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Competence portfolio assessment of research and development center for regional development

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Abstract

Digitalization is rapidly increasing and enterprises must find new ways to innovate for business advantage. Engineering industry is currently living in the middle of co-evolution from being the product provider to offering smart services and even to being the provider of customer value. The right way of digitalization can lead to business differentiation by smart services. But to transform themselves, the companies must have the right digital assets, suitable organizational capability and culture, right competence structure and individuals with right mindset to succeed in co-evolution. This article concentrates on analysing the role of research and development unit HAMK Smart Services. Its mission is to support co-evolution of municipal and industrial enterprises as well as value networks and through that increasing the competitiveness of the region. For that purpose, it is important to know the overall capabilities of the HAMK Smart Services unit. In our article we categorize the competence and capability into three layers: human competence and capability, organizational capability and content management capability. This article introduces a new interrelated three layer competence portfolio model and results of survey done with Smart Services research and development unit. Case study analysis has been executed within the customer segment of Industrial digitalization and life cycle care.

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1. Introduction

It is widely recognized that the industrial service business is a fast growing business area in the business world. It is seen that the engineering industry is currently living in the middle of co-evolution from product provider to product related service provider and even to the provider of customer value.

Digitalization is rapidly increasing and enterprises must find new ways to innovate to gain business advantage. Through the use of new technologies like cloud, mobile, big data, and social networks with increasing intelligence and automation enterprises can capitalize on new opportunities and optimize existing operations to achieve significant business improvement. But to transform themselves, they must have the right digital assets, suitable organizational capability and culture, right competence structure and individuals having right mindset to succeed in co-evolution. Knowledge is scattered and distributed in business networks. Competence areas have become more complicated. Single human capacity cannot cope with all the needed competence to create new opportunities for businesses. To succeed, companies need democratic innovation culture and co-innovation and co-evolution processes.

In 2014 HAMK University of Applied Sciences (HAMK) established the Smart Services-research unit to act as dynamic breeding environment to create and execute, together with co-operation network, well addressed research and development activities for the regional and enterprise development needs. The research unit supports cross-sectorial utilization of digital technologies and service business development. Similar solutions can be adapted in various lines of business. Research unit supports business transition of regional public and private sector partners and functions. For that purpose it is important to know the overall capabilities of HAMK and Smart Services research unit. In our article we categorize the competencies and capabilities on three layers: human competence and capability, organizational capability and content management capability. Various features can be analyzed within these layers and their interrelationship with each other's. For that purpose various groups of Smart Services research unit and individuals were interviewed to find out the structure with which the deeper analysis could be done.

The article introduces a concept of a new interrelated three layer competence portfolio model. The idea for further research is to make a survey inside Smart Services research unit (five research groups and 30 individuals). The intention is that in future the created competence and capability portfolio model could serve as an adaptive complex system when building multidisciplinary groups to tackle with the co-evolution challenges of customer enterprises. When some new competence is needed for challenges of business co-evolution, HAMK education and training system serves for the purpose of adaptive lifelong learning. The adaptive system is supposed to interrelate between regional needs, applied research and education, learning from each other's and tuning their operations according to the challenges.

2. Theoretical background of the research approach

As universities become bigger players in R&D and economic development, their relationship with industry, research parks and regions needs to be carefully rethought. On some level, the very notion of a university as solely a center of research and teaching needs to be re-examined. It is commonly known that universities are among the least adaptive institutions. While universities do routinely respond to market and economic shifts, they do so over very long periods of time. Economic development often responds to the needs of universities. For regional knowledge ecosystems to become more resilient, they will need to encourage universities that are responsive to well-articulated regional needs. Structuring the engagements around mechanisms that produce tangible benefits for the universities will be crucial. [1]

Nonaka & Takeuchi [2] introduce that knowledge is created by flow of information and is anchored in the beliefs and commitment of its holder. Chesbrough, [3] declares innovation practices over the enterprise boundaries and in value networks by open innovation. In the open innovation model, the boundary between a firm and its surrounding environment is more porous; enabling innovation to move easily between the two. In existing theory it can be found similar type of concept in human-machine interaction research called participatory design. Schuler and Namioka [4] have introduced basic methodologies with principles and practices. Bdker [5] has concentrated on participatory IT design. In practical studies Collins [6] describes the transition from average to great company and the ways how you can fail in making that. Skyttner [7] introduces systems theory with self-organization and evolution. Jamshid

[8] introduce that system thinking is the art of simplifying complexity. It is about seeing through chaos, managing interdependency, and understanding choice. Concepts are important to explain chaos. Sanchez and Heene [9] have proposed an open systems model of firms. Improving of organizational competence also requires increasing managers' own cognitive flexibilities to imagine new strategic logics for creating and realizing new kinds of value-creating product offers and new ways of managing processes for creating and realizing new and existing product offers. Markopoulos and Vanharanta [10] have created the Company Democracy Model. It can be characterized as a multidisciplinary science, as it integrates many management (strategy, leadership, etc.), engineering (process knowledge, innovation), social (human resources, ethos, etc.), financial (marketing, extroversion, etc.) and other disciplines. The uniqueness of the model is its capability to integrate them all in a transparent way, making the execution sequence these disciplines to seem absolutely normal, reasonable and effective. The co-evolutionary spiral method in the model contributes towards the identification and achievement of the capacity, capability, competence, and maturity needed to turn knowledge into innovation. The model is structured in such a way that the method reflects the Co-Evolute methodology [11] and its application in organizational democratic performance. Evolute LLC provides intelligent web-based system for managing human competences and organizational objects and capability in the world of business. Both organizational development methodologies (Co-Evolute and the Company Democracy Spiral Method) are directed towards the creation of an organizational knowledge based culture [12].

3. Co-operative organization and multidisciplinary learning

Smart services research unit supports industry, commerce and the society in digitalization and service development needs. The task of the research unit is to create and execute, together with co-operation network, well-addressed R&D activities for the region and its' enterprises. The Smart Services research unit supports the utilization of digital technologies and service business development across sectors: similar solutions can be adapted in various lines of business. The unit has six lines of business (figure 1):

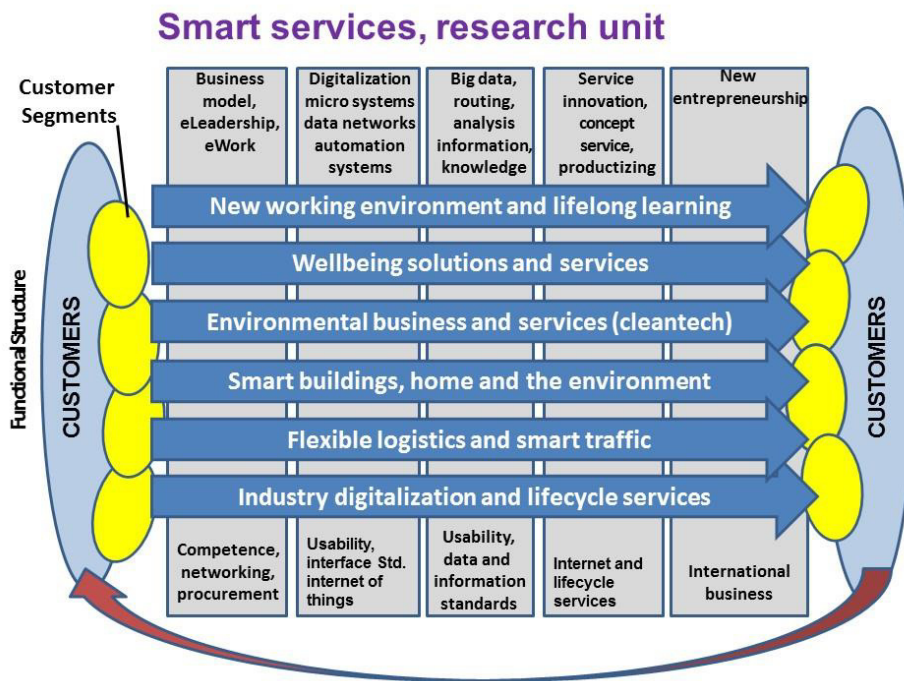


Fig. 1. Focus areas of the Smart Services research unit.

Region's public and private sector partners are supported on following lines of business:

- Wellbeing solutions and services
- Flexible logistics and smart traffic
- Smart buildings, home and the environment
- Environmental business and services (cleantech)
- Industry digitalization and lifecycle services
- New working environment and lifelong learning.

4. Business co-evolution through platform configuration and management

Main dynamics in business is between the market and technology co-evolution. By integrating technology and knowledge, it is possible to provide new products and services to the certain market segment. Markets are driven by customers' needs and requirements. Technology development is constantly in evolving state and there is strong relationship between the markets and technology development. New technology enables new functionality or replaces existing technologies. Re-organizing network activities can provide possibilities for new business. New core technology may lead to new industry and even new economic system. The question is what drives the network to re-organize itself and commercialize innovations in the new way? There have to be a customer's value that can be evaluated against investments and cost of change in the network. Management of economic and technical risks is important as well as win-win situation among the partners.

Platforms are essential in strategic product and service planning and management. This strategy performs in minimizing the complexity of the overall business. To find out sustainable growth in the technology oriented business it is important to have three different platforms: business portfolio platform, competence portfolio platform and technology platform (figure 2). These are in dynamic relationship with each other's during business co-evolution. They form an adaptive complex system, which try continuously to find balance. A competitive company manages synergy between these platforms during spiral innovation process of new offering.

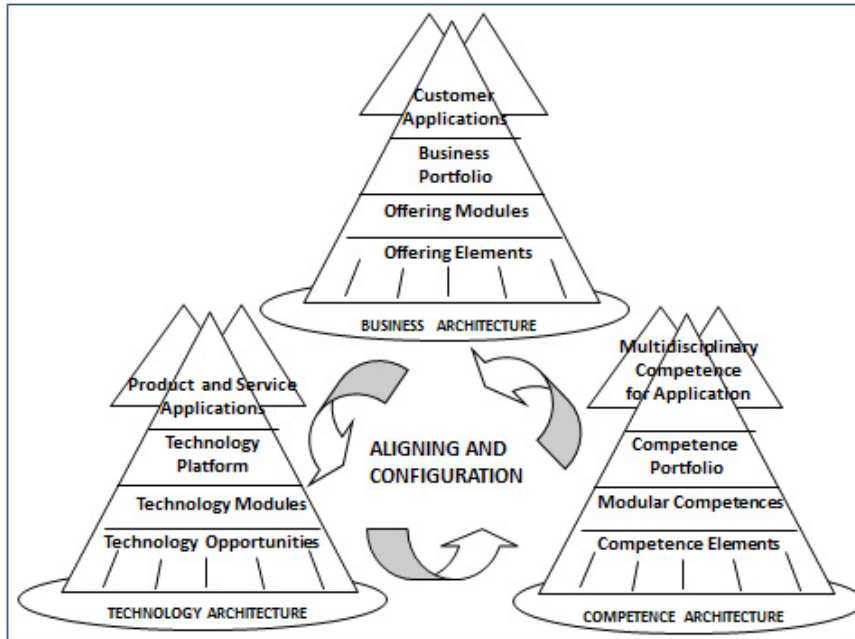


Fig. 2. Platform management is the key for business alignment and configuration.

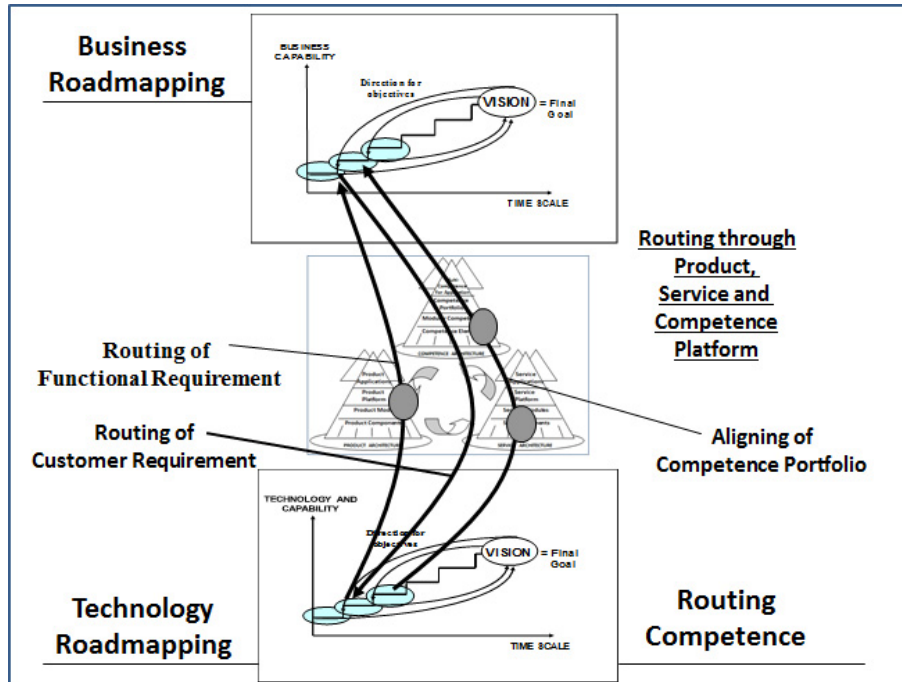


Fig. 3. Requirement routing through platform based technology, competence and business.

5. Competence and capability aligning

It is possible to create dynamic system (figure 3), which helps to integrate technology planning by unbundling and identifying technologies within the platforms, linking them in turn to technology road maps. Integrated development systems manage and iterate the platform elements. Product and service is organized in a systematic way, where the dependency is exploited in architecture. Platforms are key enablers for continuous introduction of product and service derivatives to multiple market segments. Furthermore the strategy is critical also when managing the complexity. Dependency is exploited in architecture.

The discipline of applying the model-based laws in a dynamic behavior such as shown in the figure 3 to describe the routers in the system become known in tracking and packing, while on process. The driving force behind such a dynamic system when business drivers are changing; customer requirements are changing, new technology is creating new opportunities or there are new competences to solve more requiring functional problems. The system learns and complements the sequent, which is continuous.

6. Competence portfolio model as adaptive complex system

This article concentrates on analyzing of the role of research and development unit Smart Services at HAMK. To be capable to collaborate with industrial companies, it is important to know the overall capability of research and development unit. The experts making applied research with customers have to have content and process knowledge of customer site, they have to be capable to work in teams on distributed way with other experts in value network and have to certain collaborative skills to work together. In our article we categorize the competence and capability on three layers: content management capability, organization capability and human competence and capability.

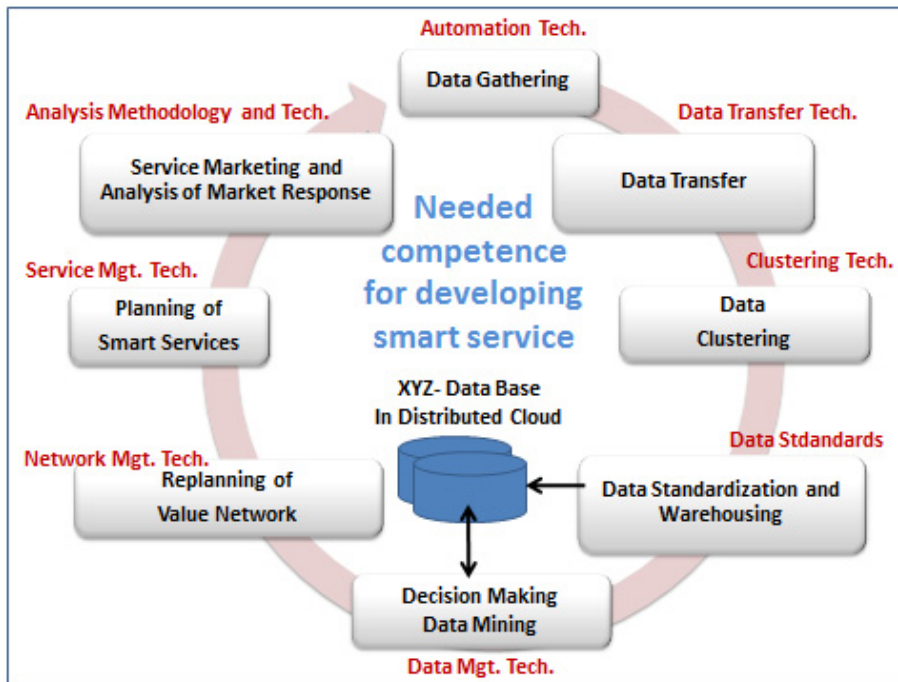


Fig. 4. Relationship of technology and competence in life time care service.

In figure 4, there is an example of technology oriented competence on the field of industrial digitalization and life time care of supplier application in customer business. Automation system is creating data, which is gathered, clustered, transferred to supplier service center, where a group of experts analyze and compare the data to the life cycle data gathered earlier and then make recommendation on repair or inform that everything is all right in the process. To support this customer value network process it is important to have all type of experts in research network. They can also have customer experts in the same network.

The substance in the network is knowledge and capability, which is activated when the customer requirements are decomposed. In order to manage economical and technical risks the new innovation should be evaluated as a value for customer and network partners. Effective method of decomposing the requirements reveals precisely. Content management competence, organizational capability and human mental capability are in strong interrelationship. The interrelationship between these three portfolios will be opened up in the continuing research project. It is planned to parametrize each of the three entities and turn as a questionnaire's. Evolute- tool is thought to gather and analyze the knowledge.

It is possible to benefit on dialogue and reflection in multidisciplinary research collaboration (figure 5). Every expert as a human being has his own metacognitive mental mindset and he can build his own schema out of discussed topic or problem to be solved. Individual expert members of co-operative team can change ideas of their individual schemas based on knowledge exchange. The other expert member can learn, make his own mental picture out of that combining it with his own knowledge and create a new schema and make dialogue with the other expert. When having a common understanding of the new tuned schema after dialogue it can be applied in problem solving or task executing.

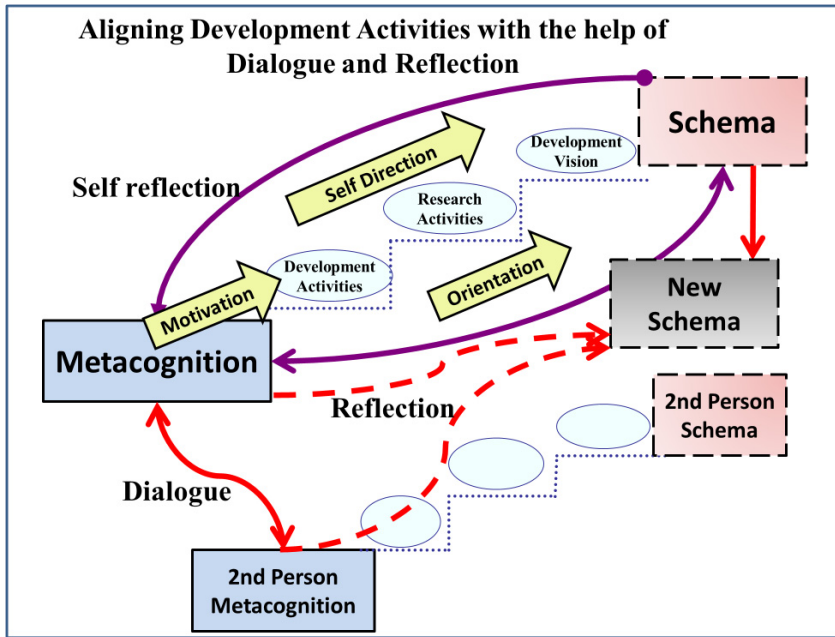


Fig. 5. Benefiting of Dialogue and Reflection in Multidisciplinary Research.

Figure 6 describes the adaptive alignment and development environment and system to keep the competence and capability portfolio in competitive shape according the life cycle requirements of economic life.

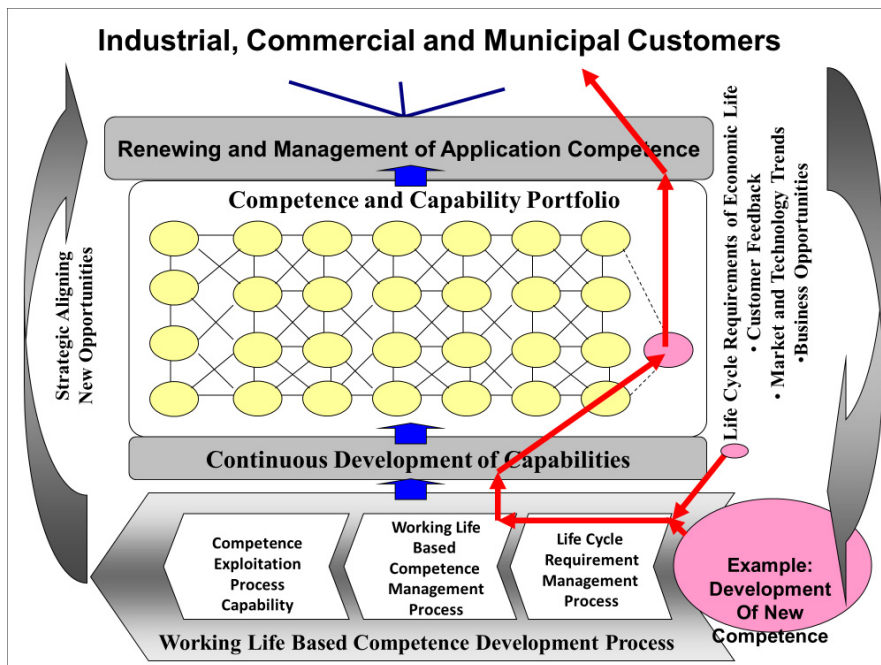


Fig. 6. Continuous Competence Aligning and Development.

7. Conclusions

In this article a concept of interrelating three independent entities have been introduced. Those are human capability, organizational capability and content knowledge competence. These entities build a common competence and capability portfolio of an expert service group. This work is still on conceptual phase but the case study on industrial digitalization and life cycle service has been introduced. In that work has been drafted a competence and capability portfolio of Smart Services research unit and its expert group making supporting work for local economy and industry. The purpose is to disintegrate independent entities to see them separate as subsets. The deeper analysis of the competence portfolio in the Smart Services research unit will be done by using Evolute LLC tool by creating new domain solutions for that. The idea is to gather information from individuals and pool them through Evolute tool to find available competence and capability portfolio and recognize the development needs.

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