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Proposition of a Systemic and Dynamic Model to Design Life-Long Learning Structure: The Quest of the Missing Link Between Men, Team, and Organizational Learning

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Background

Strategy: Management of/by Projects, to Deal With Complexity and Irreversibility

For the past 40 years project management has become a well-accepted way to manage organizations. The field of project management has evolved from operational research techniques and tools to a discipline of management (Bredillet 1999; Cleland 1994). Many authors emphasize the evolution in the way to manage project: "*this book traces the development of the discipline of project management,*" writes Morris (1997). Project management becomes *the* way to implement corporate strategy (Frame, 1994; Turner 1993) and to manage a company: "*… value is added by systematically implementing new projects—projects of all types, across the organization*" (Dinsmore, 1999, p. ix). Management of Projects, the way to manage projects within the same organization (Morris, 1997), and Management by Projects, projects as a way to organize the whole organization (Dinsmore 1999; Gareis, 1990), are both a good example of that tendency. To go further in the strategic issue, we can point up that strategic processes in other words focused actions, implement strategy, defined in its dynamic dimension. These processes aim to modify the conditions of insertion of firm in its environment. Through them, resources and competencies are mobilized to create competitive advantage, source of value. As resources are easily shared by many organizations, competencies are the relevant driver. Thus, through processes or projects, past action is actualized as experience, present action is revealing and proving competencies, future action, discounted as project, generate and experiment new competencies (Lorino & Tarondeau, 1998). Lastly, projects are a form of organization that puts a company in relation to the environment. As projects are the vectors of the strategy (Grundy, 1998), project management is a way to deal with the characteristics of the whole environment: complexity (Arcade, 1998), change (Voropajev, 1998), globalization, time, competitiveness (Hauc, 1998). Thus, with the help of project management, strategic management becomes really the management of the irreversibility (Declerck & Debourse, 1997), concentrating on the ecosystems project/company/context, operation/company/context and their integrative management (Declerck, Debourse, & Navarre, 1983).

Competencies, Source of Competitive Advantage and Creation of Value

Thus, competencies (both individual and organizational) are at the source of competitive advantage and creation of value: some research programs are working on this. For example, Lynn Crawford, directing the Project Management Competence Research Project, writes that "interest in project management competence stems from the very reasonable and widely held assumption that if people who manage and work on projects are competent, they will perform effectively and that this will lead to successful projects and successful organizations" (Crawford, 1998). Project Management Institute (PMI®) research project "Project Manager

Competencies" puts forward in the project overview that "The Project Manager Competency Framework will be based on the premise that competencies have an impact on outcomes indicative of effective performance. The degree or extent of this impact is expected to vary depending on certain contingencies (such as project types and characteristics). At a more specific level, the framework will identify and define some of the key dimensions of effective performance, the competencies that likely impact performance, and the contingencies likely to influence the extent to which a particular competency has an impact on performance." These projects and the development of professional certifications contradict former findings (for example, Pinto & Prescott (1988)) conclude that the "Personnel factor," even if designated in theoretical literature as a crucial factor in project efficiency, is a marginal variable for project success (at any of the four project life cycles. For a criticism of their findings, see Belout, 1998). A working paper (Turner, 1998) shows the influence of the project managers on value of shares: "Projects are undertaken to add value to the sponsoring organization. In the private sector this ultimately means increasing the value of shares to the holders of equity in the company." But performance also comes from the maturity of an organization to deal with projects, especially through the aspects of learning. The OPM3 research program (PMI Standards Committee), and others papers (for example: Fincher et al. 1997; Remy, 1997; Saures, 1998) explore the relations between maturity of the organizations and success of the projects. The issue is important in a context of globalization of the profession (Curling, 1998).

Project Management: A Knowledge Field Not That Clear

To develop competencies, a knowledge field is needed. But both in academia and the business world, the field of project management is not clearly defined. To that, there are numerous reasons: the field evolves in breadth and in depth. In breadth, embracing information systems, human resources management, change management, strategic management, economic value management, psychology, management of technology, quality, sociology, multicultural management, systems thinking, knowledge management, organizational learning, team management, temporary group, systems engineering … In depth, going further into cost engineering, finance, specific aspects of risk management, earned value management, scheduling methods, resources allocation, project life-cycle, processes, studying phases, types of projects, projects portfolio management and so on. Over the last twenty years the profession has been working on its recognition, and standards, certifications arose from Professionals Associations. They work on the definition of field and on the recognition of Project Management as a Profession. Definition of standards (bodies of knowledge (broad range of knowledge that the discipline encompasses and some behavioral characteristics), certification and assessment of project management competence models, maturity model), best practices reflect this trend (Gareis, 1997; Hobbs, 1997; Hobbs & Miller, 1998; Toney & Powers, 1997; Project 2000, 1998).

We can identify three main points of view among the attempt to clarify the field (IPMA GWG, 1999). A first one relates primarily to the management of projects (ISO 10006, *A Guide to the Project Management Body of Knowledge* (*PMBOK® Guide*)). A second one is designed primarily as a standard and guideline to define the work of the project management personnel and a basis for the assessment of the project management competence of people. IPMA Competence Baseline (ICB) and the Australian National Competency Standards for Project Management (ANCSPM) are good examples albeit different in their perspectives and coverage (Turner, 2000a; Turner, 2000b). A third one is directed at the PM practices of organisations (current PMI project OPM3 on PM Maturity Model).

One main point is the ongoing adaptation of the different standards according to the change in project management. The theory of conventions can enlighten this: as socioeconomical constructs (Gomez, 1994) standards are the result of negotiation enabling reduction of complexity and uncertainty in the relations between the stakeholders of projects. But according the global evolution of the environment, changing the bases of the negotiation, they need to evolve in a dynamic perspective.

In an other hand, numbers of books, and papers, give both depth and breadth points of view according several dimensions: technical, methodological, and managerial. They aim to fill a long-standing need for a comprehensive, unified, and practical description of the field (among others see: Archibald, 1992; Cleland, 1994; Dinsmore, 1993; Forsberg & Mooz, 1996; Harrison, 1992; Kerzner, 1997; Kerzner, 2000, Pinto, 1998,). But the quest of key success factors, best practices and other "best ways" don't prevent failures and waste of money. And the present development of bodies of knowledge, reengineering of certification show that the current situation is not that clear and a number of practices are hindering growth and quality of the field.

Thus, we have to note that:

1. Project management is becoming the way to manage the development of organizations.

2. Competencies and learning (both individual and organizational) are the source of competitive advantage, and, of creation of value (de Geus 1988; Stata, 1989).

3. Project management knowledge field is not that clear because it evolves in depth and breadth, so that standards as social constructs, need ongoing adjustment.

Considering the definition, the assessment, the development of competencies and the certification processes, we have to note that they are built from standards both in a synchronic and diachronic perspective. In a synchronic perspective because they need to answer to "hic et nunc" requirements for current projects. In a diachronic perspective because the development of competencies, both for individuals and for organization (developing maturity implies time) takes time and it is a necessary condition for future performance to forecast and anticipate the needs for future projects. For example, people who want to pass the different degrees of the IPMA certification have to consider time: according to the development of their ability to manage bigger and more complex projects the will be able to get higher degree. Some companies like IBM Global Services, Bull or Unisys use this process (appropriate degree of certification plus continuous education) to manage the competencies (and the career) of their project managers.

It is unfortunately not a sufficient condition because the future is not predictable: that means the capacities to deal with uncertainty and risk are fundamental. And the link(s) between individual competencies, team competencies and organizational is neither that clear nor the way to develop it (them).

Thus, we see the rapid implementation of project management in organizations, great efforts spend to train people in project management (Parker, 1999). NASA train one third of its workforce (18 500) in a way or another in PM each year and its Centre of Excellence change its name from Project/Program Management Initiative to NASA Academy of Program and Project Leadership (APPL): Initiative has become Academia… (NASA, 1999)

We see many papers and books about individual competencies, the way to develop them, about organizational learning, about lessons learned, about knowledge management, about communities of practice. But many companies reach a limit in term of efficiency and effectiveness while using traditional approaches (seminars, business games, teamwork, and university degrees …) and find very difficult to simultaneously combine individual and organizational development in a coherent way while using approaches like TQM, 5S & 6σ. We lack of an integrated perspective where individual, team and organizational learning, where systemic and dynamic aspects of learning are take in account.

This is the reason why we would like to propose a systemic and dynamic conceptual framework to answer the following question: **How to design a learning process enabling concurrent development of individual competencies and maturity of organization in a perspective of creation of value?**

Before giving some insights and elements of response we have to clarify our vision of project management and what approaches we are going to mobilize.

Some Insights on Research Issues and Method

An Epistemological Perspective of Project Management

We would like first to adopt Terry Cooke-Davies presentation of research issue and approaches in his IRNOP IV paper as mine (Cooke-Davies, 2000). Quoting Michael Polanyi (1959), he proposes an alternative epistemology both to positivism and constructivism. We do not want to separate personal judgement from scientific method.

We think that, especially in project management, knowledge has to integrate both scientific and mathematics aspects (operational research in network optimization for example) and fuzzy or symbolic aspects. A "reality" can be explained according to a specific point of view and be considered as the symbol of higher order (Guenon, 1986) and more general reality (for example a two-dimensions form can be seen as the projection on a plan of a n-dimensions figure). We think that the "demiurgic" characteristic of project management involves seeing this field as an open space, without "having" but rather with a *raison d'être,* this because of the construction of Real by the projects. Project management can be seen as a mean to realize different purposes as Boutinet (1996) shows in his compass rose: technical/existential project and individual/collective project.

Our vision project management would be the one of an integral function: the knowledge field is made up of differential elements, each of them being able to be defined (for example, cost control, scheduling, communication, quality, information system, temporary group …) but seen as a whole, it is a transition to the limit, and in mathematics the result of an integral is both quantitatively and qualitatively more than the sum of the parts. In another way, it is what we can call system effect: parts A, B and C forming a system S, keep some of their properties and potential performances, lose some others, but gain some entirely new performances (Legay, 1996).

Discourse on the Method …

"… of rightly conducting the reason, and seeking truth in the sciences" (René Descartes, 1637).

"I am in doubt as to the propriety of making my first meditations in the place above mentioned matter of discourse; for these are so metaphysical, and so uncommon, as not, perhaps, to be acceptable to every one. And yet, that it may be determined whether the foundations that I have laid are sufficiently secure, I find myself in a measure constrained to advert to them" (Part IV).

The method we chose is the integration of inputs coming from several fields according to two dimensions. The first dimension is what we call the individual/organizational dimension. The individual level includes the aspects of project management having an impact on the person: bodies of knowledge, certifications, standards, best practices, and all project management tools, techniques, experience, competencies, change, task performance. The organizational level includes the aspects of project management having an impact on the team, the organization: bodies of knowledge, maturity, standards, norms, best practices, and all project management tools and techniques, project success and performance, creation of value. The second dimension is what we call the synchronic/diachronic dimension. The synchronic dimension is made up of what have an immediate or short-term impact or effectiveness: It's the level of optimization, stability, predictability and control. The diachronic dimension is composed of what have to be considered on long period of time: it is the level of complexity, fuzzy logic, influence rather than control, creation of value, project performance, performance of the organization, change of culture.

We are considering a map figuring only the first level of the inputs (fields). (For example at a lower level Knowledge Management would include: Anthropology, Artificial Intelligence (Individual), Artificial Intelligence (Collective), Artificial Intelligence (Other), Cognitive Psychology (Individual), Cognitive Psychology (Collective), Complexity and Adaptive Systems, Linguistics, Organizational Learning and Management Science, Philosophy, Sociology of Knowledge (KMCI web site Last updated 06/18/99).)

We have to note that we want to keep a general perspective according to the definition of the inputs: the different perspectives of each input are source of pluralities of meaning.

1. Standards: Standards (including all organization standards: for example, NASA 7120-5A, NSIA EVMS, DoD 5000), bodies of knowledge, best practices, norms, maturity models, professional certifications. They represent the social construct of the project management knowledge field mainly accepted at a time (Bredillet 1998), but as we put it forward higher they evolve according to change in the global context (Gomez, 1994)

2. Learning aspects: we will consider the different levels of learning: individual learning (Hawrylyshyn, 1977), organizational learning (Senge, 1990), single loop learning, double loop learning (Fiol & Lyles, 1985; Kim, 1993). They represent both the structure and the process of learning (Romme & Dillen, 1997).

3. Performance, value: the performance measurements have to be done at the different levels and according the different time perspectives. Normative, prescriptive or threshold definitions can be considered. The creation of value include here all the developments on intellectual capital, intangible assets and the different perspectives developed in this field (Sveiby, 1998; Kaplan & Norton, 1992, 1996).

4. Knowledge Management: KM is "The art of creating value from an organization's Intangible Assets" (Sveiby, 1999). With Sveiby, we can define Knowledge Management by looking at what people in this field are doing. "Both among KM-researchers and consultants and KM-users there seem to be two tracks of activities—and two levels. The track of activities are:

a. Management of Information. Researchers and practitioners in this field tend to have their education in computer and/or information science. They are involved in construction of information management systems, AI, reengineering, group ware etc. To them Knowledge = Objects that can be identified and handled in information systems. This track is new and is growing very fast at the moment, assisted by new developments in IT.

b. Management of People. Researchers and practitioners in this field tend to have their education in philosophy, psychology, sociology or business/management. They are primarily involved in assessing, changing and improving human individual skills and/or behavior. To them Knowledge = Processes, a complex set of dynamic skills, know-how etc, that is constantly changing. They are traditionally involved in learning and in managing these competencies individually - like psychologists—or on an organizational level—like philosophers, sociologists or organizational theorists. This track is very old, and is not growing so fast.

The two levels are (1) Individual Perspective. The focus in research and practice is on the individual (AI specialists, psychologists) and (2) Organizational Perspective. The focus in research and practice is on the organization (reengineers, organization theorists).

Crossing these two dimensions, we can capture one essential issue: "There are paradigmatic differences in our

understanding of what knowledge is. The researchers and practitioners in the "Knowledge = Object" column tend to rely on concepts from Information Theory in their understanding of Knowledge. The researchers and practitioners in the column "Knowledge = Process" tend to take their concepts from philosophy or psychology or sociology." Some development including Knowledge Management and Measurement of Performance can be found in Bontis (1999) showing that creation of value and knowledge are closely linked.

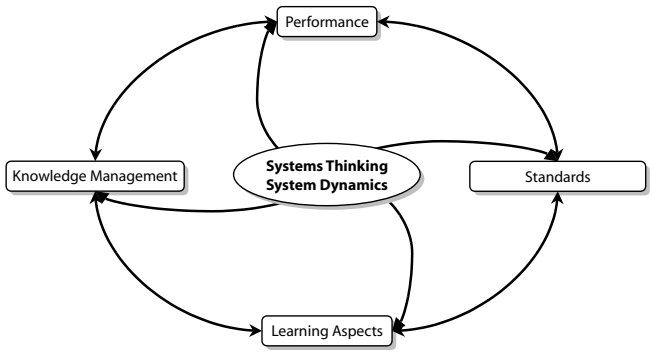
The Interrelation Between the Fields

As many books and papers show it, the four fields we consider are in interrelation: for example, Sveiby (1998) and Bontis (1999) integrate Knowledge Management, Intellectual Capital, Measure and Management of Intangible Resources. Some others (Morten et al., 1999) put forward the role of standardization to manage knowledge. Individual learning and organizational learning are the heart of numerous books and papers (Garvin, 1993; Kim & Senge, 1994; Kim, 1993; Morecroft & Sterman, 1994; Senge, 1994, 1999). Many standards include the management of knowledge through the lessons learned (ICB §36, PMBOK §9.3, NASA 7120-5A see "capture process knowledge" in each step), training and building communities of practice (Wenger, 1998). But these fields are not only in interrelation. They share the same fundamental way to see the world, to take in account complexity: the systems thinking and system dynamics perspective. Thus, we have the integral function of the four fields.

After these short insights on research issues and method, we are going to propose some insights and elements to define a systemic and dynamic conceptual framework to design life-long learning process enabling concurrent development of individual competencies and maturity of organization in a perspective of creation of value.

Exhibit 1. Mapping the Four Fields (Inputs) According to the Individual/Organizational and the Synchronic/Diachronic Dimensions

Exhibit 2. Interrelation Between the Four Fields and Their Integration Through Systems Thinking and System Dynamics



Proposition of a Systemic and Dynamic Model to Design Life-Long Learning Structure

At this stage we have to clarify what kind of model we would like to build. Then we will give some insights and elements on the conceptual framework and assumptions supporting the construction of the model. Lastly, we will propose a generic model to design life-long learning structure.

Clarification on Modeling

Our purpose is not to rewrite all the works and researches done on this subject but to focus on specific aspects useful for our purpose. (For more details, see, for example, MIT Sloan School of Management System Dynamics Group, URL: http://web.mit.edu/sdg/www/).

Let us specify the key points (Sterman, 1991):

The Purpose of the Model

"A model must have a clear purpose, and that purpose should be to solve a particular problem. … Beware the analyst who proposes to model an entire social or economic system rather than a problem. Every model is a representation of a system—a group of functionally interrelated elements forming a complex whole. But for the model to be useful, it

must address a specific problem and must simplify rather than attempting to mirror in detail an entire system … The usefulness of models lies in the fact that they simplify reality, putting it into a form that we can comprehend … The art of model building is knowing what to cut out, and the purpose of the model acts as the logical knife. It provides the criterion about what will be cut, so that only the essential features necessary to fulfill the purpose are left … The resulting models would be simple enough so that assumptions could be examined."

The specific problem we address is how to design a learning process enabling concurrent development of individual competencies and maturity of organization in a perspective of creation of value. The assumptions will be explained lower.

The Type of Model

The distinction between optimization and simulation models is particularly important since these types of models are suited for fundamentally different. (1) Optimization. "The output of an optimization model is a statement of the best way to accomplish some goal. Optimization models do not tell you what will happen in a certain situation. Instead they tell you what to do in order to make the best of the situation; they are normative or prescriptive models." Limitations of Optimization: "Specification of the Objective Function, linearity, lack of feedback, and lack of dynamics." (2) Simulation. "The purpose of a simulation model to mimic the real system so that its behavior can be studied. The model is a laboratory replica of the real system, a *microworld*. Simulation models are descriptive. A simulation model does not calculate what should be done to reach a particular goal, but clarifies what would happen in a given situation. The purpose of simulations may *be foresight (predicting* how systems might behave in the future under assumed conditions) *or policy design* (designing new decision-making strategies or organizational structures and evaluating their effects on the behavior of the system). In other words, simulation models are "what if" tools. Often such "what if" information is more important than knowledge of the optimal decision. Every simulation model has two main components. First it must include a representation of the physical world relevant to the problem under study. In addition to reflecting the physical structure of the system, a simulation model must portray the behavior of the actors in the system. In this context, behavior means the way in which people respond to different situations, how they make decisions. The behavioral component is put into the model in the form of decision-making rules, which are determined by direct observation of the actual decision-making procedures in the system. Given the physical structure of the system and the decision-making rules, the simulation model then plays the role of the decision-makers, mimicking their decisions. In the model, as in the real world, the nature and quality of the information available to decision-makers will depend on the state of the system. The output of the model will be a description of expected decisions. The validity of the model's assumptions can be checked by comparing the output with the decisions made in the real system." Limitation of Simulation: "Most problems occur in the description of the decision rules, the quantification of soft variables, and the choice of the model boundary."

The model we plan to build is a simulation one with a "design" purpose in an "insight modeler" perspective (we mean using systems thinking diagramming and not, at that time, a complex quantitative model) (Graham & Sharon).

Conceptual Framework and Assumptions Supporting the Construction of the Model

First, we would like to formulate some preliminary remarks, and then, indicate the approaches, models and assumptions supporting the construction of the model.

Preliminary Remarks

In spite of a different perspective, we wish to be based on the contributions of the researches and work in progress dealing with the three main aspects we mention above.
1. Project management (ISO 10006, *A Guide to the Project Management Body of Knowledge* (*PMBOK® Guide*)).
2. Standard and guideline to define the work of the project management personnel and a basis for the assessment of the project management competence of people. (IPMA Competence Baseline (ICB) and the Australian National Competency Standards for Project Management (ANCSPM))
3. PM practices of organisations (current PMI project OPM3 on PM Maturity Model).

In the same way, we will adopt a viewpoint of assembler, i.e., initially at least, we will seek to put together existing models, but with the concern of giving a system dynamics perspective.

The fact of relying on existing or under development standards is coherent with the Quality seen from the perspective of theory of conventions (Gomez, 1994): as socioeconomical constructs standards are the result of negotiation enabling reduction of complexity and uncertainty in the relations between the stakeholders of projects. (Visible demonstration of the socioeconomic adjustments produced by a convention of qualification [relation customer-provider] on the one hand, and a convention of effort [relation manager—project team] on the other hand, whose conjunction characterizes social and technical division of work.)

Exhibit 3. Models—Some Examples of Combinations According to the Different Dimensions and Fields

Types of models	Dimensions S = synchronic / D = diachronic I = individual/ O = organizational	Fields K = knowledge management L = learning aspects, S = standards P = performance	Reference
Simu - design	D O	K L P	Wideman 1998
Simu - design	SD O	K L P	Declerck & Debourse 1997
Simu - design	SD IO	K L P	Romme & Dillen 1997
Simu - forecast	D O	S L P	Alarcõn & Ashley 1993
Optimization	S O	S P	Griffith & Gibson 1997
Optimization	D O	P	Milosevic 1990
Optimization	D O	S P	Hartman & Ashrafi 1996
Optimization	S IO	S P	Beale 1991
Optimization	D I	L	Thamhain 1991
Optimization	S I	S P	Pettersen 1991
Optimization	S O	L	Globerson & Ellis 1994
Optimization	D IO	L	Communier 1998
Optimization	D IO	K L P	Peters 1997
Optimization	D IO	L P	Belout 1998
Optimization	D O	K L P	Hubbard 1990
Optimization	D I	L P	Turner 1998

This implies the following issues: (1) The model proposes a theoretical framework to the problematic of the training of the "project" men and teams. It does not pose it as obviousness but exposes the logic of its development; (2) It is impossible to find measurements of competence which are not "deus ex machina" invented for a special case, and this generates uncertainty and explains the existence of conventions of quality, i.e. standards which provide the elements of calibration; (3) The whole of the model constitutes a complex system: there are no causal linearity (such competence leads to such result), but permanent adjustments between competencies and their use; (4) We put at the same level importance, the standard as built in the exchange, and the standard as result of an effort of production. What means that we will pay a detailed attention to the way in which the profession or the field of the management of projects evolves. The standard is thus not seen as a fixed fact.

Models and Approaches Taken Into Account

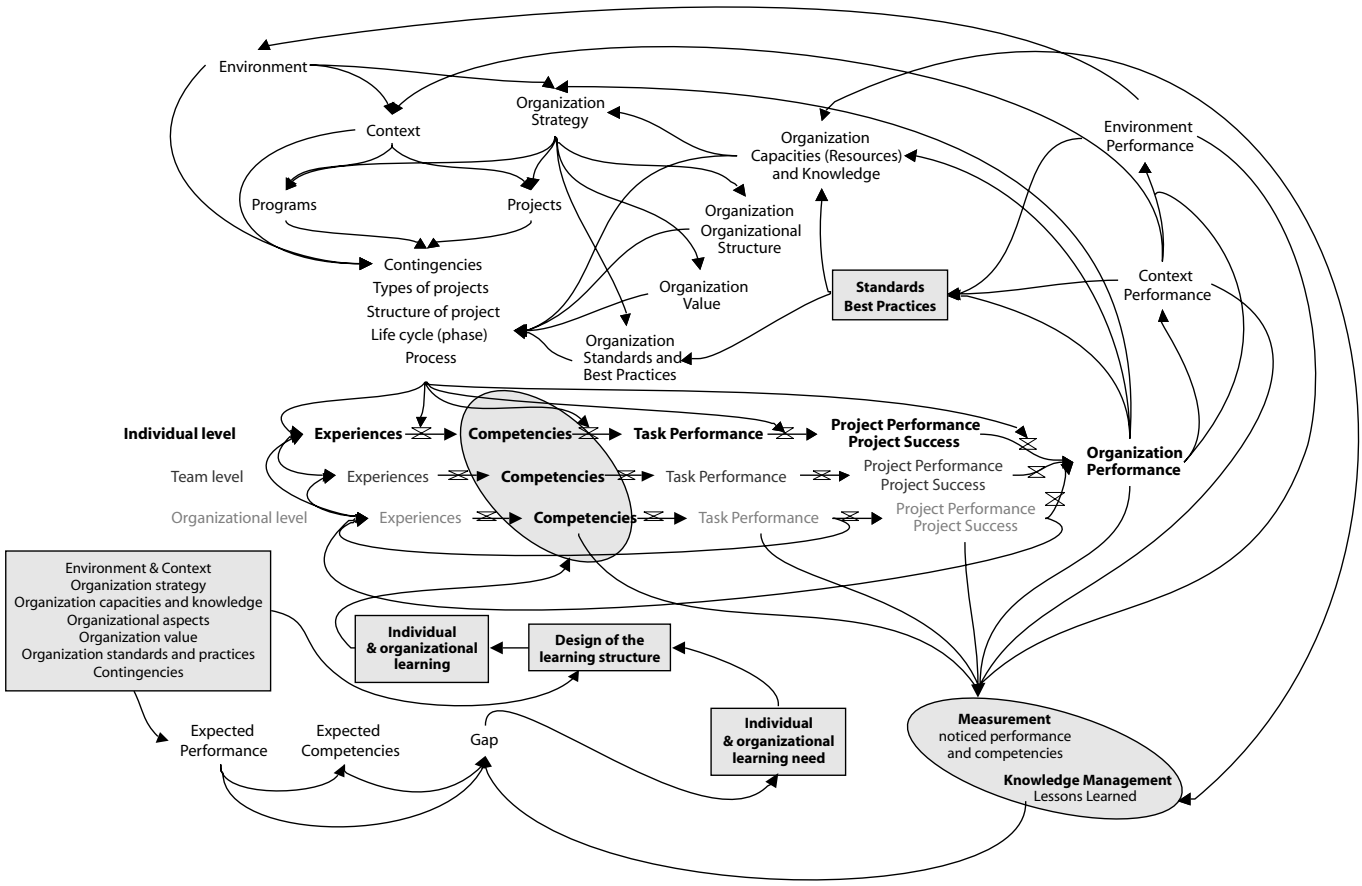
As mentioned above, the construction of the conceptual model will be based on various models and approaches. (We indicate only some of them, but the list is not exhaustive.)

We have presented above the four fields, basis of the work. Knowledge Management (Bontis, 1999; Sveiby, 1999), Performance (Bontis, 1999; Sveiby, 1999), Standards (ICB—IPMA, *PMBOK® Guide*—PMI, ANCSPM, Maturity Model) (Fincher & Levin, 1997; Remy, 1997; Saures, 1998), Learning aspects (Kim, 1993, 1994; Morecroft & Sterman, 1994; Senge et al., 1990, 1994, 1999). These fields may be combined together through different ways to give different kind of models.

Models—Exhibit 3 shows examples of combinations according to the different dimensions and fields.

Approaches—They integrate the different models into a coherent whole. (1) A systemic vision of the management of project (Declerck & Debourse 1997, Wideman 1998 1997, Leroy 1998). (2) An approach that highlights the links between competencies of the managers of projects and success of the projects (Project Manager Competencies—PMI). (3) An integrated model of development of competencies in management of projects (Development Assessment of Project Management Competence—Crawford, 1998). (4) The model of education of the leaders proposed by Hawrylyshyn (1977). (5) Design for learning in team seen as communities of practice (Wenger, 1998). (6) Principles of organizational learning according to a systems dynamic perspective (Kim, 1993, Romme & Dillen, 1997).

Exhibit 4. Systemic and Dynamic Model to Design Architecture for Life-Long Learning: The General System



Assumptions

Before presenting the general system in which the model is included we need to clarify some assumptions.

Increasing competencies (individual, team and organizational) lead to improved performance (Crawford, 1998). Implementing standards and best practices lead to increased performance (PMI, IPMA) But without a double-loop learning system, increasing competencies, implementing standards and best practices lead to limited performance if not poor performance (Kim, 1997). We consider that general environment, context of the project, contingencies affect the performance of people, tasks, project, organization, stakeholders. They affect also the learning aspects (individual, team and organizational) (Communier, 1998; Wideman, 1998). The systemic and dynamic model enables to deal with different time horizons (from short-term to long term).

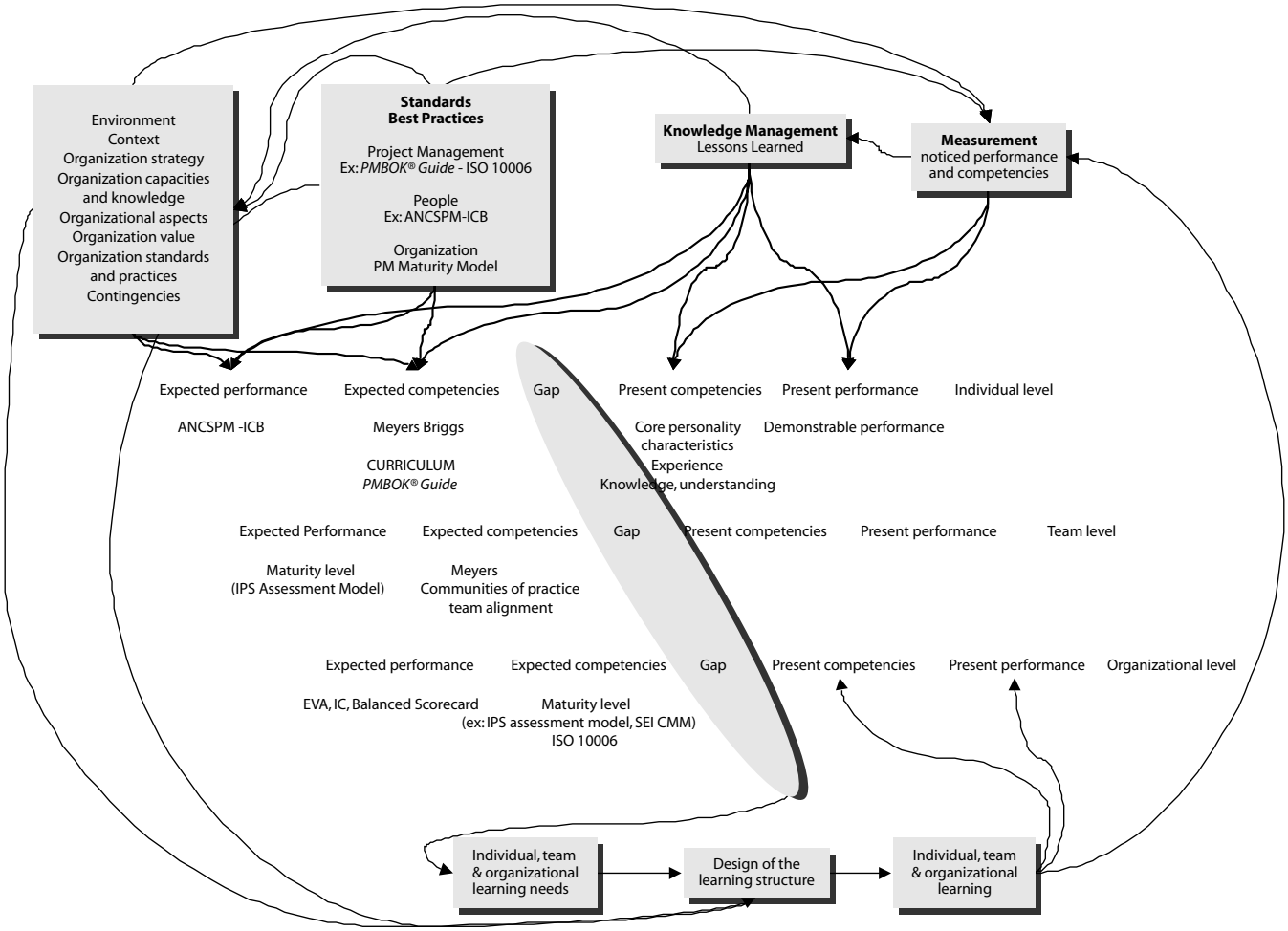
The integration of these different elements leads us to propose the following general system and the learning subsystem.

Thus, the model suggested will have to allow the design for learning answering three series of objectives:

The objectives of individual learning (project managers, project "people"): they are depending of the gap between their present level (performance, experience, and knowledge …) and their expected level. For example, they need to reinforce their managerial capacities, they will have to take the PMP® exam or to prepare for IPMA project management certification according to their responsibilities, their experiences, and the nature of project they manage or are involved in … (Hawrylyshyn, 1977)

The objectives of team training: The development of team competencies depends on many aspects (participation/reification, designed/emergent, local/global, identification/negotiation, engagement, alignment, and imagination, Wenger, 1998) and has a great influence on both individual performance and

Exhibit 5: Systemic and Dynamic Model to Design Architecture for Life-Long Learning: The Learning Subsystem



organizational performance (Maturity levels, lessons learned). The level is the key of the learning process. It makes the link between individual learning and organizational learning. It integrates all the aspects developed in the other levels and represents a kind of mirror between them. This also the level of the link between project team members and operation team members.

The objectives of organizational learning: they are depending on the disturbances in organizational learning (Kim, 1993; Romme & Dillen, 1997) and on the degree of maturity reached by the organization.

The architecture for life-long learning proposed has to be coherence between the different learning levels. It integrates both single loop and double loop learning. It considers the factors of contingencies, the characteristics of the organization, the context, the environment and the state of the standards and best practices.

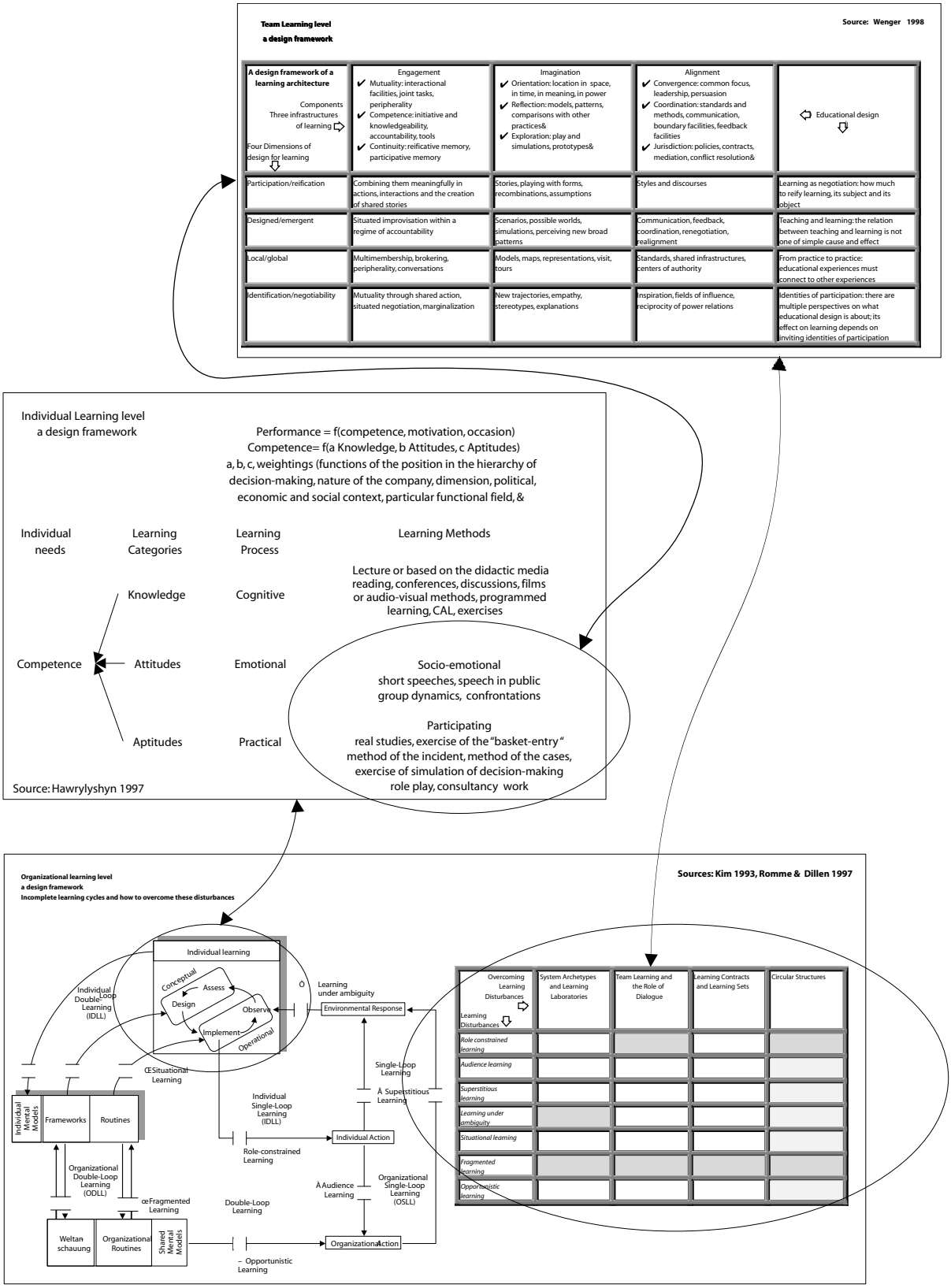
At this stage, we will stay on a general pattern because of the nature of Learning. With Wenger (1998) we think that learning cannot be designed. Learning happens design or not design. One can design curriculum but not learning, process but not practice. Learning can only be designed for. This implies a conceptualization of the architecture. There is not "one best way" architecture.

The systemic and dynamic model to design architecture for life-long learning is presented below.

By Way of Conclusion …

We tried in this work to demonstrate that, while Project Management has become a well-accepted way to manage the organizations and to deal with complexity and uncertainty,

Exhibit 6. Systemic and Dynamic Model to Design Architecture for Life-Long Learning



the source of competitive advantage and creation of value are the competencies (individual, team, organizational). But developing competencies means that we need to have a clear view of the field. It the reason why we tried to give some insights on this emergent field showing the fundamental role of standards, as social constructs, in its dynamic structure. We showed that, according to the nature of project management, a necessary condition to get project success, organization and stakeholders performance was to manage men, team and organizational learning in a systemic, dynamic and integrated perspective. Standards, Knowledge Management, Learning aspects, Performance and Value management provided the basis of the model. As a consequence, the design of architecture had to consider different time periods, factors of contingencies, characteristics of the organization, context, environment, state of the standards and best practices, learning curves and complex interactions between the individual, team and organizational levels. Systems Thinking provided a support to simulate this complex learning process and helped to design architecture for long life learning. The result of this work is the proposition of a systemic and dynamic model to design architecture for life-long learning. In essence, this model has to be generic and "contextualisable": There is not "one best way" architecture.

Thus, we hope to have contributed to demonstrate that project management is an emergent scientific field according to Audet's sense (1986), to show that the design and the application of standards are a dynamic way to build a legitimate framework for profession while recognizing its existence, to put forward, beyond the dynamics of fads, that the profession, by nature, needs a systemic and dynamic learning framework to provide performance and creation of value, and to avoid the rise and decline of popularity and the risk to fall quickly to oblivion.

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