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T-shaped Capabilities of the next Generation: Prospecting for an Improved Model

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Abstract: Modern companies are in constant search of ways to improve the integration of the various departments and business processes into a coherent entity. Changes made to the organizational structure and deployment of common company-wide ICT solutions such as Enterprise Resource Planning (ERP) and cloud infrastructure are some means that enable better internal collaboration and transparency, compared to siloed structures and modes of operating. However, infrastructural or management system changes cannot foster a holistic view, and collaboration between different parts of the organization is not possible if the stakeholders in company processes do not possess capability profiles that match the need. Human Resource Management (HRM) and knowledge management (KM) research has introduced and elaborated on the concept of T-shaped capabilities as an answer to the needs of a modern knowledge-era employee. A T-shaped capability profile is highlighting the need of employees (and managers alike) to build broad combinatory capabilities (the horizontal line on the top of the letter T) between the firm's processes in addition to their specific expertise in one area (the vertical line in the letter T - so-called I-shape capability). Our paper introduces a prospective evolutionary step to T-shaped capabilities that we call the T² capability model. The model adds another horizontal layer to the model. This layer is made of generic i.e., not industry- or firm-specific capabilities, as imposed by megatrends and mindsets needed across all areas of economic activity. Examples of such generic capabilities are sustainability and ethics as well as financial and technical literacies. The second horizontal line consists of the firm's business processes such as sales and marketing, supply chain, research, and development, etc. We will also introduce some practices on how T²-shaped capabilities could be fostered in education and the company- and industry-level actions.

Keywords: capability, interprofessional, skills, interaction, composability, knowledge sharing

1. Introduction

Employees in modern organizations are assumed to possess capability sets that are wider in their scope than those needed earlier. The knowledge era in which companies currently operate, calls for new capabilities in both technological and behavioural dimensions and in combining these (Haapasalo and Kess, 2001). The demand for agility urges a firm to be capable of proact and react with speed to anticipated or experienced changes in the operating environment. Thus, an agile and adaptive firm can be assumed to be more resilient to demanding internal and external forces of change. A concept of composable business has been introduced (Gartner, 2020) to propagate an enterprise architecture where an organization is made from interchangeable building blocks. This modularity allows a business to rearrange and reorient when facing external (or internal) factors like sudden shifts in customer values or supply chains (ibid.).

If the new era asks for change in enterprise architecture and its flexibility, how do these demands affect the employees and capabilities asked of them? An early response to address the need for connecting diverse knowledge areas and to improve the integration of the different parts and functions of an organization was a communal one. The ideas of interacting multidisciplinary teams were introduced in many fields from noticeably different organizations like ones in social and health care (Atwal and Caldwell, 2005; Ke et al., 2013) to the oil and gas industry (van der Vegt and Bunderson, 2005). As Jackson (1996) pointed out, the underlying logic of diverse teams was rather straightforward: "Increasing popularity of team-based organizational structures reflects the widely shared belief that teamwork offers the potential to achieve outcomes that could not be achieved by individuals working in isolation". In addition to moving to team-based organizations, many companies have nominated task force groups to operate outside the frame of the normal organigramme on a given task calling for swift analysis, decision making, and solution implementation i.e., to solve emerged or imminent business challenges. As Tropman and Johnson already in 1992 defined: "Task forces arise out of a crisis-oriented environment and are time-limited, action-oriented groups (...) formed when the situation is very complex, where resistance is expected, or when the system involved is very large, speed is essential, and one cannot wait for the normal channels of implementation to work". All these postulates are very typical in any business in the 2000s plagued by dot-com crashes, economic recession resulting from the financial system's crisis in 2007, and, lastly, the Russian aggression in Ukraine.

An increasing interest in Human Capital (HC) and Knowledge Management (KM) research has shifted the focus from the collective capability of diverse employees organized to work together towards the capability profile that everyone should possess to contribute successfully to the joint operations within the company. In the information era that was characterized by the increase in volume and complexity of technology (especially ICT technologies), the employees were assumed to be specialized and master their own area of expertise on a deeper and deeper level. As a result, an I-shaped capability profile was preferred. An I-shape professional is an expert in their own domain but lacks cross-functional and collaborative capabilities (Elayan et al, 2022). The capital letter “I” given to this capability set symbolizes the vertical depth of skill and simultaneously the lack of width.

The literature has introduced various new models of modern capability profile demands. For example, Elayan et al. (ibid.) proposed increased capacity to innovate emerging from the π -shaped capabilities, where the two vertical lines (of the letter “pi” in the Greek alphabet) represent two domains mastered and the horizontal line the ability to combine these two different domains in one’s work.

The most referred to capability profile for professionals in the knowledge era has been one of the T-shaped capabilities (Barile et al., 2012; Barile, Saviano and Simone, 2015; Demirkan and Spohrer, 2018) that sees a need for deep skill (I- shaped expertise) still relevant but additional combinatory capability needed for professional success.

This conceptual paper elaborates on earlier work on the T-shaped capability profile and proposes a new conceptual model of T²-shaped emerging from observations of the current development trends of business and societal environments. The conceptual development is based on the study of the earlier research and various discussions with practitioners in management and human resource management in companies with an international scope and technology intensity, as well as discussions and observations on the current directions in Higher Education Institutions (HEIs) curricula and study program developments. As Kothari (2004) defines, conceptual research aims at creating new models and/or re-interpretations of the existing ones before having full empirical evidence or validation for them. The paper discusses and proposes the potential improvements based on the new model particularly needed for business education and practice as well as offers ground and directions for further research on the model created. As Squires et al. (2011) state, conceptual research is lacking clear indicators of reliability and validity, and thus conceptual research is an early explorative step in the development of new models for research and management practice.

2. Literature review

The prior-art research on capability management and its recent developments gets briefly reviewed in this chapter with aim to define the core constructs linked to the issue area and to review the work done on the core element of this paper, capability profiles.

2.1 On talent, skill, and capability

Not surprisingly, in the era of the knowledge economy researchers have paid attention to the knowledge possessions of individuals – labelled as Human Capital by Reed, Lubatkin and Srinivasan (2006) – as well as focused on the resulting (from the integration and collaboration of individuals working together) structural capital of the company as subsets of intellectual capability. Another stream of research pays attention to the psychological capital i.e. capacity of an individual in dimensions of “self-efficacy, hope, optimism, and resilience... linked with a range of desirable work attitudes, behaviours, and other outcomes” (Nolzen, 2018). However, individual and organizational success requires also the members of the working community to possess social capital. According to Martin et al. (2020), individuals may achieve their goals independently but the additional resources attainable in their social network provide an asset to goal achievement: “In addition to whom an individual knows, what the people in the individual’s social network know is also critically important.” Thus, the capabilities of an individual are partly made of communal capabilities.

Parallel to the interest in elaboration on the human capital construct, organizations have shown a growing interest in finding, nurturing, and utilizing talent. Talent management typically focuses on developing the skills of the workforce to execute strategic priorities (Hicks, 2008). The whole life-cycle view on talent management contains segments such as talent strategy, acquisition, development, engagement, and retention (Tavis, 2008).

At the level of an individual, the question of what makes a relevant talent for a job and career is a complicated issue. As Kravatiri and Johnston (2020) point out, "...workers along the competency spectrum will need to plan for a much longer life span with many career and life transitions. They will have to be prepared for more uncertain employment prospects, be able and willing to take care of themselves and build more resilient work-life scenarios." An important dimension to the discussion caused by the existing cultural and organisational context.

As can be seen from the above-mentioned definitions, the boundaries between constructs are blurring. One potential additional element to the confusion are the ones of skills and competency. Skills and competencies are defined in knowledge management (KM) and Human Resource Management (HRM) literature in various ways, many of which are overlapping. Skills are commonly tied to a particular job and tasks and situations arise when performing in the job. At the same time, skills may be seen either bounded by the context where the task or situations appear or as being independent of the context (Attewell, 1990). In the latter view, the skill will stick to the individual even though the context changes, but its relative value in the new context may change. A fresh view of Stanley and Williamson (2017) makes an important point: The skills get their manifestations as knowledge (on how to perform) as well as in using that knowledge in practice. In other words, skills have the capacity as well as action-based nature. Kumar, Peng and Chen (2018) call these two facets of skills as potential and actual skills. Another division of skills in the literature (e.g., Gilbert et al., 2018) can be identified when skills are seen as 1) generic, a set of skills that are transferable to many domains and situations, and 2) specific, needed, and relevant in the situation and context-bound manner.

This leads us to the final and core constructs relevant for this study capability, and profiles of capability that use the construct as the identifier for the central building blocks for the different profiles. Capability is a very wide term. Enterprises need and require their employees to have specific capabilities to be able to implement strategies efficiently and achieve business value. Stephenson (1998) stated that capable individuals possess specific professional skills, are able and motivated to take that knowledge into use and assess the righteousness of the actions they take. Capabilities are also discussed both as a characteristic of organizations and systems, not only as a construct involving individuals.

This paper synthesizes these fragmented and at times contradictory definitions as follows:

- Talented individuals have the potential to learn new skills
- The skills learned work for the organization and the individual a) in a way that serves immediate situational and contextual needs with immediate rewards as specific goals are met, and 2) as a potential to use the skill, adjust or improve it in new situations and context
- For the organization, skills that can be communally shared and combined, have more value than independent and non-connected skills
- For the sharing of the skills, both the company and individuals need a platform and processes for interaction, that transform to social capital for an individual and structural capital for a company
- Capability is an overarching concept that combines the individual's potential to do well in specific tasks, the potential to succeed (and assist others in succeeding) in new tasks as well as the mindset and motivation to develop and expand the scope of action
- Capability profiles depict these characteristics for an individual by looking at 1) specific and generic skills and 2) active and potential skills.

2.2 T-shaped vs. I-shaped capability models

Much of the latest discussion on the developments and research has circled around the transition from I-shaped capability profiles to T-shaped ones. The I-shaped capability profiles for an individual and an organization consisting of individuals possessing the I-shaped capabilities provide companies with deep expertise on different functions and jobs but fall short in the capacity to interchange and communally elaborate on the knowledge possessed (Figure 1).

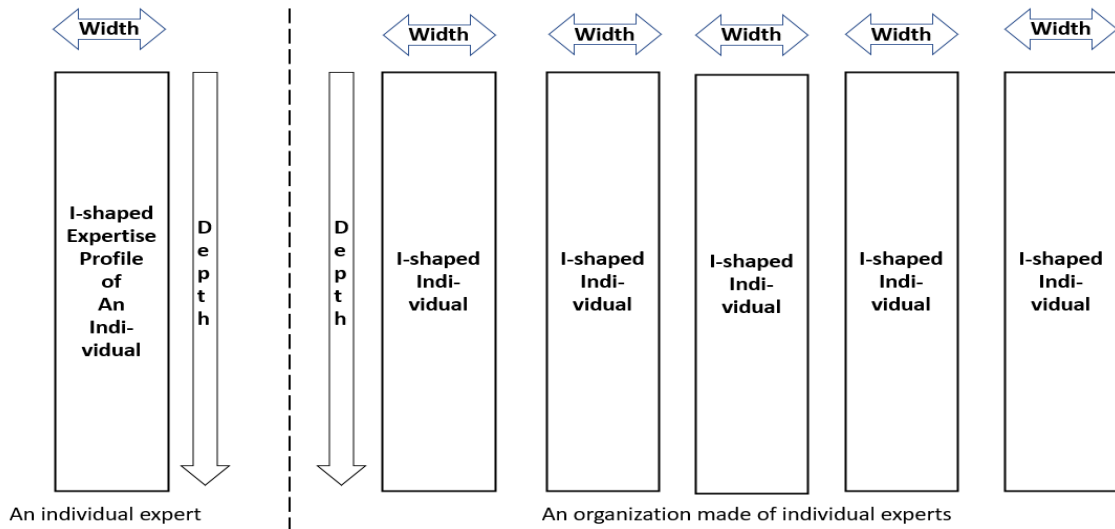


Figure 1: I-shaped capability profiles for an individual and an organization

By hiring and cultivating special (I-shaped) expertise an organization seems to cover the essential areas of knowledge needed, but due to the limited width of these experts to share and interact with others’ knowledge domains, the company does not reach an optimal width of shared knowledge (e.g., Barile et al., 2012), i.e. it is siloed.

The need for building boundary-crossing and combinatory capabilities has been expressed both at the level of corporate knowledge management (e.g. Barile, Saviano and Simone, 2015) as well as in the education in disciplines such as software engineering (Boehm, 2018), engineering in general (Kulkarni et al., 2022), entrepreneurship (Rippa et al., 2020), medical education (Donofrio et al., 2010) as well as in the cross-disciplinary capability to manage projects (Martinez, di Nauta and Merola, 2016) and in the context of different industries like in textile and apparel industry (Leiby and Zhao, 2020).

The requested new capability set has been named the T-shaped capability profile. As the symbolic letter T proposes, the need for a domain- and/or function-specific expertise (the vertical line in the letter) but in addition to that, true professionals should possess width in their knowledge. This horizontal width offers the individual and organization flexibility via “empathy, breadth of knowledge, skills, experience, and complex communication abilities” (Demirkan and Spohrer, 2018).

From the organizational point of view, the growth and interaction of T-shaped individuals widen the shared knowledge pool of the organizations (Figure 2).

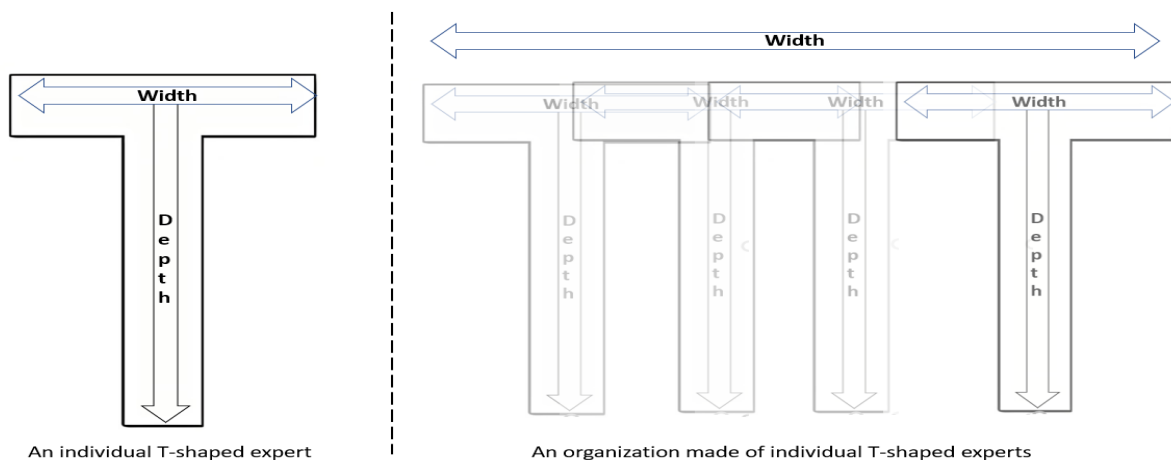


Figure 2: T-shaped capability profiles for an individual and organization

The T-shaped capabilities have been proposed to impact positively on different processes and functions in organizations, e.g., for innovativeness (McIntosh and Taylor, 2013), service design and fulfillment (Barile, Saviano and Simone, 2015) and the combination of the two – service innovation (Demirkan and Spohrer, 2015). The need to move toward T-shaped capabilities has also been recognized in public and non-profit organizations, where the concept of interprofessional approach e.g. in social work has been promoted (Hammick et al., 2009).

2.3 Extensions on the T-shaped capability model

The T-shaped model emerged in research and KM and HRM practice in the early 2010s. Since then, various modifications or upgrades to the model have been proposed.

The concept of a π -shaped (Greek letter “pi”) capability profile (Elayan et al., 2022) propagates for an individual to master two distinct knowledge areas and combine those two (Figure 3)

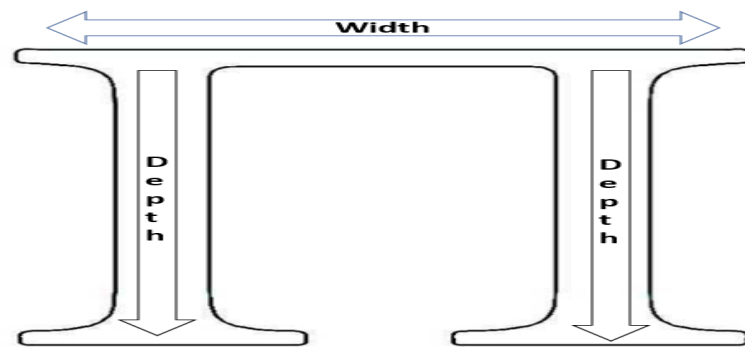


Figure 3: A π -shaped capability profile

A practical instantiation of the model could be for example a digital marketing expert who has generic technological capabilities combined with up-to-date knowledge on marketing processes that together help the individual to navigate the changing landscape of technologies and markets. It can be logically assumed, that having this type of capability possessions by individuals allows an organization to cover the needed knowledge areas with a lower number of employees.

The π -shaped capability profiles can be assumed to be cultivated 1) in start-up companies due to the lack of human resources and the lack of financial resources to buy and hire knowledge from outside the founding entrepreneurial team and, 2) because of the changes in the career trajectories of Generations X and Y. Employees of the future are not expected to gradually improve in their original area of expertise and functions, but also start new careers both in terms of job context and contents (e.g., Kerka, 2003). The nearby concept of multiple careers is one of the boundaryless careers that refers to “career paths wherein individuals respond to decreased organizational resources by seeking resources or opportunities from outside their current employer, such as by changing employers or building an external professional network” (Wiernik and Kostal, 2019).

The birth of extension to the T-shaped capabilities can thus be traced back to personal actions, organizations’ demands, and wider societal discontinuities in the way careers develop.

Another prospective model to expand the coverage of the T-shaped model has been that of conserving the T-shape but adding parallel elements to both vertical in-depth expertise and horizontal combinatory integrative capabilities (Figure 4). The models of extended T-shaped capabilities see the vertical dimension of the letter T consisting of different systems or processes. The horizontal dimension, in its turn, is made of expertise from different operational environments and cultures. As a result, individuals have expanded both the area where they are deep and where they are wide. That way, they are more flexible to adapt to new circumstances and have wider usability for their employers. The question can be posed whether in a global market a collection of experiences for the horizontal layer is a way to enlarge one’s capability coverage or would a more generic skillset better services the individual and the organization that the individual works for. Also, the notion of two truly deep expertise areas may be in practice difficult to reach in the modern environment where the function-specific knowledge and accumulation of research on each area is increasing.

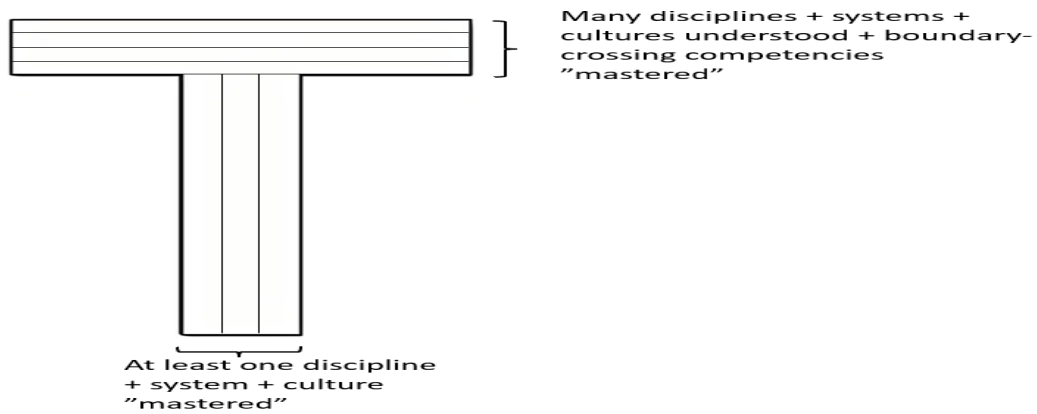


Figure 4: Extended T-shaped model (adapted from Demirkan and Spohrer, 2015)

Perhaps the most advanced version of extensions on the T-shaped capability model is the one by Heikkinen (2018) presented in Figure 5. In the model, the idea of mastering more than one system is preserved, but interestingly the horizontal lines also describe different disciplines and systems, but on the level of understanding rather than in expertise. On top of disciplinary and system-level understanding, a layer of boundary-crossing generic skill has been added. The critical view of the model asks whether the depth in more than one system, is already a boundary-crossing capability. Also, the presence of communications and systems in two different layers and dimensions is somewhat confusing. Furthermore, the definition of “understanding and communication” in the lower horizontal layer gives an impression the skill level in these issues is (naturally) inferior to the areas of deep knowledge. However, the same qualitative assessment requirement for the skill level is not given to the upper horizontal layer of boundary-crossing skills.

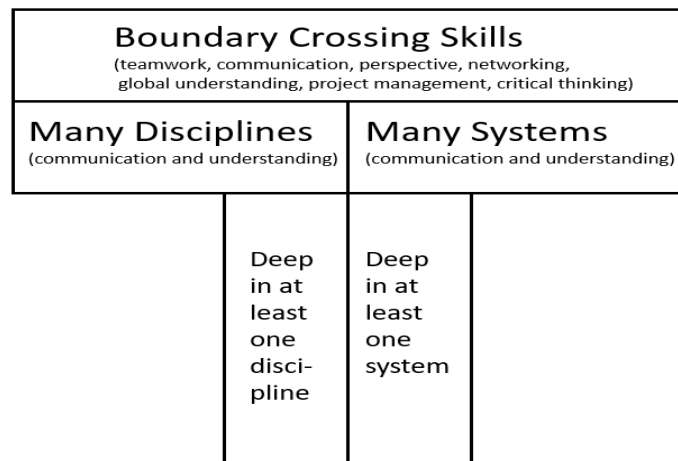


Figure 5: Extended T-shaped capability model (adapted from Heikkinen, 2018)

3. Findings – proposal for a new T²- capability model

The models proposed by earlier research are built on a solid foundation of the fundamental shifts taking place in the world of work. The dilemma of the T-shaped models – the dominating depiction of a capacity profile of the future expert is that they are either so generic (like the basic idea of T-shape: Combining knowledge depth to width) or to a certain extent overloaded with layers and capability areas. In both cases, they fall short in usability for HRM and KM practitioners both in organizations and educational institutions developing the young talents towards future skills and competencies and finally, employability and career success.

Based on the analytical assessment of the prior-art models and our discussions with and observations of modern organizations, we propose a new model called T²- capability profile (the basic form of it shown in Figure 7), that is built on the following pre-assumptions:

- despite the expressed needs for interchangeability of information and flexibility of the workforce, deep expertise skills possessed by an individual are still a valid demand for competitiveness

- the number of skills and competencies with deep expert-level knowledge cannot be many since the time and other resources of an individual and organization to prepare for multiple areas of expertise are constrained
- the interdependent nature of business functions in a modern organization set demands for the experts to understand the context-dependent (on the industry- and company-level) processes beyond one's expertise area
- in addition to deep expertise and context-dependent capabilities, there is a layer of context-independent competencies, that are needed across domains and industries

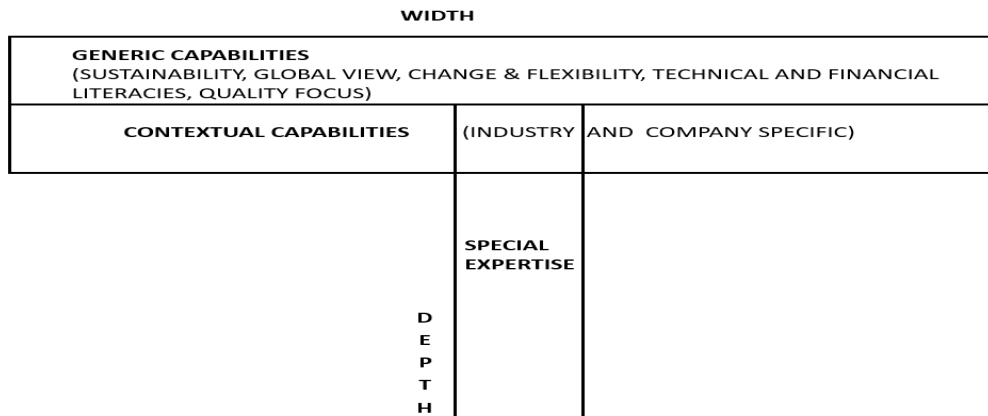


Figure 7: The base model of T²- capability profile

The base model is lacking detail in 1) what are the processes included in the contextual capability area, 2) what kind of practical instantiations the model would have for the true unit of analysis in capability development research and practice – an individual professional employee, and 3) what are the different and relative to each other skill levels needed in different layers,

To specify the model further and implement it to the level of an individual employee/job, two examples were created (Figures 8 and 9) for the professions of a software engineer and a digital marketing lead, both in an industrial company.

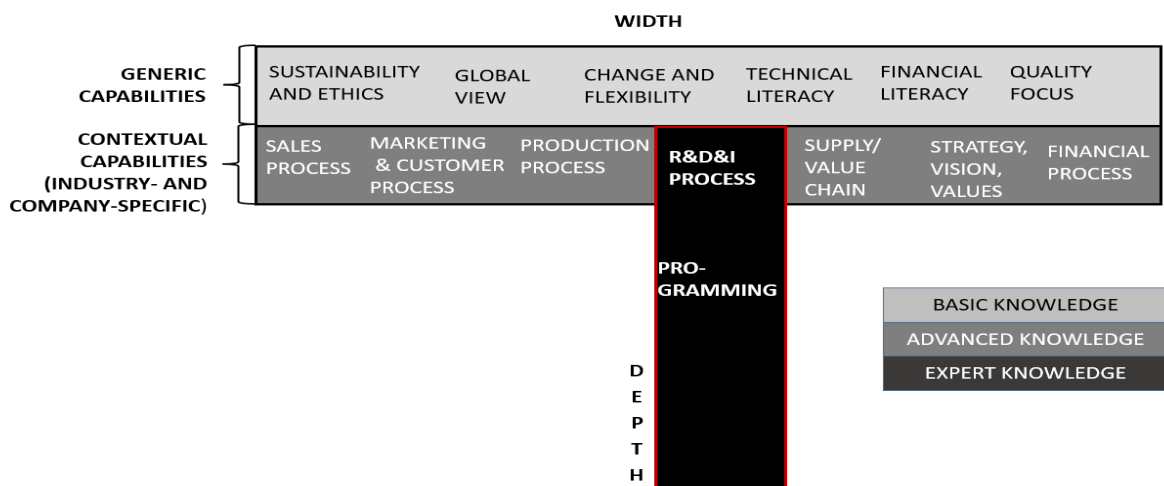


Figure 8: An instantiation of the T²-capability profile for a software engineer in an industrial company

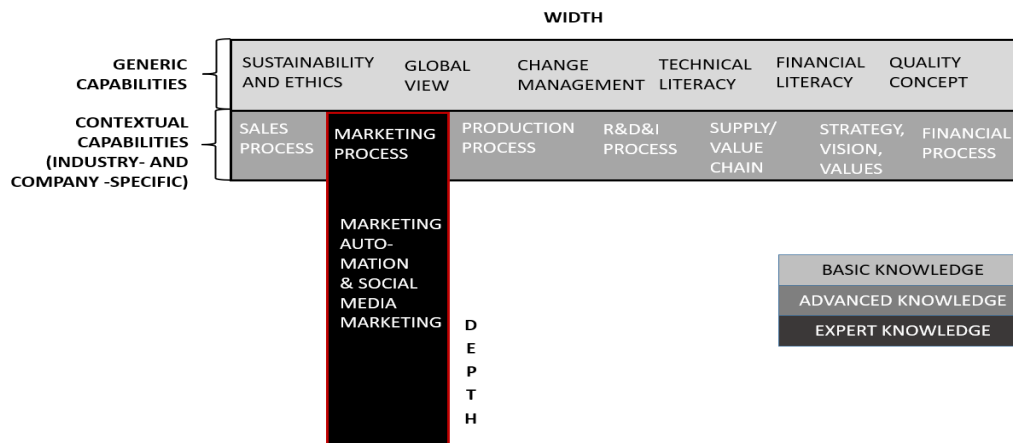


Figure 9: Instantiation of T²-capability profile for a digital marketing lead in an industrial company

The examples shown above can naturally be adjusted based on the size and type of the organization. For example, in small and medium-sized companies or start-ups the distances between functions and resulting contextual capabilities are likely to be shorter as well as resources to address all different capabilities to different experts are likely to be limited. This sets the demand level for the contextual combinatory capabilities even higher than they would be in an established large enterprise. So, even within the categories of advanced and basic knowledge, there are variations.

4. Conclusions

The authors have elaborated on a construct under development in the research and practitioner community for over a decade. During this relatively short period there have occurred changes in the ways companies are organized and individuals working in them educated in both educational institutions' programs and corporate-level training events and programs. Thus, a final all-conclusive model is out of reach, as the accelerating pace of change has prevailed in organizations already since the 1990s (Fine, 1999) and is likely to continue. Thus, further work in the development of the model and its implementations is in need.

The role of educational institutions in the build-up of T² capabilities is an interesting one. Especially in higher education institutions (HEIs) the boundaries between areas of knowing crosscut the whole operation from dividing the organization into faculties and schools down to the contents of individual courses. The depth of expertise is targeted, expected, and assessed from educators as well as from the students. On the other hand, the coverage of non-context-specific basic skills is also sought in the curricula design in HEIs. This leaves the middle layer in T²-model to the responsibility of the organizations to work on, either as specific training or on-the-job learning. The instruments of such learning are often either slow to yield the required wider capabilities (e.g., job rotation) or one-off events with limited continuity (project task forces, company hackathons).

Based on our study we encourage the knowledge area experts in HEIs and their counterparts in the world of work to jointly map the relevant content for their specific T²- model and a process to act on the capability needs identified. The continuation of this paper will be the assessment and development of sector-specific T²-profiles, starting from the fields of business and engineering. The process is likely to require recognition of soft skills more widely than in this work and most of the other studies referred. That way the move towards V-shaped capabilities introduced e.g., by Oetrher (2022) would produce "humanitarian technologists" to the resource pool of the organizations.

In addition, the process of the capability profile definition by industries or companies offers a topic of research, as the idea of dynamic capabilities, i.e., proactivity and reactivity to changes in the operating environment by the transformation of capabilities (Helfat et al., 2007) are likely to prevail as a core tool for competitive advantage, survival, and success of organizations. The authors, due to their positions in academia where they both educate future professionals and act with (especially SME-) organizations to improve their competitive positioning by upskilling and knowledge pool extensions, are also aiming at pragmatic deployments of the model in curriculum design and lifelong learning programs. To support this target action research approach would be a logical choice, as it would allow the learning-by-doing and continuous improvement mindset. Since cross-sectional studies can't be harnessed to studies on capability growth and alteration, the remaining option of

longitudinal research designs means the next steps of the research process will take time, and reported findings can be expected approximately at the two-year milestone from the start.

Finally, the authors have seen the academic views and model proposed in this paper to resonate with the voices coming from the industry in what comes to the need for new capability profiles. In a recent webinar, a “holistic skill taxonomy” by the HRM consultant and digital HRM system/tool supplier Workday (n.d.) was referred. The model, interestingly, builds on three layers like our model but uses a somewhat different lexicon to describe the skill profile for the future. In Workday’s pyramid-shaped model the bottom is called “core” – skills that every modern employee needs. On top of that, skills that are needed in a “specific part of the business” are of need. Lastly, advanced skills are needed in the frame of a single role. Thus, we see potential in uniting the needs of future workers, institutions educating them, and organizations recruiting and developing them to elaborate on the model proposed.

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