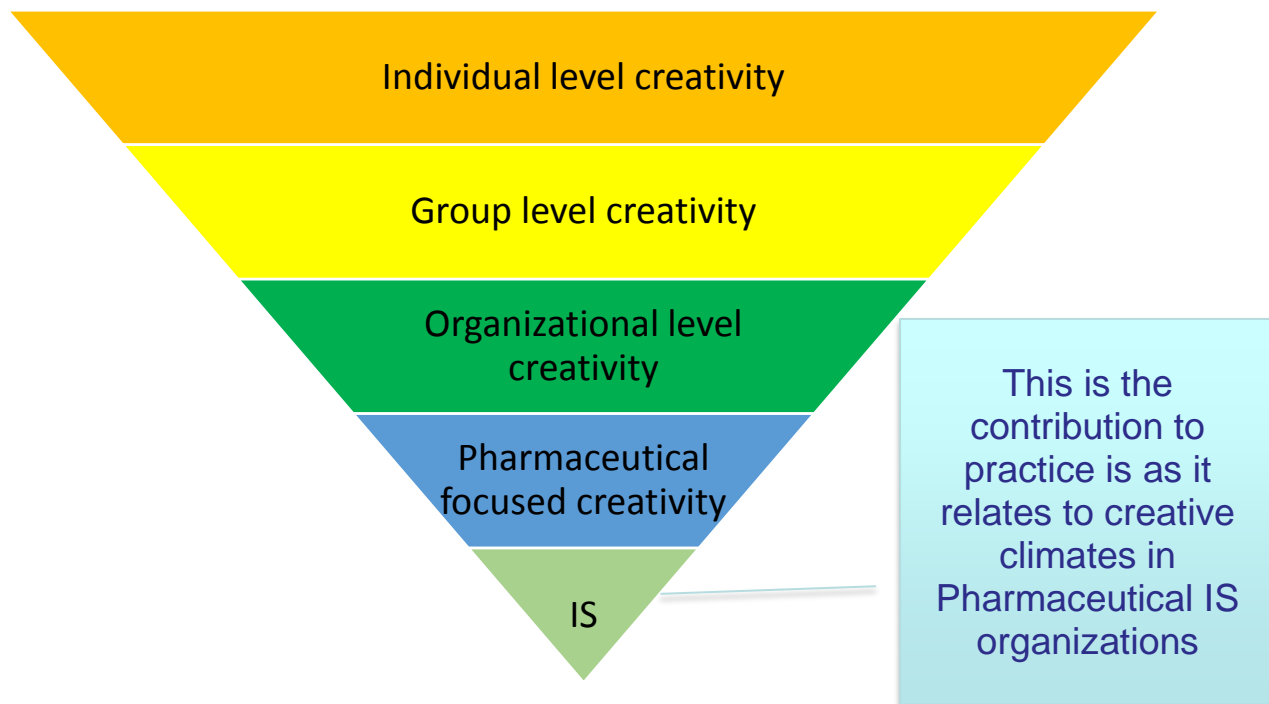


Figure 5. Contribution of thesis to the literature. Volume of previous studies.

1.1.1 Recommendations of authors for contribution of thesis

As to be discussed in the following sections, many theoretical frameworks exist in the literature concerning organizational climate (Mumford & Hunter, 2005), but as highlighted in the previous section, none were focused on the applicability in Pharma IS organizations. It is the recommendation of several theorists, to test the perspectives of theoretical frameworks onto subsystem climates to assess the degree of fit (T. M. Amabile, 1988; Ashforth, 1985; Hunter, 2016; Hunter et al., 2005; Schneider & Reichers, 1983).

As stated by Paulus, Dzindolet, and Kohn (2012), “The research on group creativity is mostly based on objective performance data, but often involves the use of college students in laboratory settings. Although there now is a wealth of data on team/group innovation and creativity, there remains much uncertainty in regard to our understanding of the actual innovative process in teams in organizations.” This perspective is supported by West and Sacramento (2012), who recommended that the impact of creative dimensions be examined across contexts.

A secondary contribution of this thesis therefore, can be considered as the testing of theoretical frameworks within a practical Pharma IS organization. This aligns with

what Golden-Biddle (2007) refers to as “Progressive Coherence” in terms of a contribution of the thesis.

A third contribution of this thesis is the investigation of impediments to creative climates as recommended by T. M. Amabile (1996) and West and Sacramento (2012). According to these authors, there is a focus in the literature for the enabling or positive aspects of creative climates, and a literature deficiency for inhibiting behaviours, beyond the simple inverse of enablers. This research examines both the enablers and inhibitors and presents respective thick qualitative descriptions.

1.2 Background of the Author

The primary author of the research has an 18-year background in the pharmaceutical and biotechnology industries. As a management consultant, he has worked for 7 of the top 20 global drug companies, with projects in the USA, Canada, UK, Ireland, Denmark, Sweden, France, Germany, Belgium, Spain, and Switzerland. His project exposure has covered most of the areas of the drug lifecycle from the clinical R&D phase up to pharmacovigilance. He has a BEng degree in Chemical Engineering with a specialization in Pharmaceuticals, as well as an MSc in Manufacturing Business Management.

In addition to his scientific background, the author also has training in music and jazz (partial degree completion). As a music composer, he has an interest in creative environments and has exposure to creative teams in the creative industries. His creative endeavours can be found at www.mgoomusic.com.

The mixed background of pharmaceutical and creative experience, serves as a backdrop to his interests in this research.

1.3 Industrial Sponsors

The Industrial Sponsor is a global top 5 research based Pharmaceutical and Biotechnology company. Their main offices are in Basel, Switzerland (Head Office) and employees over 90,000 people in 100 countries.

The sponsor key areas of therapeutic focus and portfolio covers:

- 1) Oncology
- 2) Neuroscience
- 3) Infectious diseases
- 4) Immunology
- 5) Cardiovascular and metabolism
- 6) Ophthalmology
- 7) Haematology
- 8) Hemophilia
- 9) Respiratory

At the time of writing the case study company has over 70 NME (New Molecule Entities) in clinical trials (pipeline), and generates over CHF 48bn in sales revenue, which represents an annual increase of 5% (2014 to 2015 figures). According to the case study company's mission statement, "Innovation is in the DNA of the company". Throughout its business, creativity, innovation, and knowledge creation is held within high esteem.

This research was sponsored by the IS organization for Pharmaceutical Development. The main areas covered were the Manufacturing and Pharmaceutical Development. A more granular description of the day to day activities and interests are covered in the Findings chapter.

1.4 Structure of the Thesis

In order to achieve the objectives this study is structured along the following six chapters captured in Table 4:

Chapter	Purpose
1) Introduction and area of concern.	Defines research area, practical industrial relevance, gaps in the literature, and contribution to knowledge
2) Purpose and Objectives	Statements on research questions and goals

3) Literature Research – Theoretical Model	Provides an overview of key extant literature with the aim of justifying the theoretical framework.
4) Literature Research – Meanings of Theoretical model in an organizational setting	Having presented the theoretical framework for creative and innovative climates, this section discusses the literature perspectives of the meanings of the presented category concepts.
5) Research Design	Develops research design and methodology.
6) Findings	Provides a granular mapping of the field data to the extant literature theoretical framework. Framework extensions, gaps and contributions are presented.
7) Discussion and Conclusions	Provides analysis and discussion on limitations of research and contribution to practice as well as recommendations for further research.

Table 4. Structure of thesis.

1.5 Summary of chapter

Due to a cascade of reasons (presented in this chapter), the drug industry has found itself in what is referred to as ‘the patent cliff’. Many of the proprietary products that have fuelled growth and profits are coming off patent without sufficient replacements. It is estimated that approximately \$210bn (US) will be lost in revenue from 2015 to 2020 due to this reason and this shift is transforming the industry as it struggles to adjust. Innovation is considered a key strategy in mitigating risks due to these changes. The drug industry is a mature industry, and it is estimated that all of the ‘easy wins’ have already been pursued. Core to profitability going forward are the ‘difficult to get to targets’ which requires innovative approaches and developments.

In this chapter, the drug life cycle Phases I, II, III, and IV were briefly explained which serves as a backdrop to understand the potential opportunities for improvements via innovation. Small increments in productivity and reduction of attrition rates potentially can have a large impact on the cost and time of developing and bringing a drug to the market. The current average cost of bringing a drug to market is estimated to be \$1.3bn.

The roles of innovative technology and IS stakeholders were discussed as enablers for drug lifecycle innovation. An example of re-fitting tablet technology from the Medical Affairs department to the Manufacturing department via the IS function facilitation was presented so that the reader can appreciate the role of IS in adapting technology for innovation. A map of current innovative technologies to an overview of potential opportunities for business improvement in the drug lifecycle was presented, arguing for the role of technology.

Having identified innovative technology as an enabler for innovation in the drug life cycle, a literature gap of creative and innovative organizational climates focused on IS stakeholders within a Pharmaceutical and Biotechnological context was identified. The overarching question of the thesis which aims to address the gaps in the literature was presented as: How can organizational creative climates be better understood with within a Pharmaceutical IS organization stakeholders with the aim of improving innovation in the adaptation of technology for better drug product delivery? The literature was classed as “incomplete”. Recommendations from several theorists also suggests that climates differ from function to function and from industry to industry, therefore theoretical models should be tested in real settings. Recommendations from the literature also estimates that small improvements in the creative and innovative climates in organizations can have significant impacts on innovation. This corresponds to “progressive coherence” in terms of this thesis contribution to the literature. The testing of a theoretical framework within a Pharmaceutical IS was also identified as a contribution of this thesis.

Finally, the backgrounds of the case study corporation and author were introduced, and the remaining structure of the thesis was presented.

Chapter 2: Purpose and Objectives

2.0 Introduction

The goal of this chapter is to explain the granular aims and objectives of the research. The objectives are broken down into items which then map into outcomes and deliverables.

2.1 The Research Aims

The aim of the thesis is to contribute to the research and knowledge concerned with building innovative and creative climates within Pharmaceutical IS organizations in order to improve various aspects of the drug life-cycle and ultimately patient care. The author believes that the knowledge can be leveraged by other organizations within the same business niche similar to the point of view of Dennis A. Gioia, Corley, and Hamilton (2013).

The main aim of the research is to:

- *Source, extend, and enrich a creative climate taxonomy to enhance IS Innovation in a drug company case study setting.*

The innovation climate taxonomy template is intended to be used at an IS department in a global drug company, to improve the development and deployment of technology with the overarching aim of improving patient care.

2.2 Objectives

The following objectives paint a picture of the aims and eventual outcome of the research. Each objective has aims and deliverables that coalesce to the overall research question and contribution.

2.2.1 **Objective 1:** Identify general views regarding innovation, creative climates, and knowledge creation with the aim of producing a theoretical framework and typology.

The objective was met out by:

- Conducting a detailed literature review.

2.2.2 **Objective 2:** To explore Innovation Climate enablers and inhibitors within a Pharmaceutical IS case study:

- What participants perceive to be enablers;
- What participants perceive to be inhibitors;
- What participants say are actual enablers;
- What participants say are actual inhibitors.

These overarching categorizations leveraged similar questions in an exploratory study by T. M. Amabile (1988) on creative climates, who produced two broad categories: 'Qualities of the environments that promote creativity', and 'Quality of environments that inhibit creativity'.

This objective was met by:

- Conducting detailed qualitative interviews across a representative cross section of an IS organization in a leading Pharmaceutical company. Semi-structured interviews adopting the dramaturgical model were used.

2.2.3 **Objective 3:** Map the case study's enablers and inhibitors of the Innovation Climate to extant literature and typologies and identify new concepts unique to this environment.

Test the extant typology in a real working environment.

The objective was met by:

- Producing a detailed Template Analysis of the case study data with thick qualitative descriptions and comparing back to the theoretical model.

2.2.4 **Objective 4:** Produce Rich Pictures of key dominant relationships (systems thinking) as discussed by the case study participants. Make recommendations for mechanisms to enable derived creative climate typology. This objective was met by:

- Generating models in NVivo around key dominant case study derived nodes, and presenting these as rich cause and effect pictures as suggested by (Armson, 2011)
- Identifying concepts that cut across the derived typology, which can act as transformative mechanisms.

Chapter 3: Literature Review

3.0 Introduction and approach to literature review

The goal of this chapter is to introduce the concepts of creativity and innovation in more granular and progressive detail, and to present and analyze the empirical evidence of these concepts to organizational competitiveness. The components of organizational innovation are then discussed, and the various conceptual models that exist in the literature are examined. This chapter is concluded by presenting a theoretical framework that supports creative climate attributes. Limitations, validity, and a meta-analysis of this theoretical framework are discussed. Part 2 of the literature review (Chapter 4) seeks to expand the theoretical framework with literature review identified day to day expressions of the attributes. This enhanced theoretical framework, is then used to compare the case study data (Chapter 6, and 7). This flow is described in Figure 7.

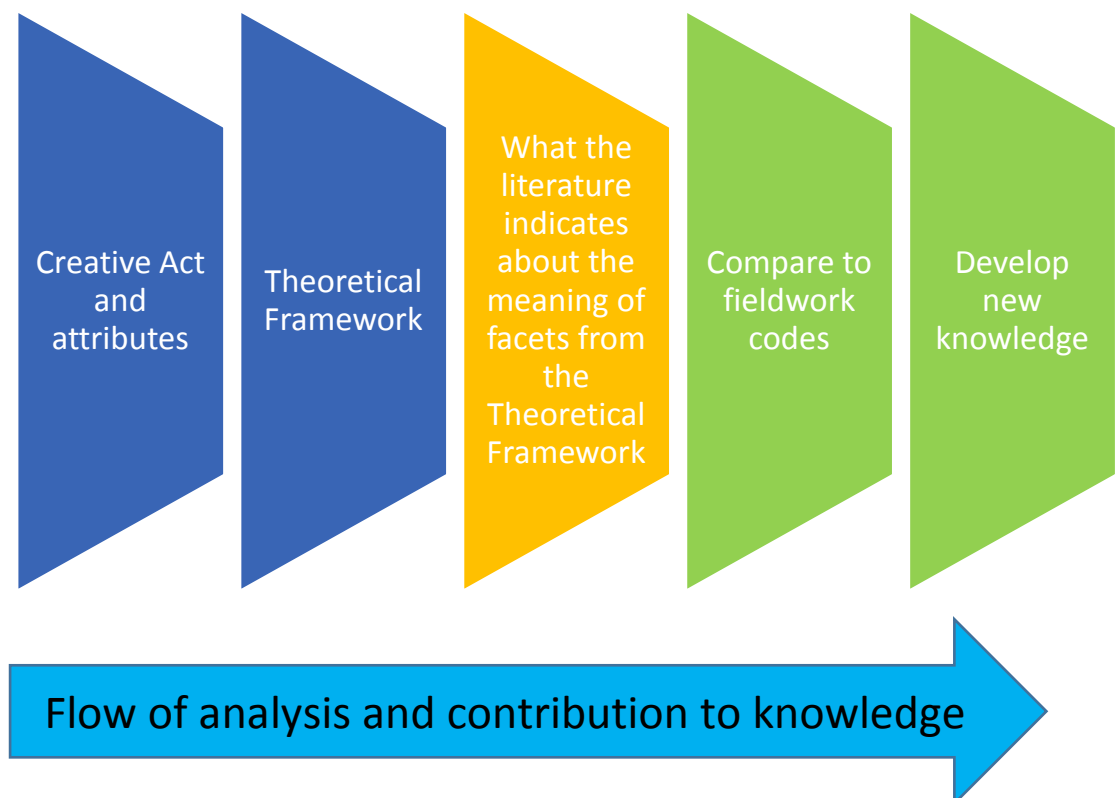


Figure 7. Flow and analysis of contribution to knowledge.

3.1 Definitions of innovation and creativity

Before a journey of a theoretical framework can be embarked upon on which to base the findings of the study, it is first pertinent to define creativity and innovation and evaluate the various definitions of creativity and innovation. This will then be used to view theoretical frameworks, and importantly, align and make sense of the case study data.

3.1.1 Creativity

According to T. M. Amabile (1988), there is historical diversity in the literature regarding the semantic interpretation of the term “creativity”. For example, Findlay and Lumsden (1988) focus on creativity from an individual persona’s point of view, and defined creativity as, “the constellation of personality and intellectual traits shown by individuals who, when given a measure of free rein, spend significant amounts of time engaged in the process of generating ideas.” However others, such as T. M. Amabile (1997) go beyond the individual persona focus and define creativity, as the “generation of new ideas, that arise as a function of an interaction between the person and the situation.” Others, such as Rogers (1954) expand further, and specify outputs in their definition. These authors define creativity as, “the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, peoples, or circumstances of his (or her) life on the other.” Table 5 highlights a selection of definitions from various literature authors over a period of time demonstrating the spectrum in the interpretation of creativity.

Reference	Definition
(Stein, 1974)	“Novelty that is useful.”
(West, 2002a)	“Creativity is the development of new ideas that are useful.”
(T. M. Amabile, 1988)	“Creativity is the production of novel and useful ideas by an individual or small group of individuals working together.”
(Paulus et al., 2012)	“Creativity is the generation or production of novel products or ideas.”

(Woodman, Sawyer, & Griffin, 1993)	"Creativity is a novel product that attains some level of social recognition." (Sawyer, 2006)
(Drabkin, 1996)	"Creativity is that mental process by which a man combines and recombines his experience, possibly with some distortion, in such a way that he arrives at new patterns, new configurations, and arrangements that better solve some need of mankind."
(Rogers, 1954)	"The emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, peoples, or circumstances of his (or her) life on the other."
(Mumford & Gustafson, 1988)	"Creativity is defined as the production of novel and useful ideas."
(Boden, 2004)	"Creativity is defined as something new and useful."
(Bilton & Cummings, 2007)	"Creativity is defined as the duality between something new and of something of value."
(K. James & Drown, 2012)	"Creativity is defined as the generation of something that is both novel and useful toward accomplishing desired goals."
(Gilson & Shalley, 2004)	"Creativity is defined as the production of ideas concerning products, practices, services, that are (a) novel or original and (b) potentially useful to the organization."
(George, 2007)	"Creativity is typically defined as the generation or production of ideas that is both novel and useful. Creativity is typically seen as a precursor to innovation."
(Mumford & Gustafson, 1988)	"Creative ideas can range from suggestions for small incremental refinements in procedures or processes, to radical major breakthroughs in the development of new products or policies."
(Hargadon & Bechky, 2006)	"Creativity emerges when new and different sets of information are reshuffled or recombined."

Table 5. Select literature samples of the definition of creativity

In providing a historical summary of creativity research, Mumford (2003) suggests that most theorists have gravitated to a definition of creativity similar to the definition of Stein (1974) as, "novelty that is useful". This conceptual duality, of being novel and useful is vital, since according to Levitt (2002), separating these two layers of creativity can be destructive, and can lead to people creating for creativity sake without adding value, or creators being treated as something mythical and abstract, and separate from the rest of the value chain.

This simple duality definition of creativity however, has several layers of additional complexity. In the first instance, Boden (2004) argues that there are types and intensities of novelty. Boden (2004) suggests not asking the question, “Is it creative?” but “how creative is it?”

Boden (2004) suggests there are three broad progressive levels for creative novelty, that corresponds to a sentiment of “creative surprise”:

- 1) The “Why didn’t I think of that?” creative surprise level. Boden (2004) argues this first level of novelty is produced by unfamiliar combinations of familiar ideas, and can be either deliberate or happening subconsciously. This is analogous to shaking different coloured marbles in a bag, where the result can be that some varying colour combinations present some value.
- 2) The “Exploring conceptual spaces”. According to Boden (2004), this second type of novelty is produced when there are unfamiliar combinations of familiar ideas while exploring a conceptual space. It produces a more intense level of creative surprise. An example of this can be jazz music improvisation. Some conceptual spaces or thinking styles are vast, while others are limited. An analogy can be getting lost on a road trip and using a paper map to navigate back on track but purposely discovering a new village that was always there and possible.
- 3) “The impossible idea” or transforming the space. Boden (2004) argues that this type of novelty occurs when someone has come up with an impossible idea by redefining the rules, maps, and essentially changing the thinking style within a particular area. This type of idea generation would not have existed within the previous thinking styles identified. It is the hardest area of achievement, and produces the most potent surprise level.

In a similar approach to Boden (2004), in regards to articulating the nuances of creativity, Sternberg (2006) suggests that creativity by its nature is a propulsion of where the creator believes a field should go. He presents a ‘propulsion’ theory of creativity, which maps to the three types of creative intensity suggested by Boden (2004) but presents eight additional subtypes. These are demonstrated in Figure 8.

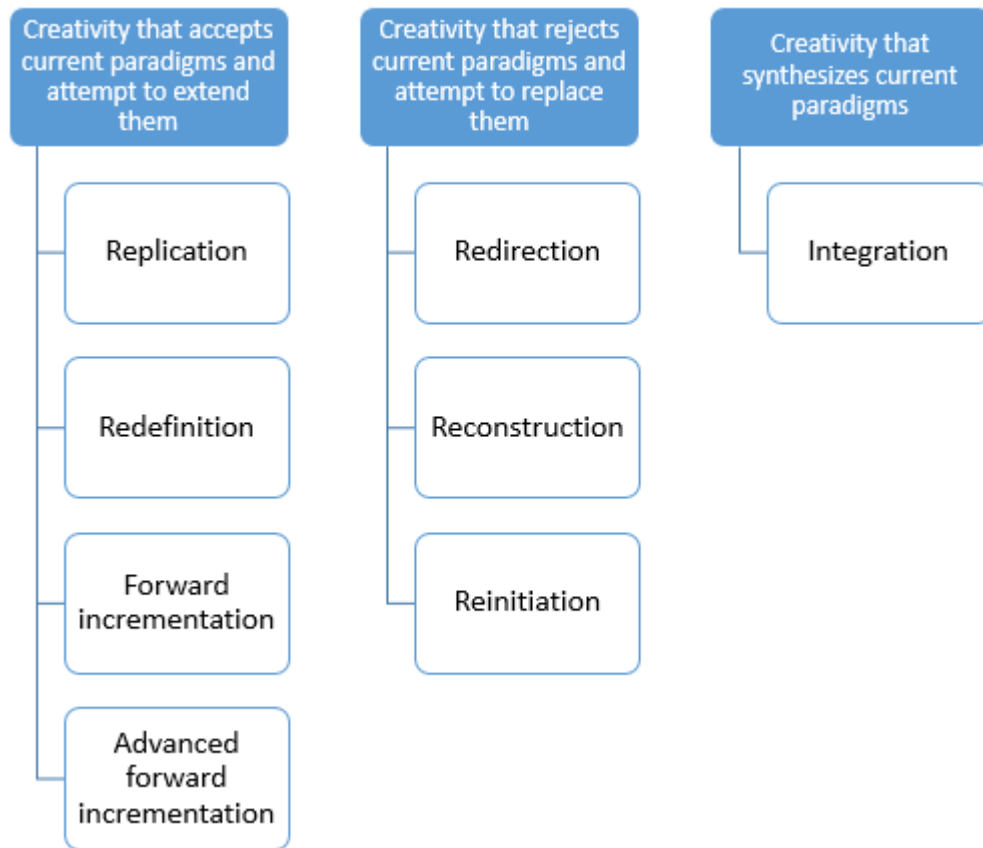


Figure 8. Sternberg (2006) Propulsion model of creativity

Explanation of terms:

1. Replication. This happens when the contribution of the creator(s) seeks to keep the field in the same place. Sternberg (2006) characterizes this as “a wheel that is moving but staying in the same place”.
2. Redefinition. This is an attempt by the creator to redefine the field where it is. Sternberg (2006) characterized this propulsion as “a circular motion that leads back to where the field is, but the field is viewed in a different way.”
3. Forward incrementation. This is an attempt by the creator to move the field in the direction of travel that it is already going.
4. Advance forward incrementation. This is an attempt by the creator to move the field in the direction of travel that it is already going, however, where others are not ready for it to be.

5. Redirection. This is an attempt of the creator to move the field from its current direction of travel. Sternberg (2006) describes it as “the propulsion leads to motion in a direction that diverges from the way the field is currently moving”.
6. Reconstruction. This is an attempt of the creator to move the field to a previous state, and then redirect the field to a different line of travel.
7. Reinitiation. This is an attempt of the creator to move the starting point of the field to a different context or point to where it is now, and then use that new position as a new starting point.
8. Integration. There is an attempt of the creator, to integrate two former distinct paths or ways of thinking into a single way of thinking.

These various types of creativity produce different types and intensities of novelty outputs according to (Sternberg, 2006)

An additional level of complexity in the definition, “something novel and of value” (Stein, 1974), is the perception of value, which depends on social context and time Bilton and Cummings (2007). An example can be found in Edmund Becquerel, a French physicist, who created the first solar power cell in 1839 (Maehlum, 2012). It was a creation that was not valuable in his lifetime but would later find value in space travel, and forms of alternative energy exploits in the 21st century.

3.1.2 Innovation

In a similar manner to the concept of creativity, there is variation in the literature regarding the interpretation of innovation (West & Altink, 1996). According to Lin, Ho, and Lu (2014) theorists define innovation either in terms of products (Crawford, 1980; Dougherty & Bowman, 1995), or in terms of a thinking process (Kanter, 1988). Table 6 highlights various literature definitions of innovation demonstrating the challenge in the variations constructs of the concept.

Reference	Definition
(Drucker, 1985)	“Innovation is the purposeful and organized search for changes.”
(Zaltman, 1973)	“Any idea, practice, or material artifact perceived to be new by relevant unit of adoption.”
(I. Nonaka, 1994)	“Innovation is a process in which an organization creates and defines problems and then actively develops new knowledge to solve them.”
(Sarros, Cooper, & Santora, 2008)	“Organizational innovation refers to the introduction of any new product, process, or system into an organization.”
(Paulus et al., 2012)	“Innovation is the actual implementation of an idea.”
(Hameed, Counsell, & Swift, 2012)	“An innovation can be thought as an idea, a product, a program or a technology that is new to the adopting unit.”
(Scott & Bruce, 1994)	“Innovation is the production or adoption of useful ideas and idea implementation.”
(Gülsoy, 2013)	“Organizational Innovation as a process of profitably creating innovation within an organizational setting.”
(T. M. Amabile, 1988)	“Organizational innovation is the successful implementation of creative ideas within an organization. With this definition, the ideas in question can be anything from ideas for new products, processes, services, procedures, policies, etc.”
(OECD/Eurostat, 2005)	“An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in-business practices, workplace organization or external relations.”

Table 6. Select literature samples of the definition of innovation.

The Webster Dictionary, simply defines innovation as “the (successful) introduction of something new” and similarly Göran Ekvall (1997) defines it as, “a creative idea that has been brought to application”, or simply “something useful that works”. It is argued for the purpose of this research that the definition by Göran Ekvall (1997) is adopted, since it presents the concept at an appropriate level that incorporates more granular aspects of innovation. These granular aspects of innovation will now be discussed.

From an organizational perspective, OECD/Eurostat (2005) defines four innovation derivatives and outputs from the definition of “something new that works”:

1. Product innovations. *“The introduction of a good or service that is new or significantly improved with respect to its characteristics or intended use. This includes improvements in technical specifications, components, and materials, incorporated software, user friendliness, or other functional characteristics.”*
2. Process innovations. *“The implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment, and or software.”*
3. Marketing innovations. *“The implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.”*
4. Organizational innovations. *“The implementation of a new organizational method in the firm’s business practices or external relations.”*

Within the context of the case study, it is argued that the outputs of innovation that is of concern mainly includes both process innovation and organizational innovations given the role of IS stakeholders for improving the drug lifecycle as discussed in Chapter 1. Organizational innovation is a supporting factor to Process Innovation (OECD/Eurostat, 2005). The output of IS stakeholders within a pharmaceutical context is seldom or never an actual commercial product (IT). The definition of innovation used for this case study can be summarized by ‘something useful that works for a particular process (including the use of technology) or organizational improvement’.

Having presented the definition of innovation, discussed the various outputs of innovation within an organization, the final pertinent discussion on the conceptualization of innovation is the degree of innovativeness. Innovation is essentially concerned with change brought to fruition by some creative idea or artifact. Similar to the degree of creativity, Schumpeter (1934) discusses two types of innovation, that corresponds to the degree of change that a particular innovation brings:

1. 'Radical', which is sometimes referred to as 'Disruptive innovation', are types of innovation which brings about major disruptive change, and
2. 'Incremental' innovation are types of innovation that are smaller in nature and that can continuously advance the process of change.

It is argued that within a pharmaceutical IS context it is incremental innovation that is of focus, due to the environment being highly regulated. This is seen as an impediment to innovation and disruptive innovation (A.-M. Lilleoere & Hansen, 2011).

3.1.3 Relationship between creativity and innovation

In the last section, creativity was presented as something new and of value, and innovation was presented as something new that works. Although, with both theorists and practice stakeholders, these terms are used interchangeably (Scott & Bruce, 1994; West & Sacramento, 2012), there is a dependency and distinction which will now be discussed.

Creativity, according to T. M. Amabile (1997) is the first step of innovation, since at the core of innovation lies, 'something new and of value'. George (2007) describes creativity as the precursor of innovation. Mumford (2003) states innovation as "late-stage creativity", i.e. creativity involved in making an idea work, or taking it to a value stage. Mumford (2003) argues that implementing a creative idea, that is innovation, itself loops back into creativity, since the implementation process generates practical problems which require additional novel solutions as an idea is shaped into a viable innovation.

From the above discussion, it is argued that the relationship between innovation, or an innovation is that innovation is the successful implementation of a creative idea or artifact.

3.2 Significance of creativity and organizational innovation to business practice

In the previous sections the concepts of creativity and innovation were discussed. In this section, the significance and relevance of creativity and innovation to business value is discussed. It is argued that unless a creative idea or artifact is implemented, that is, it becomes an innovation, then there is little value to the organization.

According to OECD/Eurostat (2005), the ultimate reason that organizations innovate is to improve their performance. This may be via new products, costs reductions, etc. It is a common assumption that innovation is reserved to the R&D section of a company. However innovation is applicable to many activities across the value chain. In-fact, according to OECD/Eurostat (2005), 'spillover' is the concept where innovation improves an organization's ability to innovate from one area to another. For example, improving the capabilities of production may result in developing a new line of products, or new organizational practices may improve an organization's ability to gain and create new knowledge that can be used to generate new knowledge.

The extant literature is rich with scholarly affirmations, both theoretical and findings based, on the positive impact of creativity and innovation on business performance, both at an organizational level and at a national level. For example, West and Sacramento (2012) states, "Creativity is heralded as key for organizational survival and success. As global economic models become the norm and competitiveness assumes a further international character, leaders realize that, to prosper in highly challenging environments, companies must innovate. The source of organizational innovation is unquestionably the ideas generated by individuals and teams."

These perspectives are shared by many authors in the literature. Accordingly, Table 7 provides a snapshot of some of the literature views on the significance of organizational innovation within today's business objectives by various authors.

Reference	Quote
(Sarros et al., 2008)	“Research has called for organizations to be more flexible, adaptive, entrepreneurial, and innovative to effectively meet the changing demands of today’s environment”.
(Paulus et al., 2012)	“Today in the US and many other countries, governments, scientific agencies, university programs, and organizations are anxious to promote the development of innovation and creativity, since it is presumed that this will be an important basis for economic development and for solving environmental and social problems.”
(Lin et al., 2014)	“Joseph Alois Schumpeter, the famous economist in the 20th century, proposed the Innovation Theory, indicating that innovation is the core of economic development and entrepreneurs as the driving force of innovation. Since the 1990s, the global economy has turned to knowledge-based economic systems where both knowledge and innovation are the key characteristics in the new economic era.”
(Horrobin, 2000)	“The present and future health of populations depends on pharmaceutical innovations.”
(West & Anderson, 1996)	“To maintain or enhance effectiveness within rapidly changing and challenging environments, organizations must adapt appropriately, and innovation is the process through which this is often achieved.”
(Razavi, 2013)	“The essential nature of the present-day world underlies a very fast and competitive society where the ability to dictate changes and transformation adds the utmost value. A competitive advantage in managing innovation and creativity is the key to this ability. Hence, leading organizations particularly efficient managers are giving top priority to develop ways and mechanism for greater organizational innovation and creativity.”
(T. M. Amabile, 1988)	“Domestic and international competition, changing government regulations, and rapidly shifting market conditions demand constant and visionary innovation.”
(Dess & Picken, 2000)	“Innovation, flexibility, responsiveness, and the creative redefinition of markets and opportunities have become the new sources of competitive advantage in an increasingly interconnected global economy.”
(Mumford, Scott, Gaddis, & Strange, 2002)	“Global competition, new production techniques, and rapid technological change have placed a premium on creativity and innovation.”

(Mumford, Hester, & Robledo, 2012)	“Creativity and innovation are critical to the growth and performance of organizations—business, government, and non-profit organizations.”
(Mumford & Hunter, 2005)	“Innovation may be one of the most powerful influences on organizational performance.”

Table 7. Selected literature views on the relevance of innovation on competitiveness.

In a study of 721 firms in the UK, Geroski, Machin, and Vanreenen (1993) discovered that the rate of innovation was related to profitability, with innovation having both direct and indirect effects on a firm's performance. The authors postulated that innovation not only improved the output (direct effects) of an organization, but also its internal capabilities (indirect effects), providing empirical evidence of spilling as presented previously. Other authors also suggest indirect benefits to organizational innovation to include; leveraging new technologies (Cohen & Levinthal, 1990), coping with environmental change (Tushman, 1997), and obtaining stronger vision positioning and strategies (Dean & Sharfman, 1996).

In addition to the scholarly views covered in Table 7 that creativity and innovation make a difference to business performance, it is argued that this aligns to the world of practice. According to Mitchel (2016), results from a survey of 1000 global CEOs, placed building an innovation culture as a top priority for many CEOs in 2016 and 2017.

3.3 The Creative act

In moving towards a framework for organizational creativity and innovation enabled by a climate system, it is first important to understand creativity in its fermenting stages to build out a picture for its enablement. Ultimately it is people, or individuals who generate new ideas and develop these ideas into something useful (Mumford & Hunter, 2005). The ‘creative act’ is a multidimensional construct which Mumford (2003) suggests is composed of four major topline factors: (a) creative thought, (b) motivation, affect, and dispositions, (c) development, and (d) creative climates. These factors are now examined in more detail.

3.3.1 Creative thought

Creative thought itself is a multidimensional concept which several authors in the literature suggests consists of: information search, knowledge, problem finding, conceptual combination, and idea generation.

The discussion begins with Ward (1999), who suggests that creative thought comprises two key cognitive capabilities: conceptual combination, and idea generation. Within this theoretical framework, new concepts, or new understandings, emerging from conceptual combinations provide a basis for the subsequent generation of new ideas. According to Mumford (2003) conceptual combinations sparks divergent thinking, which then translates into idea generation.

In order to combine concepts, it is argued that the mind must be aware of concepts in the first place and the contexts in which they exist. (Ericsson & Charness, 1994); Weisberg (1999) suggests that knowledge is the baseline that provides the needed rich mental structures in which to combine. Put more eloquently (Newell, 1972) states, "Knowledge provides the creator with a network of mental wanderings."

Knowledge itself, however, is a construct with several layers. According to Mumford and Hunter (2005), knowledge involves two critical attributes: (1) information, and (2) a framework for interpreting, organizing, gathering, and acting on that information. This framework that is used in interpreting, organizing, gathering, and acting on information, falls under the rubric of experience. Chi, Bassok, Lewis, Reimann, and Glaser (1989) states, "Experience provides people with cognitive structures, more extensive and better organized knowledge bases, and relevant experimental cases that allow them to work effectively with available information in solving the kind of complex, ill-defined, novel problems that call for creative thought." As a subset to general knowledge and life experience, domain relevant skills and expertise constitute an individual's raw materials for creative thought (T. M. Amabile, 1988). T. M. Amabile (1988) states, "Certainly it is impossible to be creative in planning financial strategy unless one knows something (and probably a great deal) about the stock market, money markets, and current economic trends. In addition to basic knowledge the component includes technical skills or domain relevant talents such as an engineers'

ability to sketch designs, etc. It is formal and informal education in the domain of endeavour.”

There is support from empirical evidence for the above postulation for creative thought and the importance of knowledge, and specifically domain knowledge. In a study of 74 R&D teams, covering 938 professionals, Thamhain (2003) correlated individual expertise, and managers appraisals of innovation covering new product fielding, patents, etc., and found a strong correlation. In a similar study, Dewar and Dutton (1986) evaluated technical specialists expertise in 40 organizations and correlated with radical and incremental innovative output and also found a strong correlation.

As a complement to the notion of knowledge and expertise (Boden, 2004) indicates that the creator must possess an ability to search, retrieve and encode information when dealing with complex domains and subject matter. The suggestion is that individuals are not able to have all the requisite knowledge for organizational level innovation, and the ability to search and process is key to creative thought. A more detailed discussion on organizational knowledge creation and management is discussed in more detail in a later section.

In addition to the above constructs, Jay (1997) suggests that problem finding, and the articulation of problems, provides a locus for creative thought integrating cognition, conceptual combinations, attention, motives, and dispositional characteristics. This argument is supported by A.-M. Lilleoere and Hansen (2011) who in an ethnographical study within a Pharmaceutical case study environment, noted that knowledge sharing and creative thought ascended into high gear, when there was some organizational problem articulated metaphorically as a ‘catastrophe’, ‘explosion’, or ‘surprised event’. In a more general sense Todd I. Lubart (2001), defines the term ‘problem’ as any task that an individual or team of individuals seeks to accomplish. Therefore, an artist who seeks to express his or her feelings, scientists who seek to understand complex phenomenon, and people who seek to solve conflict are all considered to be problem solving and finding.

Finally, Boden (2004) argues there are two types of creativity emanating from creative thought: *P* creativity, and *H* creativity. *P* creativity occurs when creativity happens and

it is perceived to be creative to the individual, whereas *H* creativity occurs when creativity happens and is it both creative to the individual and also from a historical context, i.e. someone can make a global claim, “this has not been done before”. *H* creativity is an evidently certain type of *P* creativity. This is relevant from the perspective of this research and case study, since the scope that is of concern is *P* creativity, and the mechanism to generate this type of creativity is unique to the organization. Innovations that are unique to the organization and firm is of interests, and may exist already in another firm but finds its way through the process of diffusion (OECD/Eurostat, 2005).

In summary, for effective idea generation and conceptual combinations, the literature suggests among other factors: problem finding, experience, information, knowledge, domain experience, and an ability to search and encode relevant information.

3.3.2 Motivation

According to T. M. Amabile (1988) the motivation of problem solvers accounts for a great deal of the difference between successful and unsuccessful attempts at creativity. T. M. Amabile (1988) frames the value of motivation as the difference between what someone can do and what someone will do, and this to some extent can make up a deficiency in other domain relevant skills, or creativity relevant skills.

Motivation is a construct that T. M. Amabile (1988) divides into two forms: intrinsic, and extrinsic. Intrinsic motivation covers concepts such as being excited by the work itself, enthusiasm, being attracted by the challenge of the problem, and a sense of working on something significant. Extrinsic motivation covers items such as being motivated primarily by money, recognition, goals, etc., factors external to the work and task itself. Mumford (2003) suggests that extrinsic and intrinsic motivations may be serving different functions, in which extrinsic motivation may influence the choice of the field, type of task, and implementation strategy, and intrinsic motivation may influence the task itself. Collins (1999) argues that both intrinsic and extrinsic motivation operates synergistically.

The literature provides some discussion and caution on the efficacy of extrinsic motivation to creativity. De Vet and De Dreu (2007) produced some research that suggests external goals such as rewards can have a negative effect on creativity. The argument for this view is that some aspects of extrinsic motivation such as performance evaluation and reward expectancy, can have a negative effect on autonomy, divergent thinking and intrinsic motivation, which are key components to creativity (Edward L. Deci, Koestner, & Ryan, 1999). However, research also suggests that it is the manner in which extrinsic motivation is positioned that determines the positive or negative influence on creativity (Edward L. Deci et al., 1999; G. R. Oldham, 2002; G. R. Oldham & Cummings, 1996). G. R. Oldham (2002) suggests that when extrinsic motivation is presented in a supportive manner that connects the individual and / or team to deeper engagement with the task the effect on creativity is positive. M. Baer and Frese (2003) provides evidence that when extrinsic motivation factors are connected positively with other dimensions such as challenge, and stimulation, the creative output has a positive effect.

Any theoretical framework for organizational creative climate should possess the ability to activate, build and leverage motivation, both intrinsic and extrinsic.

3.3.3 Disposition

Connected to motivation, is the concept of disposition of the individual. T. M. Amabile (1988) suggested based on empirical findings of 161 qualitative interviews covering 22 companies in a range of industries, 10 individual dispositional qualities that promote creativity, and 5 individual qualities that inhibit creativity. The dataset covered a diverse set of participants, scientists, bankers, and railroad employees. This list of qualities is summarized in Table 8 and Table 9.

Quality	Description
1) Creative Personality Traits	Qualities included in the individual including persistence, curiosity, energy, intellectual honesty. N.B. These qualities are expanded further in Table 12.
2) Self-motivation (intrinsic motivation)	Being self driven, excited by the work itself, attracted to the challenge of the problem, having a sense of working on something important, commitment to the

	idea. The difference between what one can do and what one will do.
3) Cognitive Abilities	Tactics for creative thinking. Problem-solving abilities. Cognitive style for an application of heuristics for the exploration of new pathways. Knowledge of methods to generating novel ideas, for example, “let’s try that”, or “when all else fails, try something counterintuitive.” (Newell, 1972)
4) Risk-Orientation	Attraction to challenge. Orientated towards risk taking and doing things differently.
5) Expertise in the Area	Talent, experience, and acquired knowledge in the particular field. Knowledge of a set of pathways for solving a particular problem or as Newell (1972) states, “network of possible wanderings.”
6) Diverse Experience	Broad general knowledge and experiences in a wide range of domains.
7) Social skills	Good social actor, good rapport with others, being a good listener or team player. Being open-minded.
8) Brilliance	A high level of intellect.
9) Naivete	Not be biased by preconceptions or bound by the old way of doing things.

Table 8. Individual qualities that promote creativity (T. M. Amabile, 1988).

Quality	Description
1) Unmotivated	Lack of motivation for the work. Not feeling challenged by the problem. Having a pessimistic attitude towards the likely outcome. Complacent, lazy.
2) Unskilled	Lack of ability or experience in the field.
3) Inflexibility	Being set in one’s ways
4) Externally motivated	Being motivated primarily by money, recognition, or other factors rather than the work itself. Responding primarily to restrictions and goals set by others. Being competitive and jealous of others' success.
5) Socially unskilled	Lack of social skills. Can’t work with others or gather intelligence.

Table 9. Individual qualities that inhibit creativity (T. M. Amabile, 1988).

Mumford and Hunter (2005) share a similar approach to describing of individual level disposition for creativity. According to these authors, the literature and studies for individual level creativity can be summarized into four key variables. These are summarized in Table 10 and compared to T. M. Amabile (1988) as presented above.

Individual level creativity according to Mumford and Hunter (2005)	Mapped to individual level creativity according to T. M. Amabile (1988)
1) Knowledge	<ul style="list-style-type: none"> • Expertise in the area • Diverse experience • Brilliance
2) Creative processing activities	<ul style="list-style-type: none"> • Cognitive abilities • Social skills
3) Dispositional characteristics	<ul style="list-style-type: none"> • Creative personality traits • Risk orientation • Naivete
4) Motivation	<ul style="list-style-type: none"> • Intrinsic motivation

Table 10. Individual level creativity characteristics (Mumford & Hunter, 2005)

One’s disposition, as conceptualized above, is a key facet of the creative act, as T. M. Amabile (1988) suggests that individuals will not produce creative work if disposition attributes are lacking, even though the pre-requisite domain relevant skills may be strong. T. M. Amabile (1988) describes disposition as the ‘something extra’ in creative performance.

Expanding on T. M. Amabile (1988)’s personality traits presented in Table 8 (a subset of one’s disposition attributes), the literature presents a robust set of individual traits based on in-depth research developed over several decades that support creative behavior. Table 11 provides a summary and scope of the studies done covering various age groups and disciplines.

Discipline	Reference	Key target group
Art	(Trowbridge & Charles, 1966)	Creative pre-school and elementary school children
Art	(Schaefer & Anastasi, 1968)	Creativity in adolescent boys

Art	(Holland, 1968)	High school students
Art	(Rossman & Horn, 1972)	Students in art schools (university level)
Art	(Cross, Cattell, & Butcher, 1967)	Professional artists
Architects	(Karlins, Schuerho.C, & Kaplan, 1969)	Student Architects
Architects	(Gough, 1979)	Professional Architects
Film	(Domino, 1974)	Professional Cinematographers
Literature	(Milgram, Yitzhak, & Milgram, 1977)	School Children
Literature	(Schaefer & Anastasi, 1968)	High School Students
Literature	(Bachtold & Werner, 1973)	Professional Writers
Music	(Khatena, 1971)	Creative Musicians
Technology	(Schaefer & Anastasi, 1968)	High School students
Technology	(Rossman & Horn, 1972)	University level students
Technology	(Chambers, 1964)	Professional psychologists
Technology	(Bergum, 1975)	Professional inventors
Technology	(Gough, 1979)	Mathematicians
Technology	(Chambers, 1964)	Chemists
Technology	(Owens, 1969)	Engineers and Research Scientists

Table 11. Creativity and personality traits (sample), (Barron & Harrington, 1981)

According to Barron and Harrington (1981), this wide net of research, covering Art to Technology and school children to professionals, has resulted in a saturated set of personality characteristics presented in Table 12.

Active	Alert	Ambitious
Argumentative	Artistic	Assertive
Capable	Clear thinking	Clever
Complicated (attraction to complexity)	Confident	Curious

Cynical	Demanding	Egotistical
Energetic	Enthusiastic	Hurried
Idealistic	Imaginative	Impulsive
Independent (autonomous)	Individualistic	Ingenious
Insightful	Intelligent	Interest-wide
Inventive	Original	Practical
Quick	Rebellious	Reflective
Resourceful	Self-Confident	Sensitive
Sharp Witted	Spontaneous	Unconventional
Versatile	Not conventional	Not inhibited
Experience		

Table 12. Composite Creative Personality Disposition Factors (Harrington, 1975)

This saturated set of creative personality characteristics by Harrington (1975) is a more in-depth presentation of dispositional traits presented by both Mumford and Hunter (2005) and T. M. Amabile (1988). It is argued that one individual cannot possess all of the dispositional attributes, and perhaps collectively in a team environment, these dispositions are spread over several individuals via diversity lending weight to the importance of a team approach to organizational innovation.

In conclusion, a climate framework for organization creativity should be complementary to the personal collective traits outlined in Table 12, in the sense that climate must be able to tap into and to activate creativity abilities, since as highlighted by Mumford and Hunter (2005) and mentioned previously, organizational creativity begins with individuals.

3.3.4 Affect

Closely related to intrinsic motivation, but more immediate in the actual moment of creativity, is the concept of affect or ones' emotional state or state of mind. The literature discusses two primary states of affect, positive affect and negative affect. According to Isen (1984) examples of positive affect would include feelings of

empowerment and happiness and examples of negative affect would include feelings of anxiety, stress, depression and sadness.

Positive affect influences the manner in which cognitive material is organized and processed, and according to Isen, Daubman, and Nowicki (1987) results in the more efficient creative processing for problem solving. Under a positive affect condition, a greater depth and breadth of diverse concepts are primed, brought to mind, and dealt with at the same time, allowing to see relationships between concepts and grouping of concepts that are otherwise difficult to conceptualize. Neutral or negative affect seems not to produce the similar richness of conceptual combinations seen with a positive affect state (Isen, 1984). Positive affect can be a partial explanation of activation theory, which proposes that positive creative climates within a group setting can activate one's creative acumen that may have otherwise been dormant (Tett & Burnett, 2003). The implications mentioned above within an organizational setting, suggests that managers who seek innovation, should induce good feelings among workers which include feelings of competence, self-worth, and respect (Isen et al., 1987). It also seems that, it is the small everyday gestures that can influence positive affect (Kahn, 1990).

Using a candle experiment, in which teams comprising of 67 individuals had to creatively problem solve the manner in which a candle can be vertically attached to a wall without dripping wax on the floor, Isen et al. (1987) tested various manipulations of affect on the teams. In one experiment, several teams were shown a short comedy film to stimulate laughter, another team was shown a film on the holocaust to stimulate sadness and depression, a 3rd team was made to exercise, and a 4th team had no manipulations performed. The results suggested that a positive affect achieved through inducing laughter before the problem of the candle was addressed, produced more creative solutions that were statistically more significant compared to the groups with no affect manipulations. The other 2 manipulations produced similar results to the control group (no manipulation), i.e. no differing statistical creative output benefits noted.

In another empirical study, Carnevale and Isen (1986), tested the effect of positive affect on the impact of integrative bargaining using 80 males in New York. The results

showed that when both teams were induced with positive affect, the result was a reduction in the use of contentious tactics, and a more favourable joint benefit scenario (win-win scenarios). The contrary scenario was also observed, that is in teams where there was no positive affect, or negative affect, there was heavy use of contentious tactics, reduced trade-offs and stalemate (less win-win scenarios).

It should be noted, as a closing perspective, that Johnson and Tversky (1983) suggests the effect of affect depends on the task involved. For example, some pieces of art, depends on negative affect to be creative. However, within the context of Pharmaceutical IS stakeholders, it is argued that negative affect, for example being sad or anxious, will have a negative group creativity outcome. This is due to the perspective that the type of tasks involved in a pharmaceutical IS context, requires conceptual combination as described above and teamwork, both aligned to positive affect.

3.3.5 Development

Development according to Mumford (2003) involves the nurturing of the individual which starts at a young age. Feldman (1999) indicates that the development of creativity is a complex phenomenon involving a supporting family, exposure to appropriate creative values and knowledge, a family environment of mentoring, and the availability to requisite educational opportunities, and opportunities to practise and interact with peers. Within an organizational setting, Cropley (1997) suggests a long term thinking, multiple intervention strategy that includes: (a) building the requisite knowledge and expertise, including a firm grasp of the principles (b) creating exercises that build skills needed to work with this knowledge, (c) encouraging a search for novel solutions and effective strategies for testing those solutions (d) openly evaluating progress and errors, and (e) extending these efforts into independent, collaborative projects. Nickerson (1999) adds that in addition to the above perspective, creative efforts will lead to “real gains”, when held over a long period, and supported by autonomy, healthy criticism, persistence, and curiosity. It is expected that the conceptual framework will accentuate these organizational learning criteria.

3.3.6 Creative Climates

“Why is climate important? Climate may be a critical aspect of innovation to the extent that provides a work context that ultimately facilitates the innovation process.” -

Hunter et al. (2005).

Isaksen, Lauer, Ekvall, and Britz (2001) defines climate as the “recurring patterns of behaviour, attitudes, and feelings that characterize life in an organization.” Hunter et al. (2005) similarly states organizational climate as, “perceptions of, or beliefs about, environmental factors shaping expectations about outcomes, contingencies, requirements, and interactions in the work environment.” Tesluk, Farr, and Klein (1997) suggests that climate perceptions at both the individual and group level, have been found to be effective predictors of innovation, and Mathisen and Einarsen (2004) affirm that climate assessments have provided a basis for organizational interventions that have proven useful in enhancing creativity and innovation in real world settings.

According to Anderson and West (1998) the literature presents two dominant approaches on conceptualizing organizational creative climate: (a) the cognitive schema approach, and (b) the shared perception approach. The cognitive schema approach looks through the perspective of the individuals’ constructive representations of their work environments. This approach has been used to uncover individuals sense making of their proximal work environment (Ashforth, 1985). The second approach of organizational creative climate looks at climate as the shared perceptions as stated by Anderson and West (1998), “the way things are around here”. Both schemas according to Anderson and West (1998) are not mutually exclusive, and are compatible with each other. Isaksen et al. (2001) describes the two types of creative climate perceptions along a similar trend and states, “at the individual level of analysis the concept is called psychological climate, and when aggregated, the concept is called organizational climate.” Anderson and West (1998) recommend due to the diversity and size of organizations, micro-analytical examinations of ‘sharedness’ at the level of the workgroup is needed to understand better and to facilitate organizational creativity. This is the unit of analysis for this research thesis and will be covered in greater detail in Chapter 5.

The mechanism by which organizational creative climates enable innovation are several-fold:

- 1) Creative climates as stated by Tesluk et al. (1997), “provides a basis for interpretation, identifies important goals and the means to achieve them, and creates a force for action.” Mumford and Hunter (2005) argues, “When creativity ascends from individuals to group and beyond environments, climate becomes a critical component.”
- 2) Creative people are attracted to and likely to perform better in situations and work environments consistent with their broader pattern of dispositional and creative characteristics (Mumford & Hunter, 2005). In fact, providing a deeper relationship Tett and Burnett (2003)’s trait activation theory suggests situational context and work environments, expressed as its climate, can actually activate an individual’s creative features that are complementary to the contextual influence. In other words, an organizational creative climate can activate creative personality traits in individuals that were previously dormant.
- 3) Creative climates enhance intrinsic motivation (T. M. Amabile, 1988).
- 4) As stated by Mumford and Gustafson (1988), “Creative climates provide a cognitive basis for idea generation and encourages the actions required for implementing these ideas while it demonstrates acceptance and recognition for the individual's creative efforts.”

Literature empirical studies conducted by Ellison, James, and Carron (1970) support that individuals' perceptions of environmental support, trust, communication, freedom, and goal clarity yielded a strong correlation with the prediction of scientific innovative achievement. In an ethnographic study, P. Meyer (2015) further supports these literature findings, and argues that creative climate is one of the key factors for the success at the Apple Corporation⁵. Additionally, likewise through an ethnographic study, Stross (2012) supports the literature findings, and purports that creative climate is perhaps the key factor for Silicone Valley’s most successful venture capitalist, Y

⁵ At the time of writing Apple Corporation is considered one of the worlds most innovative organizations

Combinator⁶ as the place value on potential investments. According to Stross (2012), Y Combinator places more value on creative climate as an attractive attribute above the actual innovation itself before making an investment.

The challenge for organizations is that team based creativity is not a naturally occurring synergy among its members, and manual intervention in the form of organizational creative climate is needed to facilitate it (T. M. Amabile, Goldfarb, & Brackfield, 1990). Historical accounts from highly creative people support the sentiment that the presence of others can actually be detrimental to creativity (T. M. Amabile et al., 1990). In other words, there needs to be proactive management mechanisms to manage the organizational creative climate or the innovation value chain may become disjointed. T. M. Amabile (1988) states that “relatively subtle changes in the work environment can make possible substantial increases in individual creativity”. Dougherty and Hardy (1996), in a study of 15 firms with \$9.5bn of annual revenue, demonstrated that a firms’ inability to synergize ideas and innovations using resources from across organizations causes a fall in competitiveness and new product introduction. That is, if a company has an inability to facilitate group level creativity and idea exchange, there will be a cost to competitiveness.

The perspective that organizational creative climate is a key enabler to creativity and innovation output, is widely dominant in the creative literature. Mumford and Gustafson (1988) states, “Facilitating group and organizational creativity is achieved through organizational climate.” M. Baer and Frese (2003) supports this perspective by indicating that having an intention of innovation is not enough, and that innovation strategy must be reflected by an appropriate climate. T. M. Amabile, Conti, Coon, Lazenby, and Herron (1996), suggests that the extent to which individuals create novel and useful ideas not only depends on their individual characteristics, but also on the work environments, that they perceive. And finally, Fleishman (1984) provides a point of view that is aligned with the objectives of this research within a Pharmaceutical IS stakeholder context and states, *“It is hoped that by viewing creative climates, not as a collection of workplace perceptions, but rather as a facilitator of creative work context,*

⁶ Y Combinator success stories include Dropbox, AirBnB, and Reddit

we may begin to better understand creative climate, resulting ultimately in a useful comprehensive creative climate taxonomy.”

3.4 Attributes enablers to organizational creativity and innovation

The previous sections discussed the definition of creativity and innovation, their significance to business practice, the creative act, and the relevance of creative climates as an enabler to creative and innovative output. The goal of this section is to get insight into attributes and processes discussed in the literature for the enablement of creativity and innovation through situational influences or creative climates. As discussed in the previous section creative climates can be considered as the engine that funnels creativity intentions into output, i.e. facilitate the creative act. Insight into the creative attributes helps discuss and assess the theoretical framework presented later in the literature review and its appropriateness to the pharmaceutical IS stakeholder case study.

Stated by T. M. Amabile (1988), “the kinds of creative tasks that people tackle in an organization, very often demands the concerted efforts of a group of individuals working very closely together, rather than the idea generation of a single worker.”

Therefore, according to T. M. Amabile (1988) any theoretical framework that aims to describe organizational innovation and creativity should cover the following points:

- a) The entire process at an individual level should be considered as a crucial element in the process of organizational innovation;
- b) There should be an attempt to incorporate all aspects of organization that influence innovation;
- c) The theoretical framework should cover the major phases in the organizational behavioural process;
- d) The theoretical framework should describe the influence of organizational factors on individual creativity.

Aligned with this view, Mumford and Hunter (2005) reviewed over 200 articles exploring influences on creative performance, and suggested that organizational creativity and innovation are best viewed through a multi-level lens and theory. Different levels of analysis and observations, i.e. individual, group, organization, environment, may impose different requirements for innovation (Mathisen & Einarsen, 2004; Taggar, 2002; West & Altink, 1996) see Figure 9. For example, in a study of 193 scientists in 38 teams, Bain, Mann, and Pirola-Merlo (2001) estimated that attributes of safety and support were most significant at the group level and attributes of objectives and task orientation were most significant at the individual level.

A discussion is now conducted on the various multi-level components of organizational innovation as presented by Mumford and Hunter (2005), based on the author's comprehensive review of the creative literature, and supplemented by additional authors in the literature. A challenge presents itself in the inconsistency of several scholars as to the subjective nature of the levels, and the subcomponents of each of those levels. For example, T. M. Amabile (1988) places individual creativity and group creativity at the same level, claiming that the needs and dynamics are the same. Taggar (2002) in another example promoted just two levels of creative and innovative climate: individual, and group levels. The objective of this section is not to provide a detailed literature review on the various authors views and combinations on the components of organizational creativity, but to summarize multi-level creative climate attributes, since according to (Mumford & Hunter, 2005), it is through these layers and attributes that individuals perceive the domain.

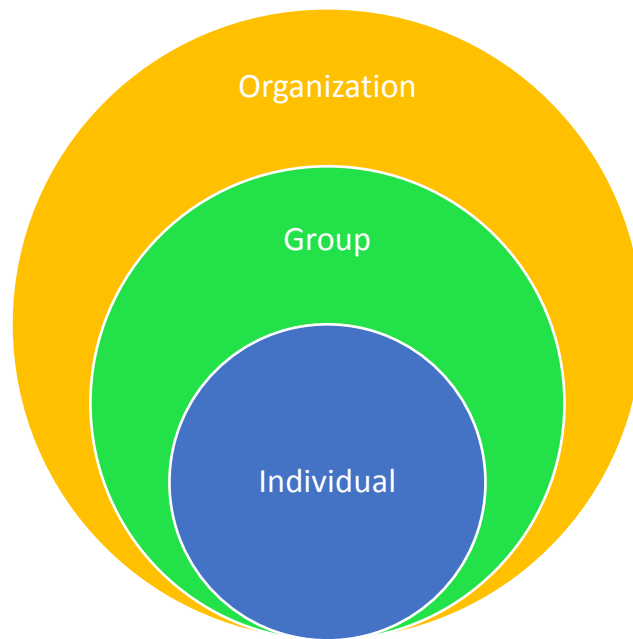


Figure 9. Multi-level lens to view climate (Mumford & Hunter, 2005)

Individual level creativity attributes were discussed in previous sections covering traits, domain relevant skills, motivation, and disposition. The perspective from group and organizational levels will now be presented.

3.4.1 Group level creativity

In this section, group level creativity and its overarching attributes and empirical evidence are discussed. As stated by Mumford and Hunter (2005), “Ideas and innovative products emerge from individuals’ interactions with their work environment, a distinctly social environment requiring collaboration and sustained group effort. Four key attributes of the work group’s environment represent noteworthy influence on creativity and innovation: (1) climate (2) leadership (3) process, and (4) group structure.”

Group level creativity is significant to organizational innovation, because it allows ideas and the implementation of those ideas not to be limited or dependent on one person, but to leverage assets across several people.

Climate and its relevance were discussed in section 3.3.6.

3.4.1.1 Leadership, what is its relevance to creative climates?

According to Trevelyan (2001) creative efforts, by virtue of their novelty and complexity, are frequently poorly structured. In practice, these efforts often involve an intersection of disciplines, counter interests of parties, etc., all interacting in a chaotic environment. Under these circumstances, according to Trevelyan (2001), there is a need for leaders who can provide guidance that helps individuals and teams structure their creative problem tasks. The literature proposes many different roles for leadership in creative and innovative endeavours. For example, Sosik, Kahai, and Avolio (1998) focused on leadership that motivated stakeholders. Cardinal (2001) suggested that the focus of leadership in innovation is to formulate structures that will allow creative activities to flower. And, Bain et al. (2001) suggests the main focus of leadership in innovation is one of support.

The literature broadly subdivides leadership into two broad categories: Transactional Leadership and Transformational leadership (Elkins & Keller, 2003). Bass and Avolio (1990) describes transactional leaders as those who motivate subordinates through the use of contingent rewards, corrective actions, and rule enforcement. This is aimed at completing linear tasks and appealing to extrinsic motivation mechanisms.

Bass and Avolio (1990) describes transformational leaders as those who encourage subordinates to view problems from new perspectives, provide support and encouragement, communicates visions, and engender emotion and identification. Gumusluoglu and Ilsev (2009) suggest that transformational leadership is more fitting for creativity and innovation environments, and provides a mapping of the relevance of transformational leadership traits to creative environments. Gumusluoglu and Ilsev (2009) suggest four traits of transformational leadership: charismatic role modelling, individualized consideration, inspirational motivation, and intellectual stimulation. Accordingly, by having charisma, a leader inspires admiration, collective respect, loyalty, and he or she anchors a sense of mission clarity. By individual consideration, leaders would develop one on one support for their team, helping with skills development and so on. By inspirational motivation, a leader articulates a sense of excitement to the mission, and helps map out a path from A to B. Finally, by

intellectual stimulation, a leader stimulates his team to think about old through new paradigms, etc.

According to Elkins and Keller (2003) transformational leadership match determinants of innovation and creativity in an organization through vision setting, support, autonomy, encouragement, recognition, and challenge.

3.4.1.2 Creative Processes

Integrating creativity into a process, T. M. Amabile (1988) proposed a mixture of the componential model (intrinsic motivation, skills in the task domain, and skills in creative thinking) integrated with a creativity workflow for a pictorial representation of individual or small group creativity as depicted in Figure 10.

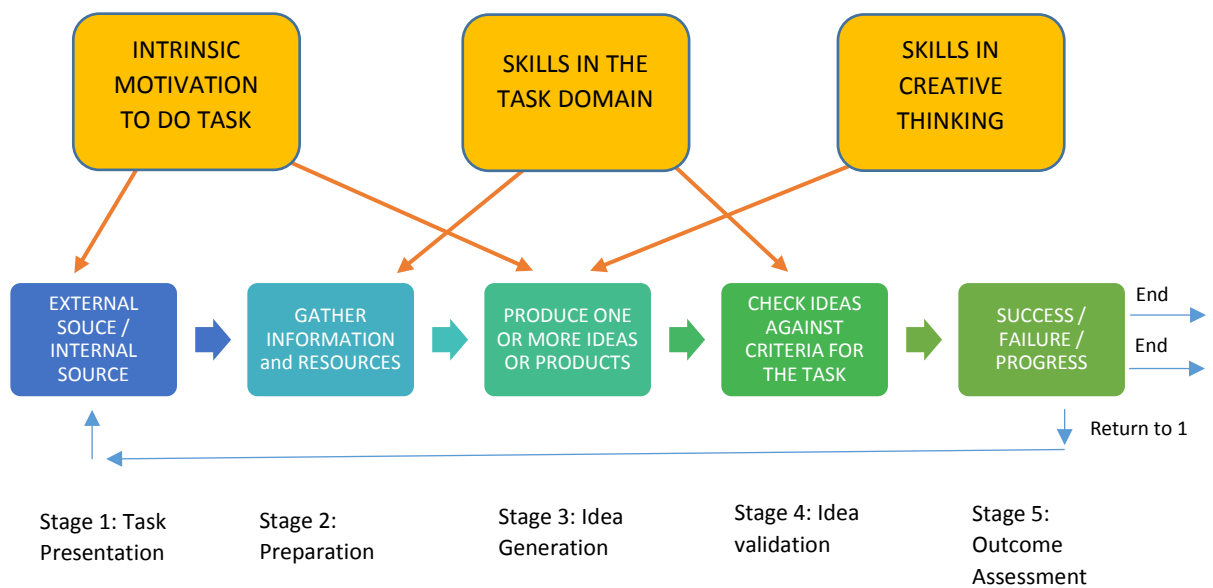


Figure 10. Individual or small group creativity (T. M. Amabile, 1988).

As stated by T. M. Amabile (1988), “although this framework cannot be considered a detailed mathematical model of the creative process, it is conceptually a multiplicative model”. That is, each of the components are necessary for creativity to be produced, and the higher the level of the components, the higher the overall level of creativity should be.

Similarly, in a review of the literature Mumford, Mobley, Reiter-Palmon, Uhlman, and Doares (1991), identified eight core process steps involved in creative thought. These are presented in Table 13 and a comparison to the model by T. M. Amabile (1988) is made.

Creative process as identified by Mumford et al. (1991)	Creative process as identified by T. M. Amabile (1988)
1) Problem identification	Task presentation
2) Information gathering	Preparation
3) Concept selection	Preparation
4) Conceptual combination	Preparation
5) Idea generation	Idea generation
6) Idea evaluation and revision	Idea validation
7) Implementation planning	Outcome assessment
8) Monitoring	Outcome assessment

Table 13. Creative processes as identified in the literature

These process concepts from T. M. Amabile (1988) and Mumford et al. (1991) map in good agreement, with the exception of more granularity from Mumford et al. (1991).

Both models are adaptations of the four-stage process model of (a) preparation (b) incubation, (c) illumination (d) verification by (Guilford, 1950). In this baseline classic model Todd I. Lubart (2001) ‘preparation’ involves a primary analysis of a problem, defining and setting up the problem. ‘Incubation’ is conceived as that part of the process where the uncurious mind comes to the forefront and processes various options, etc. It is thought that no conscious mental work takes place at this phase. ‘Illumination’ occurs when a promising idea breaks through the conscious awareness. Following illumination there is a phase of conscious work which involves evaluating, refining, and developing ideas. At this stage, the process can be returned to earlier phases of the process. Eindhoven and Vinacke (1952) however dispute this linear view of the creative process, and suggests it is dynamic blend of processes that co-occur in a recursive way throughout the creative work. In addition, Eindhoven and Vinacke (1952) suggest that the creative process differs from one person to another. Although there is criticism of the baseline model of Guilford (1950), it is argued that it serves as

a good baseline on which to build understanding, since within the context of the research question, what is being discussed is innovation from an organizational perspective, and not variations within individuals.

Finally, according to Brophy (1998), the effective execution of the processing activities highlighted in Table 13 is related to the production of higher quality and more original solutions as organizations work on creative and innovation issues. The introduction of a granular description of the creative process, suggests a new question according to Mumford and Hunter (2005), “What are the climate conditions required for effective process execution?” This literature based question forms a baseline of this thesis’s research questions, and analysis of the case study data.

3.4.1.3 Group Structure

According to Mumford and Hunter (2005), team process effectiveness (as described in the previous section) is dependent on group structure. Group structure according to Mumford and Hunter (2005), pertains to primarily team size, appropriate co-ordination proportional to size, diversity, and a balance of ‘adaptors’ to ‘creatives’. A brief discussion now follows with regards to the relevance of these attributes to creative climate.

3.4.1.3.1 Team size and team co-ordination

According to Curral, Forrester, Dawson, and West (2001), based on empirical research of 87 teams ranging in size from 2 to 18, larger teams are less likely to be innovative. Too small a team, however, would stifle creativity due to a lack of diverse expertise (Steck & Sundermann, 1978). Steck and Sundermann (1978) suggest a team size of 4 to 7, however, it is intuitive that larger teams will be a necessity in larger companies, for reasons of complexity of the project and scope (Cardinal, 2001). Mumford and Hunter (2005) suggest the larger the team, the more attention is needed for cohesion, structure, and leadership. Gassmann and von Zedtwitz (2003) examined this question and found in their industry sample of 37 large technology driven companies, 4 team structures are prevalent: (1) decentralized self-organizing teams (2) teams with a

system integration coordinator (3) a core team structure where an architectural team directs other teams working on some aspect of the larger project, and (4) centralized venture teams. According to the analysis, the varying forms of team set up, has varying forms of success based on the innovation requirement. Ad hoc or decentralized self-organizing teams are effective for incremental innovations where complexity and resource requirements are low. As innovation complexity and resource requirements increases, both group size and centralization (control) become necessary. In more complex innovation requirement environments, the overall effort may include a core team directing the efforts or other contributing teams that will result in a multifunctional structure.

3.4.1.3.2 Diversity

Multifunctional or diversity as an attribute to group innovation and according to Mumford and Hunter (2005) this is virtually consistent in all studies examining the factors that contribute to group innovation and structure. The driver for this, is the diversity of knowledge that multifunctional teams bring. Lovelace, Shapiro, and Weingart (2001) reinforces the perspective that as team complexity, size, and multifunction attributes increases, so must an investment in climate enhancement. In a study of 43 innovative development teams, Lovelace et al. (2001) found that as team size and functional diversity grew, the occurrence of disagreements also increased. The research found that the abilities of the cross functional teams to be innovative was dependent on the manner in which disagreements were managed. Teams whose disagreements were managed in a collaborative manner, performed better than teams that were managed in a contentious manner, thus reinforcing the perspective that climate is significant in managing team diversity.

3.4.1.3.3 Balance of adaptors to creators

Finally, according to Taggar (2001) found that groups composed of primarily highly creative people often exhibit poorer process and creative performance. According to the authors, this is probably due to the issues having a large number of diverse ideas, and lack of management in convergence. This aligns with the 'adaptors' and 'creatives'

theory and group construction recommendations of Kirton (1984) and also with the manner in which groups are managed as covered in the previous section.

This section presented literature research and some empirical evidence that group structure is significant to creative output, and a key perspective relevant to the research case study, that the larger and more complex the team, the stronger the investment in creative climate should be. The next section discusses briefly creative climate attributes at the organizational level.

3.4.2 Organizational level creativity

There is support in the literature for organizational level creative climate variables (Damanpour, 1991; George, 2007; Mumford, 2000; Shalley & Gilson, 2004; Shalley, Zhou, & Oldham, 2004). Damanpour (1991) for example through a meta-analysis demonstrated statistical significance correlations with specialization, functional differentiation, professionalism, managerial support, knowledge, administration intensity, slack resources, and communication, existing at an organizational level. Pierce and Delbecq (1977) suggested the following creative climate variables at the organizational level that facilitates creative climates: differentiation, professionalism, decentralization, formalization, and stratification. Mumford and Hunter (2005), suggests that analyzes at the organizational level are distilled broadly to the following categories: evaluation and control, resources, advocacy and structure. The perspective of Sundgren et al. (2005) and I. Nonaka (1994) suggest the inclusion of knowledge creation and information exchange at the organizational climate level. This section aims to present briefly the organizational level attributes and their contribution to creative climates.

3.4.2.1 Evaluation and control

As workstreams grow and becomes more dynamic, a level of evaluation and control becomes necessary for the management of creative outputs. This section discusses the value of these concepts, and at the organizational level.

The nature of creative and innovation systems carries with it a high failure rate (Sharma, 1999) i.e. most ideas generated are eventually discarded. Innovation activities can be described as unpredictable, labour intensive, long-term and multi-staged, idiosyncratic, risky, highly uncertain, cumulative, and highly differentiated (Henderson & Cockburn, 1994). As a result, Mumford and Hunter (2005) states, “organizational controls must be imposed to determine which ideas will be pursued, when they will be pursued, and how they will be pursued.”

Evaluation is a critical aspect of creative thought and the creative process (Halpern, 2003) and a precursor to organizational control. It allows less effective aspects of ideas to be identified, therefore providing a basis for refinement and progressive improvement (J. Baer, 2003). Evaluation is therefore the first step in weeding out unproductive but necessary journey ideas and identifying those ideas worth pursuing to the next stage of development. Importantly, however, evaluation is also mechanism that stimulates ideation itself, and not only acts as a filter, but it is closely related to generative activities and idea production (Mumford, Connelly, & Gaddis, 2003). In a study T. I. Lubart (1994) asked college students to write stories or make drawings that were judged for manifest creativity. As students worked on these production tasks, they were asked at different times to evaluate their work. It was found that early self-evaluation resulted in the eventual generation of more creative products, suggesting that idea evaluation can serve as a stimulus for creative thought. Goor and Sommerfeld (1975) found similar results in a study that used a ‘think aloud’ procedure that evaluated ideas to solve ill defined problems calling for creative thought. They found that more creative students were more likely than less creative students to apply evaluative statements using evaluation both to guide information search and formulate new hypotheses.

As previously mentioned, evaluation is a precursor and tied closely to the organization concept of control. According to Mumford and Hunter (2005) control is a multidimensional construct, varying at the various stages of the innovation and creativity process, and also dependent on the level of innovation that the strategy is calling for (West, 2002a).

Cardinal (2001) defines organizational control as, “any process which manages direct attention, motivate, and encourage organizational members to act in desired ways to meet the firm's objectives.” Paletz (2012) describes control as, “recommending corrective or preventative actions as necessary, as well as identifying places where undesired changes from the plan or strategy may be occurring. Monitoring and controlling processes examine objectives, such as quality, scope, costs, and schedule, as well as intermediate processes such as communication, performance, and risk management.” According to Paletz (2012) control processes are clearly relevant to creative and innovation teams.

Cardinal (2001) further distinguishes three forms of organizational control: input, behaviour, and output control.

Input control can be considered a form of resource allocation, because it regulates the knowledge environment desired by manipulating the degree and variety of core knowledge, skills, experiences, and attitudes displayed on the job (Mintzberg, 1979). Diversity in perspectives, backgrounds, and tacit training facilitate the generation of new ideas (Bantel & Jackson, 1989). Cardinal (2001) terms the ability to increase an organization's knowledge base through networking and input control, etc., as ‘professionalization’. Professionalization according to Cohen and Levinthal (1990) improves both an organizational creative and innovation capabilities, but also its ability to absorb external innovations.

Cardinal (2001) in a study with 57 pharmaceutical companies tested the hypothesis that input control improves creative and innovative throughput. Their results showed that input control was related positively related with innovation throughput, both with incremental and radical innovation expectations.

Behaviour control, as defined by Snell (1992), is the “ongoing monitoring of employee activities and behaviours, and regulating how work gets done.” This is also sometimes referred to in the literature as ‘bureaucratic control’ (Aiken, Bacharach, & French, 1980). Behaviour controls have been predominantly viewed as a mechanism that stifles creativity and fosters employee dissatisfaction (Adler & Borys, 1996), but according to Zaltman (1973) this is dependent on the nature of the task.

Cardinal (2001) in a study with 57 pharmaceutical companies tested the hypothesis that behavioural control improves creative and innovative throughput. The results showed that behavioural control had an insignificant relationship with incremental innovation, but a positive relationship with radical innovation.

Output controls regulate outcomes and results as opposed to the means by which outcomes are achieved (Eisenhardt, 1985). According to Cardinal (2001) in applying output control, organizations communicate vision and measures of the desired results, set standards, and reward mechanisms. Embedded in output control is the concept of mission clarity, and extrinsic motivation, the latter according to T. M. Amabile (1988) is the lesser compared to intrinsic motivation. The challenge is that the more innovative or creative an effort is, the more difficult it is to define from the outset with a risk of over definition stifling creative thinking (Cardinal, 2001).

Cardinal (2001) in a study with 57 pharmaceutical companies tested the hypothesis that output control improves creative and innovative throughput. The results showed that output control was related positively with innovation throughput, both with incremental and surprisingly radical innovation expectations.

Boden (2004) discusses that even in radical innovation situations, specifications of an output is important, and that constraints are valuable to drive creative thought. According to this perspective, constraints force the mind to be imaginative, and mediates the transition from divergent thinking to convergent thinking. This perhaps provides some explanation to Cardinal (2001)'s observation that output control is also correlated positively to radical innovation.

3.4.2.2 Resources

Resources supply the organization with the capacity to pursue idea generation and subsequent innovative processing. Without resources, i.e. people, time, financial and structural tools, it is unlikely that even the most promising ideas can be pursued (Mumford & Hunter, 2005). In essence, the need for resources is what drives venture capitalists as they perceive a path between great embryotic ideas to innovation output and profitability (Stross, 2012). Intuitively there is not a linear relationship

between resources and innovation output, otherwise the larger the organization the higher the innovative throughput would be (Mumford & Hunter, 2005), which is not the case, for the pharmaceutical industry as discussed in the introduction chapter. Empirically evaluating this potential U shape relationship between resources and innovation output, Graves and Langowitz (1993) examined R&D in 16 pharmaceutical companies over a 19 year period. Challenging the strategy drive for mergers in the industry, and the concept of 'bigger is better', which increases capacity, the author's study suggests that after a certain point R&D productivity diminishes with resources. Graves and Langowitz (1993) states, "While our study of the pharmaceutical industry shows a positive relationship between R&D expenditures and the number of new chemical entities (NCEs), the proportion of that return decreases as R&D expenditures, generally related to firm size increases."

3.4.2.3 Advocacy

The success of innovation efforts depends on top management support and the willingness of senior management to work as advocates for the efforts (Mumford & Hunter, 2005). Empirical evidence for this correlation is presented from two studies. In a study that surveyed professions involved in 158 new product introductions, Maidique and Zirger (1984) found that a high level innovation support from management from the initial embryotic phase (development) to commercialization was one of 8 key success attributes. In a study in understanding innovation 'assimilation,' A. D. Meyer and Goes (1988) observed the implementation of 12 medical innovations in 25 hospitals. Involvement at the CEO level was evaluated for various attributes, including CEO education, tenure, and importantly advocacy. A positive correlation between CEO advocacy and successful adoption of innovation were found.

3.4.2.4 Organizational knowledge and experience

In the previous section, knowledge and experience were discussed as fundamental key attributes. In-fact, Mumford et al. (2003) claims that virtually all theories of creative thought and innovation, place knowledge and knowledge exchange as essential for the

generation of new ideas. Mumford and Hunter (2005) support the importance of information and knowledge exchange by stating, “Of course, expertise is unlikely to prove of much value if the experts lack the necessary information (in an organization)”. For example, in a study of 5 firms, Monge, Cozzens, and Contractor (1992), correlated product improvement against information availability and exchange measures and found a strong correlation.

Providing more granularity on knowledge exchange and creativity, Finke (1992) discussed the Geneplore model, in which creativity involves generative and exploratory processes. The generative processes concern the construction of loosely formulated ideas called preventive structures. Generative processes include knowledge retrieval, idea association, synthesis, transformation, and analogical transfer. The exploration processes concern the examination, elaboration, and testing of the preventive structures. Exploratory processes include interpretation of preventive structures, hypothesis testing, and the search for limitations. According to Todd I. Lubart (2001) these two sets of processes are combined together in cyclical sequences that lead to creative processes. The Geneplore model described above is compatible with the creative process model presented by T. M. Amabile (1988) and Guilford (1950) as discussed in the previous sections, but explicitly includes knowledge into the process.

Finke (1992) as discussed above, presented the concepts of: knowledge retrieval, idea association, synthesis, transformation, and analogical transfer. Too much information, however, without structure and context can be counterproductive (J. A. Meyer, 1998). Creative thought requires the right information during the creative process (Mumford & Hunter, 2005). A study supporting this view can be found in Souitaris (2001) who in a sample of 105 firms, deduced a positive relationship between the search and retrieval of specific problem related information and creative output, versus searching for general information. These concepts are relevant to the discussion because the relationship between information, context, experience, knowledge, creativity, and innovation is a basis for the creative act, organizational knowledge, and creative output (Hunter et al., 2005), see Figure 11.

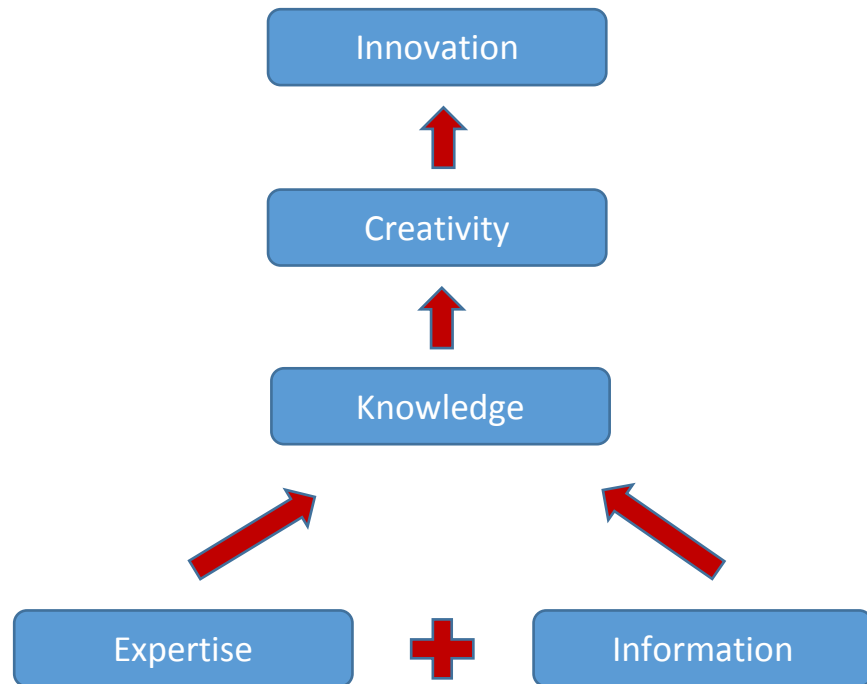


Figure 11. Relationship for information, knowledge, and innovation (Hunter et al., 2005)

As articulated by Stewart (2011), “it is possible for an organization to drown in too much information and produce no new knowledge.”

The practical discipline of Organizational Knowledge is commonly referred to as “Knowledge Management”. As an industry concept it is defined by Koenig (2012) as, “the process of capturing, distributing, and effectively using knowledge.” Given the key points discussed above, the importance of leveraging and amplifying the correct facets of organizational knowledge during the creativity process, the following discussion explores the dominant model from the literature model for Knowledge Management and Creation enablement.

3.4.2.4.1 The SECI model – enabling knowledge management and creation.

Organizations can be considered as distributed knowledge systems, in which knowledge is dispersed across members of the organization (Berends, van der Bij, Debackere, & Weggeman, 2006). As discussed previously, due to the cognitive

limitations of humans, it is unlikely that single individuals can possess the knowledge and expertise to bring an innovation to fruition.

I. Nonaka (1994) conceptualized knowledge creation and management as an interaction between tacit and explicit knowledge. Explicit knowledge is defined by A.-M. Lilleoere and Hansen (2011) as “knowledge that can easily be expressed in formal, systemic language such as written documents”. Explicit knowledge is codified knowledge (I. Nonaka, 1994). But according to I. Nonaka (1994), knowledge that can be expressed in words and numbers only represents the tip of the iceberg of the entire body of possible knowledge. Tacit knowledge is more elusive knowledge, more difficult to formalize, and covers knowledge such as know-how, personal experiences, etc. (A.-M. Lilleoere & Hansen, 2011).

I. Nonaka (1994) conceptualized a theoretical framework for Knowledge Management and Creation, a key ingredient for organizational creativity and innovation depicted in Figure 12.

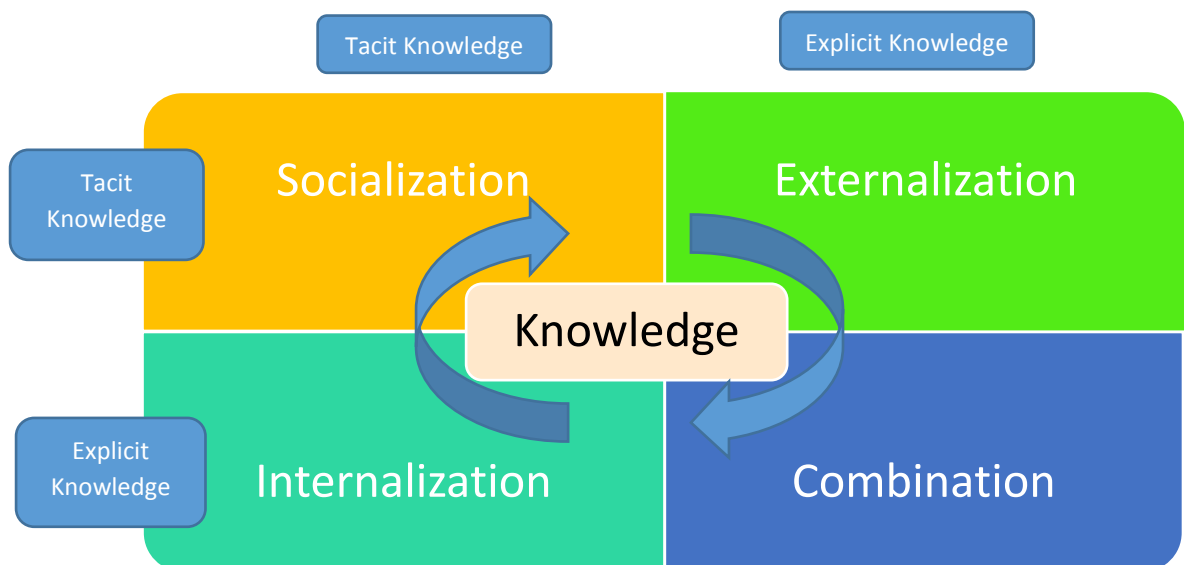


Figure 12. SECI model (I. Nonaka, 1994).

S – Socialization (tacit to tacit knowledge). The occurs when members of the organization shares feelings, mental models, experiences, etc. I. Nonaka (1994) emphasizes that an individual can acquire tacit knowledge without language. For example, apprentices work with their mentors and learn craftsmanship not through language but by observation, imitation, and practice.

C – Combination (explicit to explicit knowledge). This occurs when members of the organization use social processes to combine different bodies of explicit knowledge. This can include for example, reconfiguring explicit knowledge through meetings, and telephone conversations.

E – Externalization, and I – Internalization. These two modes involve both forms of knowledge, both tacit and explicit. Externalization is concerned with the conversion of tacit knowledge into explicit knowledge. For example, codifying how to do something into a standard operating procedure. Internalization, which is the inverse of externalization, is the conversion of explicit knowledge into tacit knowledge. Examples of this can be training materials, or the absorption of knowledge from any codified source.

The intent of the SECI model as described above is to act as a spiral to the knowledge creation process in a cyclic and iterative manner, building on the previous contribution of each circuit. Nonaka (1995) describes this as a constant conversation or feedback loop between the four elements described above. This is aligned with the creative process model presented previously by T. M. Amabile (1988) covered in Figure 10, however, introducing additionally the conceptions of organizational explicit and tacit knowledge assets into the process loop. In terms of a comparison with the Geneplore model presented earlier (Finke, 1992), the SECI framework may be seen as an enabler for both the generative and exploratory phases, since knowledge assets are contained both with human and organizational physical (explicit) assets. The Finke (1992) concepts of knowledge retrieval, idea association, synthesis, transformation, and analogical transfer are all enabled by the SECI model and its feedback loop mechanism, building each of these concepts through its iteration and interaction.

This section briefly described the SECI theoretical framework as it pertains to knowledge creation in an organization. Its importance in building organizational knowledge and knowledge creation was discussed above, and therefore any theoretical framework must act as an enabler.

3.5 Justification to focus on organizational level creativity.

A check point to justify the focus of this thesis to the organizational level to facilitate individual and group level creativity is now presented. An alternative paradigm could have been to focus at the individual or environmental level of analysis. Pertinent justifications are now presented:

- 1) The focus of individual traits to creativity is a well researched area in the literature. Example (Barron, 1968; Boden, 2004; Mackinnon, 1965; Stein, 1974);
- 2) Recommended further research by literature authors, and key gaps in the literature are at the organizational level for creative climates (Hunter et al., 2005);
- 3) There is an expected variation of organizational creative climate based on domain (George, 2007);
- 4) The research question is focused on producing a typology of organizational creative climate within an industry niche;
- 5) It is recommended by the literature to test theoretical models for organizational climate within real organizational settings (Hunter, 2016);
- 6) It is assumed that the hiring process at major corporations select individuals who exhibit high levels of personal qualities that are conducive to a creative or innovative expectation;
- 7) It is the intention that the output of this thesis be of practical contribution. Fine tuning organizational climate is of more practical significance than rehiring staff, or having expectations that the marketplace will change in an organization's favour.
- 8) Relative subtle changes in an organization work environment can produce substantial increases in individual level creativity (T. M. Amabile, 1988) and therefore the output of the thesis may be of immediate practical value.

3.6 Theoretical Framework

Having discussed the key components and attributes that the literature indicates constitute organizational creativity, a discussion is now conducted on theoretical frameworks that best incorporate the required multi-level elements and attributes at into a practical enabling model.

Expressing a phenomenon or ‘thing’ into an effective classification system, taxonomy, or typology is fundamental for its understanding and scientific advancement (Fleishman et al., 1991). A taxonomy, according to Stewart (2011) encapsulates meaning with three basic types of hierarchical relationships: *is a type of*, *is a part of*, and *is an instance of*. Therefore, as an example, in the case study data, which will be discussed in the Chapter 6, ‘management support’ is *an instance of* ‘positive supervisor relationships’ and gives the parent term more meaning and insight.

A typology can be used to identify conditions that make innovation possible (Mumford & Hunter, 2005). As noted in the previous sections, organizational creativity and innovation are closely interrelated set of activities that involve the development of new ideas with subsequent application (Tesluk et al., 1997).

In this section, a consolidated theoretical framework is proposed and presented based on previous empirical and literature research. This theoretical framework is presented in the form of an organizational taxonomy classification system for creativity and innovation enablement. It is presented with its literature foundations, and mapped back to the attributes covered in the previous sections.

3.6.1 Theoretical factor models for creativity

Before a creative climate typology is proposed, Hunter et al. (2005) suggests it is important to review what is considered necessary core factors that support and facilitate the various attributes at an organizational level. In this section, four literature frameworks are examined which aim to identify the core factors that would support a creative climate at an organizational level.

Consolidating the multi-level view as discussed in the previous sections, Hunter et al. (2005) proposed six core actionable factors as most prevalent in order to begin

building a taxonomy. Hunter et al. (2005) factors are discussed by additional literature and analysis as described below:

- 1) *Exposure to novel problems or situations*: Ritter, Damian, et al. (2012) suggests that schema violation is a precursor to cognitive flexibility or creative thinking. I. Nonaka (1994) refers to this as 'chaos' and being one of the drivers for knowledge generation. Boden (2004) describes this factor as an opportunity to change habitual thinking and fixed paths and is a driver for creative thinking. In simpler language, as stated by Hunter et al. (2005), "to be innovative requires that individuals be regularly exposed to situations where they can be innovative."
- 2) *Goal awareness*: Constraints are an important part of creativity and the creative mindset (Boden, 2004). Although creative thinking involves new ways of thinking and unlocking new thought pathways (Boden, 2004), a general end state must be made apparent in an organizational context (Tesluk et al., 1997). Creativity takes place with both chaos and order, and although divergent thinking is critical to the thought process (Acar & Runco, 2012), ideas must converge around a goal (Bilton & Cummings, 2007). When goals are made clear, individuals within an organizational context are able to direct their resources and attention towards the achievement of that goal (Locke & Latham, 2002).
- 3) *Freedom*: Ritter, van Baaren, and Dijksterhuis (2012) discusses that creative and idea generation involves unconsciously travelling uncharted paths (thought paths and neurological). The freedom to do so is implied as a context to allow this to be done, and as defined by Isaksen and Ekvall (2010) it is "the degree of independence shown by the people in the organization." High levels of freedom imply more perceived autonomy and ability for individual discretion, and individuals who struggle with this dimension are unlikely to be creative or generate new ideas in the workplace (T. M. Amabile & Gitomer, 1984; Bailyn, 1985; Lapierre & Giroux, 2003).
- 4) *Reason to be creative*: Intrinsic motivation deals with inner interests of the person that drives involvement or commitment to a particular task (T. M.

Amabile, 1979). According to Utman (1997), intrinsic motivation correlates with task interests, task enjoyment, and commitment to a task. Grant and Berry (2011) states, "Intrinsic motivation stimulates creativity by broadening the range of cognitive information available, expanding the scope of attention toward assimilating a wider set of ideas, and encouraging cognitive flexibility for identifying patterns and associations between ideas." Complementing intrinsic motivation, which implies an inward anchoring to the individual, is extrinsic motivation, which are external dimensions to the individual drivers, such as rewards, evaluation, etc. (T. M. Amabile, 1996). There is extant literature that support both intrinsic and extrinsic motivation on creativity, although the literature is more supportive of a correlation between intrinsic motivation and creativity. For example, Utman (1997) analyzed 24 studies that correlated positively intrinsic motivation to creative output.

- 5) *Resource availability*: To move creative thought from the mind into tasks and reality requires resources. According to Klein, Conn, and Sorra (2001) resources are a significant criteria to an organizational innovation success. This is supported by an analysis of 40 product development projects which demonstrated a critical correlation between resource availability and creative innovative output (Dougherty & Hardy, 1996).
- 6) *Idea Exchange*: I. Nonaka (1994) states, "Although knowledge is created at the individual level, organizations play a critical role in articulating and amplifying that knowledge to ultimately turn it into innovation." Single discrete ideas may come from a single individual, but it is the combination and reconfiguration of those ideas that produces creativity (M. Baer, Leenders, Oldham, & Vadera, 2010; Boden, 2004; Mumford & Gustafson, 1988; Perry-Smith & Shalley, 2003), and therefore a context and / or structure that enhances access or exposure, accelerates and enriches that process (Madjar, 2008; Perry-Smith, 2006). Certainly within a modern organization, innovation requires a team of individuals in order to develop ideas and bring them to fruition (Mumford & Gustafson, 1988). I. Nonaka (1994) discusses in detail the SECI model for creativity and generating new organizational knowledge. This was presented in section 3.4.2.4.1. 'Idea exchange' can find itself, according to the SECI model,

in many different formats, from collaboration, to formal and informal meetings, correspondence, procedural absorption, etc.

In addition to the above proposal, another less robust proposal can be found by T. M. Amabile et al. (1996) who produced 3 broad organizational factors and defined them as follows:

- 1) *Organizational motivation to innovate*: This, according to the authors is the basic orientation of the organization towards innovation, and it supports creativity and innovation throughout the organization;
- 2) *Resources*: This according to the authors refer to everything that the organization has available to aid work in a domain targeted for innovation (e.g. sufficient time for producing novel work in the domain, and the availability of training);
- 3) *Management Practices*: This refer to the allowance of freedom or autonomy in the conduct of work, provision of challenging, interesting work, specification of clear overall strategic goals, and formation of work teams by drawing together individuals with diverse skills and perspectives.

A third conceptual factor framework is presented by Woodman et al. (1993), who conceptualized two root factors to build an organizational climate taxonomy, and defined them as follows:

- 1) *Group characteristics*, such as norms, group cohesiveness, size, diversity, roles, task characteristics, and problem-solving approaches;
- 2) *Organizational characteristics*, such as organizational culture, resources, rewards, strategy, structure, and focus on technology.

Finally, a fourth conceptual factor model is presented by Greg R. Oldham and Baer (2012). They proposed two general conditions for organizational climate:

- 1) Enhanced access and exposure to new and different pockets of information (i.e. ideas, perspectives, approaches), and
- 2) Full engagement in the job and workplace.

These last three factor proposals by Greg R. Oldham and Baer (2012), Woodman et al. (1993), and T. M. Amabile et al. (1996) are all incorporated in the six factor proposal by Hunter et al. (2005). These six core factors are relevant, since as mentioned above, they form the baseline to begin to construct an organizational climate taxonomy.

3.6.2 Proposed conceptual framework

Leveraging the 6-factor model as discussed in the previous sections, Hunter (2016) proposes a taxonomy for creative climates for organizational creativity and innovation as presented in Table 14.

Level 1	Level 2
1) Work freedom and stimulation	Challenge
	Autonomy
2) Positive Member Exchange – Group	Positive Peer Group
	Intellectual Stimulation
	Positive Interpersonal Exchange
3) Leadership Influence and Direction – Group	Positive Supervisor Relationships
	Participation
	Mission Clarity
4) Organizational Support – Organization	Resources
	Top Management Support
	Reward Orientation
5) Organizational Integration	Organizational Integration
	Flexibility and Risk Taking

Table 14. Proposed 5 dimension typology model (Hunter, 2016)

The level 2 classifications are defined as (Hunter et al., 2005):

- 1) *Positive Peer Group*: Perception of a supportive and intellectually stimulating peer group. Relationships are characterized by trust, openness, humour, and good communication.
- 2) *Positive Supervisor Relations*: Perception that an employee's supervisor is supportive of new and innovative ideas. Supervisor also operates in a non-controlling manner.
- 3) *Resources*: Perception that the organization has, and is willing to use, resources to facilitate, encourage and eventually implement creative ideas.
- 4) *Challenge*: Perception that jobs and/or tasks are challenging, complex, and interesting—yet at the same time not overly taxing or unduly overwhelming.
- 5) *Mission Clarity*: Perception and awareness of goals and expectations regarding creative performance.
- 6) *Autonomy*: Perception that employees have autonomy and freedom in performing their jobs.
- 7) *Positive Interpersonal Exchange*: Employees perceive a sense of “togetherness” and cohesion in the organization. Employees experience little emotional or affectively laden conflict in the organization.
- 8) *Intellectual Stimulation*: Perception that debate and discussion of ideas (not persons) are encouraged and supported in the organization.
- 9) *Top Management Support*: Perception that creativity is supported and encouraged at the upper levels of the organization.
- 10) *Reward Orientation*: Perception that creative performance is tied to rewards in the organization.
- 11) *Flexibility and Risk-Taking*: Perception that the organization is willing to take risks and deal with uncertainty and ambiguity associated with creative endeavours.

12) *Participation*: Perception that participation is encouraged and supported.

Communication between peers, supervisors and subordinates is clear, open, and effective.

13) *Organizational Integration*: Perception that the organization is well integrated with external factors (e.g., outsourcing) as well as internal factors (e.g., use of cross-functional teams).

The Level 1 dimensions were derived by factor loading the 13 dimensions into 5 dimensions through a Confirmatory Factor Analysis (CFA) with a sample of 289 science and research participants (Hunter, 2016).

3.6.2.1 Validity of proposed theoretical framework

The validity of the above theoretical framework was tested from several perspectives;

- (a) comparing the proposed taxonomy classifications to extant literature taxonomies
- (b) meta-analysis study.

3.6.2.1.1 Testing validity against literature taxonomies

Via an intensive literature review, Hunter et al. (2005) examined over 40 extant creative climate taxonomies from the dominant creativity focused research journals; Creativity Research Journal, Journal of Creative Behaviour, Organizational Behaviour and Human Decision Processes, Korean Journal of Thinking and Problem Solving, and Creativity and Innovation Management.

Utilizing a coding process, the authors subsequently mapped the 40 extant literature taxonomies, from over 200 published papers, to the proposed consolidated model. Industrial psychologists were used to discuss and map semantic variation during the coding process where meanings were not one to one.

Examples of the literature models mapped to the theoretical framework are found in Table 15:

Source	Climate classifications
(Göran Ekvall, 1997)	<ol style="list-style-type: none"> 1. Challenge 2. Freedom 3. Trust / Openness 4. Idea Support 5. Playfulness / humour 6. Conflicts 7. Idea Time 8. Debate 9. Risk-Taking 10. Dynamism
(Hisrich, 1990)	<ol style="list-style-type: none"> 1. Frontier of technology 2. Encourage ideas 3. Encourage experimentations 4. Opportunity parameters 5. Resources 6. Encourage multi-discipline teams 7. Rewards 8. Champions 9. Top management support
(Nystrom, Ramamurthy, & Wilson, 2002)	<ol style="list-style-type: none"> 1. Support for new ideas 2. Encourage freedom 3. Challenge 4. Risk 5. Assumption 6. Debate
(Tesluk et al., 1997)	<ol style="list-style-type: none"> 1. Goals emphasis 2. Means emphasis 3. Reward orientation 4. Task support 5. Socioemotional support

(Hurley & Hult, 1998)	<ol style="list-style-type: none"> 1. Innovativeness 2. Participative decision-making 3. Power sharing 4. Support and collaboration 5. Learning and development
-----------------------	--

Table 15. Examples of extant creative climate taxonomies

According to Hunter et al. (2005), the proposed typology maps to 95% of the typologies in the extant literature. The authors propose that this is a good fit and encapsulates the literature propositions of creative climate classifications.

3.6.2.1.2 Testing validity via meta-analysis

In order to examine the size of effect (effect size) of the proposed dimensions and to establish internal and external validity to creative achievements, Hunter et al. (2007) conducted a meta-analysis on 42 literature articles (peer reviewed), conference papers, dissertations, and manuscripts all using independent samples and involving 14490 participants. Effect sizes help estimate the scale of causality between two concepts, and assist in making deductions about the strength of the relationship between two variables. In this meta-analysis study, Hunter et al. (2007) utilized *Cohen's delta*, Δ , effect sizes. Field (2012) suggests that a $\Delta = 0.2$ indicates a small effect size, $\Delta = 0.5$ indicates a medium effect size, and $\Delta = 0.8$ indicates a large effect size.

As is it standard to meta-analysis work, risks were identified, and precautions were put in place in order to address variations across studies. In this case various concerns including semantic variation, and quality of creative judgments (performance criteria) were identified as the key challenges in aggregating effect sizes. These two key concerns were addressed in the following manner:

- (1) The use of a psychologist was adopted, in order to map the definitions and concept labels from study to study ensuring that the analysis was aggregating the same concepts. For example, study A may have referred to a dimension as 'goal setting', and study B may have referred to the same dimension as 'mission clarity'. Hunter et al. (2007) states that the 13 proposed dimensions cover 95% of dimensions identified in prior studies.

(2) Variations in the studies for performance criteria occurred at several layers.

For example, varying studies had creative performance appraisals done by the creator themselves, peer, supervisor, subordinate, researcher, or mixed methods. In addition, studies used various forms of judgment criteria of creative performance, such as ratings on creative performance, or new products, patents, publications, etc. To address these variants, a psychologist was used to correlate each dimension against each criteria measure in a given study and the average delta across each dimension was determined for each of the criterion identified. Then the average delta across studies examining the multiple data criteria was obtained using the technique as described by McGaw and Glass (1980).

The conclusion results from the meta-analysis performed by Hunter et al. (2007) is presented in Table 16.

Dimension	Effect sizes	Number of studies effect size is based on
Challenge	.82	12
Autonomy	.74	15
Positive Peer Group	.80	27
Intellectual Stimulation	.77	11
Positive Interpersonal Exchange	.78	10
Positive Supervisor Relationships	.74	24
Participation	.79	22
Mission Clarity	.72	18
Resources	.71	14
Top Management Support	.70	30
Reward Orientation	.68	9
Organizational Integration	.72	20
Flexibility and Risk Taking	.73	24

Table 16. Meta-Analysis of Dimensions from literature

From this meta-analysis study, Hunter et al. (2007) deduced that all of the proposed dimensions demonstrated strong effect sizes to creative output. However, the meta-

analysis provided guidance on which dimensions demonstrated stronger effect of creative output. The following statements were presented by Hunter et al. (2007) and captured in Table 17.

Meta -Analysis Deduction by Hunter et al. (2007)	Effect size evidence from meta-analysis
<p>“Apparently, an intellectual stimulating environment in which people have challenging work, and colleagues with whom they can exchange ideas, is critical to creativity and thus innovation.”</p>	<p>The three largest observed effect sizes:</p> <ul style="list-style-type: none"> • Interpersonal exchange $\Delta = .91$ • Intellectual stimulation $\Delta = .88$ • Challenge $\Delta = .88$
<p>“Apparently though it is desirable, and perhaps necessary, to provide requisite resources and recognize creative work, resources and recognition are not as important as providing challenging work in an intellectually stimulating environment.”</p> <p>“Although autonomy is considered critical for creativity and innovation, the empirical results suggest there is some need for balance with direction given.”</p>	<p>The three smallest observed effect sizes:</p> <ul style="list-style-type: none"> • Resources $\Delta = .51$ • Reward orientation $\Delta = .88$ • Autonomy $\Delta = .48$

Table 17. Most and least significant dimensions (meta-analysis review)

Additionally, Hunter et al. (2007) also analyzed individual level creativity and group level creativity and their relationship with creative output. From the meta analysis larger climate effects were obtained in studies that assessed creativity at the group level $\Delta = 1.00$ vs. at the individual level $\Delta = .44$. In this regard, Hunter et al. (2007) comments, “Apparently, climate is an especially important influence on creative achievement when performance is contingent on interactions among individuals and their collective perceptions of the work environment.”

3.6.2.1.3 Limitation and opportunity of applicability of theoretical framework

As highlighted by Hunter (2016), one of the limitations of this streamlined typology is testing in a practical space. This is echoed by West (2002a), who indicated that many of the extant literature is based on a social psychology laboratory, such as university students, and may miss the more nuance dynamics of real work teams. In a quantitative study using the Situational Outlook Questionnaire (SOQ), which aims to measure perception of creative climate, Isaksen et al. (2001) demonstrated that respondents will vary their answers in different work environments.

This represents an opportunity for this thesis as it seeks to compare and map a practical working environment, within a specific subject matter domain (Pharmaceutical IS) to the theoretical framework by Hunter (2016). To the best of the author's knowledge, this approach and work do not exist in the literature.

3.7 Mapping of proposed climate to attributes, and psychometric instruments

This section maps the conceptual framework to:

- 1) The attributes discussed in the previous sections (extant literature);
- 2) Psychometric deductive instruments tools in the extant literature.

3.7.1 Fit of concept model to multi-level attributes

In the previous section a multi-level view of creative climate with corresponding literature attributes was presented. These are now mapped against the proposed theoretical framework and captured in Table 18.

Creative Climate Typology Concept Level 1	Creative Climate Typology Concept Level 2	Definition	Multi-level attributes (Mumford & Hunter, 2005)	Root factor (Hunter et al., 2005)	(T. M. Amabile, 1988)
Work Autonomy and Challenge (Individual Level)	Autonomy	Perception that employees have autonomy and freedom in performing their jobs.	Creative dispositional skills	Freedom	
	Challenge	Perception that jobs and / or tasks are challenging, complex, and interesting – yet at the same time not overly taxing or unduly overwhelming.	Individual knowledge / domain relevant skills / creativity skills / motivation	Exposure to novel problems or situations	
Positive Member Exchange – Group	Positive Peer Group	Perception of a supportive and intellectually stimulating peer group. Relationships are characterised by trust, openness, humour, and good communication.	Creative Process	Idea exchange	
	Intellectual Stimulation	Perception that debate and discussion of ideas (not persons) is encouraged and supported in the organization.	Motivation	Exposure to novel problems or situations.	

	Positive Interpersonal Exchange	Employees perceive a sense of “togetherness” and cohesion in the organization. Employees experience little emotional or affectively laden conflict in the organization.	Group Leadership / group structure / creative process	Idea Exchange	
Leadership Influence and Direction – Group	Positive Supervisor Relations	Perception that an employee’s supervisor is supportive of new and innovative ideas. Supervisor also operates in a non controlling manner.	Control / Advocacy		Management Practices
	Participation	Perception that participation is encouraged and supported. Communication between peers, supervisors, and subordinates are clear open and effective.	Advocacy	Idea Exchange	
	Mission Clarity	Perception and awareness of goals and expectations regarding creative performance.	Control	Goal awareness	

Organizational Support – Organization	Resources	Perception that organization has, and is willing to use, resources to facilitate, encourage and eventually implement creative ideas.	Resources	Resources	Resources / Organizational Motivation to Innovate
	Top Management Support	Perception that creativity is supportive and encouraged at the upper levels of the organization.	Advocacy	Freedom	Management Practices
	Reward Orientation	Perception that creative performance is tied to rewards of the organization.		Reasons to be creative	
	Flexibility and Risk taking	Perception that the organization is willing to take risks and deal with uncertainty and ambiguity associated with creative endeavours.	Creativity dispositional skills	Freedom	
Organizational Integration and Extension	Organizational Integration	Perception that the organization is well integrated with external factors (e.g. outsourcing) as well as internal factors (e.g. use of cross functional teams).	Knowledge creation and management	Idea Exchange	

Table 18. Mapping of proposed conceptual framework to multi-level attributes.

The above mapping typology in Table 18 demonstrates a good coverage fit between the proposed conceptual typology and the multi-level views explained in section 3.4. It should be noted that the objective of the proposed theoretical typology is to incorporate the multi-level views of creative climate which supports the view that employees consider and discuss climate in a way that is best described as multi-level drivers (Ma, 2009).

3.7.2 Mapping conceptual framework to psychometric measurement tools.

The proposed theoretical framework from Hunter (2016) and captured in Table 14 is utilized in part because of its robustness and mapping to over 200 academic articles summarizing the multi-view attributes, and a consolidation of 40 creative climate literature typologies (as discussed previously). According to the authors, it is the most comprehensive consolidation of literature typologies available (Hunter, 2016). However, psychometric instruments are available and are used in practical settings and based on a focused theoretical perspective, such as motivation, for example. These are now presented and compared to the proposed climate taxonomy. The value of this mapping is to determine if the theoretical perspective of each psychometric test is captured in the proposed taxonomy climate classification. Mathisen and Einarsen (2004) identified and reviewed four of the most universal psychometric qualitative instruments used to assess creativity and innovation environment.

These are:

- 1) CCQ - Creative Climate Questionnaire (Göran Ekvall, 1996);
- 2) KEYS – Assessing the Work Environment for Creativity (T. M. Amabile et al., 1996);
- 3) SSSI - (Siegel & Kaemmerer, 1978);
- 4) TCI – Team Climate Inventory (Anderson & West, 1998).

3.7.2.1 CCQ - Creative Climate Questionnaire

The CCQ is a 50 item Likert scale questionnaire designed to measure the climate for creativity within organizations. It was derived out of research from various Swedish organizations and a literature review (Göran Ekvall, 1996). For clarity, there are primarily two views as to why this model was not selected as the main theoretical framework for this research; (1) the literature review was not aimed to be a consolidation of extant creative and innovation climate taxonomies, and (2) creative climate was placed as an objective property of the organization, rather than individual perceptions (Mathisen & Einarsen, 2004). Table 19 provides a mapping between the classification scheme of the CCQ to the proposed theoretical framework. As can be seen, the CCQ maps neatly into the proposed classification. However the proposed classification presents more classifications, based on extant literature which the CCQ does not consider.

CCQ Classification	Proposed Classification
1) Challenge	Challenge
2) Freedom	Autonomy
3) Idea Support	Positive Peer Group / Positive Supervisor Exchange
4) Trust / Openness	Positive Peer Group
5) Dynamism / liveliness	Positive Interpersonal Exchange
6) Playfulness / humour / debates	Positive Peer Group
7) Conflicts	Intellectual Stimulation
8) Risk Taking	Flexibility and Risk Taking
9) Idea Time	Resources

Table 19. Coverage of the CCQ with the proposed classification.

3.7.2.2 KEYS – Assessing the Work Environment for Creativity

The basis of KEYS is focused on intrinsic motivation of the individual (Hunter et al., 2005). The instrument consists of 78 items on a four-point scale, and measures the individuals' perceptions of the work group environment that influences creativity. There are several reasons why it was felt that the classification schema of the

proposed theoretical framework was a better fit than KEYS: (1) KEYS was primarily based on a survey study. It was not a literature consolidation. (2) KEYS has a focus of intrinsic motivation which is not the overarching research question of the thesis. (3) Mathisen and Einarsen (2004) highlights validity concerns, as factor analysis studies show that many items load onto more than one factor. Table 20 shows the fit between KEYS, and the proposed theoretical framework.

KEYS Classification	Proposed Classification
1. Organizational encouragement	Top Management Support / Positive Supervisor Exchange
2. Supervisory encouragement	Positive Supervisor Exchange
3. Work group supports	Positive Peer Group
4. Sufficient resources	Resources
5. Challenging work	Challenge
6. Freedom	Autonomy
7. Creativity	Mission Clarity
8. Productivity	Organizational integration

Table 20. Coverage of the KEYS with the proposed classification.

As can be seen in Table 20 there is a good coverage of the KEYS classification to the proposed theoretical framework, but as with the case of the CCQ, the proposed classification offers more enriched classification based on the extant literature.

3.7.2.3 SSSI – Siegel Scale of Support for Innovation

The SSSI instrument was developed to assess organizational climate factors assumed to be present in innovative organizations. The instrument consists of 61 items, loaded onto 5 factors, and was developed mainly in schools with student-generated data (Siegel & Kaemmerer, 1978). It was felt that the proposed theoretical framework was a better fit for the research question for several reasons: (1) the sample size of the SSSI was low, N=2153, (2) The participants in the SSSI were mainly students. According to Mathisen and Einarsen (2004) the SSSI would be best thought of as a student school climate instrument, rather than a measure of organizational creative climate. And (3), the SSSI does not consolidate any other extant classification schemes.

Table 21 shows a good coverage for the SSSI classification, compared to the proposed theoretical classification, with the exception of the dimension ‘Consistency’.

SSSI Classification	Proposed Classification
1. Leadership	Top Management Support / Positive Supervisor Exchange
2. Ownership	Autonomy
3. Norms for diversity	Intellectual Stimulation
4. Continuous development	Intellectual Stimulation
5. Consistency	Not Mapped

Table 21. Coverage of the SSSI with the proposed classification.

3.7.2.4 TCI – Team Climate Inventory

The TCI was developed focused for proximal group work climates (Anderson & West, 1998). It is based on 38 items, and loads onto 4 dimensions. It was felt that the proposed theoretical framework was a better fit to the research question, for several reasons: (1) the focus of the TCI was primarily at the group level, and did not take into consideration individual or organizational dynamics, and (2) there was not general consolidation of extant classifications with the TCI. Table 22 shows good coverage of the TCI within the proposed theoretical framework, but as with the case with the previous discussed instruments, the proposed classification offers more enriched classification based on the extant literature.

TCI Classification	Proposed Classification
1 Vision	Mission Clarity
2 Participant Safety	Positive Peer Group
3 Task Orientation	Mission Clarity
4 Support for Innovation	Top Management Support

Table 22. Coverage of the TCI with the proposed classification.

In conclusion, the proposed organizational creative climate taxonomy classification scheme, provides good coverage for the various literature angles of conceptualizing and classifying creativity. These include:

1. The multi-level view with its attributes;
2. The various literature conceptual factors to build a classification scheme;
3. The 5 key psychometric instruments in the literature;
4. A consolidation of extant climate classifications.

In addition, the proposed conceptual model is a consolidation of 40 extant literature models and over 200 journal literature articles on creative climate.

3.8 Chapter Summary

This chapter introduced the concepts of creativity and innovation and described the interrelationship as ‘the implementation of something new and of value’. The discussion then progressed to provide evidence of the link between organizational innovation and business practice in the sense that innovation is seen to provide competitive positioning in today's economic environment. The creative act was introduced and discussed in detail, composing of 4 key parts: (1) creative thought (2) motivation, affect, and dispositions (3) development, and (4) creative climates. Creative climates, which is the focus of the thesis was discussed in detail within the context of the creative act. Group level and organizational level creativity were introduced, as a multi-level view, and their sub components were presented and discussed. These were: climates, leadership, creative processes, and group structure. The key concept of knowledge management through the SECI model was introduced. The 13 dimensions theoretical framework by Hunter et al. (2005) was presented as a climate typology conceptualized to facilitate innovation output and encompassing the attributes discussed. Its validity and comparison with the extant literature were discussed, which included the findings that creativity at the group level had a larger effect size on innovation output than creativity at the individual level. Finally, a comparison between the theoretical framework, and key published psychometric instruments were made, and demonstrated to be a good fit.

Chapter 4: Dimension descriptors in the workplace

4.0 Introduction

Chapter 3 proposed a conceptual framework for creative climates in the form of a taxonomy classification. In this chapter, the taxonomy classifications are investigated further for meaning from a literature perspective. The objective is to describe the narrative of how the taxonomy dimensions are identified and expressed in the workplace on a day to day basis according to the literature, from both enabling and inhibition perspectives. These are presented as level 3 in the proposed taxonomy classification. This is therefore extending and enriching the theoretical framework by Hunter (2016) prior to testing in a real-world environment.

4.1 Dimension 1: Work Autonomy and Challenge

4.1.1 Concept discussion

In this section, a practical and granular look at what it means for *work autonomy and challenge* is undertaken. Two of the 13 taxonomy level items by Hunter et al. (2005) seen in Table 14: *work autonomy*, and *challenge*, are explored in this section.

This section builds on the literature review section in Chapter 3, presents the concepts in more detail and focuses on several extant descriptors for these concepts. These descriptors are then presented in the typology and compared to the case study data set in the Findings section.

The first concept that is discussed is *challenge*. However *work autonomy* also loads within the same base dimension as indicated by Hunter (2016). *Work autonomy* will be introduced and discussed when appropriate.

4.1.2 Challenge / Job Complexity

According to Hunter et al. (2007), challenge refers to workers perception of how complex, stimulating, and difficult their work tasks are. Schraw, Dunkle, and Bendixen (1995) investigated the relationship between two kinds of problem solving: defined and ill-defined, with each requiring separate cognitive process. Hunter et al. (2005) states, “problems with overt or clear absolute answers are not likely to be solved creatively, even by the most innovative individuals. Thus, to be innovative, individuals must be exposed to situations where they can be creative. Innovation requires that individuals be regularly exposed to a work context that is challenging and intellectually stimulating.” This is echoed by Shalley, Gilson, and Blum (2009) who states, “the level of creativity required or possible in any job, may be dependent on the job in question.” Shalley, Gilson, and Blum (2000) suggests that the manner in which a job is designed may be a proximal and stable work environment characteristic that contributes to an employee’s required creativity. Several literature authors suggest a positive correlation between job design, job complexity, and predictive team performance (G. R. Oldham & Cummings, 1996; Shalley & Gilson, 2004; Shalley et al., 2004).

Having briefly described the extant literature view on jobs that are challenging or complex, and the suggestion that it is positively correlated to creative output, an examination of descriptors that indicate a reflection of job complexity or a challenge is now discussed, as it forms the template in which to view the case study findings.

A difficulty for analysis, according to Hunter et al. (2005), is that the granular dimensions of *challenge* or job complexity are among the least explored and discussed creative dimensions in the extant literature. However, several extant references do refer to a more granular evaluation of this concept, which are now presented and forms the basis of the template used. According to Shalley et al. (2009), complex jobs are multifaceted, and encourages employees to combine knowledge from various sources, and Farr (1990) suggests that complex jobs require more intricate thought processes than simpler jobs. However Campbell (1988) provides a granular understanding of job complexity and challenge by developing an integrated framework based on a literature review. The conceptual framework put forward by Campbell

(1988) is built on four fundamental task attributes that are associated with job complexity, and challenge:

- 1) *Decision tasks*: These are tasks that normally evaluate several desired outcomes, but contains a straightforward path. The complexity may involve outcomes conflicting interdependence and uncertain outcomes or desired states. Examples of this type of complex task can include buying a house, or selecting a building site.
- 2) *Judgment tasks*: These types of complex tasks are characterized by the conflicting and probabilistic nature of task-associated information. Tasks in this typology branch require the task doer to first consider and integrate diverse sources of information and to then make a judgment about the likelihood of some future event. An example of this may include stock market analysis.
- 3) *Problem tasks*: These types of tasks display a common characteristic of having multiple paths to achieve a clear and defined outcome. Paths differ in terms of their relationships with each other (can be interdependent to each other, and to the desired outcome). Examples of these types of complexity can include personal problems, scheduling, playing chess.
- 4) *Fuzzy tasks*: The final category in the model provided (Campbell, 1988), includes the characteristic of having both multiple end states, and multiple ways of attaining end states. Similar to the previous categories, different pathways can be interdependent, conflicting, or uncertain. Examples of this would include many business decision, as developing or applying innovative technology.

Table 23 summaries the extant literature (above) view on a typology for *job complexity* and *challenge*. The literature provided no negative descriptors for the concept.

Concept Level 2	Concept Level 3
Job Complexity and Challenge (positive)	
	Tasks are multifaceted

	Tasks require employees to combine knowledge from various sources
	Requires comparatively more intricate thought processes
	Intellectually stimulating
	Decision tasks <ul style="list-style-type: none"> • Challenge of selecting outcome • Conflicting interdependence and uncertain outcomes • Overall uncertainty
	Judgment tasks <ul style="list-style-type: none"> • Conflicting task information • Predicting future state
	Problem tasks <ul style="list-style-type: none"> • Multiple paths to achieve a clear outcome • Conflict paths • Interdependent paths
	Fuzzy tasks <ul style="list-style-type: none"> • Multiple end states, and multiple paths to achieve end states • Interdependent pathways • Conflicting pathways

Table 23. Descriptors for job complexity and challenge.

4.1.3 Autonomy

Autonomy is concerned with giving members of the organization leeway, local decision empowerment, freedom, and flexibility to travel uncharted creative waters, without fear of reprisals if those new paths followed do not bear an expected yield (Tesluk et al., 1997). Banker, Field, Schroeder, and Sinha (1996) defined team *autonomy* as the extent to which members are able to exert direct control over the management and execution of an interdependent set of primary work tasks assigned to it by the

organization. Increased autonomy acts to reduce superfluous managerial and bureaucratic constraints on the application of knowledge and local skills within a team (Cordery, Morrison, Wright, & Wall, 2010; Wall, Jackson, & Davids, 1992).

Complementing these perspectives, autonomy and freedom are also about individuals and teams having a sense of ownership of their own ideas (Bailyn, 1985; Paolillo & Brown, 1978). Ownership is important, as suggested by Schuler and Jackson (1987) indicating creativity pursuing tasks involve risk, experimentation, and needs an environment of high tolerance of ambiguity and unpredictability all of which requires intrinsic motivation and ownership. This Kirkman and Rosen (2000) indicates that *autonomy* is a central contributor to feelings of empowerment in teams, which is a motivational state linked to performance. Several authors have correlated *autonomy* to the concept of 'socioemotional support'. This is the view that, organizational members who receive decision latitude, autonomy, and influence from their supervisors tend to see their organization as more supportive of innovation (G. Ekvall & Tangebergandersson, 1986; Mumford & Gustafson, 1988; Scott & Bruce, 1994).

Hunter et al. (2005) places *autonomy* within their freedom conceptual framework root factor and suggests that freedom is a key contributor to creativity. Supplementing this point of view, Ritter, van Baaren, et al. (2012) argues that part of the creative journey involves unconscious processes, and according to these authors, people perform better at idea selection, when they are given the freedom and time to think about solutions unconsciously. Tesluk et al. (1997) pitches that creative processes can't be prescribed or controlled by higher management as T. M. Amabile (1988) postulates that goal setting should be tighter and more specific at the level of the mission and outcomes, but should be looser and more flexible in terms of the methods and procedures for creative minds to reach their goals.

Autonomy therefore is an enhancer for the various types of creative pathways and behaviours and is further supported by several scholars (Farr, 1990 ; Frischer, 1993). T. M. Amabile et al. (1996) identified *autonomy* as one of the more prominent dimensions along with organizational encouragement and resource availability discussed in the extant literature. In addition, having a direct impact on creativity, some authors support the position that *autonomy* and freedom serve as moderators

for other dimensions that support creativity. R. M. Ryan and Deci (2000) states for example, “self-determination theory identifies the provision of opportunities for self-regulation (autonomy) as one of the environmental supports necessary for the realization of innate intrinsic motivation tendencies in human beings.” Intrinsic motivation is a key dimension in creative and innovative environments (Hunter et al., 2005) and therefore autonomy serves as a key moderator.

The key features of autonomous workgroups as described by Wall, Kemp, Jackson, and Clegg (1986) include;

- a high degree of self-determination by employees in the management of their day to day work;
- collective control over the pace of work;
- distribution of tasks;
- absence of direct supervision or micromanagement;
- the workgroup has the inter-related tasks in order to produce the final output;
- the various skills set are available in the team;
- feedback for the whole team is given (from upper management);

The key dimensions identified by Scott G. Isaksen (2007) for the dimension of ‘*autonomy and freedom*’ are:

- A reflection of the level of independence in behaviour exerted by the people in the organization;
- Autonomy given to teams and employees to define much of their own work. People are able to exercise discretion in their day-to-day activities;
- People take the initiative to acquire and share information;
- People make plans and decisions about their work.

Scott G. Isaksen (2007) also indicates potential inhibitors for the ‘*autonomy and freedom*’ climate, which include:

- people work within strict guidelines and roles;

- People carry out their work in prescribed ways with little room to redefine their tasks.

Finally, deducing from field research, T. M. Amabile and Gitomer (1984) supported the hypothesis that unconstrained choice of task approach by teams, can be conducive for creativity.

The above literature sourced factors are consolidated and captured in Table 24 in which the field data is compared.

Concept Level 2	Concept Level 3
Autonomy (Positive)	
	Unconstrained choice of task approach by teams
	Collective control over the pace of work
	Distribution of tasks
	Absence of direct supervision or micromanagement
	Workgroup has the inter-related tasks in order to produce the final output
	Various skills set are available in the team
	Feedback for the whole team is given (from upper management)
Concept Level 2	
Autonomy (inhibitors)	
	People work within strict guidelines and roles
	People carry out their work in prescribed ways with little room to redefine their tasks

Table 24. Descriptors for autonomy.

4.2 Dimension 2: Positive Member Exchange

4.2.1 Concept Discussion

In this section, a granular look at what it means for *positive member exchange* is undertaken. Three of the 13 taxonomy level items by Hunter et al. (2005): *positive peer group*, *intellectual stimulation*, and *positive interpersonal exchange*, are explored in this section.

This section builds on the literature review section in Chapter 3 and focuses on several extant descriptors for these concepts. These descriptors are presented in the taxonomy and then compared to the case study data set in the Findings chapter.

The first concept that is discussed is *positive peer group*. However the three dimensions identified above load within the same base dimension (*positive member exchange*) as indicated by Hunter (2016). These will be introduced and discussed when appropriate.

4.2.2 Positive Peer Group

Hunter et al. (2005) defines the *positive peer group* dimension as “perception of a supportive and intellectually stimulating peer group. Relationships are categorized by trust, openness, humour, and good communications”.

Anderson and West (1998) defines peer groups, or proximal work groups, as “either the permanent or semi-permanent teams to which individuals are assigned, to whom they identify with, and to whom they interact with regularly to perform work-related tasks”.

A wealth of extant literature exists that support a positive relationship of positive peer groups to creative output (T. M. Amabile & Conti, 1999; Basu & Green, 1997; Frese, Teng, & Wijnen, 1999; Janssen, 2005; Lim & Choi, 2009; Madjar, Oldham, & Pratt, 2002; Madjar & Shalley, 2008; G. R. Oldham & Cummings, 1996; Rice, 2006).

According to Shalley and Gilson (2004), within an organization, individual creativity is often expressed within a team environment. Figure 13 proposes a three stage creative ecosystem model where the team is seen as a bridge between the individual

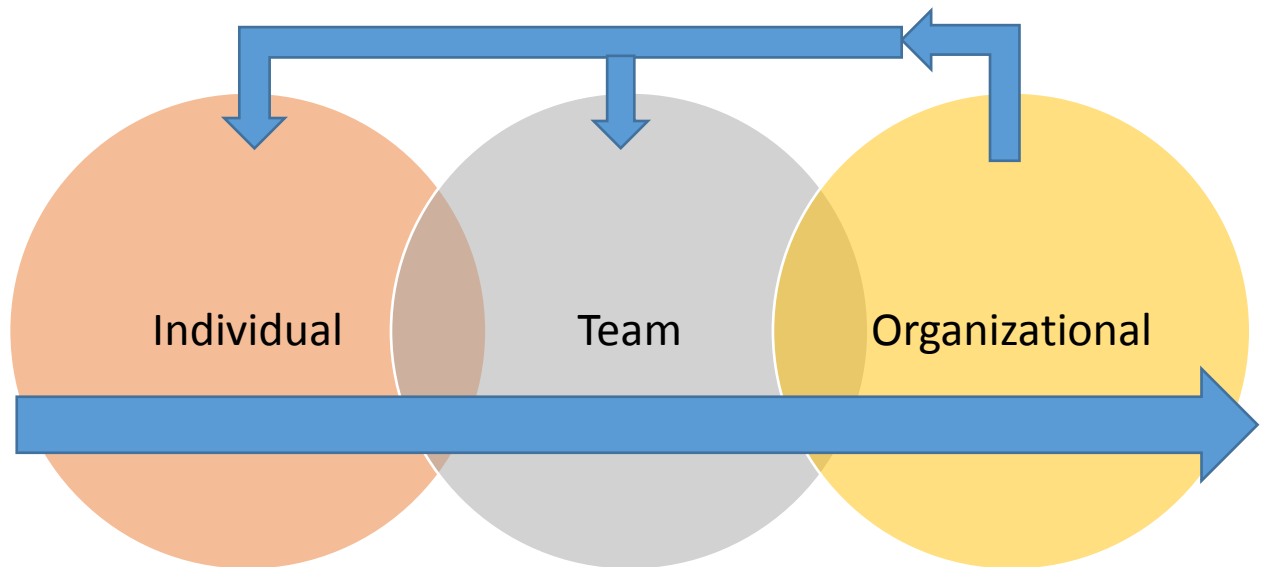


Figure 13. Creative Ecosystem Model (West & Sacramento, 2012)

and the organization (West & Sacramento, 2012). According to West and Sacramento (2012), team climate is a more proximal influence (to creativity) than organizational climate. It is likely to have a fundamental importance to the extent to which team members engage in creative behaviour, and also to the degree to which the team as a whole will be able to deliver an innovative output. Campion, Medsker, and Higgs (1993) states, “individuals who identify with their proximal work group, and who interact with colleagues are likely to develop shared patterns of understanding and norms of behaviour, allowing the opportunity for a shared climate to evolve.”

In order to contextualize the weight-full aspects of team climate, West and Sacramento (2012) points to ‘person in situation’ theories. Tett and Burnett (2003) support the perspective that strong contexts, such as a strong team climate, minimize individual variances in the group members. In this conceptual model, in weak creative climates, creative output is dependent on the individual, whereas strong climates

limits the number of behavioural patterns that are acceptable and consequently decrease response variation between individuals (West & Sacramento, 2012). Tett and Burnett (2003) developed this idea further with a 'trait activation theory' that suggests features of the context can promote and facilitate the expression of individual dispositions when the contextual influence is relevant to the disposition. That is, the context can actually activate individual features that are complementary to the contextual influence.

The effect of these two models affects the research in two manners. In the first idea, a strong creative team climate, the context takes a dominant role, and individuals respond in kind to a dominant creative typology. In the second idea, the proposition is that strong creative team climates, actually activates individual creativity which then support team creativity. West and Sacramento (2012) propose four foundational aspects in group dynamics that specifically support creativity focused on maintaining intrinsic (individual) motivation: team member diversity, mutual openness to ideas, constructive challenge of ideas, and shared commitment of ideas.

Having established in the literature review, and supplemented in this section, the importance of team climate on individual and group creativity, an examination of some key extant exhibitors of what constitutes a group climate conducive to creative output are now presented.

According to West (2002a), although there has been numerous works done in understanding the factors that influence effectiveness of work teams, much less focus has been on understanding how creativity and innovation in work teams are expressed or exhibited. Based on the TCI (Team Climate Inventory) and work done by Anderson and West (1998), West and Sacramento (2012) proposed a 7-factor model for exhibitors of creative team climate:

- 1) Clarifying and ensuring commitment to group vision;
- 2) Participative safety and trust;
- 3) Task Orientation;
- 4) Support for Innovation;

- 5) Participation in decision making;
- 6) Managing conflict and minority influence constructively;
- 7) Reflexivity.

The additional to the above seven-factor model , the term 'interaction frequency' is added due to the evidence of Anderson and West (1998), who proposed that this can be in an influential factor in larger organizations.

- 8) Interaction frequency

Several of these dimensions will now be discussed briefly as they form the foundation of the prism by which the coding was performed with the case study data.

- *Clarifying and ensuring commitment to group vision:*
West (2002b) states, "ensuring clarity of and commitment to shared team objectives is a sine qua for integrating diversity of knowledge to meet task requirements for teamwork". As discussed in the opening section of the chapter, the taxonomy structure for creativity is poly-hierarchical in nature and that creative concepts are like 'clouds in the sky'. In this case this subdivision on group creative dynamics maps to *mission clarity* which is addressed in more detail in section [4.3.3](#).
- *Participative Safety and Trust:*
According to West (2002b) safety within groups is concerned with a sense of psychological or psychosocial safety group members feel in the presence of their fellow group members, and especially during whole group interactions. Groups according to West (2002b) that develop intergroup safety and trust, will have a positive group affect, will be more creative and more innovative. Trust is an integrative theme that cuts across the organizational creativity and innovation template. It exists at the top management level, supervisor level, and at the group level. Evidence of semantics for group level trust and safety are coded at this level.
- *Task Characteristics:*
Mohrman (1995), states a team is "a group of individuals who work together to produce or deliver services for which they are mutually accountable. Team

members share goals and are mutually accountable for meeting them, they are interdependent in their accomplishments, and they affect the results through their interactions with one another.” The task itself, its nature, will influence the level of creativity and innovation.

- *Task Orientation:*

West (1990) discussed task orientation as a shared concern with excellence of quality and task performance in relation to shared vision or outcomes, characterized by evaluations, control systems and critical appraisals. This implies more than focus towards a common point, but also common control mechanisms. Some of the key classifications identified by Anderson and West (1998) that fall under task orientation are: intra-team advice, feedback and cooperation, mutual monitoring, appraisal of performance and ideas, clear outcome criteria, exploration of opposing opinions, contrastive controversy, and a concern to maximum quality of task performance.

- *Support for innovation:*

Support for innovation is an integrative dimension that cuts across the organizational creativity typology. Support exists at the organizational level, at the management level, and at the group level. According to Kanter (1988), innovation is more likely to occur in groups where there is support for innovation and where innovation attempts are rewarded rather than punished. West (1990) states support for innovation as “the expectation, the approval, and practical support of attempts to introduce new and improved ways of doing things in the work environment”. Negative aspects may include, according to West (2002a), new ideas being routinely rejected or ignored.

- *Participation in decision making:*

When team members are active in decision making of teams, which includes having influence, interacting with colleagues involved in the change process, sharing information, they tend to have a vested interests in the task outcomes (Kanter, 1988; West & Sacramento, 2012). According to Locke and Latham (2002), participation in decision making is tied significantly to data exchange, which is a key component of knowledge creation, integration and commitment (I. Nonaka, 1994). Participation in decision making is also closely related to

autonomy (Kirkman & Rosen, 2000). According to West (2002a), some of the key negative attributes to participating in decision making include social inhibition, 'free ride' aspects, and groupthink.

- *Managing conflict and minority influence constructively:*

Amason (1996) distinguishes between two types of conflict in an organizational setting: relationship conflict, and task conflict. Relationship conflict describes emotional friction between two individuals based on interpersonal relationships, while task conflict describes differences in viewpoints, ideas, and management of the task itself (Isaksen & Ekvall, 2010). De Dreu and Weingart (2003) discussed that at the root of task conflict, is a discussion of various perspectives and viewpoints, which, according to I. Nonaka (1994) and Boden (2004) are key for group creativity and knowledge creation. Relationship conflict, according to Pelled (1996) is likely to limit individuals' access to new information as well as the ability to thoroughly process this information, and forces individuals to disengage from the task at hand, hence, creativity is likely to be undermined. According to Kratzer, Leenders, and Van Engelen (2006) via a study of innovation teams, task conflict seems to be most valuable at moderate levels of conflict, and at the early stages of innovation, such as during conceptualization and incubation periods. However, the authors found that task conflict had a negative effect of team innovation during the later more execution phases when projects were less complex. Furthermore, conflict (properly managed) is critical to the avoidance of groupthink (i.e., the tendency to sacrifice quality decision making and problem solving for the sake of consensus and conflict avoidance). Troyer and Youngreen (2009) suggests it is important to think of strategies to incorporate healthy conflict to aid group problem solving endeavours. West (2002b) identifies constructive conflict to be characterized by constructive challenges, exploration of opposing opinions, frank analyzes of task-related issues, and minority insistence.

- *Reflexivity*

West and Anderson (1996) argue for the case that team reflexivity is a significant predictor of group innovation and effectiveness. West (2002b) defines 'team reflexivity' as "the extent to which team members collectively

reflect upon the team’s objectives, strategies, and processes, as well as their wider organizations and environments, and adapt them accordingly”.

Accordingly, the three traits that suggest reflexivity are: reflection, planning, and action.

In summary, the taxonomy or terms that are associated with *positive peer group* are presented in Table 25.

Concept Level 2 Positive Peer Group (Positive)	Concept Level 3
	Mutual Openness
	Humour
	Good Communications
	Diversity
	Shared Commitment of ideas
	Clarifying and ensuring commitment to group vision (mission clarity)
	Participative safety and trust
	Task orientation <ul style="list-style-type: none"> • Intra-team advice • Feedback and cooperation • Mutual monitoring • Appraisal of performance and ideas • Clear outcome criteria • Concern to maximize quality of task performance
	Support for innovation <ul style="list-style-type: none"> • Expectation of innovation • Approval • Practical support
	Participation in decision making <ul style="list-style-type: none"> • Having influence

	<ul style="list-style-type: none"> • Interacting with those in the change process • Sharing information
	Managing conflict <ul style="list-style-type: none"> • Constructive challenges • Exploration of opposing opinions • Frank analyzes of task-related issues • Minority insistence
	Reflexivity <ul style="list-style-type: none"> • Reflection • Planning • Action
	Interaction frequency
	Balance of adaptors and creators
Concept Level 2 Positive Peer Group (Inhibitors)	Concept Level 3
	Excessive task conflict
	Personal conflict
	Lack of support for innovation <ul style="list-style-type: none"> • Ideas routinely rejected or ignored
	Participation in Decision Making <ul style="list-style-type: none"> • Social inhibition • Groupthink

Table 25. Descriptors for *positive peer group*.

4.2.3 Intellectual Stimulation

The *intellectual stimulation* climate dimension is defined by Hunter et al. (2005) as the “perception that debate and discussion of ideas are encouraged and supported by the organization”. Enhanced access and interaction with new and different pockets of knowledge contributes to an individuals’ creativity (I. Nonaka, 1994), not only from the

point of view of providing ideas but by also energizing the combinatory process that underlies the production of creative ideas (M. Baer et al., 2010; Mumford & Gustafson, 1988; Perry-Smith & Shalley, 2003).

Greg R. Oldham and Baer (2012) states, "If the work context facilitates access, exposure, and the exchange of new unique information from other sources to the employee, the creativity of the employee should be enhanced." Complex and intellectually stimulating jobs / tasks require collaboration and interaction with others (Morgeson & Humphrey, 2006), and this interaction drives the acquirement and absorption of new ideas and perspectives which are important to the creative outcome (Boden, 2004; I. Nonaka, 1994).

According to Mumford and Gustafson (1988), who states, "the integration and reorganization of cognitive structures are likely to underlie creative contributions, and that the application of existing cognitive structures are likely to underlie minor contributions." A key mechanism for this to be achieved is through debate (Isaksen & Ekvall, 2010). According to S. G. Isaksen (2007), debate occurrence through encounters that include disagreements between viewpoints, ideas, different experiences, and knowledge. In this an intellectual stimulating environment Isaksen and Ekvall (2010) writes, "many voices are heard and people are keen on putting forward their ideas for consideration," and according to the same authors, where debates are missing, people follow authoritarian patterns.

Based on a situational questionnaire developed by Isaksen et al. (2001), the SOQ (Situational Outlook Questionnaire) was designed to measure attitudes, feelings, and behaviours that supported creativity and change. Key examples of debate that had high factor loadings (between debate and creative output) were; 'many different points of view are shared here during discussion' (0.92), 'differences of opinions are frequently expressed here' (0.86), 'people here often exchange opposing viewpoints' (0.81), and 'a wide variety of viewpoints are expressed here' (0.78).

Estes and Ward (2002) and Mumford and Hunter (2005) further supports the idea of debate specifically during the incubation phases of creativity and innovation by suggesting, as ideas develop, exploration of new concepts, alternative ideas originating from these concepts, needs to be evaluated, debated, and assessed. Incremental

evaluation running in parallel with debate is key part of creative output (Mumford & Hunter, 2005).

Debate is distinguished from negative conflict which is considered to be the presence of personal and emotional tensions in the organization (Isaksen & Ekvall, 2010).

Debate is focused on task or idea conflict / tension, which can evolve into personal conflict. Personal conflict, which can begin with constructive debate, then undermines task conflict and has a negative impact on creativity (Isaksen & Ekvall, 2010). From the SOQ (Situational Outlook Questionnaire) referenced above Isaksen et al. (2001) suggested key negative conflict items with significant loadings (between conflict and creative output), that negatively affect intellectual stimulation include: ‘there is a great deal of personal tension here’, ‘there is quite a few people here who cannot tolerate each other’, ‘there are power and territory struggles here’. With less personal conflict, people accept and deal effectively with diversity (Isaksen et al., 2001). In a qualitative study, testing the validity of the SOQ, Isaksen et al. (2001) tested its dimensions, which includes debate and conflict, against groups of professionals who worked in both good example of innovation and worse case examples of innovation. In this study, it was demonstrated that there was an inverse relationship between debate and conflict, i.e. in the cases of environments where innovation was high, measures of debate were high, and measures of negative conflict were low, and in cases of environment where innovation was low, measures of debate were low, and measures of negative conflict were high.

According to I. Nonaka (1994), knowledge is created in an organization from a constant conversation between tacit and explicit information from a diverse set of stakeholders. The dimensions identified above map well as facilitators and inhibitors for towards this process. Table 26 summarizes a literature review on *intellectual stimulation*.

Intellectual Stimulation (positive)	
	many different points of view are shared here during discussion
	differences of opinions are frequently expressed here
	people here often exchange opposing viewpoints

	a wide variety of viewpoints are expressed here
	People accept diversity
Intellectual Stimulation (inhibitors)	
	Authoritarian patterns
	There is a great deal of personal tension here
	There are quite a few people here who cannot tolerate each other
	There are power and territory struggles here

Table 26. Descriptors for *intellectual stimulation*.

4.2.4 Positive Interpersonal Exchange

The *positive interpersonal exchange* climate dimension is defined by Hunter et al. (2005) as “employees perceive a sense of togetherness and cohesion in the organization. Employees experience little emotional or affectively laden conflict in the organization.”

As identified in Hunter (2016), *positive interpersonal exchange* is part of the overall dimension that facilitates and promotes the sharing of ideas between members of a workgroup. As mentioned in the above sections, the extant literature supports the perspective that interpersonal support provided by colleagues and supervisors generally relates to creativity (T. M. Amabile, 1996; T. M. Amabile & Conti, 1999; Basu & Green, 1997; Choi, 2004; Lim & Choi, 2009).

Individuals who identify with their proximal work group, and who interact with positively colleagues are likely to develop shared patterns of understanding and norms of behaviour (Campion et al., 1993). According to Gong, Huang, and Farh (2009), mutual inspiration among colleagues provides meaning, and results in a more energized environment and a willingness to make the effort, take risks etc., which are key components of creative endeavours.

George (2007) promotes that a coherent theme has emerged in the literature that suggests that positive affective states promote more flexible and divergent thinking and related cognitive processes that support creativity. Examples of positive effective states include signals that all is well, good progress has been made and current efforts are sufficient (Johnson & Tversky, 1983). However, not all interaction between colleagues are realistically positive, for example providing information that current efforts are insufficient, which can lead to lower levels of confidence in progress, etc. (George, 2007). George and Zhou (2002) hypothesized and demonstrated when negative signals are controlled by a supportive context covering trust, intrinsic rewards, and clarity of motivation and feelings, negative signals can be positively correlated with creativity because if presented constructively people in negative affect states use the mood as feedback and may exert higher levels of effort to come up with creative ideas.

‘Anti-social behaviours’, within an organizational context possibly depresses creativity. These include: intimidating colleagues and subordinates, dispensing punishment, micromanagement (Lim & Choi, 2009). This correlates with personal conflict as discussed in the previous section of *intellectual stimulation*. The extant findings on *positive interpersonal exchange* are now summarized in Table 27.

Positive Interpersonal Exchange (Positive)	
	Support
	Signals of progress
	Trust
	Rewards
	Clarity
Positive Interpersonal Exchange (Inhibitors)	
	Conflict (personal) <ul style="list-style-type: none"> • Intimidation • Dispensing Punishment • Micro-Management

Table 27. Descriptors for *positive interpersonal exchange*.

4.3 Dimension 3: Leadership Influence and Direction

4.3.1 Concept discussion

In this section, a granular look at what it means for *leadership influence and direction* is undertaken. Three of the 13 taxonomy level items by Hunter et al. (2005): *positive supervisor relations*, *mission clarity*, and *participation*, are included in this section.

The first concept that is discussed is *positive supervisor relations*. However the three dimensions identified above load within the same base dimension (*leadership influence and direction*) as indicated by Hunter (2016). These will be introduced and discussed when appropriate.

4.3.2 Positive Supervisor Relations

It is pertinent to start a discussion around what is leadership, and more importantly what is perceived as positive leadership in the eyes of the followers of leaders, which constitutes 'climate' (Carr et al., 2003). As stated by T. M. Amabile, Schatzel, Moneta, and Kramer (2004), "of all of the forces that impinge on people's daily experience of the work environment, one of the most pertinent and potent is likely to be leadership". Hunter (2016) estimates that the success rate of creative projects is 1 in 20, and states, "creative projects will not see the light of day if not for the support of management in the organization". Göran Ekvall (1997) states, "Leadership behaviour has a major influence on the perceptions people have about the climate for creativity".

In a study, T. M. Amabile et al. (2004) proposed the question, "what is it that leaders say and do, that leads people to perceive that they do or do not have their leader's support?" Having identified this as a gap in the literature, T. M. Amabile et al. (2004) proposed two specific questions:

Research question (1): Do a subordinate's day-to-day perceptions of team leader support relate to the subordinates' overall creativity?

Research question (2): How do specific day-by-day leader behaviour relate to positive and negative day by day subordinate perceptions of leader support?

These questions align well with the overarching research question of this thesis. Not only does the research by T. M. Amabile et al. (2004) investigate the views of the team leader from the subordinate's point of view, but within the context of how it relates to creative output. Regarding research question (1), T. M. Amabile et al. (2004) found that overall perceived leader support is a significant aspect of the work environment for creativity.

In order to answer question 2, T. M. Amabile (1988) used the componential theory of organizational creativity which presented eight features including perceived leader support, which was termed, 'supervisory encouragement'. According to the theory initiated by T. M. Amabile (1988), positive supervisor support influences employees creativity through, direct help with projects, skills set development, and of key importance, intrinsic motivation. T. M. Amabile (1997) suggests that behaviours of positive supervisors include: serving as a good role model, planning and setting goals appropriately, supporting the work group within the organization, communication and interacting well with the workgroup, valuing individual contributions to the project, providing constructive feedback, showing confidence to the workgroup, and being open to new ideas. Broadly speaking, leader support can be grouped under 'instrumental' (task focused) and 'socio-emotional' actions (T. M. Amabile et al., 2004). Expanding on these concepts, Wang and Cheng (2010) described 'benevolent leadership' which is a branch of socio-emotional leadership as described above and found a positive relationship with employee creativity when controlled by autonomy. An additional expansion of socio-emotional leadership is the concept of transformational leadership which is heavily related to empowerment and autonomy (Ahearne, Mathieu, & Rapp, 2005). According to Greg R. Oldham and Baer (2012), transformational leadership, also a branch of socio-emotional leadership, involves activities such as intellectual stimulation, idealized influence, inspirational motivation, and individualized considerations.

The longitudinal study by T. M. Amabile et al. (2004), by which the understanding of what constitutes leader support on a day to day basis is based, collected data by mixed methods covering 238 knowledge workers from 26 project team in 7 companies (chemicals, high tech and consumer products). The data collection techniques utilized

by were an initial quantitative survey using the Managerial Practices Survey (MPS) by Yukl (2002) followed by qualitative interviews, and diary note taking.

The results from the study, for perceived leader support, yielded by T. M. Amabile et al. (2004) is shown in Table 28, and is utilized as the expanded Level 3 in the theoretical classification.

Positive Supervisor Relations (Positive)	
	Showing support for a team members actions or decisions.
	Helping alleviate stressful situations for subordinates
	Socializing
	Keeping members informed about stressful issues
	Addressing subordinates' negative feelings
	Disclosing personal feelings and information
	Absence of an expected negative or alteration of a negative pattern
	Maintaining regular contact with and providing general guidance to subordinates
	Providing constructive feedback on work done
	Monitoring progress in a timely manner
	Reacting to problems in the work with understanding and help
	Absence of an expected negative or alteration of a negative pattern
	Recognizing good performance in private
	Recognizing good performance in public
	Acting on subordinates' ideas or wishes
	Asking for team members ideas and opinions
	Collaborating with subordinates
	Expressing emotion observable by subordinates
Positive Supervisor Relations – (Inhibitors)	

	Creating high time pressure with assignments
	Giving assignments that are not appropriate for the team member
	Not providing enough clarity for an assignment
	Changing assignments or objectives too frequently
	Assigning the conflict with other management instructions
	Checking on the status of assigned work too often
	Inadequate understanding of subordinates' capabilities or work
	Providing nonconstructive feedback on work done
	Checking on the status of assigned work for too long
	Display lack of interest in subordinates work or ideas
	Avoiding solving problems
	Creating problems

Table 28. Descriptors of *positive supervisor relations*.

These leader behaviour categories map well into the literature of other researchers. For example, T. M. Amabile (1996) demonstrated that evaluating creative contributions powerfully has the ability to shape an individual's creativity. This aligns to the 'monitoring – (positive)' category above. G. R. Oldham (2002) demonstrated that judgment evaluations involving others, e.g. from a manager, subject matter expert, or group team member, assessing creativity in a manner which causes the individual to react defensively, aligns to the 'monitoring – (negative)' category above. The latter is expected to have a negative impact on creativity, since the environment may cause the individual to dismiss any ideas that may be forthcoming (Greg R. Oldham & Baer, 2012) which aligns to the conclusions of T. M. Amabile et al. (2004). In contrast to judgment evaluations, development evaluations are non-judgmental in nature and intended to provide the individual with direction and support in developing creativity skills (Shalley, 1995). Individuals anticipating constructive criticism in a development environment are open to new perspectives and approaches, since information is digested and perceived as an attempt to enhance creativity (Greg R. Oldham & Baer, 2012). This again aligns to the 'monitoring – (positive)' category

above and to the conclusions by T. M. Amabile et al. (2004). In summary, the above exhibitors provide a good foundation in which to suggest the value and contribution of the case study data.

As highlighted above, the other two intertwined dimensions with leadership are *mission clarity*, and *participation*, which will be now be further discussed.

4.3.3 Mission Clarity

Intuitive as a product of leadership, is the ability to formulate and communicate direction, or *mission clarity*. Hunter et al. (2005) defines the climate of *mission clarity* as “The perception and awareness of goals and expectations regarding creative performance.” In this section *mission clarity* is examined in relation to creativity and how it is exhibited on a day to day basis. This will then allow a comparison to be made against the case study data and any differences to be highlighted.

Conscious goals affect action (T. A. Ryan, 1970). A goal as stated by Locke and Latham (2002) is “an object or aim of an action, for example, to attain a specific standard of proficiency within a specific time limit.” In terms of an organizational context, the focus is on the relationship between conscious performance goals, and the level of performance (both task and creative).

According to Shalley (1991), creative goals represents articulated and framed challenges that enhance an individuals’ intrinsic motivation. Accordingly, goals are effective in encouraging focus on particular facets of a task that has creative yields, for example gathering of information, etc., and would activate several of the cognitive activities needed for creativity. In contrast, again according to Shalley (1991), not having a creative goal, may discourage intrinsic motivation, and temper down the investigation of various knowledge frameworks. Having a goal also allows a framework for feedback, evaluation, and constructive leadership guidance, as discussed in the previous section.

The literature distinguishes between two types of goals: productivity, and creative goals (Greg R. Oldham & Baer, 2012; Shalley et al., 2004). Productivity goals are objectives of the type ‘produce X units in 20 mins’, and creative goals are of the type

'produce novel, useful ideas in 20 mins' (Greg R. Oldham & Baer, 2012). Further, Locke (1976) suggests that goals have two specific characteristics: difficulty and specificity. Shalley (1995) states, a "great deal of laboratory and field research has been conducted on goal setting, with a major finding being that setting goals increases productivity when individuals accept specific difficult goals and receive evaluative feedback. Little comparative research, however, has examined the effect of goals on creativity or how creative goals affect various aspects of performance."

There is some evidence in the literature, however, of occasions where performance and creative goals conflict with each other resulting in a diminishing return on creativity output (G. R. Oldham & Cummings, 1996). According to T. M. Amabile, Hadley, and Kramer (2002) who states, "when tight deadlines or production deadlines are present, individuals are expected to feel pressured to meet these deadlines or goals, resulting in lowered intrinsic motivation and creativity". Greg R. Oldham and Baer (2012) offer additional coherence of this view by stating, "when individuals are assigned challenging performance goals, they are likely to focus their attention and energy on attaining these goals, and as a consequence, have less time and energy available to seek out or attend to new ideas and perspectives." Accordingly this results in lower creativity. The inverse of this perspective as stated by Shalley et al. (2004) are that, "those assigned to creativity goals seek out new perspectives and knowledge since this information may increase the chances that they will achieve the creative goal that has been assigned. In addition, creativity goals are likely to cause individuals to focus their attention on the task itself, thereby enhancing engagement and creativity."

M. Baer and Oldham (2006) challenged the literature's view that time pressure stifles creativity by reducing the extent to which employees engage in exploratory thinking and also causing them to rely on familiar algorithms when approaching problems. In a study, M. Baer and Oldham (2006) distinguished between time pressure (which is non-creative related) and creative time pressure. Using 170 employees and 10 managers in a manufacturing company M. Baer and Oldham (2006) found that there was a curvilinear relationship between creative time pressure and creativity. Further, the study showed that individuals who scored high on openness (personality) and received high levels of support from their team and management moderated the U-shaped

relationship, in that they exhibited higher levels of creativity, than those who scored lower on openness and those who received lower levels of support.

In summary, the taxonomy or terms that are associated with *mission clarity*, are captured in Table 29.

Mission Clarity – Positive	
	Stated action and aims with regard to creativity
	Requirements
	Creative time pressure
Mission Clarity – Inhibitors	
	Unrealistic performance goals
	Keeping the lights on
	Excessive time pressures
	Loosing sight of big picture
	Excessive creative time pressure

Table 29. Descriptors for *mission clarity*.

4.3.4 Participation / Engagement

Hunter et al. (2005) define the *participation* dimension as, “Perception that participation is encouraged and supported. Communication between peers, supervisors, and subordinates is clear, open, and effective.” Rich, Lepine, and Crawford (2010) suggests that engagement and employee participation are key mechanisms mediating a variety of individual characteristics and organizational factors to job performance. West and Sacramento (2012) suggest that when *participation* in a team is high, then creative output is also high.

Kahn (1990) defined *participation* and engagement as “the simultaneous employment and expression of a persons preferred self in task behaviours that promote connections to work, and to others, personal presence (physical, cognitive, and emotional) and active, full performances.” Kahn (1992) theorizes three direct psychological conditions for engagement expressed in personal internal questions that

people ask themselves: (1) How meaningful is it for me to bring myself into this performance? (2) How safe is it to do so? (3) How available am I to do so? Kahn (1992) also proposes three antecedents of participation that must act simultaneously: value congruence, perceived organizational support, and core self-evaluations. Rich et al. (2010) suggests that the three traditional views of job performance: job involvement, job satisfaction, and intrinsic motivation, are not distinct dimensions to job performance but simultaneous investments mediated by engagement and *participation*.

According to Rich et al. (2010) those who are engaged or display high *participation* are likely to step outside the bounds of their normally defined jobs and engage in acts that may benefit the work group or organizations. This suggests that *participation* supports weathering the creative dimension of chaos (I. Nonaka, 1994). Rich et al. (2010) states, "People with high *participation*, harness their full selves in active, complete work role performances by driving personal energy and physical, cognitive, and emotional labours. Engaged individuals are described as psychologically present, fully there, attentive, feeling connected, integrated, and focused in their role performance. They are open to themselves and others, connected to work and others, and bring their complete selves to perform".

This perspective is supported by M. Baer et al. (2010) who states, "Individuals who are fully engaged in their work are curious and are more willing to take risks, such as experimentation, etc., factors important in the creative process". Further support is provided by Greg R. Oldham and Baer (2012) who states, "engagement suggests that creativity is enhanced when employees are fully engaged in their tasks." Finally *participation* means that employees should be attentive, emotionally connected, and totally focused on their full work tasks and performance (May, Gilson, & Harter, 2004).

In an analysis Rich et al. (2010), suggested that the traditional themes that correlate to job performance, i.e. job involvement, job satisfaction, and intrinsic motivation are singular depictions of the self. Job involvement harnesses from the cognitive investments that an individual invests, job satisfaction the affective investment, and intrinsic motivation the effort and persistence investments. Rich et al. (2010) suggested that if the self is viewed in a broader sense, for example the simultaneous

investments of the self via job involvement, job satisfaction, and intrinsic motivation, then a more comprehensive explanation of job performance is attained. This enhanced paradigm, as suggested by Rich et al. (2010) is mediated by *participation*.

Kahn (1992) suggests that participation behaviour is observed through the behavioural investment of personal physical, cognitive, and emotional energy into work roles. Contexts or dimensions that undermine participation or engagement should contribute to lower creativity levels (Greg R. Oldham & Baer, 2012).

Table 30 summarizes the literature discussed attributes regarding *participation*.

Participation – Positive	
	Physically involved in tasks
	Cognitively vigilant
	Focused
	Attentive
	Emotionally connected to work
	Emotionally connected to others (in the service of the work)
Participation - Inhibitors	
	Disengaged at work
	Withhold physical energy
	Withhold cognitive energy
	Withhold emotional energy
	Robotic
	Passive
	Detached

Table 30. Descriptors of *participation*.

4.4 Dimension 4: Organizational Support

4.4.1 Concept Discussion

In addition to individual, team, and immediate supervisory factors, Anderson and West (1998) suggest that creativity requires instrumental support from the organization.

In this section, a granular look at what it means for *organizational support* is undertaken, with the overarching objective of reviewing the literature regarding how this dimension is exhibited in the workplace. Three of the 13 taxonomy level items by Hunter et al. (2005); *resources*, *top management support*, and *reward orientation* are included in this section.

The first concept that is discussed is *resources*. However the three dimensions identified above load within the same base dimension (*organizational support*) as indicated by Hunter (2016). These will be introduced and discussed when appropriate.

4.4.2 Resources

Hunter et al. (2005) defines the climate *resources* dimension as the “perception that the organization has, and is willing to use resources to facilitate, encourage, and eventually implement creative ideas”. West and Sacramento (2012) writes, “aside from the obvious practical limitations that a lack of resources impose, individual perceptions of the adequacy of resources may also lead to beliefs about the intrinsic values of the task, which will have obvious implications for individual commitments.” Dougherty and Hardy (1996) conducted a 2 year longitudinal study of 15 large (accumulated annual revenue of \$9.4bn in 1996 rates) and mature firms, to determine the role and how resources were used and connected to innovation capabilities. The qualitative study found that resource availability was considered critical to innovation capabilities. In a qualitative study comparing the various stages of the creative and innovation process, Delbecq and Mills (1985) compared the dynamics of low innovation organizations to high innovation organizations, and concluded, “innovation in organizations is dependent on the interaction among three variables: motivation, overcoming inhibitors, and *resources*.”

Although it seems from the literature there is a perspective that *resources* are a critical parameter to creative and innovative output, there seems to be a gap in the literature around the question what are the exhibitors of resources in the workplace in terms of climate attributes.

From the case study dataset, what emerged as a dominant theme of resources was the concept of time, time restrictions, and idea time, all of which can be considered resources (to be discussed in Chapter 7). In the literature, there are discussions and empirical data concerning time, and time pressure, which will now be discussed, with the objectives of interpreting the case study data.

Greg R. Oldham and Baer (2012) state, “When individuals are assigned challenging performance goals they are less likely to focus their attention and energy on attaining these goals, and hence have less time and energy available to seek out or attend to new ideas and perspectives.” The lack of time, or time pressure relates to a negative impact on creativity (T. M. Amabile et al., 2002). Possible root causes of the negative correlation include the reduced likelihood that individuals can collect and correlate different points of view and exploit tacit knowledge exchanges (Greg R. Oldham & Baer, 2012) which are the basis of organizational creativity (I. Nonaka, 1994). Or it can also extend to the reduced likelihood that individuals have the capacity to examine all parameters of a given problem situation in order to gain a comprehensive understanding of what it is they need to do (J. Andrews & Smith, 1996; M. Baer & Oldham, 2006; Boden, 2004).

In addition, and pertinent to creative tasks, research on incubation on subconscious think time, suggests that when trying to find creative ideas or solutions it is beneficial to take a break from task-related activities (Jett & George, 2003). An explanation by Dijksterhuis and Meurs (2006) suggests that sometimes when people are consciously working on a task, there is a mental limitation from considering alternative perspective. That is, according to George (2007), people consciously approach tasks with a certain mental set of heuristics, schemas, assumptions, and biases that can limit their creative insights. Taking a break, or engaging in a different activity may be beneficial, as when people return to the focal task, they may approach it with a different mental set and prior blocks to creative ideas may no longer exist (Dijksterhuis

& Meurs, 2006). Conscious thought tends to operate in a focused, top-down manner and rely on expectations, whereas unconscious thought tends to be a more bottom-up thought process and more divergent (Dijksterhuis & Meurs, 2006). Social-psychological research supports the notion that on relatively complex tasks, allowing time for unconscious thought leads to better outcomes than relying exclusively on conscious thought. Reduced time as a resource, reduces this creative necessity (Dijksterhuis & Meurs, 2006). Time as a resource is poly-hierarchical in the theoretical framework, as it is discussed in several other dimensions, such as *mission clarity*, for example.

Empirical evidence in the literature supports the presented perspectives on time as a resource. In a study of 193 marketing product managers, J. Andrews and Smith (1996) confirmed two hypotheses (1) the greater the time pressure perceived by participants, the less the creativity output, and (2) the effects of (a) knowledge of the operating environment (b) knowledge of the macro environment, (c) diversity of experience, and (d) diversity of education all diminished as time pressure increased. Finally, in an ethnographical study of 177 employees covering 22 teams, T. M. Amabile et al. (2002) discovered that during times of high time pressures, participants were 45% less likely to think creatively. However as mentioned in section 4.3.3 (Mission Clarity), M. Baer and Oldham (2006) do suggest a curvilinear relationship between time pressure and creative output.

Both in the TCI (Anderson & West, 1998) and the CCQ (Göran Ekvall, 1996) creativity and innovation measuring instruments, resources is not measured or explored. In the KEYS framework (T. M. Amabile et al., 1996), resources is briefly explored by the simple question, "Is there enough resources?" It can be assumed that due to the unavailability of granular studies that suggest how resources are discussed or exhibited in the workplace, this research potentially contributes to a gap in this regard with Pharma IS organizations.

Based on KEYS, the typology of describing resources is captured in Table 31.

Resources – Positive	
	There are enough resources in order to perform creative and innovative tasks
Resources – Inhibitors	
	There are not enough resources to perform creative and innovative tasks.
	Time constraints

Table 31. Descriptors for *resources*.

4.4.3 Top management support

The climate dimension, *top management support*, is defined by Hunter et al. (2005) as “Perceptions that creativity is supported and encouraged at the upper levels of the organization.” West (1990) defines this concept as “the expectation, approval, and practical support of attempts to introduce new and improved ways of doing things in the work environment.” This level of support, although connected, is distinct from the *positive supervisor relation*, in the sense that the latter is more proximate to the individual. In a practical sense, *top management support* is synonymous to ‘Executive Sponsorship’ which is a day to say term used in the Pharmaceutical IS domain.

The literature provides some indication of how *top management support* is exhibited in the workplace. In the SSSI (Siegel & Kaemmerer, 1978) creative climate measuring instrument, support at the top level is characterized by several factors: (a) the initiation and development of new ideas are supported throughout the system (b) there is a diffusion of power throughout the system (c) there is a support of personal development of individuals (d) the system respects member's capacity to function creatively.

T. M. Amabile et al. (1996) characterizes *top management support* as (1) the encouragement of risk taking and of idea generation from the highest to the lowest levels of management (2) fair and supporting evaluation of new ideas (3) reward and recognition of creativity.

Siegel and Kaemmerer (1978) identified several traits to explore as inhibitors for *top management support*: (a) managers get the credit for other ideas (b) persons at the

top have a lot more power than persons lower in the organization (c) the leadership acts like the teams are not very creative (d) the power of final decision-making can always be traced to the same few people (e) the main function is to follow orders that come down through the channels (f) the leaders 'pets' are in a better position to get their ideas adopted than others.

Tesluk et al. (1997) adds that *top management support* contribution to the creative climate is demonstrated by the behaviour of the management themselves, and perhaps codified in mission statements, etc. The exhibitors discussed for *top managers support* is described in Table 32.

Top Management – Positive	
	Top level support for the initiation and development of new ideas.
	Autonomy
	Personal development
	Respect capacity to function creatively
	Support Risk taking
	Reward and recognition
	Innovation is codified in mission statements, etc.
Top Management – Inhibitors	
	Managers taking credit for creativity
	Decisions are concentrated at the top
	Leadership behaves like teams are not creative
	Expected to follow orders coming down
	Creativity is based on 'clique' groups

Table 32. Descriptors for *top management support*.

4.4.4 Reward orientation

As mentioned above, *reward orientation* is interconnected with *top management support*, as can be expected. According to Hunter et al. (2005), the climate dimension

of *reward orientation* is defined as, “Perception that creative performance is tied to rewards in the organization.” Tesluk et al. (1997) defines reward orientation as, “the extent that rewards and evaluations are allocated on the basis of creativity and innovative results”. According to Tesluk et al. (1997), the types of mechanisms that communicates rewards, includes: financial rewards, promotions, formal or informal recognition, increased authority, or enhanced feelings of self-worth and competence. Erez (1992) through an ethnographical study of Japanese firms observed that highly innovative firms implemented reward structures that tapped into their social status and feelings of seniority, which are important motivational factors in Japan. As discussed in section 3.3.2 (Motivation), rewards should be designed as not to contaminate the individual’s sense of intrinsic motivation, but rather facilitate it (T. M. Amabile, 1988). Financial rewards according to the literature should play particular focus to intrinsic motivation. According to Greg R. Oldham and Baer (2012) financial rewards has a duality effect on creative input depending on the perspective and interpretation of the individual. On the one hand, in some cases, financial rewards may reduce interest and engagement in work roles, by an interpretation of being controlled and manipulated, resulting in a disengagement from the task and losing energy on the task itself (E. L. Deci & Ryan, 2000). On the other hand, financial rewards for creative output may inspire individuals to scan their environment for new ideas and perspective, which are important for knowledge creation (I. Nonaka, 1994; Shalley & Gilson, 2004). Tesluk et al. (1997) suggests that a climate that is *reward orientated*, will display (1) rewards and recognition practises that encourage intrinsic motivation, and (2) evaluation of new ideas based on the contribution of ideas, and not the creators place in the organizational hierarchy. These are captured in Table 33.

Reward Orientation – Positive	
	Rewards and recognition practises that encourage intrinsic motivation.
	Recognition at all levels of the organization where idea originated.
Reward Orientation – Inhibitors	
	Rewards not part of system

Table 33. Descriptors from *reward orientation*.

4.5 Dimension 5: Organizational Integration and Extension

4.5.1 Concept discussion

In this section, a more granular perspective for climates exhibitors concerning *organizational integration and extension* is undertaken, with the overarching objective of reviewing the literature for how this dimension is exhibited in the workplace. Two of the 14 taxonomy level items by Hunter et al. (2005): *organizational integration*, and *flexibility and risk taking* are included in this section.

The first concept that is discussed is *organizational integration*. However *flexibility and risk taking* loads within the same base dimension in the theoretical framework as indicated by (Hunter, 2016). These will be introduced and discussed when appropriate.

4.5.2 Organizational Integration

Hunter et al. (2005) define the climate of *organizational integration* as, the “Perception that the organization is well integrated with both internal and external factors.” Hunter et al. (2005) place a priority on internal teams, etc., but has also included suppliers, partners, etc., as external factors or links. Partnerships and outsourcing tasks were discussed as a Pharma industry strategy in the literature review section, [Chapter 1](#).

A key component proposed in this dimension is the repeated theme of ‘idea exchange’ (Hunter, 2016). Cross-functional capabilities is a necessary dynamic to achieve organizational innovations (Thamhain, 2003). A key challenge of organizations in addition to the generation of ideas is the effective transfer and development of knowledge through the various stages from conceptualization to implementation. This requires interdisciplinary teamwork across various functions including suppliers and partners if appropriate (Thamhain, 2003). The SECI model by I. Nonaka (1994) was discussed in the literature section, as a facilitator of knowledge creation, but in addition Bilton and Cummings (2007) discusses the challenges of matrix teams and overspecialization in organizations.

Matrix teams are flexible organizational structures which allow managers to assemble and deconstruct project-based teams based on needs. It is relevant because this is the structure of the case study environment, and is discussed in the case study data.

Bilton and Cummings (2007) suggest that challenges with organizational integration with respect with matrix teams and creative expectations are several:

- 1) Successful integrated teams should contain a good mix of adaptors and creators (Kirton, 1984);
- 2) Accountability and communication between the horizontal lines of the project team, and the functional based hierarchies leaves room for confusion, buck-passing, and prevarication;
- 3) Matrix structures also potentially limit organizational learning and personal development. Individually, the matrix can become 'a kind of straitjacket' according to Bilton and Cummings (2007);
- 4) Teams can lose sight of the 'big picture' because team members focus solely on their areas of specialization.

Bilton and Cummings (2007) suggests a couple of exhibitors from multi-discipline teams that correlate to creative output;

- a) Specialization is married to flexibility to adapt to other people and their contexts. Organizational members embrace different types of experience and styles of thinking;
- b) Team members play multiple roles.

In a survey design and exploratory qualitative research, covering 74 R&D teams, Thamhain (2003) found an effect size correlation between *organizational integration* and creative output to be strong. The authors also documented the following derived indicators for this dimension;

- 1) Cross-functional cooperation;
- 2) Effective communications;
- 3) Planning and support systems;

4) Goals and priorities.

In addition Thamhain (2003) suggests that Project Management indicators are also part of the *organizational integration* dimension. The indicators for Project Management within the context of *organizational integration* are indicated as Thamhain (2003):

- a) Project Planning;
- b) Functional support systems;
- c) Project tracking;
- d) Cross-functional support / top management support.

The literature exhibitors for organizational integration are summarized in Table 34.

Organizational Integration – Positive	
	Idea exchange and Knowledge Creation dynamics are prevalent. SECI model.
	Good mix of adaptors and creators
	Specialization with flexibility
	Multi-tasking
	Cross-functional co-operation
	Mission clarity
	Project planning
	Functional support systems
	Project tracking
	Cross-functional support / Top management support
Organizational Integration – Inhibitors	
	Confusion for management accountability and communication
	Constraints on organization learning
	Constraints on personal development
	Losing sight of big picture

Table 34. Descriptors for *organizational integration*.

4.5.3 Flexibility and risk taking

One of the key tenets of the creative process, is the need to travel uncharted grounds and deviate from heuristic approaches (Boden, 2004). In essence, creativity is a risky path for organizational members, as it usually involves a challenge to the status quo. George (2007) states, “given that organizational structures and routines are developed to enhance predictability and control, creativity can be seen as raising levels of uncertainty and reducing predictability and control. Creativity can also be risky as there is always an associated risk of failure and mistakes.” Risk-taking from a team based perspective is defined by Isaksen and Lauer (2002) as “the degree to which a team can tolerate ambiguity and make decisions with some uncertainty.” Teams members according to Isaksen and Lauer (2002), who accept risk taking, are prepared to live with the potential negative consequences of decisions.

Isaksen and Lauer (2002) described the traits of an organization’s risk-taking as feelings that they can ‘take a gamble’ on ideas, or they often ‘go out on a limb’. Göran Ekvall (1996) includes ‘prompt decision taking’, ‘experimentation’, and ‘opportunity seeking’ as exhibitors. In contrast, the traits in risk avoiding organizations, according to Isaksen and Lauer (2002) include: ‘being overly cautious’, ‘hesitant mentality’, ‘lack of decisiveness’, ‘over analysis’, and avoidance language such as ‘sleep on the matter’.

Creativity may be discouraged if there is a work context signal that indicates a potential negative repercussion that may accompany creative ideas. In the same theorizing, creativity may be encouraged if ‘signals of safety’ are present (George, 2007). ‘Participant safety’, or ‘psychological safety’ as identified by West (2002b) serves as mitigating approaches for risk taking and flexibility, and is covered by the *positive member exchange*, and *leadership support* concepts. Exhibitors for *flexibility and risk taking* are described in Table 35.

Flexibility and Risk Taking – Supporting	
	Acceptance to go take a gamble
	Prompt decision-making
	Experimentation
	Opportunity seeking

Flexibility and Risk Taking – Inhibitors	
	Overly cautious
	Paralysis by over-analysis
	Hesitant mentality
	Indecisive

Table 35. Descriptors for *flexibility and risk taking*.

4.6 Summary of chapter

This chapter presented a more in-depth literature review on the theoretical framework presented in Chapter 3. It examined the meaning of each of the 13 creative climate facets, and how they are exhibited in the workplace. Both positive and inhibitor attributes were literature reviewed, and were summarized as exhibitors for each of the dimensions. For example, *autonomy* as a classification concept was identified in the theoretical framework. What *autonomy* means in a work environment, and how team members express supporting and negative traits for *autonomy* were researched in a literature review. For example, *absence of direct supervision or micromanagement*, and *unconstrained choice of task approach by teams* were identified by the literature as positive attributes to a work environment with *autonomy*. As explained in Chapter 5, the nodes from the case study are compared to these more granular constructs of the theoretical framework and presented in Chapter 6.

This enhancement of the theoretical framework forms Level 3 of the theoretical framework, and can be considered new knowledge generated.

Chapter 5: Research Methodology

5.0 Introduction

“Research designs are about organizing research activity, including the collection of data, in ways that are most likely to achieve the research aims” - Easterby-Smith (2015).

A good methodology guides the investigator in the process of collecting, analyzing, and interpreting observations (Yin, 2009). The journey from conceptualizing a research question, to designing a methodology to answer that question or need, needs to be aligned in a coherent manner (Braun & Clarke, 2006). Underlying these alignments, the researchers ontological and epistemological approaches must also be coherent. This section deals with detailing the research methodology journey and the decisions criteria taken / justified.

Easterby-Smith (2015), Figure 14, provides the metaphor of a tree to demonstrate alignment, and forms the basis of the approach.

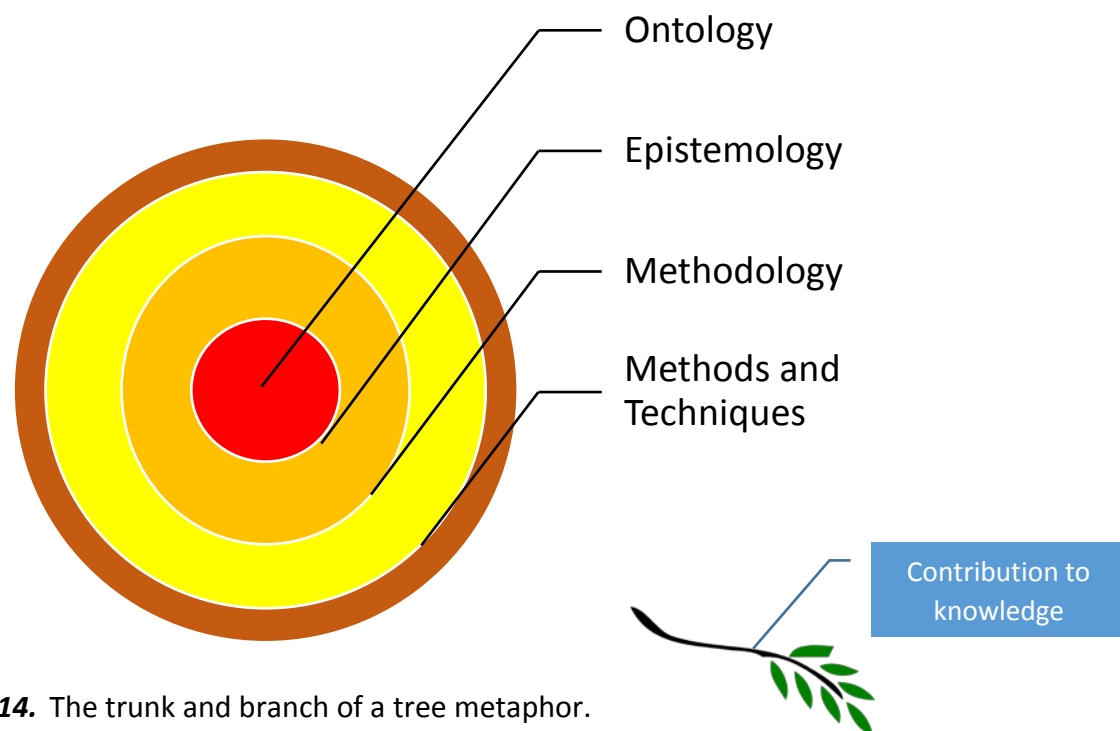


Figure 14. The trunk and branch of a tree metaphor.

The fruit of the labour, using the tree metaphor, would be the leaves, which represents the knowledge that that is being contributed. The various positioning and decisions on options to achieve the overarching objectives are now discussed.

5.1 The research questions and their nature

The research question, its nature and dynamics, plays an important part, in addition to ontology and epistemology considerations, to the choices of research design and methodology (Benbasat, Goldstein, & Mead, 1987; Dey, 2005). Hence it seems like the natural place to start the thought process that will define what was done, and the process adopted, in order to contribute to the knowledge that is endeavoured.

5.1.2 The foundation of the enquiry

From the literature research section (Chapters 3 and 4), a gap was identified in terms of understanding what drives creativity and innovation in Pharma IS (both from barriers and enablers perspective). How technology is conceptualized, developed, and utilized, plays an important role in how drugs are developed and supplied to the marketplace, which has the ultimate aim of improving human health. According to G. L. Parsons (1983), some companies use IS systems more effectively as a strategic weapon than others.

Creativity, from an organizational point of view, is a relatively new field of study (West & Sacramento, 2012), although it has been studied extensively from an individual point of view. According to Bilton and Cummings (2007), creativity and innovation have been historically treated as something abstract and mystical in the organization, as a distinct operation, separate to delivery mechanisms. Although distinct ideas may be created by individuals, the coming together of ideas, and value, involves a team of people (T. M. Amabile, 1997; I. Nonaka, 1994). Fuglsang and Sundbo (2007) depicts innovation as a social system. The output of this research can be depicted as a 'social code' for this social system.

There has been work regarding innovation / creativity / knowledge creation climates at an organizational level (West & Sacramento, 2012). The use of an innovation climate

lens to make sense of the Pharma IS world, can assist in the articulation of the contribution to knowledge. This was covered in detail in the literature research chapter. The outputs of these works are generally a typology type of categorization. Carr et al. (2003) produced a molar level typology for organizational climates to demonstrate its impact on the affective states of team members. By 'molar', it is meant that the classifications are not granular or specialized. Carr et al. (2003) recommends to dig deeper into more granular climate constructs, for example safety climates. Hunter et al. (2005) produced a more granular typology for organizational creative climates. The net that was cast for this work was wide: across several industries, and covering various parts of the organization, etc. As eluded in the literature research, few studies have been conducted in the pharmaceutical / biotechnology domains, and fewer have been focused on leveraging the use of technology for innovative outcomes in these organizations. This thesis contribution therefore, is to produce more granularity and understanding (Hunter et al., 2007) for a pharmaceutical / biotechnology IS climate for creative and innovation outputs. As an example, Hunter et al. (2005) suggest that 'positive peer group' is a contributor to innovation climates, but what does this mean within the case study context, a pharmaceutical and biotechnology IS context? Rich thick data can provide some insight into meanings and build on the extant literature.

Taxonomies, however, pose some limitations: they are unidirectional and produce a linear view of the world. The world and its interrelations are more complex than what a taxonomy can produce (Stewart, 2011). Rich pictures offers a tool for the more circular nature of the world (Armson, 2011), and the research approach endeavours to produce the key findings and interrelationships, both with a typology and rich pictures.

In essence, this research project is an exploration, built on the extant literature, on the innovation climate within an IS organization for a Top 5 global drug and biotech company. It aims to explore how various people within various verticals of the IS organization work together among themselves and with their business counterparts (scientists, doctors, regulatory personnel and so on), in order to leverage technology to produce better medicines. This is with the objective of enabling (or catalyzing) innovation, and can be summed up by the following question:

“Within the case study company, how can creative and innovative climates be better understood and further enabled within the IS and business areas to produce more value in the development and delivery of medicinal product?” In this question, ‘business areas’ is meant to represent scientists, regulatory members, drug safety, manufacturing and so on.

The objective of this study is to understand the case study’s view of the world in terms of what they perceive as enablers and barriers to innovation, as well as what actually enables and bars innovation, and the circular relationships between its various sub components. Primarily this information exists as tacit knowledge within our case study participants, and the primary aim is to convert this to explicit knowledge and express it in a taxonomy.

5.2 Ontological and epistemological positioning

As discussed above and using the tree metaphor by Easterby-Smith (2015), the journey begins with examining and justifying the Ontological and Epistemological positioning in order to ensure correct alignment between objectives and results.

5.2.1 Ontological positioning.

Ontology is concerned with the nature of the world. Various authors use different nomenclature to describe the ranges of ontological lines of views. However, regardless of nomenclature, there is coalescence around similar themes. Bryman and Bell (2007) position on the continuum of ontological positions a range from objectivism to constructionism. These (ontological positions) maps conceptually to the continuum of realism, internal realism, relativism, and nominalism ontologies by Easterby-Smith (2015). Each of these positions and their appropriateness are now discussed.

5.2.1.1 Objectivism or realism

Realism has the belief the world is concrete and external. This end of the belief system, believes that as Easterby-Smith (2015) states, “science can progress through

observations that have a direct correspondence to the phenomena being investigated.” An iteration from this end of the belief system, according to the same authors, is ‘transcendental realism’. This is the belief that the objects of scientific inquiry exist and act independently of researchers and their activity. Finally, according to Easterby-Smith (2015), within this class of thinking, is internal realism, which is a belief that there is a single reality, but it is difficult to get to. None of these options fits the position of the researcher, nor are appropriate to the study. The view put forward in this research is more aligned with the view that the researcher is part of the research cycle, and that s/he brings to the process, knowledge. As stated by Dennis A. Gioia et al. (2013), “Researchers are pretty knowledgeable people too.”

5.2.1.2 Relativism

Easterby-Smith (2015), states that “relativism is the belief that scientific laws are not simply out there to be discovered - but are created by people.” The associated belief with this view, is that people hold different views, and the truth is dependent on their status and reputation. What is considered as truth can vary from person to person. This view is useful the research’s positioning, aims and objectives.

5.2.1.3 Nominalism

Easterby-Smith (2015) states that “the opposite ontological spectrum to objectivism, is the belief that social reality is no more than the creation of people through language and discourse.” This can also be a possible view for the research positioning.

5.2.2 Epistemological positioning

Epistemology deals with the ways of enquiring about the nature of the world. Various authors use different nomenclatures to describe the ranges of epistemological lines of view. As above, regardless of nomenclature, they all coalesce around similar themes. Bryman and Bell (2007)’s position on the continuum of epistemological position ranges from positivism to interpretivism, and these map conceptually to positivist and social constructionism epistemologies by Easterby-Smith (2015).

5.2.2.1 Positivism and realism

Positivism takes the view that the world is ordered and that we can investigate the world objectively, using the tools and methods of natural science (Bryman & Bell, 2007), rather than being inferred subjectively through sensation, reflection, and intuition (Easterby-Smith, 2015). Positivism can be summarized by Auguste Comte (19th Century French philosopher), who wrote, “all good intellects have repeated, since Bacon’s time, that there can be no real knowledge but that which is based on observed facts.” (Easterby-Smith, 2015). Easterby-Smith (2015) dives deeper into this statement and outlines two baselines with this view: (a) reality is external and objective, and (b) knowledge is only significant if it is based on observations of an external reality, and is the result of empirical evaluation.

Positivism schemas tend to be aligned with approaches that deal with prediction and experimentation. This is not the case in this study. In a positivist approach for example, there is a theory or hypothesis as the aim of the study, which then may be proven or disproven via measuring and evaluating the concerned phenomena. A ‘strong positivist’ takes the view that there is a reality that exists independently of the observer and the job of the researcher is to discover the laws and theories that explain this reality. A ‘less positivist’ is one that takes the view can’t be accessed directly in a straightforward way (Easterby-Smith, 2015). Positivism maps with realist ontologies which suggest that the world is concrete and external.

Easterby-Smith (2015) provides some further granularity of realism, by suggesting ‘Transcendental realism’, and ‘Internal realism’. Transcendental realism carries with it the belief that the objects of inquiry (i.e. the researcher) acts independent to the phenomena that they are observing. Internal realism deals with the belief that there is a single reality, but that is it difficult to get to, but through indirect evidence.

These views are not appropriate for this research since in essence, its aim is to explore the perspectives and understanding of a phenomenon through the eyes and interpretations of various participants, and in addition the researcher is very much part of that process, in terms of how the data is sliced and so on. This will be discussed further in the following section.

5.2.2.2 Social constructionism, relativism, nominalism, and interpretative research.

Constructionism focuses on the ways that people make sense of the world through shared experiences. It evolved in the last 60 years fuelled by the limitations of the positivists approach for social science research. Constructionism, relativism, and nominalism all deny (or question) the existence of a single objective reality (Bryman & Bell, 2007; Easterby-Smith, 2015; Mills, Bonner, & Francis, 2006). In this view of the world, relativism (and constructionism) asserts that social phenomena and their meanings, are constantly being accomplished by social actors. This implies that social phenomena and categories are not only produced through social interaction, but are in a constant state of revision (Bryman & Bell, 2007).

Interpretative research is primarily associated with understanding the social context of a phenomenon; the patterns of social behaviour, and an appreciation of the different constructions and meaning that people place on their experiences (Easterby-Smith, 2015). Focus should be on what people are individually and collectively thinking and feeling, both verbally and non-verbally. Critically, Easterby-Smith (2015) surmises for this approach by stating, “human action arises from the sense that people make of different situations, rather than as a direct response to external stimuli”.

Checkland and Scholes (1999) supports the view that an output of interpretative research leads to a valuable understanding how humans within a problem context, interact and perceive their environment.

These views are more aligned with the aims of this research, since the research is not starting with a list of pre-conceived variables of a positivist approach, instead the flow of the analysis will shed light on how humans make sense of their world.

To be discussed in a following section, it is proposed to use some high level ‘a priori’ in matching how participants view the world, and these were matched only if there was evidence. ‘A priori’ themes were used to make sense of the literature data, and its applicability to this case study context, if there is evidence to support it.

Myers and Newman (2007) support that this is a popular approach for the IS domain.

5.2.3 The ontological and epistemological position stated.

The researcher’s personal view aligns with the following perspective: since knowledge is based on our experiences that everyone’s experiences are different, and that experience is a continuum, then it follows that knowledge itself cannot be absolute. In addition, we construct our realities based on our interpretations of our experiences and assign meaning to them.

The researcher’s position can be construed as an “engaged constructionist / interpretivist” as conceptualized by Easterby-Smith (2015) since the researcher also believes that we do not shape our truth out of nothing.

5.3 Research design

In the above section several ontological and epistemological points of view were discussed to identify, which would be appropriate for the approach. Inspired by a summary table from Easterby-Smith (2015) the options available can be summarized.

(Easterby-Smith, 2015) assert the approach that researchers can use a mix of various positions in order to pursue their knowledge journey Table 36.

Ontological / Epistemological Positioning	Appropriate to this research	Aligned methodology and data collection techniques	Goals / Outcomes
Objectivism / Internal Realism. There is a single truth – but it may be obscure.	No	Hypothesis testing such as Quantitative testing	Confirmation of theories
Relativism. There are many truths.	Compatible	Qualitative techniques, Interviews, code analysis, grounded theory, Template Analysis	Theory generation. Although this is not an output of this research, it is hoped that this research can be used by further researchers in theory generation.

Nominalism. There is no truth.	Compatible	Qualitative techniques, Interviews, code analysis, grounded theory, Template Analysis	Sense making and understanding / new insights and actions
Positivism	No	Hypothesis testing such as Quantitative testing	Confirmation of theories. Note: it is the intention of this research to document the experiences of practice so that the domain can move towards theory and testing.
Social constructionism, relativism, nominalism, and Interpretative research	Compatible	Qualitative techniques, Interviews, code analysis, grounded theory, Template Analysis	Sense making and understanding / new insights and actions

Table 36. Compatibility of philosophical positioning to research question.

5.3.1 Research methods

As stated previously, this research approach is idiographic in nature, which means an attempt is being made to understand a phenomenon (innovation climates) in its context (a pharmaceutical IS case study) (Benbasat et al., 1987).

The research must address the gap that exists in the literature: a deeper understanding of the innovation climate within a Pharmaceutical IS department and its relations with its LoB (line of business). Since it is a step into the uncharted waters, methods that unearth new insights are appropriate. A discussion on the adopted methodology, and on the tools pursued in order to achieve the research aims that are in line with the ontological and epistemological paths is now undertaken.

Because the over-arching essence of the research question is sense making and discovery in a particular IS context (Yin, 2009), three broad categories for IS explorative

research can provide guidance (Benbasat et al., 1987). These options and their applicability will now be discussed.

5.3.1.1 Application descriptions

Application descriptions can be considered as a list of do's and don'ts from the experience of practitioners in the implementation of technology (Benbasat et al., 1987). Because this research is not specific on an implementation of a particular application, but is a higher-level view of choosing and implementing innovative technologies, this approach is not appropriate. However, it is a recommendation of this research for its outputs to be considered in the approach to implement high value and innovative applications.

5.3.1.2 Action research

Action Research is focused on conducting research while effecting change (Dick, 2002). The intent is to identify key variables in intervention, and monitor change over several cyclic iterations (French, 2009). Baskerville and WoodHarper (1996) recommends a five-stage process for action research: "diagnosing, action planning, action taking, evaluating, and specifying learning." In this research scope, there is no intention to initiate change to concepts or processes. Therefore, this path is inappropriate to the research aims. However, this research can be considered as the diagnosis stage of a future action research project in this field, and has formed several parts of the recommendation items for future study (see Chapter 7). This research provides practical mappings to extant concepts and provides circular relationships to business outcomes that are less obvious in the literature (Shah, Eardley, & Wood-Harper, 2007).

5.3.1.3 Case study

Case study research is pertinent when there is a focus of the 'how's and 'whys' as stated by Yin (2009), when a subject matter is in its exploratory stages, and as Benbasat et al. (1987) states, when the "sticky, practice-based problems where the experiences of the actors are important and the context of action is critical." It

provides a rich and potentially detailed insight into the studied processes and explores the complex relationships and processes that exist within a study area of interest in a real-life situation (Oates, 2006; Yin, 2009). By nature of this research aims and focus, this aligns well with the goals, since the aim is to understand the innovation climate dynamics within a domain of a company in a particular industry with unique characteristics. It is an appropriate way to research an area in which few previous studies have been carried out (Benbasat et al., 1987). Benbasat et al. (1987) argue that the case study approach in a rich natural setting can be fertile ground for generating theories. When a research is exploratory, a single case study may be useful as a pilot study with the intention of conducting further studies in similar environments or testing for generalization (Benbasat et al., 1987).

Benbasat et al. (1987) provides a summary table, Table 37, of the characteristics of a case study approach, which serves as a foundation for definition and alignment:

1	Phenomena are examined in its natural setting.
2	Data are collected by multiple means.
3	One or few entities (person, group, or organization), are examined.
4	The complexity of the unit is studied intensively.
5	Case studies are more suitable for exploration, classification and hypothesis development stages of the knowledge-building process; the investigator should have a receptive attitude towards exploration.
6	No experimental controls or manipulation are involved.
7	The investigator may not specify the set of independent and dependent variables in advance.
8	The results derived depend heavily on the integrative powers of the investigator.
9	Changes in site selection and data collection methods could take place as the investigator develops new hypotheses.
10	Case study research is useful in the study of “why” and “how” questions because these deals with operational links to be traced over time rather than with frequency or incident.
11	The focus is on contemporary events.

Table 37. Characteristics of case study approach.

Yin (2009) explains five components for the design of case study research that are important for alignment:

- 1) The study's question;
- 2) Its propositions, if any;
- 3) Its unit of analysis;
- 4) The logical linking the data to the propositions;
- 5) The criteria for interpreting the results.

The next section describes the types of case study options that can be pursued, and which is appropriate to this research.

5.3.1.4 Multiple or single case study

The study's question (covered in Chapter 2) gives direction as to whether the research should follow a single or multiple case study approach. At the onset, it would be understandable to conclude that the nature of the research question (i.e. how innovation climates affect innovation within the case study entity) points towards a single case study model. However, it is pertinent to reflect on the merits of single / multiple case studies approaches to discuss the possibility that this research question would be better served as a multiple case study design.

According to Yin (2009), single case study designs are appropriate if it is a revelatory case. Because limited research has been scientifically done within research-based drug companies IS departments on innovation climates (A.-M. Lilleoere & Hansen, 2011), it is argued that this criterion is met. As an exploration case, a single case study is more appropriate since researchers can learn the jargon and context before moving onto a multiple case study approach (Benbasat et al., 1987). The focus in this research was a deep dive and a rich description of the web of nuances existing within the organization as opposed to theory building or testing, which is more appropriate for multiple case studies. Testing some of the revelations from this research in a wider company sample is one of the recommendations of this research (see Chapter 7).

Finally, the nature of the research question did not involve the organization's interaction with other organizations, which could also have been criteria for a multiple case study approach (Yin, 2009).

For these reasons, a single case study approach was deemed appropriate in the research design.

5.3.1.5 The proposition

Given the unique characteristics of research-based drug companies operating environment and its overarching regulatory umbrella (A. M. Lilleoere & Holme Hansen, 2011) are there are unique granular nuances to innovation climates?

Using the metaphor of clogging as a description of factors acting as a barrier in a process (Armson, 2011), the proposition is that if unique granular nuances to innovation climates exist (within our case study) and can be identified, then the throughput of innovative problem solving and product development can be improved, aiding the case study's strategic objectives.

5.3.1.6 Unit of analysis

The unit of analysis is important to codify since this is a common denominator that allows the researcher to draw from the literature where appropriate (Yin, 2009) and to allow the research to be used in further work (Benbasat et al., 1987). Both the above-mentioned authors recommend that the unit of analysis can be inferred from the research aims and objectives. The focus of this study is on individuals and their interpretation of the innovation climate within their workgroup at the case study company, and in their words the barriers and enablers for this core strategic objective. The unit of analysis is therefore 'group level creativity'.

5.3.2 Qualitative, quantitative or mixed methods for case study?

Having established the research aims, the ontological and epistemological positions, the position of a single case study, and the unit of analysis, this section briefly covers

the thought process on whether qualitative / quantitative, or mixed methods approaches are most applicable to the aim and objectives.

Quantitative methods, in very broad terms, as stated by Bryman and Bell (2007), is the “collection of numerical data as exhibiting a view of the relationship between theory and research as deductive, a predilection for a natural science approach (and of positivism in particular), and as having an objectivist concept of social reality.” From the path described above, it was determined that this was not the appropriate method set for this research to follow. However, in the recommendation section, it is recommended that the rich data originating from this single case study be used to generate theories for this domain which to be then tested in a more general setting via quantitative methods (see Chapter 7).

Qualitative research tends to be concerned with words rather than numbers, with three further features:

- 1) An inductive view of the relationship between theory and research, whereby the former is generated out of the latter;
- 2) An epistemological position described as interpretivist,
- 3) An ontological position described as constructionist (Bryman & Bell, 2007).

It is clear from the preceding sections that a qualitative approach was very much aligned with the research question and goal outcomes. This was therefore the path that was chosen.

According to Easterby-Smith (2015), it is not unheard of that researchers mix their ontological and epistemological positions to adopt a mixed methods approach. (Bryman & Bell, 2007) suggests that the connections between ontological and epistemological positioning and research methods are tendencies rather than definitive connections. A technical vision gives greater prominence to the strengths of the data collection and data analysis techniques with which quantitative and qualitative research are each associated and sees these as capable of being fused (Bryman & Bell, 2015). The thought process to determine any applicability for a mixed methods approach to satisfy the research aims is now discussed.

According to Bryman and Bell (2007), there are some areas where quantitative approaches may be used to augment a qualitative methodology:

- 1) Triangulation. This is a strategy where the results of an investigation are cross checked against the results of another method. In this case, the key findings of the research could have been triangulated using surveys to other participants in our case study company. Scandura and Williams (2000) suggests that this kind of triangulation is declining in use. It was felt that this was not necessary in this research, since there were already aspects of reliability within the qualitative interviews that were performed (to be discussed in the forthcoming sections). This was not deemed appropriate and not pursued.
- 2) Generality. The critics of qualitative approaches focus on its limitations of generality. Although it is useful and forms part of the recommendations, it was out of scope for this research aims. As stated above one of the recommendations is to use these research key findings to infer more generalization across the industry, which can then be pursued via quantitative or mixed methods approached.
- 3) "Filling in the gaps". A mixed methods approach is perusable in situations where the researcher cannot rely on a quantitative or qualitative method alone and must buttress the findings with a method drawn from the other research strategy (Bryman & Bell, 2007). As discussed in the following sections, within the boundaries of this research question, rich and in-depth data are pursued in an inductive manner. Quantitative methods may be appropriate to shed light on any high level deductive discussion points for further. This is a recommendation of this thesis (see Chapter 7).

Having reached a focus on a qualitative approach, attention is now turned to the qualitative path that was chosen, the data gathering tools that were deployed, and the analytical and presentation methods used.

5.3.3 Qualitative methodology path

As alluded to in the above section, qualitative research is focused on words, expression, direct observation of human behaviour, as opposed to numbers. However, qualitative research can be construed as a lot of 'airy fairy' and not 'real research' as stated by Labuschagne (2003). Therefore as stated by Attride-Stirling (2001), "it is critical for researchers to be clear about what they are doing, why, and how". It is also important that the theoretical framework and methods match what the researcher wants to know, and that the researcher acknowledges these decisions (Braun & Clarke, 2006). These alignments are critical for the research and forms the following sections which accounts for the path that was chosen.

The qualitative path that was chosen is summarized by (and will be described in detail in the following sections):

Data collection (Oates, 2006; Yin, 2009):

- 1) Semi-structured interviews;
- 2) Memos;
- 3) Observations;
- 4) Document Analysis.

Data Analysis adopted:

- 1) Creation of a data structure
 - a. Transcriptions;
 - b. Coding, open and axial, using case study's natural semantic language;
 - c. Memos and Notes.
- 2) Template Analysis
 - a. Produce an initial template;
 - b. Refine with subsequent analysis.
- 3) Rich Pictures

- a. Produce relationships with concepts of interests.

5.3.3.1 Template analysis

Template Analysis as stated by (Brooks, McCluskey, Turley, & King, 2015), “emphasizes the use of hierarchical coding but balances a relatively high degree of structure in the process of analyzing textual data, with the flexibility to adapt it to the needs of a particular study.” Central to this technique is the development of a coding template, usually on a subset of the data, which is then applied to further data, revised and refined. Template Analysis, a branch of Thematic Analysis (King, 2015), but differs from other branches of Thematic Analysis from the point of view that code development start earlier on in the process, rather than wait until the complete dataset is reviewed and analyzed (Braun & Clarke, 2006). In addition, Template Analysis allows the use of ‘a priori’ codes both in the initial template / typology development and in its subsequent revisions. This technique is therefore aligned with the research objectives of augmenting the literature from more molar and generalized innovation climate typologies with a typology more focused for this case study, which is a Pharma IS environment.

As a key standard of inductive qualitative approaches, Grounded Theory was also considered. Although Grounded Theory fits the constructionist / interpretivist paradigms as outlined previously, it carries with it certain aspects that were found not to be suitable. Mainly:

- 1) The outcome of Grounded Theory is the production of theories. Although this research produces circular relationships, which can be argued implies theories, it does not produce, or has in its aim, the production of explicit theories.
- 2) Grounded Theory does not allow for the use of “a priori” themes. The approach in this research, to be discussed in the following sections is to leverage soft ‘a-priori’ themes where appropriate in order to contribute to the extant literature.

Template Analysis, which contains many similarities to the early stages of the Grounded Theory approach (Brooks et al., 2015), diverts from it at key areas which are

of interests to this research. According to King (2015), Template Analysis if used within a coherent framework supports a constructionist / interpretivist approach. The remaining of this chapter focuses on outlining the structure that was adopted in order to align all of the elements discussed previously to satisfy the research aims.

Figure 15, describes the overall framework that was adopted in order to fit the case study and objectives.

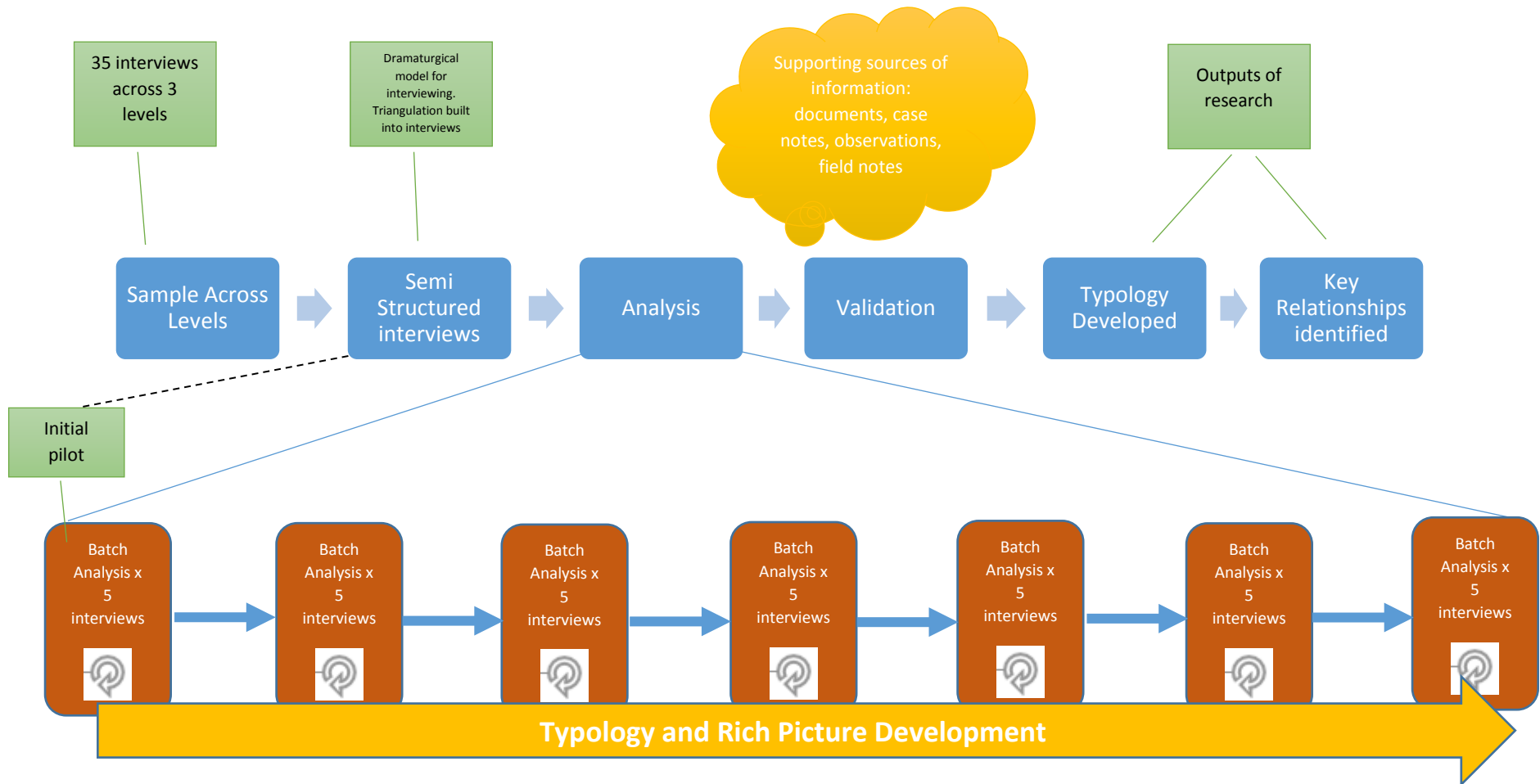


Figure 15. Overall framework for the case study analysis.

5.3.3.2 Sample across business unit.

In the case study company, the Global IS business unit contained approximately 500 employees. Within this IS organization a rough hierarchal structure with four levels, was identified, and as per the table below, 42 respondents were invited to be interviewed, which represented approximately 9% of the IS organization. The resources invited were functionally and managerially dispersed, and proportional to the hierarchal pyramid structure of the organization. According to Symon (2012) a key approach of Template Analysis is diversity of viewpoints, which directed the choice of the respondents that was approached. 35 respondents responded and the final mix of responded represented a good distribution across the levels in the organization (for diverse viewpoints), Table 38.

	Number of people invited to interviews	Level	Number interviewed
Head	1	1	0
Global Area Heads	6	2	6
Team Managers	10	3	10
Leads / Solution Business Managers / Analyst	25	4	19
TOTAL	42		35

Table 38. Participants in case study.

5.3.3.3 Semi-structured Interviews and the dramaturgical model

The qualitative interview is as stated by Myers and Newman (2007), “the most common and one of the most important data gathering tools in qualitative research.” Rubin and Rubin (2005) write, “Qualitative interviewing is like wearing night goggles,

which allows us to see what is not ordinarily on view, and examine that which is looked at but seldom seen.”

Myers and Newman (2007) summarizes key points of concern in qualitative interviewing within an IS context as:

- 1) Artificiality of the interview;
- 2) Lack of trust;
- 3) Lack of time;
- 4) Level of entry;
- 5) Elite bias;
- 6) Hawthorne effects⁷;
- 7) Constructing knowledge;
- 8) Ambiguity of language;
- 9) Interviews can go wrong.

Based on an in-depth analysis of qualitative interviewing and published research literature in the IS field, Myers and Newman (2007) highlighted a lack of robustness, in terms of the reported structure, structural consistency across subjects interviewed, distribution of voices, how the interviews were held, etc. A dramaturgical interview model, which sees the IS qualitative interview as a social interaction, in addition to a benchmark of seven guidelines, was suggested by Myers and Newman (2007) as an interview tool, to address several of the issues summarized above. Its overall objective is to improve the rigour in qualitative research as expressed by several authors (Braun & Clarke, 2006; Dennis A. Gioia et al., 2013).

A key point of the type and style of the qualitative interview that was adopted for this research, was its ability to be aligned with the inductive nature of the research, as well as the ontological and epistemological position of ‘engaged constructionist / interpretivist’. The use of the dramaturgical model within IS Pharmaceutical /

⁷ This is the instance where the researcher is seen as an intruder, and interferes with peoples’ behaviour (Fontana, 2000)

Biotechnology arena, at the time of writing, has little evidence of being used to address the issues highlighted above, and hence the use of this interview tool within Pharmaceutical IS research is also a contribution to the literature.

The dramaturgical model adopted for the interviews followed the following framework from Myers and Newman (2007), Table 39:

Concepts	Description from Myers and Newman (2007)	Notes on execution within case study
Drama	The interview is a drama with a stage, props, actors, an audience, a script, and a performance.	Each interview was set up in a consistent manner with an automated hard stop of 60 mins. The structure and goals of the interview were communicated at the beginning of each session, and the 'performance' was conducted in a consistent manner as further described below. There were no preparatory materials or discussions with the participants, and each participant was simply sent an invitation with the title 'Innovation Interview' and a brief sentence 'to discuss innovation here. No preparation required.'
Stage	In an organizational setting, the stage is normally an office. Props may include pens, notes, recording equipment.	All interviews were conducted in an in house video conference room. Conference rooms were chosen as opposed to personal offices or cubicles to establish continuity and consistency across all interviews. The geographical distribution of the interviewees was Switzerland and the US. Recording equipment were made clear as well as note

		pads to give the context of a deep information exchange experience.
Actor	Both the interviewer and interviewee can be seen as actors. A researcher has to play the part of an interested interviewer; the interviewee plays the part of a knowledgeable person in the organization.	
Audience	Both the interviewer and interviewee can be seen as the audience. The researcher should listen intently while interviewing, the interviewee should listen to the questions and answer them appropriately. The audience can also be seen as the consumers of the research.	The interviewer assured active listening and engagement at all times.
Script	The interviewer has a more or less partially developed script with questions to be put to the interviewee to guide the conversation. The interviewee normally has no script and has to improvise.	Semi-structured interviews were used in order to guide the conversations. Questions were open such as “tell me about that experience,” except in cases where opportunities for triangulation presented itself in a natural discourse during the mature stages of the interview. The interviewee came to the interview without a script. The context was simply an invite to discuss innovation at the case company. See Appendix B.
Entry	Impression management is very important, particularly first impressions. It is	A professional attire in line with the dress code and culture of the case study

	important to dress up, or dress down depending on the situation.	company was kept consistently at all times.
Exit	Leaving the stage.	All interviews were concluded with a summary of the aims of the research, and a thank you closure.
Performance	All of the above together produces a good or bad performance. The quality of the performance affects the quality of the disclosure, which in turn affects the quality of the data.	To be discussed in the analysis section, this performance frame work produced a data set of rich data. All of the respondents were deeply engaged with approximately 50 to 100 concepts per interview with deep interconnections of concepts.

Table 39. Dramaturgical Model mapped against execution.

5.3.3.4 Interviews – semi structure

According to Fontana (2000), there are three types of qualitative interviews which are covered in Table 40.

Type of interview according to Fontana (2000)	Applicability to this case study research
<i>Structured interview.</i> In a structured interview there is a complete script that is prepared beforehand. There is no room for improvisation.	Structured interviews are not aligned to the epistemological and ontological path of the research. These are more in line with positivists approaches.
<i>Semi-structured interviews.</i> In a semi-structured interview there is an incomplete script. The researcher may have prepared some questions beforehand, but there is a need for improvisation.	These were considered appropriate for this research due to its alignment with the stated ontological and epistemological positions, in addition to observing climate through the perceptions of individuals.
<i>Group interview.</i> In a group interview two or more people are interviewed at once.	Group interviews were considered but deemed not appropriate since the unit of analysis is at the individual level and not

	at the group level. A recommendation can be to conduct group level interviews to produce any new knowledge that may be produced at a group level.
--	---

Table 40. Literature types of interviews.

As from Table 40, semi-structured interviews were therefore the primary means of data gathering and forms the backbone of the research. Interviews are commonly associated with case-study work where the participants are aware of the rationale behind the conversation and permit the researcher to conduct the study (Oates, 2006).

5.3.3.5 Initial sample and pilot

Borrowing from the early stages of the grounded theory approach (King, 2015), an initial sample pilot was conducted. The participants from this initial pilot were from each level of the IS organization except level 1 and the objective of the initial pilot was to assess the validity of the research aim, semi-structure format, dramaturgical model, type of questions, and the molar conceptual framework for which the subject matter is based. From this initial pilot, decisions were made on fine-tuning the approach such as social setting of interview, duration of interview, type of questions to present, etc. The initial pilot, suggested a robust qualitative structure developed, yielding engaged conversations, rich data sets, and a sense of clarity towards the research aims.

5.3.3.6 The structure of the semi-structure interview

As described above, all interviews were conducted in the same manner following the dramaturgical model. Appendix B contains the guidance notes and questions that were adopted and agreed on beforehand with the project sponsors at the case study company.

The questions asked were aligned with a similar study by T. M. Amabile, S. Gryskiewicz (1987) investigating creativity in an R&D laboratory via a qualitative approach. The shared general questions were:

- What influenced creativity and innovation in the work organizations?

- What is it about the persons and the work environment that makes a difference?

As in the approach by T. M. Amabile, S. Gryskiewicz (1987), this study also explored with participants two events from their work experiences. One experience that exemplified high creativity, and another experience that exemplified low creativity. Participants themselves needed to be one of the central characters in the stories they described, and they were close enough to the events to be able to describe it in detail.

Overarching these guidance questions was an approach described by Armson (2011) as 'framing the bigger picture'. This involved the discussions focused on innovation with the context of the case study operational environment and. The use of a topic guide (with guidance questions) is also supported by J. S. Corbin, A. (2008). The guidance notes were split into 4 exploratory phases:

- 1) Understanding innovation as a concept and its relevance to the case study company;
- 2) Examples of innovation at the case study company;
- 3) Subject matter questions around innovation climate;
- 4) Closing questions / discussions.

All interviews followed the same format (as confirmed by the initial sample), and recorded with the permission of the interviewees. No interviewees declined to have their interview recorded. Interviewees were informed that feedback and information will remain anonymous. Each semi-structured interview was conducted in the corporate video conferencing facility, and was automated to stop after 60 mins.

5.3.3.7 Paraphrasing, reliability and exploration

Paraphrasing, according to the Google dictionary reference, is "expressing the meaning of (the writer or speaker or something written or spoken) using different words, to achieve greater clarity." Paraphrasing was used constantly in the interviews by the interviewer to the interviewee. This ensured that the interviewer had a clear idea of the concepts that was being expressed.

From a constructionist point of view, the assumption is that there are multiple perspectives reflecting different realities, and the approach is to collect the views and experiences of diverse individuals and observers (Easterby-Smith, 2015). Reliability and exploration were built in into the interview process in two aspects:

- 1) The interview subjects that were solicited were drawn with diversity central to the approach. There were three layers of organization, with the participant sample proportional to the pyramid structure in reality;
- 2) Where possible during the interviews, and where opportunities presented itself, developing themes and matters of interests were discussed across participants. For example, a verbal discussion thread started around the dominant theme of 'trust', and the IS experiences of trust within the case study context. During the interview process the researcher would present at an appropriate time, previously gathered perspectives (from diverse participants), for the interviewee to contribute his or her perspective on particular viewpoints concerning 'trust'. The result was either an affirmation of the previous perspective, or a description of further nuances, or a new perspective.

5.3.3.8 Transcriptions

All interviews were recorded directly into MP3 format using a Livescribe Echo 8GB note taking pen. Anonymity was assured to all of the participants. All of the interviews were transcribed verbatim into Microsoft WORD, and during the analysis phase, both the recording was listened to and the transcripts read in order to ensure accuracy and improve interpretation.

5.3.4 Analysis

Analysis is considered as a process of interacting with the data using analytical techniques progressing from description to explanation (J. S. Corbin, A., 2008). The procedural steps in Template Analysis as used in the thesis's analysis phase is summarized below in Table 41:

	Phase (Braun & Clarke, 2006; Brooks et al., 2015)	Description of process
1	Familiarizing yourself with the data	Transcribing data, reading, and rereading the data, noting down initial ideas.
2	Generating initial codes (using natural semantic language)	Coding interesting features of the data in a systematic fashion across the entire data set, collecting data relevant to each code. Template Analysis differs from other Thematic Analysis processes since it is permissible to use some a priori themes which may be helpful for the analysis.
3	Organize the emerging themes into meaningful clusters and begin to define how they relate to each other.	Collating codes into potential themes, gathering all data relevant to each potential theme.
4	Define an initial coding template	Develop an initial coding template on the basis of a subset of the data rather than carrying out preliminary coding and clustering on all accounts before defining a thematic structure.
5	Apply the initial template to further data and modify as necessary.	The researcher examines fresh data and where material of potential relevance to the study is identified, he or she considers whether any of the themes identified on the initial template can be used to represent it. Where there is a gap, an iteration of the template may be needed.
6	Finalize template and apply it to the full set of data.	The researcher needs to decide when the template meets his or her needs for a project at hand, considering the resources available.
7	Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Table 41. Analysis and presentation workflow.

According to King (2015), the recommendation for Phase 1, is aligned with Braun and Clarke (2006) in terms that the data within a context should be explored first.

Brooks et al. (2015) suggests the distinctive features of Template Analysis that distinguishes it from other forms of Thematic Analysis can be summarized by:

- 1) In Template Analysis it is permissible to use an initial template based on a subset of the data.
- 2) Theme development starts in the initial template rather than after the entire data set has been reviewed.
- 3) There is a lack of prescriptive hierarchies in Template Analysis, whereas in Thematic Analysis the recommendation is three (Braun & Clarke, 2006)

According to King (2015), the suggested approach for analysis and template development, and the approach used in this research, is summarized by Figure 16. King (2015) recommends to produce the initial template and further iterations within batches. That is review for example, interviews 1 to 5 in its entirety, and then as King (2015) states, “attempt to code other batches, since a piece of text or theme is within the context of what we know about the dataset.” This recommendation was followed in analyzing the data.

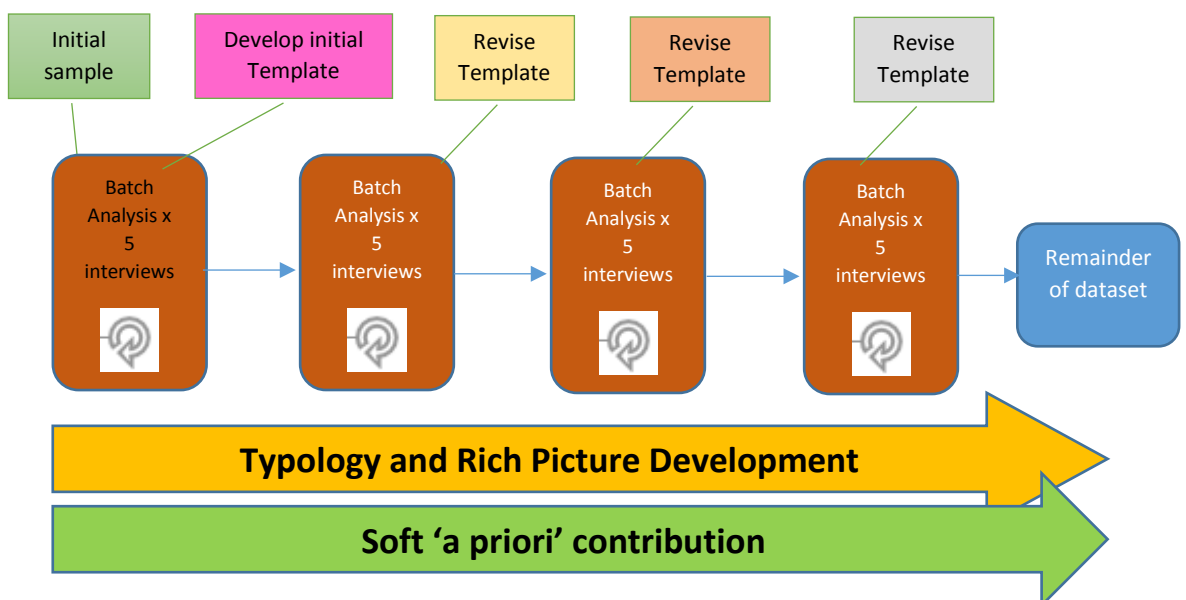


Figure 16. Template development workflow.

The tools of analysis are now examined in more detail to ensure robust accountability.

5.3.4.1 Coding (using NVivo10)

The process of coding is central to qualitative analysis (Miles, 1994), and it involves primarily organizing data into meaningful themes (Tuckett, 2005). It is focused on assigning labels to segments of the data in order to reduce the data into manageable pieces to enable analysis (Charmaz, 2006; J. S. Corbin, A., 2008), and should be done in a manner that indicates what is happening in the data and what it means in respect to the research question (Charmaz, 2006).

Codes can be tagged to pieces of data of various expressions, e.g. words, phrases, sentences, paragraphs, line by line or section by section, etc. (Charmaz, 2006; Miles, 1994). One of the risks identified with coding, is the potential loss of context when codes are extracted and compiled (Dennis A. Gioia et al., 2013). NVivo supports minimizing this issue since individual codes can reference back to its context for initial and subsequent clarification. The researcher used this feature to validate the alignment of codes to the overarching themes developed during the coding process.

Template Analysis is similar to the early stages of Grounded Theory (King, 2015), and therefore an alignment of the coding process for additional rigor was made. J. M. Corbin and Strauss (2015), in the Grounded Theory methodology, suggest the first layer of coding as 'open coding', which was applied to the data set. This is a process of trying to adhere to the informants' terms, and little effort is made to distill the categories. The next layer of coding applied, suggested by J. M. Corbin and Strauss (2015) was 'axial coding', which is the process of seeking similarities between the numerous codes, which eventually reduces the codes to a more manageable number. Since Template Analysis is the overall tool, it is also here that using 'a priori' categories and themes were applied, where the evidence matches.

As a guide, Dey (2005) suggests asking question of the data in an active way. For example, as "What is happening here?", "What is going on in the interviews?", "What does this mean?", and "Who? What? Where? Why?" (Charmaz, 2006; J. M. Corbin & Strauss, 2015; Dey, 2005).

As referred to above in the previous section, the codes were performed after the initial sample diverse set of transcripts were reviewed and familiarized. This phase produced

a set of initial codes, along with the a priori codes, and the raw data that produced that information was tagged with those codes using NVivo version 10.

5.3.4.2 Memos, field notes, observations and other supportive documentation.

Memos after each transcript were written reflecting any additional observations of the participant, key themes, further thoughts, impressions and ideas, etc. (Miles, 1994). The objective of memos serves as primary analytical notes which became important during the iteration phases of the template and the mapping of field data to 'a priori' categories where the evidence was a conceptual and contextual fit.

Memos were documented when needed into NVivo and used in the generation of codes as described in the previous section.

5.3.4.3 Coding approach

The coding output from the case study, supported by "thick descriptions" (Myers & Newman, 2007) is a further level of granularity (level 3) to the theoretical model, which can potentially make it more meaningful and actionable in a practical sense for innovation and knowledge managers, particularly in a Pharmaceutical IS environment.

The interviews were analyzed and the perceptions of the work environment were coded as outlined below following a similar structure to T. M. Amabile et al. (1996):

In this study, the nodes per classification were:

- 1) *Positive Concepts and Practical Enablers*. These were perceptions by the case study participants focused on perceptions of the work and organizational environment that contributed to creative and innovative thinking. This was expressed in the language such as "I think that trust is something that must be present." It also includes explicit statements of instances of climate dimensions that are operational and in the participants' mind is contributing to the creative climate. This was expressed in language such as "Here we have a high degree of trust, and that facilitates creative and innovative thinking."

- 2) *Practical Inhibitors*. These were practical instances or examples, by the case study participants that were experienced in their work environment, that they felt obstructed creativity and innovative thinking. This was expressed in the language such as “Here the lack of trust is an issue.”
- 3) *Implied relationships*. In addition to the above discrete concepts that were documented, implied relationships between the various concepts were noted as expressed by the participants. This was expressed in the language such as “Because we don’t have trust this causes a reduction in risk taking”.

5.3.4.4 Saturation of case study nodes

During the coding process, it was observed that saturation of the nodes occurred at case study participant 8, i.e. most of the codes (95%) identified from case study 9 onwards, were mostly mapped to the nodes already developed in case studies 1 to 8.

5.3.4.5 Coding for circular relationships, context and process.

The objective of establishing linkages and relationships is to understand the interactions between the various themes, concepts in the typology (Dey, 2005). In the raw data from the interviews, the participants themselves expressed the relationships and interactions, which when documented became very complex. Language such as “when you have the occurrence of W, this has a positive (or negative) effect on X, Y, and Z” were coded faithfully and set up as explicit relationships in NVivo. NVivo also has the functionality to trace back the text and context by which those relationships refer to which was used to verify validity.

Visual methods, and developing rich pictures have been suggested as a technique to develop and explore circular relationships (Armson, 2011). Diagrams, maps, charts, networks, tables, and matrices, are all suited for data analysis and the articulation of conclusions and the relationships between concepts (Dey, 2005; Miles, 1994). NVivo possesses all of the above capabilities and was used to its full extent within the datasets and concepts that were of interests to focus on. Rich pictures are presented

in the Chapters 6 and 7, and a raw list of relationships surfacing from the case study participants is included in the Appendix D.

5.3.4.6 Validity, reliability, authenticity

(Easterby-Smith, 2015) defines 'validity' as to the "extent to which measures and research findings provide accurate representation of the things they are supposed to be describing." The overarching constructionists questions suggested by (Easterby-Smith, 2015) are:

- 1) Have a sufficient number of perspectives been included (validity)?
- 2) Will similar observations be reached by other observers (reliability)?

'Authenticity' is concerned with 'convincing the reader that the researcher has a deep understanding of what is taking place' (Goldenbiddle & Locke, 1993).

To address the above a subset of five open coded scripts were presented back the respective interviewees for discussion and coding feedback. All five interviewees were in general agreement to the codes generated, and the researcher's interpretation as it corresponded to the overarching research aim. In addition, as mentioned in the previous section, saturation of the data codes occurred at case study 9.

Reliability was also built into the interviews, and described in section 5.3.3.7.

5.4. Summary - 10-point framework

This chapter is summarized and concluded by referring to the 10-point framework table which is structured to support the researchers claim of rigour and transparency as suggested by Myers and Newman (2007). See Table 42:

Number of interviews	35 / 42
Period of interviews	Over three months in 2013
Interview model	Dramaturgical
Description of process	Heavy

Type of interview	Semi Structured based on an interview guide
Recording technique	Echo Smartpen with MP3 capabilities. Transcription of all interviews
Thick / Thin description	Thick
Anonymous / Revealed	Anonymous
Feedback	Some. 5 participants
Data Structure used	Coding. Open and Axial
Tool used	NVivo
Procedure Used	Template Analysis
Relationships described by	Relationship statements
Epistemological and Ontological Position	engaged constructionist / interpretivist

Table 42. 10 point summary table for qualitative research.

Chapter 6: Findings and results

6.0 Introduction

In this chapter, the empirical findings of the case study data are presented. In the literature research section, an ‘a priori’ literature template was presented for general creativity and innovation climates, and for ease of reference, it is repeated in Table 43.

Creative climate Typology Level 1.	Creative Climate Typology Level 2
1. Work freedom and stimulation	Challenge
	Autonomy
2. Positive Member Exchange – Group	Positive Peer Group
	Intellectual Stimulation
	Positive Interpersonal Exchange
3. Leadership Influence and Direction – Group	Positive Supervisor Relationships
	Participation
	Mission Clarity
4. Organizational Support – Organization	Resources
	Top Management Support
	Reward Orientation
5. Organizational Integration	Organizational Integration
	Flexibility and Risk Taking

Table 43. ‘a Priori’ Template Analysis.

In the literature research section, Chapter 3, the concept dimensions and their relevance to creative climate were presented and discussed. Chapter 4, progressed to explore the literature meanings of the identified concepts and how they are expressed in working environments. For example, in Chapter 3, *autonomy* was identified as a dimension that contributes towards creative climates. How participants describe whether or not they are experiencing *autonomy* in their work environment was explored in Chapter 4. In this Findings chapter, the coding output (nodes identified) of

the case study is mapped to literature descriptors providing a more enriched picture for the case study environment and a testing of the theoretical framework in a real work environment via a qualitative method.

As a prelude, it appears from the data that the concept of innovation and its drivers were a source of detailed interest with participants. On average, each interview produced approximately 100+ coding instances (which are an expression of concepts), and a series of identified complex relationships. (Dennis A. Gioia et al., 2013) suggests that this is within the ball park of a rigorous and robust qualitative research piece of work.

Prior to discussing the case study data mapped to a taxonomy classification, it is important to provide the perspective that components of a phenomenon are more interrelated than a linear typology suggests (Stewart, 2011). In addition to causal relationships, the presence of moderating factors combines to form a complicated cause and effect web of factors (T. M. Amabile et al., 1996; Greg R. Oldham & Baer, 2012);. West (2002a) suggests that dimensions for creative and innovative climate are ‘more like clouds, and less like clocks’, which means to say that an understanding of this cloudiness or overlapping is warranted. In addition to the typology developed for this case study, interrelationships between the dimensions as identified by the case study participants are also coded and documented. This may be expressed for example as, “when I feel we don’t have autonomy, we lose motivation”. Hence a relationship *autonomy* impacts *motivation* was coded. A complete list of interrelationships (471 in total) as described by the participants is included in Appendix D, and represents new knowledge generated. In this section key relationships around a central theme is presented.

6.1 Overview of main results

Table 44 provides an over of the main results which will be presented in more detail in the remainder of the chapter and Chapter 7 (Discussions).

Study Aims / Objectives	Main results and new knowledge generated
To explore Innovation Climate enablers and inhibitors within a Pharmaceutical IT case study.	<p>Important Innovation Climate enablers and barriers were identified. Three levels were documented,</p> <p>(1) What the case study subjects consider as concepts for innovation based on their experiences</p> <p>(2) What the case study identified as inhibitors to innovation within their “day to day” experiences, and</p> <p>(3) What the case study identified as enablers within their “day to day” experiences.</p>
Map the case study’s concepts, enablers and inhibitors of the Innovation Climate to the theoretical framework and identify and extend new typologies unique to this case study environment.	<p>The concepts and codes derived from the case study data were mapped against an extant theoretical framework based on a consolidation and streamlining of 40 literature taxonomies for creative and innovative climates (Hunter et al., 2005).</p> <p>Results demonstrate that the theoretical framework developed by Hunter et al. (2005) was a good fit to the conceptual themes that surfaced from the case study data set.</p> <p>New additional concepts unique to this case study were identified, which can be used for further analysis and possibly as a Template in other like organizations. This contributes to new knowledge generated.</p> <p>This can be used by innovation practitioners in articulating and operationalizing their improvement initiatives (see Figure 17).</p>
Explore practical expressions in instances of extant typology within case	There were over 1000 practical instances (codes) of day-to-day experiences within

<p>study environment. For example, how is “Top Management Support” (Extant concept) expressed in practical terms in a Pharma IT department.</p>	<p>the case study environment, mapped to the extant Innovation Climate typology.</p> <p>471 relationships around concepts were derived from the case study data, as discussed by the participants. This gives practitioners a rich picture of cause and effect patterns for continuous improvement. This contributes to new knowledge generated. These are presented in Appendix D.</p> <p>This potentially gives practitioners a clearer understanding for practical day-to-day experiences of the extant creativity concepts.</p> <p>A limitation of the theoretical framework as proposed by Hunter et al. (2005) is a lack of practice based application. As Hunter et al. (2005) recommend, “it is critical that future research continues to explore the substantive meaningfulness of the classification scheme”.</p> <p>This thesis is a contribution to the recommendation by Hunter et al. (2005) for Pharmaceutical IS systems (of exploring fit within practice based environments).</p>
<p>Produce a picture of dominant and key relationships</p>	<p>Key integrative relationships from the data appeared. These were documented and produced with NVivo.</p>
<p>Mechanisms for enablement</p>	<p>Two mechanisms for creative climate enablement, i.e. incorporating incubation with correct idea time and resources into the business process, and implementing robust SECI techniques were recommended and suggested for further study and action research.</p>

Table 44. Overview of main results and new knowledge generated

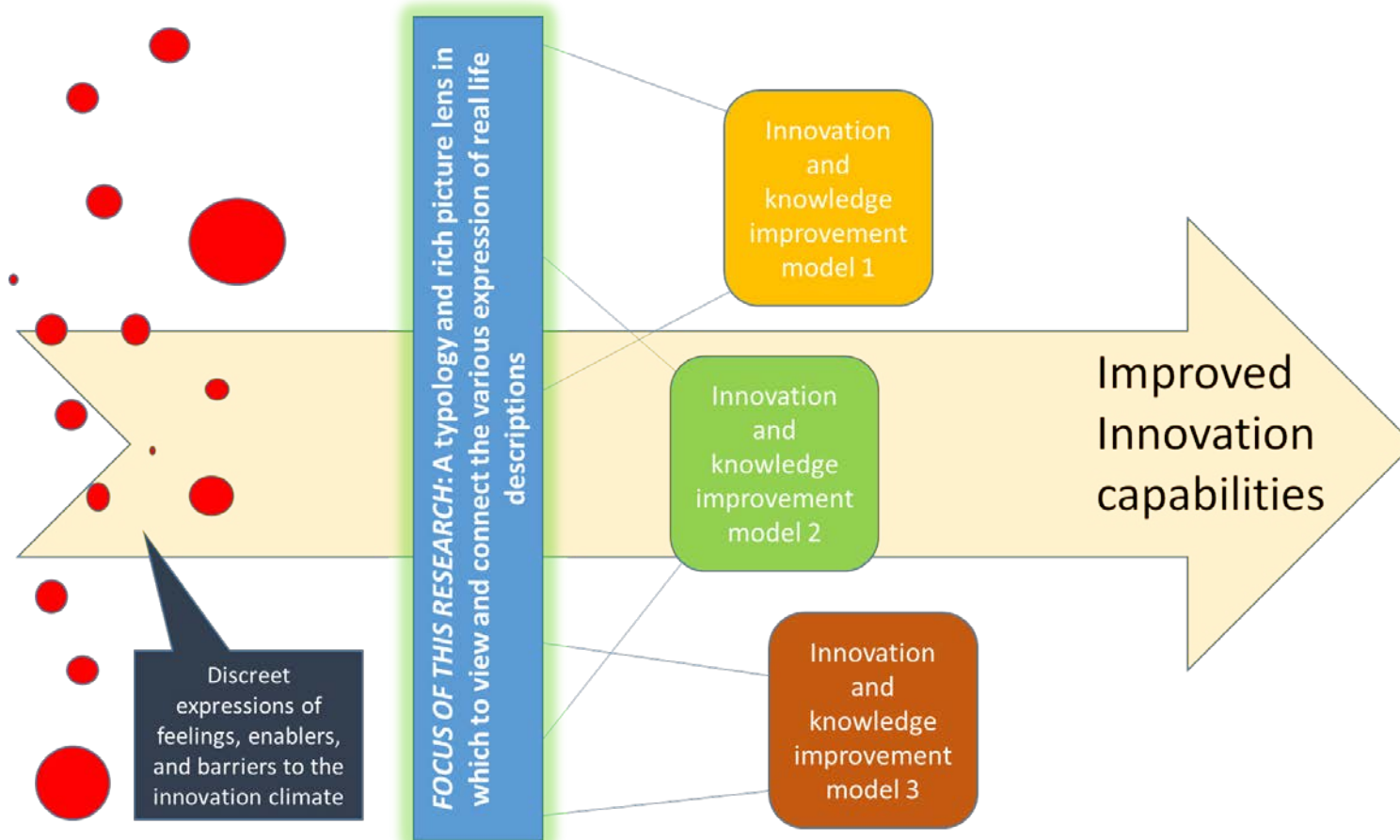


Figure 17. Practical value of research to innovation managers in Pharma IS.

6.2 Case study context

Stake (1995) discusses that in order to understand a case study, its context must also be presented.

The case study was carried out within the drug development and manufacturing IS departments at a global top 5 Pharmaceutical company. The IS departments interviewed covers Phases II, III, and IV of the drug lifecycle as described in Chapter 2.

6.3 Verification of the terms creativity and innovation.

The first set of case study results to examine is the alignment of the participants' interpretation of creative and innovation, to the literature. The literature definition of creativity and innovation utilized are:

- “Creativity is defined as the production of ideas concerning products, practices, services, that are (a) novel or original and (b) potentially useful to the organization,” (Gilson & Shalley, 2004);
- “Organizational innovation is the successful implementation of creative ideas within an organization. With this definition, the ideas in question can be anything from ideas for new products, processes, services, procedures, policies, etc.” (T. M. Amabile, 1988).

Table 45 provides a selection of participants' perceptions on the meanings of creativity and innovation. As can be seen from the mapping in Table 45, there is good alignment between the meaning of these concepts from the participants and the literature from which the conceptual model is based.

Participant Level in Organization⁸	Perception / Definition
3	“My immediate reaction would be ‘thinking out of the box’. Not doing the same thing as usual, checking on your own is there some, is there any way to do it differently by being better, in

⁸ Organizational levels were explained in Chapter 5. Level 1 means the head of the organization, and level 4 means the day to day stakeholders such as solution engineers etc. Level 2, and 3 are intermediary leadership positions.

	terms of deliver it faster, quicker – yeah, faster, quicker, or of better quality. That’s how I would describe innovation.”
3	“Innovation for me is about doing things differently than we’re doing (now) and, doing things differently and doing things better. And by doing them differently, ultimately coming to a better result.”
2	“The main thing is it (creativity and innovation) should be different and it doesn’t need to be something absolutely super gigantic in terms of volume. It can be something very small as well but it should be different and it should make a difference in that it’s different!”
2	“For me, innovation can be anything from the way you’re doing a communication to how you are suddenly finding a smarter way to do your work, to a gadget being new technology that helps our business be more productive. Innovative thinking is just applying new principles, new ways of doing stuff which is dramatically changing the way those things were before and can be in any domain.”
4	“Innovation means, not just new technology – I mean that’s part of innovation but that’s part of the understanding I would say. Innovation, I would say, is a (new) piece of work you do which is well thought through, in terms of it meets the requirement from the core. It also adds value to those who use that piece of functionality or piece of paper even – whatever it is you’re designing. It meets the requirement, it’s maintainable. It’s updatable. That’s innovation for me.”
3	“Innovation is about uncovering new areas of benefits to generating new benefits that was never generated before. So benefit meaning, money, cost savings, new ways of working that make us more efficient. At the end, for me, innovation that translates into a clear business case. I think for me, innovation is not a thing, it’s an act, it’s about doing so. It’s not about the idea itself, it’s about the application of the idea. So that may be old idea or old context that you may apply in a new way that never, and commit that to, that innovation.”
4	“Innovation is really looking for alternative ways in doing things so that we are more efficient, or it brings us faster or better to one of our objectives that we have. There is a kind of mission that we have as an organization, as a department, as a group, and being innovative is coming up with ideas and doing things differently so that you are more efficient and better in how you do it, either more efficient or better in what you are doing.”

Table 45. Case study perceptions of creativity and innovation meanings

It should be noted that there is evidence of a variation in the degree of change and value in the perceptions of some participants with regards to the concepts of creativity and innovation. In a few observations, 'incremental' innovation does not register as 'innovation'. This does not impact the alignment of the definitions between the participants and the literature.

Having aligned the participants' perceptions of creativity and innovation, the remaining of the chapter is focused on the dimensions of the theoretical framework, and its mapping with the case study data.

6.4 Concept mappings.

The following notes are outlined before a summary of the data is presented:

- 1) The interviews were coded using the language and the interpretations of the participants. This was then mapped to the language of the conceptual model and literature. In some cases, the semantic expressions of the literature to the case study participants were the same and therefore a "neat match" (Hunter et al., 2005). For example, the concept 'autonomy' was articulated as 'autonomy' in the literature, and 'autonomy' with the case study participants and carried the same semantic meaning. In other cases, however, where there was not an exact word and semantic match, the interpretation of the researcher for approximate mappings was therefore needed. For example, the literature concept 'unconstrained choice of task approach by teams' was mapped to the case study node 'Empowerment'. The latter case is referred to as a "good fit". This approach is consistent to the consolidation process carried out by Hunter et al. (2005) in consolidating over 40 extant literature taxonomies into the theoretical framework adopted.
- 2) Not all literature concepts were one to one fits with the case study nodes. For example, the literature concept, 'mutual openness', mapped to 3 case study nodes, 'honesty about failures', 'trust', and 'open mind'.
- 3) Not all concepts that were discussed in the literature surfaced in the interviews. That does not conclude that those concepts are not of concern in

the case study environment. The interpretation is simply that the semi-structured conversations did not surface and explore these concepts. If this template is used for further work, such as surveys or a factor analysis, it is recommended that all of the concepts are used. Concepts that were identified in the literature, but did not surface in the case study interviewed, are marked “N/A” in Appendix A.

- 4) Similar to (2), concepts that were identified as nodes from the case study data but did not map to, or was present in the literature review, are marked “N/A” (in Appendix A). This contributes to new knowledge generated.
- 5) Mapping in the following discussion segments are presented in the form (literature concept) → (case study node). The symbol “→” is utilized to mean “maps to”.

6.4.1 Work Autonomy and Challenge

Work autonomy and challenge consisted of two dimensions; (1) *job complexity / challenge*, and (2) *autonomy*.

With this dimension, there was good representation from the various levels of the organization in the dataset, that is at levels 2, 3, and 4.

Evaluating the case study data for *job complexity* and *challenge* for enabling dimensions, several of the literature dimensions did not surface in the conversations. As mentioned in the opening of the section, that does not imply that the literature dimensions are not relevant. The following enabling dimensions and their mapping are presented from the results:

- idea exchange → job rotation, tacit knowledge exchange;
- intellectual stimulation → intellectual stimulation;
- decision tasks → challenge.

On the list of inhibitors, the case study data does suggest perhaps a set of unique environments dimensions. These are:

- (i) lack of challenge;
- (ii) perception that innovation is not possible;
- (iii) thinking innovation is only something big;
- (iv) organizational comfort zones;
- (v) lack of team diversity; and
- (vi) when a business walks in with a firm solution in mind.

Items (i) to (vi) possibly contributes to new knowledge generated, and it is recommended they be explored further.

Summary of thick descriptions can be found in Table 46.

Challenge – Positive		Level in organization
Challenge	When I am challenged, I come up with better solutions. I am always looking for someone to challenge me.	3
Job rotation	See Table 57.	
Tacit knowledge exchange	See Table 57, and Table 49.	
Intellectual stimulation	See table Table 49.	
Challenge – Negative		
Lack of challenge	The other dimension is probably how do we get them some exposure with challenge. I feel lucky that I was in the dot com era where everything we were trying to do was challenging and innovative. I mean that was the whole pitch to come to the company (dot com) and use our consultants because we came out with really cool innovative ideas. And I have never had any exposure like that in big pharma. Especially in big pharma because it is highly regulated.	2
Perception that innovation is not possible	The first one, we are working in a highly regulated environment. That gives people the perception we cannot do something different because of its highly regulated.	2
Thinking innovation is only something big	I think a lot of times we think of innovation in these large grandiose terms, but it can be something as small and trivial as an applet.	2

Comfort zones	Human nature is if you are not comfortable or don't know something you are reluctant. On the other end you don't know what the final payoff would be. Together they become a deterrent.	3
Lack of diversity in team	We should have some cross discipline at the council level. It can't be just project managers together.	2
When the business walks in with a firm solution in mind	A challenge with the business, is that they sometimes have a requirement in mind, but they come to the table with a solution already.	4

Table 46. Work Autonomy and Challenge – Summary of thick descriptions

Examining the case study data regarding *autonomy*, there was a good fit of the literature concepts spanning the various levels of the IS organization. The following concepts aligned with the case study data:

- Unconstrained choice of task approach by teams → freedom, empowerment, ownership of innovation, leaner governance for small scale innovation, small core team for decision making, innovation decision making owner;
- collective control over pace of work → leaner governance;
- feedback → support from senior management.

On the inhibitor mapping, there was also good mapping with the literature, which included:

- people working within strict guidelines and roles → Company regulations, compliance regulations;
- people carrying out work in prescribed ways with little room to refine their tasks → methodology addicts.

Notable are inhibiting dimensions that surfaced in the case study data that did not appear in the literature. These were:

- Ivory tower; and
- too many lateral stakeholders for decision making.

This possibly suggests unique concepts to this domain, and it is recommended for further exploration. It also possibly contributes to new knowledge generated. Summary of thick descriptions can be found in Table 47.

Autonomy – Positive		Level in organization
Freedom	When I am given freedom, saying “I trust you”, you do your best. That really works for me.”	3
Ownership of innovation	Creativity and Innovation comes from the person. Whenever you are in a situation, you own it, and it's stressful. In my opinion, you are the most innovative.	3
Empowerment	This dimension of innovation, discussing it, etc., for me was changed two years ago with our new manager from San Francisco. She’s giving the space and time for that; to talk about and discuss new ideas.	3
Leaner governance	I talked to our business, and they definitely like leaner and lighter versions (and governance) of their applications. Can we innovate on smaller things immediately?	4
Incubation	Regarding innovation, we need a space to think about it. To really think about it, what our target is at the end. A culture to try it out. Don’t try to plan to much, just go and try. In our plans we should build that incubation time in, because if you rush, you will not deliver the quality that you should.	3
Autonomy – Inhibitors		
Internal and external Regulations	There is in IS, no floor space for incubation, because there is a very rigid IS framework which does not allow you to set up simple tests. One possible driver for this is the demand to be regulatory compliant.	4
Methodology addicts	I think we are quite often well meaning so the intention is good, but what we effectively do is provide too much of a framework. We prevent personal responsibility, and we over-regulate to a methodology.	2
Ivory tower decision making	We just sit back in our ivory tower and we think, hey, this is probably what the customer wants. But we need to find ways to get back in touch with the customers and find out what they really need.	3

Too many lateral stakeholders	Too many decision makers who need to be asked to move things forward. I guess that is one of the biggest problems which we need to overcome.	4
-------------------------------	--	---

Table 47. Autonomy – Summary of thick descriptions

With any continuous improvement or action research mindset, inhibiting factors play a key role and further exploration and research is recommended. Particular interests could be placed on exploring the inhibiting concepts ‘Ivory Tower’ and ‘Too many lateral stakeholders’.

Surfacing out of the *work autonomy and challenge* dimension was the level 3 concept ‘Incubation’. *Incubation* was identified as a concept heavily connected with other case study concepts and appropriately coded. *Incubation* seems to cut across the entire typology, as an integrative dimension (King, 2015), and potentially can be a moderating factor other key dimensions. From a literature perspective, *incubation* has been studied from a psychological point of view (Boden, 2004; Mednick, Mednick, & Mednick, 1964), and also from an innovation process point of view (Bilton & Cummings, 2007). *Incubation* as an innovation concept or mechanism within Pharmaceutical IS organizations has a limited literature footprint, and this thesis can be potentially utilized as potential research in this area. See Chapter 7 for action research recommendations regarding the implementation of an incubation step within the creative development process.

6.4.2 Positive Member Exchange

Positive Member Exchange consisted of three dimensions: (1) *positive peer group* (2) *intellectual stimulation*, and (3) *positive interpersonal exchange*.

Positive member exchange was the most discussed dynamic of all the 5 dimensions. This is to be expected, since it is the most proximal in terms of creativity (West & Sacramento, 2012) to the participants. Within this dimension, there was good representation from the various levels of the organization in the dataset.

Examining the case study data for Positive Peer Group, there were almost neat fits between the positive literature concepts and the case study nodes:

- Mutual openness → honesty about failures, trust, open minded;
- humour → fun environment;
- good communications → ongoing communications;
- diversity → diversity;
- shared commitment of ideas → team with conviction;
- clarifying and ensuring group vision → mission clarity;
- participants' safety and trust → trust, personal respect;
- task orientation → collaboration, intra team advice, measuring innovation, recognition;
- support for innovation → idea support;
- participation in decision making → incubation, autonomy;
- managing conflict → conflict;
- reflexivity → reflexivity;
- interaction frequency → face time;
- balance of adaptors and creators → let doers be doers and thinkers be thinkers.

Regarding the inhibitors, there was also a good fit between the literature concepts and the case study nodes:

- Excessive task conflict → lack of bandwidth for innovation;
- personal conflict → lack of openness;
- lack of support for innovation → negative manner in which ideas are discarded, premature blocking of ideas.

There were 7 inhibiting nodes that surfaced in the interviews that were not presented in the literature review:

- business frustration;

- “can’t step back”, closed culture / wall thinking;
- resistance to change;
- lack of idea management;
- too ridged on embryotic ideas;
- lack of trust;
- lack of collaboration with the business / unidirectional requirements development.

As mentioned previously, with any continuous improvement or action research mindset, inhibiting factors play a key role and further exploration and research is recommended. These inhibiting factors possibly represent new knowledge created and possibly there are nuances that are reflective or specific to this industry environment. A summary of thick descriptions can be found in Table 48.

Positive Peer Group – Positive		Level in organization
Honesty about failures, trust, open mind	When we’ve failed, let’ be honest within the team. Let’s go to the data, let’s really understand why we have failed, and let’s be okay talking about that. That can sometimes sound like we are focusing on failure, but it should be about how we are going to improve it, and learn from it.	3
Fun environment	I would like to think innovation is exciting that it brings some fun into our daily jobs. First and foremost, it is to have an attitude that this is a fun thing to do, and not just another added responsibility.	2
Ongoing communications	Being innovative, I think one of the things that is very important is dialogue, and that is must not always be scheduled. How many things you learn just by corridor discussions and ideas that you can exchange with others spontaneously.	4
Diversity	Invariably, if you don’t have diversity, everyone’s just going to come up with the same things over and over again. And so it's really being open to change, being open to challenge, etc.	2

Team with conviction	Innovation groups are eager to work on things. They are enthusiastic for the things that they develop. They have a sense of deep determination for success, even in the event of failure.	3
Mission clarity	See Table 52	
Trust	Trust has to be there. Because sometimes experimentation is not measurable, day to day.	3
Personal respect, Idea support	In my opinion, whenever a team has an innovation culture, there is a lot of personal respect in that team. It's like a family at home. Everyone can talk and everyone is respected for that their idea is.	3
Collaboration, intra team advice, recognition,	I think part of innovation is really getting the right feedback to begin with to be able to determine the lay of the land. So working with a certain group of people and carving that dedicated time to think, brainstorm, etc., or how can we improve value.	4
Measuring innovation	What we did was that we showed the benefit through measurement of innovation and the excitement of end users to our business.	3
Incubation, autonomy	If their way of doing a pre-proof of concepts, to test things out, that would be perfect. I can't see how that would work with resource constraints and budget constraints. But if we could we would be de-risking the whole process, by having more team input in the decision-making process.	4
Conflict	I think when you walk in a room with innovative people, you feel the intensity of the discussion. For example, the interaction between each person will include conflict and cohesion.	4
Reflexivity	I think we should have smaller components to deliver. For example, with (name withheld), these projects took two years. And because there was no group reflection it took that long to realize it was really a disaster. Things were constantly changing and not reflected on.	3
Face time	For innovation it's better to connect face to face. These are my preferences to build trust and relations with people. I advocate face to face meetings, and also working a	4

	few months or a few days in different locations to understand various teams. It's very important.	
Balance of adaptors and creators	Some people are more exploratory minded ad they get the thrill and excitement of upcoming changes, and then you have those who are comfortable with being shown what to do, and they get things done regarding execution. I think you need a healthy mix of them.	2
Positive Peer Group – Inhibitors		
Lack of bandwidth for innovation	I think a big obstacle to innovation is that a lot of people would have the potential to come up with new ideas but are very much bogged down with operational work.	3
Lack of openness	I think most important is that you should not go to someone and sell your idea like it's the best thing, and the other person 'can have it'. It more about how you can bring other people into share and develop your ideas.	3
Negative manner in which ideas are discarded, premature blocking of ideas	I don't want to blame anyone, but sometimes other functions shut down initiatives that leaves a bad impression that innovation is not allowed.	3
Business frustration	One of the things that I think always come up is that they design time frames for projects without aligning customers, and in some cases, they are not ready. When the project then slips, people then change, scope creeps in, and everyone gets frustrated.	4
"Can't step back"	I think for me, I have to find the time just to step back and think. It's always like putting out a fire. But I think just a dedicated time and management support to do that, will be great.	4
Closed culture, wall thinking	For sure there are teams who are specialized in certain areas, and they are not happy if you jump on their toes by coming up with an idea for their area.	3
Resistance to change	One obvious thing would be to have more horizontal movement in the organization so that people get exposure to other areas. I think you see what's happening is that people are reluctant to change, because	4

	they are sitting in their activity for a long time.	
Lack of idea management	Anyone should be free to suggest innovative ideas, but there is no forum or mechanism to take those ideas and convert them into concrete solutions. Currently we send or discuss ideas with someone, and they get lost.	4
To ridged on embryotic ideas	I think we have been very poor at giving room for innovation to grow, for example in discussions, or allowing idea time. I think we very deliberately and analytically look at ideas very early on and make pretty tough assessments. Ideas are like little mushrooms, but we tend to put a lid on it.	3
Lack of trust	But you need to provide the trust. You need to provide the protection when someone wants to raise a concern or an idea. Currently the team is not set up for this trust, because it goes against how we are currently measured or incentivized.	3
Lack of collaboration with the business, unidirectional requirements development	I sometimes feel that in informatics we have become order takers. We would get these 500 page requirements documents. We get in situations where the customer says, "build me a house with no windows or doors," and we go and build it.	2

Table 48. Positive Member Exchange – Summary of thick descriptions

Examining the case study data for enablers for *intellectual stimulation*, there was almost a neat fit between the presented literature concepts and the case study nodes:

- Many different points of view are shared during discussions → collaboration, combinational thinking, disruption, personal learning;
- Differences of opinions are frequently expressed here → group ideation;
- A wide variety of viewpoints are expressed here → edge of the box thinking, tacit knowledge exchange, job rotation;
- People accept diversity → diversity.

An enabling case study concept that was not present in the literature was; "attempting to be future proof".

Examining the inhibiting factors for *intellectual stimulation*, it was observed that participants did not surface evidence of personal conflict which was identified in the literature. However, the literature concept, ‘there are territory struggles’ → ‘power structure and power struggles’.

There were some notable inhibiting factors that surfaced in the case study dataset, that was not presented in the literature review concepts. These were:

- when business walks in with a firm solution;
- architects not on top of technology;
- poor collaboration;
- lack of knowledge share.

It is recommended that further exploration and research for these inhibiting concepts, which can be accentuated by this industry domain, and the size and complexity of a drug company. These inhibiting factors possibly represent new knowledge created. A summary of thick descriptions can be found in Table 49.

Intellectual Stimulation – Positive		Level in organization
Collaboration	Innovation is about where people can share ideas and be able to collaborate and network around things. Because part of innovation is getting the right feedback to begin with.	4
Combinational thinking	I’d say the ability to see different angles and combine different experiences is definitely good for innovation.	4
Disruption, personal learning	Innovation has to have a disruptive element, because you need to do things differently to what you do today.	4
Group ideation	When a team has an innovative culture, when you go into discussions with them, you can see that everyone is talking about ideas.	3
Edge of the box thinking,	Innovation is about changing the way we do things to get a better result. There is an element of thinking outside the box. Therefore, forcing ourselves to do things differently, or to think about how we do	3

	things differently in order to come up with a better result.	
Tacit knowledge exchange, job rotation	It's important to get people to try to exchange knowledge. Can be as simple as meeting for ¼ hour grabbing a coffee. We open up our minds to things, and this helps us bring innovation to the team.	3
Diversity	I know we are encouraging vertical moves for people. For example, someone coming from drug safety into clinical operations, and this brings diversity. You may for instance, have a different view how to do business because you are coming from a different background.	2
Attempting to be future proof	My team and business are extremely open to new ways of working, new technologies, and future concepts. We are ensuring that systems are future proof by building in flexibility and adaptability.	3
Intellectual Stimulation – Inhibitors		
Power structure and power struggles	We have a great culture of personal fiefdoms, people having their own empire and everyone is extremely protective of that. And it's not only between IS and the business, but also within Informatics, and internally with the business. For these folks, in general, they don't have an interest in working together.	4
When business walks in with a firm solution	Its challenging from an innovation point of view, when business engages with a solution already. It is very hard to bring them back to a collaborative and engaging space.	3
Architects not on top of technology	Innovation should not fall completely in the hands of architects. But they have two key purposes: one is roadmaps, and second is staying on top of new technology and mapping new technology to the needs of customers. As I see it right now, there are instances of two big disconnects. One is the disconnects between the architects and business, and the other is that some architects are not staying o top of the technology world.	3
Poor collaboration	I think lack of innovation comes down to loss of communication with the customers.	3

	We just sit back in our ivory tower and we think, 'hey this is what the customer wants'.	
Lack of knowledge share	I think as an organization, we are not very good at information and idea exchange and what's going on. We tend to make the same mistakes over and over again.	2

Table 49. Intellectual Stimulation – Summary of thick descriptions

Examining the enabling dimensions for *positive interpersonal exchange*, there was a neat fit between the literature concepts and the case study nodes.

- Support → informal environment, open thinking, socialization;
- signals of progress → recognition;
- trust → trust;
- rewards → rewards;
- clarity → ongoing communications.

There were two inhibiting case study nodes that were not presented in the literature concepts;

- fear to raise your hand;
- power struggles.

As above, further exploration is recommended for these inhibiting concepts. A summary of thick descriptions can be found in Table 50

Positive Interpersonal Exchange – Positive		Level in organization
Informal environment, open thinking, socialization	You need to be free to express your thinking with each other and also to accept someone else's different thinking.	3
Recognition	I think the tough part of recognition is not just to say job well done during an emergency, but you are recognized for the 10 evolutions of the process that just occurred.	3
Trust	Innovation is a lot about people's mindset and feeling trust enough to bring creative ideas forward.	3

Rewards	People are very anxious on delivering within timelines, because it's what you are measured against and have rewards against. We don't have rewards on ideas, so it's not going to be people's major focus.	3
Ongoing communications	See Table 48	
Positive Interpersonal Exchange – Negative		
Fear to raise your hand	You need to provide the protection so that your colleagues feel that they can actually raise concerns, because sometimes we are not on the right path. This currently is an issue, because it is not how we are incentivized.	3
Power struggles	See power struggles in Table 49.	

Table 50. Positive Interpersonal Exchange – Summary of thick descriptions

Surfacing out of the *positive member exchange* case study data is the concept of *trust*. This is a well researched area in the literature, and intuitively a key factor. A contribution in presenting a rich picture, Figure 18, and model around *trust* derived from the case study data, gives innovation managers a clearer view of its influence and effects through relationships with other concepts within this case study domain, and potentially provide some similarity within the industry.

From the case study data, *trust* seems to be a concept that potentially has an unclogging effect in identifying root factors in a 'mess' situation (Armson, 2011). It is connected, within the case study environment to other key concepts such as 'ideation', 'motivation', 'openness', and 'seeing the big picture'.

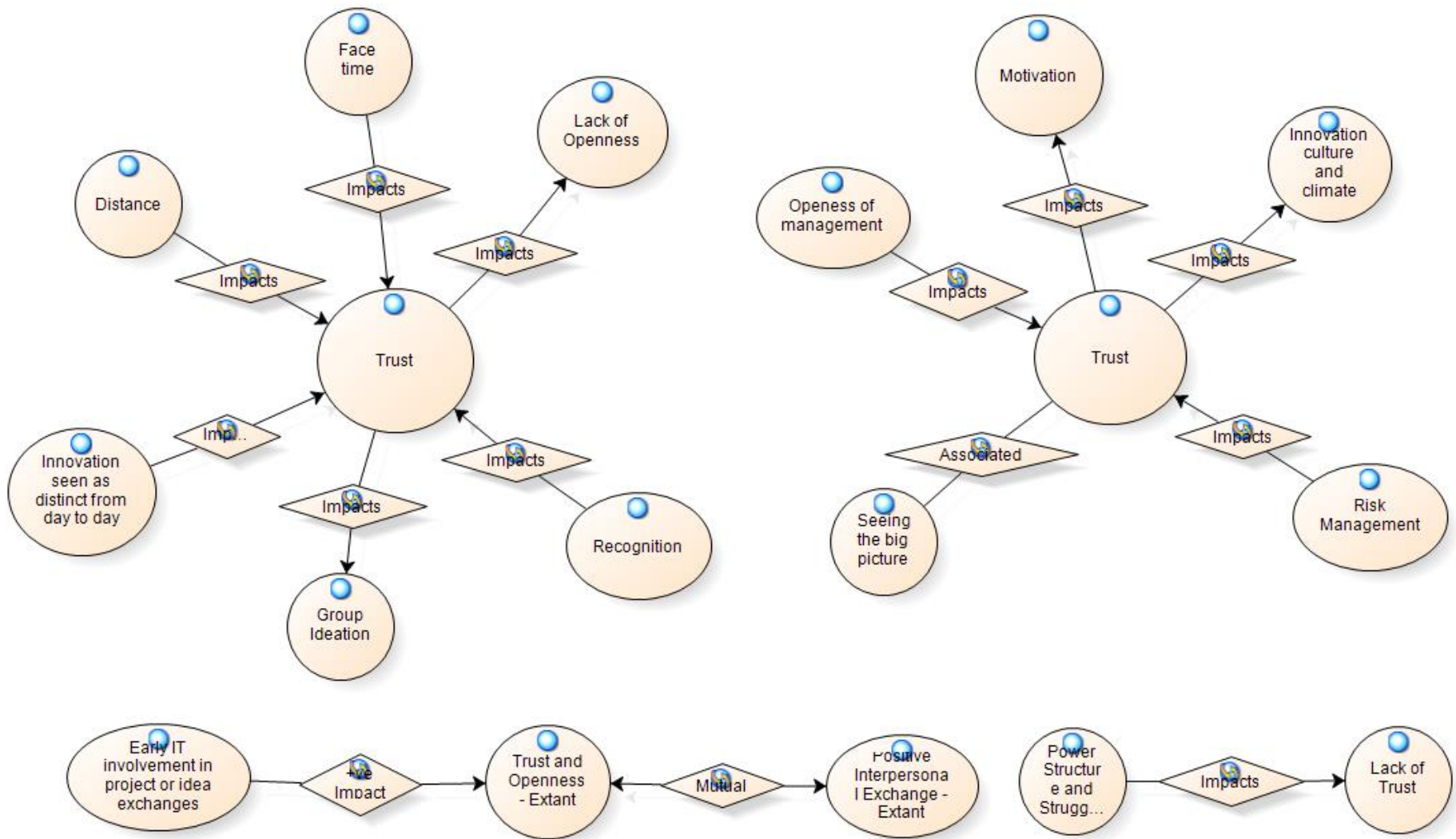


Figure 18. Rich picture displaying case study concepts to trust.

6.4.3 Leadership influence and direction

Leadership Influence and Direction consisted of three dimensions: *positive supervisor relations* (2) *mission clarity*, and (3) *participation*. Similarly to *positive member exchange*, this area also produced rich discussions with the case study participants. Likewise to *positive member exchange*, a possible explanation could be that is also proximal to the participants in terms of creativity (West & Sacramento, 2012). With this dimension, there was good representation from the various levels of the organization in the dataset.

Examining the dataset for *positive supervisor relations*, there was a good fit between the literature concept dimensions and the case study nodes. There were instances of literature dimensions that were not mapped to case study nodes. These were:

- Keeping members informed of stressful situations;
- Addressing subordinates' negative feelings;
- Disclosing personal feelings.

However as indicated, this could be explained by these dimensions simply not surfacing in the interviews. Regarding enablers to *positive supervisor relations*, the following mappings were observed:

- show support for a team members actions or decisions → management support;
- help alleviate stressful situations for subordinates → give subordinates the space to be creative;
- socializing → physical exchanges;
- maintaining regular contact with and providing general guidance to subordinates → management being a good role model;
- provide constructive feedback on work done → trust, recognition;
- reacting to problems in the work with understanding and help → trust;
- recognizing good performance → recognition;
- acting for team members' ideas → team leaders support people's ideas, trust;

- collaborating with subordinates → trenches together.

The inhibiting dimensions for *positive supervisor relations*, was also observed to be a good fit. These included:

- Creating high time pressure with assignment → can't step back, keeping the lights on;
- changing assignments too frequently → lack of focus;
- assignment in conflict with other management instructions → operationalization pressure / lack of bandwidth to be creative;
- display lack of interests in subordinates work or ideas → negative manner in which ideas are discarded, lack of trust.

A summary of thick descriptions can be found in Table 51.

Positive Supervisor Relations – Positive		Level in organization
Management Support	What works well is the understanding of management to recognize innovation as a driving factor and their attempts to get a positive, innovative framework and environment set up to facilitate innovation.	4
Give subordinates the space to be creative	You have to figure out how to have structures in place so while people are working, there is a period and place that you have to take them to help alleviate the pressures. This will help the creative juices flow.	2
Physical exchanges	I think where we can create an environment where people can have fun experimenting (in person preferably). That encourages innovation because ideas come from these environments.	3
Management being a good role model	Being a good role model... Management being a good role model. Providing support, and creating communicative spaces.	3
Trust, recognition	An environment that is safe for people to know they can fail, and that they are not going to be penalized via a negative performance review.	3
Team leaders support people's ideas	What my manager is saying is that I can fail, he is supporting my ideas. I can learn from	3

	it. This creates safe and supportive environment.	
Trenches together	I think there is a value (for management) in being in the trenches together. Management to say, "I'm not in a tower somewhere with a pen and paper.	2
Positive Supervisor Relations – Inhibitors		
Can't step back, keeping the lights on	If I say to them (subordinates), look go ahead and spend 20% of your time innovating, they will have a reaction, "well hang on, I have too many things and problems to fix before I can think about additional value in terms of innovation.	3
Lack of focus	Often when it comes to practical timeline of doing work, the business feels challenged. This is because they do not usually have one thing that they are exposed to but multiple things from multiple directions.	2
Operationalization pressure	We are too bogged down with operational work. We are busy 150% with just running the business that I don't think we can have the potential to come up with new ideas.	3
Negative manner in which ideas are discarded	I don't want to blame anyone, but sometimes you get an answer back that your idea is not allowed. This leaves you with a feeling, "ok they (management) don't want us to be creative.	3

Table 51. Positive Supervisor Relations – Summary of thick descriptions

Examining the dataset for *mission clarity*, similarly there were good fits between the literature dimensions and the datasets:

- stated action and aims in regards to creativity → planning horizon, seeing the big picture, innovation expectations;
- requirements → requirements;
- creative time pressure → challenge;

The inhibiting dimensions for *mission clarity* were also a good fit;

- Keeping the lights on → keeping the lights on;
- excessive time pressures → can't step back;

- losing sight of the big picture → lack of idea time;
- excessive creative time pressure → lack of idea time.

A summary of thick descriptions can be found in Table 52.

Mission Clarity – Positive		Level in organization
Planning horizon, seeing the big picture, innovation expectations	In order to understand where we want to go, we have to be able to map it out, because there are so many things we want to do. So we have done a 3 year road map with is very helpful.	4
Requirements	Sometimes we don't understand requirements properly. This causes a lot of misalignment issues.	3
Challenge	See Table 46.	
Mission Clarity – Inhibitors		
Keeping the lights on	We are at the point where we are too busy delivering projects or supporting our people to make innovation happen.	4
Can't step back	You can't do strategy in war time.	4
Lack of idea time	I think the main challenge for me that is holding me back is really the bandwidth to be innovative.	4

Table 52. Mission Clarity – Summary of thick descriptions.

Examining the *participation* dimension, there was also good fits between the literature concepts and the case study for enablers:

- Physically involved in tasks → co-location;
- cognitively attentive → curiosity;
- focused → commitment;
- emotionally connected to work → motivation;
- emotionally connect to others → motivation, personal responsibility.

Finally, the inhibitors for *participation* did not have any traceability to the literature research, but yielded case study codes:

- distance;

- lack of interests from other groups.

A summary of thick descriptions can be found in Table 53.

Participation – Positive		Level in organization
Co-location	Co-location is a specific form of collaboration, because of physical presence, you have very direct ways of trial and error, and that is a very idea situation for creativity.	4
Curiosity	There should always be a sense of curiosity, a need to learn more about technology and one to explore further what technology can do.	2
Commitment	You are only going to get that with the right people, right business customer, who are willing to turn on their heads, support and commit. I think there are definitely tears in innovation.	3
Motivation	It's about intrinsic motivation for the person and what drives that person to be part of that environment that requires they put in so much extra effort without being asked.	2
Motivation, personal responsibility	I'm thinking about a particular innovative individual working in our team. He thrives on waking up every morning and looking at new RSS feeds. He starts his day by sourcing the technical social networks for new ideas that people are throwing out there. People that have a lot of personal responsibility and motivation, and they are the ones comfortable with testing the waters.	2
Participation – Inhibitors		
Distance	One of the most important things is face to face dialogue. In our environment I think that is difficult – and it costs us.	3
Lack of interest from other groups	Sometimes there is a lack of interests from other groups, and an active blocking of innovative paths.	3

Table 53. Participation – Summary of thick descriptions.

6.4.4 Organizational Support

Organizational Support consisted of three dimensions: (1) *resources*, (2) *top management support*, and (3) *reward orientation*.

Examining the data set for *resources* there was a good fit between the case study and the literature concepts:

- sufficient resources → resources to try things out.

However, there were two case study nodes not identified in the theoretical framework for enabling *resources*:

- team size and
- idea time

In terms of inhibition factors for *resources*, there was a neat fit with the literature:

- Insufficient resources → Insufficient incubation resources
- Time constraints → Lack of idea time

The concept of time as a resource surfaced dominantly in this category and was discussed in terms of cause and effect relationships in the case study interviews. 'Time as a resource' has knock on effects (relationships) and cascades to other key concepts such as 'motivation', 'ideation', 'idea exchange', and 'organizational learning'. Further exploration of these concepts and their relationships are recommended and forms part of the recommendation in Chapter 7.

A summary of thick descriptions can be found in Table 54.

Resources – Positive		Level in organization
Resources to try things out	But really to make something successful (with innovation) you need incubation, and prototyping. It's not just the costs, you need resourcing.	2
Team size	We (management) discussed team size previously, and I fully support that because creating an environment with small teams, will be productive, and we can rotate these people in the organization.	2

Idea time	Part of is giving people the time space in small ways to run away with ideas and bring things to the table.	3
Resources – Inhibitors		
Insufficient incubation resources	I can't see how incubation would work given the resource constraints. But if incubation can work, then we can de-risk many parts of the innovation process.	4
Lack of idea time	We are far too bogged down with operational work. I just don't think we can have the potential to come up with ideas.	4

Table 54. Resources – Summary of thick descriptions

Examining the case study data supporting the dimension *top management support*, a semi-good fit was observed. From a literature point of view there were concepts that overlapped with the literature used in the *positive supervisor relations* dimension, as can be expected since there was not a clear distinction between these two concepts during the semi-structured interview settings. On the enabling dimensions:

- Top level support for the initiation and development of ideas → commitment, openness, support, trenches together;
- autonomy → autonomy;
- supports risk taking → risk taking;
- rewards and recognition → rewards;
- codified commitment to innovation → mission clarity.

Regarding enablers, 'top management being a good role model' surfaced as a concept for *top management support* not found in the literature research.

Regarding inhibitors for *top management support*, the case study data was a good fit with the literature review concepts:

- decisions concentrated at the top → premature high level decisions, ivory tower thinking;
- team members are expected to follow orders coming down → top down standardization, hierarchy.

However, two case study nodes observed did not map to the literature search:

- lack of credibility in innovation;
- expectation that innovation is done outside your job in your spare time.

Further research is recommended with these inhibition concepts to understand nuances in more depth. A summary of thick descriptions can be found in Table 55.

Top Management Support – Positive		Level in organization
Commitment, openness, support, trenches together	Having top management commitment is really important, and that commitment to continuously drive innovation.	3
Autonomy	See Table 47.	
Risk taking	See Table 57.	
Rewards	See Table 56	
Mission clarity	Mission clarity from top level management sets the tone. This is expressed in the Annual Report, business meetings, etc.	3
Top Management being a good role model	Top management being good role models help.	3
Top Management Support– Inhibitors		
Premature high level decisions, ivory tower thinking	What I am referring to are these high level decisions being made without asking the right people, or getting a complete picture.	4
Top down, standardization, hierarchy	Three big ones. I think it's the hierarchical structure, the complex processes that we have so that everything is over complex. Everyone is afraid of stepping out of that.	4
Lack of credibility in innovation	Honestly the word innovation is overused. All the things that have been labelled innovative which I have experiences in the recent past, to me they are more negative than positive.	3
Expectation that innovation is done outside your job in your spare time.	I think for me in my busy day I have to find the time to just step back. At work, its like always putting out a fire.	4

Table 55. Top Management Support – Summary of thick descriptions

Finally, *rewards* offer a semi-good fit between the case study data set and the literature:

- Rewards and recognition practises that encourage intrinsic motivation → benefits or value realization;

Regarding the inhibitors for *rewards*, there were two concepts that surfaced from the case study data not aligned to the literature review concepts:

- missed recognition;
- how teams are measured.

It is recommended to research these inhibiting concepts further.

A summary of thick descriptions can be found in Table 56.

Rewards – Positive		Level in organization
Benefits or value realization	People have to see the value of innovation. It's always the question, "what's in it for me?". Versus, "just doing it".	3
Rewards – Inhibitors		
Missed recognition	We used to have the option of purchasing stock at reduced prices. And when you are in an environment like that, you want to contribute extra hours and extra time to make the best product. Now, the culture has changed a lot.	3
How teams are measured	The boss is measuring quantitative delivery – what if I don't deliver? Does that mean it's actually stifling creativity or innovation? Probably.	3

Table 56. Rewards – Summary of thick descriptions

6.4.5 Organizational integration and extension

Organizational Integration and Extension consists of two dimensions; (1) *organizational integration*, and (2) *flexibility and risk taking*.

Examining the dataset for *organizational integration* against the literature research, the mappings appear to be a good fit (enablers) to the themes discussed in the case study conversations:

- Idea exchange and knowledge creation → knowledge management;
- good mix of adaptors and creators → let does be does and thinkers be thinkers;

- specialization with flexibility → wearing multiple hats;
- multi-tasking → job rotation;
- mission clarity → mission clarity;
- project planning → project management.

Regarding inhibitors, there was also a good fit between the theoretical framework and the case study data set:

- confusion for accountability and communication → difficult cross discipline dialogue, disparate storage of explicit knowledge, lack of knowledge sharing within organization, matrix organization, operation silos;
- constraints on organizational learning → understanding the business;
- Losing sight of the big picture → losing site of the big picture;
- constraints on personal development → over specialization.

Significantly, the case study node of ‘global-working’ surfaced as an inhibitor to *organizational integration* from the case study data set. This perhaps suggests a unique concept for this industry domain, given the international nature of drug companies. Further study is recommended. This concept represents new knowledge generated.

Knowledge Management was a dominant theme discussed in this dimension and surfaced various impacts and dependencies. These were captured and coded, and displayed in the rich picture in Figure 23. From this rich picture, relationships appear as related to knowledge management and the SECI dynamics (Chapter 3). This rich picture of the local language concepts can help to paint a picture to innovation managers in this case study and possibly similar industry IS organizations.

In addition, a counter dynamic for organizational knowledge management, is ‘organizational silos’. This also surfaced during the interviews, and relationships were noted and coded. As above system approach diagram was constructed as a rich picture and is captured in Figure 19. From this rich picture of relationships, there is a clear indication that within this case study, and according to the case study

participants, the occurrence of operational silos has knock-on effects to the organization: ‘resisting change’, ‘group ideation’, ‘losing sight of the big picture’, and ‘reflexivity’. This rich picture offers guidance and enablement knowledge to innovation managers within this case study and possibly similar industry organizations. Further research is recommended to explore these relationships and moderating factors.

A summary of thick descriptions can be found in Table 57.

Organizational Integration and Extension – Positive		Level in organization
Knowledge management	My experience of knowledge sharing is that I have never found someone not willing to explain or help me. And I am like that with others. With knowledge sharing, the tricky part is to identify the appropriate resource or asset.	3
Let doers be doers and thinkers be thinkers	Some people are just more exploratory minded, and they get the thrill from changes. Some people are more comfortable with AS-IS. But you need to have a healthy mix of that.	2
Wearing multiple hats	Wearing multiple hats gives you a broad understanding of what the different environments look like and provide you with a broad network of people to tap into.	2
Job rotation	Job rotation, or having multiple tasks, like a project manager doing some requirements building or validation, can really broaden the scope of collaboration.	2
Mission clarity	See Table 52	
Project management	Context of projects change and someone at a high level has to say “hey, objectives have changed, please redirect the missile.” That is the nature of business and ultimately project management has to be flexible to that.	2
Organizational Integration and Extension – Inhibitors		
Difficult cross discipline dialogue	Your innovations die sometimes when you go to other functions. It could be that it clashes with their view of the world, but you	3

	can't help thinking, "why are you blocking the innovative path?"	
Disparate storage of explicit knowledge	The way we structure or data, it's stored and all over the place. Word documents, excel sheets, etc. It is very difficult to access information.	3
Lack of knowledge share within organization, matrix organization.	Although we have diversity in our matrix structure because people can't really communicate at a certain level, that diversity doesn't really bear fruit. People tend to be over specialized in their little deliverable.	3
Operational silos	When you dig into it, some functions just do not think alike, not do they want to think alike, that is always a challenge.	2
Understanding the business	I think the best way for IS to innovate is to observe and understand the business. If you sit down sometimes just for 30 mins and just observe, you'll come up with 10 innovative things to make life easier. I don't think that is an exercise that we do.	3
Over specialization	In a matrix organization you accidentally limit organizational learning, and when you do that you put a box on innovation, because innovation is about that cross pollination of knowledge, versus a vertical focus of knowledge.	4
Losing sight of the big picture	One of the things about a small business or creative team is that they can never lose sight of the big picture, and that is one of the traits of a creative environment. Whereas sometimes here, losing sight is the norm.	2
Global working	For instance, people sitting in the West Coast of the US, and in Switzerland, that's already creating a barrier to innovation.	4

Table 57. Organizational Integration and Extension – Summary of thick descriptions

Examining the case study data for *flexibility and risk taking*, a good fit is observed for the enabling dimensions:

- Acceptance to take a gamble → Acceptance to risk and failure;
- Experimentation → Fail fast and fail small;
- Opportunity seeking → Belief that innovation open doors;

- Flexibility → Flexibility.

Notable, the case study data set discussed the concept of ‘risk management’ which did not appear as a feature of ‘risk taking’ in the literature review.

Examining the case study data set for the inhibitors for *flexibility and risk taking*, there is also a good fit between the literature and case study data:

- Overly cautious → Risk averse culture, staying in a comfort zone, fear of failure;
- Hesitant mentality → Fear of failure.

A summary of thick descriptions can be found in Table 58.

Flexibility and Risk Taking – Positive		Level in organization
Acceptance to risk and failure	I think the other thing is building trust, and letting failures happen. I think it is very important. I was very inspired that our top management said, “I’d really like at some point us becoming an organization where we reward failures.	3
Fail fast and fail small	I think we should have a way to work in a way where we have smaller components to deliver, with reflection points. Rather than these big 2 year projects.	3
Belief that innovation open doors	We thought it just seems like if we build innovation applications, it will open the door for us to more innovation successes in the future	2
Flexibility	In my mind, I think innovation needs to be driven by the idea that no matter where you’re based in each of your teams, there needs to be flexibility to say, “I like that, I like what is being proposed, I can be flexible and be part of it.”	3
Risk Management	Part of the innovation discussion is understanding the risk profiles of whatever you are trying to innovate. This will indicate the severity of a potential failure. Because we struggle with those discussions formally, people stay in their comfort zones.	2
Flexibility and Risk Taking – Inhibitors		
Risk averse culture, staying in comfort zone, fear of failure.	The nature of our IS systems generally means we cannot fail. And if people do, the consequences can be enormous. We like in	2

	a risk averse culture and environment. Inherently, we are not risk taking teams.	
--	---	--

Table 58. Flexibility and Risk Taking – Summary of thick descriptions

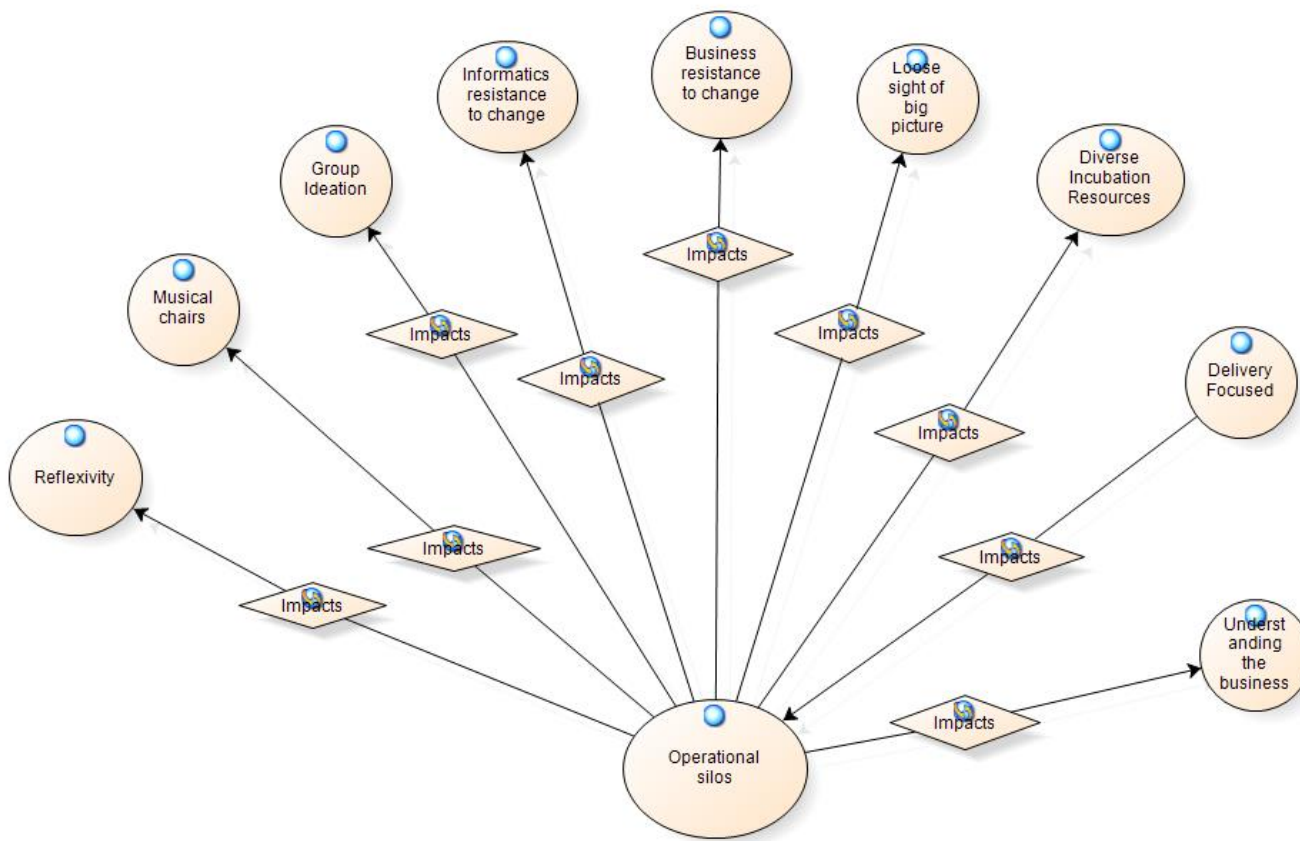


Figure 19. Case study rich picture for the effects of operational silos.

Chapter 7: Discussions and Conclusion

7.0 Introduction

In this closing chapter, several topics are discussed. Firstly, the contributions to both theory and practice are presented including what is new for the case study company and possibly similar IS organizations. Secondly, the limitations of the research are discussed. Thirdly, the contributions per typology dimensions are presented and summarized. And fourthly, two recommendations for further study and action research are presented as appropriate.

7.1 Theoretical contributions – testing and adding meaning to a theoretical framework

Meaning is an essential component of climate. Some authors describe it as the essence of climate (L. R. James, Joyce, & Slocum, 1988). Studying the meaning of climate dimensions in organizations is likely to yield a greater understanding of behaviour in organizations because people's behaviour is based on their interpretations they attach to situations (D. A. Gioia & Poole, 1984).

Climate studies are usually assessed with questionnaires where organizational members are asked to rate how well statements describe the organization (Rentsch, 1990). This is the case with the main instruments used in assessing creative climate: CCQ (Göran Ekvall, 1996), KEYS (T. M. Amabile et al., 1996), SSSI (Siegel & Kaemmerer, 1978), and TCI (Anderson & West, 1998). According to Rentsch (1990), there is variance found across individuals in how they rate the descriptiveness of event statements. For example, one organizational member may rate a given statement as "very descriptive", while another may rate the same event as "not every descriptive". The issue with questionnaires according to Rentsch (1990) is that the interpretations of the events asked are not captured and assessed. There is no allowance for qualitative variance in meaning. Therefore, for example, a survey may pose a question about a manager's creative support, and respondents may agree, but there may be variation in the interpretations of what that means. Thus, according to Rentsch (1990), "although

meaning is critical to understanding climate, the typical methods used do not actually measure meaning.” This is a gap to be filled, and a contribution of this thesis.

According to Rentsch (1990) organizational members perceive their climate by a multitude of factors including objective properties such as policies, practices, procedures, but also ‘events’. An ‘event’ is defined by anything in the organization that members interpret or attach meaning to in their attempt to make sense of the workplace. The drug industry is a unique niche with a unique set of business and environmental drivers (A. M. Lilleoere & Holme Hansen, 2011), and hence by extension a unique set of day to day events.

In this research, a theoretical framework by Hunter et al. (2005), which is a consolidation of 40 creative climate typologies found in the literature and covers dimensions at the individual, group, and organizational levels was used as a typology template. Via a qualitative research design, the theoretical contribution of this research is the testing of the theoretical framework in a practical case study environment within a specific industry domain and the enlargement of the theoretical framework. A good fit with practical qualitative data for a particular industry domain was found. In addition, the 13-level literature classification was enlarged to 172 sub-classifications, providing more granularity and richer understandings of the concepts. This meaning layer can be compared to other research work exploring meaning of creative climates.

Finally, the use of the dramaturgical model as outlined by Myers and Newman (2007), as far as the knowledge of the researcher is aware, has no previous use within the Pharmaceutical IS space. Therefore, this thesis can be seen as case study contributing to the use of the dramaturgical model for interviewing within the Pharmaceutical IS domain.

7.2 Contributions to practise – a soft ‘a priori’ template for practitioners

According to Anderson and West (1998) it is considered a confusing endeavour regarding the actual conceptualization of ‘innovation and creative climates’. In a practical setting for example, if top management cannot align on what innovation is,

and / or what a creative and innovation climate 'is', then initiatives will reach an impasse due to an inability to articulate coherent vision. Deconstructing creative climate into multiple facets is a valuable way to clarify some of the confusion over its meaning which results in overcoming impasses of meanings (Rentsch, 1990). This thesis offers practitioners within this industry domain (Pharmaceutical IS) a template to better articulate their vision and tool set, and / or to conceptualize and plan improvement strategies. It can be used for example as an 'a priori' Template in itself (King, 2015; Symon, 2012), and / or it can fuel further research such as surveys, factor analysis and so on. Vala-Webb (2017) states that the various levels in organizations are frequently responsive on identifying barriers and bottlenecks that unclog pathways for improvement for a given concept area. This was discussed in the literature review (A.-M. Lilleoere & Hansen, 2011), as stakeholders circle around and are motivated by problem definition and solving. The inhibitors found during this research via the Level 3 classifications (see Appendix A), and the case study articulated relationships (see Appendix D) are particularly relevant in helping innovation managers organize collaboration and alignment for problem definition, change management improvements involving the various stakeholders, including the various organizational levels. This is in contrast to improvement initiatives that may seem being dictated from above, or one sided.

Specifically, and in summary, what is new to the case study organization are:

- 1) The testing of the theoretical framework to this industry niche via a qualitative data study. As a pharmaceutical IS practitioner's tool set, there is new confidence that the theoretical framework fits their world view;
- 2) The expansion and enrichment of the theoretical framework to include meanings and local language expressions possibly unique to this industry niche;
- 3) The identification of enablers and inhibitors of each of the dimensions, which can unify and motivate teams around improvement initiatives;
- 4) The identification of concepts relationships as expressed by participants in this case study environment;
- 5) The identification of concepts that cut across the taxonomy, which forms opportunities as vehicles or mechanisms of enablement.

Dennis A. Gioia et al. (2013) states, “Is it possible to generalize from a single case study? Of course it is—if the case generates concepts or principles with obvious relevance to some other domain.” As pointed out in the following Limitations section, this thesis is based on a single case study, and therefore has limitations for generalization. However, it is argued as a contribution to practise, that the typology developed by this thesis delivers an enablement mechanism for innovation managers in pharmaceutical IS organizations, within the context of knowledge of its limitations.

Finally, as stated by Thamhain (2003), an effective innovation manager, is a “social architect who understands the interaction of organizational and behavioural variables and can foster a creative climate of active participation and minimal dysfunctional conflict.” A better understanding of the criteria and organizational dynamics that drive innovation performance, can assist innovation managers in pharmaceutical IS organizations in developing a better framework, fine-tuning leadership styles, managerial actions, and allocation of resources.

The following subsections discuss some real-life case studies in the applicability of the enhanced typology developed from this thesis.

7.2.1 Applicability Use Case 1

A pharmaceutical company in Germany invested heavily (> €1M) into a Knowledge Management System in order to improve organizational learning and innovation in the medical marketing phase of the drug lifecycle. The consultancy firm who sold the idea was brought in to implement the technology.

Upon completion of implementing the technology, it was observed that key stakeholders were not using it, and their sentiment was “no thanks” to its promotion and adoption. The few departments who were using it, were primarily using it as a platform for self-promotion and announcing, ‘what wonderful jobs their departments were doing’. In essence, key discussions on problem definitions, pain points, etc., were not being surfaced and carried out as expected.

The author of this thesis was brought in to manage the technology and suggest design improvements. Using this thesis climate typology as a prism in which to articulate and

diagnose innovation, a set of simple interviews were conducted. During its coding, it was discovered that in the climate framework of the company, a dominant theme 'knowledge was power', and therefore people did not want to share what they knew. The concept of 'knowledge' was team members currency which was also reflected in their reward system. It also surfaced that the climate of a 'lack of trust' was an issue. These attributes were labelled as "climate blockers" that were impeding the flow of knowledge generation as expected. Based on this feedback, and mapping back to the climate typology in this thesis, the latter was used to demonstrate why these factors were impeding knowledge sharing. An organizational change management consultant was brought in to address these issues. A change in these climate factors resulted in a more favourable adoption of the Knowledge Management system.

7.2.2 Applicability Use Case 2

A pharmaceutical company in New Jersey USA, invested heavily (> \$1M+) in a Content Intelligent system that was intended to improve the findability of key document assets. The technology⁹ identifies the meaning of content by applying pre-established taxonomy and ontology models with configured algorithms and some Artificial Intelligence. On the surface of the initiative, the technology appeared promising, but a key mechanism for its success was the development of ontological models which represents in a codified manner the 'view of the world' from the organizational perspective.

After 3 years of the implementation of the tool, there was little success in its adoption.

There were many challenges, but three critical ones:

- 1) The tool was a back-end tool, and therefore seemed abstract to stakeholders;
- 2) The business value and its link to innovation output of the tool was not understood and / or communicated. This led to minimum input in developing organizational ontological models, which was critical to its success.
- 3) From a climate perspective, collaboration was done within silos and therefore the value organizational knowledge was not appreciated.

⁹ Technology referenced: www.smartlogic.com

The author of this thesis was brought in to manage the program. One of the first actions taken was to use the climate typology of this thesis to articulate meaning and value of the Content Intelligence initiative. The typology was used to map the tool to the overall innovation goals of the organization. Specifically, the Content Intelligence tool was placed under the “Organizational Integration” typology, and positioned as a key contributor in the explicit to tacit knowledge exchange of the SECI model. The relationships developed in this thesis were used to identify the secondary effects of knowledge exchange, including better collaboration, ideation, increased intellection stimulation, conceptual combination, etc.

This repackaging of the tool and initiative as a key enabler of the “creative act” and innovation goals of the company, transformed the required interests. As a result, stakeholders contributed heavily in the development of the ontological models needed for the tools enablement. As of the time of writing, the tool is embedded in the organization, functions as expected, and assists greatly stakeholders to find content in order to generate new ideas and solutions.

7.3 Limitations of the research

There are several limitations of the research which will be discussed in this section.

7.3.1 Single Case Study

Firstly, this research was based on a single case study within a particular industry sector. Although there are many commonalities between research based pharmaceutical companies due to the drug life cycle, and the nature of development, caution is recommended on making any generalization assumptions. Template Analysis is designed to be a flexible research method, and therefore the output of this research can be used as an ‘a priori’ template in another pharmaceutical context (Benbasat et al., 1987; King, 2015).

7.3.2 Limitations of perception data

Qualitative research, with semi-structured interviews, taps into individual perception of the organization regarding likes, dislikes, preferences, and performance. Although in the research design, and construction of the semi-structured interview, strong efforts were made to limit bias, a limitation exists. As with any research that is qualitative in nature, and modelled around semi-structured interviews, there are certain topics that are discussed and explored in more depth than others. Some qualitative researchers such as T. M. Amabile (1988) would quantify the amount of occurrence a particular topic is discussed, and imply a weighting around that topic. The approach in this thesis is not to follow that route, but topics that participants talk about more deeply are noted. Further research in quantifying the effect sizes of dimensions to creative output is recommended.

Another limitation of the research, is the perception of reality (Thamhain, 2003). In this research, participants focused on the enablers and inhibitors on initiatives that they perceived were innovative. There was no measure or validation if those initiatives were innovative, and there could be a case of bias. Further research can include choosing established (measured) creative and innovative projects, and interviewing the involved participants.

There is an assumption in this research, that meanings and perceptions (of climate concepts) are shared by groups. This was not tested, and further testing would be recommended.

7.3.3 Variation in literature's creative dimensions.

A challenge and potential limitation of the research is the literature variation on the maturity of the various dimensions explored. In some cases, for example, there were clear literature examples of how that particular dimension was expressed in the workplace and these were utilized and mapped against the case study. For example, there was research asking the question, 'what does it mean to be a good leader in the eyes of subordinates on a day to day basis within the context of creative output?', and a recommended attribute list was produced. In other dimensions, there was not the equivalent level of research maturity, and how the dimension is expressed in the

workplace was inferred from descriptive text the literature. For example, there was not an equivalent study ‘what does it mean to have good resources in the eyes of subordinates on a day to day basis within the context of creative output?’ that produced descriptive attributes. Attributes had to be inferred from scholarly papers on the subject matter.

7.3.4 Interconnections between the dimensions

As described by West (2002b), creative climate dimensions are “more like clouds and less like clocks”. The relationship between these concepts are not a neatly fitting linear typology, but a complex set of interconnections and poly hierarchical typologies (Tesluk et al., 1997). As an example, Cordery et al. (2010) in a longitudinal study of 17 waste water plants, proposed that risk and task uncertainty impacts team performance, and moderates the impact of increased autonomy. Autonomy, on the other hand, also has a causality relationship with intrinsic motivation (R. M. Ryan & Deci, 2000). These complex webs of concepts interacting with each other, can form what Armson (2011) refers to as a “mess”.

As the case study interviews progressed, visibility of the “mess” surfaced, and various interconnections of the concepts were expressed and documented. These appeared as thick descriptions and were configured as relationship nodes in NVivo. 471 relationships were noted and coded, and could be found in Appendix D, as an indication of the complexity of the “mess”.

The capabilities of NVivo allow the construction of rich pictures (concept models) from these relationships to improve systems thinking and appreciation. For example, Figure 20 demonstrates the system thinking around “baby steps innovation” (semantic as described by participants) as it pertains to the case study data set thick descriptions, i.e. qualitative expressions by the participants based on their knowledge and experience of the work environment. Figure 20 represents a system thinking approach for the hypothetical question by an Innovation Manager at the case study site, “What will be the impact if we were to break our innovation projects into smaller chunks?”

Each one of these rich pictures can be explored further using quantitative techniques to determine causality, effect size, moderation, etc., and is recommended for further evaluation. However, in this thesis two key rich pictures are presented as mechanisms for climate enablement (see section 7.4).

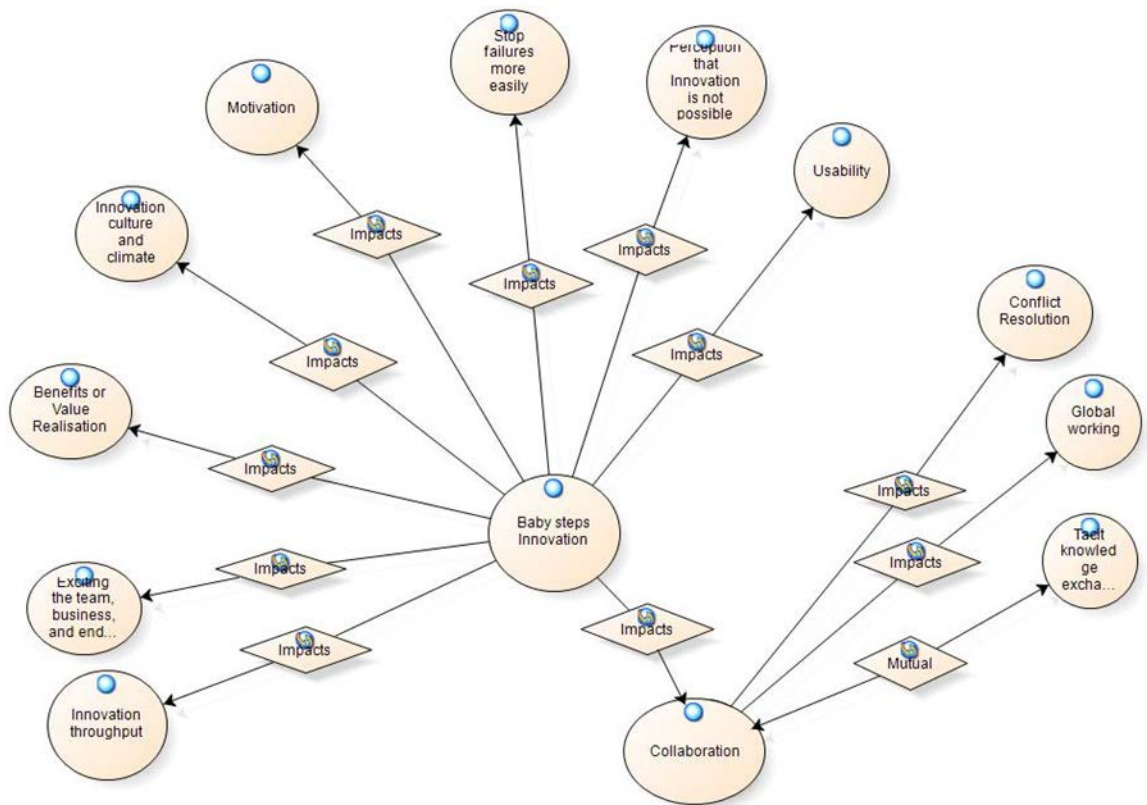


Figure 20. “Mess” or systems approach map for “baby steps innovation”.

7.4 Discussion and recommendations on dimensions

In the following sections, a discussion on the five dimensions are presented with recommendations.

7.4.1 Dimension 1

Dimension 1, discussed the concepts of work *autonomy* and *challenge*. Within the case study data set it was observed that there was good representation from the various levels in the organizations, i.e. levels 2, 3, and 4. It should be noted as an observation that inhibitors to this dimension were discussed uniformly among these

various levels, which suggest some level of investigation from management on the dimension. A generic expectation can be that management in innovative environments are appreciative of autonomy and job complexity, but are sometimes blind to its effectiveness. In this case it seems that management are self reflective on this dimension and are engaged with some of its impediments. It perhaps suggests a good communication loop between the various organizational levels on this particular issue.

There was also a good fit with the case studies thick descriptions of the dimension and the literature theory. According to Hunter et al. (2007) from a meta analysis review, “Apparently an intellectual stimulating environment in which people have challenging work, and colleagues with whom to exchange ideas is critical to innovation.” The case study qualitative data supported this statement (see Table 46 and Table 47). *Challenge* according to Hunter et al. (2007) had a strong correlation with innovation with an effect size of $\Delta = .88$ (see Table 17). Some of the interesting impediments of the *challenge* dimension surfacing from the data, included ‘a perception that innovation is not possible’, ‘thinking that innovation is only something big’, ‘lack of diversity’, and ‘teams staying in the comfort zones’. Although not unique to large pharmaceutical IS organization, it is possible that these perceptions of ‘bigness’ of innovation and that it is not possible are due to the size of the corporation and its regulated drug industry context. A recommendation can include using the output of this thesis to articulate better the innovation concept in order to mitigate these impediment perceptions. The identification of ‘a lack of diversity’ as an inhibiting concept factor is consistent with the literature and was discussed in more detail in section 3.4.1.3.2 (Diversity).

According to Hunter et al. (2007), *autonomy* had a $\Delta = .48$ effect size with innovation output, and concluded, “Although *autonomy* is considered critical for creativity and innovation, the empirical results suggest there is some need for balance with direction given.” This is consistent with Trevelyan (2001) observation that there is need for direction in most real world examples. In the case study data, this was arguably reflected in the thick descriptions that a project incubation mechanism can perhaps allow team members to have a sense of autonomy, but at the same time be focused on an explicit stated direction and mission (Hunter et al., 2007).

7.4.2 Dimension 2

Dimension 2, discussed *positive peer group, intellectual stimulation, and positive interpersonal exchange*. As noted in the Findings sections, this dimension was the most vibrant and discussed topic with the case study participants. Compared with the meta data analysis of Hunter et al. (2007), who concluded, “Apparently an intellectual stimulating environment in which people have challenging work, and colleagues with whom they can exchange ideas, is critical to creativity and thus innovation,” this suggests good alignment of the case study data to the literature. The meta analysis (Hunter et al., 2007) effect sizes correlation to creative output were, *interpersonal exchange* $\Delta = .91$, *intellectual stimulation* $\Delta = .88$, and *challenge* as discussed in the previous section, $\Delta = .88$. These perspectives were strongly reinforced and discussed in detail in the case study data, with good representation from the various levels in the organization. The theoretical framework Level 2 of the *positive member exchange* taxonomy, which has three categories was expanded to 36 subcategories in level 3 via this research for this particular case study, and possibly for other like industry environments. A full list of the level 3 attributes can be found in Appendix A. This suggests, as per the literature (Hunter et al., 2007), a rich set of nuances and expressions of the concept. These level 3 concepts can be used by industry innovation managers, to articulate the meaning and multi-faceted nature behind this most important driver for innovative efforts. It can also be used to judge and assess IS supportive technology for ROI (return on investment) such as SharePoint (Knowledge Management Software) and other team based systems. A recommendation to innovation managers in Pharma IS systems is to possibly utilize this dimension as an improvement starting point. The background to this recommendation is the return on effort due to engagement with the relevant stakeholders which will motivate further improvements¹⁰.

The key literature review concepts in favour of strong peer group climates were the ideas that in strong climates team members tend to align with positive norms (Campion et al., 1993), and the idea of “trait activation theory” where strong climates influence members to be creative that was otherwise dormant (Tett & Burnett, 2003).

¹⁰ In management ‘speak’ this can be viewed as ‘the lowest picking fruit’.

The qualitative data does not explicitly discuss these perspectives, although there are some hints in some responses. However, it can be argued that the nuances of how to support a positive peer group, as expressed in the level 3 taxonomy, for this particular case study and possibly like industry IS domains, are mechanisms in which to achieve activation theory and positive norms.

The case study qualitative data also demonstrates the multivariate nature of the case study dimensions, particularly concerning this concept, rather than a univariate view suggested by Hunter et al. (2007), and discussed in the Limitations section. It seems to the case study participants, that there were heavy expressions with this concept relating to other concepts. A full list of relationships derived from the thick descriptions, can be found in Appendix D.

Unlike Dimension 1, it seems like most of the inhibitor concepts discussed came from levels 3 and 4 of the organization. It's possible that management has a blind spot to barriers in this key dimension, or the discrepancy is partly due to interview bias (Rubin & Rubin, 2005). It is recommended for these reasons that Dimension 2 inhibiting factors are investigated further, if only to communicate to upper management.

For *positive peer group*, there were over 100 case study examples which discussed relationships with other concepts (see Appendix D). This rich semantic map indicates that *positive peer group* positively impacts (within this case study): ideation, intrinsic motivation, and tacit knowledge exchange. These are key concepts and contribute to the web of interaction as discussed by Tesluk et al. (1997) and West (2002b). The case study data also suggests that *intellectual stimulation* was also heavily related to other concepts. 130 conversational relationships that involved intellectual stimulation were identified (See Appendix D), which as in the case of *positive peer group*, gives an indication of its depth and vibrancy as a topic for discussion and exploration. Specifically, the case study participants aligned with the literature and identified key relationships for *intellectual stimulation* and other concepts including diversity, challenge, ideation, tacit knowledge exchange, divergent thinking, and trust. Finally, for *interpersonal exchange*, there were 17 discussed relationships with the case study participants. As discussed by Hunter (2016) the key essence of this dimension is a sense of togetherness and cohesion. In a broad sense this was reflected in the

qualitative data with interpersonal trust and recognition being underlying dimensions, consistent with the literature (Blomqvist, 1997).

There were some notable inhibiting factors for *positive peer group*, not explicitly identified in the literature review. It is possible that these factors are local experiences and it is recommended that they be explored further. The root of the concept 'business frustration' seems to be a misalignment of project management and collaboration between the relevant business and technology stakeholders. It is possible that that aligns with the perspective of West (1990) regarding the innovation requirement of aligning task orientation and characteristics (see section 4.2.2). Also discussed was the experience of the effect of departments fortifying into silos which impacts collaboration and innovation. This correlates with an impact on the concept *organizational integration and extension*. A possible root cause is the matrix structure of the organization and its reward structure which was expressed in the case study data (Bilton & Cummings, 2007).

Several impediments for *intellectual stimulation* were identified, which possibly can be unique to this industry environment. These include the situations where business stakeholders engage with IS with already firm solution concepts. A possible cause of this can be due to a lack of trust (for project delivery), and a perception that some solution architects are not cutting edge enough as expressed in some of the thick descriptions. Secondary effects of this disconnect between business stakeholders and technology stakeholders can include a further erosion of trust, poor collaboration, and a lack of understanding of the business (as identified by the case study participants). Further investigation is recommended.

Other notable discussed impediments were 'fear', and 'power struggles' and the thick descriptions suggests these are related to a lack of trust which aligns to the literature (Holste & Fields, 2010).

7.4.3 Dimension 3

Dimension 3 focused on *positive supervisor relations*, *mission clarity*, and *participation* as concepts. As with Dimension 2, discussions concerning relationships with the

immediate management produced comparatively rich qualitative data. A possible explanation is that supervisor leadership is in close proximity to team members (T. M. Amabile et al., 2004; West, 2002b), but also transformative leaders form a socio-emotional connection with their subordinates (T. M. Amabile et al., 2004).

Leadership relationships with their subordinates, according to Hunter et al. (2007) is one of the most widely discussed dimensions in the literature (see Table 16). The effect sizes to creative output in the meta-analysis study by Hunter et al. (2007) suggests *positive supervisor relations* $\Delta = .74$, *participation* $\Delta = .79$, and *mission clarity* $\Delta = .79$. Apparently, teams that have strong relations with their immediate supervisors, who participate well, who are motivated with what they are doing, and who have a clear sense of target, produce creative output. This articulated assumption derived from quantitative data is supported by the case study qualitative evidence, and with good representation from across the various organizational levels. For example, one level 4 respondent affirmed, “what works well is the understanding of management to recognize innovation as a driving factor and their attempts to get a positive, innovative framework and environment set up”. Another descriptive example from level 4 was, “In order to understand where we want to go, we need to be able to map it out”. The Level 3 dimensions derived in this research gives innovation managers in pharmaceutical IS settings a sense of these enabling concepts in a real-world setting.

The inhibiting factors surfacing from the qualitative data, seemed to be largely rooted in a constraint of lack of time as a resource, and possibility that it puts a strain on relationships with management. Case study participants discussed in detail the secondary effects of time constraints which included: causing teams to lose sight of the big picture, loss of reflexivity, and lack of think time. This is somewhat a paradox with some scholars in the literature. Hunter et al. (2007) via a meta-analysis study supported (F. M. Andrews & Farris, 1972); Janssen, van de Vliert, and West (2004) view that ‘production pressure’ puts a premium on and increases the need for creativity, and thus creative output. Other scholars suggest time pressures are destructive to creativity and innovation (T. M. Amabile et al., 2002; J. Andrews & Smith, 1996). However, M. Baer and Oldham (2006) suggests a curvilinear relationship between time and creative output which perhaps provides some explanation to this paradox.

Time constraints were discussed in multiple conversations with the participants and the researcher challenged participants with the perspective that although time as a resource is very much a scarce resource in small startups, their innovative output are usually high (for successful startups). The responses of this perspective seemed to suggest a divide between the various levels, with level 4 being most vocal about the lack of idea time as a major impediment, and management articulating a perspective of understanding but a caution that free unquestioned time as per the suggested 20% Google model¹¹, and innovative output was not an automatic correlation. That is, management seemed to be more aligned with M. Baer and Oldham (2006) curvilinear relationship between time and creative output than organizational levels 3 and 4. It was noted in a memo note by the researcher, a possible source of this contradiction is perhaps romanticizing the idea of “if only I had time”. The data, however, correlates well with the perspectives put forward in the literature, from the perspective of a conflict between performance and creative goals results in diminishing returns on creativity (T. M. Amabile et al., 2002; Greg R. Oldham & Baer, 2012; G. R. Oldham & Cummings, 1996). It was expressed via case study participants almost as a paraphrasing of the literature with sentiments such as “they expect us to do innovative tasks in our spare time, or at home,” (level 4 participant). It is recommended to explore the curvilinear nature of time with creative output as discussed by M. Baer and Oldham (2006) within this case study type environment to understand and articulate the objectives balance between top management and teams.

7.4.4 Dimension 4

Dimension 4 focused on *resources*, *reward orientation*, and *top management support*. Some scholars in the literature seem to suggest that *resources* and *rewards* are not forefront dimensions (in comparison to the other 11 climate dimensions in the theoretical framework). For example, Hunter et al. (2007) suggest, “apparently though it is desirable and perhaps necessary to provide requisite resources and recognize creative work, resources and rewards are not as important as providing challenging

¹¹ Google founders famously allowed 20% of their employees’ time to be ‘idea time’ dedicated to brainstorm issues and experimentation (without accountability).
<http://www.businessinsider.com/google-20-percent-time-policy-2015-4>

work in an intellectually stimulating environment.” Hunter et al. (2007) suggested this perspective from a meta-analysis which estimated an effect size of $\Delta = .55$ for rewards, and $\Delta = .51$ for resources to creative and innovative output. This corresponds well with (T. M. Amabile, 1997), who argues that intrinsic motivation, which is more connected with *challenge* and *intellectual stimulation*, drives creative output more than extrinsic motivation, which is connected with reward structures. T. M. Amabile (1997) also suggests that intrinsic motivation has the capacity to mitigate shortcomings in terms of resources.

In terms of the case study data, it should be noted that *rewards* was one of the comparatively least discussed concepts which seem to align to Hunter et al. (2007) observation. In terms of coding instances in the data for example, *rewards* and *resources* were coded 53 and 80 times, compared with 175 and 185 for *intellectual stimulation* and *positive peer group*. Although caution should always be used in drawing conclusions from numbers in qualitative work (Bryman & Bell, 2015), these coding instances do give some indication of the relative non vibrancy of the topic in the case study discussions. The case study data also seemed to highlight the concept of an optimum team size, expressed as ‘small teams’ in order to achieve a balance in idea generation. According to the thick descriptions, smaller teams allow for less bureaucracy and fewer ideas stalling prematurely due to too many stakeholders. These perspectives seems to align with Steck and Sundermann (1978) who suggests an optimum team size of 4 to 6 for creative output.

A key concept observed output of the case study data, is the identification of time as a resource. Time constraints were discussed in the previous section (in Dimension 2), and shows the poly-hierarchical nature of time as a concept. In this dimension, time was discussed from the perspective of *resource* support given to develop ideas, etc. A correlation from several participants, at level 4, between time being allocated for experimentation and idea generation aligns with perspectives in the literature; Göran Ekvall (1997) who placed ‘idea time’ as a distinctive dimension in a creative climate taxonomy.

Rewards were discussed in a manner consistent with the literature. Notably, the case study participants tied *rewards* to job tasks and their impact on intrinsic motivation,

rather than on remuneration. The correlates well with T. M. Amabile (1997)'s position that intrinsic motivation is a key driver to creative thought, and plays a more significant role than extrinsic motivation. It should be noted that surfacing from the case study data, is the perspective that case study rewards structures, and their measurement are focused on quantitative delivery, and less on innovation. This, according to the case study data, is an impediment to creative thought since misaligned performance metrics, in the words of a level 3 participant, "our rewards stifles creativity". These sentiments align with the literature perspective that extrinsic motivation can have a negative effect on innovative output by deflecting focus (De Vet & De Dreu, 2007). A recommendation is therefore made to ensure that extrinsic rewards reflect behaviour coherent with creative climate (M. Baer & Frese, 2003), as discussed in section 3.3.2 (Motivation).

Top management support was seen by the case study data as an important attribute, and there was good alignment of the case study data to the literature review. The key enablers from the case study data, which originated from the subordinate level of the organization included *mission clarity*, 'supporting risk taking', 'commitment', and 'being in the trenches together'. The identification of impediments also aligns with the literature review. Siegel and Kaemmerer (1978) sentiments of 'decisions are concentrated at the top', 'expect to follow orders coming down', were expressed in local language as 'ivory tower thinking', 'top down standardization' were all reflected in the case study data as impediments. The case study data (level 4) also provided a view that the top management sometimes displays the expectation that innovation is something to be done outside of the job. It is recommended to explore further the impediments to the climate dimension of top management, for case study and possibly domain nuances.

7.4.5 Dimension 5

Dimension 5 focused on *organizational integration and extension*, and *flexibility and risk taking*. Hunter et al. (2007) suggested via a meta-analysis study, *organizational integration and extension*, and *flexibility and risk taking* had effect sizes of $\Delta = .72$ and $\Delta = .73$ respective to creative and innovation output. Apparently, organizations who

integrate their people and systems (both internally and externally) well, as well as take calculated risks, experience relatively good creativity and innovation output. Both dimensions produced rich dialogues with the case study participants with good and balanced representation from across the various levels. This is not surprising, since a sub dimension of *organizational integration* is knowledge management and creation, which is conceptualized with the SECI model (see 3.4.2.4). The SECI model is dynamic with the interchange of knowledge and creativity between explicit (documents, etc.) and tacit (people) assets and is at the heart of how organizations innovate. The SECI dynamic, inspires fertile creative concepts and conversations such as *intellectual stimulation*, 'motivation', 'knowledge exchange' (I Nonaka, 1995) which were discussed in the previous sections.

The case study thick descriptions provided good agreement with the literature review for enabling dimensions. There is evidence via some of the discussions with participants, that the operational strategies of 'job rotation', and 'project management' seems to be improving *organizational integration*, and some key innovation attributes such as 'tacit knowledge exchange' and 'collaboration'. Within the case study environment, there were expressions that people from all walks of the organization were willing to share information. This is a good indication of a climate that does not 'hoard knowledge', which can be a significant barrier to knowledge creation (I Nonaka, 1995). In terms of risk, it was also expressed that breaking projects into smaller chunks, and following a 'fail fast, fail small' approach seems to be practical examples of enabling innovation within certain areas of the organization.

The thick descriptions highlight useful insight on granular impediments for both *organizational integration* and *flexibility and risk taking*. This is particularly pertinent for pharmaceutical IS innovation managers, since the results perhaps suggest unique case study, or domain specific issues. Upon inspecting the inhibitors for these two dimensions, it can be argued that the size and global nature of the case study organization can be a root factor, and the case study nodes are its granular expressions in local domain language. Issues such as 'global working', 'understanding the business', 'lack of knowledge share', can be symptomatic to the nature of the organization including its size. Further study is recommended.

Issues in matrix organizations where personnel become over-specialized which then causes collaboration to suffer is discussed by Bilton and Cummings (2007). It can be argued, case study nodes such as 'over specialization', 'difficult cross discipline dialogue', 'operational silos' are symptomatic of these literature identified issues. Additionally, the case study expressed that explicit knowledge assets are difficult to access and that has a negative effect on knowledge creation. This aligns to the explicit to tacit dialogue conceptualized by I. Nonaka (1994). Finally, the case study data suggests that 'losing sight of the big picture', to be a norm within the organization and has a negative impact. It is possible that deficiency negatively affects *mission clarity*, and hence has a cascade effect with other dimensions such as motivation. Further study is recommended to investigate these inhibiting nodes.

7.5 Recommended for further study and development: mechanisms for enablement

In Template Analysis, as King (2015) describes, there are nodes and dimensions that seem to 'cut across the data'. In this section, two dimensions that cut across and grounded in the data are presented, discussed, and recommended for further action research development, as mechanisms to enable the climate system.

7.5.1 Incubation with idea time allocation and correct team size

Incubation is discussed in the literature as a mental process to creativity (Guilford, 1950; Todd I. Lubart, 2001; Mednick et al., 1964). It is discussed as that part of the creative process, where the unconscious mind comes to the forefront and processes various options, etc. Guilford (1950) suggests that incubation is followed by illumination, or the moment when a promising idea breaks through to the conscious awareness. Illumination, is the fruit of creative thought, and is a key objective of the process. Not all ideas birthing from the illumination phase will be promising, and in fact the majority of them will be untenable in a team setting. Therefore, important to a process involving incubation, is a loop back to conceptualization and ideation (T. M. Amabile, 1988; T. I. Lubart, 2000). The importance of the unconscious mind is also

discussed by Ritter, van Baaren, et al. (2012) who argued that creative individuals who spend time and think about their ideas unconsciously are better at screening out and selecting their most advantageous ideas. This is a key advantage of potentially building incubation into the innovation process at the case study organization.

Examining the thick descriptions and the coding of (case study) stated relationships, the concept of incubation was discussed among all levels of the organization as a process step lacking in the overall IS approach and it appeared in conversations spanning all 5 dimensions. Most relevant, as identified by case study participants, and coded as relationship nodes, it appeared as a facilitator mechanism for the 3 dimensions with the highest affect sizes (correlated to innovative output) according to Hunter et al. (2007): *interpersonal exchange, intellectual stimulation* and *challenge*. These concepts also produced heavy dialogues as discussed in the previous sections. Figure 21 displays a system rich picture of the effects of incubation as discussed by the case study participants.

According to relationships identified, improving incubation within the innovation process, positive effects will be experienced with other identified concepts: intrinsic motivation, SECI, external views of the company, portfolio management, requirements, organizational learning, lowering risk of choosing wrong technology, better risk management, opening up the culture, exciting the teams, benefits realization, better cross business dialogues, and adopting a 'fail small fail fast' mindset.

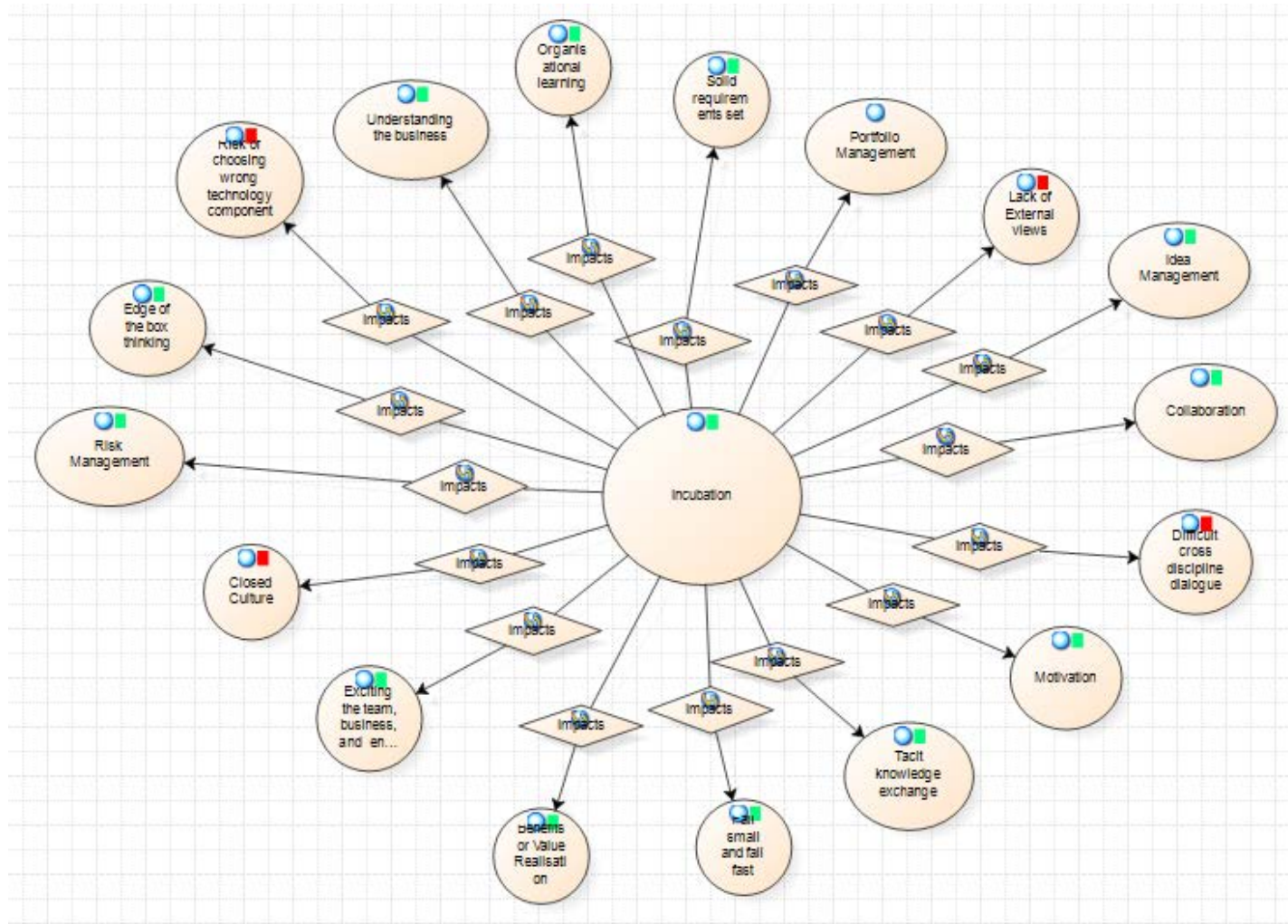


Figure 21. Rich picture displaying case study concepts relating to incubation

Linked to the idea of an unconscious mind, is idea time. This was discussed in 7.3.4 (Dimension 3) and in the literature section. According to scholars, the mind needs time to process these unconscious thoughts and for mental wanderings. A lack of think time has the potential to stifle creativity, and undermine innovation efforts. Figure 22 maps the rich picture around Idea Time, and its effects on other dimensions within the case study environment, as described by the case study participants. As identified by the case study participants, idea time is related to and has the potential to unclog issues surrounding group ideation, organizational learning, focus and motivation.

Further study and action research are recommended in conceptualizing a business process incorporating the technology and business departments around incubation with ample idea time and optimum team sizes (Gassmann & von Zedtwitz, 2003), as a mechanism for improving creative and innovative output.

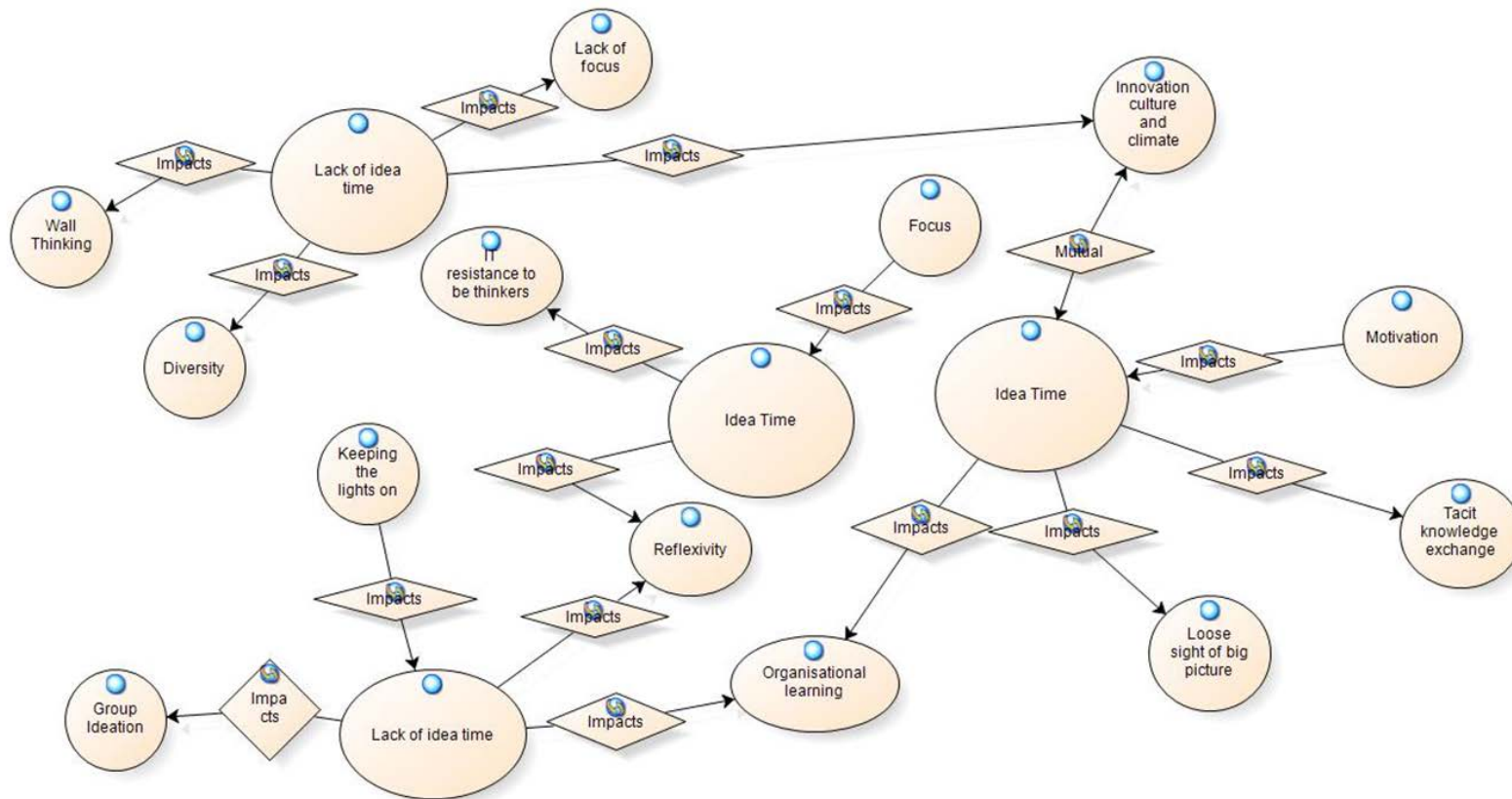


Figure 22. Rich picture displaying case study concepts attached to “Time”.

7.5.2 Knowledge management and creation (SECI model)

In addition to the concept of incubation, the SECI model (see section 3.4.2.4.1) as presented by I. Nonaka (1994) was evident in dialogues with the case study participants. Components of the SECI model seemed to cut across the data as an integrative concept (King, 2015). As in the case of incubation, this suggests that the SECI model is perhaps a mechanism to facilitate creative climates. In the case study thick descriptions for example, knowledge exchange was identified as sub-dimension of *challenge, positive peer group, intellectual stimulation*, all of which are estimated to be the key climate factors out of the 13 according to Hunter et al. (2007). This suggests that efforts at implementing good knowledge exchanges would be a good mechanism to support creative climates, and hence creative and innovative outputs.

Thick descriptions from across the various levels describe scenarios that knowledge and experiences are sometimes difficult to find and source and organizational (people and systems) integrations are sometimes challenged. This is also made acute by the global nature of the case study organization (as identified by the case study data).

Specific issues identified by the case study participants that perhaps is possibly mitigated by a robust SECI approach include (Table 57):

- Difficult cross discipline dialogue;
- Disparate storage of knowledge;
- Lack of knowledge share within organization;
- Operational silos;
- Understanding the business;
- Losing sight of the big picture.

Figure 23 displays the rich picture of the concept of SECI or knowledge exchange and its relationship with other concepts and dimensions, as coded by the case study participants. It is possible that addressing Knowledge Management concepts, via the SECI model, positive effects by way of case study articulated relationships may be experienced with: collaboration, intrinsic motivation, improvement of opportunities, organizational learning, ideation, knowledge flow, and conflict resolution, see Figure 23.

Further study and action research, in conceptualizing and implementing robust SECI techniques are recommended as a mechanism to improve the creative climate and hence creative and innovative output.

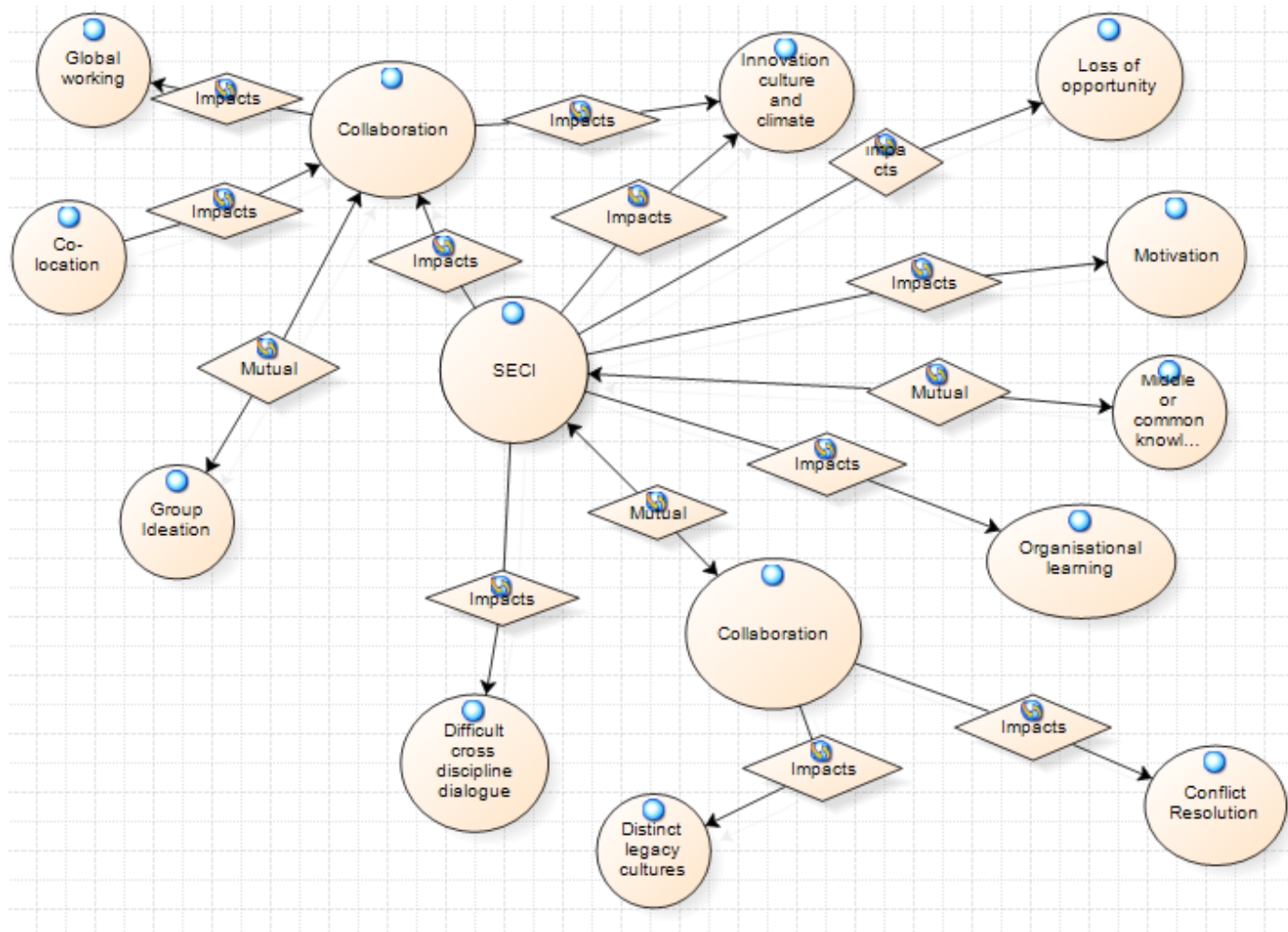


Figure 23. Integrative nature of the SECI model to the IS organization.

7.6 Final conclusions and remarks

In this research a theoretical framework for creative climates in the form of a 5 dimension, 13 conceptual classification taxonomy was tested with qualitative data from a pharmaceutical IS case study organization. A good fit of the theoretical classification against the case study data was found. This, according to Golden-Biddle (2007) is referred to as 'progressive coherence', and is considered a contribution to theory. In addition, the theoretical framework was expanded from 13 levels to 172 sub divisions providing richer understandings and meanings for this case study environment. This according to Golden-Biddle (2007) is referred to as 'problematizing the literature as incomplete'. It is envisaged that this enlargement and enrichment with meaning of the literature classification can be used by innovation practitioners within pharmaceutical IS organizations as an 'a priori' template or starting point to evaluate their environments with the aim of innovation enablement.

The research also seems to support the meta-analysis findings from Hunter et al. (2007) that the most significant dimensions are *intellectual stimulation*, *interpersonal exchange*, and *challenge*. That is as stated by Hunter et al. (2007), "An intellectual stimulating environment in which people have challenging work, and colleagues with whom they can exchange ideas, is critical to creativity and innovation." This gives practitioners, in Pharmaceutical IS, an area of initial focus or 'low hanging fruit' in practical applications of the climate framework.

Supplementing these findings, two practical recommendations in the form of mechanisms for climate enablement, grounded in the case study data are recommended for further action research. These are (1) Incubation with idea time and correct team size, and (2) Knowledge Creation programs leveraging the SECI model. These two vehicles for enablement seems to leverage the theoretical framework, but with the required focus on the dimensions with the most significant impact.

- Acar, S., & Runco, M. A. (2012). Creative Abilities. 115-139. doi:10.1016/b978-0-12-374714-3.00006-9
- Adler, P. S., & Borys, B. (1996). Two types of bureaucracy: Enabling and coercive. *Administrative Science Quarterly*, 41(1), 61-89. doi:10.2307/2393986
- Ahearne, M., Mathieu, J., & Rapp, A. (2005). To empower or not to empower your sales force? An empirical examination of the influence of leadership empowerment behavior on customer satisfaction and performance. *Journal of Applied Psychology*, 90(5), 945-955. doi:10.1037/0021-9010.90.5.945
- Aiken, M., Bacharach, S. B., & French, J. L. (1980). ORGANIZATIONAL-STRUCTURE, WORK PROCESS, AND PROPOSAL MAKING IN ADMINISTRATIVE BUREAUCRACIES. *Academy of Management Journal*, 23(4), 631-652. doi:10.2307/255553
- Albert, R., Runco, M.A. . (1999). *A history of research on creativity* Cambridge Cambridge University Press.
- Amabile, T. M. (1979). EFFECTS OF EXTERNAL EVALUATION ON ARTISTIC CREATIVITY. *Journal of Personality and Social Psychology*, 37(2), 221-233. doi:10.1037//0022-3514.37.2.221
- Amabile, T. M. (1988). A MODEL OF CREATIVITY AND INNOVATION IN ORGANIZATIONS. *Research in Organizational Behavior*, 10, 123-167.
- Amabile, T. M. (1996). *Cerativity in context: update to the social psychology of creativity* Boulder CO: Westview.
- Amabile, T. M. (1997). Motivating creativity in organizations: On doing what you love and loving what you do. *California Management Review*, 40(1), 39-&.
- Amabile, T. M., & Conti, R. (1999). Changes in the work environment for creativity during downsizing. *Academy of Management Journal*, 42(6), 630-640. doi:10.2307/256984
- Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the Work Environment for Creativity. *The Academy of Management Journal*, 39(5), 1154-1184. doi:10.2307/256995
- Amabile, T. M., & Gitomer, J. (1984). CHILDRENS ARTISTIC CREATIVITY - EFFECTS OF CHOICE IN TASK MATERIALS. *Personality and Social Psychology Bulletin*, 10(2), 209-215. doi:10.1177/0146167284102006
- Amabile, T. M., Goldfarb, P., & Brackfield, S. C. (1990). Social influences on creativity: Evaluation, coaction, and surveillance. *Creativity Research Journal*, 3(1), 6-21. doi:10.1080/10400419009534330
- Amabile, T. M., Hadley, C. N., & Kramer, S. J. (2002). Creativity under the gun. *Harvard Business Review*, 80(8), 52-+.
- Amabile, T. M., S. Grysiewicz. (1987). *Creativity in the R&D Laboratory*. . Retrieved from Greensboro, NC:
- Amabile, T. M., Schatzel, E. A., Moneta, G. B., & Kramer, S. J. (2004). Leader behaviors and the work environment for creativity: Perceived leader support. *Leadership Quarterly*, 15(1), 5-32. doi:10.1016/j.leaqua.2003.12.003
- Amason, A. C. (1996). Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams. *Academy of Management Journal*, 39(1), 123-148. doi:10.2307/256633
- Anderson, N. R., & West, M. A. (1998). Measuring climate for work group innovation: development and validation of the team climate inventory. *Journal of Organizational Behavior*, 19(3), 235-258. doi:10.1002/(sici)1099-1379(199805)19:3<235::aid-job837>3.3.co;2-3
- Andrews, F. M., & Farris, G. F. (1972). TIME PRESSURE AND PERFORMANCE OF SCIENTISTS AND ENGINEERS - 5-YEAR PANEL STUDY. *Organizational Behavior and Human Performance*, 8(2), 185-200. doi:10.1016/0030-5073(72)90045-1

- Andrews, J., & Smith, D. C. (1996). In search of the marketing imagination: Factors affecting the creativity of marketing programs for mature products. *Journal of Marketing Research*, 33(2), 174-187. doi:10.2307/3152145
- Armson, R. (2011). *Growing wings on the way : systems thinking for messy situations*.
- Ashforth, B. E. (1985). CLIMATE FORMATION - ISSUES AND EXTENSIONS. *Academy of Management Review*, 10(4), 837-847. doi:10.2307/258051
- Attride-Stirling, J. (2001). Thematic networks: an analytic tool for qualitative research. *Qualitative Research*, 1(3), 385-405. doi:10.1177/146879410100100307
- Bachtold, L. M., & Werner, E. E. (1973). PERSONALITY-CHARACTERISTICS OF CREATIVE WOMEN. *Perceptual and Motor Skills*, 36(1), 311-319.
- Baer, J. (2003). *Evaluative thinking, creativity, and task specificity; Separating the wheat from the chaff is not the same as finding needles in haystacks*. Hampton Cresskill
- Baer, M., & Frese, M. (2003). Innovation is not enough: climates for initiative and psychological safety, process innovations, and firm performance. *Journal of Organizational Behavior*, 24(1), 45-68. doi:10.1002/job.179
- Baer, M., Leenders, R., Oldham, G. R., & Vadera, A. K. (2010). WIN OR LOSE THE BATTLE FOR CREATIVITY: THE POWER AND PERILS OF INTERGROUP COMPETITION. *Academy of Management Journal*, 53(4), 827-845.
- Baer, M., & Oldham, G. R. (2006). The curvilinear relation between experienced creative time pressure and creativity: Moderating effects of openness to experience and support for creativity. *Journal of Applied Psychology*, 91(4), 963-970. doi:10.1037/0021-9010.91.4.963
- Bailyn, L. (1985). AUTONOMY IN THE INDUSTRIAL R-AND-D LAB. *Human Resource Management*, 24(2), 129-146. doi:10.1002/hrm.3930240204
- Bain, P. G., Mann, L., & Pirola-Merlo, A. (2001). The innovation imperative - The relationships between team climate, innovation, and performance in research and development teams. *Small Group Research*, 32(1), 55-73. doi:10.1177/104649640103200103
- Banker, R. D., Field, J. M., Schroeder, R. G., & Sinha, K. K. (1996). Impact of work teams on manufacturing performance: A longitudinal field study. *Academy of Management Journal*, 39(4), 867-890. doi:10.2307/256715
- Bantel, K. A., & Jackson, S. E. (1989). TOP MANAGEMENT AND INNOVATIONS IN BANKING - DOES THE COMPOSITION OF THE TOP TEAM MAKE A DIFFERENCE. *Strategic Management Journal*, 10, 107-124. doi:10.1002/smj.4250100709
- Barron, F. (1968). *Creativity and personal freedom* New York Van Nostrand
- Barron, F., & Harrington, D. M. (1981). CREATIVITY, INTELLIGENCE, AND PERSONALITY. *Annual Review of Psychology*, 32, 439-476. doi:10.1146/annurev.ps.32.020181.002255
- Baskerville, R. L., & WoodHarper, A. T. (1996). A critical perspective on action research as a method for information systems research. *Journal of Information Technology*, 11(3), 235-246.
- Bass, B. M., & Avolio, B. J. (1990). Developing Transformational leadership: 1992 and beyond. *Journal of European Industrial Training*, 14(5). doi:10.1108/03090599010135122
- Basu, R., & Green, S. G. (1997). Leader-member exchange and transformational leadership: An empirical examination of innovative behaviors in leader-member dyads. *Journal of Applied Social Psychology*, 27(6), 477-499. doi:10.1111/j.1559-1816.1997.tb00643.x
- Ben-Menahem, S. M., von Krogh, G., Erden, Z., & Schneider, A. (2016). COORDINATING KNOWLEDGE CREATION IN MULTIDISCIPLINARY TEAMS: EVIDENCE FROM EARLY-STAGE DRUG DISCOVERY. *Academy of Management Journal*, 59(4), 1308-1338. doi:10.5465/amj.2013.1214
- Benbasat, I., Goldstein, D. K., & Mead, M. (1987). THE CASE RESEARCH STRATEGY IN STUDIES OF INFORMATION-SYSTEMS. *Mis Quarterly*, 11(3), 369-386. doi:10.2307/248684
- Bennetts, P. D. C., Wood-Harper, A. T., & Mills, S. (2000). An holistic approach to the management of information systems development - A view using a soft systems

- approach and multiple viewpoints. *Systemic Practice and Action Research*, 13(2), 189-205. doi:10.1023/a:1009594604515
- Berends, H., van der Bij, H., Debackere, K., & Weggeman, M. (2006). Knowledge sharing mechanisms in industrial research. *R & D Management*, 36(1), 85-95. doi:10.1111/j.1467-9310.2005.00417.x
- Bergum, B. O. (1975). SELF-PERCEPTIONS OF CREATIVITY AMONG ACADEMIC INVENTORS AND NON-INVENTORS. *Perceptual and Motor Skills*, 40(1), 78-78.
- Bilton, C., & Cummings, S. (2007). *Management and creativity : from creative industries to creative management*.
- Blomqvist, K. (1997). The many faces of trust. *Scandinavian Journal of Management*, 13(3), 271-286. doi:[http://dx.doi.org/10.1016/S0956-5221\(97\)84644-1](http://dx.doi.org/10.1016/S0956-5221(97)84644-1)
- Boden, M. A. (2004). *The creative mind : myths and mechanisms* (2nd ed.). London ; New York: Routledge.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. doi:10.1191/1478088706qp063oa
- Brooks, J., McCluskey, S., Turley, E., & King, N. (2015). The Utility of Template Analysis in Qualitative Psychology Research. *Qualitative Research in Psychology*, 12(2), 202-222. doi:10.1080/14780887.2014.955224
- Brophy, D. R. (1998). Understanding, Measuring, and Enhancing Individual Creative Problem-Solving Efforts. *Creativity Research Journal*, 11(2), 123-150. doi:10.1207/s15326934crj1102_4
- Bryman, A., & Bell, E. (2007). *Business research methods* (2nd ed.). Oxford ;: Oxford University Press.
- Bryman, A., & Bell, E. (2015). *Business research methods* (Fourth edition. ed.). Cambridge, United Kingdom ; New York, NY, United States of America: Oxford University Press.
- Campbell, D. J. (1988). Task Complexity: A Review and Analysis. *The Academy of Management Review*, 13(1), 40-52. doi:10.2307/258353
- Campion, M. A., Medsker, G. J., & Higgs, A. C. (1993). RELATIONS BETWEEN WORK GROUP CHARACTERISTICS AND EFFECTIVENESS - IMPLICATIONS FOR DESIGNING EFFECTIVE WORK GROUPS. *Personnel Psychology*, 46(4), 823-850. doi:10.1111/j.1744-6570.1993.tb01571.x
- Cardinal, L. B. (2001). Technological innovation in the pharmaceutical industry: The use of organizational control in managing research and development. *Organization Science*, 12(1), 19-36. doi:10.1287/orsc.12.1.19.10119
- Carnevale, P. J. D., & Isen, A. M. (1986). THE INFLUENCE OF POSITIVE AFFECT AND VISUAL ACCESS ON THE DISCOVERY OF INTEGRATIVE SOLUTIONS IN BILATERAL NEGOTIATION. *Organizational Behavior and Human Decision Processes*, 37(1), 1-13. doi:10.1016/0749-5978(86)90041-5
- Carr, J. Z., Schmidt, A. M., Ford, J. K., & DeShon, R. P. (2003). Climate perceptions matter: A meta-analytic path analysis relating molar climate, cognitive and affective states, and individual level work outcomes. *Journal of Applied Psychology*, 88(4), 605-619. doi:10.1037/0021-9010.88.4.605
- Chambers, J. A. (1964). RELATING PERSONALITY AND BIOGRAPHICAL FACTORS TO SCIENTIFIC CREATIVITY. *Psychological Monographs*, 78(7), 1-20.
- Charmaz, K. (2006). *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*: Sage Publications
- Checkland, P., & Scholes, J. (1999). *Soft systems methodology in action*.
- Chi, M. T. H., Bassok, M., Lewis, M. W., Reimann, P., & Glaser, R. (1989). SELF-EXPLANATIONS - HOW STUDENTS STUDY AND USE EXAMPLES IN LEARNING TO SOLVE PROBLEMS. *Cognitive Science*, 13(2), 145-182. doi:10.1207/s15516709cog1302_1
- Choi, J. N. (2004). Individual and contextual predictors of creative performance: The mediating role of psychological processes. *Creativity Research Journal*, 16(2-3), 187-199. doi:10.1207/s15326934crj1602&3_4

- Chung, R. (2011). Biotech Drug Approvals in the U.S. Nearly Doubled in the Last Decade. Retrieved from http://csdd.tufts.edu/news/complete_story/pr_ir_may-jne_2011
- Cohen, W. M., & Levinthal, D. A. (1990). ABSORPTIVE-CAPACITY - A NEW PERSPECTIVE ON LEARNING AND INNOVATION. *Administrative Science Quarterly*, 35(1), 128-152. doi:10.2307/2393553
- Collins, M. A. (1999). *Motivation and Creativity* Cambridge: Cambridge University Press.
- Corbin, J. M., & Strauss, A. L. (2015). *Basics of qualitative research : techniques and procedures for developing grounded theory* (Fourth edition. ed.). Los Angeles: SAGE.
- Corbin, J. S., A. (2008). *Basics of Qualitative Research (3rd ed.)*. Sage Publications Inc.
- Cordery, J. L., Morrison, D., Wright, B. M., & Wall, T. D. (2010). The impact of autonomy and task uncertainty on team performance: A longitudinal field study. *Journal of Organizational Behavior*, 31(2-3), 240-258. doi:10.1002/job.657
- Crawford, C. M. (1980). DEFINING THE CHARTER FOR PRODUCT INNOVATION. *Sloan Management Review*, 22(1), 3-12.
- Cropley, A. J. (1997). *Fostering creativity in the classroom: General Principals*. . Cresskill, NJ: Hampton.
- Cross, P. G., Cattell, R. B., & Butcher, H. J. (1967). PERSONALITY PATTERN OF CREATIVE ARTISTS. *British Journal of Educational Psychology*, 37(NOV), 292-299.
- Csikszentmihalyi, M. (1999). *Implications of a systems perspective for the study of creativity* Cambridge Cambridge University Press
- Curral, L. A., Forrester, R. H., Dawson, J. F., & West, M. A. (2001). It's what you do and the way that you do it: Team task, team size, and innovation-related group processes. *European Journal of Work and Organizational Psychology*, 10(2), 187-204. doi:10.1080/13594320143000627
- Damanpour, F. (1991). ORGANIZATIONAL INNOVATION - A METAANALYSIS OF EFFECTS OF DETERMINANTS AND MODERATORS. *Academy of Management Journal*, 34(3), 555-590. doi:10.2307/256406
- De Dreu, C. K. W., & Weingart, L. R. (2003). Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis. *Journal of Applied Psychology*, 88(4), 741-749. doi:10.1037/0021-9010.88.4.741
- De Vet, A. J., & De Dreu, C. K. W. (2007). The influence of articulation, self-monitoring ability, and sensitivity to others on creativity. *European Journal of Social Psychology*, 37(4), 747-760. doi:10.1002/ejsp.386
- Dean, J. W., & Sharfman, M. P. (1996). Does decision process matter? A study of strategic decisionmaking effectiveness. *Academy of Management Journal*, 39(2), 368-396. doi:10.2307/256784
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). *A Meta-Analytic Review of Experiments Examining the Effects of Extrinsic Rewards on Intrinsic Motivation*. [Article]: Psychological Bulletin November 1999;125(6):627-668.
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227-268. doi:10.1207/s15327965pli1104_01
- Delbecq, A. L., & Mills, P. K. (1985). MANAGERIAL PRACTICES THAT ENHANCE INNOVATION. *Organizational Dynamics*, 14(1), 24-34. doi:10.1016/0090-2616(85)90041-5
- Dess, G. G., & Picken, J. C. (2000). Changing roles: Leadership in the 21st century. *Organizational Dynamics*, 28(3), 18-34. doi:10.1016/s0090-2616(00)88447-8
- Dewar, R. D., & Dutton, J. E. (1986). THE ADOPTION OF RADICAL AND INCREMENTAL INNOVATIONS - AN EMPIRICAL-ANALYSIS. *Management Science*, 32(11), 1422-1433. doi:10.1287/mnsc.32.11.1422
- Dey, I. (2005). *Qualitative data analysis : user-friendly guide for social scientists*: Routledge.
- Dick, B. (2002). Postgraduate programs using action research. *The Learning Organization*, 9(4), 159-170. doi:doi:10.1108/09696470210428886

- Dijksterhuis, A., & Meurs, T. (2006). Where creativity resides: The generative power of unconscious thought. *Consciousness and Cognition*, 15(1), 135-146. doi:10.1016/j.concog.2005.04.007
- DiMasi, J. A., Grabowski, H. G., & Hansen, R. W. (2016). Innovation in the pharmaceutical industry: New estimates of R&D costs. *Journal of Health Economics*, 47, 20-33. doi:10.1016/j.jhealeco.2016.01.012
- DiMasi, J. A., Hansen, R. W., & Grabowski, H. G. (2003). The price of innovation: new estimates of drug development costs. *Journal of Health Economics*, 22(2), 151-185. doi:[http://dx.doi.org/10.1016/S0167-6296\(02\)00126-1](http://dx.doi.org/10.1016/S0167-6296(02)00126-1)
- Domino, G. (1974). ASSESSMENT OF CINEMATOGRAPHIC CREATIVITY. *Journal of Personality and Social Psychology*, 30(1), 150-154. doi:10.1037/h0036667
- Dougherty, D., & Bowman, E. H. (1995). THE EFFECTS OF ORGANIZATIONAL DOWNSIZING ON PRODUCT INNOVATION. *California Management Review*, 37(4), 28-44.
- Dougherty, D., & Hardy, C. (1996). Sustained product innovation in large, mature organizations: Overcoming innovation-to-organization problems. *Academy of Management Journal*, 39(5), 1120-1153. doi:10.2307/256994
- Drabkin, S. (1996). Enhancing creativity when solving contradictory technical problems. *Journal of Professional Issues in Engineering Education and Practice*, 122(2), 78-82. doi:10.1061/(asce)1052-3928(1996)122:2(78)
- Drews, J. (1998). *In Quest of Tomorrows Medicines*. Basel Springer.
- Drucker, D. F. (1985). *Innovation and Entrepreneurship: Practice and Principal*. London Heinemann.
- Easterby-Smith, M. (2015). *Management and business research* (5th edition. ed.). Thousand Oaks, CA: SAGE Publications.
- Eindhoven, J. E., & Vinacke, W. E. (1952). CREATIVE PROCESSES IN PAINTING. *Journal of General Psychology*, 47(2), 139-164.
- Eisenhardt, K. M. (1985). CONTROL - ORGANIZATIONAL AND ECONOMIC APPROACHES. *Management Science*, 31(2), 134-149. doi:10.1287/mnsc.31.2.134
- Ekvall, G. (1996). Organizational climate for creativity and innovation. *European Journal of Work and Organizational Psychology*, 5(1), 105-123. doi:10.1080/13594329608414845
- Ekvall, G. (1997). Organizational Conditions and Levels of Creativity. *Creativity and Innovation Management*, 6(4), 195-205. doi:10.1111/1467-8691.00070
- Ekvall, G., & Tangebergandersson, Y. (1986). WORKING CLIMATE AND CREATIVITY - A STUDY OF AN INNOVATIVE NEWSPAPER OFFICE. *Journal of Creative Behavior*, 20(3), 215-225.
- Elkins, T., & Keller, R. T. (2003). Leadership in research and development organizations: A literature review and conceptual framework. *Leadership Quarterly*, 14(4-5), 587-606. doi:10.1016/s1048-9843(03)00053-5
- Ellison, R., James, L., & Carron, T. (1970). Prediction of R&D performance criteria with biographical information. *Journal of Industrial Psychology*, 5, 37-57.
- Erez, M. (1992). INTERPERSONAL-COMMUNICATION SYSTEMS IN ORGANIZATIONS, AND THEIR RELATIONSHIPS TO CULTURAL-VALUES, PRODUCTIVITY AND INNOVATION - THE CASE OF JAPANESE CORPORATIONS. *Applied Psychology-an International Review-Psychologie Appliquee-Revue Internationale*, 41(1), 43-64. doi:10.1111/j.1464-0597.1992.tb00685.x
- Ericsson, K. A., & Charness, N. (1994). EXPERT PERFORMANCE - ITS STRUCTURE AND ACQUISITION. *American Psychologist*, 49(8), 725-747. doi:10.1037/0003-066x.49.8.725
- Estes, Z., & Ward, T. B. (2002). The Emergence of Novel Attributes in Concept Modification. *Creativity Research Journal*, 14(2), 149-156. doi:10.1207/S15326934CRJ1402_2
- Farr, J. L., Ford, C.M. (1990). *Innovation and creativity at work: Psychological and organizational strategies*. New York Wiley.
- FDA. (2014). Frequently Asked Questions on Patents and Exclusivity. Retrieved from <http://www.fda.gov/drugs/developmentapprovalprocess/ucm079031.htm#How> many years is a patent granted for?

- FDA. (2015). The Drug Development Process Retrieved from <http://www.fda.gov/forpatients/approvals/drugs/default.htm>
- Feldman, D. H. (1999). *The Development of Creativity* Cambridge Cambridge University Press.
- Field, A. (2012). *Discovering Statistics using IBM SPSS Statistics* (4th ed.). London: Sage
- Findlay, C. S., & Lumsden, C. J. (1988). THE CREATIVE MIND - TOWARD AN EVOLUTIONARY-THEORY OF DISCOVERY AND INNOVATION. *Journal of Social and Biological Structures*, 11(1), 3-&. doi:10.1016/0140-1750(88)90025-5
- Finke, R. A. (1992). *Creative Cognition: Theory, Research, and Applications*. Cambridge: MIT Press.
- Fleishman, E. A. (1984). *Taxonomies of human performance: The description of human tasks*. Orlando Academic Press.
- Fleishman, E. A., Mumford, M. D., Zaccaro, S. J., Levin, K. Y., Korotkin, A. L., & Hein, M. B. (1991). Taxonomic efforts in the description of leader behavior: A synthesis and functional interpretation. *The Leadership Quarterly*, 2(4), 245-287. doi:[http://dx.doi.org/10.1016/1048-9843\(91\)90016-U](http://dx.doi.org/10.1016/1048-9843(91)90016-U)
- Fontana, A. F., J. H. . (2000). *Handbook of Qualitative Research*: Sage
- Frank, R. G. (2007). The ongoing regulation of generic drugs. *New England Journal of Medicine*, 357(20), 1993-1996. doi:10.1056/NEJMp078193
- Frantz, S. (2006). Chemistry outsourcing going global. *Nature Reviews Drug Discovery*, 5(5), 362-363. doi:10.1038/nrd2049
- French, S. (2009). Action research for practising managers. *Journal of Management Development*, 28(3), 187-204. doi:10.1108/02621710910939596
- Frese, M., Teng, E., & Wijnen, C. J. D. (1999). Helping to improve suggestion systems: predictors of making suggestions in companies. *Journal of Organizational Behavior*, 20(7), 1139-1155. doi:10.1002/(sici)1099-1379(199912)20:7<1139::aid-job946>3.0.co;2-i
- Frischer, J. (1993). EMPOWERING MANAGEMENT IN NEW PRODUCT DEVELOPMENT UNITS. *Journal of Product Innovation Management*, 10(5), 393-401.
- Fuglsang, L., & Sundbo, J. (2007). The organizational innovation system: Three modes. *Journal of Change Management*, 5(3), 329-344. doi:10.1080/14697010500258056
- Gamba, S. (2015). *Determinants and Effects of Innovation: An Empirical Analysis* Università Cattolica del Sacro Cuore. Retrieved from <http://hdl.handle.net/10280/7327>
- Gassmann, O., & von Zedtwitz, M. (2003). Trends and determinants of managing virtual R&D teams. *R&D Management*, 33(3), 243-262. doi:10.1111/1467-9310.00296
- George, J. M. (2007). Creativity in Organizations. *Academy of Management Annals*, 1, 439-477. doi:10.1080/078559814
- George, J. M., & Zhou, J. (2002). Understanding when bad moods foster creativity and good ones don't: The role of context and clarity of feelings. *Journal of Applied Psychology*, 87(4), 687-697. doi:10.1037//0021-9010.87.4.687
- Geroski, P., Machin, S., & Vanreenen, J. (1993). THE PROFITABILITY OF INNOVATING FIRMS. *Rand Journal of Economics*, 24(2), 198-211. doi:10.2307/2555757
- Gilson, L. L., & Shalley, C. E. (2004). A little creativity goes a long way: An examination of teams' engagement in creative processes. *Journal of Management*, 30(4), 453-470. doi:10.1016/j.jm.2003.07.001
- Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods*, 16(1), 15-31. doi:10.1177/1094428112452151
- Gioia, D. A., & Poole, P. P. (1984). SCRIPTS IN ORGANIZATIONAL-BEHAVIOR. *Academy of Management Review*, 9(3), 449-459. doi:10.2307/258285
- Golden-Biddle, K., Locke, K. (2007). *Composing Qualitative Research* (2nd ed.). Thousand Oaks, CA: Sage Publications

- Goldenbiddle, K., & Locke, K. (1993). APPEALING WORK - AN INVESTIGATION OF HOW ETHNOGRAPHIC TEXTS CONVINCED. *Organization Science*, 4(4), 595-616. doi:10.1287/orsc.4.4.595
- Gong, Y. P., Huang, J. C., & Farh, J. L. (2009). EMPLOYEE LEARNING ORIENTATION, TRANSFORMATIONAL LEADERSHIP, AND EMPLOYEE CREATIVITY: THE MEDIATING ROLE OF EMPLOYEE CREATIVE SELF-EFFICACY. *Academy of Management Journal*, 52(4), 765-778.
- Goodman, M. (2009). Pharmaceutical industry financial performance. *Nature Reviews Drug Discovery*, 8(12), 927-928. doi:10.1038/nrd3049
- Goor, A., & Sommerfeld, R. E. (1975). COMPARISON OF PROBLEM-SOLVING PROCESSES OF CREATIVE STUDENTS AND NONCREATIVE STUDENTS. *Journal of Educational Psychology*, 67(4), 495-505. doi:10.1037/h0077009
- Gough, G. (1979). A creative personality scale for the Adjective Check List. *Journal of Personality & Social Psychology*(37), 1398-1405.
- Grant, A. M., & Berry, J. W. (2011). THE NECESSITY OF OTHERS IS THE MOTHER OF INVENTION: INTRINSIC AND PROSOCIAL MOTIVATIONS, PERSPECTIVE TAKING, AND CREATIVITY. *Academy of Management Journal*, 54(1), 73-96. doi:10.5465/amj.2011.59215085
- Graves, S. B., & Langowitz, N. S. (1993). INNOVATIVE PRODUCTIVITY AND RETURNS TO SCALE IN THE PHARMACEUTICAL-INDUSTRY. *Strategic Management Journal*, 14(8), 593-605. doi:10.1002/smj.4250140803
- Group, K. (2009). Pharmaceutical Benchmarking Forum Retrieved from <http://kmrgroup.com/forumsPharma.html>
- Guilford, J. P. (1950). CREATIVITY. *American Psychologist*, 5(9), 444-454. doi:10.1037/h0063487
- Gülsoy, T. (2013). Human Resource Practices of an Emerging-Market Multinational: Implications For Enhancing Organizational Innovation. *Procedia - Social and Behavioral Sciences*, 75, 498-507. doi:<http://dx.doi.org/10.1016/j.sbspro.2013.04.054>
- Gumusluoglu, L., & Ilsev, A. (2009). Transformational leadership, creativity, and organizational innovation. *Journal of Business Research*, 62(4), 461-473. doi:10.1016/j.jbusres.2007.07.032
- Halpern, D. F. (2003). *Thinking critically about creative thinking*. Hampton Cresskill
- Hameed, M. A., Counsell, S., & Swift, S. (2012). A conceptual model for the process of IT innovation adoption in organizations. *Journal of Engineering and Technology Management*, 29(3), 358-390. doi:10.1016/j.jengtecman.2012.03.007
- Hargadon, A. B., & Bechky, B. A. (2006). When collections of creatives become creative collectives: A field study of problem solving at work. *Organization Science*, 17(4), 484-500. doi:10.1287/orsc.1060.0200
- Harrington, D. M. (1975). EFFECTS OF EXPLICIT INSTRUCTIONS TO BE CREATIVE ON PSYCHOLOGICAL MEANING OF DIVERGENT THINKING TEST-SCORES. *Journal of Personality*, 43(3), 434-454. doi:10.1111/j.1467-6494.1975.tb00715.x
- Helpman, E. (1998). *General Purpose Technologies and Economic Growth*. Boston MIT Press.
- Henderson, R., & Cockburn, I. (1994). MEASURING COMPETENCE - EXPLORING FIRM EFFECTS IN PHARMACEUTICAL RESEARCH. *Strategic Management Journal*, 15, 63-84. doi:10.1002/smj.4250150906
- Hirst, G., Van Knippenberg, D., Zhou, J., Quintane, E., & Zhu, C. (2015). Heard It Through the Grapevine: Indirect Networks and Employee Creativity. *Journal of Applied Psychology*, 100(2), 567-574. doi:10.1037/a0038333
- Hisrich, R. D. (1990). ENTREPRENEURSHIP INTRAPRENEURSHIP. *American Psychologist*, 45(2), 209-222. doi:10.1037/0003-066x.45.2.209
- Ho, C. M. (2014). Drugged Out: How Cognitive Bias Hurts Drug Innovation. *51 San Diego Law Review*(419).
- Holland, J. L. (1968). PRECONSCIOUS ACTIVITY SCALE - DEVELOPMENT AND VALIDATION OF AN ORIGINALITY MEASURE. *Journal of Creative Behavior*, 2(3), 217-225.

- Holste, J. S., & Fields, D. (2010). Trust and tacit knowledge sharing and use. *Journal of Knowledge Management*, 14(1), 128-140. doi:10.1108/13673271011015615
- Horrobin, D. F. (2000). Innovation in the pharmaceutical industry. *J R Soc Med*, 93(7), 341-345.
- Hu, M. S., K.; Sheu, J. . (2007). *The innovation gap in the pharmaceutical drug discovery and new models for R&D success*. Retrieved from Evanston:
- Hunter, S. T. (2016). *Creative Climate Measurement: A Multilevel Scaling Approach (inprint)*.
- Hunter, S. T., Bedell, K. E., & Mumford, M. D. (2005). Dimensions of Creative Climate: A General Taxonomy. *The International Journal of Creativity & Problem Solving*, 15(2), 97-116.
- Hunter, S. T., Bedell, K. E., & Mumford, M. D. (2007). Climate for Creativity: A Quantitative Review. *Creativity Research Journal*, 19(1), 69-90. doi:10.1080/10400410709336883
- Hurley, R. F., & Hult, G. T. M. (1998). Innovation, market orientation, and organizational learning: An integration and empirical examination. *Journal of Marketing*, 62(3), 42-54. doi:10.2307/1251742
- Isaksen, S. G. (2007). The Climate for Transformation: Lessons for Leaders. *Creativity and Innovation Management*, 16(1), 3-15. doi:10.1111/j.1467-8691.2007.00415.x
- Isaksen, S. G. (2007). The situational outlook questionnaire: Assessing the context for change. *Psychological Reports*, 100(2), 455-466. doi:10.2466/pr0.100.2.455-466
- Isaksen, S. G., & Ekvall, G. (2010). Managing for Innovation: The Two Faces of Tension in Creative Climates. *Creativity and Innovation Management*, 19(2), 73-88. doi:10.1111/j.1467-8691.2010.00558.x
- Isaksen, S. G., & Lauer, K. J. (2002). The Climate for Creativity and Change in Teams. *Creativity and Innovation Management*, 11(1), 74-86. doi:10.1111/1467-8691.00238
- Isaksen, S. G., Lauer, K. J., Ekvall, G., & Britz, A. (2001). Perceptions of the Best and Worst Climates for Creativity: Preliminary Validation Evidence for the Situational Outlook Questionnaire. *Creativity Research Journal*, 13(2), 171-184. doi:10.1207/S15326934CRJ1302_5
- Isen, A. M. (1984). THE INFLUENCE OF POSITIVE AFFECT ON DECISION-MAKING AND COGNITIVE ORGANIZATION. *Advances in Consumer Research*, 11, 534-537.
- Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). POSITIVE AFFECT FACILITATES CREATIVE PROBLEM-SOLVING. *Journal of Personality and Social Psychology*, 52(6), 1122-1131. doi:10.1037//0022-3514.52.6.1122
- James, K., & Drown, D. (2012). Organizations and Creativity. 17-38. doi:10.1016/b978-0-12-374714-3.00002-1
- James, L. R., Joyce, W. F., & Slocum, J. W. (1988). ORGANIZATIONS DO NOT COGNIZE - COMMENT. *Academy of Management Review*, 13(1), 129-132. doi:10.2307/258360
- Janssen, O. (2005). The joint impact of perceived influence and supervisor supportiveness on employee innovative behaviour. *Journal of Occupational and Organizational Psychology*, 78, 573-579. doi:10.1348/096317905x25823
- Janssen, O., van de Vliert, E., & West, M. (2004). The bright and dark sides of individual and group innovation: a Special Issue introduction. *Journal of Organizational Behavior*, 25(2), 129-145. doi:10.1002/job.242
- Jay, E. S. (1997). *Problem finding: The search for mechanism* (Vol. 1). Cresskill, NJ: Hampton.
- Jett, Q. R., & George, J. M. (2003). Work interrupted: A closer look at the role of interruptions in organizational life. *Academy of Management Review*, 28(3), 494-507.
- Johnson, E. J., & Tversky, A. (1983). AFFECT, GENERALIZATION, AND THE PERCEPTION OF RISK. *Journal of Personality and Social Psychology*, 45(1), 20-31. doi:10.1037//0022-3514.45.1.20
- Joshi, S., Kulkarni, N., & Athavale, R. (2013). Business Informatics a Key Driver For Successful Strategic Planning. In D. AlDabass, P. Uthayopas, S. Sanguanpong, & J. Niramitranon (Eds.), *Fourth International Conference on Intelligent Systems, Modelling and Simulation* (pp. 305-309).

- Juliano, R. L. (2013). Pharmaceutical innovation and public policy: The case for a new strategy for drug discovery and development. *Science and Public Policy*, 40(3), 393-405. doi:10.1093/scipol/scs125
- Kahn, W. A. (1990). PSYCHOLOGICAL CONDITIONS OF PERSONAL ENGAGEMENT AND DISENGAGEMENT AT WORK. *Academy of Management Journal*, 33(4), 692-724. doi:10.2307/256287
- Kahn, W. A. (1992). TO BE FULLY THERE - PSYCHOLOGICAL PRESENCE AT WORK. *Human Relations*, 45(4), 321-349. doi:10.1177/001872679204500402
- Kanter, R. M. (1988). WHEN A 1000 FLOWERS BLOOM - STRUCTURAL, COLLECTIVE, AND SOCIAL CONDITIONS FOR INNOVATION IN ORGANIZATION. *Research in Organizational Behavior*, 10, 169-211.
- Karlins, M., Schuerho.C, & Kaplan, M. (1969). SOME FACTORS RELATED TO ARCHITECTURAL CREATIVITY IN GRADUATING ARCHITECTURE STUDENTS. *Journal of General Psychology*, 81(2), 203-&.
- Khanna, I. (2012). Drug discovery in pharmaceutical industry: productivity challenges and trends. *Drug Discovery Today*, 17(19–20), 1088-1102. doi:<http://dx.doi.org/10.1016/j.drudis.2012.05.007>
- Khatena, J. (1971). EVALUATION AND CREATIVE POTENTIAL IN MUSIC. *Gifted Child Quarterly*, 15(1), 19-&.
- Kim, C., & Park, J. H. (2013). Explorative search for a high-impact innovation: the role of technological status in the global pharmaceutical industry. *R & D Management*, 43(4), 394-406. doi:10.1111/radm.12026
- King, N. (Producer). (2015, Nov 2015). Qualitative Analysis using Template Analysis [Online Video / Lecture] Retrieved from https://www.youtube.com/watch?v=jH_CjbXHCSw
- Kirkman, B. L., & Rosen, B. (2000). Powering up teams. *Organizational Dynamics*, 28(3), 48-66. doi:10.1016/s0090-2616(00)88449-1
- Kirton, M. J. (1984). ADAPTORS AND INNOVATORS - WHY NEW INITIATIVES GET BLOCKED. *Long Range Planning*, 17(2), 137-143. doi:10.1016/0024-6301(84)90145-6
- Klein, K. J., Conn, A. B., & Sorra, J. S. (2001). Implementing computerized technology: An organizational analysis. *Journal of Applied Psychology*, 86(5), 811-824. doi:10.1037//0021-9010.86.5.811
- Koenig, M. (2012). What is KM? Knowledge Management Explained. Retrieved from <http://www.kmworld.com/Articles/Editorial/What-Is-.../What-is-KM-Knowledge-Management-Explained-82405.aspx>
- Kofinas, A. K. (2008). *Managing innovation in IT-based, project-led organizations : a pharmaceutical case study*. (PhD), Manchester Metropolitan University.
- Kola, I., & Landis, J. (2004). Can the pharmaceutical industry reduce attrition rates? *Nature Reviews Drug Discovery*, 3(8), 711-715. doi:10.1038/nrd1470
- Kratzer, J., Leenders, R. T. A. J., & Van Engelen, J. M. L. (2006). Team Polarity and Creative Performance in Innovation Teams. *Creativity and Innovation Management*, 15(1), 96-104. doi:10.1111/j.1467-8691.2006.00372.x
- Labuschagne, A. (2003). Qualitative Research - Airy Fairy or Fundamental? *The Qualitative Report*, 8(1), 4.
- Lapierre, J., & Giroux, V.-P. (2003). Creativity and Work Environment in a High-Tech Context. *Creativity and Innovation Management*, 12(1), 11-23. doi:10.1111/1467-8691.00263
- Levitt, T. (2002). Creativity is not enough. *Harvard Business Review*, 80(8), 137-+.
- Lilleoere, A.-M., & Hansen, E. H. (2011). Knowledge-sharing Practices in Pharmaceutical Research and Development-a Case Study. *Knowledge and Process Management*, 18(3), 121-132. doi:10.1002/kpm.379
- Lilleoere, A. M., & Holme Hansen, E. (2011). Knowledge-sharing enablers and barriers in pharmaceutical research and development. *Journal of Knowledge Management*, 15(1), 53-70. doi:10.1108/136732711111108693

- Lim, H. S., & Choi, J. N. (2009). TESTING AN ALTERNATIVE RELATIONSHIP BETWEEN INDIVIDUAL AND CONTEXTUAL PREDICTORS OF CREATIVE PERFORMANCE. *Social Behavior and Personality, 37*(1), 117-135.
- Lin, P.-C., Ho, H.-Y., & Lu, M.-H. (2014). EFFECTS OF KNOWLEDGE MANAGEMENT AND CORPORATE CULTURE ON ORGANIZATIONAL INNOVATION CLIMATE. *Revista Internacional De Sociologia, 72*, 43-55. doi:10.3989/ris.2013.08.09
- Locke, E. A. (1976). *The Nature and Causes of Job Satisfaction* Chicago Rand McNally.
- Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation - A 35-year odyssey. *American Psychologist, 57*(9), 705-717. doi:10.1037//0003-066x.57.9.705
- Lovelace, K., Shapiro, D. L., & Weingart, L. R. (2001). Maximizing cross-functional new product teams' innovativeness and constraint adherence: A conflict communications perspective. *Academy of Management Journal, 44*(4), 779-793. doi:10.2307/3069415
- Lubart, T. I. (1994). *Product centered self-evaluation and the creative process*. (Doctorate), Yale University New Haven, CT.
- Lubart, T. I. (1999). *Creativity across cultures* Cambridge Cambridge University Press
- Lubart, T. I. (2000). Models of the creative process: Past, present and future. *Creativity Research Journal, 13*(3-4), 295-308.
- Lubart, T. I. (2001). Models of the Creative Process: Past, Present and Future. *Creativity Research Journal, 13*(3-4), 295-308. doi:10.1207/s15326934crj1334_07
- Ma, H. H. (2009). The Effect Size of Variables Associated With Creativity: A Meta-Analysis. *Creativity Research Journal, 21*(1), 30-42. doi:10.1080/10400410802633400
- Mackinnon, D. W. (1965). PERSONALITY AND THE REALIZATION OF CREATIVE POTENTIAL. *American Psychologist, 20*(4), 273-281. doi:10.1037/h0022403
- Madjar, N. (2008). Emotional and informational support from different sources and employee creativity. *Journal of Occupational and Organizational Psychology, 81*, 83-100. doi:10.1348/096317907x202464
- Madjar, N., Oldham, G. R., & Pratt, M. G. (2002). There's no place like home? The contributions of work and nonwork creativity support to employees' creative performance. *Academy of Management Journal, 45*(4), 757-767. doi:10.2307/3069309
- Madjar, N., & Shalley, C. E. (2008). Multiple tasks' and multiple goals' effect on creativity: Forced incubation or just a distraction? *Journal of Management, 34*(4), 786-805. doi:10.1177/0149206308318611
- Maehlum, M. (2012). The History of Solar Energy *Energy Informative* Retrieved from <http://energyinformative.org/the-history-of-solar-energy-timeline/>
- Maidique, M. A., & Zirger, B. J. (1984). A STUDY OF SUCCESS AND FAILURE IN PRODUCT INNOVATION - THE CASE OF THE UNITED-STATES ELECTRONICS INDUSTRY. *Ieee Transactions on Engineering Management, 31*(4), 192-203.
- Martinaityte, I., & Sacramento, C. A. (2013). When creativity enhances sales effectiveness: The moderating role of leader-member exchange. *Journal of Organizational Behavior, 34*(7), 974-994. doi:10.1002/job.1835
- Mathisen, G. E., & Einarsen, S. (2004). A review of instruments assessing creative and innovative environments within organizations. *Creativity Research Journal, 16*(1), 119-140. doi:10.1207/s15326934crj1601_12
- May, D. R., Gilson, R. L., & Harter, L. M. (2004). The psychological conditions of meaningfulness, safety and availability and the engagement of the human spirit at work. *Journal of Occupational and Organizational Psychology, 77*, 11-37. doi:10.1348/096317904322915892
- McGaw, B., & Glass, G. V. (1980). Choice of the Metric for Effect Size in Meta-analysis. *American Educational Research Journal, 17*(3), 325-337. doi:10.3102/00028312017003325

- Mednick, M. T., Mednick, S. A., & Mednick, E. V. (1964). INCUBATION OF CREATIVE PERFORMANCE AND SPECIFIC ASSOCIATIVE PRIMING. *Journal of Abnormal and Social Psychology*, 69(1), 84-88. doi:10.1037/h0045994
- Meyer, A. D., & Goes, J. B. (1988). ORGANIZATIONAL ASSIMILATION OF INNOVATIONS - A MULTILEVEL CONTEXTUAL ANALYSIS. *Academy of Management Journal*, 31(4), 897-923. doi:10.2307/256344
- Meyer, J. A. (1998). Information overload in marketing management. *Marketing Intelligence & Planning*, 16(3), 200-209. doi:doi:10.1108/02634509810217318
- Meyer, P. (2015). Apple Inc. Organizational Culture: Features & Implications Retrieved from <http://panmore.com/apple-inc-organizational-culture-features-implications>
- Miles, M. B. H., A.M. (1994). *Qualitative Data Analysis: an expanded sourcebook*, 2nd ed. : Sage.
- Milgram, R. M., Yitzhak, V., & Milgram, N. A. (1977). CREATIVE ACTIVITY AND SEX-ROLE IDENTITY IN ELEMENTARY-SCHOOL CHILDREN. *Perceptual and Motor Skills*, 45(2), 371-376.
- Mills, J., Bonner, A., & Francis, K. (2006). Adopting a constructivist approach to grounded theory: implications for research design. *International journal of nursing practice*, 12(1), 8-13. doi:10.1111/j.1440-172X.2006.00543.x
- Mintzberg, H. T. (1979). *The Structuring of Organizations* Englewood Cliffs: Prentice-Hall.
- Mitchel, C. (2016). The CEO Survey - How are CEOs addressing the issues they consider most critical? . Retrieved from <https://www.youtube.com/watch?v=x5SEUyZr2EY>
- Mohrman, S. A., Cohen, S.G., Mohrman, A.M. . (1995). *Designing team-based organizations: New forms of knowledge work*. . San Francisco: Jossey-Bass.
- Monge, P. R., Cozzens, M. D., & Contractor, N. S. (1992). COMMUNICATION AND MOTIVATIONAL PREDICTORS OF THE DYNAMICS OF ORGANIZATIONAL INNOVATION. *Organization Science*, 3(2), 250-274. doi:10.1287/orsc.3.2.250
- Morgeson, F. P., & Humphrey, S. E. (2006). The Work Design Questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology*, 91(6), 1321-1339. doi:10.1037/0021-9010.91.6.1321
- Mumford, M. D. (2000). Managing Creative People: Strategies and Tactics for Innovation. *Human Resource Management Review*, 10(3), 313-351. doi:[http://dx.doi.org/10.1016/S1053-4822\(99\)00043-1](http://dx.doi.org/10.1016/S1053-4822(99)00043-1)
- Mumford, M. D. (2003). Where have we been, where are we going? Taking stock in creativity research. *Creativity Research Journal*, 15(2-3), 107-120. doi:10.1207/s15326934crj152&3_01
- Mumford, M. D., Connelly, S., & Gaddis, B. (2003). How creative leaders think: Experimental findings and cases. *Leadership Quarterly*, 14(4-5), 411-432. doi:10.1016/s1048-9843(03)00045-6
- Mumford, M. D., & Gustafson, S. B. (1988). CREATIVITY SYNDROME - INTEGRATION, APPLICATION, AND INNOVATION. *Psychological Bulletin*, 103(1), 27-43. doi:10.1037/0033-2909.103.1.27
- Mumford, M. D., Hester, K. S., & Robledo, I. C. (2012). Creativity in Organizations. 3-16. doi:10.1016/b978-0-12-374714-3.00001-x
- Mumford, M. D., & Hunter, S. T. (2005). Innovation in Organizations: A Multi-Level Perspective on Creativity *Multi-Level Issues in Strategy and Methods* (pp. 9-73).
- Mumford, M. D., Mobley, M. I., Reiter-Palmon, R., Uhlman, C. E., & Doares, L. M. (1991). Process analytic models of creative capacities. *Creativity Research Journal*, 4(2), 91-122. doi:10.1080/10400419109534380
- Mumford, M. D., Scott, G. M., Gaddis, B., & Strange, J. M. (2002). Leading creative people: Orchestrating expertise and relationships. *Leadership Quarterly*, 13(6), 705-750. doi:10.1016/s1048-9843(02)00158-3
- Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and Organization*, 17(1), 2-26. doi:10.1016/j.infoandorg.2006.11.001

- Newell, A., Simon, H. (1972). *Human Problem Solving* Englewood Cliffs, NJ: Prentice-Hall
- Nickerson, R. S. (1999). *Enhancing creativity*. Cambridge: Cambridge University Press.
- NIHCM. (2002). *Changing Patterns of Pharmaceutical Innovation*. Retrieved from <http://www.nihcm.org/pdf/innovations.pdf>
- Nonaka, I. (1994). A DYNAMIC THEORY OF ORGANIZATIONAL KNOWLEDGE CREATION. *Organization Science*, 5(1), 14-37. doi:10.1287/orsc.5.1.14
- Nonaka, I. (1995). *The Knowledge Creating Company*. New York Oxford University Press
- Nystrom, P. C., Ramamurthy, K., & Wilson, A. L. (2002). Organizational context, climate and innovativeness: adoption of imaging technology. *Journal of Engineering and Technology Management*, 19(3-4), 221-247. doi:10.1016/s0923-4748(02)00019-x
- Oates, B. J. (2006). *Researching information systems and computing*. London ; Thousand Oaks, Calif.: SAGE Publications.
- OECD/Eurostat. (2005). *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data* (3rd Ed.). Paris: OECD Publishing.
- Oldham, G. R. (2002). *Stimulating and supporting creativity in organisations*. San Francisco Jossey-Bass.
- Oldham, G. R., & Baer, M. (2012). Creativity and the Work Context. 387-420. doi:10.1016/b978-0-12-374714-3.00016-1
- Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Journal*, 39(3), 607-634. doi:10.2307/256657
- Owens, W. A. (1969). COGNITIVE, NONCOGNITIVE, AND ENVIRONMENTAL CORRELATES OF MECHANICAL INGENUITY. *Journal of Applied Psychology*, 53(3P1), 199-&. doi:10.1037/h0027378
- Paletz, S. B. F. (2012). Project Management of Innovative Teams. 421-455. doi:10.1016/b978-0-12-374714-3.00017-3
- Pammolli, F., Magazzini, L., & Riccaboni, M. (2011). The productivity crisis in pharmaceutical R&D. *Nature Reviews Drug Discovery*, 10(6), 428-438. doi:10.1038/nrd3405
- Paolillo, J. G., & Brown, W. B. (1978). HOW ORGANIZATIONAL-FACTORS AFFECT R AND D INNOVATION. *Research Management*, 21(2), 12-15.
- Parsons, G. L. (1983). INFORMATION TECHNOLOGY - A NEW COMPETITIVE WEAPON. *Sloan Management Review*, 25(1), 3-14.
- Parsons, T. W. (2007). *Enhancing pharmaceutical innovation through the use of knowledge management*. (PhD), Loughborough University (United Kingdom). Available from ProQuest Dissertations
- Pattikawa, L. H. (2007). *Innovation in the Pharmaceutical Industry: Evidence from Drug Introductions in the U.S.* (PhD), Erasmus University Rotterdam. Retrieved from file:///C:/Users/meighu/Downloads/EPS2007102MKT9058921352Pattikawa.pdf
- Paul, S. M., Mytelka, D. S., Dunwiddie, C. T., Persinger, C. C., Munos, B. H., Lindborg, S. R., & Schacht, A. L. (2010). How to improve R&D productivity: the pharmaceutical industry's grand challenge. *Nature Reviews Drug Discovery*, 9(3), 203-214. doi:10.1038/nrd3078
- Paulus, P. B., Dzindolet, M., & Kohn, N. W. (2012). Collaborative Creativity—Group Creativity and Team Innovation. 327-357. doi:10.1016/b978-0-12-374714-3.00014-8
- Pelled, L. H. (1996). Demographic diversity, conflict, and work group outcomes: An intervening process theory. *Organization Science*, 7(6), 615-631. doi:10.1287/orsc.7.6.615
- Perry-Smith, J. E. (2006). Social yet creative: The role of social relationships in facilitating individual creativity. *Academy of Management Journal*, 49(1), 85-101.
- Perry-Smith, J. E., & Shalley, C. E. (2003). The social side of creativity: A static and dynamic social network perspective. *Academy of Management Review*, 28(1), 89-106.
- Pharma. (2016). Biopharmaceutical Industry Profile. Retrieved from <http://www.phrma.org/sites/default/files/pdf/biopharmaceutical-industry-profile.pdf>
- Pierce, J. L., & Delbecq, A. L. (1977). Organization Structure, Individual Attitudes and Innovation. *Academy of Management Review*, 2(1), 27-37. doi:10.5465/AMR.1977.4409154

- Pyzdek, T. (2003). *The Six Sigma Handbook* (2nd ed.). New York: McGraw-Hill
- Rainer, R. K. (2013). *Introduction to Information Systems* (3rd ed.): Wiley.
- Rappeport, A. (2012). Pfizer feels impact of end to Lipitor patent. Retrieved from <https://www.ft.com/content/9820326a-9398-11e1-8ca8-00144feab49a>
- Razavi, S. H. (2013). Management of Organizational Innovation. *International Journal of Business and Social Science*, 4(1), 7.
- Rentsch, J. R. (1990). CLIMATE AND CULTURE - INTERACTION AND QUALITATIVE DIFFERENCES IN ORGANIZATIONAL MEANINGS. *Journal of Applied Psychology*, 75(6), 668-681. doi:10.1037/0021-9010.75.6.668
- Rice, G. (2006). Individual values, Organizational Context, and self-perceptions of employee creativity: Evidence from Egyptian organizations. *Journal of Business Research*, 59(2), 233-241. doi:<http://dx.doi.org/10.1016/j.jbusres.2005.08.001>
- Rich, B. L., Lepine, J. A., & Crawford, E. R. (2010). JOB ENGAGEMENT: ANTECEDENTS AND EFFECTS ON JOB PERFORMANCE. *Academy of Management Journal*, 53(3), 617-635.
- Ritter, S. M., Damian, R. I., Simonton, D. K., van Baaren, R. B., Strick, M., Derks, J., & Dijksterhuis, A. (2012). Diversifying experiences enhance cognitive flexibility. *Journal of Experimental Social Psychology*, 48(4), 961-964. doi:10.1016/j.jesp.2012.02.009
- Ritter, S. M., van Baaren, R. B., & Dijksterhuis, A. (2012). Creativity: The role of unconscious processes in idea generation and idea selection. *Thinking Skills and Creativity*, 7(1), 21-27. doi:10.1016/j.tsc.2011.12.002
- Rogers, C. R. (1954). TOWARD A THEORY OF CREATIVITY. *Etc-Review of General Semantics*, 11(4), 249-260.
- Rossmann, B. B., & Horn, J. L. (1972). COGNITIVE, MOTIVATIONAL AND TEMPERAMENTAL INDICANTS OF CREATIVITY AND INTELLIGENCE. *Journal of Educational Measurement*, 9(4), 265-286. doi:10.1111/j.1745-3984.1972.tb00959.x
- Rubin, H. J., & Rubin, I. S. (2005). *Qualitative interviewing : the art of hearing data*.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78. doi:10.1037//0003-066x.55.1.68
- Ryan, T. A. (1970). *Intentional Behaviour*. New York Ronald Press.
- Sarros, J. C., Cooper, B. K., & Santora, J. C. (2008). Building a Climate for Innovation Through Transformational Leadership and Organizational Culture. *Journal of Leadership & Organizational Studies*, 15(2), 145-158. doi:10.1177/1548051808324100
- Scandura, T. A., & Williams, E. A. (2000). Research methodology in management: Current practices, trends, and implications for future research. *Academy of Management Journal*, 43(6), 1248-1264. doi:10.2307/1556348
- Schaefer, C. E., & Anastasi, A. (1968). A BIOGRAPHICAL INVENTORY FOR IDENTIFYING CREATIVITY IN ADOLESCENT BOYS. *Journal of Applied Psychology*, 52(1P1), 42-&. doi:10.1037/h0025328
- Schneider, B., & Reichers, A. E. (1983). ON THE ETIOLOGY OF CLIMATES. *Personnel Psychology*, 36(1), 19-39. doi:10.1111/j.1744-6570.1983.tb00500.x
- Schraw, G., Dunkle, M. E., & Bendixen, L. D. (1995). COGNITIVE-PROCESSES IN WELL-DEFINED AND ILL-DEFINED PROBLEM-SOLVING. *Applied Cognitive Psychology*, 9(6), 523-538. doi:10.1002/acp.2350090605
- Schuler, R. S., & Jackson, S. E. (1987). Linking Competitive Strategies with Human Resource Management Practices. *The Academy of Management Executive* (1987-1989), 1(3), 207-219.
- Schumpeter, J. (1934). *The Theory of Economic Development* Cambridge, Massachusetts: Harvard University Press.
- Scott, S. G., & Bruce, R. A. (1994). DETERMINANTS OF INNOVATIVE BEHAVIOR - A PATH MODEL OF INDIVIDUAL INNOVATION IN THE WORKPLACE. *Academy of Management Journal*, 37(3), 580-607. doi:10.2307/256701

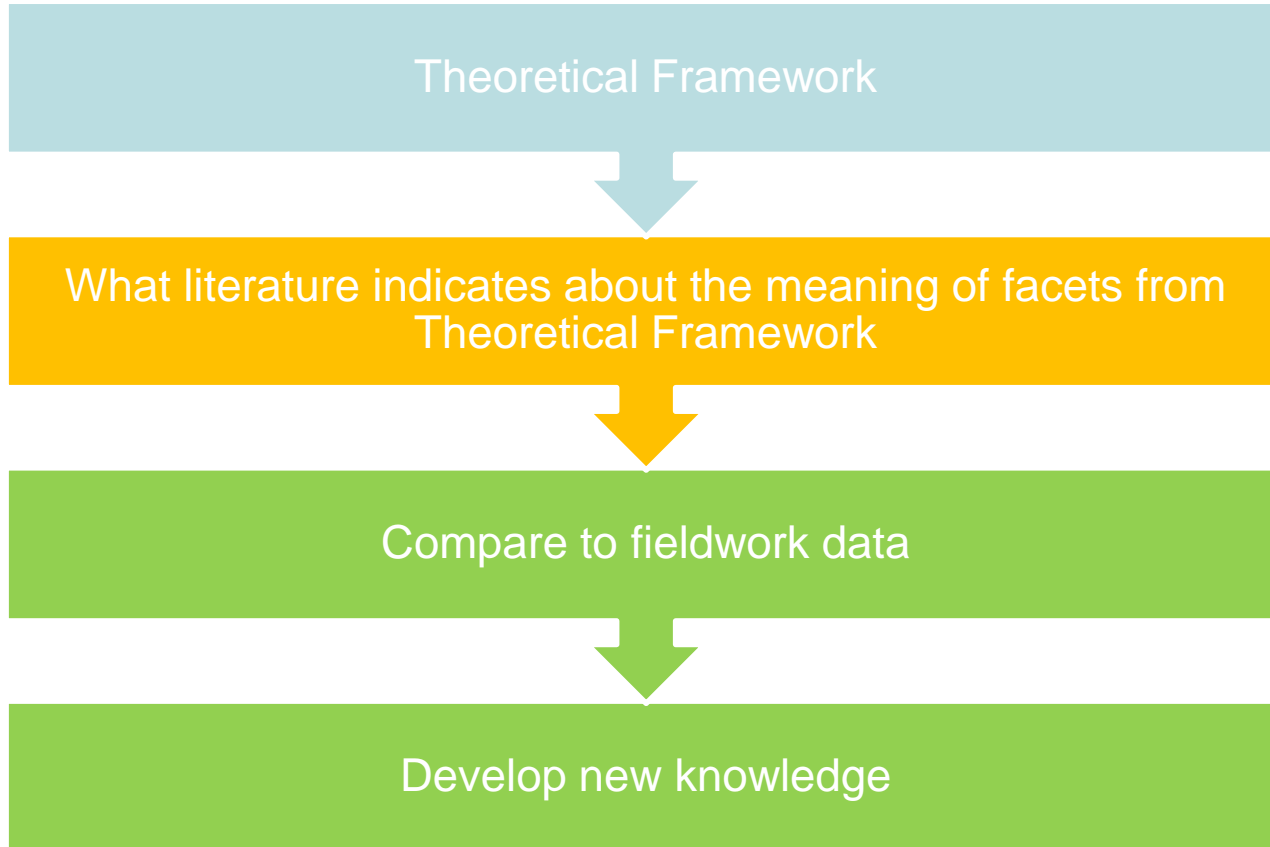
- Segerstrom, P. S. (1998). Endogenous growth without scale effects. *American Economic Review*, 88(5), 1290-1310.
- Shah, H., Eardley, A., & Wood-Harper, T. (2007). ALTAR: achieving learning through action research. *European Journal of Information Systems*, 16(6), 761-770. doi:10.1057/palgrave.ejis.3000720
- Shalley, C. E. (1991). EFFECTS OF PRODUCTIVITY GOALS, CREATIVITY GOALS, AND PERSONAL DISCRETION ON INDIVIDUAL CREATIVITY. *Journal of Applied Psychology*, 76(2), 179-185. doi:10.1037/0021-9010.76.2.179
- Shalley, C. E. (1995). EFFECTS OF COACTION, EXPECTED EVALUATION, AND GOAL-SETTING ON CREATIVITY AND PRODUCTIVITY. *Academy of Management Journal*, 38(2), 483-503. doi:10.2307/256689
- Shalley, C. E., & Gilson, L. L. (2004). What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. *Leadership Quarterly*, 15(1), 33-53. doi:10.1016/j.leaqua.2003.12.004
- Shalley, C. E., Gilson, L. L., & Blum, T. C. (2000). Matching creativity requirements and the work environment: Effects on satisfaction and intentions to leave. *Academy of Management Journal*, 43(2), 215-223. doi:10.2307/1556378
- Shalley, C. E., Gilson, L. L., & Blum, T. C. (2009). INTERACTIVE EFFECTS OF GROWTH NEED STRENGTH, WORK CONTEXT, AND JOB COMPLEXITY ON SELF-REPORTED CREATIVE PERFORMANCE. *Academy of Management Journal*, 52(3), 489-505.
- Shalley, C. E., Zhou, J., & Oldham, G. R. (2004). The effects of personal and contextual characteristics on creativity: Where should we go from here? *Journal of Management*, 30(6), 933-958. doi:10.1016/j.jm.2004.06.007
- Shanler, M. (2015). Hype Cycle for Life Sciences. Retrieved from <https://www.gartner.com/doc/3100221/hype-cycle-life-sciences->
- Sharma, A. (1999). Central dilemmas of managing innovation in large firms. *California Management Review*, 41(3), 146-+.
- Siegel, S. M., & Kaemmerer, W. F. (1978). MEASURING PERCEIVED SUPPORT FOR INNOVATION IN ORGANIZATIONS. *Journal of Applied Psychology*, 63(5), 553-562. doi:10.1037//0021-9010.63.5.553
- Simba, A. (2014). *The process of developing innovative capabilities in biotechnology: The case of uk firms*. (PhD), University of Nottingham, ProQuest Dissertations & Theses Global.
- Snell, S. A. (1992). CONTROL-THEORY IN STRATEGIC HUMAN-RESOURCE MANAGEMENT - THE MEDIATING EFFECT OF ADMINISTRATIVE INFORMATION. *Academy of Management Journal*, 35(2), 292-327. doi:10.2307/256375
- Sosik, J. J., Kahai, S. S., & Avolio, B. J. (1998). Transformational leadership and dimensions of creativity: Motivating idea generation in computer-mediated groups. *Creativity Research Journal*, 11(2), 111-121. doi:10.1207/s15326934crj1102_3
- Souitaris, V. (2001). External communication determinants of innovation in the context of a newly industrialised country: a comparison of objective and perceptual results from Greece. *Technovation*, 21(1), 25-34. doi:10.1016/s0166-4972(00)00014-6
- Stake, R. (1995). *Multiple Case Study Analysis*. New York: The Guildford Press.
- Steck, R., & Sundermann, J. (1978). EFFECTS OF GROUP-SIZE AND COOPERATION ON SUCCESS OF INTERDISCIPLINARY GROUPS IN R AND D. *R & D Management*, 8(2), 59-64. doi:10.1111/j.1467-9310.1978.tb01278.x
- Stein, M. I. (1974). *Stimulating Creativity* (Vol. 1). New York Academic Press.
- Sternberg, R. J. (2006). The Nature of Creativity. *Creativity Research Journal*, 18(1), 87-98. doi:10.1207/s15326934crj1801_10
- Stewart, D. (2011). Building Enterprise Taxonomies
- Stross, R. (2012). *The Launch Pad: Inside Y Combinator, Silicon Valley's Most Exclusive School for Startups*: Portfolio

- Sundgren, M., Dimenas, E., Gustafsson, J. E., & Selart, M. (2005). Drivers of organizational creativity: a path model of creative climate in pharmaceutical R&D. *R & D Management, 35*(4), 359-374. doi:10.1111/j.1467-9310.2005.00395.x
- Symon, G. C., C. (2012). *Qualitative Organizational Research Core Methods and Current Challenges*: Sage.
- Taggar, S. (2001). Group composition, creative synergy, and group performance. *Journal of Creative Behavior, 35*(4), 261-286.
- Taggar, S. (2002). Individual creativity and group ability to utilize individual creative resources: A multilevel model. *Academy of Management Journal, 45*(2), 315-330. doi:10.2307/3069349
- Tesluk, P. E., Farr, J. L., & Klein, S. R. (1997). Influences of Organizational Culture and Climate on Individual Creativity. *The Journal of Creative Behavior, 31*(1), 27-41. doi:10.1002/j.2162-6057.1997.tb00779.x
- Tett, R. P., & Burnett, D. D. (2003). A personality trait-based interactionist model of job performance. *Journal of Applied Psychology, 88*(3), 500-517. doi:10.1037/0021-9010.88.3.500
- Thamhain, H. J. (2003). Managing innovative R&D teams. *R & D Management, 33*(3), 297-311. doi:10.1111/1467-9310.00299
- Trevelyan, R. (2001). The paradox of autonomy: A case of academic research scientists. *Human Relations, 54*(4), 495-525. doi:10.1177/0018726701544005
- Trowbridge, N., & Charles, D. C. (1966). CREATIVITY IN ART STUDENTS. *Journal of Genetic Psychology, 109*(2), 281-+.
- Troyer, L., & Younggreen, R. (2009). Conflict and Creativity in Groups. *Journal of Social Issues, 65*(2), 409-427. doi:10.1111/j.1540-4560.2009.01606.x
- Tuckett, A. G. (2005). Applying thematic analysis theory to practice: a researcher's experience. *Contemporary nurse, 19*(1-2), 75-87.
- Tushman, M. L. (1997). *Winning through Innovation*. Cambridge: Harvard Business School Press
- Utman, C. H. (1997). Performance Effects of Motivational State: A Meta-Analysis. *Personality and Social Psychology Review, 1*(2), 170-182. doi:10.1207/s15327957pspr0102_4
- Vala-Webb, G. (2017). *Building Smarter Organizations: How to Lead Your Zombie Organization Back to Life*: Elevate.
- VanEck. (2016). Drug Patent Expirations: \$190 Billion Is Up for Grabs. Retrieved from <http://marketrealist.com/2016/03/drug-patent-expirations-190-billion-sales-grabs/>
- Vorisek, J., Pour, J., & Buchalcevoa, A. (2015). MANAGEMENT OF BUSINESS INFORMATICS MODEL - PRINCIPLES AND PRACTICES. *E & M Ekonomie a Management, 18*(3), 160-173. doi:10.15240/tul/001/2015-3-014
- Wall, T. D., Jackson, P. R., & Davids, K. (1992). OPERATOR WORK DESIGN AND ROBOTICS SYSTEM PERFORMANCE - A SERENDIPITOUS FIELD-STUDY. *Journal of Applied Psychology, 77*(3), 353-362. doi:10.1037/0021-9010.77.3.353
- Wall, T. D., Kemp, N. J., Jackson, P. R., & Clegg, C. W. (1986). OUTCOMES OF AUTONOMOUS WORKGROUPS - A LONG-TERM FIELD EXPERIMENT. *Academy of Management Journal, 29*(2), 280-304. doi:10.2307/256189
- Wang, A. C., & Cheng, B. S. (2010). When does benevolent leadership lead to creativity? The moderating role of creative role identity and job autonomy. *Journal of Organizational Behavior, 31*(1), 106-121. doi:10.1002/job.634
- Ward, T. B. (1999). *Creative Cognition* Cambridge, UK: Cambridge University Press.
- Weisberg, R. W. (1999). *Creativity and Knowledge* Cambridge: Cambridge University Press.
- West, M. A. (1990). *The social psychology of innovation in groups* Chichester: Wiley.
- West, M. A. (2002a). Ideas are ten a penny: It's team implementation not idea generation that counts. *Applied Psychology-an International Review-Psychologie Appliquee-Revue Internationale, 51*(3), 411-424. doi:10.1111/1464-0597.01006
- West, M. A. (2002b). Sparkling fountains or stagnant ponds: An integrative model of creativity and innovation implementation in work groups. *Applied Psychology-an International*

- Review-Psychologie Appliquee-Revue Internationale*, 51(3), 355-387.
doi:10.1111/1464-0597.00951
- West, M. A., & Altink, W. M. M. (1996). Innovation at work: Individual, group, organizational, and socio-historical perspectives. *European Journal of Work and Organizational Psychology*, 5(1), 3-11. doi:10.1080/13594329608414834
- West, M. A., & Anderson, N. R. (1996). Innovation in top management teams. *Journal of Applied Psychology*, 81(6), 680-693. doi:10.1037/0021-9010.81.6.680
- West, M. A., & Sacramento, C. A. (2012). Creativity and Innovation. 359-385.
doi:10.1016/b978-0-12-374714-3.00015-x
- Witt, L. A., & Beorkrem, M. N. (1989). Climate for creative productivity as a predictor of research usefulness and organizational effectiveness in an r&d organization. *Creativity Research Journal*, 2(1-2), 30-40. doi:10.1080/10400418909534298
- Wood-Harper, T. (2015). *An 'Ideal Type' Problem Solving Doctoral Thesis: A Template with Multiview as an Exemplar*. Presentation. Manchester Business School. University of Manchester. Manchester.
- Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). TOWARD A THEORY OF ORGANIZATIONAL CREATIVITY. *Academy of Management Review*, 18(2), 293-321.
doi:10.2307/258761
- Yin, R. K. (2009). *Case study research : design and methods*.
- Yukl, G. L. (2002). *Leadership in Organizations* (5th ed.). Upper Saddle River, NJ: Prentice Hall
- Zaltman, G. (1973). *Innovations and Organizations* London Wiley.

APPENDIX A – Completed derived expanded typology for Case Study Company

Fieldwork findings...



Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
1. Work freedom and Stimulation			
	Challenge / Job Complexity (Enablers)		
		Tasks are multifaceted	
		Tasks requires employees to combine knowledge from various sources	<ul style="list-style-type: none"> • Job rotation • Tacit Knowledge Exchange
		Tasks requires comparatively more intricate thought processes	
		Intellectually Stimulation	<ul style="list-style-type: none"> • Intellectual Stimulation
		Decision Tasks	<ul style="list-style-type: none"> • Challenge
		Judgement Tasks	
		Problem Tasks	
		Fuzzy Tasks	

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
1. Work freedom and Stimulation			
	Challenge / Job Complexity (Inhibitors)		
			<ul style="list-style-type: none"> • Lack of Challenge
			<ul style="list-style-type: none"> • Perception that innovation is not possible
			<ul style="list-style-type: none"> • Thinking that innovation is only something "Big"
			<ul style="list-style-type: none"> • Comfort zones
			<ul style="list-style-type: none"> • Lack of diversity in team
			<ul style="list-style-type: none"> • When business walks in with a firm decision in mind

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
1. Work freedom and Stimulation			
	Autonomy (Enablers)		
		Unconstrained choice of task approach by teams	<ul style="list-style-type: none"> • Freedom • Empowerment • Ownership of innovation • Leaner governance for small scale innovation • Small core team for decision making • Innovation decision making owner
		Collective control over the pace of work	<ul style="list-style-type: none"> • Leaner governance
		Distribution of tasks	
		Absence of direct supervision or micromanagement	
		The workgroup has the inter-related tasks in order to produce the final output	

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
1. Work freedom and Stimulation			
	Autonomy (Enablers)		
		The various skills sets are available in the team	
		Feedback for the whole team in given (from upper management)	<ul style="list-style-type: none"> • Support from senior management
			<ul style="list-style-type: none"> • Incubation
	Autonomy (Inhibitors)		
		People work within strict guidelines and roles	<ul style="list-style-type: none"> • Company regulations • Compliance regulations
		People carry out their work in prescribed ways with little room to refine their tasks	<ul style="list-style-type: none"> • Methodology addicts
			<ul style="list-style-type: none"> • Ivory tower thinking
			<ul style="list-style-type: none"> • To many lateral stakeholders for decision making

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
2. Positive Member Exchange			
	Positive Peer Group (enablers)		
		Mutual openness	<ul style="list-style-type: none"> • Honesty about failures • Trust • Open minded
		Humour	<ul style="list-style-type: none"> • Fun environment
		Good communications	<ul style="list-style-type: none"> • Ongoing communications
		Diversity	<ul style="list-style-type: none"> • Diversity
		Shared commitment of ideas	<ul style="list-style-type: none"> • Team with conviction
		Clarifying and ensuring commitment to group vision	<ul style="list-style-type: none"> • Mission clarity
		Participants safety	<ul style="list-style-type: none"> • Trust • Personal respect

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
2. Positive Member Exchange			
	Positive Peer Group (enablers)		
		Task Orientation <ul style="list-style-type: none"> • Intra-team advice • Feedback and cooperation • Mutual monitoring • Appraisal of performance and ideas • Clear outcome criteria 	<ul style="list-style-type: none"> • Collaboration • Intra-team advice • Measuring innovation • Recognition
		Support for innovation <ul style="list-style-type: none"> • Expectation of innovation • Approval • Practical support 	<ul style="list-style-type: none"> • Idea support
		Participation in decision making <ul style="list-style-type: none"> • Having influence • Interacting with those in the change process • Sharing information 	<ul style="list-style-type: none"> • Incubation • Autonomy

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
2. Positive Member Exchange			
	Positive Peer Group (enablers)		
		Managing Conflict <ul style="list-style-type: none"> • Constructive challenge • Exploration of opposing opinions • Frank analysis of task related issues • Minority insistence 	<ul style="list-style-type: none"> • Conflict
		Reflexivity <ul style="list-style-type: none"> • Reflection • Planning • Action 	<ul style="list-style-type: none"> • Reflexivity
		Interaction Frequency	<ul style="list-style-type: none"> • Facetime
		Balance of adaptors and creators	<ul style="list-style-type: none"> • Let does be does and thinkers be thinkers

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
2. Positive Member Exchange			
	Positive Peer Group (inhibitors)		
		Excessive task conflict	<ul style="list-style-type: none"> Lack of bandwidth for innovation
		Personal conflict	<ul style="list-style-type: none"> Lack of openness
		Lack of support for innovation	<ul style="list-style-type: none"> Negative manner in which ideas are discarded Premature blocking of ideas
		Participation in decision making <ul style="list-style-type: none"> Social inhibition Groupthink 	
			<ul style="list-style-type: none"> Business frustration
			<ul style="list-style-type: none"> Can't step back / lack of reflexivity

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
2. Positive Member Exchange			
	Positive Peer Group (inhibitors)		
			<ul style="list-style-type: none"> • Closed culture / wall thinking
			<ul style="list-style-type: none"> • Resistance to change
			<ul style="list-style-type: none"> • Lack of idea management
			<ul style="list-style-type: none"> • Too rigid on embryotic ideas
			<ul style="list-style-type: none"> • Lack of trust
			<ul style="list-style-type: none"> • Lack of collaboration
			<ul style="list-style-type: none"> • Unidirectional business requirements

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
2. Positive Member Exchange			
	Intellectual Stimulation (Enabling)		
		Many different points of view are shared during discussions	<ul style="list-style-type: none"> • Collaboration • Combinational thinking • Disruption • Personal learning
		Different of opinions are frequently expressed here	<ul style="list-style-type: none"> • Group ideation
		A wide variety of viewpoints are expressed here	<ul style="list-style-type: none"> • Edge of the box thinking • Outside the box thinking • Tacit knowledge exchange • Job rotation
		People accept diversity	<ul style="list-style-type: none"> • Diversity
			<ul style="list-style-type: none"> • Attempting to be future proof

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
2. Positive Member Exchange			
	Intellectual Stimulation (Inhibitors)		
		Authoritarian patterns	
		There is a great deal of personal tension here	
		There are quite a few people who cannot tolerate each other	
		There are power and territory struggles here	<ul style="list-style-type: none"> • Power structures and struggles
			<ul style="list-style-type: none"> • When a business walks in with a firm solution
			<ul style="list-style-type: none"> • Architects not on top of technology
			<ul style="list-style-type: none"> • Poor collaboration
			<ul style="list-style-type: none"> • Lack of knowledge share

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
2. Positive Member Exchange			
	Positive Interpersonal Exchange (enabling)		
		Support	<ul style="list-style-type: none"> • Informal environment • Open thinking • Socialization
		Signals of progress	<ul style="list-style-type: none"> • Recognition
		Trust	<ul style="list-style-type: none"> • Trust
		Rewards	<ul style="list-style-type: none"> • Rewards
		Clarity	<ul style="list-style-type: none"> • Ongoing communications

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
2. Positive Member Exchange			
	Positive Interpersonal Exchange (inhibitors)		
		Conflict (personal) <ul style="list-style-type: none"> • Intimidation • Dispensing Punishment • Micro Management 	<ul style="list-style-type: none"> • Fear to raise your hand
			<ul style="list-style-type: none"> • Power structures and struggles

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
3. Leadership Influence and Direction			
	Positive Supervisor Relations (enabling)		
		Show support for a team member's action or decisions	<ul style="list-style-type: none"> • Management support
		Help alleviate stressful situations for subordinates	<ul style="list-style-type: none"> • Give subordinates the space to be creative
		Socializing	<ul style="list-style-type: none"> • Physical exchanges
		Keeping members informed about stressful issues	
		Addressing subordinates negative feelings	
		Disclose personal feelings	
		Maintaining regular contact with and providing general guidance to subordinates	<ul style="list-style-type: none"> • Management being a good role model

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
3. Leadership Influence and Direction			
	Positive Supervisor Relations (enabling)		
		Providing constructive feedback on work done	<ul style="list-style-type: none"> • Trust • Recognition
		Monitoring progress in a timely manner	
		Reacting to problems in the work with understanding and help	<ul style="list-style-type: none"> • Trust
		Recognizing good performance	<ul style="list-style-type: none"> • Recognition
		Asking for team members ideas and opinions	<ul style="list-style-type: none"> • Trust
		Collaborating with sub-ordinates	<ul style="list-style-type: none"> • Trenches together
		Expressing emotion observable by subordinates	

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
3. Leadership Influence and Direction			
	Positive Supervisor Relations (Inhibiting)		
		Creating high time pressure with assignments	<ul style="list-style-type: none"> • Can't step back • Keeping the lights on
		Giving assignments not appropriate for the team member	
		Not providing enough clarity for an assignment	
		Changing assignments or objectives too frequently	<ul style="list-style-type: none"> • Lack of focus
		Assignment in conflict with other management instructions	<ul style="list-style-type: none"> • Operationalization pressure
		Checking on status of work too often	

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
3. Leadership Influence and Direction			
	Mission Clarity (enabling)		
		Stated action and aims in regards to innovation and creativity	<ul style="list-style-type: none"> • Planning horizon • Seeing the big picture • Innovation expectations
		Requirements	<ul style="list-style-type: none"> • Requirements
		Creative time pressure	<ul style="list-style-type: none"> • Challenge
	Mission Clarity (inhibitors)		
		Performance goals	
		Keeping the lights on	<ul style="list-style-type: none"> • Keeping the lights on

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
3. Leadership Influence and Direction			
	Mission Clarity (inhibitors)		
		Excessive time pressures	<ul style="list-style-type: none"> • Can't step back
		Loosing site of the big picture	<ul style="list-style-type: none"> • Loosing site of the big picture
		Excessive creative time pressure	<ul style="list-style-type: none"> • Lack of idea time
	Participation (enabling)		
		Physically involves in tasks	<ul style="list-style-type: none"> • Co-location
		Cognitively vigilant	<ul style="list-style-type: none"> • Curiosity
		Focused	<ul style="list-style-type: none"> • Commitment

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
3. Leadership Influence and Direction			
	Participation (enabling)		
		Emotionally connected to work	<ul style="list-style-type: none"> • Motivation
		Emotionally connected to others	<ul style="list-style-type: none"> • Motivation • Personal responsibility
			<ul style="list-style-type: none"> • Ownership of innovation
			<ul style="list-style-type: none"> • Location in an innovation cluster
	Participation (inhibitors)		
		Disengaged	
		Withhold physical energy	
		Withhold cognitive energy	

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
3. Leadership Influence and Direction			
	Participation (inhibitors)		
		Without emotional energy	
		Robotic	
		Passive	
		Detached	
			<ul style="list-style-type: none"> • Distance
			<ul style="list-style-type: none"> • Lack of interests from other groups

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
4. Organizational Support			
	Resources (enabling)		
		Sufficient resources	<ul style="list-style-type: none"> Resources to try things out
			<ul style="list-style-type: none"> Team size
			<ul style="list-style-type: none"> Idea time
	Resources (inhibitors)		
		Insufficient resources	Insufficient incubation resources
		Time constraints	Lack of idea time

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
4. Organizational Support			
	Top management support (enabling)		
		Top level support for the initiation and development of ideas	<ul style="list-style-type: none"> • Commitment • Openness • Support • Trenches together
		Autonomy	<ul style="list-style-type: none"> • Autonomy
		Personal development	
		Respect capacity to function creatively	
		Support risk taking	<ul style="list-style-type: none"> • Support risk taking
		Rewards and recognition	<ul style="list-style-type: none"> • Rewards
		Codified commitments	<ul style="list-style-type: none"> • Mission statements
			<ul style="list-style-type: none"> • Management being a good role model

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
4. Organizational Support			
	Top management support (inhibitors)		
		Managers take credit for creativity and innovation	
		Decisions are concentrated at the top	<ul style="list-style-type: none"> • Premature high level decisions • Ivory tower thinking
		Leadership behaves like their teams are not creative	
		Team members are expected just to follow orders coming down	<ul style="list-style-type: none"> • Top down standardization • Hierarchy
		Creativity based on cliques	
			<ul style="list-style-type: none"> • Lack of credibility for innovation
			<ul style="list-style-type: none"> • Expectation that innovation is done outside your job or in your spare time

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
4. Organizational Support			
	Rewards (enablers)		
		Rewards and recognition that encourage intrinsic motivation	<ul style="list-style-type: none"> • Benefits or value realization • Recognition
		Recognition at all levels of the organization	
			<ul style="list-style-type: none"> • Breaking projects into smaller chunks
			<ul style="list-style-type: none"> • Measuring innovation
	Rewards (inhibitors)		
		Rewards not part of the system	<ul style="list-style-type: none"> • Missed recognition and rewards
			<ul style="list-style-type: none"> • How teams are measured

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
5. Organizational Integration and Extension			
	Organizational Integration (enabling)		
		Idea exchange and knowledge creation dynamics are prevalent (SECI model)	<ul style="list-style-type: none"> • Knowledge sharing • Common knowledge • Organizational learning
		Good mix of adaptors and creators	<ul style="list-style-type: none"> • Let does be does and thinkers be thinkers
		Specialization with flexibility	<ul style="list-style-type: none"> • Wearing multiple hats
		Multi-tasking	<ul style="list-style-type: none"> • Job rotation
		Cross-functional cooperation	<ul style="list-style-type: none"> • Collaboration • Positive member exchange
		Mission clarity	<ul style="list-style-type: none"> • Mission clarity
		Project planning	

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
5. Organizational Integration and Extension			
	Organizational Integration (enabling)		
		Functional support systems	
		Project tracking	<ul style="list-style-type: none"> • Feedback mechanism during project execution
		Cross functional support	<ul style="list-style-type: none"> • Positive interpersonal exchange • Top management support
			<ul style="list-style-type: none"> • Understanding and collaborating with the business
			<ul style="list-style-type: none"> • Social collaboration
			<ul style="list-style-type: none"> • Soft networks

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
5. Organizational Integration and Extension			
	Organizational Integration (inhibitors)		
		Confusion for accountability and communication	<ul style="list-style-type: none"> • Difficult cross discipline dialogue • Disparate storage of explicit knowledge • Lack of knowledge share within the organization • Matrix organization • Operational silos
		Constraints on organizational learning	<ul style="list-style-type: none"> • Understanding the business
		Constraints on personal development	<ul style="list-style-type: none"> • Overspecialization
		Loosing sight of the big picture	<ul style="list-style-type: none"> • Loosing site of the big picture
			<ul style="list-style-type: none"> • Global working

Findings

Creative Climate Typology Level 1	Creative Climate Typology Level 2	Creative Climate Typology Level 3 (descriptive meanings from the literature)	Creative Climate Typology Level 4 (descriptive meanings from the case study)
5. Organizational Integration and Extension			
	Risk taking (enablers)		
		Acceptance to take a gamble	<ul style="list-style-type: none"> Acceptance to risk and failure
		Experimentation	<ul style="list-style-type: none"> Fail fast and fail small
		Prompt decision making	
		Opportunity seeking	<ul style="list-style-type: none"> Belief that innovation opens doors
			<ul style="list-style-type: none"> Risk management
		Flexibility	<ul style="list-style-type: none"> Flexibility
	Risk taking (inhibitors)		
		Overly cautious	<ul style="list-style-type: none"> Risk adverse culture Staying in comfort zone
		Paralysis by over analysis	
		Hesitant mentally	<ul style="list-style-type: none"> Fear of failure
		Indecisive	

Contact

Michael Meighu

Program Member DBA (Doctorate in Business
Administration)

University of Manchester

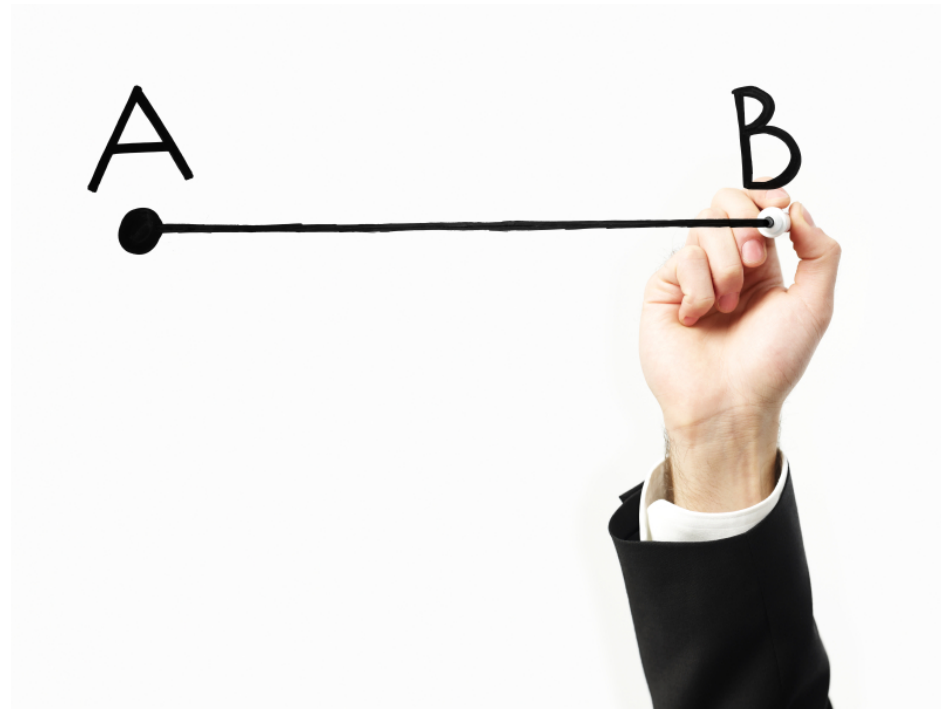
email: michael.meighu@postgrad.manchester.ac.uk

phone: +1 347 596 4848

APPENDIX B – Interview Strategy and Semi-Structured Interview guidelines

Interviews XXXX Informatics

- Mike Meighu
- DBA Candidate



Agenda

1. Key aims / What are we trying to achieve?
2. Inductive or deductive approach?
3. Semi Structured Interviews
 - Literature Review
 - Theoretical Sampling
 - Discussion with colleagues
4. Grounded Theory
5. Outputs and deliverables for XXXX
6. Interview Strategy
7. Timelines

What are we trying to achieve in this phase?

1. In this phase we are doing an analysis in order to know how to improve innovation at XXXX within the informatics group
2. We are doing this by data gathering, and then using Template Analysis to analyze the data



Inductive or deductive approach

1. Qualitative or an inductive approach is about placing an emphasis on the interviewees perspectives. It is about understanding with rich data how XXXX folks frames and understands issues and events. This will be done by semi structured interviewing
2. By contrast, quantitative or deductive approach is about placing an emphasis on how the analyst sees the world. This will usually be in the forms of surveys etc. This is used to test the analyst perspectives
3. We will be using an inductive approach, i.e. built relationships and dynamics from the data. We may use some surveying later on to double check or test relationships that we may find

Semi structured interviewing

1. Semi structured interviewing is a technique used to gather rich and documented data around specific issues. The analyst has a limited set of questions on topics to be covered – but allows the interview to be flexible to explore concepts etc.
2. We are using this because
 1. The data needs to be analyzed
 2. Guides interviewees on specific themes
 3. We want to compare attitudes on the various layers
 4. We want to identify barriers and enablers
 5. You may decided to expand the data collection to other parts of the business and so do some case study analysis
3. Two key concepts: Interview guide + theoretical sampling

What are the deliverables to XXXX

The specific deliverables to XXXX for this phase will be:

1. Analysis of all the interviews / rich data. This can be useful for any further work internal to XXXX, setting objectives and so on

Interview Guide

Its important to see this guide as a living set of criteria. As interviews progress they may be novel issues etc., that we may want to explore on that is not in our line of vision. The guideline for the interviews are:

1. Structuring: gives purpose for interview, rounds it off, ask if the interviewee has questions
2. Clear: asks clear questions, no jargon, and in a language understood
3. Gentle: let people finish, gives time to think. Pauses
4. Sensitive: Listen attentively to what is said and how it is said.
5. Open: responds to what is important to the interviewee
6. Steering: knows what we want to find out
7. Critical: be ok to challenge what is being said in cases of inconsistencies
8. Interpreting: Clarifies meaning without imposing meaning

Interview Guide – types of questions

The types of questions that would be asked will always take the shape of:

1. Introducing questions: “Please tell me about.....”
2. Follow up questions: “Could you say something more about”
3. Probing questions: Following up with a topic through direct questioning
4. Specifying questions: “What did you do then?”
5. Direct questions: “Do you find that XYZ”
6. Indirect questions: “What do you think most people think of.....?”
7. Interpreting questions: “Do you mean that innovation is?”

Interview Guide – current questions guide

It is important to remember that these can be reviewed with progress, and is a product of several factors including the subject matter, what we are trying to data gather, and intelligence coming from the field.

Phase (1) Innovation as a concept and its relevance within XXXX...

- 1) Introduction on yourself and role. Typologies..
- 2) (interpretation) Please tell me about your understanding of what innovation is.. What does this mean to you?
- 3) Is it important to your job and to you as an individual? If so, how so?
- 4) How do you measure innovation. Do you have one single value? Or can you run several values in mind. If you can, what would be the most important values you described?
 - 1) how do you think we achieve innovation
 - 2) Do you see innovation before or after the budget has been set?

Interview Guide – current questions guide

Phase (2) Examples of innovation at XXXX (can invert question)

- 1) Reaching out into your context, what would you say are some of the issues for the innovative climate to yourself and your team?
 - 1) How do you see us accelerating innovation? What are some of the main components for a good innovative climate?
 - 2) How do you see us accelerate diversity of thinking, organizational learning, and challenging different views...? What stopping us from doing that?
 - 2) What are you currently doing?
 - 3) What are your main concerns about the situation?
 - 4) What worries you most about our innovation objectives?
-
- 2) Reaching out into your context, what would you say are some of the good things for the innovative climate to yourself and your team?
 - 3) Are there some tools that you have developed within your team?

Note: During the interview this would be expanded on and discussed in more detail

Interview Guide – current questions guide

Phase (2) Examples of innovation at XXXX

8) Specifically, what would you see as barriers to innovation at XXXX Informatics. Name 5

9) Specifically, what would you see as enablers to innovation at XXXX Informatics
Name 5

Note: We would expect to ask more follow up and probing questions around these answers

Questions around creativity and idea generation..

Matrix structure, over familiarization and over specialization

Where do you see your role within a creative and innovative team? Thinker / doer / completer etc.

What do you think makes a creative climate

what other roles have you had

Interview Guide – current questions guide

Phase (3) Specific subject matter questions (direct questions)

“Lets expand a little on these concepts. I wanted to get your view on it, and what role you see these dynamics at play, and whether or not they contribute to innovation”

- 1) Challenge / Involvement
 - How is the brainstorming experience?
 - Is it more of a “quick consensus” meeting or a challenge meeting?
- 2) Diversity of ideas
- 3) Freedom
- 4) Trust and openness
- 5) Idea Time
- 6) Playfulness and Humour
- 7) Conflict
- 8) Idea Support
- 9) Debate
- 10) Risk Taking
- 11) Knowledge Sharing
- 12) Socializing

Interview Guide – current questions guide

Phase (4) Closing Questions

1) If you were advising the organization on this subject, what would be the main change or improvement that you would recommend?

Interview Sample Strategy

We will be using a “stratified” interview sample approach, which simply means its not “randomized”. The reason for this is that we want to gain an impression of views at different levels of the organization, and in addition across the various functions.

	Number of people	Level
Head (XXX XXX)	1	1
Global Area Heads	6	2
Team Managers	10	3
Leads / Solution Business Managers / Analyst	25	4
TOTAL	42	

Next steps

1. Finalize target list with invitations.
2. Introduction email to be done via XXXX or XXXX
3. Finalize logistics for dates July 12th to July 27th in XXXX
 1. Booking of video conferencing rooms
 2. Calendars etc.
4. Deliverables: mid Sept

APPENDIX C – Raw organizational climate nodes NVivo

Name	Sources	References
Organisational Creative Climate typology for Case Study IS	29	1402
Integrative - NEW	26	143
Concept	25	89
Incubation	18	41
Innovation culture and climate	11	22
Innovation eco-system	0	0
Innovation throughput	0	0
Knowledge Spiral	1	1
Something new and something valuable	19	23
Understanding of the granularity of Innovation	2	2
Constraints	17	45
Business resistance to change	5	7
Informatics resistance to change	0	0
Innovation seen as distinct from day to day	3	3
Lack of Innovative culture or environment	0	0
Lack of innovative environment	2	2
Legacy organizational culture	7	14
long cycle times	3	5
Paralysis	0	0
Pharma industry standards is old technologies	1	1
Reactive Mindset	1	4
Regulated environment	5	6
Thinking innovation is just a shinny object	3	3
Enablers	6	9
Belief from the business that IT is moving in the right direction	1	1
Fail small and fail fast	2	2
Simple Innovation	2	2
SSF Innovation culture	3	4
Leadership Influence and Direction - Group	26	207
Mission Clarity - Extant	24	106
Concepts	14	34
Idea Time	10	19
Innovation expectations	3	3
Planning Horizon	3	3
Private time	1	1
Seeing the big picture	6	8
Constraints	20	68
Architects consumed with non-value functions	1	1
Keeping the lights on	14	29
Lack of idea time	12	19
Lack of planning horizon	2	2
Loose sight of big picture	8	14
Old paradigms knowledge base	1	1
Too much change	2	2
Enablers	2	3
Challenging both the business and IT with common objectives	1	2
High Level pictures and Communications	1	1
Participation - Extant	14	28
Concepts	9	18
Co-location	1	2
Commitment	2	2
Curiosity	1	1
Motivation	6	11
Personal Responsibility	2	2

Constraints	7	7
Distance	6	6
Face time	0	0
Initial lack of business participation so IT innovates by itself	1	1
Enablers	3	3
End user interviews	0	0
Ownership of innovation	2	2
Proximity to Silicon Valley	1	1
Positive Supervisor Relations - Extant	21	73
Concepts	0	0
Management being good role model	1	1
Recognition	4	7
Support	4	7
Trenches together	4	4
Constraints	17	48
Can't step back	1	2
Keeping the lights on	14	29
Lack of bandwidth of users to assess innovative change thinking	2	3
Lack of focus	1	1
Negative manner in which innovative ideas are discarded	1	1
Operationalising Pressure	8	12
Enablers	3	4
Management Support	3	3
Trust and Openness - Extant	10	21
Concepts	9	15
External organizational views	1	1
Physical Exchanges	1	1
Trust	8	13
Constraints	3	4
Lack of Trust	3	4
Enablers	0	0
Organization Integration and Extension - Organization	26	204
Flexibility and Risk Taking - Extant	19	66
Concepts	14	36
Acceptance to risk and failure	4	5
Belief that innovation opens doors	1	2
Fail small and fail fast	3	7
Failure	1	2
Flexibility	2	4
Risk Management	12	15
Stop failures more easily	1	1
Constaints	14	28
Blaming culture for failure	1	1
Conservative Culture and environment	1	1
Fear	1	1
Fear of failure	4	9
Risk Adverse Culture	6	11
Risk of choosing wrong technology component	1	1
Company Risk Adverse Culture	1	1
staying in comfort zone	2	3
Enablers	1	1
San Francisco Risk Tolerance Culture	1	1
Organisational Integration - Extant	25	138
Concepts	18	57
Core Business is VERY INNOVATIVE	1	1

Knowledge Sharing	4	4
Middle or common knowledge	3	5
Musical chairs	4	7
Openess for Innovation to business functions	2	3
Organisational learning	9	16
Efficiency	1	1
Social Collaboration	3	3
Soft networks	9	13
Subject Matter Expertise	3	3
Wearing multiple hats	2	2
Constraints	19	57
Difficult cross discipline dialogue	3	5
Dispirate storage of explicit knowledge	2	2
Distinct legacy cultures	2	2
Don't know who knows	1	1
Global working	2	2
Instinctive Resistance to helping	1	1
Lack of External organizational views	2	2
Lack of knowledge share outside of organization	2	2
Lack of knowledge share within organization	2	2
Loss of opportunity	1	1
Matrix Organisation	2	2
Not proposing ideas because of feeling of rejection of ideas	1	1
Operational silos	9	13
Lack of interest in enterprise type innovation initiatives	1	1
Over Specialisation	7	10
Poor Collaboration between Architects and Business	2	2
Understanding the business	7	9
Enablers	8	24
Collaboration with business	3	4
Early IT involvement in project or idea exchanges	1	3
Legacy Culture	3	4
Inter-discipline problem identification discussion get togethers	1	3
Mixing organizational folks on projects	1	1
Social Connectors (People)	1	1
Soft networks	3	5
Understanding the business	2	2
Organizational Support - Organization	27	186
Resources - Extant	19	56
Concepts	5	6
Ability to attract creative people	1	1
resources to try things out	1	1
Team size	4	4
Constraints	4	4
Incubation Resources	3	3
Slowness to accept new technologies	1	1
Enablers	0	0
Idea Support - Extant	0	0
Concepts	6	7
Budget to play with ideas	1	1
Idea Management	5	6
Constraints	7	11
Idea Management	4	6
Disembodiment of ideas	0	0
Parking	0	0

Synergies	0	0
Lack of Idea Management	1	2
To rigid on embryotic ideas	3	3
Enablers	6	6
Incubation	6	6
Idea-time - Extant	16	44
Concept	10	20
Idea Time	10	19
Private time	1	1
Constraints	14	24
Architects consumed with non-value functions	1	1
Concept of scheduling creativity	1	1
Lack of idea time	12	19
Lack of incubation space	3	3
Reward Orientation - Extant	19	80
Concepts	15	53
Benefits or Value Realisation	10	16
Breaking projects into smaller chunks	1	1
Changing how we measure success	1	3
Job satisfaction	3	3
Measuring Innovation	10	22
Exciting the team, business, and end users	8	13
Face to Face Surveys	1	1
Improvements	2	2
Propositions to business	3	3
Repetition	1	1
Usability	2	2
Recognition	4	7
Social Capital	1	1
Constraints	14	26
How current Innovation is measured	1	1
How we are measured	12	23
Lack of innovation index	1	1
Missed recognition and rewards	1	1
Enablers	0	0
Top Management Support - Extant	20	50
Concepts	10	20
Management being good role model	1	1
Management Commitment	4	5
Openess of management	3	3
Support	4	7
Trenches together	4	4
Constraints	15	27
All talk but no innovation track record	4	6
Delta between business sponsors and the ground force	3	4
Equating efficiency to headcount reduction	2	3
Hierarchy	3	3
Lack of clear budget for innovation	2	2
Lack of committed bandwidth - almost an expectation to be innovative in your spare	1	2
Management Innovation Vision	1	1
Openness of Management to discuss change when project is in progress	1	1
Premature high level decisions	1	1
Top down standardisation	4	4
Enablers	3	3
Upper Management Commitment	3	3

Other	6	8
Big IT systems	2	3
Current value gaining objectives	0	0
Frustration	0	0
Lack of priority on support systems	1	1
Lack on Combinational thinking on current assets	1	1
Outward looking culture of architects	1	1
Paralization	0	0
Perception of the dominance of idea time	0	0
Too much change	2	2
Positive Member Exchange	26	377
Intellectual Stimulation - Extant	26	175
Concepts	25	147
Architechs on top of the technology world	1	1
Collaboration	13	24
Knowing who to know	1	1
Combinational thinking	14	27
Compeition among teams	1	1
Disruption	4	6
Diversity	14	18
Diverse Incubation Resources	1	1
Edge of the box thinking	9	14
Face time	6	8
Group Ideation	12	15
Idea Disembodiment	1	1
Knowledge Sharing	1	1
Personal Learning	2	2
Re-use	1	1
Tacit knowledge exchange	16	28
Constraints	11	18
Architects not up to date with latest technologies	1	1
Grouphink	4	5
IT resistance to be thinkers	0	0
Lack of Diversity in Team	3	3
Lack of knowledge share within organization	2	2
Lack on Combinational thinking on current assets	1	1
Poor Collaboration between Architects and Business	2	2
Poor Collaboration with the business	3	3
When business walks with a firm solution in mind	1	1
Enablers	6	10
Attempting to be future proof	1	1
Collaboration	3	3
San Francisco folks staying on top of the technology world	1	1
Knowledge Sharing	3	3
Tacit knowledge	2	2
Positive Interpersonal Exchange - Extant	11	18
Concepts	6	12
Informal environment	3	3
Open thinking	4	5
Socialisation	2	2
Constraints	5	5
Fear to raise your hand	4	4
Power Structure and Struggles	1	1
Enablers	0	0
Positive Peer Group - Extant	26	184

Concepts	24	102
A team with Conviction	2	2
Collaboration	13	24
Knowing who to know	1	1
Common Group Goals	1	1
Conflict	6	9
Conflict Resolution	1	1
Creative Conflict	5	8
Diversity	14	18
Diverse Incubation Resources	1	1
Have cross discipline challenging and idea exchange	1	1
Face time - interaction frequency	6	8
Honesty about failures	1	1
Intra-team advice	1	1
Let doers be doers and thinkers be thinkers	7	10
Measuring Innovation	0	0
Exciting the team, business, and end users	8	13
Face to Face Surveys	1	1
Improvements	2	2
Propositions to business	3	3
Repetition	1	1
Usability	2	2
On-going communications	1	1
Open Minded	1	1
Personal respect	1	1
Recognition	4	7
Reflexivity	8	15
Social Capital	1	1
Constraints	18	44
Business frustration	3	4
Can't step back	1	2
Closed Culture	4	6
Feeling of being disconnected from the various team members	0	0
Lack of bandwidth of users to assess innovative change thinking	2	3
Lack of Openness	2	3
Negative manner in which innovative ideas are discarded	1	1
Premature blocking by other departments before exploring idea	1	1
Resistance to change	2	2
Under-capacity to digest and leverage Innovation from business	0	0
Unidirectional Requirements Gathering	4	9
Wall Thinking	9	13
Enablers	7	8
Engagement of ideas with stakeholders rather than imposing - Participation in deci	1	1
Fluidity and movement of people	1	1
Innovation Champions	1	1
Open Culture	5	5
Playfullness and humour - Extant	10	11
Concept	10	11
Fun Environment	10	11
Constraints	0	0
Enablers	0	0
Motivation	0	0
Trust and Openness - Extant	10	19
Concepts	9	14
External organizational views	1	1

Trust	8	13
Constraints	2	3
Lack of Trust	2	3
Enablers	0	0
Product Emphasis - Extant	15	47
Concepts	12	32
Business Interests	0	0
Competition of offerings to customers	2	3
Culture that innovation is important to patient	1	1
End User Focus	2	3
Focus	2	3
Innovation to critical core business	0	0
Innovative business change	2	2
Requirements Development	1	1
Solid requirements set	1	1
Tying innovation to the patient	1	1
Understanding innovation drivers to the business	1	1
Understanding the business	5	8
Uptake from User Community	1	1
Usability	3	5
User driven innovation	2	2
Constraints	7	8
Business sees IT as evolutionary not revolutionary	1	1
Changing requirements	1	1
Lack of knowledge on main project drivers	1	1
Lack of Usability testing	2	2
Managing a MESS	2	2
Users not at the centre of innovation	1	1
Enablers	6	7
End users embracing change	3	3
Usability	1	1
User Interviews	1	2
Virtual Environments	1	1
Project Management - NEW	23	72
Concepts	16	31
Baby steps Innovation	12	16
Cycle time reduction	1	1
Feedback mechanism during Project execution	2	4
Lean Environment	2	2
Pre-budget ideation	4	4
Simple Innovation	4	4
Constraints	17	36
Already framed projects	2	2
Annual Budget Process	2	2
Budget Restrictions and Portfolio Management	5	6
Delivery Focused	5	7
Delta between business innovation and IT delivery	1	2
How projects get started in the first place	1	1
Implementation Methodology	1	1
Insufficient idea time during project for challenges	1	1
No innovation feedback mechanism during Project Execution	1	1
Project Management Methodology	8	9
Project understimation - resources and time	1	2
Too much admin in IT processes	2	2
Enablers	4	5

Baby Step Innovation	2	3
Planning Horizons	1	1
Portfolio Management	1	1
Work Autonomy & Challenge	25	158
Autonomy or Freedom - Extant	24	108
Positive Concepts	19	58
Empowerment	1	1
Freedom	5	6
Incubation	18	41
Innovation clear decision making owner	3	5
Leaner Governance for small scale innovation	1	1
Small Core Team for decision making	2	4
Practical Constraints	16	48
Complex Processes	10	20
Decision makers outdated view of the world	2	3
Ivory Tower decision making	5	5
Methodology Addicts	4	5
Organizational regulations	6	10
Too many stakeholders for decision making	5	5
Practical Enablers	1	2
Autonomy	1	2
Challenges - Extant	16	50
Concepts	13	25
Challenging Culture within Informatics	1	1
Opportunity or business need	1	1
Ownership of Innovation	2	4
Reacting to change in the world	1	1
Contraints	9	19
Comfort Zones	1	2
Lack of challenge	1	1
Lack of Diversity in Team	3	3
Perception that Innovation is not possible	5	9
Thinking Innovation is only something big	2	3
When business walks with a firm solution in mind	1	1
Enablers	3	5
Challenging the Business	1	2
Challenging within IT	1	1
Job rotation	2	2

APPENDIX D – Identified case-study relationships NVivo

From Name	Type	To Name
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Closed Culture
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea Support - Extant\Concepts\Idea Management
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Enablers\Portfolio Management
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Understanding the business
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Risk Management
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Lack of External views

Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Requirements Development
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk of choosing wrong technology component
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Difficult cross discipline dialogue
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Solid requirements set
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Fail small and fail fast
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate	Associated	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning\Efficiency
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Concepts\Ability to attract creative people
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Job satisfaction

Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Business resistance to change	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Innovation seen as distinct from day to day	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Innovation seen as distinct from day to day	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Lack of innovative environment	Impacts	Organisational Creative Climate typology for Case Study IS\Other\Perception of the dominance of idea time
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Legacy Case Study Culture	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Lack of Openness
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\long cycle times	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\long cycle times	Impacts	Organisational Creative Climate typology for Case Study IS\Other\Frustration
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\long cycle times	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Constraints\Perception that Innovation is not possible
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\long cycle times	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Constraints\Changing requirements
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\long cycle times	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Business frustration
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\long cycle times	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Complex Processes
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\long cycle times	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Regulated environment	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Constraints\Perception that Innovation is not possible
Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Regulated environment	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture

Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Regulated environment	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Constraints\IT resistance to be thinkers
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Idea Time	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Planning Horizon	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Planning Horizon	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Private time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Seeing the big picture	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Seeing the big picture	Associated	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust

Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Seeing the big picture	Associated	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Architects consumed with non-value functions	Mutual	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Architects consumed with non-value functions	Mutual	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Can't step back
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of planning horizon
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Can't step back
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Instinctive Resistance to helping
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity

Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Wall Thinking
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Lack of focus
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of planning horizon	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Enablers\Ownership of innovation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Enablers\Challenging both the business and IT with common objectives	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Enablers\Challenging both the business and IT with common objectives	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate

Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Enablers\Challenging both the business and IT with common objectives	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Concepts\Open thinking
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Enablers\Challenging both the business and IT with common objectives	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Co-location	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Constraints\Distance
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Co-location	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Co-location	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Co-location	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Commitment	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation throughput
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Idea Time
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Idea Time
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Personal Responsibility	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Constraints\Distance	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Constraints\Distance	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Constraints\Distance	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Constraints\Distance	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration

Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Enablers\Ownership of innovation	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Enablers\Collaboration
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Social Capital
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Concepts\Recognition	Dominant	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Social Capital
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Concepts\Support	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Can't step back	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Can't step back	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Can't step back
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time

Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of planning horizon
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Can't step back
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Instinctive Resistance to helping
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Lack of bandwidth of users to assess innovative change thinking	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Business resistance to change
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Negative manner in which innovative ideas are discarded	-ve Impact	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Operationalising Pressure	Associated	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Operationalising Pressure	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Operationalising Pressure	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Lack of idea time
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant

Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Lack of Openness
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Belief that innovation opens doors	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts\Opportunity or business need
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Fail small and fail fast	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Failure	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Flexibility	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Risk Management	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Risk Management	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Risk Management	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Fear of failure	Associated	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Not proposing ideas because of feeling of rejection of ideas

Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Fear of failure	-ve Impact	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Playfulness and humour - Extant\Concept\Fun Environment
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture	Mutual	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Fear of failure
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Playfulness and humour - Extant\Enablers\Motivation
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\staying in comfort zone	Mutual	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\staying in comfort zone	Mutual	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\staying in comfort zone	Mutual	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant	+ve Impact	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant	+ve Impact	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Disruption
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning

Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Empowerment
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning\Efficiency
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Wall Thinking
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Over Specialisation
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Openness for Innovation to business functions	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning	Associated	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Personal Learning

Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation throughput
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Social Collaboration	Mutual	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Social Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Social Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Idea Disembodiment
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks	Mutual	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Social Collaboration
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Enablers\Open Culture
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Difficult cross discipline dialogue

Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks	+ve Impact	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks	Counteracts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Don't know who knows
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Subject Matter Expertise	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Decision makers outdated view of the world
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Subject Matter Expertise	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Wearing multiple hats	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Wearing multiple hats	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Concepts\Ability to attract creative people
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Wearing multiple hats	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Seeing the big picture
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Wearing multiple hats	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Soft networks
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Matrix Organisation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Matrix Organisation	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Matrix Organisation	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate

Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Matrix Organisation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Informatics resistance to change
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Business resistance to change
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity\Diverse Incubation Resources
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Understanding the business
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Musical chairs
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity\Diverse Incubation Resources
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Over Specialisation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Middle or common knowledge
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Over Specialisation	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Seeing the big picture

Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Over Specialisation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Feeling of being disconnected from the various team members
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Poor Collaboration between Architects and Business	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Understanding the business
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Poor Collaboration between Architects and Business	Counteracts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Enablers\Collaboration with business	Counteracts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Enablers\Early IT involvement in project or idea exchanges	+ve Impact	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Enablers\Early IT involvement in project or idea exchanges	+ve Impact	Organisational Creative Climate typology for Case Study IS\Project Management - NEW
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Enablers\Early IT involvement in project or idea exchanges	+ve Impact	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Enablers\Soft networks	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Enablers\Soft networks	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Enablers\Ownership of innovation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Concepts\Team size	Mutual	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Concepts\Team size	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate

Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Concepts\Team size	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Constraints\Groupthink
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Constraints\Incubation Resources	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea Support - Extant\Concepts\Idea Management	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea Support - Extant\Enablers\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk of choosing wrong technology component
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Constraints\IT resistance to be thinkers
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Idea Time	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Idea Time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Private time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation

Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Architects consumed with non-value functions	Mutual	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Architects consumed with non-value functions	Mutual	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Wall Thinking
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Lack of focus
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Constraints\Lack of idea time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity

Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Resistance to change
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Constraints\Perception that Innovation is not possible
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Breaking projects into smaller chunks	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Fail small and fail fast
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Breaking projects into smaller chunks	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts\Reacting to change in the world
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Breaking projects into smaller chunks	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Constraints\Lack of credibility in innovation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Breaking projects into smaller chunks	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\long cycle times
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Breaking projects into smaller chunks	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Measuring Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Social Capital
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate

Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Recognition	Dominant	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Social Capital
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Social Capital	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Constraints\How we are measured	Mutual	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Constraints\Hierarchy
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Constraints\How we are measured	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Constraints\How we are measured	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Constraints\How we are measured	Impacts	Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Feedback mechanism during Project execution
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Constraints\How we are measured	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Constraints\How we are measured	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Concepts\Management Commitment	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Can't step back

Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Concepts\Management Commitment	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Fail small and fail fast
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Concepts\Management Commitment	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Can't step back
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Concepts\Management Commitment	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Concepts\Openness of management	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Concepts\Openness of management	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Concepts\Support	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Constraints\Equating efficiency to headcount reduction	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Resistance to change
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Constraints\Lack of clear budget for innovation	-ve Impact	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Constraints\Lack of credibility in innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Constraints\Lack of incubation space	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Constraints\Premature high level decisions
Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Constraints\Top down standardisation	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Other\Big IT systems	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Business frustration

Organisational Creative Climate typology for Case Study IS\Other\Big IT systems	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Top Management Support - Extant\Constraints\Lack of credibility in innovation
Organisational Creative Climate typology for Case Study IS\Other\Lack of priority on support systems	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Keeping the lights on
Organisational Creative Climate typology for Case Study IS\Other\Lack of priority on support systems	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Keeping the lights on
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Architechs on top of the technology world	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Architechs on top of the technology world	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Knowledge Spiral
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Global working
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration	+ve Impact	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Distinct legacy cultures
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Conflict\Conflict Resolution
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Compeition among teams	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Disruption	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning

Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Disruption	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Disruption	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity	Associated	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity	Associated	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity\Diverse Incubation Resources	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking	Mutual	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking	Mutual	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Disruption
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking	Mutual	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Combinational thinking

Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Face time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Face time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Face time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Face time	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Face time	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation	Mutual	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Idea Disembodiment	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Knowledge Sharing	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Knowledge Spiral
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Knowledge Sharing	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Personal Learning	Mutual	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation

Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Difficult cross discipline dialogue
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI	Mutual	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Middle or common knowledge
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Loss of opportunity
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Constraints\Architects not up to date with latest technologies	Mutual	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Old paradigms knowledge base
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Constraints\Poor Collaboration between Architects and Business	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Understanding the business
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Constraints\Poor Collaboration between Architects and Business	Counteracts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Concepts\Informal environment	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Concepts\Informal environment	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate

Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Concepts\Open thinking	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Concepts\Socialisation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Concepts\Socialisation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Constraints\Fear to raise your hand	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Constraints\Groupthink
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Constraints\Power Structure and Struggles	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Constraints\Power Structure and Struggles	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Lack of Openness
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Constraints\Power Structure and Struggles	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Constraints\Lack of Trust
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Constraints\Power Structure and Struggles	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant\Constraints\Power Structure and Struggles	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Constraints\Lack of Trust
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\A team with Conviction	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Global working
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation

Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration	+ve Impact	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Distinct legacy cultures
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Conflict\Conflict Resolution
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Conflict\Creative Conflict	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity	Associated	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity	Associated	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity\Diverse Incubation Resources	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Face time - interaction frequency	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Face time - interaction frequency	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Face time - interaction frequency	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration

Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Face time - interaction frequency	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Face time - interaction frequency	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Honesty about failures	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Honesty about failures	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Measuring Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Recognition	Dominant	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Social Capital
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Trust and Openness - Extant\Concepts\Trust
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Recognition	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Social Capital
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Social Capital	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Can't step back	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture

Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Can't step back	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Lack of bandwidth of users to assess innovative change thinking	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Business resistance to change
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Lack of Openness	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Lack of Openness	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Negative manner in which innovative ideas are discarded	-ve Impact	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Combinational thinking
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Understanding the business
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Diversity

Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	-ve Impact	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Diversity
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Unidirectional Requirements Gathering	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Wall Thinking	Dominant	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Wall Thinking	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Wall Thinking	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Over Specialisation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Enablers\Fluidity and movement of people	Associated	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Knowledge Sharing
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Enablers\Fluidity and movement of people	Associated	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Enablers\Tacit knowledge
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Playfullness and humour - Extant\Concept\Fun Environment	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant	Mutual	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Interpersonal Exchange - Extant
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation

Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Trust and Openness - Extant\Concepts\Trust	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Lack of Openness
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Competition of offerings to customers	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Focus
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Focus	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea-time - Extant\Concept\Idea Time
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Focus	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Idea Time
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Innovative business change	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Understanding the business	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Understanding the business	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Usability	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Business Interests
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Usability	Mutual	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Usability	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Usability	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Uptake from User Community
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Constraints\Lack of knowledge on main project drivers	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Reflexivity
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Constraints\Lack of knowledge on main project drivers	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Constraints\Loose sight of big picture

Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Enablers\User Interviews	+ve Impact	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Enablers\Collaboration with business
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Enablers\Virtual Environments	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Enablers\Virtual Environments	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Incubation
Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Enablers\Virtual Environments	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Competition of offerings to customers
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Fail small and fail fast
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation throughput
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Constraints\Perception that Innovation is not possible
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Usability
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation

Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Baby steps Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Pre-budget ideation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Simple Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Simple Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Concepts\Simple Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Constraints\Perception that Innovation is not possible
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Constraints\Already framed projects	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Constraints\Annual Budget Process	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Constraints\Annual Budget Process	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Constraints\Annual Budget Process	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Operationalising Pressure
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Constraints\Delivery Focused	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Constraints\Delivery Focused	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Operational silos
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Constraints\Project Management Methodology	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Constraints\Project understimation - resources and time	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Operationalising Pressure

Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Enablers\Portfolio Management	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Lack of bandwidth of users to assess innovative change thinking
Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Enablers\Portfolio Management	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Positive Supervisor Relations - Extant\Constraints\Lack of bandwidth of users to assess innovative change thinking
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Freedom	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Closed Culture
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Benefits or Value Realisation
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Project Management - NEW\Enablers\Portfolio Management
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea Support - Extant\Concepts\Idea Management
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Understanding the business
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Risk Management

Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Reward Orientation - Extant\Concepts\Measuring Innovation\Exciting the team, business, and end users
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\SECI
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Lack of External views
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Requirements Development
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk of choosing wrong technology component
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Difficult cross discipline dialogue
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Edge of the box thinking
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Concepts\Solid requirements set
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Concepts\Fail small and fail fast
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Incubation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Concepts\Collaboration
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Positive Concepts\Innovation clear decision making owner	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Case study regulations	Impacts	Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Constraints\Perception that Innovation is not possible
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Case study regulations	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture

Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Case study regulations	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\long cycle times
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Complex Processes	Impacts	Organisational Creative Climate typology for Case Study IS\Organizational Support - Organization\Resources - Extant\Idea Support - Extant\Constraints\To rigid on embryotic ideas
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Complex Processes	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Constraints\Feeling of being disconnected from the various team members
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Complex Processes	-ve Impact	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Ivory Tower decision making	Impacts	Organisational Creative Climate typology for Case Study IS\Product Emphasis - Extant\Constraints\Lack of Usability testing
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Ivory Tower decision making	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Constraints\Understanding the business
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Methodology Addicts	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Personal Responsibility
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Too many stakeholders for decision making	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Constraints\Groupthink
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Too many stakeholders for decision making	Impacts	Organisational Creative Climate typology for Case Study IS\Other\Paralization
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Autonomy or Freedom - Extant\Practical Constraints\Too many stakeholders for decision making	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Constraints\Paralysis
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Participation - Extant\Concepts\Motivation
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts	Associated	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate

Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts\Opportunity or business need	Impacts	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts\Ownership of Innovation	Impacts	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Positive Peer Group - Extant\Playfulness and humour - Extant\Enablers\Motivation
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts\Ownership of Innovation	Mutual	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Concepts\Ownership of Innovation	+ve Impact	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation throughput
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Constraints\Comfort Zones	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Flexibility and Risk Taking - Extant\Constraints\Risk Adverse Culture
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Enablers\Challenging the Business	+ve Impact	Organisational Creative Climate typology for Case Study IS\Integrative - NEW\Concept\Innovation culture and climate
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Enablers\Challenging within IT	+ve Impact	Organisational Creative Climate typology for Case Study IS\Positive Member Exchange\Intellectual Stimulation - Extant\Concepts\Group Ideation
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Enablers\Job rotation	Impacts	Organisational Creative Climate typology for Case Study IS\Organization Integration and Extension - Organization\Organisational Integration - Extant\Concepts\Organisational learning
Organisational Creative Climate typology for Case Study IS\Work Autonomy & Challenge\Challenges - Extant\Enablers\Job rotation	Impacts	Organisational Creative Climate typology for Case Study IS\Leadership Influence and Direction - Group\Mission Clarity - Extant\Concepts\Seeing the big picture