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Managing resource learning in distributed organisations with the organisational capability approach

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Abstract: Organisational capability management is a recent approach; it enables global and coordinated management of resources and facilitates future synergies within extended organisations. This paper provides a state of the art of organisational capability approach and proposes a management framework. On the one hand, an overview of the theoretical principles and the practical solutions, especially methods for standardising and transferring firms' good practices, points out the limits of their sustainable functioning. On the other hand, the framework manages organisational capabilities by following the theoretical principles and overcoming identified barriers. This proposition is structured around three kinds of processes: primary (design and transfer), support (assessment and enhancement) and management (coordination and alignment).

Keywords: knowledge management; learning system; transfer of good practices; standardisation methods.

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Alain Bernard is a Professor in Industrial Engineering, head of the 'Virtual Engineering for Industrial Engineering' project in IRCCyN Laboratory, at the École Centrale de Nantes, France. He obtained his PhD in 1989. As an Assistant Professor, he worked from 1990 to 1996, in Ecole Centrale de Paris, on product, technology and process modelling. From September 1996 to October 2001, he has been a Professor in CRAN, as the head of the mechanical and production engineering team. His main research topics are related to RE, KBS, CAPP, product and process modelling, integration of economical and human aspects.

1 Introduction

Over the last few years industrial groups have adapted to a very competitive and global environment by aiming at optimising their production system and their organisational structure. They used 'rightsizing', 'reengineering', and 'total quality' to reduce costs, downsize risks and standardise practices (Amidon, 1997; Skyrme and Amidon, 1998). However, this industrial optimisation, which was sometimes drastic (outsourcing, wage bill saving) triggered new stakes. Companies realised that they only resized the emerged part of their value production system, sometimes to the detriment of the immersed part called 'immaterial capital' (Hamel and Prahalad, 1990). Individual and organisational knowledge management (Bernard and Tichkiewitch, 2008; Malerba, 2007) and innovations have become the new sources of competitive advantages that must be created and protected.

Through their analysis of what performance is nowadays, Kaplan and Norton (2004) demonstrated that production and structural optimisation must be reconciled with innovation and learning capabilities. In the balanced score card (Bhagwat and Sharma, 2007), the instantaneous, material and 'short-term' performance (financial efficiency) is only the top of the pyramid. It is supported by two operational performance levers: customer satisfaction (which increases volume growth) as well as internal process improvement and product/service innovation (which reduces costs and increases profit). Finally all these elements are backed by what these authors call 'learning and growth', i.e. the capability of an organisation to innovate and renew its functioning to ensure a sustainable and 'long-term' performance.

To support this learning power, the organisational capability approach emerged at the beginning of the 1990s. Stemming from the resource-based view theory and the competitive advantage approach (Helfat and Peteraf, 2003), it looks at optimally exploiting the internal resources to create significant assets for the organisation. If previous works have already focused on the notion of organisational capability and its conceptual modelling (Rauffet et al., 2012), it is still necessary to define the dynamics of this managerial concept: "How is it designed and transferred? How is it assessed and enhanced? How is it aligned with the organisational strategy?"

This paper aims at providing a state of the art and a theoretical management framework to support the organisational capability approach and to integrate it efficiently into the management system of distributed organisations (geographically and functionally, in terms of variety on delivered products). These research efforts occur in the Pilot 2.0 project, supported by the French National Research Agency (ANR, 2007). They are based on roadmapping, a specific method that authors aim at enriching by using this theoretical framework.

The second section introduces the concepts and the principles of organisational capability management. The third section presents the context of the research project Pilot 2.0, and explains the research methodology. The fourth section provides a review of the industrial and academic methods and tools which can support the management of organisational capabilities, and it points out the barriers that prevent these methods from efficiently developing their capabilities. A framework for managing organisational capabilities is then proposed, verifying the principles exposed in part I, and overcoming the barriers of part III. This framework is described through two models: an UML class diagram that presents the different systems and concepts supporting the method, and an IDEF0 activity diagram that details the transformation of the concepts (in terms of input-output flows) and places the actors involved in the approach. Finally propositions are discussed in the last sections.

2 Theoretical mechanisms for organisational capability management

2.1 Definition: what is organisational capability?

According to de Pablos and Lytras (2008), financial, strategic (building better products, pricing offer lower than competitors) and technological capabilities (introducing technological innovations in products or in processes) must be supported by an 'organisational capability'. This is defined as "the firm's ability to manage resources in order to gain competitive advantage". As emphasised by these authors, merely hiring the best people or buying the best machine does not guarantee organisational capability. It is necessary to develop individual competencies through effective human resource practices. Quick fixes or management speeches are not sufficient. It involves adopting principles and attitudes to create a real, collective synergy. In a more operational way Saint-Amant and Renard (2004) define organisational capability as "a know how to act, a potential of action which results from the combination and the coordination of resources, knowledge and competencies of organization through the value flow, to fulfill strategic objectives".

Several characteristics emerge from this concept (Saint-Amant and Renard, 2004; Teece and Pisano, 1994):

1 capability is systemic, like knowledge, it is larger than the sum of its components

2 capability cannot be considered separately from the 'action process'

3 capability is the result of active learning, both on individual and organisational levels.

That is to say its behaviour is adaptive and linked to its 'path dependency'.

Furthermore, these authors suggest that organisational capability results from the creation of a practical knowledge guide which is sent to different organisational entities to ensure coordinated and collective progress. This concept links the organisational and the economic vision of the resource-based view theory (Fall, 2008). In fact, the value of organisational resources, knowledge and competencies does not depend only on Barney's (1991) criteria regarding their rareness, value, inimitability, and non-substitution (such as patterns, special machines), it can also be gained by the coordination of non-strategic elements which bring together a real asset. For instance the compliance by all people with hand hygiene rules is crucial in the prevention of the spread of influenza, in addition to a rare, valuable vaccine invention. Finally, organisational capabilities can be regarded as a potential performance, which can induce a real performance over a long-term period (Rauffet et al., 2009).

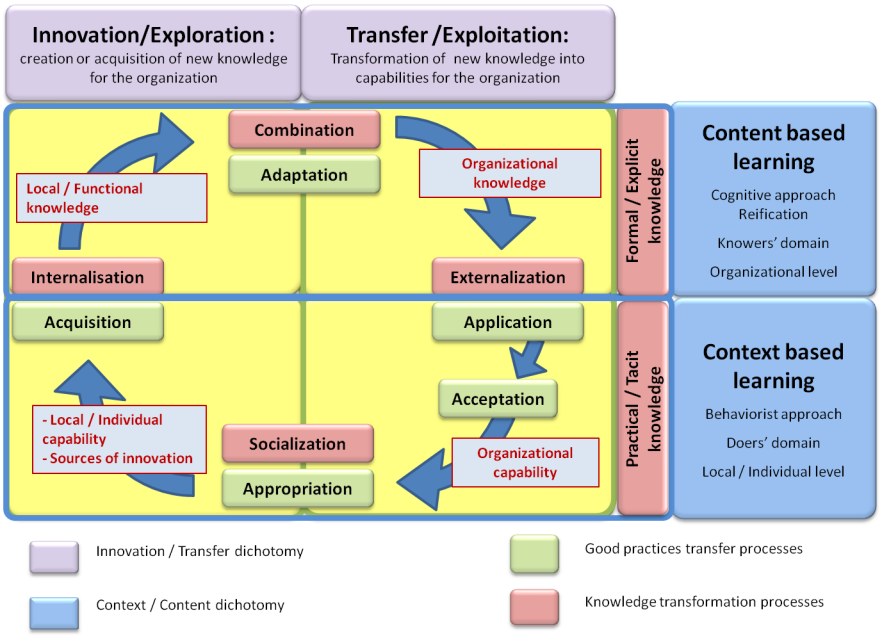
2.2 Operating principles: how to develop organisational capabilities?

Organisational capability concepts are now defined but questions still remain. How is an organisational capability created? How is it modelled? How is it transferred to the whole organisation? To answer these questions we have studied the research works on developing organisational capabilities, by exploring the fields of organisational learning, knowledge lifecycle management and the transfer of good practices. This enables us to propose the 'organisational capability lifecycle' and the 'organisational capability renewal mechanisms'. These two aspects are developed in the following sections.

2.2.1 Organisational capability lifecycle

Organisational learning is defined as a "collective endeavor which aims at increasing, in a continuous and active way, individual and organisational knowledge and skills" (Senge, 1990; Garvin et al., 2008). According to Yeung et al. (1999), it can be considered as a capability which "can generate ideas (innovation), detect and generalise them (conceptualisation) and can then transfer them through all the organizational layers (transfer), with the aid of initiatives and management practices". The first part of Yeung's definition, focused on a 'learning capacity', is similar to the analysis of Diani (2002), who writes about an ability to "create new knowledge and to transform it into competencies for organization". This two-fold challenge is depicted by the purple boxes in Figure 1. An important matter in organisational learning in distributed organisations is the codification of local innovations, the transfer of this knowledge, sometimes called 'good practices', and the use of these practices to increase the organisational capabilities of each entity. In this framework, Szulanski and Jensen (2006) describe five processes.

Figure 1 Mechanisms for the development of organisational capabilities (see online version for colours)



They explain the different transformation stages from a local innovation into a conceptualised organisational practice and then into a transferred organisation capability (Figure 1, green boxes):

1 *acquisition:* an organisational need is identified and knowledge is found locally (by expert or operational workers) to address this requirement

2 *adaptation:* knowledge is modified and combined, to become organisational knowledge and to be adapted to future learners

3 *application:* this adapted knowledge is communicated and transferred to the learners

4 *acceptation:* management around the applied knowledge must be done so that knowledge is effectively acquired by learners and becomes an organisational capability

5 *appropriation:* organisation uses the transferred knowledge and skills efficiently.

Organisational entities adapt them locally or propose modifications to the group.

These five processes are actually very similar to the SECI model (Nonaka, 1994), as emphasised by the green boxes in Figure 1. There is only a slight difference proposed by the Szulanski processes. Knowledge 'externalisation' is derived from two different processes, 'application' and 'acceptation', which play on the 'individual/organisation' duality. Thus an organisation has to share the practices it wants to implement, but it has also to check if these practices are understood and correctly used by operational subsidiaries.

A second layer could be added to this analysis. As emphasised by Kutsoati and Zabojnik (2005) and Xu and Bernard (2010), learning processes can also be divided into two approaches, as shown above (Figure 1, red box):

1 A *cognitive approach*, based on knowledge and capability codification, which is also called 'reification'. It is the part dedicated to the 'knowers', who model and make knowledge formal.

2 A *behaviourist approach*, based on the learning and the work context, which is more focused on Nonaka's process of socialisation. It is the part that concentrates on the 'doers', who use knowledge as a capability to carry out their tasks.

The synergy of cognitive and behaviourist approaches is essential for organisational learning in distributed organisations. On the one hand the formal work of knowledge modelling is a way to clarify the message that an organisation wants to convey to its entities, and to mobilise these entities around key objectives. On the other hand informal knowledge sharing is vital for adapting corporate practices to the local and operational context. It is also an enabler for creating an innovation dynamics, where the 'doers' have the possibility to improve the guide by sharing their experience.

In other words, learning must take place between standardisation and diversity, as David and Rothwell (1996) emphasised in the case of the US nuclear industry.

2.2.2 Organisational capability renewal mechanisms

This paragraph deals with the adaptive and transformative mechanisms, which are able to obtain a sustainable organisational capability.

The management of organisational capabilities is sometimes reduced to a transfer of practices, where local innovations are detected just once and modelled to a standard that learners must comply with. People have to adapt to requirements, but they cannot adapt the standards to what they really face. This learning configuration looks to align entities on organisational practices, but it can trigger resistance to change and an incorrect appropriation of required knowledge by entities.

To guarantee practice appropriation by the 'doers' (the 'fulfilled tasks'), acceptation mechanisms must be understood. As explained by Guillevic (1993), this acceptation process depends on two factors (cf. left side of Figure 2):

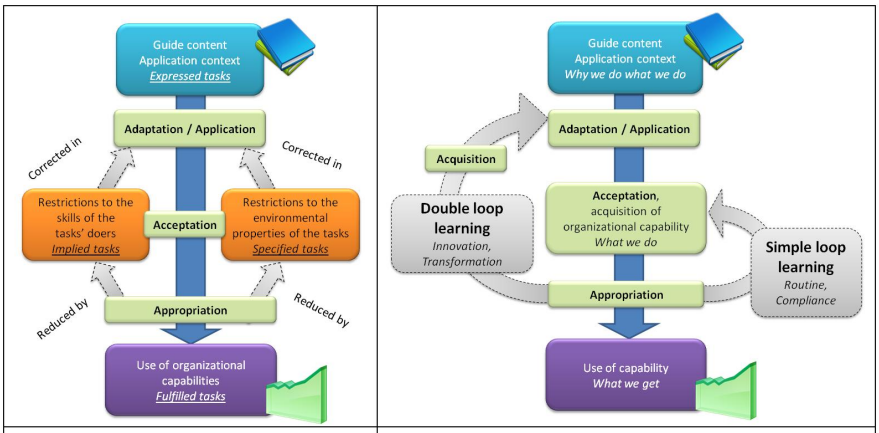
1 the intrinsic attributes of the learners, which reduce what the organisation wants (the 'expressed tasks') to what learners are capable of doing (the 'implied tasks')

2 the characteristics of the learning environment, which reduces what an organisation wants to what learners are allowed to do (the 'specified tasks').

To limit the restriction effects generated by these factors, it is necessary to adapt or to transform the guide content or the application context. In this framework, Argyris and Schoen (1978) introduced the 'double-loop learning' principle (cf. right side of Figure 2). This supports the sustainability of the organisational learning system, by leaving the 'doers' proposed innovation and question the imposed practices. As underlined by the performance causal model from Burke and Litwin (1992), the 'doers' are not only in a 'transactional' logic (where they look to adapt their behaviour to match the allocated objective), they are also able to have a 'transformational' impact on what they are asked

to do, enabling organisations to acquire new knowledge locally (around the basis of existing transferred practices).

Figure 2 Adaptive and transformative mechanisms (see online version for colours)



Issue: Gap between formal knowledge and practical capabilities

Theoretical solution: Learning loops for content / context improvement

The existing concepts and principles to manage organisational capabilities have been emphasised. An operational structure of them is proposed in Figures 3 and 5 to enable their theoretical implantation into organisations. The Pilot 2.0 project attempts to implement this organisational capability approach. The following section explains the experimental context and the methodology which guided our research.

3 Experimental context and research methodology

3.1 Project Pilot 2.0 and roadmapping

The Pilot 2.0 project was supported by the French National Agency of Research (ANR, 2007) between 2008 and 2011. It involved laboratories (IRCCyN and M-LAB), companies (MNM Consulting, Valeo Group) and institutional partners (General Council of Vaucluse). The aim of this partnership is to provide a generic methodology and a platform for transferring business practices and measuring progress in distributed organisations, through organisational capability management.

The experimental field of our research is centred on the case of a distributed organisation which presents particular characteristics. The *Valeo Group* is an automotive supplier, composed of 134 plants around the world. In business, a group is most commonly a holding company consisting of a parent company and subsidiaries (Khanna and Yafeh, 2007). This is typically a cluster of legally distinct firms with financial relationships (takeovers), economic relationships (resources sharing), commercial relationships (concessions, purchasing centralisation), or managerial relationships (corporate managers choice). The relationship between firms may be formal or informal. A group is based on the centralisation of the strategy and on the relative autonomy of

subsidiaries. This form of organisation aims at insuring the efficiency and the agility of the management (Birkinshaw, 1999) and its variety guarantees an innovative richness (Criscuolo et al., 2010), but it can also cause heterogeneities in the practices used by plants and therefore in the products delivered to the customers.

This context raises serious learning issues: How to integrate a new organisational entity and help it to acquire organisational culture. How to coordinate subsidiaries with heterogeneous structures and practices. How to detect and capitalise local good practices for the whole organisation. How to transfer best practices to the operational ground, without 'threatening' the autonomy of subsidiaries. How to guarantee that customers will have the same performance and same quality level from goods or services, wherever they come from.

These questions underline the need for managing organisational capabilities: how to guarantee a cohesive, continuous improvement of delocalised organisational entities; how to sustain organisational changes, and how to have a robust image of what an organisation can do at every level.

The Pilot 2.0 project emerged from previous collaboration between MNM Consulting and the Valeo group, which led to a specific method called roadmapping of management (Monomakhoff and Blanc, 2008). This first endeavor was motivated by the need of Valeo to modernise its good practice documents. Furthermore, Valeo has to group its heterogeneous and distant plants into a functionally and geographically distributed structure (with ten product branches in 27 countries), around the same corporate, strategic objectives. Valeo's use of this method will be analysed as a case study in this paper. Management roadmapping is a method supported by the roadmap (a pattern for modelling organisational capabilities with good practices), and by management mechanisms (implemented in a software). It is used for transferring good practices, and assessing locally and globally organisational capabilities.

Figure 3 Roadmap architecture and assessment (see online version for colours)

Maturity levels/ Action levers	1	2	3	4	5
Manager	A manager is appointed	Resources and structure are ready to go	Management by objectives is used	IS objectives are aligned with the other functions' objectives	IS department becomes the group training center
Applications and data	Applications comply with local laws	A fulfilled applications mapping is made	IS is involved in all the stage of applications lifecycle	A Data Quality approach is implemented	Data formats are updated to comply with last standards
Suppliers	IS purchasing processes exist	The IS purchasing processes are standard	Contracts are organised based on deliverables	The audit of suppliers provides new performance indicators	Suppliers are involved in the continuous improvement process

An example of a roadmap is illustrated in Figure 3, used for developing the capability of managing information systems. This pattern has a two-dimensional matrix architecture, composed of:

1 'Actions levers' in the rows, i.e. all the resources required by organisational learning at the entity levels.

2 Five 'knowledge maturity levels' in the columns, similar to CMMI (SEI, 2010), which draw a progressive learning path. In this way, this learning path complies with the principle of path-dependency given by Egidi and Narduzzo (1997).

3 The roadmap content is based on the capture of local good practices.

These are organised on two levels of granularity.

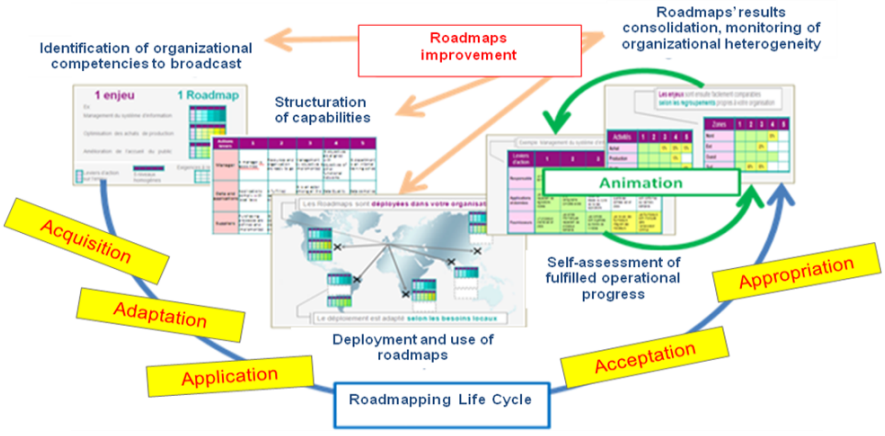
1 The requirements express general objectives for each 'action lever' at each maturity level. For instance, 'a manager is appointed' is a requirement.

2 The deliverables are a list of actions which gives details on how the above requirement has to be fulfilled. For instance, 'a selection committee is created' and 'a list of the applicants for the position exists' are two deliverables of the previous requirement.

A web platform supports the modelling and the transfer of good practices. It also enables the delocalised measurement of the organisational learning, by evaluating the acquisition of organisational capabilities by entities. Thus, all local managers who use a roadmap give a monthly progress report.

The use of the roadmaps and their assessment could be summed up in the lifecycle presented in Figure 4.

Figure 4 Roadmapping lifecycle (see online version for colours)



As depicted above the roadmapping processes closely follow Szulanski's proposition:

1 The roadmap subjects are generated by strategic managers, and necessary knowledge is identified by functional experts (acquisition).

2 Roadmaps are written, to combine good practices into the roadmap structure (*adaptation*).

3 The roadmaps are sent to middle and operational managers, who discuss objectives (level to reach, schedule for level achievement). Then the roadmaps are deployed in relevant entities (*application*).

4 The roadmaps are used and self-assessed by local managers. The notes are consolidated to provide indicators on capabilities acquisition, and to help managers plan resource development and adapt the correct strategy (*acceptation*).

5 To continuously improve, feedback is collected regarding the content and the deployment of roadmaps. New versions of roadmaps or new learning objectives can be proposed (*appropriation*).

Roadmapping has been tested on the Valeo Group's internal libraries. Its key points are the architecture (which propose a learning path coordinating the different organisational resources), the mechanisms of assessment and consolidation (which provide relevant indicators for governing resource development) and feedback tools (which enable the organisational capabilities management system to evolve).

3.2 Research methodology

To build a robust methodology for managing organisational capabilities and improve the specific roadmapping method, we obtained research material from theoretical and practical fields:

1 on the one hand, we explored literature on quality libraries (ISO, CMMI etc.) and competency management, two approaches related to practices and capability aims

2 on the other hand, we analysed the use of roadmapping in Valeo so as to identify the limitations of this first experiment.

To some extent, our approach is in the context of action research: we are in the position of the researchers who create the theory after the discovery or the innovation of a model by a pioneering company (David and Hatchuel, 2007). This inside point of view helps to detect potential improvements. We chose the case of Valeo, due to their effective implementation of roadmapping (since 2004 about 50 modelled roadmaps have been deployed on 200 organisational entities, in six different functional networks). Interviews were conducted in 2008 to obtain experience feedback from Valeo's users:

a The sample is composed of 27 people, coming from different industrial branches (compressors, air conditioning etc.) and at different organisational levels (12 local managers, 15 middle managers).

b Each interview was on a one-to-one basis and lasted approximately one hour. They were face-to-face, or by phone (for those interviewed in Turkey, USA, Germany etc.).

c It was divided into two parts: a 'questionnaire' with about 30 closed questions (multiple choice, questions), and a free conversation with ten open questions. It focused on four distinct themes: knowledge modelling, capability deployment, capability lifecycle, and impact on activity performance. The closed questions were processed by statistical analysis for a quantitative analysis and the free conversation was transcribed, for a qualitative analysis.

To sum up, our research methodology compared our operational observation during the redesign phase of roadmapping and existing literature methods, and we enriched this comparison by our analysis of the experience feedback from Valeo.

4 Research material – existing methods and limitations

There are many 'organisational learning' approaches aimed at supporting the previously presented mechanisms. After giving an overview of these methods, a summary table is given.

4.1 Comparison between literature methods and roadmapping

Since the 1950s, several methods have looked at how to manage capabilities and their learning processes. Industrial groups have created good practice libraries to make their entities progress on particular concerns (production, information systems etc.). The same efforts are to be found in national institutions, such as the Canadian administration (Saint-Amant and Renard, 2004), or in organisations for the development of emerging economies (Watson, 2006).

4.1.1 Towards a holistic management for organisational learning

The approaches found in the review of industrial and academic methods are aimed at covering the whole organisational capabilities development lifecycle (cf. Section 2.2 and Figure 5). This review emphasises the classification of practical solutions into three groups of processes, organised according to AFNOR's (2000) typology.

- *Primary processes – design and transfer*

  The first stage is the formalisation of simple good practices. Deming's PDCA and 5S methods aimed at communicating on new work cultures through rallying leitmotivs.

- *Support processes – assessment and enhancement*

  These 'primitive' good practice libraries were replaced by very detailed libraries to support their controlled implementation within the whole organisation. Progress becomes measurable to assess and certify the organisational capabilities acquisition on a particular criterion (ISO9000 for quality, OHSAS for security, ISO14000 for environment) or on a specific department (CMMI for IT). This control uses metrics included in the structure (e.g. CMMI defines a scale for measuring capability), or by means which are external to the methodology (such as audits for ISO norms). Moreover the design of practice libraries becomes bottom-up through the use of feedback tools to adapt or transform the top-down recommendations (QRQC, REX).

- *Management processes – coordination and alignment*

  Integrated governance frameworks (SMI, EFQM, COBIT) aim at coordinating functional learning and aligning it to corporate strategies.

4.1.2 From generic to 'customised' good practices

In addition to the previous evolution, practices become more customised so as to match the context where they are used.

- *Generic:* Initially 5S 'common sense' principles could be applied in production or in the office.
- *Functional:* Numerous pages of ITIL (2010) or CMMI methods concentrated on the specific domain of IT, whereas ISO (2010) proposed transversal norms to manage a particular criterion, such as quality or security.
- *Specific:* Nowadays normalisation works are still more adapted to specific contexts (pharmaceutical, nuclear industries etc.). Together with a constant effort to improve good practice, organisations have their own practice libraries based on their corporate culture and want to include it in the learning management system.

There is therefore a granularisation of capability modelling. This contextualisation of good practices makes organisational learning more concrete and assessable.

4.1.3 Synthesis

The two previous analysis axes are used in Figure 5 to compare the different approaches to the review industrial and academic methods. The 'V' sign means the process is completely covered by the method studied; the '/' sign means the method finds partial solutions.

This table emphasises different points:

- *Primary processes:* all methods start from the constitution of good practice libraries. Nevertheless two categories can be distinguished: those that focus on creating libraries (ISO, ITIL, CMMI), and those which enrich existing libraries with a learning path and a specific structure (integrated management systems, COBIT, roadmapping).
- *Support processes:* methods add maturity levels (Camarinha-Matos et al., 2009) into their structure (CMMI, project management methods), to clarify the acquisition path and provide metrics on achieved progress. They are different from recommendation methods (ISO norms), which only provide a global guide. Moreover all libraries have a lack of tools enabling operational staff to modify the practices given by functional experts.
- *Management processes:* only a few methods (EFQM, COBIT) provide a global management framework for driving the development of different capabilities.

Figure 5 Summary table of the academic and industrial methods (see online version for colours)

Practical means	Primary processes: Design and Transfer	Support processes: Assessment and Enhancement		Management processes: Learning coordination and Alignment
	Good practices libraries	*Progress measurement tools*	*Learning Improvement tools*	*Governance frameworks*
State of the art				
Generic Principles				
Toyota's 5S, Child safety guides, Journals of Child Health Care	**V** (very simplistic leitmotivs, easy to communicate as an organizational culture)			
Functional capabilities development				
Security, Quality, Environment				
Transversal norms (ISO 9001/ ISO 14001 / OHSAS 18001)	**V**	**/** (Compliance Audit)		
Integrated Management System, EFQM Model	**/** (ISO 9001/ ISO 14001 / OHSAS)	**/** (Compliance Audit)		**V**
Information Technologies				
ITiL / ISO 27000 /ISO 20000	**V**	**/** (Compliance Audit)		
CMMI	**V**	**V** (Maturity level notes)		
COBiT	**V** (can also integrate ITIL / ISO 27000 library)	**V** (Maturity level notes)		**/** (only for IT)
Project Management				
Project Management Maturity Model, SMEP, Mariska, OP3M	**V** (PMBoK)	**V** (Maturity level notes)		**/** (only for PM)
Specific capabilities development				
sectorial norms: adaptation of generic norms for particular domains like oil (ISO 29001), automotive (ISO 16949), chemical or food industries (REACH)…	**V**	**/** (Compliance Audit)		
Internal libraries: Valeo's V5000, Toyota's TMMT…	**V**	**/** (Compliance Audit)	**/** (linked with QRQC's feedbacks…)	
Studied method				
Pilot2.0's Roadmapping method	**/** (Can integrate Valeo's V5000, CG84 Quality Policy, REACH)	**V** (Maturity level notes)	**V** (user's feedbacks systems)	**/** (Ascending control but not descending deployment: creation of multilevel and multi- functional indicators, but no coordination tool for all the roadmap)

The table stresses that no method offers a complete covering of the operating principles for managing capabilities. There is a need for enhancement tools (for improving primary processes) and governance frameworks (for optimising globally organisational capabilities).

4.2 Theoretical and practical limitations

The literature emphasises obstacles which interfere with the smooth operation of organisational capability development. Furthermore, the feedback from Valeo raises new barriers. This section exposes these limits and provides perspectives to overcome them. These perspectives will be used to propose a management framework.

4.2.1 Primary processes: design and transfer

The choice of good practices that make up organisational capability models is essential to guarantee correct understanding from the 'learners' and a successful transfer. However this is a difficult task for many reasons:

1 Reification of practices is complex.

2 Transferred practices are sometimes not adapted to the perimeter of use. They are either not generic enough (too few entities can use them) or too generic (the definition of practices is too broad to be useful).

3 Good practices are sometimes over-diversified for dealing with the same problem.

These observations result in a problem of knowledge management: good practices must be capitalised, homogenised and reused before the modelling of organisational capabilities in order to avoid the creation of confused and useless good practice libraries.

The definition of the application perimeter of the capability models is also crucial. If the global increase of the organisational capabilities is the objective, entities do not have the same context or the same means to respond to a given challenge. Thus a too uniform application (same objectives and same transfer scheme for everyone) could be unproductive and could be perceived as a restraint by operators. Management must therefore be flexible so as to prevent cultural barriers, and overcome the external and internal constraints defined by Guillevic (1993) (cf. 2.2).

The interviews of Valeo's managers show that practical solutions from the review of industrial and academic methods can face pitfalls. According to 83% of operational engineers and 73% of middle managers, roadmaps can be a source of misunderstanding. The conversations with the managers show that this can be due to not enough explicit modelling, to inaccurate granularity levels of deliverables, or to language problems (in this case, roadmaps are written in 'academic' English). There is therefore a gap between what top management and functional experts prescribe, and how middle and operational management understand it (cf. Guillevic in 2.2).

As Fall (2008) suggests, a solution could be a 'crossed learning', where both 'teachers' and 'learners' design collaboratively to build adapted roadmaps, taking into account organisational objectives and operational realities.

4.2.2 Support processes: assessment and enhancement

The literature methods propose verification and measurement tools to assess the acquisition of organisational capabilities by entities. However, this notion of measurable progress, even if it is practical, has limits. Stata (1989) raises issues: does an organisation really learn if it is impossible to observe an improvement in its performance and a satisfaction of its customers? Ineffective organisational capabilities can come from the two primary processes:

1 the transfer of new methods and tools can cause problems in the operational field and result in decreased efficiency (Weick, 1991) even if the proposed practices are good

2 good practice libraries are only a body of assumptions from organisational capability designers, which will be validated, refuted or more often improved by the learners' experience (Beguin and Cerf, 2004).

It is therefore important to verify and validate the effectiveness of the primary processes by comparing capability progress and performance results (Rauffet et al., 2009) to ensure that proposed capability models and transfer choices work.

The dysfunction of learning primary processes (cf. 2.2.3) is often explained by issues of appropriation and innovative participation from learners:

1 *People motivation:* the Valeo Feedback shows people are often busy with their weekly action plans and have no time to do what they consider the job of functional experts.

2 *Learners' involvement:* The transfer medium (a 'bible' of good practices, an information system) can be non-user-friendly and will prevent the acceptation process (Szulanski and Jensen, 2006).

3 *Improvement of organisational capability primary processes:* Organisational structures (in a network) become more complex and diversified, and interlocutors can be multiple (functional expert, plant manager etc.). This makes it difficult to know to whom to address feedback.

In the Valeo study case, middle managers use roadmapping as a management tool, but 66% of operational managers consider it only as a reporting tool (operational managers are people who self-assess their progress in the system). They regret that there is a lack of easy means to compare their performance and their organisational capabilities and to verify if their commitment and their resource development have an impact on their operational results. The interviews also reveal that there are problems communicating with roadmaps. Almost all those interviewed confessed that they do not use the feedback tools included in the roadmapping system. Moreover they claim they have no time or motivation to improve roadmaps, because they are already very busy with other work (objectives etc.). This problem of motivation and participation from operational managers could come from insufficient communication from middle management. Moreover, the incentive system of Valeo rewards only the acquisition of organisational capabilities, but not the participative innovation for improving modelling or implementation processes. Formal and practical works are therefore partitioned: the latter only aims at satisfying the former, without following the double loop learning principles (cf. 2.2).

There are thus many challenges raised for providing a sustainable enhancement system: making middle management aware of its responsibilities, defining clearly the management networks, finding incentives and new participative systems, or creating indirect systems (based on a comparison between progress indicators and result indicators) for identifying risk zones where enhancement and innovation are crucial (Rauffet et al., 2009).

4.2.3 Management processes: coordination and alignment

An organisational capability approach gives a strategic dimension to resource development and management. It is therefore necessary to support the link between strategy and progress plans (Kaplan and Norton, 2004) and to avoid 'silo effects' (Mellat-Parast and Digman, 2008). Capability management can be viewed as a global multi-criteria resource optimisation problem. However, many methods are still focused on finding a local optimum for each criterion (e.g. quality vs innovation). The

dependency relation between the different organisational capabilities must be considered for managing and even sometimes modelling them.

Our interviews with Valeo's middle managers involved in different functional networks stress the need for a coordination tool, which could help them to manage transversally and coordinate their progress. This silo effect comes from the dominance of functional networks (in the structure and the management of roadmaps), and prevents them from having a strategic view of the organisational capability development.

5 Propositions – towards an organisational capability management framework

The barriers identified in the literature and in the field study are summarised below in Figure 6.

Figure 6 Summary table of the key concepts of the proposed management framework (see online version for colours)

Systems	Literature barriers	Field study barriers	Key Objects
Primary processes - Design and transfer	- Reification, Granularity level, Homogeneity - Flexibility and dialog for defining perimeter and objectives	- Collaborative design needs	**→ Collaborative organizational capability model** **→ Flexible transfer guide**
Support processes - Assessment and enhancement	- Validity of organizational capability design, verification of effectiveness in transfer processes - Participative innovation	- No comparison between capabilities progress and performance results - Motivation and participation weaknesses	**→ Multi-dimensional and Crossed scorecards** **→ Passive and active feedbacks**
Management processes - Coordination and Alignment	- Silo effect - Linking strategy to operations	- No coordination tool for managing transversally different functional organizational capabilities - Dominance of functional networks in the management of organizational capabilities	**→ Management Portfolio**

The following paragraphs structure a framework for managing organisational capabilities that reuses the essence of theoretical principles (Part I), the review methods (Part II), and which overcomes the identified barriers (Part III). To assemble all these elements, two models are built: an UML class diagram (in Figure 7, showing the three systems and the key concepts), and an IDEF0 diagram (in Figures 8, showing the input-output flows of concepts and those involved).

5.1 System and concept modelling

As illustrated in Figure 7 top left, the definition of organisational capabilities results from a strategic view of the organisational status, i.e. organisational strengths and weaknesses. Fundamental objectives (what results does an organisation have to achieve?) and means (what means does an organisation have to acquire?) objectives can be therefore deduced

(Keeney, 1992). Means objectives could then be reached by the acquisition of a key resource (as defined by Barney, cf. 2.1) or by the coordinated development of an organisational capability. The following paragraphs introduce the core concepts of the framework, which are shown on the right-hand side of Figure 6.

5.1.1 Primary processes: design and transfer

These processes rely on a collaborative organisational capability model and a flexible transfer guide.

Functional experts (who have formal knowledge about the progress objectives of their domain of expertise) should design the model. Nevertheless, to avoid the gap between functional experts and operational staff, design must also consider operational experience using a collaborative approach. Starting from the capitalisation of practical and formal knowledge, the model has to synthesise and structure the good practices following a determined learning structure. It must be generic enough to be understandable wherever it is implemented, and contextualised enough to be useful for the organisation.

The transfer guide enables discussions to take place regarding objectives and context (schedule, level, application perimeter) between operational staff and middle management for the development of an organisational capability. The guide generally comes from the organisational capability model: for instance, ISO9001 norm is an organisational capability model, which helps people, at a local level, to build a transfer guide to reach quality standards.

5.1.2 Support processes: assessment and enhancement

Support processes rely on multidimensional and crossed scorecards and on passive and active feedback.

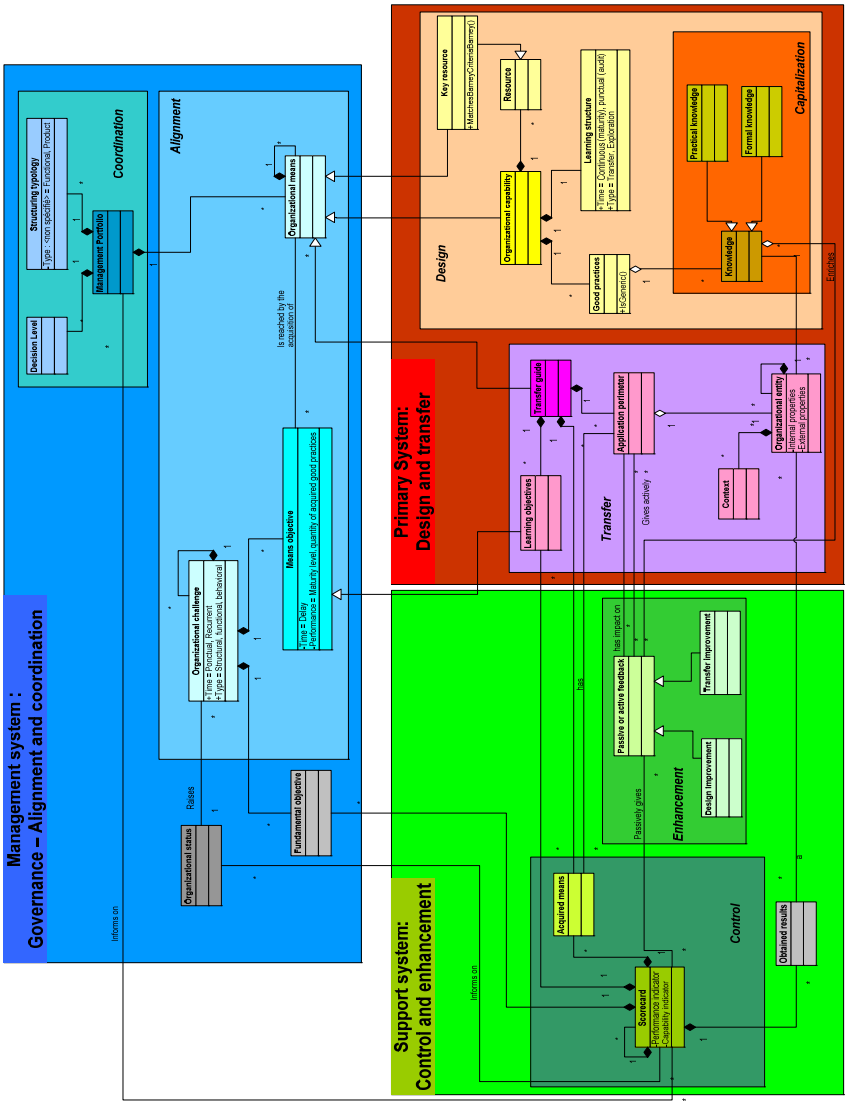
Some scorecards must be dynamically built to assess the means acquisition and consolidate these measurements. Moreover, these progress indicators must be crossed with activity results indicators, to verify if capabilities and key resources are real drivers of performance. These scorecards could be helpful at all levels: to represent the work done and the effort required (operational staff), to focus on particular concerns (middle management), to observe the alignment between objectives and means and to direct organisational strategy (decision-makers).

Feedback is necessary to support the double loop described by Argyris and Schoen (cf. 2.2), and to make organisational capability management sustainable. They can be active, i.e. users can share experience, e.g. by feeding wiki. These active participations are also a means to identify and to reward contributors of the learning system, as well as to ensure a continuous motivation from the system users (Frey, 1997). Nevertheless, participative innovation can be low, especially in distributed organisations, so passive feedback could be also a possibility. The managers can use the comparison between key performance indicators and organisational capabilities indicators, to identify entities with a singular behaviour. Then they can launch targeted actions to assess the causes of the outperformance.

5.1.3 Management processes: coordination and alignment

Management processes need a management portfolio. This portfolio ensures the cohesion of the different organisational capabilities development and avoidance of a silo effect, by listing and linking the organisational capability models and key resources around the organisational objectives.

Figure 7 Systems and concepts modelling of the management framework with UML (see online version for colours)



5.2 The modelling of processes and actors

Figure 8 shows the behaviour of the concepts previously described.

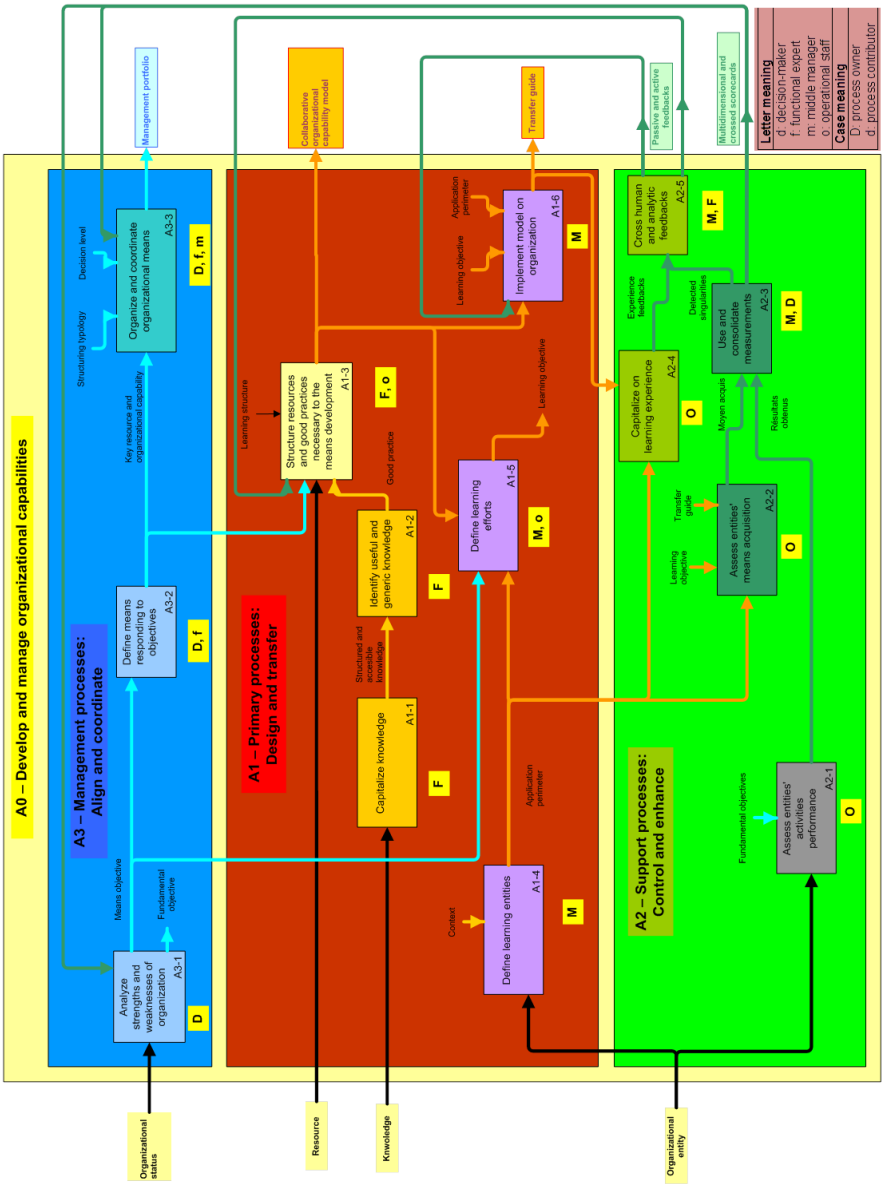
- *A1. Primary processes – design and transfer:* This group of processes aims at creating and transferring the 'corporate' good practices library. After a bottom-up phase (where good practices are identified by functional experts, and then structured with operational staff into an organisational capability model), there is a top-down phase (where the model is deployed through a flexible transfer guide on to chosen organisational entities with specific learning objectives discussed between middle management and operational staff).
- *A2. Support processes – assessment and enhancement:* The goal of these processes is on the one hand to gather the experience feedback of entities regarding their transfer guides, and, on the other hand, to measure the organisational capabilities acquisition by these entities. These two kinds of processes enrich each other: the feedback could explain specific results, whereas the consolidated scorecards can provide passive feedback. The impact of organisational learning can therefore be verified, and these complementary processes enable a double loop system to be created, where the design and the application of the model is continuously improved.
- *A3. Management processes* – Coordination and alignment: These processes are used to determine the organisational stakes and refine them into needs for organisational means, by studying and analysing the organisational status. Furthermore, they contribute to the creation of a management portfolio, where the identified organisational means are structured and coordinated around means objectives.

Those involved in each process are represented below each box in Figure 8:

- *Decision-makers* choose and structure the organisational means to be implemented (processes A3.1, A3.2, A3.3), and have the responsibility (A2.3) to direct organisational strategy.
- *Functional experts* guarantee that decision-makers' choices can be documented and structured (A3.2, A3.3). They are responsible for knowledge collection and they build organisational capability models (A1.1, A1.2, A1.3), and analyse the feedback of organisational entities (A2.5) in order to improve their models.
- Middle managers have a coaching role in the system. They hold discussions with operational staff about learning objectives and application perimeters (A1.4, A1.5, A1.6), in order to define the transfer guides. They are also the main users of consolidated scorecards (A2.3) which follow the progress of organisational entities and identify the entities which must be helped. Finally they must analyse the feedback of operational staff so as to adapt and improve the transfer guides (A2.5).
- *Operational staff* have to acquire the organisational means that decision-makers choose. They follow what functional experts model with their contribution (A1.3) and must comply with the objectives they discussed with middle managers (A1.5). They have the responsibility to report their results (A3.1), to assess the acquisition of the organisational means (A3.2), and to give their experience feedback. (A3.4) They

also provide information on the system and create a control loop. They use the scorecards to follow the progress on their roadmaps (A2.3), as well as the feedback from the other entities to overcome any problems (A2.5).

Figure 8 Processes and actors modelling of the management framework with IDEF0 (see online version for colours)



6 Discussion

Valeo uses roadmapping for managing the development of organisational capabilities throughout its structure. This system helps them to integrate newcomer entities more quickly, and to measure the organisational strengths and the weaknesses at all levels. Roadmapping also decides on the launch of a new product, a new transversal project or a new merger, etc. Since the first implementation and the field study carried out in 2008, the method has improved, following the management framework described in the previous section:

- *Primary processes – design and transfer:* Valeo's functional experts use the quick response quality control method, audit reports, and the V5000 quality guide to structure organisational capability models according to a maturity path. To guarantee global coherence as well as a better genericity of roadmaps, and to avoid a silo effect between functional networks, crossed meetings were organised between different functional experts, and operational staff from different product branches. This participative and collaborative design can reduce the number of roadmaps in production systems from 21 to 8.
- *Support processes – assessment and enhancement:* Support and feedback tools have been improved. A service was created in India to support users in their understanding of the roadmap content and in their use of the information tool. Furthermore, collaboration tools were added to the platforms (forums, chat, mailing lists) in order to share and solve common problems. Furthermore, a double check system was implemented to check the state of organisational capability development. About ten auditors control each entity on their roadmaps once a year (these models are becoming the transparent audit guides for the whole organisation), in order to validate the self-assessment. The business intelligence tools are able to compare organisational capability acquisition indicators with activity results indicators and to validate the effectiveness of the roadmaps on the organisational performance.
- *Management processes – coordination and alignment:* Some tools are tested to coordinate the development of organisational capabilities from different functional networks. For instance a middle manager in a UK division created a tool based on VBA to plan the joint objectives and monitor the progress of her organisational capabilities in Production Systems and People Involvement.

7 Conclusions

In this paper, we have provided a macroscopic description of organisational capabilities management in distributed organisations. We mixed the field study provided by the Pilot2.0 project, with the literature principles and the review of industrial and academic methods, to propose a management framework for the development of organisational capabilities in distributed organisations. These research works are therefore positioned between organisation sciences (especially concerning organisational learning), and engineering sciences (with enterprise modelling and KM approaches). We have considered the sustainable integration of the organisational capability approach in organisations, whatever methods are used (CMMI, ISO, roadmapping etc.). The

principles of transfer and learning, as well as the barriers observed in the review of industrial and academic methods, remain the same.

References

AFNOR (2000) *Norm FD X 50-176: Process Management.*

Amidon, D. (1997) *Innovation Strategy for the Knowledge Economy: The Ken Awakening*, Butterworth-Heinemann, Boston.

ANR (2007) *ANR-07-TLOG-016*, Projet-Pilot2.0 [online] http://www.agence-nationale-recherche.fr/documents/aap/2007/ selection/Techlog-2007.pdf (accessed 2013/11/10).

Argyris, C. and Schoen, D. (1978) *Organizational Learning: A Theory of Action Perspective*, Addison Wesley, Reading, Mass.

Barney, J. (1991) 'Firm resources and sustained competitive advantage', *Journal of Management*, Vol. 17, No. 1, pp.99–120.

Beguin, P. and Cerf, M. (2004) 'Formes et enjeux de l'analyse de l'activité pour la conception des systèmes de travail', *Activités*, Vol. 1, No. 1, pp.54–71.

Bernard, A. and Tichkiewitch, S. (2008) *Methods and Tools for Effective Knowledge Life-Cycle-Management*, Springer, Berlin.

Bhagwat, R. and Sharma, M.K. (2007) 'Performance measurement of supply chain management: a balanced scorecard approach', *Computers and Industrial Engineering*, Vol. 53, No. 1, pp.43–62.

Birkinshaw, J. (1999) 'The determinants and consequences of subsidiary initiative in multinational corporations', *Entrepreneurship: Theory and Practice*, Vol. 24, No. 1, pp.9–36.

Burke, W. and Litwin, G. (1992) 'Causal model of organizational performance and change', *Journal of Management*, Vol. 18, No. 3, pp.523–545.

Camarinha-Matos, L.M., Afsarmanesh, H., Galeano, N. and Molina, A. (2009) 'Collaborative networked organizations: Concepts and practice in manufacturing enterprises', *Computers and Industrial Engineering*, Vol. 57, No. 1, pp.46–60.

Criscuolo, C., Haskel, J.E. and Slaughter, M.J. (2010) 'Global engagement and the innovation activities of firms', *International Journal of Industrial Organization*, Vol. 28, No. 2, pp.191–202.

David, A. and Hatchuel, A. (2007) 'From actionable knowledge to universal theory in management research', *Handbook of Collaborative Management Research*, Sage Publications, New York.

David, P.A. and Rothwell, G.S. (1996) 'Standardization, diversity and learning: strategies for the coevolution of technology and industrial capacity', *International Journal of Industrial Organization*, Vol. 14, No. 2, pp.181–201.

de Pablos, P.O. and Lytras, M.D. (2008) 'Competencies and human resource management: implications for organizational competitive advantage', *Journal of Knowledge Management*, Vol. 12, No. 6, pp.48–55.

Diani, M. (2002) 'Connaissance et performance économique : Une nouvelle vision de la firme dans une économie basée sur la connaissance', *ACS Conference*, Aix-En-Provence.

Egidi, M. and Narduzzo, A. (1997) 'The emergence of path-dependent behaviors in cooperative contexts', *International Journal of Industrial Organization*, Vol. 15, No. 6, pp.677–709.

Fall, I. (2008) *Approche « gestionnaire » de la capacité organisationnelle et pilotage du progress*, PhD Thesis, Mines de Paris.

Frey, B.S. (1997) 'On the relationship between intrinsic and extrinsic work motivation', *International Journal of Industrial Organization*, Vol. 15, No. 4, pp.427–439.

Garvin, D.A., Edmondson, A.C. and Gino, F. (2008) 'Is yours a learning organization?', *Harvard Business Review*, Vol. 86, No. 3, pp.109–116.

Guillevic, C. (1993) *Psychologie du travail*, Nathan Université, Paris, France.

Hamel, G. and Prahalad, C.K. (1990) 'The core competence of the corporation', *Harvard Business Review*, Vol. 68, No. 3, pp.79–93.

Helfat, C.E. and Peteraf, M.A. (2003) 'The dynamic resource-based view: capability lifecycles', *Strategic Management Journal*, Vol. 24, No. 10, pp.997–1010.

ISO (2010) ISO website [online] http://www.iso.org/iso/home.htm (accessed 2013/11/10).

ITIL (2010) ITIL website [online] http://www.itil-officialsite.com/home/home.asp (accessed 2013/11/10).

Kaplan, R.S. and Norton, D.P. (2004) 'Measuring the strategic readiness of intangible assets', *Harvard Business Review*, February, Vol. 82, No. 2, pp.52–63.

Keeney, R.L. (1992) *Value-Focused Thinking. A Path to Creative Decision Making*, Harvard University Press, Cambridge, MA.

Khanna, T. and Yafeh, Y. (2007) 'Business groups in emerging markets: paragons or parasites?', *Journal of Economic Literature*, Vol. 45, No. 2, pp.331–372.

Kutsoati, E. and Zabojnik, J. (2005) 'The effects of learning-by-doing on product innovation by a durable good monopolist', *International Journal of Industrial Organization*, Vol. 23, No. 1, pp.83–108.

Malerba, F. (2007) 'Innovation and the dynamics and evolution of industries: progress and challenges', *International Journal of Industrial Organization*, Vol. 25, No. 4, pp.675–699.

Mellat-Parast, M. and Digman, L.A. (2008) 'Learning: the interface of quality management and strategic alliances', *International Journal of Production Economics*, Vol. 114, No. 2, pp.820–829.

Monomakhoff, N. and Blanc, F. (2008) *La méthode 5Steps® : Pour déployer efficacement une stratégie*, AFNOR, Paris, France.

Nonaka, I. (1994) 'A dynamic theory of organizational knowledge creation', *Organization Science*, Vol. 5, No. 1, pp.14–37.

Rauffet, P., da Cunha, C. and Bernard, A. (2012) 'Conceptual model and IT system for organizational capability management', *Computers in Industry*, Vol. 63, No. 7, pp.706–722.

Rauffet, P., Labrousse, M., da Cunha, C. and Bernard, A. (2009) 'Progress management in performance-driven systems: study of the 5Steps® roadmapping, a solution for managing organizational capabilities and their learning curves', *INCOM Conference*, Moscow.

Saint-Amant, G.E. and Renard, L. (2004) 'Référentiel des capacités organisationnelles de l'administration électronique', *Management International*, Vol. 9, No. 1, pp.49–68.

SEI (2010) CMMI website [online] http://www.sei.cmu.edu/cmmi/ (accessed 2013/11/10).

Senge, P. (1990) *The Fifth Discipline: The Art and Practice of the Learning Organization*, Doubleday, New York.

Skyrme, D. and Amidon, D. (1998) 'New measures of success', *Journal of Business Strategy*, Vol. 19, No. 1, pp.20–24.

Stata, R. (1989) 'Organizational learning: the key for management innovation', *Sloan Management Review*, Spring, Vol. 30, No. 3, pp.63–7430.

Szulanski, G. and Jensen, R.J. (2006) 'Presumptive adaptation and the effectiveness of knowledge transfer', *Strategic Management Journal*, Vol. 27, No. 10, pp.937–957.

Teece, D.J. and Pisano, G. (1994) 'The dynamic capabilities of firms: an introduction', *Industrial and Corporate Change*, Vol. 3, No. 3, pp.537–556.

Watson, D. (2006) 'Embracing innovative practice', *Capacity.org Journal*, Vol. 29, No. 4, pp.4–7.

Weick, K.E. (1991) 'The non-traditional quality of organizational learning', *Organization Science*, Vol. 2, No. 1, pp.116–124.

Xu, Y. and Bernard, A. (2010) 'Measurement of enterprise knowledge by state characterization', *Expert Systems*, Vol. 27, No. 5, pp.374–387.

Yeung, A., Ulrich, D., Nason, S. and Glinow, M. (1999) *Organizational Learning Capability*, Oxford Press, Oxford, UK.

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