

IT Leadership in Transition

The Impact of Digitalization on Finnish Organizations

Jari Collin, Kari Hiekkanen,
Janne J. Korhonen, Marco Halén,
Timo Itälä, Mika Helenius (Eds.)



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Preface

IT leadership is currently undergoing major changes, as digitalization of products and services is transforming traditional business models across industries. IT is no longer merely an internal corporate function that provides services for the organization's employees only, but IT services are becoming embedded into sellable products and services, too. The first implications of this dualistic IT role have come about in Finnish information-intensive organizations during our ACIO research program.

The ACIO research program (Adaptive and Complex Informatics Organizations) has been an interesting and fascinating journey for all of us. It started already in 2011, when Mika Helenius and Kari Hiekkanen activated discussions with Tekes and the Finnish industries on business and information system engineering. Altogether 16 industry and public organizations decided to join the research. In April 2012, the research program was kicked-off. In those days, both Marco Halén and the undersigned were working as CIOs in two of the stakeholder companies. A few months after the kick-off, Janne J. Korhonen and Timo Itälä joined the research team.

First, we would like to thank Tekes and all the stakeholder organizations to make the ACIO research possible. We are especially grateful to the case-study organizations for enabling deep analysis on the concurrent changes in IT leadership. The “god father” of our research, prof. Heikki Saikkonen, gave us valuable guidance and support throughout the research. Likewise, we are thankful for the collaboration with a number of people at the departments of Computer Science, Industrial Management, and Aalto Pro, as well as with the visiting professors Jerry Luftman and Eng Chew. Special thanks belong to Mr. Raimo Mäenpää, who was the chairman of ACIO steering group and actively guided the research with his professionalism and long experience in IT leadership.

This research report demonstrates the level of excitement in the ACIO program to explore new insights into and understanding of IT leadership in Finnish information-intensive organizations. It also shows how the digitalization has a concrete impact on IT and how quickly the changes are taking place.

Helsinki, the 11th of June, 2015

On the behalf of the whole team,

Prof. Jari Collin, Head of ACIO Research

Contents

Introduction	5
Jari Collin, Aalto University	
Digital Organizations of the Future.....	13
Eng K. Chew, University of Technology Sydney	
Digitalization and Dualistic IT	29
Jari Collin, Aalto University	
IT in Enterprise Transformation	35
Janne J. Korhonen, Aalto University	
Strategic Alignment and Internal IT	44
Kari Hiekkänen, Aalto University	
Digital Business and Platforms	50
Timo Itälä, Aalto University	
The Changing Role of the CIO	58
Janne J. Korhonen, Aalto University	
IT Governance and Enterprise Architecture	67
Marco Halén, Aalto University	
Mega Data Centers – Key Infrastructure for Digitalization	78
Kari Hiekkänen, Aalto University	
Case Aalto University – Digital Transformation in Higher Education .	81
Pekka Kähköpuro, Aalto University	
Digitalization in Retail: The Impact on Competition	89
Raimo Mäenpää, SOK; Janne J. Korhonen, Aalto University	
Case Luottokunta:	
Example of Transformative Impact of Digitalization	103
Jussi Pekka Paasonen, Nets; Janne J. Korhonen, Aalto University	
Case RAY: Playing It Digital	109
Konsta Luhtala, RAY; Janne J. Korhonen, Aalto University	

Introduction

Prof. Jari Collin, Aalto University

This research report summarizes key findings and conclusions of the ACIO research program that was conducted in 2012–2015 with a number of Finnish information-intensive organizations. The report is a follow-on to the document “TEKES-loppuraportti: ACIO tutkimusprojekti” that included the preliminary research results based on the program’s first phase and was delivered to Tekes (the Finnish Funding Agency for Innovation) in fall 2014.

This report presents the final results of the research program’s phases 1 and 2. The motivation for ACIO research was Finnish industries’ interest in improving strategic competitiveness in business and information systems engineering. During the pre-study in 2010–2011, over 60 leading executive decision makers were interviewed to scope the strategic research agenda. In April 2012, the research program was kicked off together with 16 Finnish organizations. The research was funded by Tekes and the participant organizations. The name of the ACIO research project – Adaptive and Complex Informatics Organizations – is well deliberated, as it integrates information systems with strategic and operations management as well as with organizational development and leadership perspectives. The first two words, “Adaptive and Complex,” reflect the fact that today’s business strategy and operations have to react to and transform quickly on sudden, unexpected market changes. The word “Informatics” links systems thinking, information systems management, and information systems design theories to the research – studying how to design a system that delivers the right information, to the right person in the right place and time, in the right way. The word “Organizations” adds social and organizational transformation and development aspects into the work.

The ACIO research project was about studying how today’s information-intensive organizations in Finland utilize information technology in developing and managing critical business capabilities. Focus was on understanding and analyzing modern management approaches to make use of information systems for business process and of product/service development in digital transformation enabled by software based systems and business models. The participant organizations represented Finnish industry and public sectors that are dependent on real-time information management in customer service and operations.

The purpose of ACIO research was (1) to identify critical IT-enabled capabilities for managing complex service networks in an information intense organi-

zation and (2) to describe success factors to manage the design, implementation and use of the capabilities in digital service innovations. The research scope was limited to information-intense organizations in business environment characterized by:

- Management of complex service systems with many stakeholders
- Fast-changing business conditions; agile adaptation and transformation
- Significant business potential exists with service and operational innovations
- Need for bundled products and services, i.e. customer solutions
- Complex operations and operating environment

The research provided organizations and scholars with up-to-date insights into the latest development of business-IT alignment and IT governance practices. The research was a multi-discipline study integrating theories from information systems, operations management, organizational development, and strategic management.

ACIO can be considered as an inductive, new theory building research aiming at increasing the existing body of knowledge in the field. The study adopted constructive and design research strategies, based on multiple case studies. The research team that included six researchers and a number of thesis workers on temporary basis observed phenomena, recorded and classified facts in the case studies. Using inductive reasoning, the facts were generalized into a “construction/artifact” to be tested in larger scale. The research team used several data collection methods, such as surveys, case studies, interviews, workshops, and “insight” innovation process.

The ACIO research program was divided into following four Work Packages:

1. Beyond IT Alignment
2. Service Innovation
3. Mega Data Center Phenomenon
4. Leading Digital Transformation

The original research road map (see Figure 1) was presented around these work packages. In addition to the work packages, the ACIO program actively utilized other research instruments, such as the extensive BISE Pro professional education program on business and information systems engineering as well as a number of case studies as thesis works, to collect and analyze contemporary IT management practices in the stakeholder organizations. The ultimate goal was to create new insights into and understanding of Business and Information Systems Engineering (BISE) to improve competitiveness of Finnish society and industries.

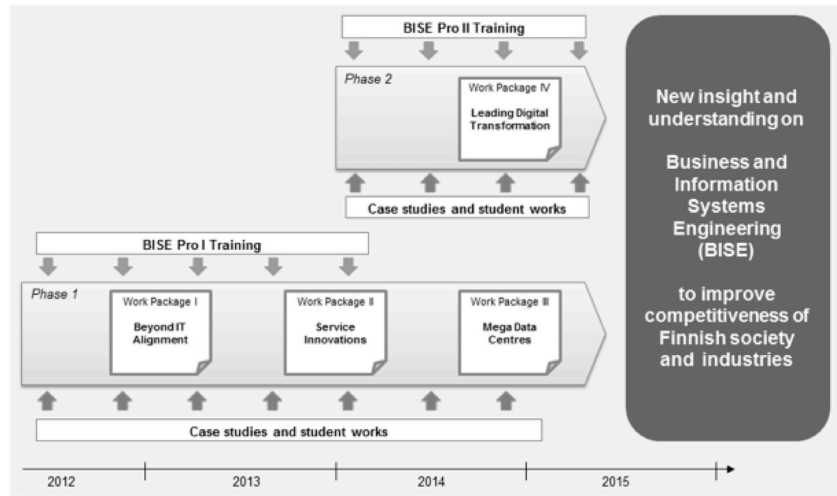


Figure 1. Road map for the ACIO research program.

Each work package of the ACIO research program had unique research questions and methods and came with its characteristic research process and methods. The contents of each work package are presented below.

Work Package I: Beyond IT Alignment

Work Package I focused on how the level of strategic alignment is impacted by IT governance practices and how it is linked with the role of IT in organizations. The research focused on business value of IT through improved IT decision-making, enterprise architecture, and portfolio management. The work considered the existing business IT alignment theories as a traditional approach in organizations and challenged the need for alignment thinking in the digitalized world of the future, where IT is an integral part of business processes and of the design of products and services.

The work package included a number of case studies and surveys among stakeholder organizations. Furthermore, via ACIO, Finnish organizations participated for the first time in the Society for Information Management's global IT Trend survey in 2013 and 2014.

In this book, Kari Hiekkanen's chapter on strategic alignment presents some of the results of this work package. The theme is also discussed in Marco Hallén's chapter on IT governance and enterprise architecture and in Pekka Kähkönen's case description of Aalto University.

Work Package II: Service Innovation

Work Package II concentrated on selected open innovation projects, where new digital services were developed in an agile way with Aalto students. A number of pre-defined assignments were given to the students to innovate new features and/or business models for products and services of the selected ACIO stakeholder organizations.

The work package utilized specific industry cases to study business value of open, networked innovation process and potential business models pertaining to new digital service innovations. The competence development of business and information system engineering played a central role in this work package. In this book, the themes of the work package are particularly addressed in the chapter on digitalization and dualistic IT by Jari Collin and in the chapter on digital business and platforms by Timo Itälä.

Work Package III: Mega Data Center

Work Package III was focused on understanding the strategic criteria behind mega data center investments in a Finnish case study. Digitalization of societies and business is driving explosive growth in data center services. The growth of data is coming from an ever-growing number of sources: interconnected sensors, scientific, medical and enterprise transactional data and digital entertainment, to name a few. Finland can be considered as an ideal place to host these data centers thanks to an advanced power infrastructure, cheap electricity, a stable operating environment, and a cool climate.

The results suggest that Finland has basic prerequisites in order to function as a data center hub, such as a stable operating environment and a redundant electricity grid. In order for Finland to become a global data center hub, the nation needs to invest in cable projects that would make Finland an intersection point of data traffic between Asia and Europe. In addition, Finland needs to make it self better-known in the data center industry.

In this book, Kari Hiekkanen's chapter on mega data centers discusses the theme in more depth.

Work Package IV: Leading Digital Transformation

Work Package IV constituted the main content of the research program's second phase. The theme of digital transformation had been pointed out several times by the program's steering group members as a topical and important aspect of IT leadership. The work package studied in detail how organizations can lead digital transformation by utilizing and enhancing IT-enabled organizational capabilities. The unit of analysis of this study was an organization in a networked environment. The focus was on understanding the required changes of digitalization in selected industries from IT and enterprise architecture viewpoints.

The work package demonstrated the dualistic role of IT in a digitalized world, where both business processes and products are becoming digital. Through case studies, digital transformation in organizations was elaborated from the IT perspective and IT-enabled, value-increasing organizational capabilities were identified. The work package also described the role of enterprise architecture and IT governance practices in leading the digital transformation.

The work package included several case studies. In this book, Janne J. Korhonen's chapter on the changing role of the CIO and co-authored case descriptions of retail industry (Raimo Mäenpää, SOK), Luottokunta/Nets (Jussi

Pekka Paasonen), and RAY (Konsta Luhtala) exhibit some results of the work package. The more conceptual chapters on IT's role in enterprise transformation (Janne J. Korhonen) and digital business and platforms (Timo Itälä) also pertain to the theme of the work package.

To create new insights into and understanding of key thematic areas related to the research, different viewpoints were analyzed across the work packages. The viewpoints were Business and Information Systems Engineering (BISE), Enterprise Architecture (EA), the role of CIO, and Portfolio Management (PM).

Business and Information Systems Engineering (BISE) has established itself as a distinct sub-discipline “between” business sciences and computer science in Europe. BISE is an applied science due to its close contact with practice and its design orientation. BISE draws on multiple research disciplines and paradigms in order to effectively address a wide range of system challenges. Three of the most important intellectual drivers of future IS research will be dealing with complexity, composition, and control. BISE Pro was an educational program that provided IT leaders, managers and other senior experts in production-oriented or service-oriented organizations with a platform for raising their IT management competencies to a new level. The program combined IT technology, business strategy, and change management into a coherent whole.

Enterprise Architecture (EA) is today's long term strategic capability for digital business models and operations. Digitalized business environment is complex and systems and applications are now interconnected using same data, information, and technology. In ACIO, we were interested in practice and value of strategic enterprise transformation using holistic engineering and management approaches such as EA.

The role of Chief Information Officer (CIO) is under rapid transition, as business and information systems have become indispensable as a core of business models and industrial transformation. In ACIO, we studied this transition in multiple large Finnish organizations pursuing innovation, improved in-house capabilities, and merger of business and IT into one.

Portfolio management (PM) is needed in modern enterprise transformation. In ACIO, we studied how companies use project portfolio management in digital transformation to align strategy in multiple business units, balance common business and information systems capabilities, and measure value in business information technology, systems development, and transformation projects.

Publications

The following publications were published during the research:

Journals, Book Chapters, and Periodicals

1. Hiekkänen K., Pekkala A., & Collin J. (Upcoming 2015). Improving strategic alignment: A case study. *Information Resource Management Journal*.
2. Nikayin F., de Reuver M., & Itälä T. (2013). Collective action for a common service platform for independent living services. *International Journal of Medical Informatics*, 82(10), 922-939.
3. Korhonen, J. J., & Poutanen, J. (2013). Tripartite approach to enterprise architecture. *Journal of Enterprise Architecture*, 9(1), 28-38.
4. Korhonen J. J., Hiekkänen K., & Mykkänen J. (2012). Information Security Governance. In M. Gupta, J. Walp, & R. Sharman (Eds.), *Strategic and Practical Approaches for Information Security Governance: Technologies and Applied Solutions* (pp. 53-66). IGI Global.
5. Korhonen, J. J., Melleri, I., Hiekkänen, K., & Helenius, M. (2012). Designing data governance structure: An organizational perspective. *The GSTF Journal of Computing*, 2(4).

Conferences and Other Publications

1. Ailisto, H., Mäntylä, M., Seppälä, T., Collin, J., Halén, M., Juhanko, J., Jurvansuu, M., Koivisto, R., Kortelainen, H., Simons, M., Tuominen, A., & Uusitalo, T. (2015). *Suomi – Teollisen Internetin Piilaakso*. Valtioneuvoston selvitys-ja tutkimustoiminnan julkaisusarja, 4/2015.
2. Korhonen, J. J., & Kaidalova, J. (2015). *Enterprise modeling facilitating business and IT alignment along the social dimension: Stakeholder intentions for model-based communication and coordination*. Workshop in Social Considerations in Business Informatics (SCBI) at the 17th IEEE Conference on Business Informatics (CBI 2015), 15 July, Lisbon, Portugal (Accepted).
3. Blomqvist, S., Halén, M., & Helenius, M. (2015). *Connecting enterprise architecture with strategic planning processes: Case study of a large Nordic finance organization*. The 17th IEEE Conference on Business Informatics (CBI 2015), 13–16 July, Lisbon, Portugal (Accepted).
4. Korhonen, J. J., & Page, I. (2015). There is more to intelligent business than business intelligence. Paper presented at the First International Workshop on Social Aspects in Business Intelligence and Technology (SABIT 2015), Nice, France, 24 March 2015.
5. Collin J., Halén, M., Helenius M., Hiekkänen K., Itälä T., & Korhonen, J. J. (2014) *IT Leadership in Finnish Organizations and Digital Transformation*, TEKES final report, 2014.

6. Halén M., Blomqvist S., & Helenius M. (2014). *Enterprise Architecture – Applied or Not*. Paper presented at the 10th European Conference of Management, Leadership and Governance (ECMLG 2014), Zagreb, Croatia, 13–14 November 2014.
7. Seppälä T., Collin, J., & Martikainen, O. (2014, September). Teollinen Internet: Yritysten tietojärjestelmäarkkitehtuurien on aika uudistua. ETLA report.
8. Korhonen J. J., & Molnar, W. (2014). Enterprise architecture as capability: Strategic application of competencies to govern enterprise transformation. Presented at 16th IEEE Conference on Business Informatics (CBI 2014), Geneva, Switzerland, 14–17 July 2014.
9. Molnar, W., & Korhonen, J. J. (2014). *Research Paradigms and Topics in Enterprise Engineering: Analysis of Recent Conferences and Workshops*. Presented at the IEEE 8th International Conference on Research Challenges in Information Science, Marrakech, Morocco, 28–30 May 2014.
10. Hiekkanen, K., Korhonen, J. J., Patricio, E., Helenius, M., & Collin, J. (2013). *IT governance, decision-making and IT capabilities*. Presented at the 9th European Conference of Management, Leadership and Governance (ECMLG 2013), Klagenfurt, Austria, 14–15 November 2013.
11. Korhonen J. J., & Hiekkanen K. (2013). *Doing IT Better: An organizational design perspective*. Presented at the 9th European Conference of Management, Leadership and Governance (ECMLG 2013), Klagenfurt, Austria, 14–15 November 2013.
12. Hiekkanen K., Mykkänen J., Korhonen J. J., Patricio E., Collin J., & Helenius M. (2013). *Architects' perceptions on EA use – An empirical study*. Presented at the 15th IEEE Conference on Business Informatics (CBI 2013), Vienna, Austria, 15–18 July 2013.
13. Helenius M. (2013). *Rigour and revelant complex businesses and information systems engineering*. Presented at the 15th IEEE Conference on Business Informatics (CBI 2013), Vienna, Austria, 15–18 July 2013.
14. Hiekkanen K., Helenius M., Korhonen J. J., & Patricio E. (2013). *Aligning Alignment with Strategic Context: A Literature Review*. Presented at Digital Enterprise Design & Management (DEDM 2013), Paris, France, 12–13 February 2013.
15. Itälä T., & Helenius M.: (2013). Using Stocks and Flows Diagrams to Understand Business Process Behavior. Presented at the International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management (IC3K 2013), Vilamoura, Portugal, 19–22 September 2013.
16. Patricio E., Hiekkanen K., Helenius M., & Gulkvisk B. (2012). IT Governance and Cloud SaaS: What Information Controls? Presented at the 9th International Conference on Enterprise Systems, Accounting and Logistics (ICESAL 2012), Chania, Greece, 3–5 June 2012.

17. Hiekkanen K., Helenius M., Korhonen J. J., & Patricio E. (2012). Business and IT: Beyond Alignment. Presented at the 8th European Conference of Management, Leadership and Governance (ECMLG 2012), Pafos, Cyprus, 8–9 November 2012.
18. Korhonen J. J., Melleri I., Hiekkanen K., & Helenius M. (2012). Data governance: A systemic approach. Presented at the 3rd Annual International Conference on Infocomm Technologies in Competitive Strategies (ICT 2012), Bali, Indonesia, 17–18 September 2012.
19. Hiekkanen K., Helenius M., Korhonen J. J., & Heiskala M. (2012). Focus and Locus of Service Innovation. Presented at the 5th World Summit on the Knowledge Society (WSKS 2012), Rome, Italy, 20–22 June 2012.

Dissertation theses

1. Hiekkanen, K. (Submitted). Exploring the Relationship between IT Governance and Strategic Alignment. Dissertation.

Master's theses

1. Antere, O. (2015). The effect of process standardization on process performance – a case study, Master's Thesis, Aalto University, Espoo.
2. Korhonen, H. (2015). Enterprise Architecture in Public Sector Digitalization, Master's Thesis, Aalto University, Espoo.
3. Nieminen, J. (2014). Understanding & Managing Digital Transformation, Master's Thesis, Aalto University, Espoo.
4. Blomqvist, S. (2013). Connecting Enterprise Architecture with Strategic Planning and Development Processes in a Large Organization, Master's Thesis, Aalto University, Espoo.
5. Savolainen, A. (2013). Strategic Investment Criteria for Mega Data Centers – case a Small Town in Finland, Master's Thesis, Aalto University, Espoo.
6. Heijari, H. (2013). Improving the Development of Dynamic Capabilities through Requirements Engineering, Master's Thesis, Aalto University, Espoo.

Digital Organizations of the Future¹

Prof. Eng K. Chew, University of Technology Sydney

Businesses including small medium enterprises are increasingly becoming digitalized and organized into a new form of digital organizations of the future (DOOTF). The DOOTF will operate as part of digital business ecosystems in which interrelated business-units with shared goals and values will collaboratively co-create value and ecosystem-advantage in a highly competitive global market. This chapter explores and explicates conceptually from diverse extant literatures the fundamental processes of and the requisite leadership capabilities for DOOTF value co-creation. The emerging new CIO leadership role for the DOOTF is also examined.

Introduction

Businesses including small medium enterprises (SMEs) are increasingly becoming digitalized and organized into a new form of digital organizations of the future (DOOTF). The DOOTF will operate as part of global digital business ecosystems (Nachira et al., 2007) in which interrelated business-units (i.e. species) with shared goals and values will collaborate and co-create value and ecosystem-advantage (Iansiti & Levien, 2004) in a highly competitive global market.

Shaped by this converging digitalization and globalization phenomena, DOOTF such as that exemplified by Amazon's evolving organizational/business model are service-oriented. They are capable of using business models to leverage such ecosystems of interdependent business-units (species) known as value cells. Value cells have stand-alone economics and are based on capabilities, which are built around activities that create value (Giordano & Wenger, 2008).

DOOTFs pursue service innovation by collaborating dynamically to co-create value in line with, or in anticipation of, the emerging or latent needs of the turbulent markets they serve. The fabric of the DOOTF ecosystem is woven together by information technology (Yoo et al., 2012; Zammuto et al., 2007)

¹ This chapter is an adaptation and extension of Chew, E. K. (2013). Value Co-creation in the Organizations of the Future. *Proceedings of the 9th European Conference on Management Leadership and Governance*. Academic Conferences and Publishing International, 16–23.

culminating into a ubiquitous value constellation/network (Normann & Ramirez, 1993; Lusch et al., 2007).

One class of the DOOTF is represented by a large multinational enterprise that could be configured as a networked (tightly-coupled) organization stretching across the globe but governed by the traditional employment-based authority. Another more generic class of DOOTF is represented by the so-called meta-organization, which is conceptualized by Gulati et al. (2012: 573) as “networks of [loosely-coupled] firms not bound by authority based on employment relationships, but characterized by a system-level goal”. Examples of meta-organization include Li & Fung’s supply networks, and Linux open-source community.

Both classes of DOOTF are trending towards an “actor-oriented” organization in which the actors with common values and disparate (though complementary) capabilities are able to dynamically self-organize, by means of shared collaboration protocols, processes, and infrastructures, in line with the changing market or institutional environments (Fjeldstad et al., 2012). These actors or value cells collaborate dynamically, inter- or intra-organizationally to co-create value in line with, or in anticipation of, the emerging or latent market needs.

But, how do the DOOTF co-create value collaboratively for the participating partners, and what are the underlying requisite leadership capabilities to enable such value co-creation? This chapter seeks to answer these joint-questions conceptually by an exploratory study of diverse extant literatures including IT, management, and service sciences to explicate the antecedent theoretical conditions, processes, and requisite leadership capabilities for DOOTF value co-creation.

The chapter is organized as follows. First, it briefly defines the context of value co-creation focusing on the process of value co-creation principally at organizational and institutional levels, following Lepak et al. (2007) and Lusch et al. (2007). Second, it describes how IT or digital technology, conceptualized as affordance, is a building block of DOOTF organizational capabilities and is used to weave DOOTF into a digitalized value co-creating ecosystem. Third, it describes the principles by which value-creating network (ecosystem) architectures are created, the evolutionary dynamics of these networks and consequently the antecedent conditions and macro (network level) mechanisms for value co-creation. Fourth, it analyzes the principles of resource orchestration and dynamic capabilities for value co-creation. Fifth, the paper examines the leadership (including CIO) capabilities required for managing organizational fluidity to sustain value co-creation in uncertain, dynamic environments. Sixth, it consolidates the findings including the requisite core organizational capabilities for DOOTF to co-create value in a sustainable way in the face of continuously disruptive external and internal environments.

Value Co-Creation Defined

According to Lepak et al. (2007), analysis of value creation needs to define the *source* and *targets* of value creation, as well as the *level of analysis*. In the DOOTF context, the source is the focal firm (actor) and the targets include the firm's customers and associated collaborating firms (actors) in the networked ecosystem. Two types of value are fundamental: *use value* (e.g. the specific quality of a product/service as perceived or experienced by the target customer *upon using* the product/service) and *exchange value* (e.g. the amount paid by the user for the use value of a product/service). Thus value creation is *subjective* as value is perceived by the target user/customer dependent on *their* 'specialized' *knowledge about* the focal product/service and other existing competitive offerings, and *relative* as the use value must be greater than the exchange value (Lepak et al., 2007).

Consistent with Lepak et al. (2007), Lusch et al. (2007) defines value co-creation, through *service-dominant logic*, as the *use* (or "consumption") *process* of the service (or product or technology) because value is only determined when "in-use" by the target customer (thus called "value-in-use"). In this co-creation process, the customer (target) plays a critical and *active* role as a collaborator and *knowledge (resource) integrator* who integrates the (source) provider's knowledge/capabilities/resource with their own (Gallouj & Weinstein, 1997; Grönroos & Voima, 2013) to co-create value. This leads to the Lusch et al. (2007: 10) proposition that "firms [source] gain competitive advantage by engaging customers and value network partners [targets] in co-creation and co-production activities." This is because managing customers for value will increase the firm's customer lifetime value and consequently its shareholder value (Kumar et al., 2006).

In terms of level of analysis, the paper focuses value creation principally at the organizational or institutional levels, although from the standpoint of organizational leadership the individual level is also partly considered. At the organization level, innovation, knowledge creation, managerial/leadership capabilities become the critical source of value creation (Lepak et al., 2007: 183). Value co-creation is achieved through the organizational routines or capabilities of the stakeholders, particularly the absorptive (new knowledge), adaptive and collaborative capabilities (Lusch et al., 2007).

According to service-dominant logic, the process of value co-creation (as exemplified by outsourcing services) involves (a) the source (firm) proposes value, (b) the targets (customers) accept the value proposition, (c) the targets (customers) continue the value creation process through use – i.e. actively driving the joint-process of integration of the customer's and the firm's knowledge (capabilities) (Vargo et al., 2008; Grönroos & Voima, 2013). Consequently, value-based pricing is becoming a compelling selling strategy for many service firms. In a value chain/network context, the routines/capabilities of the collaborators need to be *coordinated end-to-end* to co-create value (Jarzabkowski et al., 2012).

Organizing the Digital Business Ecosystem

Organizations nowadays are being pervasively permeated with digital technology (Yoo et al., 2012). Digital technology, particularly social media, is radically changing the nature and form of organizing. Value-creation activity (work process) in the DOOTF is “organized around information” focused on customer value (Zammuto et al., 2007). Thus IT and organization are symbiotically interrelated.

Technologies have physical properties, which afford different possibilities for action based on the strategic intent, and goals (contexts) in which they will be designed for and used (Leonardi, 2011). Technology usage by a user is conceptualized as a value-cocreating process of combining the technical with human competences (Gallouj & Weinstein, 1997), which executes the designed-in work process in line with the business strategic intent. The usage is typically manifested by the overlapping patterns of interactions between human and material agencies, which in turn constitute an organizational routine – the basic building block of organizational capabilities. These *interagency* relationships are consequently interwoven into organizational “infrastructure” (Leonardi, 2011: 161) that can be shaped in a variety of organizational forms or various ways of organizing through IT.

The underlying IT is hence conceptualized as a *social object* that has “an action potential” (with its inherent designed-in potential value) known as *affordance*. But the potential value of an (IT) affordance is only realized *upon use* of the technology by the human agency to perform a task/routine intentionally, consistent with the aforementioned concept of “value in-use” (Lusch et al., 2007; Grönroos & Voima, 2013). This is the basic unit of value co-creation in the DOOTF. Affordances enact the requisite value-creation organizational capabilities and other social capacities within and outside the boundary of the focal firm.

Because affordances are relational between the human and material agencies (Leonardi, 2011: 153), they can be “designed” to afford various forms of organizing, using the same basic unit of value creation, such as through virtual and mass collaborations (Zammuto et al., 2007) to create various forms of networked organizations (such as the KatrinaWiki for emergency response and recovery coordination of relief workers and disaster victims in the wake of the Katrina hurricane disaster in the US) with different configurations of value co-creation actors/agencies (Fjeldstad et al., 2012). For example, the virtual collaboration affordance encourages open knowledge sharing, acquisition, maintenance, updating, and retrieval via virtual media between team members with a shared purpose, while the mass collaboration affordance is intended to have information seen and used by unknown others creating new unexpected outcomes (Zammuto et al., 2007).

At the same time, the pervasive permeation of digital technology is giving rise to increasingly more open and flexible affordances, creating disruptive innovations characterized by *convergence* (e.g. bringing previously separate *user experiences* together or separate *industries* together – such as combining broadband internet, phone, and TV into the so-called “triple-play” telecom-

munications service, or embedding digital technology in a physical (non-digital) artefact to create a “*smart*” product with multiple affordances – such as Nike+ running shoe), and *generativity* (dynamic and malleable capacity for unprompted change driven by large, varied and uncoordinated audiences – such as Apple’s iOS platform as the resultant generative Apple App Store) (Yoo et al., 2012). These more open and flexible affordances of digital technology are fuelling the growth digital business ecosystems (Nachira et al., 2007) and their constituent DOOTF. The DOOTF will be endowed with *dynamic capabilities* (Teece, 2007) to co-create value in new ways flexibly and with agility to match the rapidly changing consumers’ experiential requirements and expectations.

Value-Creating Architectures and Dynamics

Thus, through IT and digital technology, in line with business strategy, a DOOTF firm is enmeshed with its external environments in a value constellation (Normann & Ramirez, 1993), value network (Lusch et al., 2007), industry architecture (Jacobides & Winter, 2012) or digital business ecosystems (Nachira et al., 2007; Zahra & Nambisan, 2012) of stakeholders or collaborating actors. The focus of these network/ecosystem architectures is on the reconfiguration of capabilities, roles and relationships among the actors participating in the attendant value-creating system – particularly in “mobilizing the customers” to take advantage of the reconfiguration and to “create value for themselves” (Normann & Ramirez, 1993: 69). This requires firms to create and sustain a good fit between organizational capabilities and customers as exemplified by IKEA’s famous business model (ibid.: 74).

The actor relationships comprise market ties with its customers and competitors; referential ties with other institutions; affective ties with its partners; and hierarchical ties with the regulators (Ahuja et al., 2011). Organizational capabilities interact dynamically with the industry architecture (IA). On the one hand, entrepreneurial firms seeking to exploit their superior capabilities would reshape the institutional rules and roles, and thus the IA, to create and capture value for themselves (Jacobides & Winter, 2012: 7). On the other, the IA (structure) provides feedback to the actors/agencies influencing them to change/evolve their capabilities to survive the competition. For instance, “the architecture of boundary choices shapes capabilities and drives incentives within an organization” (Jacobides & Winter, 2012: 6).

The study of value creation by the DOOTF needs to take into consideration network/ecosystem dynamics, which influence organizational capabilities development/evolution and hence the capacity or scope for value co-creation (i.e. through integration of multiple actors’ capabilities). Network/ecosystem dynamics tend to follow a cyclical change process of (a) establishing the micro-foundational motivation to form, maintain or dissolve ties – ties such as outsourcing, alliance or joint-venture arrangements, (b) enacting the micro-dynamics of the focal nodes seeking either specific partners or specific tie patterns, and (c) implementing the requisite change of the structure or content of

the network/ecosystem to create a new network architecture (Ahuja et al., 2011).

Organizational ties in the value-creating network/ecosystem would be organized in either loosely- or tightly-coupled forms following a flexibility or an efficiency organizational strategy respectively. The former is usually favoured when industry standards exist which results in limited asset specificity (e.g. power-supply component for PC manufacturing), the level of industry uncertainty is high due to technological change, and the overall industry complexity is high in terms of diverse inputs (Sahaym et al., 2007). Loosely-coupled ecosystem organizations use alliance and/or contingent workers as an uncertainty mitigation strategy to achieve flexible (re)configuration of complementary resources or capabilities dynamically in response to industry and technology uncertainties.

Where industry standards do not exist, organizations would tend to adopt tighter coupling strategy (e.g. vertical integration in manufacturing supply chain) to improve coordination and control efficiency and to reduce risk of variability. Each organizational strategy calls for varied leadership and governance models for value co-creation between stakeholders, which involves mutual alignment of stakeholder value propositions and leveraging and integration of one another's capabilities and resources.

Stakeholder alignment is contingent on information transparency across the ecosystem. This in turn requires inter-organizational systems data and process standards and joint production governance (via a shared IT architecture among the participating organizations) to facilitate value co-creation across the ecosystem (Steinfeld et al., 2011). Such standards and architecture would facilitate rapid network (actors) self-reconfiguration in the face of unexpected network node or tie disruptions. In general, DOOTF and ecosystem adaptiveness to change can be attained by cohering to the ecosystem's interdependency rules that guide the exchange of resources and information among interdependent activities in the context of patterns of ecosystem interdependent activities (Albert et al., 2015).

The interplay of social structure and economic action drives the evolutionary dynamics of an emergent ecosystem/network. The focal firm's information-intensive social structure will tend to exhibit "small-world system" (e.g. a network pattern of inter-firm scientific collaboration) dynamic characteristics – a unique capacity for connectivity and coordinated action in value co-creation (Gulati et al., 2010).

A small-world network emerges by first forming a cluster of tightly interconnected actors by establishing local ties between pairs of collaborative contacts within the same network (local clustering density) and, second, creating bridging ties between actors from different clusters, which bind these clusters together (global average path length) to form the small world. For instance, Dell servers, Oracle databases, Microsoft Internet Explorer, and Novell networking software are "bridged" together to form the client/server platform for computer networks. Bridging ties are motivated by the entrepreneurial organization's need to continuously access and recombine flows of diverse/heterogeneous

information, knowledge, and other complementary resources to innovate and sustain value co-creation. However, a small-world system, unless continuously reinvigorated by the collaborating firms, will follow an inverted U-shaped evolutionary pattern wherein an increase in the small-worldliness (i.e. a dense pattern of interdependency connectivity and ready access to heterogeneous resources) of the network is paradoxically inducing organizational rigidity and subsequently its decline. This is because of the increasing resource/knowledge homogenization (or diminishing diversity) of network actors and the self-containment (closed world) of the small-world network which will lead to inertia and homophilous preferences in partnering and ultimately resulting in the fragmentation of the small world (Gulati et al., 2010).

The value creation potential of the DOOTF networked ecosystem, especially the small-world network configuration, is determined by the combinations of and interactions between the focal DOOTF's network reach (the extent of tie to distant, different, and diverse partners), richness (the potential value of network resources available from the diverse partners through the ties), and receptivity (the capacity to channel and leverage the diverse partners' network resources across inter-organizational boundaries to realize the value) (Gulati et al., 2011).

Examples of network resources include the partners' intellectual properties, marketing channels, and manufacturing facilities. Network reach is effected by the organization's scanning capability required to search for desired network resources held by current or prospective partners and to establish ties with such partners; richness by the organization's orchestrating capability required to identify value-creation opportunities based on resource complementarity between the organization and its chosen partners and to integrate and configure these complementary resources from diverse partners with its own; and receptivity by the organization's contracting capability required to devise agreements and establish governance mechanisms for access rights to network resources as well as its absorbing capability required to absorb external knowledge, direct network resources to appropriate users in the organization or network and efficiently store them for future use (Gulati et al., 2011: 212). In sum, the DOOTF's sustained value creation capacity is fundamentally contingent on its absorptive capacity (Cohen & Levinthal, 1990; Lusch et al., 2007) and dynamic capabilities as described below (Lusch et al., 2007; Teece, 2007).

Resource Orchestration by Dynamic Capabilities

Value is jointly created by the capabilities of collaborating organizations (Lusch et al., 2007; Grönroos & Voima, 2013) – moderated by the organizations' reach, richness and receptivity (Gulati et al., 2011). The DOOTF organizational capabilities and incentives to collaborate are shaped by the architecture of boundary choices, e.g. open or closed boundaries as described below (Jacobides & Winter, 2011). An entrepreneurial firm seeks to collaborate with its market as well as the attendant broader ecosystem (network) of partners who possess the requisite complementary or co-specialized assets in order to

co-create social value for the purpose of its private appropriation (Pitelis & Teece, 2010: 1260). This requires the unique capability known as dynamic capability (Teece, 2007) which allows the firm to sense, seize, and “orchestrate” and leverage the variety of co-specialized assets (or resources) by continuously shaping, reshaping, configuring and reconfiguring, and aligning these assets to create new products or services to meet the changing or latent customer needs ahead of the competition (Pitelis & Teece, 2010). This mechanism applies equally to co-creating cross-border markets and ecosystems for globalized firms.

Value creation and firm performance is closely linked with the firm’s capability development process through orchestration of diverse portfolios of resources (capabilities) across the network (Coff, 2010; Gulati et al., 2011). Entrepreneurial firm excels in exploiting dynamic knowledge asymmetries (as exemplified by Apple’s development of the iPod) in order to appropriate greater value than the partners from the orchestration and integration of co-specialized assets, resources or capabilities from diverse network/ecosystem partners (Coff, 2010). This can be achieved through a well-designed and executed business model innovation centred on capabilities differentiation and orchestration. It requires “nonnegotiable principles” (values and norms) that guide frontline operational practices and behaviours for adaptive and speedy decision making supported by robust learning systems that reinforce and sustain the capabilities differentiation (Zook & Allen, 2011).

The firm must also balance the simultaneous conflicting demands of its global and local markets and the regulative-legal (political), social-normative (values), and cultural-cognitive (rules) mechanisms of communities that give actors a “deeply shared frame of reference” that guides firm/organizational behaviours and practices to create sustained value across the organizations (Marquis & Battilana, 2009: 288). This capacity is linked to its strategies, structure and dynamic capabilities – especially the leaders’ ability to manage paradox (see later section) – the tension between efficiency and flexibility (Smith & Lewis, 2011).

The concurrent orchestration of human resources for efficiency (stable organization) and flexibility (emergent organization) can be achieved through a framework of twin social relational archetypes – entrepreneurial (flexibility) and cooperative (efficiency), in which the former pursues flexible (loosely-coupled) work structures, result-based (co-determination) incentives, and transspecialist (T-shaped common component knowledge) development, and the latter interdependent (tightly-coupled) work structures, clan-fostering (alignment with organizational values) initiatives, and broader skill (common architectural knowledge) development (Kang et al., 2007: 247).

The DOOTF may choose open or closed boundaries and/or memberships, defined by its innovation strategy and associated organizational capabilities (Chesbrough & Teece, 2002: 132). Through IT, virtual collaboration affordance transforms the organization into an open, virtual organization (Zammuto et al., 2007) that would facilitate open innovation – the absorption and integration of external ideas and knowledge with internal knowledge to create new

(value) products or services (Chesbrough, 2003). Virtual organization (enabled by industry standards) is suited to autonomous innovation, while organizational alliance is suited to systemic innovation, in which the requisite new capabilities exist externally. In both cases, the focal DOOTF must nurture and leverage its unique organizational capabilities in combination with (or orchestration of) the externally sourced capabilities to create superior value from the virtual or alliance organizations (Chesbrough & Teece, 2002).

Open innovation allows DOOTF to gain new value through discovery of new ways of building better products or services but at the risk of losing control due to divergent goals of selected partners (Almirall & Casadesus-Masanell, 2010). The trade-off between discovery and divergence depends on the underlying complexity of the mapping between the DOOTF's choices (of product features) and the customers' willingness to pay for the product (or perceived value) (ibid: 28). Open innovation (including user-driven innovation) is generally superior in value creation to closed innovation when the product (features) to customer (value) mapping complexity is medium to low. Closed innovation favours highly complex product mapping where the innovating DOOTF is pushing the product frontier and disrupting the incumbents. For example, Apple's iPod and Nintendo's Wii follow a closed innovation strategy (Almirall & Casadesus-Masanell, 2010).

Leadership for Organizational Fluidity

The focal DOOTF's sustained value creation in dynamic environment is linked to its strategies, organizations and dynamic capabilities – specifically, through its top leaders' ability to manage the fundamental tension between efficiency (stable mode of organizing) and flexibility (emergent mode of organizing) towards achieving a fluid organizational form – as exemplified by Cisco, 3M, Microsoft, and SAP (Schreyogg & Sydow, 2010: 1251) – capable of sustained ecological fitness with its uncertain environments.

A popular leadership approach for managing this tension is to nurture ambidextrous capabilities at the network, firm, and individual-leadership levels by means of dynamic capabilities (O'Reilly & Tushman, 2011). Ambidextrous DOOTF, such as IBM Life Sciences, Ciba Vision and Zensar Technologies, would pursue exploitative (efficiency) and exploratory (flexibility) innovations simultaneously via spatially or contextually differentiated dual structural forms (each with contrasting internal alignments) while remaining integrated strategically (cognitively and behaviourally) at the top leadership level in a value-enhancing way – through shared vision, strategic intent and common fate incentives (O'Reilly & Tushman, 2011: 13).

The simultaneous pursuit could, alternatively, be organized by a singular structural form known as semi-structures, which are grounded on heuristics-based strategic processes (simple rules for managing unpredictable change) as opposed to complex (predictable-mechanistic) organizational routines (Eisenhardt et al., 2010: 1266). In this conceptual model, the leaders effectively balance efficiency and flexibility through unbalancing in favour of flexibility and

by leveraging heuristics-based simple-rules strategies for managing multiple environmental (stable and unstable) realities and, through abstraction and cognitive variety of mental models, devising cognitively sophisticated, single solutions for managing the inherent contradictions of the simultaneous pursuit (ibid.: 1268).

Yet another approach is based on leaders performing an open-ended reflexive monitoring (through a meta-level process) of the operating routines and any critical disruptive environmental signals for change, which if deemed appropriate the meta-level process would reconfigure and adapt the routines to align with the change while balancing the countervailing need for patterned repeatable operating routines (processes) for efficiency (Schreyogg & Sydow, 2010: 1258). Leaders of DOOTF must therefore master the art of leading, managing and governing contradictory demands (or paradox) to create sustained value. It can be achieved through a dynamic equilibrium model of organizing, comprising a cyclical process of (a) identifying latent tensions, (b) transforming latent into salient tensions, (c) embracing paradoxical tensions, and (d) paradoxical resolutions (Smith & Lewis, 2011: 389).

The DOOTF leadership is socially constructed. It is not only confined to the top leadership team, but distributed throughout the organization where actors interact in a dynamic and fluid leading-following adaptive process interchanging leader-follower identities and relationships contingent on the value creation contexts (DeRue, 2011). Leadership effectiveness is contingent on the collaborating actors' social system being able to evolve and adapt by reinforcing the leading-following interactions dynamically. This means the pattern of leader-follower identities and relationships could shift, for example, from a centralized to shared and then distributed pattern of leading-and-following to effectuate group adaptation (ibid: 140). Intra- and inter-organizational management practices will become "democratized" with distributed and adaptive leadership practices which would enable distributed and timely sensing across the organization and seizing of emerging or latent market opportunities (Teece, 2007) to co-create value between partnering organizations.

The distributed leadership in the DOOTF would leverage the focal DOOTF's network reach, richness and receptivity to bundle and reconfigure resources and capabilities (from diverse partners in the ecosystem) to co-create value in line with its strategic intent (Coff, 2010; Gulati et al., 2011). Inter-organizational collaborations (network ties) would require a joint production motivation scheme in which each actor has its own role and responsibility but is individually motivated to generate shared representations of actions and tasks to achieve joint goals (Lindenberg & Foss, 2011). Such a scheme would serve as an effective DOOTF governance mechanism for superior value co-creation in a collaborative work arrangement (Lindenberg & Foss, 2011).

Further, intergroup leadership practices are required as part of the DOOTF distributed leadership to achieve superior intergroup collaborative performance, e.g. between doctors and nurses in a hospital. Intergroup leadership effectiveness is centred on the leader's ability to "engender a sense of intergroup relational identity (i.e. self-definition in terms of one's group member-

ship (e.g. doctors) that incorporates the group's relationship (e.g. healthcare professionals) with another group (e.g. nurses) as part of the group's identity)" (Hogg et al., 2012: 238).

In sum, sustained value co-creation in dynamic environments requires the DOOTF firm and leadership to possess the capacity to structure its resource portfolios including those of its collaborating partners (Coff, 2010; Gulati et al., 2011), bundle the resources to create capabilities and leveraging/reconfiguring the capabilities to (efficiently) exploit market opportunities and to (flexibly) explore innovations for latent market demands (Sirmon et al., 2007) to achieve an ecosystem advantage (Iansiti & Levien, 2004).

Digital CIO Leadership Role

The digitalization of organizations towards the DOOTF and accompanied digital business ecosystems demands an evolution of the CIO leadership towards a role with increased strategic innovation responsibilities. Sometimes renamed as Chief Innovation Officer, the new CIO role in the increasingly digitalized businesses (e.g. Kohli & Johnson, 2011) is expected to lead the formulation and execution of the organizationally transformative digital business ecosystem strategy.

Digital business ecosystems are increasingly becoming social, competing on customer experience. This would require the CIO to be market- and brand-savvy and capable of co-creating the DOOTF's social media strategy with the Chief Marketing Officer and CEO (Deans, 2011), as well as ecosystem strategy (Iansiti & Levien, 2004). The CIO would need to be technology- and business-savvy to effectively engage with peer business leaders (Hansen et al., 2011), capable of enhancing the DOOTF leadership team's information orientation (Kettinger et al., 2011), and taking an "outside-in" approach (Carter et al., 2011) to co-create and co-execute new "market-driving" digital business ecosystem strategies.

In sum, the future DOOTF CIO must be a strategic leader and an innovator capable of architecting the digital business ecosystems to position the DOOTF with the requisite ecosystem-advantage. The CIO must also be a business partner and relationship architect capable of fusing business with IT (e.g. capable of instituting the CIO-CEO-CMO tripartite) to create differentiation and organizational transformation. To co-create sustained value with key DOOTF stakeholders in the face of changing external environments, the DOOTF CIO must be a distributed leader (DeRue, 2011) possessing the dynamic capabilities (Teece, 2007) to lead ambidextrously (O'Reilly & Tushman, 2011) so as to effectively manage the tension of an efficient yet flexible (Smith & Lewis, 2011) digital business operating model and ecosystems which allow the DOOTF to exploit the markets and to explore disruptive new innovations simultaneously (Sirmon et al., 2007).

Conclusion

In conclusion, the research question posed in the introduction can now be answered as follows. Value co-creation by the DOOTF is measured by “value-in-use” relative to its “exchange value”. It is attained by a resource or capability integration process during use (of the resource), initiated by the benefactor.

IT affordances, which form the building block of value-creating organizational routines and capabilities, have been used to weave the fabric of the DOOTF. Increasingly, more open and flexible IT affordances are becoming available to create a variety of DOOTF ecosystems (with convergence and generativity dynamic characteristics) and associated network/ecosystem architectures, comprising both loosely- and tightly-coupled interconnections depending on the focal firm’s organizational and innovation strategies.

To survive and thrive, the DOOTF must constantly seek diverse complementary resources (capabilities) to integrate with its own unique core capabilities to out-innovate and differentiate from the competition. This is achieved by establishing dense local ties with valuable partners within the local (industry or geographical) cluster and by bridging ties with distant clusters to maximize the heterogeneity of accessible resources/capabilities, creating a small-world system to attain the desired ecosystem advantage.

The value creation potential of the small-world system is contingent on the reach, richness, and receptivity of the collaborating partners. To prevent network and organizational rigidity inherent with the small-world evolutionary phenomenon, the DOOTF networked ecosystem must monitor and manage the network/ecosystem dynamics to maintain resource diversity by a cyclical change process. To establish and leverage these diverse ties and associated valuable diverse resources, the DOOTF must possess absorptive capacity and dynamic capabilities.

Value co-creation, be it through exploitative or exploratory innovation, is achieved through the seminal mechanisms of resource orchestration and integration – the core micro-foundation of dynamic capabilities. Moreover, the DOOTF leaders at all levels must possess ambidextrous capacity and must practice distributed leadership to balance organizational efficiency (stability) with exploiting market opportunities and flexibility (emergence) to explore innovations for latent market demands. This capacity and the underlying resource orchestration capability will allow the DOOTF to attain a high degree of organizational fluidity, allowing “actor-oriented” dynamic self-organization in line with the changing environments.

This chapter has contributed towards an initial conceptual understanding of the fundamental processes of and the requisite leadership (including the new CIO leadership) capabilities for DOOTF value co-creation. It has limitations as due to space constraints only a selection of the extant literatures has been explored. Further, the resulting theories and principles derived and integrated from the diverse literatures need to be validated empirically by case research of leading contemporary organizations.

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Digitalization and Dualistic IT

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Digitalization of products and services is a fast-moving, global megatrend that is fundamentally changing existing value chains across industries and public sectors. The manifestations of this ongoing digital transformation are various, and there are many terms used in the literature to refer to the phenomenon, e.g. Mobile Apps, Big Data, Machine-to-Machine, Internet of Things, Industrial Internet, and Industry 4.0. Nevertheless, modern wireless Internet-based technologies with real-time data analytics are the common enablers of these digital applications to provide organizations with major business improvements – such as increasing revenue via new online sales opportunities, improving operational efficiency via increased level of automation, and reducing fixed assets via new cloud-based business models. The most significant implication is the rise of data-driven, networked business models that can bring step-wise improvements in customer value across existing industry boundaries.

Telecom, banking and insurance, and media businesses are examples of pioneering industries that are in the middle of such digital transformation in a large scale. During the last decade, digitalization has already revolutionized business models in these sectors. Similar changes are expected to take place also in other, more traditional industries, when inexpensive, simple ICT-solutions (e.g. sensors and RFID-tags) are going to be widely embedded in most products. The appearance of digitalization in everyday business can look very different in different business and public sectors. The existing ways of working and collaborating in/between organizations will be significantly impacted, when the new technologies are taken into effective use.

According to a recent study by Fitzgerald et al. (2013), digital transformation will become critical for most organizations in a wide range of industries within the next two years, and almost no organization is sheltered from the competitive disruption brought by the widespread adoption of digital technologies. The study reveals how organizations that effectively manage digital technology can expect better customer experiences and engagement, streamlined operations, and new lines of business or business models. In order to gain any of these business improvements, top management needs to have a clear vision and to actively lead the transformation in the organization. This is not an easy task for anyone in top management, but especially not for business executives who have little understanding of information systems and/or have not been

earlier involved in managing IT. Therefore, corporate IT functions should be capable of proactively supporting executives in preparing the organization for the digital transformation.

The transformation, however, is not limited to the focal organization's boundaries, but products and services are also going to be digitized. Therefore, future IT services play a major role in both the corporate IT and the product development functions of the organization. For the executives, it is important to understand the dualistic role of IT in order to make right strategic decisions on IT priorities and on the budget for the coming years. IT should not be seen only as a cost center function anymore!

Corporate IT is Facing Changes

A strong involvement from internal corporate IT is going to be critical in digital transformation, as application and data architectures between internal information systems and commercial digital platforms have to be integrated – to some degree at least. According to Bharadwaj et al. (2013), it is becoming increasingly more difficult to disentangle digital products and services from their underlying IT infrastructures. The pioneering industries, such as banking and telecom sectors, demonstrate how new digital online service offerings have been built and run on top of legacy information systems, resulting in numerous complex system dependencies between commercial online services and internal transactional back-end systems. In practice, this leads to business models where internal information systems cannot be separated from sellable products and services anymore. IT services will become an integral part of digital business strategies and future customer solutions. Top management has to revisit the existing enterprise architectures and IT governance practices to successfully manage this digital transformation.

The role of corporate IT is, thus, drastically changing at the moment – from the traditional business-IT alignment thinking to IT-enabled business. Table 1 highlights how the role of corporate IT functions will change in the future.

Table 1. Digitalization is changing the role of corporate IT.

EA Domains	Traditional role	Future role
1. Technology	<ul style="list-style-type: none"> • Closed platforms • Physical 	<ul style="list-style-type: none"> • Open platforms • Virtualized
2. Applications	<ul style="list-style-type: none"> • Proprietary • Siloed • P2P integrations • EAI technology • Enterprise Systems • Automating transactions 	<ul style="list-style-type: none"> • Inter-organizational composite applications • Software as a Service • Service-Oriented Architecture • "Informating" interactions
3. Information	<ul style="list-style-type: none"> • Structured data • Data locked in systems and db's • Operational and tactical Business Intelligence • Proprietary data structures 	<ul style="list-style-type: none"> • Data, information and knowledge mix • Open data • Big Data and analytics • Industry standards • Information architecture
4. Business	<ul style="list-style-type: none"> • Procedural, linear workflows • Centralized control • Transactional 	<ul style="list-style-type: none"> • Networked, dynamic business processes • Distributed business process management

Technology is developing fast and changing the basic IT infrastructure layer from a physical to more virtual world. Organizations do not need to manage their own data centres to provide the employees with basic IT infrastructure services, because the basic services are supplied in telecom networks as cloud-based services – like power in electricity networks. This will eventually lead organizations to use more open platforms rather than building specific intra-company platforms.

Application management is also moving from siloed, proprietary systems to SaaS-based services, built on Service Oriented Architecture (SOA) that will eventually replace traditional point-to-point integrations. Applications are going to be more user-centric, cross-organizational software that operate on top of the traditional intra-company transactional systems, such as SAP ERP systems.

Information and its sharing across companies are going to be more critical differentiating factors for companies. Real-time data analytics and machine learning will create additional business value. The role of data and its management are going to play a major role in future business models.

Business is becoming more dynamic and networked, so that numerous stakeholders can provide the same customer with real-time services to offer tailored customer solutions. Data will be the oil of future businesses. Business models are moving from transactional processes to distributed business processes that add end-customer value.

IT-Enabled Solutions Are Growing Fast

Services have become an important revenue stream and growth opportunity for many traditional manufacturing companies during the last decade. The manufacturing sector has been undergoing a major transformation, where the share of services in production and exports has grown: manufacturing has become “servitized” (Pajarinen, Rouvinen, & Ylä-Anttila, 2013). Already decades ago, Peter Drucker pointed out the essence of customer solutions: “what the customer buys and considers value is never a product; it is always utility – that is – what a product does for him” (Drucker, 1974). Today’s customers have no interest in products and services per se – what they really want are solutions to problems they face in their lives. The customers simply need “fit-for-purpose” solutions to maximize value for them throughout the whole ownership. According to Sawhney (2006), a customer solution is an integrated bundle of products and services for a specific customer. Modern ICT-solutions consist of physical products, software, and services.

Services play a central role in designing and delivering tailored solutions to meet the customer’s need, i.e. they have actually become a key vehicle to mass-customize solutions. Services were earlier considered separate from products, but nowadays products become platforms for delivering services (Sawhney, 2006). In the ICT industry, services have become the main differentiator factor and source of profitability, while the role of physical products has continued diminishing in the markets.

Incumbent product-based supply chains confront a major challenge to meet the diverse customer needs in delivering integrated bundles of products and services. A well-known cliché – it is supply chains, not individual companies that compete in the markets – is so true in today’s competitive, global ICT markets, where a vast majority of companies have moved manufacturing to low cost countries. At the same time, global environmental awareness and growing willingness to reduce carbon footprints among consumers shape the market behaviour towards less consumption of physical products – for the benefits of service businesses. All this puts pressure on building (both economically and environmentally) sustainable, global supply chains that are truly customer-centric and enable the growth of service businesses.

Traditional supply chain management that primarily optimizes the supply of physical products to the market place is not sufficient to cope with growing needs for customized solutions and service businesses. In services business, managing the customer demand chain becomes as important as managing the product supply chain. The demand chain is not just another alternative perspective on supply chains, but a distinct way to conceptualize the end-to-end value chain that invites customer–supplier collaboration (Holmström et al., 2000). A demand–supply network (DSN) aligns a company’s supply chain and each of its customers’ demand chains by combining the flow of demand-related information with the material and service flows (Collin et al., 2009). The DSN approach requires close supply chain collaboration between suppliers and customers to combine product-driven and customer-driven supply chain design. For service businesses, product based supply chains need to be turned into customer-centric demand–supply networks that maximize the total customer value of ownership.

An effective use of modern information technology enables a supplier to extend its demand visibility downstream the DSN. By having an improved visibility into a customer’s demand chain, the supplier can discover new service innovations to significantly improve the customer’s operations. The new IT technology allows traditional product-based supply chains to be extended for service businesses and to increase demand visibility downstream the DSN to discover new service innovations. Five distinct demand visibility points, where a stepwise improvement in customer value can be reached, are enabled by IT technology: 1) invest, 2) implement, 3) maintain, 4) operate, and 5) use. See the approach in Figure 2.

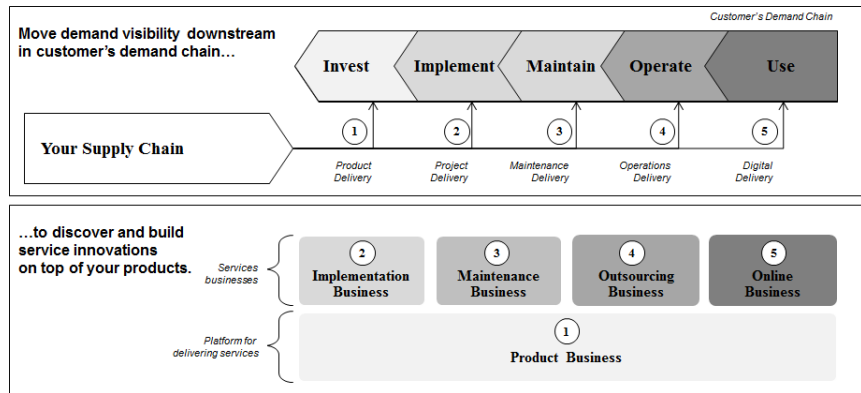


Figure 2. IT-enabled solutions improve customer value.

Product delivery model is primarily designed to optimize deliveries of physical products to the customer. The main focus is on delivering right products to right delivery address at the right time, as requested in the customer order.

Project delivery model is targeted to design and implement products for the customer. The focus of DSN integration is not only delivering physical products to a destination address but also to ensure they can be effectively taken into use for the customer. The key purpose of DSN is to provide customers with the fastest time to utilize the products and to get benefits from it.

The purpose of **maintenance delivery** model is to support the customer to use products effectively and to keep them always functional. DSN integration focuses on maximizing product utilization in the customer's operations during the whole product lifecycle and on ensuring business continuity.

Operations delivery model is designed to operate a customer's specific business process that effectively utilizes the supplier's products. The supplier is able to run the operations more efficiently, since they enjoy the scale benefits and are more capable of using all product features.

Digital delivery model is targeted to provide the customer with continuous online services on top of the supplier's products. The main focus is on delivering high-quality digital services in real time over the Internet network whenever and wherever the customer wants.

As a summary, the role of IT in building customer solutions is going to be critical in the future, as new kinds of digital services arise across industries. IT services are becoming a core platform for delivering future customer solutions. At the same time, the role of physical products is diminishing. The paradigm is changing from software embedded products to product embedded software. And this change is enabled by IT services.

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IT in Enterprise Transformation

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Information Technology (IT) has had fundamental consequences in business organizations and the society at large. In the last few decades, unprecedented computing power, infinity of virtual space and ubiquitous connectivity have radically reduced the cost of coordination, communications, and information processing as well as enabled entirely new types of technology-mediated interactions. As such, however, “IT does not matter” (Carr, 2003). Basic technological infrastructure, enterprise information systems, and specific IT skills have commoditized and do not provide businesses with competitive advantage. While the social value of information technology has increased with its diffusion, it cannot serve as a basis for strategic differentiation (Morabito, 2013). IT investments are the necessary cost of doing business just to maintain competitive parity (Hitt & Brynjolfsson, 1996).

While technology has been seen as a driver of rapid improvements in performance, the Western management theory and practice has not sufficiently emphasized the role of business processes and organizational structures in performance improvement (Burgess, 1994). Nevertheless, productivity improvements through institutional change, business process engineering and managerial innovations come increasingly from IT that enhances transparency, interaction and speed (Hanna, 2010). The *liquification* (Normann, 2001) of information resources enabled by the emergence, growth, and proliferation of digital communication and computation (Lusch et al., 2010) has brought about and continues to cause major structural changes in the economy, industries and societal institutions.

The value of information technology lies increasingly in how it enables business change or is leveraged to transform business models. As the focus of IT management has shifted from efficiency to delivering business value of IT, investments in IT increasingly have transforming effects (O’Callaghan, 2005).

In this chapter, I discuss the role of IT in organizational change and argue that the level of IT capability must match the degree of change the organization must undergo.

Degrees of Organizational Change

Organizational changes are not uniform in their type, scope or environmental contingencies, but differ in their *degree* in distinct orders of magnitude. Some changes pertain to improvements in the current operational work systems of the organization, which is relatively straightforward to carry out, while some changes are less frequent, about changing the way of working and require more planning and management, and yet there are transformative changes that call for a complete overhaul of the entire organization, going deep into the culture and shared values of the organization.

Anderson and Ackerman Anderson (2001) distinguish between three types of change: developmental change, transitional change, and transformational change. *Developmental change* represents improvement of what is already known or practiced: an existing skill, method, or performance standard. The new state is an enhancement of the old state rather than a radically new one requiring profound change. In contrast, *transitional change* replaces what is with something entirely different. The old state must be dismantled and emotionally let go of and the new state clearly created to replace the old one. The transition between the two is unique and should be managed (Beckhard & Harris, 1987). In *transformational change*, the shift from one state of being to another is so radical that it requires a fundamental shift in the way the organization and its people perceive reality: a shift in culture, behavior, and mindset. Moreover, the new state is largely uncertain at the beginning of the change process and emerges from the change effort itself (Anderson & Ackerman Anderson, 2001).

Three respective types of change interventions are frequently distinguished in literature. These types go with different names, but labels such as restructuring, reengineering and rethinking (Keidel, 1994) capture the essence and are commonly used. Dijksterhuis, van den Bosch, and Volberda (1999) categorize these interventions – strategic design actions – in terms of nodes and links, wherein nodes are defined as organizational actors and links are the interaction processes between those nodes.

Restructuring (Hamel & Prahalad, 1994; Keidel, 1994) interventions are mostly focused on the number of nodes (size) and links (density), e.g. downsizing or expansion in the resource base (Dijksterhuis et al., 1999), number of organizational units, and number of organizational levels (Keidel, 1994). Hamel and Prahalad (1994) point out that organizational transformation of this type is often “denominator management,” aimed at reducing the denominator component of return on investment: investment, net assets, capital employed, or headcount. Whereas growing the numerator – net income – would require insight into new growth opportunities, changing customer needs, required new competencies, and so on, cutting the denominator “doesn’t need much more than a red pencil” (p. 9). They liken downsizing to “corporate anorexia” that can make an organization thinner, but not necessarily healthier.

Reengineering (Hammer & Champy, 1993; Hamel & Prahalad, 1994; Keidel, 1994) the organization pertains to changing the position of nodes or links within the organization (Dijksterhuis et al., 1999), e.g. through process innova-

tion, redesign of business processes, or redeployment of resources. Reengineering is about “radical redesign of business processes” to achieve dramatic performance improvements (Hammer & Champy, 1993). It tends to be tactical, rather than strategic, focusing on operational processes with a relatively near-term improvement time frame (Keidel, 1994). According to Hamel and Prahalad (1994), it offers at least the hope of getting better, not just smaller. However, the real goal of reengineering is often reduced costs rather than higher customer satisfaction. Also, reengineering measures tend to be about catching up with competition rather than “competing for the future.”

Rethinking (Keidel, 1994), or *reinventing* industries and regenerating strategies (Hamel & Prahalad, 1994), addresses organizational identity, purpose, and capabilities (Keidel, 1994). Strategic design actions are about changing the content of nodes and links (Dijksterhuis et al., 1999). Such changes pertain to properties such as individual and collective mindsets, norms and beliefs, and organizational culture. According to Keidel (1994), organizational design mirrors the mental models of people, i.e. the organizational cognition. The leverage of rethinking lies in cognitive change, not behavioral; and in distinctive organizational capabilities, not in resources or processes. While “thinking about thinking” is difficult, the potential of rethinking is significant. It is rarely pursued for immediate or even mid-term ends (ibid.).

Three Realms of IT

In our earlier work, we have postulated a tri-partite approach to enterprise architecture (Korhonen & Poutanen, 2013) or, more broadly, three “IT Realms” (Korhonen & Hiekkanen, 2013). These realms are metaphysically distinct (i.e. differ in their ontological and epistemological assumptions) and vertically contextualizable with the organizational structure (i.e. pertain to different organizational levels).

Technical Realm pertains to the operative levels of the organization that create value in the present. It is reductionist in nature and aimed at efficiency and reliability. In this realm, IT follows business; IT planning is a rational, deterministic and economic process that aims at business–IT alignment and IT cost reduction. IT resources, such as information assets or application and technology infrastructure are geared to operational quality and reliability – producing predictable outcomes on a consistent basis. This is the realm of technically oriented IT work: information systems design and development, enterprise integration, solution architecture work, and IT operations. It also addresses architectural work practices and quality standards, e.g. architectural support of implementation projects, development guidelines, and change management practices.

Socio-Technical Realm bears relevance at the expert and managerial levels of the organization that create value for the future. It is about creating enterprise flexibility and capability to change: the focus on reliability is balanced with focus on validity in anticipation of changes, whose exact nature cannot be accurately predicted. The domain plays an important role as the link between

strategy and execution: the business strategy is translated to the design of the organization so that the strategy may be executed utilizing all the facets of the organization, including IT. Knowledge about the internal operation and construction of the organization is of essence in enabling organizational change (Hoogervorst, 2009). IT has an enabling role in enhancing organizational competencies (Peppard & Ward, 2004), i.e. abilities to utilize and mobilize organization-specific resources to strategic ends. This is the realm of business domains and their assigned business activities; business functions and business concepts that these business domains need to perform their assigned business activity; and high level business processes that show how the business domains collaborate to achieve the organizational goals and strategies (Versteeg & Bouwman, 2006).

In *Ecosystemic Realm*, the organization co-evolves vis-à-vis its ecological context: its business ecosystem, industry, markets, and the society at large. The perspective shifts from the relatively stable, closed and controllable system of a self-sufficient enterprise to the relatively fluid, open and transformational system-of-systems of networked, co-specialized entities. The focal organization is objectified from the outside, as a co-evolutionary constituent within the broader business ecosystem. In Ecosystemic Realm, IT enables strategic capability (cf. Peppard & Ward, 2004) – business follows IT.

Role of IT in Organizational Change

As today’s business is increasingly supported, enabled, and even driven by information technology, how IT is managed and governed plays an important role in organizational change. With each additional degree of organizational change, a new level of IT capability would be required. A new IT realm needs to be activated and the emphasis in the previous realm(s) shifts, accordingly. This proposition is illustrated in Table 2.

Table 2. Role of IT in organizational change.

Ecosystemic Realm		Strategic IT capability and digital business model	
Socio-Technical Realm		Enterprise architecture	Modular architecture
Technical Realm	Development to requirements	Technology standardization, shared infrastructure	Optimized core of digitized data and processes
Developmental Change		Transitional Change	Transformational Change

In developmental organizational change (Anderson & Ackerman Anderson, 2001), IT investments usually pertain to one-off application or solution development and are based on expected IT cost reductions (cf. Ross, 2003; Ross,

Weill & Robertson, 2006). With the focus on efficiency, cost containment and reliability, change interventions are of restructuring type: automating operational work and business processes in Technical Realm.

In transitional organizational changes (Anderson & Ackerman Anderson, 2001), IT plays a dual role of supply and demand. On one hand, enterprise-wide IT architecture in Technical Realm provides efficiencies through technology standardization and centralized shared infrastructure (cf. Ross, 2003; Ross et al., 2006). The IT architecture also provides visibility into the internal structure and workings of enterprise IT, thereby making it more amenable to change (cf. Hoogervorst, 2009). On the other hand, enterprise (business) architecture governs the transition between as-is and to-be states (cf. Op't Land et al., 2009). Information technology is increasingly leveraged to “informatize” (Zuboff, 1985) knowledge work and appropriate business processes and to enable reengineering type of change.

Transformational changes (Anderson & Ackerman Anderson, 2001) are driven by IT. The business model is digital and strategic capability enabled by IT. With the focus on efficacy, value innovation and resilience, IT enables continuous reconfiguration of “unbundled” and “liquefied” (Normann, 2001) resources, through which the organization can shift its value proposition vis-à-vis its ecosystem (Vargo & Akaka, 2009) in alignment with semi-coherent strategies. The core of data and processes is optimized and digitized in Technical Realm. It is difficult to make changes to that core, but building new products and services onto the core becomes easier and faster. Modular architecture (cf. Ross, 2003; Ross et al., 2006) in Socio-Technical Realm enables strategic agility through reusable modules built upon the optimized core or by allowing locally customized modules connect to core data and core processes. While not reducing the need for standardization, the modular architecture allows for local customization and provides a platform for innovation.

IT Capability Must Match the Transformation Challenge

With respect to Angyal's (1941) three dimensions of the “structure of dynamic wholes,” the lack of IT capability in an organization can be seen as boiling down to the following three interrelated basic reasons:

1. **IT is too shallow** (*the vertical dimension*). It passively reacts to business requirements that are implemented in a straightforward manner with little or no consideration of the effect on the depth structure – the more enduring and permanent aspects of IT. As a result of “quick and dirty” solutions, “IT debt” ensues and eventually erodes the core.
2. **IT is too slow** (*the dimension of progression*). It is geared to reliable business support, but consequently tends to cement status quo. It has high static friction, as dense and tight interrelations render the system insular, inattentive to signals for change, and inert in the face of forces of change. It also has high kinetic friction: once the change

is eventually triggered, it transpires slowly, as through a cascade waterfall.

3. **IT is too narrow** (*the transversal dimension*). It is managed and governed apart from the rest of the organization. This leads to suboptimal use of assets. It is difficult to implement enterprise-wide solutions and to embed IT in organizational competences.

Each organization will require a specific level of IT capability. If that capability is not enough, the environment is experienced as turbulent (McCann & Selsky, 1984). If the organization experiences turbulence (relatively higher external complexity than its internal adaptive capacity) for a prolonged period of time and fails to develop active adaptive strategies, its members will produce maladaptive responses (Babürođlu, 1988).

First order maladaptive responses aim to reduce the complexity of the social field. The passive ones include:

- *Superficiality* refers to “indifference to what needs or demands are taken as a starting point for one’s behavioral responses.” In the context of IT, the delivered systems may fully fulfill the specified business needs, but with the lack of technology standards and enterprise-wide IT architecture, the proliferation of legacy systems and idiosyncratic point-to-point integrations renders the application landscape inert, expensive, and risky in the face of change.
- *Segmentation* pertains to separation of means and ends, wherein the social field is transformed into segments, each of which is integrated within itself but poorly with other segments. IT may be driven by its own agenda, disconnected from strategic business priorities. The all-too-common idea that the rest of the organization is the client for IT perpetuates and exacerbates this disconnect.
- *Dissociation* is manifested by a lack of coordination between the parts in the whole. Each function, including IT, constitutes a closure, relatively isolated from others.

Each of these three passive responses also has a respective, active correlate aimed at reducing the uncertainty and complexity of the turbulent environment (Crombie, 1972, as cited in Babürođlu, 1988):

- *Synoptic idealism*: an attempt to comprehensively cover all relevant information to control and to reduce the causal texture of the environment (sensu Emery & Trist, 1965) to a lower level. Cases in point of this type of active maladaptive response would include “analysis to paralysis,” attempts to model enterprise architecture to a high level of detail, or measures to monitor all imaginable events, all of which would go against the grain of Pareto dynamics.
- *Authoritarianism*: an attempt to impose a very rigid structure to prevent the means-ends or part-whole relationships from breaking down. This response is prevalent in IT. Variance is eliminated through cascaded goals, metrics and internal controls. Human error is removed from the production process through disciplinary and punitive measures that regulate discretion.

- *Evangelism*: an attempt to coordinate the field through notions such as “all pulling together.” Espoused pronouncements such as these are hollow, as actual systems and structures should be set up to enable integration, coordination, and negotiation of and between stakeholders and resources.

Continued denial of turbulence and resort to quick fixes in terms of passive or active maladaptive strategies is likely to beget second order maladaptive responses. While first order maladaptive responses attempt to reduce the causal texture, the second order responses crystallize it. Whereas the first order disintegrative disturbance of segregation would lead to fragmentation, the second order disintegrative disturbance implodes the whole into parts that can no longer be reintegrated (Babürođlu, 1988). The first order passive and active maladaptive responses will convert to the following second order maladaptive responses, respectively:

- *Monothematic dogmatism*: Dogma replaces the relevant uncertainty by “crystal clear truth.” It becomes the normative base of the monothe-matic society, which is committed to the same theme and cannot transcend it. The notion of “IT follows business,” for instance, may have become so ingrained in the ethos and practice of the organization that it continues to go unchallenged despite the changes in the strategic context that would call for a reappraisal.
- *Stalemate*: The means and ends are separated to the extent of nearly rendering the social system purposeless. The parts of the whole, in pursuit of their own agenda, do not contribute toward the common goal and may even oppose each other. As a result, the whole system is unable to pursue its ends. Pathologically, business will increasingly bypass the sluggish IT in developmental endeavors, and IT will endogenously invent new ways of justify and reinforce its existence without regard to strategic relevance.
- *Polarization*: The parts of the social field are polarized to cohesive and well-integrated social enclaves and sub-optimally functioning and declining social vortices (McCann & Selsky, 1984), resulting in destructive in-group–out-group dynamic. Self-contained, insular domains compound cross-functional differences. For instance, if all IT competence resides in a centralized, specialized IT unit, or better yet, is outsourced to an external party altogether, the enterprise is divided to an IT enclave, with all the know-how of the technical possibilities of IT and little insight into its commercial and organization-transforming potential, and to a non-IT vortex with no clue about the organizations latent IT capability.

Conclusions

In the increasingly interconnected, complex and dynamic environment, the organizations are forced to continual change and renewal in the face of the shifting value proposition. The more complex and dynamic the organization’s

strategic context, the more substantial changes it must undergo to keep up with the developments in its environment. As a result, each organization will require a specific capacity to carry out the required changes on an ongoing basis. If that capacity is not enough, the environment is experienced as turbulent (cf. McCann & Selsky, 1984), and the organization will seek new environmental fit through adaptive or maladaptive responses (cf. Babürođlu, 1988).

The role of information technology (IT) as the enabler and driver of business change and enterprise transformation has increased in importance. Whereas the role of IT has traditionally been that of providing business with support services, digital information and information systems are increasingly leveraged to enable new products and services, or IT is harnessed to drive entirely new digital business models. The maturity of IT in the organization should match the complexity of the organization's strategic context and the adaptive capacity required. The development of requisite IT capability is essential to counter the emergence of maladaptive responses to turbulence that tend towards increased internal dogma, stalemates, and polarization.

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Strategic Alignment and Internal IT

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The rapid development of computer and communication hardware, with ever increasing and cheaper processing power, storage capacity, and communication bandwidth have made it possible to increasingly and pervasively digitize previously non-digital artifacts across different industrial and organizational contexts (Brynjolfsson & Saunders, 2010; Tilson et al., 2010). This has led to regular leaps in performance, exceptional growth, and radically decreasing costs (Brynjolfsson & Saunders, 2010). The development is reshaping the underlying value propositions, transforming the way organizations connect with customers and conduct business. This digitalization of “everything” is touching every industry today. This new environment is characterized by globalization, competitive dynamism, growing complexity, and high reliance on information and information processing. In this environment, organizations are increasingly dependent upon IT for competitive advantage through extensive use of information, effective operational control, rapid innovation, speed to market, and increased customer satisfaction.

The impact of IT has been studied from various perspectives, such as organizational performance, productivity, organizational capabilities, or strategic position (Melville et al., 2004). Different researchers have incorporated different viewpoints and levels of analysis – those of firm, industry or country. Overall the business value of IT can be defined as the organizational performance impact of IT, both process and organization-wide, and comprising both organizational efficiency and competitive advantages (ibid.).

More recent studies of the business value of IT value have extended the initially narrow operationalization of the “economic performance” construct, and have even gone further to proposing that some of the impacts of IT investments are intangible in nature. To be realized, IT requires complementary investments in human capital and much organizational and social learning (Brynjolfsson & Saunders, 2010). Brynjolfsson and Saunders further note that lower communication and replication costs allow businesses to innovate by new products. Business value of IT is not restricted to IT employed within companies or other companies in their value networks – instead, IT business value is increasingly generated by the IT used by consumers.

Strategic Alignment and Business Value of IT

The alignment of business and IT – so called *strategic alignment* – has been a topic of considerable attention in the academia and among the practitioners for over three decades. The practical importance of strategic alignment is evidenced by annual SIM surveys, where alignment of IT with business has been among top 10 concerns since 1984 (Kappelman et al., 2014). Conceptually, strategic alignment can be defined as the degree of fit between an organization's business strategy, IT strategy, business structure, and IT infrastructure (Henderson & Venkatraman, 1993). A common theme in the alignment literature is that alignment leads to a more focused and strategic use of IT and that organizations with “high” alignment outperform those with “lower” alignment of business and IT. Previous research has demonstrated a number of benefits of alignment, such as maximizing the return on IT investments, helping to identify the true value of IT, increasing IT usage, and moderating the relationship between IT investment and firm performance.

Strategic Alignment and IT Governance

IT governance is seen as a key lever in achieving alignment between business and IT. The impact of IT governance on firm performance has been well established in previous studies. For example, Weill and Ross (2004) note that “effective IT governance is the single most important predictor of the value an organization generates from IT.” In order to succeed in planning, organizing, controlling, and directing the IT organization, top management needs to have an understanding of individual business and IT capabilities for current and future business needs. As IT has become crucial in supporting, sustaining and enabling business models, there is a need for better governance of related IT assets, competencies and capabilities. From a pragmatic perspective, both IT governance and strategic alignment are seen as organizational practices to improve the business value of IT.

Prior research has demonstrated how different IT governance arrangements link with the development of IT capabilities and strategic alignment. Successful management of IT investments and IT portfolio requires a number of procedures, rules and human resources that guarantee the proper use of IT assets. The adoption of an effective IT management and governance framework makes it easier to reach the objectives. On a higher level, this helps in developing the associated capacity to fulfill the requirements for the organization's long-term success. Weill and Ross (2004) show that top-performing firms generate significantly higher ROI on their IT investments by well-designed IT governance. Contemporary IT governance is becoming ubiquitous in nature, i.e. modern IT crosses intra- and inter-organizational activities and boundaries and is strongly aligned with business activities.

Alignment at Strategic and Tactical Levels

Alignment occurs at multiple levels in an organization. Tarafdar and Qrunfleh (2009) differentiate between alignment at strategic and tactical levels. Alignment at the strategic level is needed to ensure that IT and business plans are synchronized and IT implementations support organizations goals. Alignment at the tactical level is necessary for ensuring that IT investments are in line with business plans and that they are successfully implemented, maintained and used. Tactical alignment ensures organizations' ability to respond quickly (tactically) to changing business needs. Both strategic and tactical alignment is needed in order to benefit from the use of IT.

Table 3. Strategic and Tactical Alignment (Adapted from Tarafdar & Qrunfleh, 2009).

Strategic Alignment	<ul style="list-style-type: none"> • Linking business and IT planning processes • Exploiting IT based strategic opportunities • Active CIO participation in strategic planning 	<ul style="list-style-type: none"> • Aligning IT and business plans • Formal and interaction between the C-level (CEO, CFO, COO, CIO, ...) • Evaluation of emerging technologies for new product/market opportunities • Conceptualizing and communicating the value and role of IT to C-level • Emphasizing the role of senior management as IT customers
Tactical Alignment	<ul style="list-style-type: none"> • Alignment at project level • Aligning decision-making between IT and other departments, • Balancing with firm-wide standardization and process-specific customization • Formal and informal communication between business and IT • Alignment at the level of IT. 	<ul style="list-style-type: none"> • Project prioritization and monitoring • Functional sponsorship of projects • Resource allocation and re-allocation • Metrics for project success • Liaison roles situating IT people in user departments • Senior managers acting as project champions, sponsors or team leads • IT-business cross-functional project execution and management teams • Standardization to reduce redundancy and competition for resources • Customization of process-specific applications for competitive advantage • Regular and planned meetings between IT and business managers • Informal walk-arounds by IT managers • End user support mechanisms • Skills for implementing and maintaining new applications resulting from new product or customer initiatives • Acquiring cultural skills for maintaining worldwide IT operations (global firms).

Implementing Effective IT Governance

Haes and Grembergen (2009) analyze the impact of IT governance on strategic alignment. The results of their study suggest that there is a clear relationship between IT governance practices and strategic alignment. In effect, maturely governed organizations do achieve higher alignment compared to organizations with less mature governance. However, as actual guidance on how organization should implement theories in practice is missing in many of the high-level governance models presented in literature, an important question for practitioners is how to effectively implement effective IT governance in order to increase the business value of IT.

The design and implementation of IT governance requires structures, processes and relational mechanisms to be efficient on a practical level (Peterson,

2004; Haes & Grembergen, 2009). IT governance structures include organizational units, bodies and roles for IT related decision-making jointly by IT and business representatives. IT governance processes formalize decision-making and monitoring to ensure that individuals' behavior are consistent with set goals. Relational mechanisms cater for the collaboration and information sharing between business and IT executives and management. Research has shown that organizations typically find it easier to implement structures as opposed to processes. However, structures or processes without the other cannot be effective.

For practical guidance, Haes and Grembergen (2009) suggest a minimum baseline of ten IT governance practices that are highly effective and easy to implement, and are shown to help increase alignment. The suggested minimum baseline consists of five structural, four processual, and one relational mechanism.

Table 4. IT Governance Minimum Baseline (Adapted from Haes & Grembergen, 2009).

Structures		
S1	IT strategy committee at level of board of directors	Committee at board of directors level to ensure that IT is a regular item and reporting issue for BoD
S4	CIO on executive committee	CIO is a full member of the executive committee
S5	CIO reporting to CEO and/or COO	CIO reports directly to CEO / COO
S6	IT steering committee at executive / senior management level	Steering committee responsible for determining business priorities for IT investments
S9	IT project steering committee	Steering committee focusing on prioritizing and managing IT projects (jointly by business and IT)
Processes		
P1	Strategic information systems planning	Defined process for making IT strategy
P3	Portfolio management	Prioritization process for IT investments and projects (jointly by business and IT)
P8	Project governance/ management methodologies	Defined processes and methodologies for IT project management
P9	IT budget control and reporting	Defined processes for IT budget control and reporting
Relational Mechanisms		
R8	IT leadership	CIO (or similar) is able to articulate a clear vision for IT's role in the company and to ensure that this vision is clearly understood in the organization

The research done in the ACIO project confirms that IT governance has a positive influence on strategic alignment. However, the impact and effectiveness of IT governance is contingent on top management's understanding of the strategic value of IT. The concept of strategic alignment presumes alignment between business and IT on the strategic level. If an organization does not see the strategic value of IT in their business, achieving high alignment, by definition, is not possible. Consequently, designing and improving IT governance practices is not sufficient to achieve high alignment. In general, implementing and improving best practices on the level of tactical alignment is possible, but their value for the organization is questionable if the more strategic practices and the strategic direction for the use of IT is missing. Implementing best practices on the strategic level successfully requires redefining the role of IT to be more strategic, creating integrated business and IT strategy processes, and defining IT-related strategic decision making rights.

The second finding of the research is that even the IT governance minimum baseline has a strong positive relationship with strategic alignment. The re-

sults also reveal that IT governance minimum baseline impacts both strategic and tactical levels of alignment as defined by Tarafdar and Qrunfleh (2009). The final findings uncovered in this research refine IT governance minimum baseline even further and offers a tentative set of eight IT governance practices that are shown to have the highest impact on strategic alignment.

Table 5. A tentative set of eight IT Governance Practices (ACIO Research, 2014–2015).

Practices impacting alignment at Tactical Level		
P1	Strategic information systems planning	Defined process for making IT strategy
P3	Portfolio management	Prioritization process for IT investments and projects (jointly by business and IT)
P8	Project governance/ management methodologies	Defined processes and methodologies for IT project management
S6	IT steering committee at executive / senior management level	Steering committee responsible for determining business priorities for IT investments
S9	IT project steering committee	Steering committee focusing on prioritizing and managing IT projects (jointly by business and IT)
Practices impacting alignment at Strategic Level		
S1	IT strategy committee at level of board of directors	Committee at board of directors level to ensure that IT is a regular item and reporting issue for BoD
S4	CIO on executive committee	CIO is a full member of the executive committee
S5	CIO reporting to CEO and/or COO	CIO reports directly to CEO / COO

Conclusions

Both IT governance and strategic alignment remain high on the agenda of IT executives. While there is critique towards strategic alignment, we believe that it will remain high on the list of key issues as IT and business evolve. In the digitalized world, IT will be an integral enabler and driver of efficiency and effectiveness throughout the businesses. Future IT governance and alignment research will need to evolve from the perspective of a single firm to IT platforms and ecosystems. As Coltman et al. (2015) note: “As we look to the future, we see three key themes that will guide future research on IT alignment. These themes are: (1) the micro-foundations of IT alignment, (2) the rise of digital business strategy, and (3) innovation ecosystem and value co-creation.”

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Digital Business and Platforms

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Change in IT Value Creation

Use of IT in companies and other organizations started some 30–40 years ago as automation of manual tasks. Finance, inventory, order processing, invoicing, and payroll were among the first functions, and the supporting applications were developed or purchased for these functions. Next step was to use IT, such as ERP and CRM applications, to support company-wide business processes across organizational boundaries with focus on improving cost-efficiency and on streamlining operations. Third domain of IT use has focused in enabling business growth and improving competitive position in the organizations' marketplace. Home banking, loyalty card programs, and e-commerce are some examples of such domains where the focus of IT is to improve the value created to the customers.

During economical downturns, companies often try to focus on cost savings and therefore try to find more opportunities where IT could be used to cut costs in the organization. However, cost-cutting mode cannot continue forever, because of the law of diminishing marginal utility. In practice, the law says that for every new euro invested in IT in order to save costs the gain is less.

Today, companies are strongly shifting the focus of IT from cost savings into revenue generation, into development of new products and services, which also involve new innovative business models.

Bits Will Eat Atoms

In 1995 Nicholas Negroponte, the director of MIT Media Lab published his book "Being Digital" (Negroponte, 1995). In that book, he was discussing digitalization and made his point comparing the difference between bits and atoms. His bold prediction was: "Bits will eat Atoms, whenever and wherever possible." Now, twenty years after the book was published, this prediction has become true in many areas, and the trend continues with increasing speed thanks to the Internet, mobility, and digital business platforms.

One topic of research in the ACIO project has been digital transformation. It can be divided in areas such as digital shopping (e.g. e-commerce, mobile payment), digital services (e.g. e-booking), digital products (e.g. CDs and DVDs), and digital delivery (e.g. Spotify and Netflix).

The term digital and electronic are often used to mean the same phenomenon, the situation where bits are eating atoms. Sometimes, the word “digital” is connected to the product or service itself, and the word electronic is connected to the method of communication. This article uses both words quite freely and interchangeably.

Shopping

Shopping has gone digital. Take for example Amazon.com, which started in 1995 as an on-line bookstore. Compared to the largest brick-and-mortar bookstores and mail order catalogs which might offer 200,000 titles, an online bookstore could carry several times more, since they had an almost unlimited virtual warehouse: those of the actual product makers/suppliers. We just browse the titles, choose what to buy, pay it online and receive the book carried to our home or to the nearest postal office. And today e-commerce is everywhere, even spreading to traditional markets like grocery stores. We can buy books, shoes, clothes, electronics, tools, and medications – just to name a few of items available for online shopping.

Mobile Payment

Payment has gone digital. Most shops have installed on-line point-of-sale terminals and accept debit or credit cards. With mobile communications, these terminals can be used in taxis, restaurants and other places where customers are visiting. Mobile payment services using smartphones instead of cards are also increasingly developed, offering customers even more options for paying mobile. Near Field Communications (NFC) technology speeds up the actual payment transaction. For small charges, the customer just swipes the payment card or mobile phone close to the cash terminal with no need to enter the PIN code.

Customer Service

Customer service has gone digital. We pay our bills using online services of our banks. Within the public sector, we can change our home address online instead of visiting the local register office. Our tax office collects information from our employers and other sources in electronic form. It even sends us a proposal for taxation, which we can then modify online if needed. The public sector is heavily developing digital versions of many of its services.

Digital Products

Products have gone digital. Audio went digital in large scale, when the Compact Disc (CD) was introduced in 1982. It quickly gained popularity and soon passed sales of analog music on vinyl records or music cassettes. Similarly, Digital Video Disc (DVD), which was introduced in 1995, soon surpassed the sales of analog VHS cassettes.

Similar development has taken place in consumer photography. First digital consumer cameras were introduced in early 1990's and now by far most cameras sold are digital cameras. Since 2003, digital cameras have outsold film cameras. Transformation to digital has made an enormous change in the whole industry including cameras, films, processing laboratories, distribution of images, etc.

The movie industry has shifted into digital production. Not just using digital equipment from shooting to showing the material, but also creating digital effects. Jurassic Park is a good example of how a totally another world can be created digitally. Avatar is another example that shows the power of 3D animations for movies.

Regarding books, we can again look at Amazon.com. They launched their Kindle e-book reader, which enables users to read digital media. The launch of an e-book reader was just enabling the customers to access digital content. Amazon.com also supports other Kindle readers on Windows, Apple OS X and iOS, Android, Windows Phone, and other platforms. Amazon Kindle e-book downloads outsold paperbacks in the last three months of 2010 (BBC News, 2011).

Digital Distribution

In addition to digital commerce and digital products, digital distribution creates a third dimension in digital transformation. Since the widespread use of the Internet and World Wide Web within the last 20–25 years, ubiquitous high-speed access is available almost everywhere at a minimal cost. That has also had a deep impact on how digital products and services are delivered to the customers.

While we used to buy and download to our own device digital content like movies or e-books from the web-store, today's high-speed connections are making this model obsolete. Today, we subscribe to Spotify or Netflix and stream music or movies to our screens when and wherever we want.

Digital distribution is changing many industries. Digital terrestrial television in Finland started in 2001 and ran in parallel with analog distribution until 2007, when analog was closed down. Today, in parallel with digital terrestrial broadcasting, YLE is distributing most of its content also on the Internet.

Products On-Demand

Digital distribution is also rapidly changing how we deliver physical products. 3D printing is in a developmental phase and has potential to change manufacturing into on-demand production. Ordering, manufacturing and distribution of digital products would radically change our traditional concept of mass production into one-on-one and on-demand production.

New Business Models

Digital transformation is profoundly changing the ways in which value is created and how value is captured. New companies with new, innovative business models are born. Existing companies need to rethink their business models when transforming to the digital era. How to define and explain business models to enable common understanding, discussion, evaluation, and agreement of implementation has also been a topic within the ACIO project.

Two-Sided Markets

In literature of business models, an emerging model is the business platform, sometimes also called two-sided or multi-sided business model pattern (Osterwalder & Pigneur, 2010). Whereas single-sided business models have one or several customer segments, which are distinct from each other, the platformed business model has two or several customer segments, which interact with each other using the business platform. A well-known example of a business platform is a commercial broadcasting company, which offers both content and commercials to its viewers. The business model of the company is to sell time slots to advertisers and provide commercials and content to viewers for free. In this specific two-sided market model, one customer segment, advertisers, subsidizes the other segment, the viewers.

In his book “The Age of the Platform: How Amazon, Apple, Facebook, and Google Have Redefined Business” (Simon, 2011), Phil Simon names these companies “The gang of Four.” They are superior in use of technology and have created strong ecosystems of companies and partners to innovate new products and services. Google and Facebook do not deal with physical products at all; their business is totally digital. They both have an advertisement-funded business model, where money from the advertisers is used to subsidize the users of those platforms.

Google is now one of the biggest global players in advertising business. Google collects lots of data from its users, creates their profiles, and using the profiles can target the advertisements with better precision than traditional mass media. That effect has made major changes in the traditional media industry, which is now trying to cope with its traditional advertisers moving to Google and other digital platforms.

Ecosystems

Another word often connected with platforms is “Ecosystems.” The book “The Keystone Advantage” (Iansiti & Levien, 2004) compares the emerging business networks with biological ecosystems.

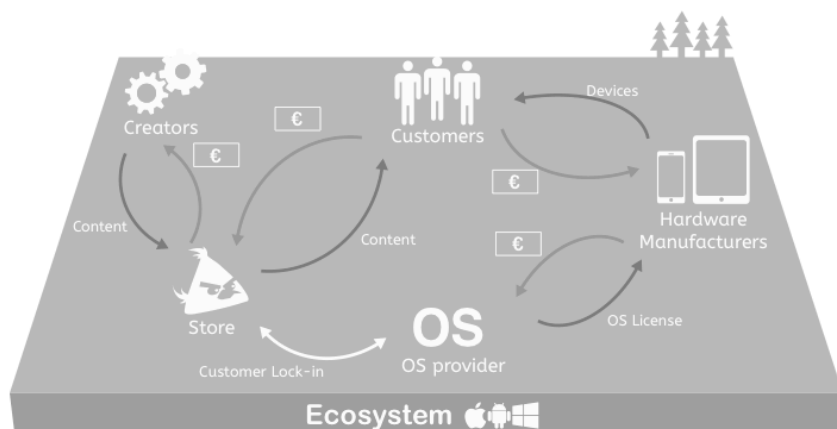


Figure 3. Example of an ecosystem.

An example of an ecosystem is the smartphone industry (see Figure 3). We have hardware manufacturers who develop and manufacture devices, such as phones and tablets. But customers have no use for the hardware device only. The customers need some software, an operating system, which makes the device a smartphone, a platform that is capable to run applications. That is typically bundled with the device and is provided by the device manufacturer (Apple) or software company (Google or Microsoft). But the operating system (iOS, Android, Windows or Linux) is not what the customers want; they want apps and content. So there is a need for a market place, an app store, where the customers can buy apps and content to their devices. And that is what Apple iTunes, Google Play, Windows Store and other shops provide. The customers can shop apps or content from their creators, and the platform takes its own share of the revenues.

This combination of a device manufacturer, operating system provider, store, app provider, and content provider is called an ecosystem, in this example a smartphone ecosystem. All the members in the ecosystem benefit from each other, and of course the customer benefits most. And, of course, the customers belong into the ecosystem. However, the operating systems and app stores also create a customer lock-in phenomenon. Once the customer has chosen the ecosystem, it will be very difficult to change it to another ecosystem. The apps and their content are strongly tied to the ecosystem. If the customer wants to change the ecosystem, almost everything, e.g. devices and apps, needs to be purchased again.

Network Effects

One reason that makes the platformed business model so strong is called a network effect. Instead of linear growth, based on how good a company is to attract new customers, the platform can experience a non-linear, sometimes exponential growth by enabling its customers to attract each other. In system dynamics parlance, this behavior is called a reinforcing feedback loop.

A well-known example of network effects is credit card companies like American Express, Visa, Master Card, etc. Their customer segments are sellers and buyers. The network effect here is a cross-side effect: The more sellers accept a specific credit card, the more attractive it is for new buyers to use that credit card. And the more buyers are using that credit card, the more attractive it is for new sellers to accept payments with that card.

An example of a same-side network effect would be the bookseller Amazon. The readers of the books can write reviews, which are then used by potential buyers, when they are making their buying decisions. The more readers write reviews, the more it attracts new buyers to purchase the book and also to write their reviews. And then this creates the cross-side network effect: The more buyers buy from Amazon, the more attractive it is for new sellers to offer their products through Amazon. And again, the more sellers join Amazon, the more attractive it is for new buyers to buy from that platform.

Digital Business Platforms

Digital business platforms are changing how products and services are created and offered. They are threatening established companies within many industries.

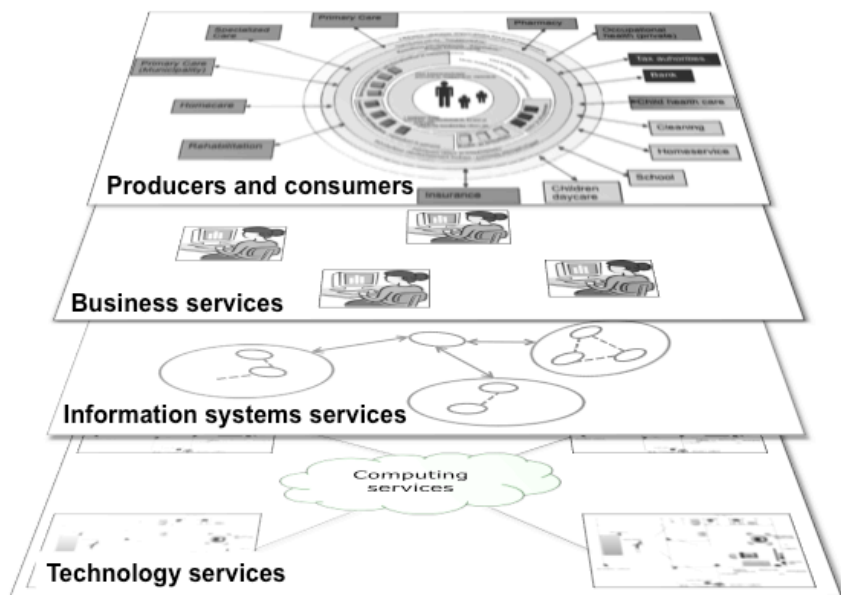


Figure 4. Layered business platforms.

AirBnB is a platform that connects those ordinary people who are willing to provide a room and those travellers who are in need of an inexpensive accommodation. Uber is a platform that connects ordinary people who are willing to provide taxi drive and customers who are in need of getting from one place to another. Interestingly, neither AirBnB nor Uber own their rooms or cars; they

just connect the owners and users into an interaction. Both AirBnB and Uber also create trust on both sides: the service buyers can write reviews of their experience, and the service providers can write reviews of their customers.

Challenges with Digitalization

Healthcare and wellbeing are industries, where digitalization has for a long time been promising to change how care is provided. However, public sector is still working in mainly the same way as it has since 1970's, when the municipalities became responsible for providing healthcare services to their citizens. How to combine digital services with manual services, such as home care, elderly care, etc. is still a challenge. The need for improving effectiveness of care services is immediate due to the aging population and the rising cost of work force, but it is not easy to find new business models within the public sector to fund the IT costs.

Digital business platforms are expensive to develop and run. They need a certain user base and a critical mass to get started. How to get started, how to find a large enough user base in the beginning? This is a typical chicken and egg problem: How to get enough care service providers and care service consumers on board at the same time, so that the platform starts to grow and to attract more providers and customers?

Another challenge is technical interoperability of service providers that connect to the digital business platforms. A key is to develop standards for connecting to the platform and using its services. And the question is: who is responsible and owns the standards and who maintains and develops them? Is it the operating system provider, like in case of smartphones? Is it a consortium, like in case of mobile phones and their communications? Or is it a public entity, like Kela and THL in Finnish health care services?

Considerations for Enterprises

Chuck Hollis says in his blog: "Every digital business model requires a platform to do business on" (Hollis 2012). For any enterprise this poses a question: should we become a digital business platform or should we become customers of digital business platforms? And if we choose to become customers, which platforms do we choose to collaborate with? Digital transformation based on the Internet, mobility, and digital business platforms does not respect borders of countries.

In Finland, we use digital business platforms like Google, Facebook, Apple, Amazon, and others in our everyday lives. They create enormous value to us, but, at the same time, they capture enormous amounts of money that goes outside Finland. Should Finnish companies develop platforms, or should they join existing platforms? Which would be their customer segments and how would value be created and captured?

Digital transformation is tightly related to digital business platforms and new business models. That could be an interesting avenue for further research.

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The Changing Role of the CIO

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As Information Technology (IT) has become increasingly embedded in organizational processes and practices, the mandate of the CIO has grown from running efficient IT operations, and delivering reliable and consistent services to “business innovation using IT” (Peppard, 2012): innovation in products and services, processes, business models, management, and customer experience. The value of IT not only comes from the technical function that it provides, but it increasingly stems from the ability of managers to invent new processes and organizational structures that leverage computational capability (Brynjolfsson & Hitt, 2000). This denotes a change from supply-side leadership (Broadbent & Kitzi, 2005) – “the extent to which the CIO leads the IT function to *exploit* existing IT resources to meet ongoing known business needs” (Chen, Preston, & Xia, 2010) to demand-side leadership (Broadbent & Kitzi, 2005) – “the extent to which the CIO leads the entire firm in *exploring* IT-enabled innovations and new strategic opportunities” (Chen et al., 2010). This shift has a dual impact on IT leadership. “Leadership in the digital age” (Wilson, 2004) calls for qualitatively different attitudes, skills, knowledge, and capability than leadership in the pre-digital age. On the other hand, “digital leadership” (ibid.) requires a very specific set of skills and knowledge.

IT management must be actively involved in integrating information technology, business strategy and organizational change management into a coherent, functioning whole. What most determines an organization’s ability to build strong IT management skills are the capabilities and character of the IT function’s most senior executive, typically the Chief Information Officer (CIO) (Chatterjee, Richardson, & Zmud, 2001). While specific skills, knowledge and experience continue to be important, the discretionary component of work – the mental processing (Jaques, 1998) – is increasingly important to manage and lead IT-driven enterprise transformation. Human work can never be exclusively knowledge-based, for when all non-verbal judgment is taken out of a decision, it becomes a calculation, not a decision (ibid.). Decision-making entails giving energy and direction to non-verbal mental processing whose outcomes are integrated with knowledge and used in conscious problem-solving.

In this chapter, I discuss the transformational thinking and post-conventional level of leadership required in the digital age. I put forward a three-level typology of IT leadership and analyze CIOs’ changing role against this backdrop. I also present tentative results of my research on Finnish CIOs.

Leadership in the Digital Age Calls for Transformational Thinking

The digital age requires a marked change in how leaders think. In linear and logical thinking of the past, change is seen as something external that can be “managed” or something imposed from the outside that needs to be adapted to. The tendency is to seek stability of the system through internal adjustments that match the changing environment. These adjustments may be *developmental* (Anderson & Ackerman Anderson, 2001) – wherein the current operations are improved – or *transitional* (ibid.) – wherein the current operational work systems are replaced.

However, logical thinking falls short in the face of *transformational* change (Anderson & Ackerman Anderson, 2001) that calls for fundamentally rethinking the very identity, purpose, or business model of the organization, which is reflected in change of individual and collective mindsets, beliefs and values. According to Laske (2008), formal logical thinking is confined to closed systems that cannot size up non-physical moving targets. Open, living systems always include contradictions and things “other” than what the system in its present form openly manifests. Transformation of such a system is a developmental movement across time that explodes any closed system in its entirety (ibid.). While linear, logical thinking may be requisite in less complex work such as project management, incremental process improvements, or reengineering efforts for optimized performance, it falls short in complex transformational undertakings such as business model transformation or business mergers that require more advanced cognitive capabilities (Laske, 2008; De Visch, 2010).

In dialectic thinking, unceasing change is seen as an intrinsic part of reality that can be directed to developmental ends. It cannot be predicted with logical thinking that relies on lagging (past-oriented) indicators and it cannot be managed in a traditional sense. Rather, change is endogenously and proactively created. A full-system organizational transformation is “led from the future as it emerges” (Scharmer, 2009). It starts from the positive stance that transformation has already transpired as opposed to negativity inherent in the disparity between “as-is” and “to-be.” By shifting the context – redrawing the boundaries – what is inside the boundary of inquiry becomes what we know that we don’t know (Davis, 1982). This focuses attention to create the content, a new reality that derives from this “ground of being.” Rather than being pulled along by the strategy, organization can be used to push the strategy toward its realization.

Complex transformational change calls for a fundamental shift in a leader’s perception of the world, a willingness to embark on a personal journey of reflection and exploration of existing mental models, and openness to personal growth and change (Vurdelja, 2011). Few leaders possess this capacity. Only about 10 per cent of leaders are functioning at the post-heroic (Bradford & Cohen, 1998; Joiner & Josephs, 2007), or, post-conventional (Torbert, 2004), levels of development that fully embrace transformational thinking (cf. Laske, 2008). At the first post-conventional level, the leader must, at least, be able to (Joiner & Josephs, 2007; Torbert, 2004):

- Have a wide-angle view on the health of the natural environment and the wellbeing of the larger society;
- Create visions that challenge commonly held assumptions;
- Focus more on both present and historical context;
- Move through different time frames with ease;
- Think globally, regionally, and locally all at the same time;
- Recognize different frames of reference and respective biases;
- Let go of defense mechanisms;
- Accept mixed feelings and inner conflicts;
- Be attracted by difference and change more than by similarity and stability;
- Create empowering environments; and
- Exhibit visionary leadership.

Strategic Drivers: New Breed of Digital Leaders

Leaders of today's digital organizations must deeply sense fundamental changes in technology, industry structure, marketplace, and society; boldly seize opportunities to create new value for existing and new markets; and simultaneously reconfigure the organization's assets to match its current and future capabilities with the continually shifting strategic context. While the role of the Chief Executive Officer (CEO) is pivotal in weaving together the internal and external strands of development, the CIO plays an increasingly crucial role in keeping up with the breakneck pace of digital progress and translating between strategic business requirements and requisite digital capabilities.

In the following, three levels of CIOs are outlined: Implementer, Business Enabler, and Strategic Driver. Each successive level of CIO requires progressively higher level of leadership capability. The characteristics of the role and requirements for the capability of each type of CIO are summarized in Table 6.

Table 6. Three levels of CIOs.

Type of CIO	Role Characteristics	Capability Requirements
<i>Strategic Driver</i>	<ul style="list-style-type: none"> • Corporate role • Strategic intent • 5–10 years time horizon • Ensures long-term resilience and viability 	<ul style="list-style-type: none"> • Shapes new contexts • Uses power of vision and participation • Multiple frames of reference
<i>Business Enabler</i>	<ul style="list-style-type: none"> • Demand-side • Tactical portfolio • 2–5 years time horizon • Ensures business responsiveness 	<ul style="list-style-type: none"> • Capacity for envisioning future possibilities • Holds opposing ideas in mind • Applies conceptual frameworks

<i>Implementer</i>	<ul style="list-style-type: none"> • Supply-side • Operational excellence • 1–2 years time horizon • Ensures efficient and reliable IT system 	<ul style="list-style-type: none"> • Focus on functional and technical tasks • Either-or mind-set • Analytical problem-solving
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Implementers are at their best on the supply side (cf. Broadbent & Kitzis, 2005): delivering to the goals and requirements of business and being measured on the results expected from IT. According to Chen et al. (2010), a supply-side CIO is a technology adviser, architect, and leader (Applegate & Elam, 1992; Ross & Feeny, 1999; McLean & Smits, 2003); a resource allocator (Grover et al., 1993; Stephens et al., 1992); an informed buyer (Feeny, 1998; Ross, 1999); a manager of vendor relations (Feeny & Willcocks, 1998; Smaltz, Sambamurthy, & Agarwal, 2006); an integrator (Earl & Feeny, 1994); and an architect leader of an effective IT management capability (Chatterjee et al., 2001).

Implementer CIOs are responsible for implementing and maintaining an organization's IT solutions and technology infrastructure, which they aim to make happen in the most cost-effective and efficient manner. They are also the sensors of the organization, reporting operational issues and problems upwards. The requisite time span of discretion in the role of Implementer would be less than two years.

The focus of Implementer CIO is on operational excellence: making sure that the IT systems, processes and solutions create value in the present and can be developed to meet the likely needs of the near future. This calls for some degree of conceptualization: connecting things to develop a systematic response, taking into account factors such as risk, cost, and time to completion. Implementers know how to get things done and are great at devising systems, policies, guidelines, instructions and procedures that ensure smooth, reliable and stable operations. They are good in analytical problem solving, yet they are typically limited by an either-or mindset (Joiner & Josephs, 2007). This level of IT leadership is being rendered increasingly inept in the face of today's transformation imperative.

Business Enablers are able to oversee the organization's IT strategy and to work together with business on the demand side (cf. Broadbent & Kitzis, 2005). According to Chen et al. (2010), a demand-side CIO is a strategist (Smaltz et al., 2006; McLean & Smits, 2003; Karimi, Gupta, & Somers, 1996; Applegate & Elam, 1992); a business leader (Feeny & Willcocks, 1998; Grover et al., 1993; Applegate & Elam, 1992); a relationship builder (Earl & Feeny, 1994; Feeny, Edwards, & Simpson, 1992); a network builder and liaison (Stephens et al., 1992; Grover et al., 1993); a visionary of business (Ross & Feeny, 1999) and technology (Chatterjee et al., 2001); an innovator (McLean & Smits, 2003); a business systems thinker (Feeny & Willcocks, 1998); and an organizational designer (Ross & Feeny, 1999).

Business Enabler CIOs develop policies and goals for the IT department, manage the portfolio of IT investments, and make investment and divestment proposals pertaining to strategic information systems, technology platforms and standards, etc., even though higher approval may still be needed before the investment can proceed. The time horizon of Business Enabler would go two to five years out to the future

The focus of Business Enabler CIO is on ensuring business responsiveness: developing a functioning set of systems that addresses comprehensive business needs now and in the future. The objective of his/her activities is often to introduce innovative new systems or solutions, or to decommission the obsolete ones. This demands integrative, cross-disciplinary thinking. Business Enablers must also be capable of assessing, prioritizing and revising goals as well as reorienting towards new goals. In comparison to Implementers, they have higher capacity for envisioning future possibilities and are better able to hold opposing ideas in mind (Joiner & Josephs, 2007). Their thinking is more systemic and often employs conceptual frameworks and other thinking tools. This level of IT leadership seems to have been up to par with complexity so far, but it probably will not suffice in the increasingly intricate future.

Strategic Drivers craft the organization's strategic intent pertaining to IT, co-create IT-driven business models with senior business executives and envision and enforce strategic IT capabilities. CIOs of this level are very rare, often transcending the mere IT function, and likely to be found only in large information-intensive corporate organizations. They typically deliver "directly to the bottom or top line of the firm" (Chew, 2011). The time horizon of a Strategic Driver would go beyond five years.

The focus of Strategic Driver CIO is on shaping the organization's information technology and information systems landscape to ensure long-term business continuity within the organization's environment. This requires dialectic and transformational thinking: long-term visionary insight into the developments in technology innovation, the industry structure and the society at large, as well as into the co-causal interrelationships and higher-order consequences of these developments. Strategic Drivers are the creators of the future: with the ability to take on multiple frames of reference, they harness the power of people and shape new contexts that enable the vision to come into being (Joiner & Josephs, 2007). In today's increasingly turbulent digital world, this level of IT leadership is increasingly called for.

CIO's Role in Finnish Organizations

Leadership is the Most Important CIO Skill

The global SIM Study (Kappelman et al., 2014) has been conducted in Finland in 2013 and 2014². According to the survey results, the CIO's role is seen in Finnish organizations as that of Business Enabler. This is reflected in what

² The particular results for the Finnish part are yet unpublished.

were considered as the most important CIO skills and activities. The trend seems to be continuing to a more strategic direction.

In the latest 2014 survey, the Finnish respondents ranked Leadership by far as the most important CIO skill. Out of the 21 who responded the question, 15 mentioned Leadership as one of the three skills or experiences most important for the CIO. This is in line with the global results: both in Europe and in North America, Leadership was also ranked as number one.

A cluster of four skills, each with seven or six mentions, ranks second: People Management/Relationships, Decision Making, Strategic Planning, and Change Management. It is to be noted that all of these skills are non-technical “soft” skills, reflecting demand-side rather than supply-side competencies. All these skills also rank in top four in North America. At the European level, other skills rank in top five, but interestingly Strategic Planning is generally not ranked near as high; it comes as #20 in the Europe-wide ranking.

A third cluster of CIO skills, each with two mentions, includes some of the skills ranked high globally: Emotional Intelligence, Communication (oral), and Business Analysis. It is notable, however, that Business Analysis was ranked as #2 in Europe, so in comparison to this geographic reference group, Finland ranks relatively markedly lower. On the other, Emotional Intelligence was not ranked as high at the European level (#13).

What is more notable, however, is that three skills in this cluster, Industry, Honesty/Credibility, and Enterprise Architecture, do not even make it to the global or regional top rank lists. The reason why Enterprise Architecture is mentioned probably lies in the fact that in Finland EA is mandated by law in public sector organizations.

Six more skills made it to the Finnish list in 2014, with one mention each: Project Plan/Budget/Schedule, Planning, Innovation, Communication (written), Collaboration with Others/Teamwork, Budgeting. Again, the first three do not occur in global, North American or European rankings. However, due to the low number of respondents, it is not possible to draw definite conclusions based on this observation.

Key CIO activities, according to the Finnish respondents, were driving business change or innovation (62 per cent of respondents), developing business strategy (33 %), deploying new services (33 %), cultivating business relationships (29 %), and reducing business costs (29 %). All of these activities support the notion of the prevalence of business-enabling CIO leadership in Finland.

According to the survey, the role of the CIO in Finland is becoming more business-oriented and more challenging (71 % and 29 % of responses, respectively). Similarly, the future skills of the CIO are expected to be more business skills (50 %) or more both business and technical skills (50 %). None of the respondents considered the future skill demands as unchanged from the current ones. No-one deemed that there will be no CIO role in the future.

The CIO's Capability Has an Important Role in Digital Transformation

In my ongoing PhD research, I studied the role of CIO in organizational change. I interviewed CIOs in six organizations, headquartered in Finland,

assessing their work capability using the Career Path Appreciation (CPA) method. The tentative empirical results of the study corroborate the findings of the SIM study: it seems that the CIO role is paradigmatically that of Business Enabler. As per my assessment, four of the interviewed CIOs were Business Enablers, one was an Implementer, and one was a Strategic Driver. The level of the CIO was reflective of the size of the organization: the Implementer comes from a fast-growing organization of about 150 employees; the Strategic Driver oversees a vast enterprise network of close to 10.000 people; while the Business Enablers lead IT in large corporate organizations.

Apart from the CIO interviews, I also developed a survey instrument – Enterprise Transformation Capability (ETC) survey – that intends to measure the organization's overall capacity to change. The survey was conducted in the same six case organizations to take the pulse of their ETC.

The capability of the CIO seems to be moderately correlated with the overall ETC ($n = 45$; $r = 0.313$; $p\text{-value} < 0.05$). In other words, the CIO capability would have a medium size effect (Cohen, 1977) on the organization's change capacity. This level of correlation is typical in behavioral and social sciences research (ibid.), where there are many other variables contributing to the variance.

While the correlation does not imply one-way causality – for instance, an organization with a high ETC score is also more likely to attract, hire, and retain a CIO of high capability than a less mature organization – the data suggests that a Strategic Driver CIO would give rise to significantly more effective IT: the Enterprise IT component of ETC was markedly higher in the case where the CIO's capability was at the Strategic Driver level than in other cases. Moreover, the Change Management score was relatively strongly correlated ($n = 45$; $r = 0.41$; $p\text{-value} < 0.01$) with the CIO capability.

Conclusions

The last few decades have seen a shift of the CIO role from the supply-side to the demand-side. With growing appreciation of the increasingly important role of IT in value creation, the CIO role is often that of Business Enabler. IT function is given the exalted status that it deserves, but its role is still that of an enabling function. In the words of a corporate CIO, such “IT is a bit like a taxi driver: you drive the shortest and best route to the destination, avoiding foreseeable traffic jams, but in the end of the day the one who says where to drive [the business] is sitting on the back seat.”

With the onset of digital business models, however, application of information technology has become a core strategic capability for a growing number of leading business organizations. “Analytic competitors” (Davenport, 2006, 2012) and pure digital companies have information and information technology in their very DNA. As IT has a fundamentally strategic role in these organizations, Strategic Drivers emerge. They may not be called CIOs, as the title of the role often reflects this more encompassing scope. Aiken and Gorman (2013) call for the role of Chief Data Officer (CDO), solely dedicated to

leveraging organizational data assets de-linked from business information system development. Chief Digital Officer (also, CDO) is another emerging epithet.

Regardless of the title, the role type of Strategic Driver CIO represents the new forefront of digital leadership. While the knowledge, skills and attitudes required in this role transcend those of more traditional CIOs, it is ultimately the required work capability – the ability to exercise discretion in decision-making – that is markedly more scarce. As only about 10 per cent of all leaders have “what IT takes” in the 21st century, not only will the leading organizations want to provide people with training in digital skills but they will also want to identify their true IT leadership potential and build their talent pool respectively. Only when the CIO has the “mental horsepower” to conceive true transformational change can the full power of digital technology be unleashed.

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IT Governance and Enterprise Architecture

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Enterprise architecture is today's long term strategic capability for digital business models and operations. Digitalized business environment is complex and systems are now interconnected using same data, information, and technology. In ACIO, we are interested in practice and value of strategic enterprise transformation using a holistic engineering and management approach such as EA.

The rapid change of the current information intensive business environment and the increasing importance of information technology within enterprises create pressure to manage change and to make correct decisions that take into account both business and information technology needs.

In this evolving environment, the governance mechanisms and co-operation processes between business and IT play a crucial role. In literature, these mechanisms are often referred to as IT Governance, and the research perspective is inherently IT driven. However, successful navigation in treacherous waters requires approach that covers organization end-to-end and seamless co-operation on all levels of organization.

Enterprise Architecture (hereafter referred to as EA), a holistic management practice covering both business and information technology, is gaining popularity as an approach for organizations to adapt to changes faster than ever before and manage the complexity of business processes as well as increasing number of information systems.

Successful implementation of EA can produce benefits across the whole organization. However, EA is most often associated with information technology consolidation and information technology landscape management as well as with business and information technology alignment.

Does One IT Governance Framework Fit All?

IT Governance is often defined as the processes that ensure the effective and efficient use of IT in enabling an organization to achieve its goals. Although the definition of IT Governance appears to be relatively straight forward, this domain can be approached from several viewpoints and several frameworks have been constructed making it difficult for enterprises to decide which frame-

works and to what extent to adopt. While the frameworks mature they tend to expand on new domains thus covering larger portion of IT management landscape.

ISACA positions COBIT as the leading framework for the governance and management of enterprise IT. Although COBIT is based on five simple principles; Meeting stakeholder needs, Covering the Enterprise End-to-End, Applying a Single Integrated Framework, Enabling a Holistic Approach and Separating Governance from Management, it is perhaps the most comprehensive IT governance framework covering 37 processes. The sheer scope of it makes it almost impossible to fully implement the framework and most enterprises end up implementing just those processes that generate most value to them, thus acting against the principles of COBIT.

De Haes and Van Grembergen (2008) suggest that effective governance can be achieved with less building blocks. They emphasize the importance of implementing IT governance using a mixture of various structures, processes and relational mechanisms. Moreover, they suggest a minimum baseline of five structural, four process and one relational mechanism that are highly effective and easy to implement. Hiekkanen goes even further on another article in this publication and suggests a tentative set of eight IT governance practices that should be sufficient.

Luftmann (2003) argues that business-IT alignment maturity has profound influence on how IT is applied in appropriate and timely way with business strategies, goals and needs. Strategic Alignment Maturity is measured thru six criteria; Communication, Competency/Value Measurement, Governance, Partnership, Scope and Architecture, and Skills. In total framework includes maturity evaluation of 40 dimensions or processes. Assessment will provide good understanding of potential development areas for business-IT alignment. However, the contribution in the actual tasks for improving governance is limited.

ICT Standard Forum (2015) has developed the ICT Standard Model which identifies five management streams; Business Alignment, Strategy and Governance, Sourcing and Vendor Relationships, Project Management, and Service Management. These domains are then divided into 23 functions within which explain briefly and concisely what different areas of ICT management actually involve. Development activity was originally based on combining other frameworks and was driven by the question "How can you run ICT management like a business?"

Ross and Weill (2004) focus on the distribution of decision rights within the organization. They argue that there are five areas where IT governance decisions are needed; IT principles, IT architecture, IT infrastructure, Business application needs, and IT investment and prioritization. The interaction between different parties of organization forms the actual governance structure and how well these parties work together determines to great extent the success of the organization.

Gartner (2013) approaches the effective and efficient use of IT by dividing the responsibilities of core governance processes explicitly between business

and IT organizations. “In this model the IT demand governance (what IT should work on) is the process by which organizations ensure the effective evaluation, selection, prioritization, and funding of competing IT investments; oversee their implementation; and extract (measurable) business benefits. This is essentially a business investment decision-making and oversight process, and it is a business management responsibility. IT supply-side governance (how IT should do what it does) is concerned with ensuring that the IT organization operates in an effective, efficient and compliant fashion, and it is primarily a CIO responsibility.” (Gartner, 2013)

It is clear that every organization has to evaluate the scope and scale of IT governance needed in their context. IT governance framework should be measured thru the value it creates and therefore organizations should first focus on getting key building blocks in place. Good enough IT governance framework and ease of implementation are the keys to success.

Enterprise Architecture Evolving

EA is an approach for providing insight and an overview for an organization. Moreover, it is a holistic management practice covering both business and information technology to manage complexity and to aid strategic decision-making (Op’t Land et al., 2009). Originally, EA was developed as a tool for information systems management (Kappelman et al., 2008), but during the past decade the concept has evolved more towards an instrument for business IT alignment (Simon et al., 2013) or even a leadership practice (Ross et al. 2006).

EA has included business goals and strategy as elements of the framework since it was first introduced by Zachman (1987). However, at that time the framework was adopted more as a tool for describing an enterprise from the perspective of information systems architecture.

Later on, EA has been more and more attached to strategic planning and business transformation (Ross et al., 2006; Kappelman et al., 2008; Simon et al., 2014). However, a survey of the state of EA programs shows that a great number of IT professionals still saw that business-oriented EA is implemented on a much smaller scale than it would be required (Leganza, 2010). In addition, a variety of studies show that EA is most often associated with IT consolidation, business IT alignment and IT landscape management, which shows the lack of focus on the business architecture layer of EA (Winter et al., 2010; Simon et al. 2013). Existing literature includes very few examples of how EA can be linked with strategy and strategic decision-making (Simon et al., 2014). This lack of focus on business side of architecture seems to indicate a gap between EA implementation and strategic business leadership. One of the few models truly linking EA with strategy is The Foundation for Execution approach presented by Ross et al. (2006).

Enterprise Architecture Breaking Free from IT

Lapalme (2011) identifies three schools of thought on EA, each with its distinct belief system, scope, limitations and set of assumptions. These schools in the order of increasing embrace and sophistication are: Enterprise IT Architecting, Enterprise Integrating, and Enterprise Ecological Adaptation.

In the Enterprise IT Architecting view, EA is seen as “the glue between business and IT”. Focusing on enterprise IT assets, it aims at business-IT alignment, operational efficiency, and IT cost reduction. It is based on the tenet that IT planning is a rational, deterministic, and economic process.

Enterprise Integrating school views EA as “the link between strategy and execution.” EA addresses all facets of the enterprise in order to coherently execute the strategy. The environment is seen both as a generator of forces that the enterprise is subject to and as something that can be managed.

In the Enterprise Ecological Adaptation school, EA is seen as “the means for organizational innovation and sustainability.” The enterprise and its environment are seen as co-evolving: the enterprise and its relationship to the environment can be systemically designed so that the organization is “conducive to ecological learning, environmental influencing, and coherent strategy execution” (Lapalme, 2011).

Benefits of Enterprise Architecture

EA can offer several potential benefits across the whole organization. The benefits of EA from a selection of professional and academic studies (CIO Council, 2001; Ross et al., 2006; Infosys, 2007; Kappelman et al., 2008; The Open Group, 2009; Tamm et al., 2011) can be summarized into five categories:

1. reduced IT costs
2. improved efficiency, utilization and integration of IT systems
3. improved strategic alignment between business and IT
4. improved change and risk management
5. improved communication and collaboration within the enterprise

The benefits of EA are mostly indirect and have proven to be difficult to verify empirically. If the linkage between benefits and EA as management practice is not established, the full potential of EA cannot be realized.

Following the introduction of EA in the 1980's, the concept has been accepted and widely studied by academics and practitioners (Simon et al., 2013). However, even though the EA practices and benefits are widely known, the concept has not yet been extensively adopted by organizations (Ross et al., 2006).

Enterprise Architecture as Strategy

According to Ross et al. (2006) an enterprise needs to build a solid understanding about three concepts, to have an effective Foundation for Execution: (1) the operating model; (2) enterprise architecture; and (3) the IT engage-

ment model. Figure 5 illustrates how the Foundation for Execution is created and exploited through the three related concepts.

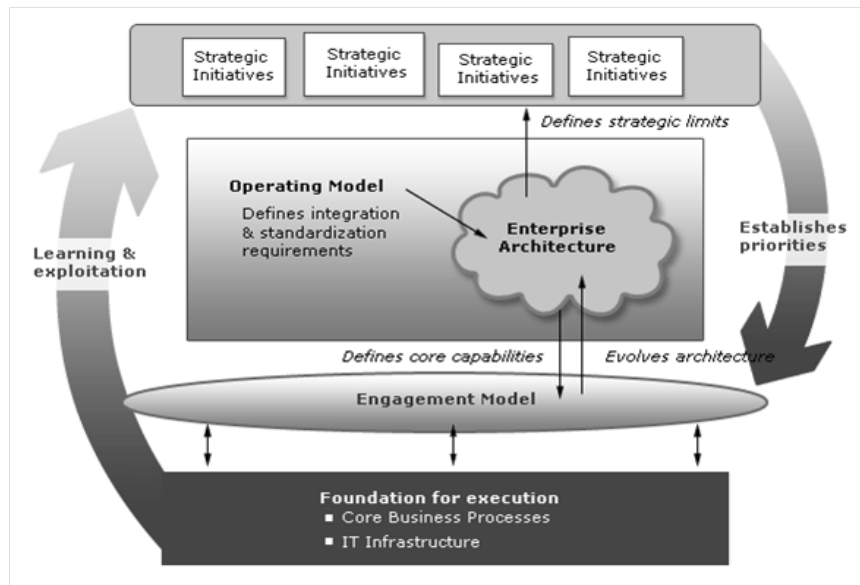


Figure 5. Creating and exploiting the Foundation for Execution (Ross et al., 2006, p. 10).

Ross et al. (2006) define four types of operating models, exhibited in Figure 6, which represent the integration and standardization requirements of the business processes of the organization. Standardization creates processes that are similar through the organization regardless where the process is executed. Integration links and shares data across business processes creating a single face towards the customer. The operating model concept is an easy-to-understand approach to enable better decision-making.

Business Process Integration	High	Coordination	Unification
	Low	Diversification	Replication
		Low	High
Business Process Standardization			

Figure 6. The four operating models (Ross et al. 2006, p. 29).

Ross et al. (2006) define Enterprise Architecture as: “the organizing logic for business processes and IT infrastructure reflecting the integration and standardization requirements of the company’s operating model.”

Van der Raadt et al. (2010) point out the need for stakeholder cooperation and active business participation in EA governance. Therefore, the business management should participate actively and be fully responsible for the domain of Business architecture. Figure 7 shows the EA domains and suggested responsibilities.

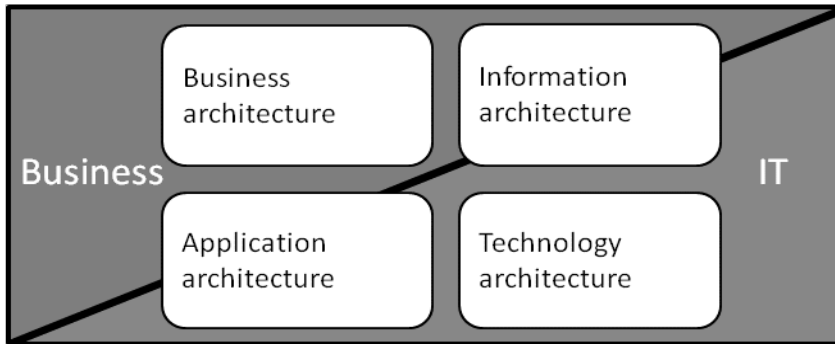


Figure 7. Enterprise Architecture domains and responsibilities.

The IT engagement model is a governance mechanism, which ensures that the business and IT projects launched to implement the foundation for execution will achieve both local and company-wide objectives (Ross et al. 2006). The IT engagement model is exhibited in Figure 8.

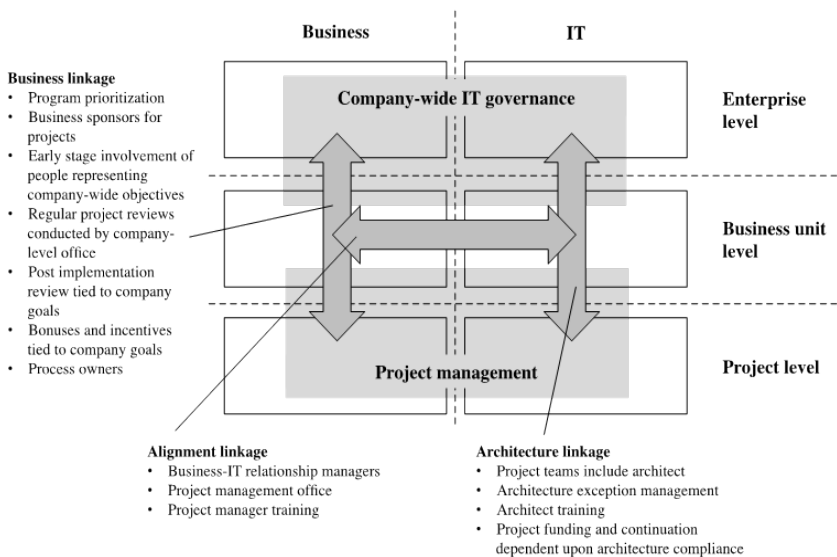


Figure 8. The IT engagement model (extended from Ross et al., 2006, p. 120).

The key to successful EA is to communicate the organizational vision in a clear way in order to create the required business processes and IT structures.

Ross et al. (2006) suggest that the discussion and communication between senior business management and IT management should be facilitated through core diagrams. In general, the core diagrams include four elements:

1. the core business processes
2. the shared data driving the core processes
3. the key linking and automating technologies
4. the key customer

The elements are specific to the company's operating model and reflect the realization of the organizational vision (Ross et al. 2006).

IT Governance and Enterprise Architecture

The linkage between IT governance and architecture is explicitly defined in most IT governance frameworks. However, in this context architecture is typically referred to as technical architecture while the connection to organization wide EA is in many cases missing. The operating model of an organization is the single most important factor when evaluating the potential of EA. Potential architecture domains (abbreviations from Figure 7) in each operating model are highlighted in Figure 9 (potential domains are in grey).

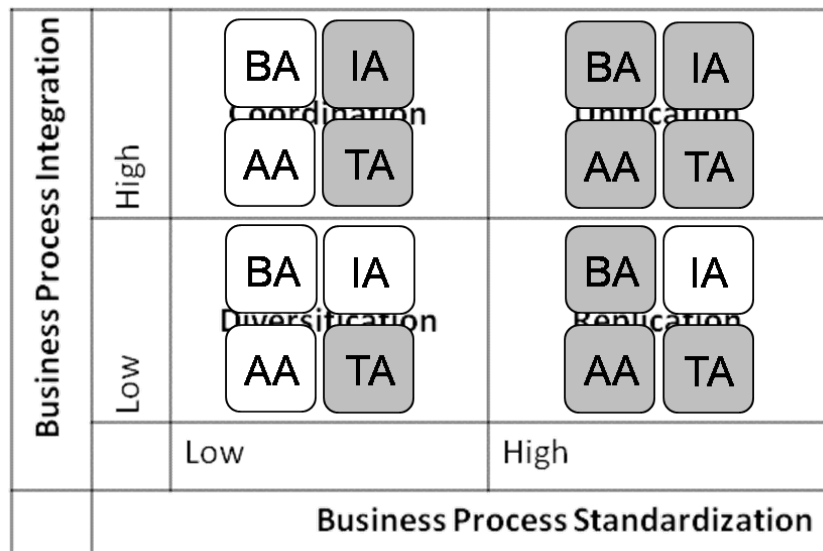


Figure 9. The potential of EA (extended from Ross et al., 2006, p. 29).

Operating model plays an integral role in constructing not just the IT governance model but the overall governance model of an organization. Therefore, it is important for an organization to recognize the operating model in use and focus EA efforts on potential domains.

Nolan and McFarlan (2005) argue that Board of Directors should pay more attention to how IT spending correlates with the execution of enterprise strategy. Their focus is primarily on board level concerns and in the use of infor-

mation technology. However, this framework can be expanded to open a more general question on the role of IT and IT organization. The selection between defensive and offensive positioning has direct implications on how effective governance should be arranged and from which organization areas should participants come from.

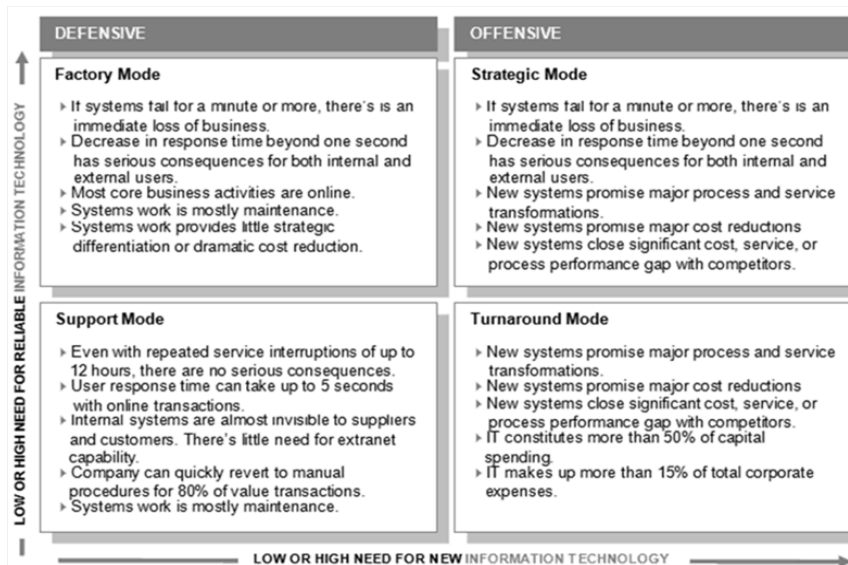


Figure 10. The IT Strategic Impact Grid (Nolan & McFarlan 2005, p. 99).

The role of IT organization and the role of IT in general in the organization have significant affect on the IT governance and on potential use of EA. Therefore, positioning the role of IT organization and role of IT in general should be openly discussed and agreed on. Once these premises exist it is possible to select correct IT governance model and promote the use of EA.

ACIO and Enterprise Architecture

In ACIO research program, several aspects of EA have been researched. Halén et al. (2014) attempt to identify what are the prerequisites for shifting from IT driven Enterprise Architecture to business driven Enterprise Architecture, and what leadership challenges have to be mitigated before the full potential of Enterprise Architecture can be achieved. Study shows that even though the benefits of Enterprise Architecture are well understood, the lack of progress on the business-oriented Enterprise Architecture can potentially result in failure to demonstrate real business value of EA. However, four prospective roles of Enterprise Architecture were identified:

1. Creating and maintaining descriptions of business models along with operating models
2. Working as a tool to outline the target state of the business
3. Supporting business decision-making in the development planning
4. Setting targets and tracking the implementation of projects

Study demonstrated the importance of applying EA as an integral part of business development and corporate governance, not as a separate practice. Moreover, a dedicated business sponsor is required to drive the process, and business architect resources should reside within business organization.

It is clear, that more research attention should be given to identifying the means to attract business decision-makers to use EA as management practice. There could even be demand for a new, simplified framework or construct, taking into account the aspects of business decision-makers' socially constructed reality. It is highly unlikely that without progress on the field of common understanding the Enterprise Ecological Adaptation school of Lapalme (2011) could be reached.

Successful enterprises should possess flexibility as an inherent capability and be able to adapt to changes faster than ever before. By applying EA, organizations can manage change and make correct decisions that take into account both business and information technology needs.

Korhonen and Molnar (2014) argue that

“Enterprise Architecture is increasingly seen as transcending enterprise-wide IT architecture. In its exalted conceptualization, EA provides the link between strategy and execution and is driven by strategic considerations such as business transformation and business agility. However, academic research on the topic is still relatively incipient. In particular, there is a gap in the literature as to what is EA's scope in terms of the organizational structure. When EA is defined as strategic capability: it pertains to the strategic application of competencies to organize and utilize the organization-specific resources towards desired ends. Its ‘area of value ownership’ is at the organizing level, linking between strategy and execution, and guiding the evolution of the operational core. Anything ‘lower’ is mere design, while anything ‘higher’ goes beyond a single organization's scope. This platform of competencies is essentially socio-technical and calls for enterprise engineering perspective with qualitatively different kind of disciplinary premises than information systems perspective, in which EA has its roots. Furthermore, EA as capability is required to properly govern business-driven, value-oriented enterprise transformation.”

Blomqvist et al. (2015) examine how EA can be connected with strategic planning and development processes in a large organization. The primary objective of this study is to explore the linkage between EA and strategic planning. The second objective of the study is to increase the knowledge of business-oriented EA in the case organization. The main findings of the study include that EA is not used in the strategy formulation phase although theory would indicate considerable benefits from EA in this area. The analysis points out that the future role of EA is promising in the case organization, even though the current role of business-oriented EA is relatively weak. EA is currently generating value in the development planning process of the organization, which corresponds to the strategy implementation phase. Moreover, EA is needed to bring insight in managing the increasing complexity of organiza-

tions. The benefits of EA range from reduced IT costs to improved strategic alignment between the business and IT. The empirical evidence shows that the Finnish terminology is confusing and that there is no proper term for EA in Finnish that supports the shared understanding of the concept.

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Mega Data Centers – Key Infrastructure for Digitalization

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Digital Transformation is partly fueled by the convergence of mobile computing, consumerization of IT, cloud computing, big data, and advanced data mining technologies. It has been noted that we are currently living in at least three eras that build upon digital data: the information era, the social era, and the Big Data era.

The explosive growth of data coming from business transactions, mobile devices, sensors, social and traditional media, streaming video, cloud computing, etc. The data is generated in the interaction between people, machines, applications, and combinations of these. The proliferation of connected devices both for personal and industrial use, coupled with the content required to satisfy the (seemingly insatiable) end user needs, has led to an increased demand which only appears to be heading one way: the demand for computing is an unending upward spiral in the near future.

This ongoing digitalization is driving explosive growth in supporting infrastructure, i.e. data centers and related services. Data processing and storage has evolved from traditional, enterprise-owned server farms into industry-scale data processing facilities that store and process data for thousands of different organizations and millions of individuals. Across the globe, billions of dollars are spent on data center infrastructure in order to meet the growing demands of businesses and their customers. Competition on the data center infrastructure has become the new “arms race” for organizations trying to differentiate themselves in this crowded, technology-driven world.

Consequently, the data center has changed considerably, as the evolution of information technology has enabled it to become the critical nerve center of today’s enterprise. These modern, industry-level data centers form the backbone on information processing for the digital transformation. They have grown into mega-size facilities that span tens of thousands of square meters, consume tens, even hundreds of megawatts of power, and cost hundreds of millions in capital expenditure. The focus of these mega-size facilities is on energy-efficiency and the provision of cost-effective, reliable, and secure services for all types of clients and their needs.

The availability of inexpensive storage and flexible pay-per-use processing capabilities, enabled by this industrialization of data processing and data cen-

ters, is also one important factor that paves the way for the Big Data revolution. Big data has emerged to one of the top trends affecting business and technology today. Big data is an agglomeration of different technologies, resulting in data processing capabilities that have been unreached before.

Big data is generally characterized by three factors: volume, velocity, and variety. Big data technology has touch points in different businesses across industries, but finds its place also in government organizations and the healthcare sector. Big data, together with the use of tools such as analytics and decision support systems will impact organizations and the managerial decision-making. If the proponents of Big data are to be believed, it will have a significant impact on our society in the near future, changing the way people live their everyday lives, their work, and the way their homes are connected.

Finland is in a desperate need for a new industry to drive national growth; data center industry has been suggested as one key opportunity for the nation. Investment into mega-scale data center amounts to hundreds of millions of euros, so the government level interest into this phenomena is understandable. It should be noted though, that – unfortunately – the data centers are not necessarily a great business after the construction phase. Data centers do not actually produce anything in and of themselves, and the effect on employment is minimal compared to many other industries with similar levels of investments into facilities. A typical data center – even a mega-scale data center – might provide employment only to several dozens of blue-collar workers such as janitors, guards, and electricians. In that sense, data centers should not be considered as a high-tech industry.

As part of ACIO research dealing with service innovation and digital transformation, Antti Savolainen analyzed in his Master's thesis (2013) data centers and the related investment criteria. Thanks to an advanced power infrastructure, cheap electricity, a stable operating environment, and a cool climate, Finland is believed to provide strong data center investment opportunities.

The case setting in this thesis is an industrial city in Finland, which is looking for data center investments to accelerate business activity in the area. In the literature review, the modern data center is defined and the potential market for data center construction is analyzed. The empirical part of the study employs a qualitative research methodology. A total of 26 people were interviewed to form a holistic view of the data center investment decision. These people represented a wide range of stakeholders (energy, networks, regional development, government and data center industry executives and analysts).

Based on the interview data, a prioritization model for data center investment criteria was constructed, in which the factors were broken to primary and secondary factors that drive data center investments. According to the study, primary factors are energy (availability, price, redundancy of grid, generation mix), network (availability of fiber and latency and routing to largest internet exchanges), incentives, and physical aspects of the site. Secondary factors are knowledge, safety and security, and the customer base.

The results of the study suggest that Finland has basic prerequisites in order to function as a data center hub, such as a stable operating environment and a

redundant electricity grid. However, the findings also revealed that the data center industry in Finland is relatively immature; that there is a lack of capabilities in building mega-scale data centers; that there is a lack of education in the data center domain; and that, in general, Finland's network connectivity to the rest of the world is limited in comparison with our neighboring countries. Finnish efforts concentrate on attracting foreign data center companies into Finland, as foreign direct investments and the development of locally owned data-center infrastructure and related capabilities is lacking.

Savolainen (2013) started his thesis with a quote: "Finland is an island." In many ways, this is true when it comes to data centers and the digital economy development in general. The remoteness of Finland also shows at a mental level – "Finland always comes 5–10 years behind everyone else" was a quote by many interviewees.

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Case Aalto University – Digital Transformation in Higher Education

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Introduction

Information technology has been used in universities for years, but the core practices of the education and research work have not been dramatically affected so far. In the last years, however, it seems that an era of more radical information technology related changes has started. It is being boosted by a number of enablers that are together stronger than any of them alone. The most obvious ones are:

- Cloud technologies,
- Social media,
- Mobility,
- Big data and analytics.

The term *nexus of forces* has been coined by the consulting company Gartner Inc. to refer to these four enablers (Howard & Plummer, 2013).

Cloud technologies provide both scale and agility for user organizations. In higher education, we have already seen two steps towards using the cloud. The first step was facilitated by companies like Microsoft and Google that started offering attractive packages for implementing student email and other generic IT services. There is already a large number of institutions using these services. More recently, we have seen a number of domain-specific services being offered through the cloud, such as Oracle's existing and new student information systems (Oracle Corporation, 2014) or the Canvas learning management system offered by the Utah-based company Instructure Inc. (Instructure Inc., 2015).

Social media provides an entirely new way to interact between people, and this is what students are doing amongst themselves. Institutions have started using social media to engage with students in different ways, for example, as part teaching (Ivala & Gachago, 2012) or as a tool for student recruitment (Shaw, 2014).

The use of *mobile devices* has increased radically among the students (Dahlstrom & Bichsel, 2014). However, universities have not yet been actively developing their services to take advantage of students' possibility to access edu-

cational resources and university services anywhere and anytime. This will change over time once the required foundations are in place.

Big data and analytics have become an important area of development especially in the area of learning analytics where an increasing amount of data is available due to the digitalization of the education processes. Tools have been introduced for providing course recommendations, early intervention etc.

Additional Trends Enforcing the Change

In parallel with the above technology enablers, we can also observe a number of additional trends that affect the higher education industry and impose pressure towards using digital and other means to improve overall performance. These trends include the following:

- Globalization and increased competition,
- Disruptive new approaches and business models are being introduced,
- Financial pressure and expected process improvement,
- New generation of students with new expectations,
- New generation of academics with new ways of working.

Globalization is a trend that affects most industries, and it is fuelled by the development of information and communications technology as well as the general trend of increasing the free movement of people, capital, and goods (the foundation of the European Union). Consequently, the high-end segment of the higher education industry has become a global competitive business where universities are trying to attract the same talented students and researchers.

While the traditional higher education industry is still fairly untouched by new business models, there are a number of adjacent industries where changes have taken place through new innovative companies and organizations. For example, the Livemocha community has introduced a new way to learn and teach languages – completely bypassing traditional language training companies (Lowendahl, 2014).

Financial pressure is another factor that has already caused changes in the higher education industry and will continue to cause additional disruptions. So far, institutions have been able to survive through traditional cost cutting measures. However, digital innovations may bring new and more effective tools to deal with financial issues.

Last but not least, digitally native students and faculty members have entirely different expectations for their home institutions compared to the past generations. Typically, existing legacy systems do not meet the expectations of the new generation and, consequently, institutions will have to take action towards the digital world in order to attract high-quality faculty and students.

Sea of Opportunities

The opportunities and challenges posed by the new digital world can be addressed in a number of ways by higher education institution. Figure 11 illustrates typical approaches taken by different organizations.

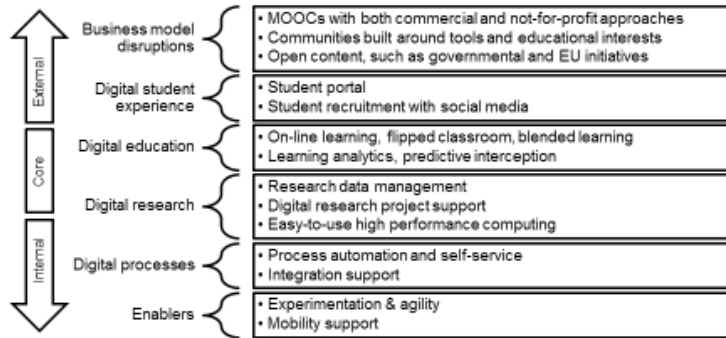


Figure 11. Different institutions take different routes to address the digital challenge.

Some of these activities are more *internally focused*, such as building organizational and technical enablers for the required transformation and enhancing operational processes through digital means. Other approaches are focused on *externally visible changes*, such as providing an enhanced user experience for the students or experimenting with new business models in the higher education community. At the center stage, we can also see a transformation taking place in university *core activities* with both education and research using an increasing number of digital tools.

When analyzing the maturity and the capabilities of an institution, these three dimensions provide a way to structure the overall picture. We will address them one by one in the following sections.

Internally Focused Activities

In this section, we discuss three areas of *internal activities* that organizations can use to support their digital journey.

The first activity is to increase the organization's ability to rapidly explore and exploit different opportunities. Most IT organizations have developed rigorous project and portfolio management methodologies, but these methodologies often lead to a long delay between the initial idea and the closing of the project. In a rapidly evolving environment with different possible directions, a second mode of operation would be needed. The aim is to allow the organization to quickly explore different directions in order to find the best approach for them.

The second area of internal activities is to build both technical and organizational foundations for the digital future. This may include, among other things, basic support for mobile devices, technical integration capabilities, and organizational readiness for dealing with IT matters that cut across the entire insti-

tution. For example, an organization with a consistent enterprise architecture in place is clearly better prepared for the digital future.

Finally, the third area of internal activities is to support the re-engineering of the organization's internal and external processes. While this work has been ongoing since the early 90's (Hammer & Champy, 1993), there is still a lot that has not been addressed in higher education institutions. Times are different now – both students and staff are familiar with an entirely new way of using information technology in their personal life. This allows institutions to follow the development and automate administrative processes in a way that would not have been possible earlier. For example, modern on-line banking has taught people to use self-service in complex interactions with sensitive information, and the same approach could be easily applied to some interactions in student and faculty administration.

Externally Focused Activities

In this section, we observe some of the externally visible trends in the higher education industry. While the signs of change are already visible in many ways, they have not changed fundamentally the core of higher education. At the same time, big changes are ongoing in the neighboring industries, and similar revolutions may affect the higher education industry.

Massive Open Online Courses (MOOCs) have been around for a few years now, and they have set a new standard for on-line teaching (Pomerol, Epelboin, Thoury, 2015). These courses are available both from for-profit organizations such as Coursera and Udacity and from non-profit organizations such as Khan Academy and EdX. In addition, there are national initiatives such as the France Université Numérique (FUN) in France and Miriada X targeting Spain and Latin America. There are different reasons universities to participate in such activities ranging from university student recruitment to providing life-long learning support.

Spurred by the new technical opportunities, a number of new and old technology vendors have also taken an active role in the marketplace. For example, the Livemocha community has collected some 16 million people to learn languages with beans and points – students earn points by helping others and buy beans with money. While the community is not threatening the higher education community, it clearly poses a challenge for the language training business. In a similar way, the Canvas Network is a community that offers on-line courses from institutions that have decided to use the Canvas learning management system for their on-line teaching. It is not a threat to the higher education community *per se*, but offers an interesting opportunity to develop the activities in the future (Instructure Inc., 2015).

The European Union has also been active in this area along with a number of national organizations. The EU has devised the *Opening up Education* initiative to stimulate new ways of learning and teaching through ICT and digital content, mainly through developing and making available open educational resources.

In addition to the disruptive business models, higher education institutions have the possibility to use digital means to manage other aspects of their outside appearance. In particular, digital tools can be used to improve the student engagement from the early phases of recruitment all the way to the alumni and life-long learning activities after graduation.

Activities at the Core of Higher Education

At center stage, we can of course see that the transformation affects the core activities of higher education institutions, i.e. education and research.

On the educational side, there are several possible directions. Some institutions focus on on-line learning, and others prefer the concepts of flipped classroom and blended learning. In this area, the traditional learning management system providers are developing their offering to meet the market expectations. At the same time, we can observe an interesting growth of startup companies offering entirely new solutions addressing the specific needs of the market. For example, there is an interesting market developing around digital assessment and examinations.

On the research side, the development is less visible. However, significant changes are taking place here as well. Firstly, the use of digital tools, such as simulation, modeling, and data analysis, has expanded beyond its traditional scope. In fact, it is very difficult to find a research domain where digital tools are not used today. As a consequence, there is a need to provide an entirely new model of using these tools – one that suits the non-technical results-oriented people (as opposed to the traditional technically oriented usage e.g. by computer scientists).

Secondly, research data is becoming an asset that universities wish to develop further and use as a differentiator. Consequently, work will be needed to provide a rigorous set of processes that harvest data sets from ongoing research for the use of further research projects. This may even change the incentive models for researchers so that the creation of data sets to be available for other researches can be used as a basis for performance evaluation.

Finally, the research process itself is often not fully supported by existing applications and tools. While this may be sufficient for individual researchers, most institutions would like to have a more comprehensive view of the current state and the expected development in research results. The digitalization of the entire research process will provide such views in the future.

Aalto University – Taking the First Steps

Aalto University was created in 2010 as a merger of three former universities, and, consequently, there is an opportunity to innovate and renew operations with less burden from the history. On its digital journey, Aalto University has already taken its first steps. In the rest of this section, we briefly review Aalto's current state using the framework introduced above with three main areas: university core, internal and external activities.

On the research side, the *Aalto Digi Platform* has been created to innovate, to initiate, and to increase digitalization related cooperation inside Aalto and with its industrial and academic partners. The focus is on fostering bottom-up activities between researchers in all research domains connected to the digital world (Aalto University, 2015).

On the educational side, work has been done at different parts of the organization. Academic units are doing research on areas such as e-learning, collaborative learning, computing education, interactive learning environment, automatic assessment etc. This research work has manifested itself in the daily education as well, the most notable example being the MOOC implementation for the Scala programming language in 2014. For the mainstream teaching in Aalto, there is an ongoing project to replace the current three learning management systems with a single *MyCourses* environment with more interactivity and better integration with additional tools and content. A single tool will enable better support for blended learning and, consequently, it will gradually change the educational approach to meet student expectations better (Dahlstrom & Bichsel, 2014).

There is also ongoing work to improve *internal* capabilities to support the digital transformation. This includes, for example, better support for application integration and new tools for service management. However, the current state of service and administrative processes is still very immature as it mostly reflects the situation before the university was founded. The current model of development is also quite traditional and there is not much support for experimentation and agile practices (e.g. a one-year budgeting cycle for projects). Initiatives have started to address these issues.

As for the *external activities*, the university has an active presence in the internet and is also using social media for generic communication purposes. However, many externally visible activities, such as student recruitment, are still mainly carried out in the traditional way. As the university's goal is to place the students at the center stage and as they already have good digital competences, student engagement in different ways would be a natural target for the next efforts in the digital journey.

Towards a Digital Vision

The above examples indicate that the digital transformation has started in Aalto and in many other universities worldwide. However, individual and partly random steps are not enough to ensure success in the future competitive scenery. The number of possible directions and options is overwhelming and, consequently, each institution needs to define a vision for itself to be able navigate in the sea of digital opportunities.

The most natural starting point for the vision is to use the institution's current strategic aspirations and the known pain points as a starting point. For some institutions, the natural focus for the digital transformation would be student engagement in different ways to ensure competitiveness in recruitment and the successful completion of studies. For a research oriented univer-

sity, the vision would also contain research related elements, such as support for the creation, conservation and exploitation of knowledge. While most institutions have included digital elements into their main strategy, some have already created a separate digital strategy. For example, the University of Oxford has defined a digital strategy (University of Oxford, 2015) based on three high-level goals: (1) to facilitate the creation, preservation, and discovery of knowledge, (2) to improve utilization and exploitation of knowledge, and (3) to enable knowledge exchange in a digital environment. This reflects the overall targets of the university in a balanced way and defines more detailed digital activities in each area.

There is of course the “me-too-digital” approach that institutions can use to follow the overall digital development and to keep the exploration work ongoing before fixing specific goals. However, this approach is likely to be less efficient in the use of university resources.

Summary

In this paper, we have presented an overview of the digital transformation in the higher education sector. A number of underlying technical changes together have triggered a transformation that has started to influence the higher education industry in many ways. The same phenomenon can be observed in most other industries as well.

We have introduced a simple framework for discussion the ongoing change in a structured way. The framework divides the activities in three areas: internally focused activities, externally visible activities, and activities affecting the university core, i.e. education and research. This framework was used to briefly assess Aalto University’s current state in the digital journey. The university has already taken some steps to leverage digital technology, but there are still a number of unaddressed areas with room for significant improvement.

The different opportunities available in the digital transformation cannot be addressed without an understanding of the direction. As a conclusion, higher education institutions should come up with a clear vision on their aspirations related to their digital journey. There are already universities that have defined such a vision, but many institutions are still looking around to find a clear direction for themselves.

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Digitalization in Retail: The Impact on Competition

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Digitalization – What’s the Big Deal?

Every business seems to be going digital: ubiquitous information and communications technology has infused channels, content, and transactions, thereby profoundly changing the way in which companies compete, co-operate, and communicate. The Internet has revolutionized access to and dissemination of information, transcending boundaries in time and space. Competition on the Web is inherently global, and customers and consumers have the power of transparently comparing value propositions of companies around the clock and regardless of where they are located. Information content that can be digitized will be digitized. In some cases, it applies to the very product: books and other text documents, photos and pictures, music and other audio, movies and videos, computer software – all can be readily stored, represented, and reproduced in binary format at negligible cost. In other cases, information technology can be used to capture product data, direct manufacturing and logistics, or govern business transactions in a manner that enables novel value configurations and networked business models.

Digital technologies have also infiltrated and integrated into people’s day-to-day life. Many of us spend most of our time at computers that serve the multitude of information, communication, and information processing needs. And when we are not tapping our laptops, we are tapped into the broadband mobile Internet and a cornucopia of cloud-based apps.

Although the process has been here for decades, the last year or two have seen *digitalization* become a much-hyped buzzword. So what has changed? Why digitalization, why now?

A cautious parallel to the industrial revolution may be appropriate. Although steam engine was invented in the early 18th century and significantly developed towards the end of the century, it was not until the mid-19th century that this groundbreaking invention took over dominance from water power. In a similar vein, the information revolution entails major undercurrents of change that will take substantial time to take the shape of full-scale transformation.

While digitalization is a visible, global theme, its attention value at the moment may be higher than value based on evidence. At this stage of develop-

ment, there are a multitude of active players in the field. To “pure digitals,” digitalization provides subsistence and is an end in itself. They take advantage of or even exist due to the digital transformation. Such players have nothing to lose in promoting the transformation and may even leverage venture capital to ride the hype with quite outrageous business ideas. On the other end, there are more or less conservative incumbent companies to which digitalization is a means that may open new opportunities. Such players typically have some assets in the game, and their primary focus is elsewhere than in the digitalization process. They also prefer to stick with the old, which complicates the picture and holds back change.

Retail Transformation

Retail is undergoing a transformation. Once again. Whereas the post-war opening of world trade precipitated global competition and led to major restructuring in the 60’s and 70’s, the current wave of digitalization brings about another burst of intensification in competition. Two major drivers that force retailers to get digital are: 1) to bring added value to the consumer armed with new digital technologies and 2) to leverage digital technologies to change the way business is conducted.

Digitalization of the Consumer

From the retail business point of view, the “digitalization of the consumer” is of essence. People are increasingly able to use digital services and are even beginning to expect them. To a certain extent, this is a generational issue. The younger generations, such as Millennials, are grown up with digitalization and are eagerly in the forefront of adopting new technology and its affordances. However, the change is so rapid and sweeping that the pre-Internet, pre-mobile generations cannot but follow the suit. Digital technology steadily becomes easier to use, and it is today common to see “technology converts” in their 70’s and beyond actively gathering information, communicating and, engaging with social media on a daily basis.

What is more striking is that the new generation exhibits markedly different consumer behavior. Millennials rather browse than buy. According to the Intelligence Group poll (TIG, 2014), 72 per cent of Millennials research and shop their options online before going to a store or the mall. They generally do not indulge in impulse buying. This new “fauxsumerist” behavior and savvy retailers who understand the shift in customer desires and expectations have further catalyzed the era of the Great Retail Demassification (Lewis, 2014), already set in motion by e-commerce.

All this has created a market potential that no retailer can ignore. While truly successful online stores are reportedly few, all future-aware merchants try at least keep abreast of the continued evolution of digitalization. Even if direct commercial benefits may be elusive, there is a multitude of by-products of digitalization that merchants need to consider and often also offer to their clients, lest they may experience a loss of brand image. To start with, the location of

stores must be available for those seeking a known or potential merchant on the Web. A natural step ahead is to provide information about assortments, services and prices available in those locations. Advancing on the road of digitalization, a retailer probably wishes to engage in some sort of conversation with clients. Increasingly often, this takes place in social media, on the arenas that customers have chosen for their interaction with friends and peers. Often-times, retailers choose to continue to the final stage of providing a full featured web shop that allows customers to purchase items on-line and to either have them delivered to home by logistics operators or stop by at the outlet to pick up purchases on their own. In some areas of business, e.g. cafeterias, restaurants and movies that target young customers, digital interactions with and between consumers are of considerable importance. Presence in social media is a given.

Digitalization of Business

Digitalization of the consumer inevitably generates the need for transparency to the retailer's business processes. The information required by the consumer, such as product information and stock levels, must be reliably created and maintained in the process to enable presentation to customers in the digital channel. Maintaining up-to-date product information throughout the digital value chain is not a small challenge. Master data management (MDM) is crucially important. New requirements emerge to retailers, as the informative label is not only required in a printed form on the physical retail package, but it also needs to be precisely maintained in the digital channel. Furthermore, environmentally or socially aware customers require more detailed information about products, such as the origin of materials or absence of child labor. These new requirements cannot be fulfilled without a truly integrated, transparent, and well-managed value chain from the manufacturing to the digital customer channel.

In addition to transparency to customers, digitalization of retail processes also offers another kind of potential to retailers and their affiliates. As more and more data about the business is available in digital format, it introduces quite novel possibilities, materialized by the digital industry as part of their offerings. Processing of digital information in the retail sector advances rapidly. Initial developments tend to emerge first as proprietary to individual large-scale retailers, but soon also in the commercial offerings of information technology providers. Evolution can be identified in the development of business intelligence (BI) tools from mere reporting vehicles towards sophisticated analytic instruments, featuring forecasting or graphical visualization of data patterns. Furthermore, these tools will provide even new benefits by allowing optimization of control parameters of the retailer's processes and, ultimately, full automation of tasks that previously required rare and special human skills and long term experience.

Through CPFR principles (Collaborative Planning, Forecasting, and Replenishment) (Seifert, 2003) and with the aid of digital technologies, information about customers' needs and changing behavior can be shared throughout the

value chain. This allows the whole ecosystem to optimize and to take actions accordingly. Having shared plans of marketing and predictions of the forecasted sales, waste and other excessive costs can be dramatically reduced within and across organizations. Manufacturers, logistics operators, and retailers can expect improved efficiency through engaging with connected digital operations, even if only in terms of reporting of plans and forecasts.

As the cost of data storage continues to erode and computing power continues to increase, the vast amounts of transaction and other data accrued from business transactions between businesses, with consumers, and with other organizations can be readily collected and processed. The resulting Big Data are used to support decision-making, to more accurately forecast, and to ultimately optimize operations. Data are increasingly analyzed statistically and vis-à-vis theoretical and mathematical models. Demand forecasts, pricing formulas, and volume predictions are no longer indications of the merchant's skills and "gut feelings" but rather results of an academically educated data scientist's capability, supported by advanced computer software and sufficient time series of data.

Direct benefits of digital technology are apparent, when it is used to automate business processes and to remove unnecessary human work, but also when technology is leveraged to *informate* (sensu Zuboff, 1988) work and thereby to reconfigure it. Initial forms of automation have been around for over a decade in automated sales based ordering, in which predefined amount of products sale at the store level have triggered a replenishment process to fill the empty shelf space and, subsequently, an accounting transaction without human involvement. In the digital tomorrow, other processes such as price setting, shelf-space allocation, and assortment composition will eventually follow.

Digitalization poses new demands for IT management of retailers as well as for the rest of their chief officers' suite. In the past, functional or piecewise craftsmanship of retailing was usually sufficient. Today, a more systematic management and insight into the whole is a must. Enterprise Architecture (EA) becomes invaluable, as it plays a central role in mediating knowledge and helping understand the underlying organizational system as a whole. Never before has it been as essential as it is now for retailers to understand, to describe, and to communicate implications and causalities of the business and the customers involved in the world of digital retailing.

Competitive Forces

To analyze the impact of digitalization in retail business, we will consider Michael Porter's (1979) five forces that determine the competitive intensity in an industry. We recognize that digitalization has had and continues to have a profound effect on all of these five forces: the bargaining power of suppliers, the bargaining power of customers, threat of new entrants, threat of substitutes, and rivalry within industry players.

The impact of retail digitalization on these forces is summarized in Figure 12 and discussed in more detail in the sections below.

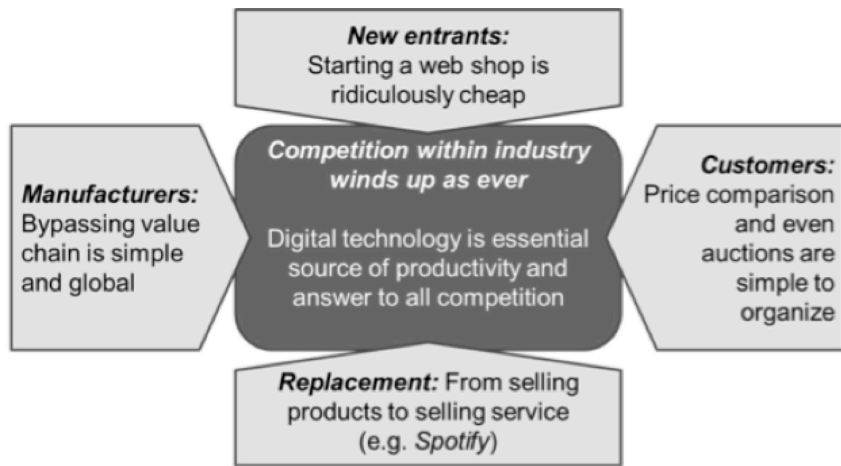


Figure 12. Digitalization intensifying competition in the retail industry.

Supplier's Power to Bypass

Retail as a business has emerged to offer manufactures and producers an efficient access to the markets of their products. First at marketplaces in towns and cities along waterways and at crossroads, later using sophisticated retailing facilities, stores, and malls replenished through carefully designed distribution networks. Retailers could offer efficiency, a lower risk of sale, and a lower cost of market access through purchase, a specialized logistics solution, and, finally, customer service.

Today, visibility on the Internet, financial services by global institutions, a largely liberated flow of goods across borders, and generally available logistics services have enabled manufacturers to directly and efficiently interact with masses of consumers regardless of their geographic location. Digitalization has enabled manufacturers to bypass intermediaries and to sell directly to consumers, cutting away one or more intermediaries and the respective costs. The streamlined value chain enables competitive pricing. Music and other digital products, in particular, do not need physical shelf space anymore. With books, music, and movies, both the publishers and people are turning to specialized digital channels like Amazon, iTunes, and Netflix to research, discover and purchase their digital content.

Traditionally, brick-and-mortar businesses have been constrained to selling large volumes of a limited number of popular items. As in the digital world distribution and inventory are virtually of zero cost, however, e-businesses are able to sell hard-to-find items of digital content to the “long tail” (Anderson, 2008) of consumer demand in small volumes profitably. Expanding the assortment adds to the experienced service quality and attracts more customers. The natural next step would be to enable digital content producers to independently set content for sale. This, however, may appear too risky, as retailers

are held legally responsible for the goods they sell, and as it is difficult to manage immaterial rights in this arrangement. At the moment, the shortest form of value chain can be identified in the crowd funding of content production.

Customers' Bargaining Power

Much of what increases suppliers' ability to bypass retailers is related to customers' ability to bargain with retailers for better price or for added value. Moreover, the Internet can be seen as a reincarnation of old time markets and the way of doing business. After all, it is a place where people can talk to each other, to learn with and from each other, and to do business together. It is a full-fledged bazaar that allows comparisons, opinions gathering, voting and polling, all forms of discussion, and influencing on virtually unlimited variety of products and services. The companies face new challenges to reach the attention of the consumer, to take part in the "naked conversations" (Scoble & Israel, 2006) of the Web and to align their business models accordingly.

Always-online consumers have unprecedented power and choice. If they fail to have a rewarding customer experience in their digital interaction with a brand, they can readily take their business elsewhere. Many companies are starting to expand their customer experience management (CEM) into new digital channels. According to a recent study on digital CEM, ensuring customer loyalty is the primary reason to invest therein (Tieto, 2014). In Finland, 24 per cent of retailers were working on projects to bring the shopping experience to smartphones and tablets, while some 51 per cent had social media encompassing CEM strategies in pipeline (ibid.).

One of the most shocking outcomes of the customers' bargaining power thus far can be seen in the revolution of the travel industry. Never before have individuals travelled so much in their leisure time, and yet travel agencies have suffered a great loss. Why? Because traditional travel agencies have been bypassed by customers, who can now directly contact hotels, car rentals, airlines, and even leisure activities at will, using digital services on the Internet.

On the other hand, this trend creates new opportunities for digital intermediaries. As consumers are expecting a smooth and convenient shopping experience in the comfort of anywhere they choose to be, companies must become "ETDBW" (Easy To Do Business With; Hammer, 2001) or run the risk of rendering obsolete. One way to add value to consumers is to provide them with "total solutions," e.g. one stop web shops to bundle a full holiday package with all elements easily and economically tailored to the consumer's individual needs.

To this end, competitive e-businesses will mash up elementary services to comprehensive and compelling offerings – new and innovative solutions that add value to their constituent parts. Traditional businesses will be challenged, unless they can rapidly compose comparable new offerings and respective ecosystems.

Threat of New Entrants

Traditionally, big has translated to economies of scale. Value was added with efficient large-scale manufacturing, widespread distribution, a huge sales force, and very large R&D staffs. In the wake of the Internet, however, “small has become the new big” (Godin, 2006). Little companies often make better profit than the big ones. Small means agility that has become an essential capability in the face of fast-evolving market and rapidly emerging opportunities. Small size means more flexibility to change the business model when needed. Small means authenticity that promotes trust in the eyes of increasingly cautious and aware customers. Small means faster decision-making and a sense of more intimate customer service.

With the new technologies of the Internet era, establishing an e-commerce site is not a matter of funding but a matter of idea. The cost of a website is measured in tens of euros instead of thousands of euros needed to set up even a modest brick-and-mortar store in a modest location. Furthermore, location, which still remains one of the crucial factors in physical retail, one of the four P’s of the marketing mix – product, price, promotion, and place – is being replaced by attracting attention in digital media. This can be seen as place in the virtual space. Such attention can be bought with money, but in many cases a genuine and impressive “guerilla” campaign that brings huge attention does not require massive investment, but merely a great idea. Social media and subsequent exposure in conventional media will eventually bring the attention, traffic and business.

Furthermore, advertising has transitioned from a campaign model to a newsroom model (Galbraith, 2014). The savviest marketers are on the constant lookout for emerging opportunities that can be leveraged through a clever and creative use of social and traditional media alike. Ads are constantly modified based on the feedback on social media and other events. A case in point of a rapid response team in advertising is Audi that reacted to the blackout in the Mercedes Benz U.S.A. Superdome Stadium during 2013 Super Bowl with the witty tweet: “Sending some L.E.D.s to the M.B.U.S.A. Superdome right now.” The traditional mass marketing paradigm characterized by heavy-weight segmentation, promotion, distribution, and rating is disrupted by digitalization that enables new and nimble entrants to vie for attention alongside large and established incumbents.

Traditional retailers have to adapt to the new habits of digital consumers and to their expectations that are shaped by numerous small but extremely visible new players. Large and complete corporate sites are not as essential as the ability to speak directly and intimately to individual customers. A retailer must be able to communicate its willingness to fulfill its promises and to attend to its customers’ changing needs, instead of feeding marketing material about the goods that it has taken to sell.

Threat of Substitutes

Digitalization has also brought alternatives and replacements to traditional products and services and, consequently, to their retailers. The Internet, per se, constitutes a substitute to traditional printed media, TV, and radio.

In the retail industry, increasing replacement of products can be identified e.g. in retail of used articles in marketplaces such as eBay and domestic equivalents.

Ecological and economical awareness, acceptability, overwhelming magnitude of material goods, as well as difficulty of the industry to innovate new needs have all influenced people's acceptance and willingness to acquire used goods. The low price of direct consumer-to-consumer (C2C) sales oftentimes more than compensates for the risk of poor quality and logistics costs. Becoming more common, this phenomenon has woken retailers to innovate ways of involving this substitutive trade, adding value to the process and gaining profits thereof.

Servitization is another example of substitution in the industry. Subscription-based digital content streaming services such as Netflix or Spotify have transformed the way in which entertainment content is consumed. Instead of discrete products such as physical or digital instances of music albums or movies, they provide the consumer with access to a virtually unlimited variety of content as a service. Traditional retailers of physical media or digital licenses of content are completely cast aside in this form of business. Transactions take place directly between the streaming service provider and the consumer over a digital infrastructure.

Industry Rivalry

Digital transformation, outcomes of which are so intensely felt by retailers through the four market forces above, is also embraced by the retailers in the market. Digital technologies are eagerly used both to protect against the increasing competition and to bring new tools to the competition against other retailers. This natural competition between market players is often overlooked when discussing outcomes of digitalization. It is sometimes questionable whether a change is motivated by digitalization of the consumer or viewed as an initiative to challenge competing peer merchants. Nevertheless, digitalization is absolutely essential to a retailer to attain efficiency in modern retail.

Particularly in this context, the four Ps needs to be amended with the fifth P of *process*. Processes of retailers, also other than those of the logistic nature, have greatly been influenced by digitalization. Most of these processes are not directly interfacing the merchant's customers and hence not influenced by customers' digitalization. In these processes, motivation of digitalization is more or less rising from improving competitiveness of retailers against their rivals. E.g. in the sourcing function of a retailer, increasingly international trade, off-shore manufacturing, electronic market places, auctions, reverse-auctions, and bidding processes of today are profoundly advanced by digital technologies of today utilized by merchants and producers of goods to improve

efficiency of the processes in the value chain and, consequently, to improve their competitive position on the market.

In the processes largely internal to a retailer, extended ERPs that enable largely automated planning, purchasing and accounting, automated warehousing and logistics optimization, advanced analytics of the customer information management, sophisticated space driven assortment management, optimizing sales based replenishment, and demand forecasting product life cycle management solutions are but a sample of the continuously evolving digital toolbox used by retailers. The wide range of solutions in many yet unstandardized retailing processes lead to a high IT cost. In many instances, the business critical nature of processes mandates extremely high availability and further increases costs. The impact on the retailer's margin by all of the IT is at the level of 1.6 per cent of revenue. The cost of digitalizing internal processes is tenfold compared to that of the digital customer channel. The high cost impact immediately translates to competition between retailers in the form of novel and efficient digitalization of internal processes.

Some of these tools, e.g. assortment management solution, may directly link to digital customers of a retailer, by facilitating presentation of the retailer's assortment in e-commerce solution. In this integration, capability of the retailer's internal processes, originally established to manage the assortment in a physical outlet, converts to a new digital functionality required in a new digital retail channel. With this integration, an efficient retailer facilitates the assortment process only once, avoiding the cost and trouble of dual systems, integration, and instances of information. Having advanced digitally supported internal processes directly and simultaneously contributes to competition in the digital market as well as in physical outlets. Even if the consumer directly observes only the customer interface of the retailer's process on the e-commerce site, the whole value chain of the retailer, extending to brick-and-mortar outlets, if any, will participate in making the digital offering available at a lower cost and relying on timely information. For any major retailer, lack of digitally implemented processes or poor integration between them presents a direct threat of losing market position for more digitally savvy competitors.

Competitive Constraints

Digitalization has introduced new arenas of competition in retail as well as reinforced traditional competitive forces. However, as advanced digital technologies have enabled reasonably priced collection, storage, process, and exchange of information for competitive purposes, it has also introduced new threats and vulnerabilities to both consumers and retailing institutions. These still emerging and fast-evolving threats are a great concern for retailers as well as for public authorities that are responsible for market rules and conditions. Largely unintentional side effects of digitalization have motivated respective authorities to regulate retailers' activity in ways that utterly constraint the competition in retail. In today's world of globalization, regional and national authorities have to maintain great awareness of their regulative actions not to

unintentionally manipulate local retailer's competitive capability, which is simultaneously challenged by international players that are free from such competition-influencing regulation.

Personal Information

Traditionally, a person has been entitled to personal privacy in one's life outside of the intentionally public life, and regulation has supported this principle. Regulation in the fast-evolving digital world has not deviated from this principle, but it is largely challenged by the changing concept of publicity. Multiple social media environments, in which users willingly share their private data, after having agreed about the terms of the media, muddle up the separation between the private and public life. While privacy is much of a personal need, identity is simply a must, even in the digital world. A theft of one's digital identity is much easier but equally or even more painful than a theft of one's traditional identity. This new threat has urged regulators to establish new stringent controls on how organizations manage personal information.

In a digital environment, solutions have been introduced in the market before respective national regulation has been in place and communicated to the solution providers, resulting in a violation of the principle, if not of the updated regulation. Having legacy systems that manage personal information updated to comply with the changing regulation about content and data access may be expensive, but it is generally possible. However, the expanding possibilities of the virtual world to utilize personal information present quite a new challenge for regulators and for those to be regulated. E.g. the simple principle of obtaining an individual's consent before utilizing personal data for a purpose efficiently prevents retailers from using personal information also in cases in which it is of an obvious benefit for the customer. Establishing a solution to manage each individual's authority poses a notable challenge and cost for a traditional retailer in terms of collecting, maintaining and controlling such information in a large legacy solution. Customer service is omitted due to its excessive cost.

In digital channels, it is a common convention to require the customer's permit to all existing and imagined future use. Few customers read and even fewer deny such permission, as that would halt their transaction. On the other hand, any personal information of the customer may be freely utilized to the extent that customers begin to question such utilization and to avoid such a retailer.

While pure digital retailers are able to liberally utilize their customer information, brick-and-mortar retailers are left struggling with the regulation. For pure digitals, the regulation intended to protect an individual's privacy is simple to comply with, and controls disappear along with the customer's permission, while traditional retailers of the physical world are greatly influenced by regulations pertaining to personal data, and their actions are controlled by regulatory bodies.

To further complicate the situation, not all countries establish similar legislation or even same principles of legislation. Digital retailers may shop between

countries for more liberal regulation as they do for lower taxation. Large global retailers will innovate liberally, while smaller local players remain tightly controlled.

Product Information

Any retailer in pursuit of long-term business success understands the need to maintain and to deliver correct product information to its customers. All aspects relevant to the shopping consumer must be covered, before the deal can be successfully made. Especially in grocery, but also pertaining to non-food items, small amounts of allergens may endanger an individual's wellbeing. Due to the risks of products to the customer's health and even to their life, regulators have seen it necessary to implement mandatory requirements for the availability and quality of product information.

Increasingly, customers are also demanding more accurate information on products, even in excess to the requirements of the regulators. Conservation of nature, fair trade movement, and personal attitudes towards certain political or social establishments may cause an individual to decide against or in favor of certain products, manufacturers, materials or countries of origin. According to the Cassandra Report (TIG, 2014), 32 per cent of Millennials have stopped buying from companies whose social practices they find unacceptable. The individual decision criteria are largely dependent on the free will of an individual, which makes these information irrelevant for some consumers and crucial for others.

In traditional retail, product information were most commonly provided on documents fixed to or accompanied by the product and available to the potential customer in a physical format in stores. Information remained up-to-date with the product without additional effort. In contrast, the product information in e-commerce is maintained separately from the physical product that is finally delivered to the customer. This separation of the information from the product at the moment of the sales generates an apparent risk of having erroneous product information. The same risk applies to some extent to brick-and-mortar outlets, as the retailer's value chains are becoming faster, allowing products to be delivered in smaller batches, which generates a possibility of product changes between deliveries. Also, much of the product information available to associates in the store is from the same source used by customers.

Concerning value chains of contemporary trade, quite usually spanning several countries, and the speed in which product developments takes place, it is a great challenge for retailers to maintain product information up to date. Some manufacturers, traders, or other intermediaries are unable to provide product information in other than a physical format with the product. With large assortment manufacturers, implementing mandatory product information as demanded by regulators or customers, may require a huge effort and introduce a great cost. In the eyes of the customer, the retailer is held responsible no matter what is the true source of false information. With the increasing threat and consequences of product counterfeits, continuous control of the value chain is becoming both essential and expensive.

Consumer Protection

Consumer protection is established to protect consumers against malicious retailers that would take advantage of overstated marketing or misleading product information. Generally, it requires retailers to fully refund any purchases that are returned in a proper condition. In the case of a traditional retailer and physical outlets, everything can be settled, as the product is returned to an outlet by a customer. In the digital channel, the same principle usually applies, even if the product is purchased from a remote retailer, as any digital retailer wishing to stay on the market will avoid causing bad reputation due to negative customer evaluations.

The cost structure of a digital retailer differs from that of a traditional store. In the common case, the bought items are sent either from a digital retailer's distribution center or from a so-called dark store, where picking of items for shipments is optimized for efficiency, the cost of shipping items by paid employees can be compared to the cost of shelving items by employees in traditional stores. The difference in cost of the "last leg" from a retailer's location to a consumer using a general logistics operator differs greatly from the diminishing cost of customer's self-service, even if possibly assisted and finally complemented by an associate's service at the check-out.

Naturally, the logistics cost also depends on the volumes of the retailer, setting huge global retailers in quite a different position compared to smaller domestic ones. In digital retailing, this difference is expected to be compensated by the much lower facility cost outside the city center's expensive quarters. The consumer's ability to return goods can make a huge difference in the cost of the last leg. Retailers in the US report a return rate of 20 to 40 per cent for online sales, with poor fit cited as the number one reason. Additionally, 72 per cent of retailers cover the cost of delivery and/or the return of items. This difference in the cost structure obviously sets digital retailers in a very different position, depending on the location of the retailer. In countries of high labor cost and taxation, the price level of logistic services also tends to be higher. Even if offering the same level of consumer protection, the very same logistics service can be priced lower as part of the logistics chain initiated from a lower cost country. Maintaining high consumer protection greatly lowers the profitability of the digital channel, or at worst, can ruin the competitiveness of a domestic retailer challenged by service providers from countries of lower cost and, ultimately, fewer consumer rights.

Environmental Legislation

In principle, environmental legislation does not make a difference between retailers with physical outlets and digital services. Retailers are naturally responsible for their own waste, which is produced in unpacking or packing of items for sale. Additionally, in certain cases of hazardous or potentially polluting material, retailers are required to accept and to properly process any used items returned by customers who want to get rid of the product. When a retail-

er is offering these products, return of the used product must be made available, possibly against a fee that rarely compensates for the effort.

In the case of a digital retailer outside the country, however, there is no practical means for customers to return a used item to the retailer. Consequently, the digital retailer can expect none or extremely few used products to return and can neglect the respective cost from its pricing formula. The cost and trouble of getting rid of worn products is left for brick-and-mortar outlets residing in the neighborhood of the digital customer. Or even worse, items are dumped among other waste, which can make environmental regulators hesitate to set returning fees for problematic waste that would compensate the cost of waste processing for local retailers.

Idiosyncracies of Retail in Finland

Finland does not seem to attract new brick-and-mortar retail chains. The country is geographically aside from major logistic routes, large but still sparsely populated, and hence the market is relatively small. Setting up the mandatory logistical infrastructure requires prohibitively high investment compared to the expected revenue and returns from the already well-served and saturated market. The Finnish grocery market, like the ones in several other European countries, is dominated by a duopoly of S Group and Kesko, and contended by Lidl, Germany's second largest retailer that has managed to gain a notable market share nearing 10 per cent in its ten years of market presence. Suomen Lähikauppa Oy, originally a domestic grocery, but nowadays owned by a Swedish venture capitalist, has been restructuring its brands and network, resulting in a diminishing market share. Behind more visible nationwide players, smaller domestic hard discounters like Halpa-Halli and Tokmanni as well as the privately held convenience stores brand M-markets and the quality brand Stockmann Herkku are seeking to grow their market share and locally challenge the bigger players.

The non-food market of Finland looks astonishingly different. The market is extremely fragmented with a plethora of players of different origins, ranging from very local single outlet fashion apparel stores to domestic hardware or specialty chains like Hong Kong, Motonet, and Puuilo with quite a few chain-led outlets; to large full-scale domestic hardware stores of K-Rauta and Kodin Terra; and to global players like Plantagen, Bauhaus, and IKEA. Multiple global car manufacturers are present, typically with their own import function and locally operated retail outlets. New entrants in the form of international category killers or by acquisition of domestic chains, like once so famous chain of Anttila bought by a German investment bank, seem to be attracted by Finnish markets. Even if Kesko reports a market share of 34 per cent in hardware retail and Agrimarket, nowadays owned by Danish cooperative DLA, is a market leader in agricultural retail, there is no comprehensive statistics on the market shares of the extremely wide non-food retail market.

The situation is again quite different in e-commerce. Domestic retailers experiment with e-commerce in many sizes and formats, seemingly with no

ground-breaking success. In grocery, which remains local due to the nature of the goods and the demands of temperature-controlled delivery, the digital market is dominated by few domestic players. The market size of digital grocery is reportedly a mere one thousandth of that of traditional grocery outlets.

In the non-food market, large e-retailers of digital and durable goods have virtually no barriers to enter the Finnish market. High educational level, easy access to digital services, and availability of easy and reliable financial services are all in favor of a wide adoption of international e-commerce sites by Finnish habitants.

The playing field is not only global but also uneven due to differences in regional regulatory regimens and high level of cost accrued by Finnish retailing operations, no matter if digital. Online stores operating from outside of the EU have global access to consumers but no need to jump through the same regulatory hoops as their European counterparts nor as high taxation, labor or other authoritative cost, like various compulsory license and inspection fees.

Given the high costs and regulatory barriers in Finland, it is not conceivable for a Finnish webshop to compete profitably in global markets. Considering the great majority of the non-food items manufactured outside of Finland, it is quite difficult to see competencies that would favor a Finnish digital retailer to such an extent to make it competitive and attractive to consumers of multiple nationalities. It is more likely that e-commerce will move outside EU borders. Just like production has moved to Far East, online retailing may follow.

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Case Luottokunta: Example of Transformative Impact of Digitalization

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Yesterday, Business Was Such an Easy Game to Play

Until 2012, Luottokunta was a national co-operative in Finland, owned by major banks and about 20.000 merchants. It was not until early 2000's when it became possible to be a customer for Luottokunta without joining the cooperative. Founded in 1965, Luottokunta had pretty much conducted stable business for decades: processing credit card payments on behalf of merchants. It had its own payment card for companies, Business Eurocard, and had also entered the businesses of lunch coupons and cards (Lounasseteli, Lounaskortti) as well as sports and culture coupons and cards (Virikeseteli, Virikekortti).

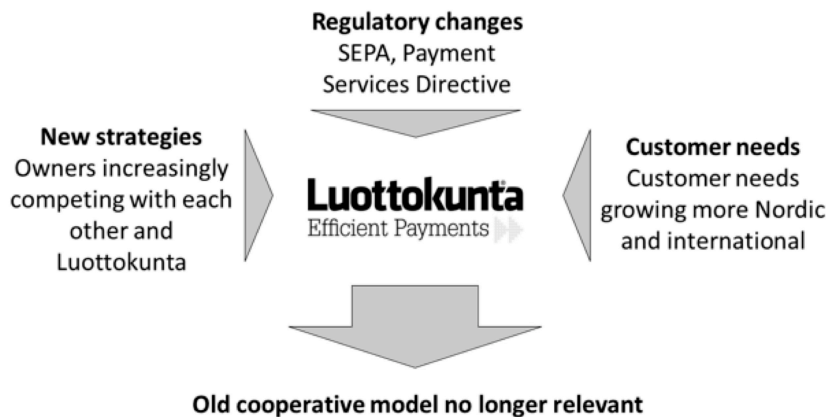


Figure 13. Changes affecting Luottokunta.

In the early 2000's, several market and regulation changes started to increase competition and to impact Luottokunta's market position. The card payment market in Finland had so far been protected by the national bank card scheme ("pankkikortti"), operated by major banks, national standards, and market models. Until now Luottokunta's business had been supplemen-

tary to banks' own business, extending the services with international credit cards. Banks had considered this unattractive to them due small volumes and investments needed to create the capabilities, due to the popularity of national bank cards and the Finnish way of using credit cards.

Single European Payment Area (SEPA) and Payment Services Directive (PSD), implemented by 2010, created standards for payment markets and opened national markets to competition at the European level. Finnish banks considered the required changes to the national bank card scheme to be too expensive for the issuing banks, and the scheme was discontinued and replaced with debit cards of international card schemes.

After the shutdown of the national card scheme, acquiring volumes of debit card transactions moved to Luottokunta, as it was handling the international card scheme acquiring. This created a boom in Luottokunta's revenue. Consequently banks wanted to secure their position and business relationship with major merchant customers and started to enter the international scheme acquiring business. To keep the transaction volumes and business relationship with banks, Luottokunta shifted its strategic focus more to that of a service provider for banks and less to providing services for merchants.

Scale is central to competition: large acquirers have a cost advantage of 2x – 3x the average acquirer (Ybarra, 2004). In global and even regional competition, Luottokunta was a small player with a relative cost disadvantage and not very well positioned to expand across borders or leverage digital channels for borderless reach.

At the same time, major customers of Luottokunta started to have more and more cross-border needs. A major Finnish bank, Sampo Pankki, had been sold to Danske Bank in 2007, and Nordea had been born in a Nordic bank merger some years earlier. On the merchant side, major Finnish retailers S Group and Kesko had started to enter markets outside of Finland, creating a need for cross-border services. Harmonized rules made Finland more interesting and easier to enter from other Nordic payment operators' and banks' point of view, increasing competition in Luottokunta's domestic market.

Along with the changed ownership of banks and their competitive environment, banks started to consider ownership of service providers like Luottokunta as no longer necessary. Additionally, new strategies of banks made them competitors to Luottokunta in certain business areas.

Finally, changes in the market environment together with some aging core solutions created a need for new investments in Luottokunta. Having the domestic service development and investments on track was no longer enough. Capabilities to be able to enter other Nordic markets as a credible service provider required even larger investments and appeared overwhelming to Luottokunta as it was.

All these different changes and challenges in the market and competitive environment led the owners and the board of Luottokunta to consider different options of ownership. After several steps and consideration of potential options from international partnerships to selling the company, Luottokunta moved its business activities and personnel to a subsidiary of the cooperative

and sold it in an auction to Nets Holding A/S, a Nordic provider of payments, cards and information services in 2012.

Fast Forward to Today: Acquisition and Transformation

Two and half years after the acquisition by Nets, the former Luottokunta is quite different from what it used to be. Things have changed in the business itself, in information technology (IT), and in the organization and company structure.

The merger with Nets has forced the organization to move towards more business-like operations. As a cooperative where customers and owners were the same, owners received added value from the service offering and pricing, and the focus was less on the bottom line of the cooperative. Today, owners expect Nets to deliver owner value also in terms of financial results of the company.

In many areas, efficiency has increased, service development has speeded up and new cross-border offerings have been implemented. Nets has also divested some of Luottokunta's services, such as Lounasseteli and Business Eurocard, in order to focus on its core: volume business on digital transactions. Overall the position of Luottokunta/Nets has become clearer from the market point of view.

Harmonization of services has been started and is in progress for both bank and merchant services. Today, Nets is offering Nordic solutions to several clients in certain services, and the offering is increasing. On the other, a card management system renewal, started in Luottokunta, has been all but finalized in Finland, and services based on the solution are being offered on the Nordic level. At the same time, Luottokunta may have lost some of its local innovation, as a lot of new business and service development tends to take place where the headquarters is; in this case, in Denmark.

The knowledge and capabilities of Luottokunta have brought an important piece to Nets. Luottokunta's long-term customer relations and major market share in Finland as well as knowledge in acting as both cards issuer and financial acquirer have all been valuable assets to Nets. Experiences in transitioning to commercial off-the-shelf applications, instead of fully tailored solutions, on certain core platforms started in Luottokunta have significantly contributed to the planning of IT roadmaps in Nets.

The organizations have merged to a fully integrated Nordic organization. The merger meant a significant change for Luottokunta's employees, who moved to international teams reporting to foreign managers at a new management level. A tangible change for Luottokunta's and Nets' employees alike was that the merger brought English as the new corporate language. Also terms of employment and other personnel policies have been harmonized.

The transformation was heavily invested in: information was openly shared and knowledge actively transferred across the organization. As a result, the merger can be considered well-managed and successful. All in all, the trans-

formation was relatively quick-paced, rather limited in scope, and led top down. The new organization was established as of the beginning of 2013.

Nevertheless, a merger of two large organizations always comes with a price, and the Nets–Luottokunta merger is not an exception. When looking from the former Luottokunta perspective, the organization has grown in layers and complexity, and decision-making can sometimes take a long time. New challenges are also seen in project prioritization, whereby more technical consolidation work can collide with more direct customer projects for new business. These challenges have placed a need for better project prioritization and portfolio management processes.

Consequences to IT

After the merger was published in summer 2012, the second half of the year was spent getting a better understanding of each other and planning the next steps. While IT plays a key role in services provided by Nets, nothing dramatic happened during the first year after the merger. Work remained largely the same, and IT was consolidated very prudently. In technical sense, the merger was mostly about harmonizing email, office systems and workstations in the common corporate network. The end user did not experience any major change due to the integration.

From the IT organization point of view, the merger denoted an order-of-magnitude change in scale. Whereas Luottokunta employed 100+ people in IT, Nets features 800–900 IT people plus external consultants. The perspective is wider and the level of coordination required to run the organization is different. The focus of IT work, post merger, has been on harmonizing the service offerings, where the technical implementation plays an important role.

From the business systems point of view, the integration was more about creating a long-term roadmap, reorganizing IT organization, and defining roles and responsibilities. IT strategy was setting targets for a 2–3 year time frame, starting from proving and delivering promised benefits and new capabilities, and commercializing products based on them.

From the acquired company's service offering point of view, it is important to make sure that existing business and IT services are not discontinued without proper analysis. Consolidation of IT systems and services is important in order to both achieve planned merger synergies and harmonize the service offering. This also creates a challenge for IT management, as it is required to balance between delivering expected benefits, running day-to-day operations and enabling business unit service development.

Transition from several local solutions to a common service platform often requires changes in both the customer service offering and internal processes, and sometimes the changes can be seen as a reduction of service from a certain business or customer point of view. Combining such changes with significant investments and reduced development – or even complete development freezes – on local solutions can be challenging. Making sure that customer satisfaction stays at an acceptable level is essential to the company's long-term suc-

cess. In the case of Nets, a lot of effort has been put to analyzing the services and planning the transition. As a result, many benefits from IT consolidation are yet to be seized.

Conclusions

Case Luottokunta exemplifies the impact of the current global trend of digitalization on the competitive landscape and subsequent transformative consequences for organizations. While trade barriers have been dismantled for decades, it is not until very recently that ubiquitous technical platforms for worldwide digital communications and commerce have enabled both businesses and end consumers to engage in global trade in an entirely new scale. After decades of linear logic, wherein companies have served markets through intermediaries and indirect interactions, conversation has returned to the global marketplace: consumers are expecting transparency of information and prices, and companies are finding new ways to cater the consumers' unique and changing needs. In the new digital age, time and space are contracted. Competition is inherently global and increasingly fierce.

Until recently, many organizations, including Luottokunta, have enjoyed decades of relatively stable business as usual. Merchant acquiring has been a steady, mature industry for many years, enabling merchants to accept debit and credit card payments. While information technology has played a major role in business for a long time, it is only with the recent diffusion of digital information, communications, and commercial transactions that has had a disruptive impact on how business is conducted. New SMAC technologies (social, mobile, analytics, and cloud) are driving change. The way consumers shop and the way they pay are profoundly changing. The business environment of an acquirer is increasingly multi-channel and features multiple payment formats. New entrants are also bringing new means of payment to market.

The ongoing competitive shakeout forces companies to develop adaptive responses to ensure their sustenance. Luottokunta's response to global digitalization was to become acquired by a larger regional player, Nets, that had more capabilities than Luottokunta in taking requisite measures to increase its competitiveness: to develop business and to grow its volume base. This seems to have been a viable choice. Integrated with Nets, the former Luottokunta personnel have had to become more business-oriented. The weeds of business legacy, such as the lunch coupon business, have been cut down, and the organization is more focused on its core business based on digital transactions.

Merchants are expecting the acquirer to support all payment types, including non-card payments and emerging payment alternatives (Accenture, 2013). To avoid the commodity trap of eroding margins, Nets will need to explore how advanced technology can be harnessed to differentiate its offering through revenue-generating value-added services, built on the optimized core of payment acceptance.

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Case RAY: Playing It Digital

Konsta Luhtala, RAY
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RAY: A Regulated, Special Operator of Slot Machines and Casino Gaming

Finland's Slot Machine Association (Raha-automaattiyhdistys, RAY) offers entertaining games, in about 20,000 physical slot machines around Finland in restaurants, arcades, online, and at Casino Helsinki. It is a non-profit special organization, governed by legislation and decrees, which give it the exclusive right to operate slot machines, casino games, and casino activities in Finland.

The profits from RAY's games are channeled to a wide range of organizations promoting health and social welfare in Finland. These social and healthcare organizations are hundreds in number and employ tens of thousands of people. The fund allocation is guided by policies created by RAY's Board of Directors and as agreed with the Ministry of Social Affairs and Health.

RAY is a responsible operator that ensures players' legal protection, prevents misuse and crime, and reduces the harmful social effects of gaming. RAY also supports organizations that aid people with gambling problems and the families of these people.

Early Days of Product Development

Product Development at RAY dates back to the 1960's, when RAY developed its mechanical payazzos. Slot machines followed in the late 1970's. Technological know-how pertained to design of games, production of machines, as well as resource planning of distribution and maintenance.

Product development based on software started in 1978, when RAY took on the task of creating a fruit game type of a slot machine. The development of games and supportive software increased in the 1990's, when the machines were connected to the network and when multigame machines were created.

All in all, it was pretty much business as usual for RAY for almost 70 years: deploying new slot machines in the field, running casino type table games in night clubs and Casino Helsinki, collecting money, and channeling it to beneficiary organizations. The saturation point of the installed base had been achieved and business was not developing. The mode of operation was largely offline: as building network for the slot machines started in 1995, Internet

connections were poor, the network was only used as an incident and reporting channel, and games were operated with coins.

Rays of Digitalization and Digitalization of RAY

In the wake of 2000's, there were increasing pressures to change the way in which RAY conducts business. A number of trends suggested that the organization should reinvent itself.

The trend had been decreasing for cash payments for a long time. It was obvious that electronic means of payment would surpass cash. In the early years of the new millennium, RAY experimented alternative means of payment and around 2005 decided to furnish its slot machines with debit card terminals. This decision was the turning point towards RAY's capability of producing contemporary digital consumer services.

The deployment of new devices started in 2009. This change had a number of major consequences. The required new payment transaction system was a challenge in its own right, but also the raise of big new 24/7 service station chains necessitated that slot machines were always online. Rolling out the entire installed base of about 20,000 machines was a major undertaking that took five years. The new slot machines enabled gathering data of playing sessions, statistics, and enhanced the understanding of the customer to an entirely new degree.

In the early 2000's, international online casinos emerged and very quickly found their audience irrespective of national borders. At RAY, the need was felt to create a responsible, local alternative that is safe and reliable compared to many overseas online casinos. The new decree allowed RAY to establish Internet casino in 2009/2010. The Web also provided a new channel for games. Moreover, Veikkaus, another Finnish organization governed by the Lotteries Act, had embraced the digital channel several years earlier already.

In addition to the debit card terminals, many other features were implemented during 2010–2012: new types of games and updates and configuration over network. In 2012, RAY introduced a Customer Loyalty program that enabled authentication of the player at slot machines as well as in online gaming services. So far the feature has made it possible to set individual limits for playing and to benefit from exclusive perks. Today, there are over 300,000 registered customers.

Digital Transformation

Digitalization of RAY's business also had a profound impact on its organization. In the end of the 1990's and in the early 2000's, RAY had largely outsourced its systems software development, which, at the time, was focused on enterprise resource planning and on production control. Also its remaining slot machine cabinet production capacity was largely ramped down and outsourced by the mid 2000's. Game development was not affected by changes in IT.

IT was relatively low-key for a couple of years, until some efforts were made towards the end of the decade to develop services for debit card payment. However, these efforts continued to fail, until a complete overhaul of the architecture of the card payment system was carried out, together with capable vendors, in less than a year in 2008–2009. Finally, this new architecture enabled debit card payment and personalized customer experience. New recruitments were not done and the organization was not changed at this point, but people were trained e.g. in project management.

By the time debit card payment was launched in 2009, the revised national decree also enabled casino games on the Internet. Thereby, this year denoted a major milestone in RAY's development. Probably the most crucial time of the digital transformation followed in 2009 through 2013. The introduction of payment terminals, Internet gaming, and customer program required building a new organization and rebuilding competencies in software development, this time pertaining to service development and payment.

In 2009–2010, a number of new processes were designed and implemented. To launch the Internet service – the first real 24/7 service at RAY, required that customer service, gaming operations, monetary transactions, marketing, monitoring, website maintenance, and many other processes were efficient and adequately resourced.

IT was insourced again, and RAY recruited people for testing, and later on developers as well. Supported by vendors, teams adopted agile methods rather quickly. In the beginning, the product owners came from RAY, while most of the developers were on the vendor side. Project management and reporting were still done in a traditional fashion.

Figures 14–16 show how the organization has changed from 2011 to date. In 2011, directors of Marketing and Customer Relations, Channels, Development, and Production were reporting to the Deputy CEO, responsible for the gaming business (see Figure 14). This role was very powerful, while the CEO was more of a figurehead of the organization with less involvement in execution. The directors formed a management collegium.

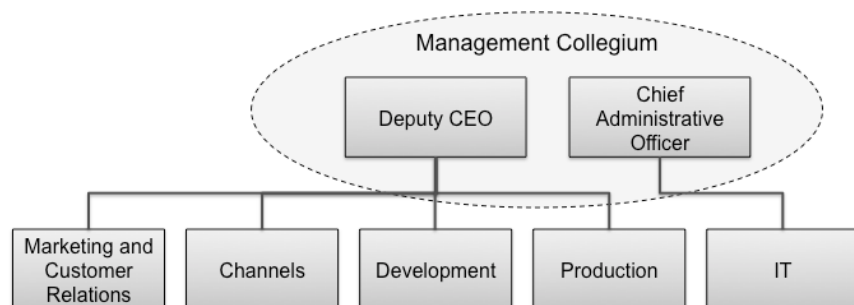


Figure 14. Organization in 2011.

By 2013, the chairs had been shuffled so that the directors of Channels and Development were in the Board of Directors and reporting directly to the CEO (see Figure 15). Customer Relations and Production were under channels, and

Innovation, Production Development, and IT were reporting to Development. Development was an interim organization, created for the transformation to unify business development across channels. On the other hand, this new entity brought about silo boundaries towards business lines and channels, each of which had its own agenda. The IT function was reporting to the Chief Administrative Officer. No natural organs for collaboration between IT and Product Development existed.

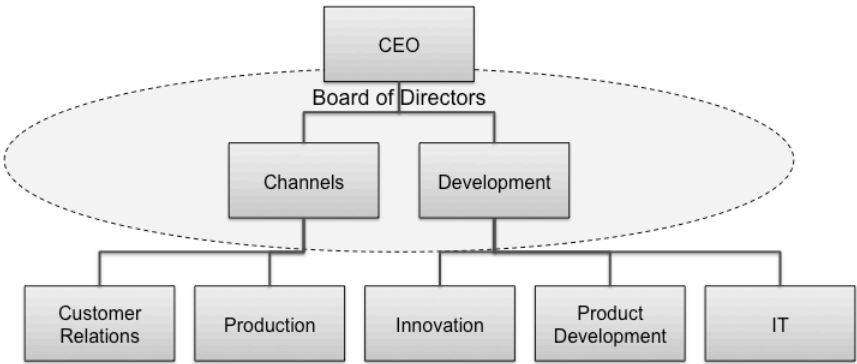


Figure 15. Organization in 2013.

As of the beginning of 2015, Development was dismantled and Business (as usual) took a prominent role in the organization chart (see Figure 16). In the latest organization change, common development across channels is under Business Development. Business Planning and Coordination emphasizes mutual planning and pertains to innovation and PMO. Business Development was given a role to coordinate products and services development between channels, whereas Business Support had a more operative role, being responsible for customer service center, maintenance, and logistics in the field. At the same time, IT was moved back to Administration organization. It moved farther away from Product Development and has already lost some of its effectiveness it used to have when working in closer alignment. As the units are no longer under same management, more effort is needed at all levels to attain alignment in goals and schedules.

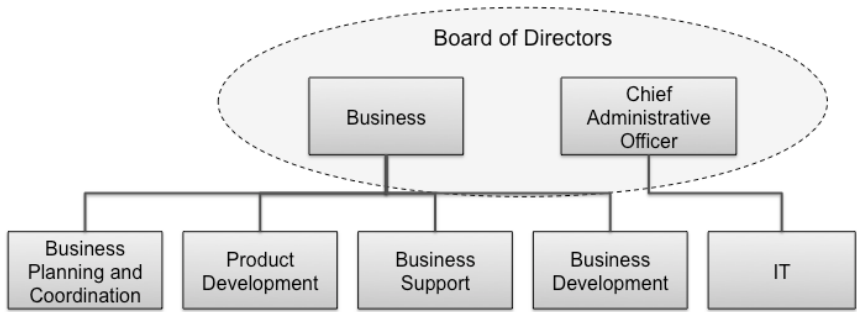


Figure 16. Organization in 2015.

The timeline of digitalization and digital transformation at RAY is exhibited in Figure 17.

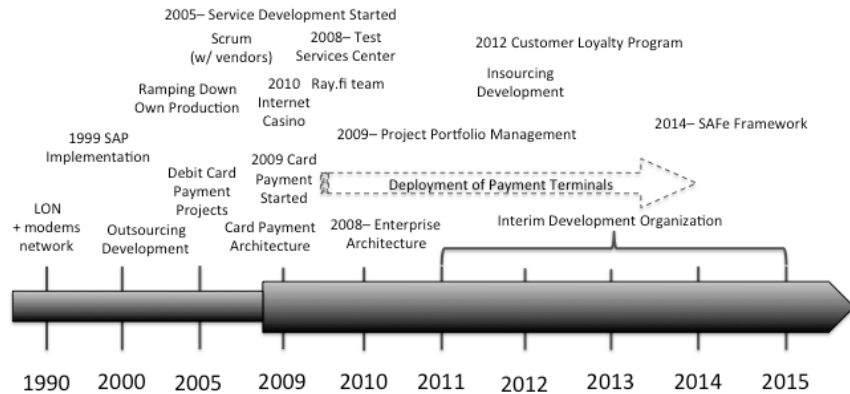


Figure 17. Digital transformation timeline at RAY.

Agile Product Development at RAY

RAY's agile game and service development dates back to six years ago. The programming of games has always been in RAY's own hands, but only in the last three years in-house service development has been strongly adopted. This is in line with the strategy of building and maintaining products in RAY's own teams, reinforced by external consultants, rather than sourcing these strategic capabilities from vendors.

In 2009, RAY took up a new project portfolio tool, whose purpose was to provide a comprehensive view of the projects in progress at RAY.

The product development teams of RAY had already attained a reasonable level of maturity in agile methods, but steering of product development and business units as internal clients did not support the agility in teams, which rather worked separately and in different rhythms.

The number of product development projects increased from 2011 onwards, and an increasingly large part of projects called for creating cross-cutting capabilities related to RAY's gaming systems. The amount and complexity of projects brought about the need to improve design and steering pertaining to product development.

As SAFe (Scaled Agile Framework) implementation planning started in 2013, the management of product development realized that without agile practices extended to budgeting, conceiving, and decision-making, agile product development and deployment will not develop enough to account for the future needs.

In the time of this writing, the conceiving phase is still on the development agenda of product development management. It might be ideal that within strategic themes, a number of concepts and project ideas are nurtured and the best ones will be chosen for further development.

The development of decision-making structures begun in the enterprise scope in late 2013, and product development seized the auspicious moment in

2014 by adopting selected features of SAFe. These features constituted the planning and steering model of RAY's product development.

SAFe was first adopted in product development but since then it has expanded step by step a team or unit at a time to embrace parties immediately connected with product development.

The management model at the moment is as follows:

- The board of directors is responsible for creating strategy.
- The business steering group is responsible for developing and implementing strategic plans.
- Distribution channels are responsible for implementing channel-specific plans.
- The business operations group is responsible for the coordination of operational cross-channel work, e.g. pertaining to the SAFe-based "development train" of product development.
- The development train implements prioritized tasks in both channel-specific and cross-channel backlogs and reports of the progress to the business operations group and thereby to the business steering group.

RAY's Implementation of the SAFe Model

SAFe is a model that helps roll out agile methods enterprise-wide (insofar the enterprise is primarily focused on software-based product development). SAFe is aimed to help develop cutting-edge processes and methods for enterprise value creation. RAY applies the model critically, adopting only practices that are considered as value-adding to its own work. RAY will also utilize appropriate practices in competing frameworks such as LESS (Large Scale Scrum) and DAD (Disciplined Agile Delivery).

The governance of agile product development at RAY is illustrated in Figure 18. The source process for RAY's planning and steering model for product development is the business planning process for strategy implementation. All operational units, including product development participate in this process. The process is about considering how the financial goals for the coming few years are attained through product and service development initiatives driven by business needs. Business requirements and concept ideas are reflected against enterprise architecture so that the necessary new capabilities and developmental requirements are recognized as early as possible.

The concept ideas chosen in business planning end up to the portfolio management process, in which the concepts are further developed, until some of them mature enough to be implemented. A part of the concepts are still translated to projects, but it only has relevance from project portfolio point of view. Within SAFe, work is done with agile methods from steering to implementation.

The coordination of work selected for implementation as well as dependence and resource management take place in the so-called planning process for product development trains.

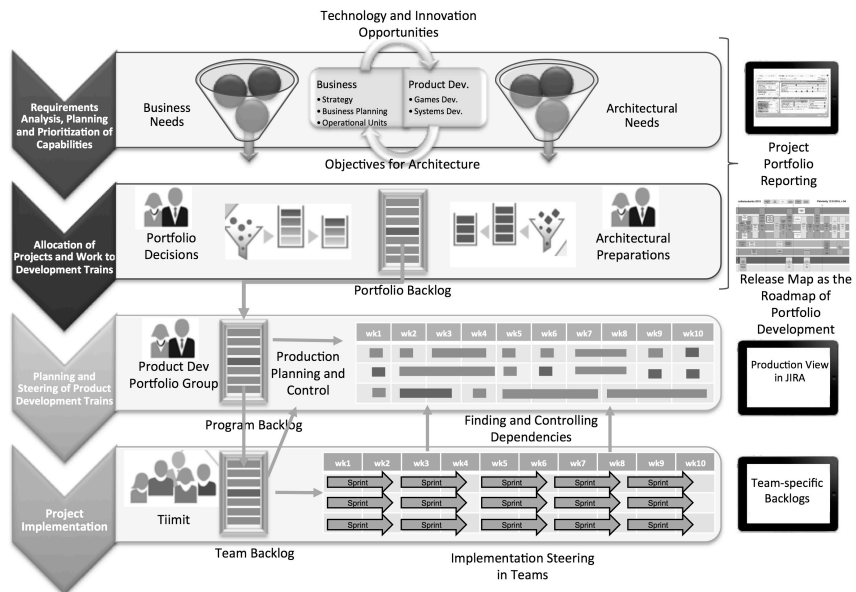


Figure 18. Agile Product Development Governance at RAY.

As per the SAFe definition, a train is a team of teams, which at RAY involves around 120 people. Its purpose is to develop together products and services for business. The product development train unites the teams in a shared rhythm, in which planning, implementation, and continuous process development occur. The product development trains are designed to be 10 weeks in duration, so that visibility into future work is as realistic as possible and that the teams may agree upon the schedule for common work. In other words, the product development train arranges the work of the teams under one planning umbrella that defines the beginning, end, and quality, but not the scope. Each team is responsible for the scope, schedule, and releasing within its own area of responsibility. Each team contributes to the mutual plan by publishing, which tasks are its own and which ones are shared with other teams during the train-planning period.

The work is done in teams, whose backlog consists of maintenance tasks pertaining to products and services in its area of responsibility on one hand and of new development and testing on the other hand. The teams are built based on the tenet that they are self-sufficient and self-governing. Members of the team include the product owner and other members that can often take on different roles within the team on an equal basis.

Conclusions

In the early 2000's, after decades of relatively stable and predictable business as usual, Finland's Slot Machine Association (RAY) increasingly started to sense the disruptive forces of digitalization in the gaming business: overseas online casinos as well as changes in consumers' preferences, use of time, and

playing behavior challenged the status quo and forced RAY to respond by upping its ante (pun intended). In just a few years, the organization invested in new technology; developed requisite organizational capabilities to match new requirements of 24/7 availability, information security, and agility; and managed a transition from a steady operator to an agile innovator. With its adaptation of SAFe (Scaled Agile Framework), RAY is well geared to continuous, agile product development in the future.

Digitalization is transforming business models across industries. As information technology (IT) is becoming embedded in products and services, IT leadership has an increasingly dualistic role in supporting the organization and also serving its customers' changing needs.

The ACIO research program studied how Finnish industry and public sector organizations utilize information technology in developing and managing critical business capabilities. The focus was on understanding and analyzing contemporary approaches to IT leadership.

This research report summarizes some of the key research findings, providing scholars and practitioners with insights into and understanding of digitalization and changes in IT leadership in Finnish information-intensive organizations.



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