A structured process framework for digital servitization

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+Additional remarks that might be necessary

Extended abstract

Over the past years, there has been a significant increase in studies focused on digital servitization. This can be described as the process by which a business switches from selling product to providing Product Service Systems (PSS) by using digital technologies (Grandinetti *et al.*, 2020; Paiola and Gebauer, 2020; Paiola *et al.*, 2021). Reasons for this increase are manyfold. Digital servitization does not only enable the creation of new or improved services by using digital technologies, it also enables new digital business models to be developed and implemented, knowledge from data to be applied, companies operational performance to be improved and their distinctiveness to be strengthened (Kohtamäki *et al.*, 2019; Paschou *et al.*, 2020). But above all, it positively impacts the enviroment due to re-manufacturing, extending product lifecycles, increasing the efficient use of resources and energy, improving product use and reducing waste of materials (Paiola *et al.*, 2021; Le-Dain *et al.*, 2023).

The shift to a digital servitization business model is a complex process may take years and necessitates major organizational adjustments to networks, capabilities, and operational procedures (Martinez *et al.*, 2010, 2019; Baines *et al.*, 2020). For SMEs this transition is typically even more challenging, due to their specific characteristics including limited internal and external capabilities (Liu and Yang, 2019), limited resources (Paiola *et al.*, 2022), small market size and economies of scale (Radas and Božić, 2009; Pati *et al.*, 2018; Miller *et al.*, 2021). As a result, SMEs often experience significant challenges during the transition, including embedding a service mindset for integration in an organizational culture, delivering integrated offerings, augmenting internal processes and acquiring capabilities, and managing complex relationships with suppliers (Baines *et al.*, 2009; Martinez *et al.*, 2010). As a consequence, SMEs regularly give up early or even reduce their

service offerings (Kowalkowski *et al.*, 2017; Valtakoski, 2017). One of the primarily reasons is that SMEs often don't know *how* to manage the transition towards digital servitization in an meaningful way (Baines *et al.*, 2020).

In contrast to generic product and business model development, servitization requires an *integrated* development process of the product, the service and the business model (Zhang and Banerji, 2017). As such, researchers have been emphasizing for a long time that existing processes and tools are not adequate enough and need to be reconstructed in order to fit for servitization (Baines *et al.*, 2009; Alghisi and Saccani, 2015; Kowalkowski *et al.*, 2015). Prescriptive processes and tools for servitization are still underdeveloped (Zhang and Banerji, 2017; Baines *et al.*, 2020)). Those that do exist, such as service blueprinting, fail to integrate technology plans within the business planning processes (Berkley, 1996; Cho and Lee, 2011). As such, despite the developments and increasing influence of digitalization on servitization, the existing tools for digital servitization can be experienced as impractical and traditional for the task at hand (Pirola *et al.*, 2020; Favoretto *et al.*, 2022). As such, despite the studying of (digital) servitization from many perspectives since the late 1990s, the discipline still lacks a coherent framework that assists practitioners to manage the (digital) servitization process in a structured way (Khanra *et al.*, 2021).

As a contribution to this gap, we present in this paper an Alpha version of our Structured Process Framework for Digital Servitization. This framework is co-developed with practical experts during 2 years of action research involving 8 SMEs in the manufacturing industry. Our framework is based on process models on servitization and business model innovation (Frankenberger *et al.*, 2013; Baines *et al.*, 2020) and extended with insights derived from our own research.

The Digital Servitization Wheel

The basic structure of the framework is a process that consists of six phases: developing a vision, drafting an ambition, determining a promise (business proposal), developing a business model, directing experiments and exploiting the business model (Figure 1). The phases are ideally executed in sequence, but in our experience the Digital servitization process rarely start with the development of a company vision and frequently skip subsequent phases in order to hurry to exploitation. We found however that passing over phases often results in barriers to change which can only be overcome by backtracking and completion of skipped phases. For this reason the framework urges the user to follow the specified sequence.
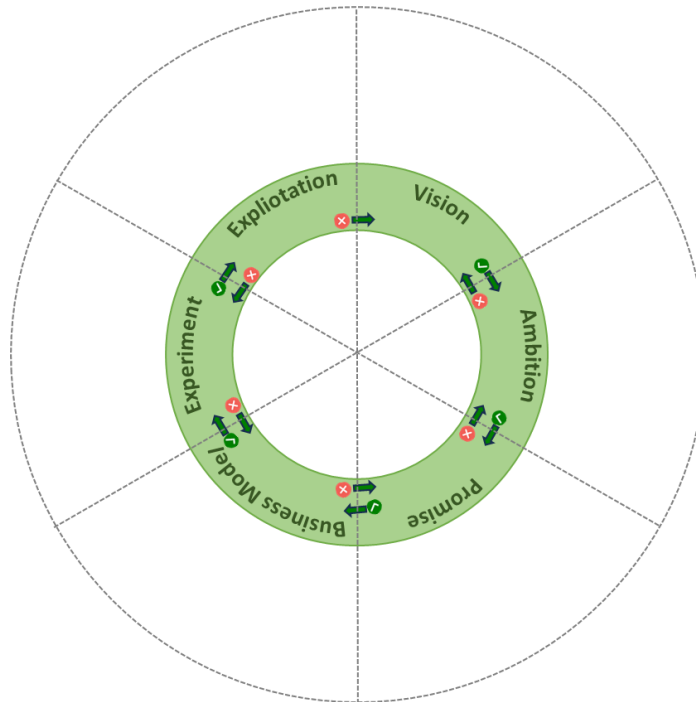
FIGURE 1 - BMI PHASES

In each phase of the process a specific group of stakeholders plays a predominant role. In vision development this is the company management, customers play a central role in the determination of a business proposal (Figure 2).
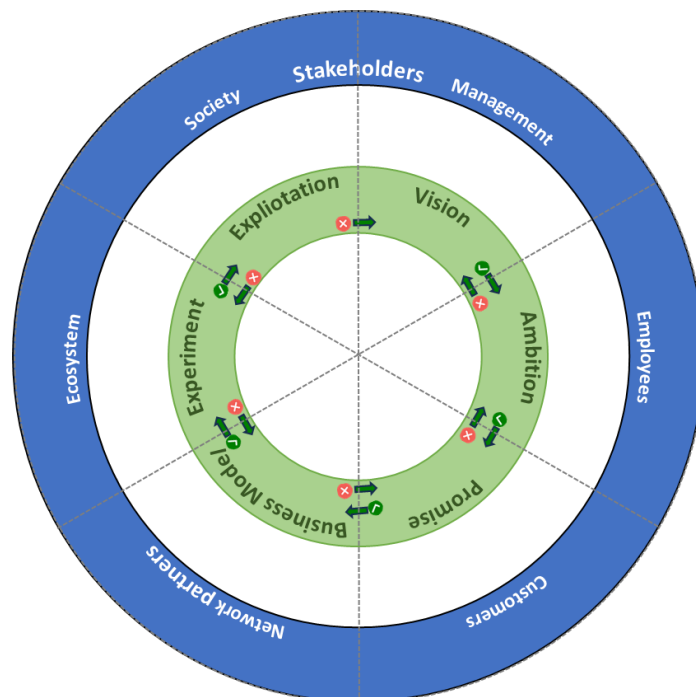

FIGURE 2 - BMI STAKEHOLDERS

The development of a new business model is usually boosted by trends/changes in the external company environment (Amit and Zott, 2020). These drivers for change can emerge in different forms, depending on which stakeholder group translates those drivers to a relevant and urgent need to change (Figure 3). As a result, the initiation of the BMI-process can start in different rings and radials of the Wheel. For example: the emergence of AI-technology can be a change-driver for employees, customers or network partners. When customers introduce AI as a compelling demand (market pull) the company will start the BMI proces from that angle and create a value propostion (promise) intended to serve the customer need. In case the starting point of the process is not the development of a vision, one should always backtrack to the vision development phase and proceed from that point.
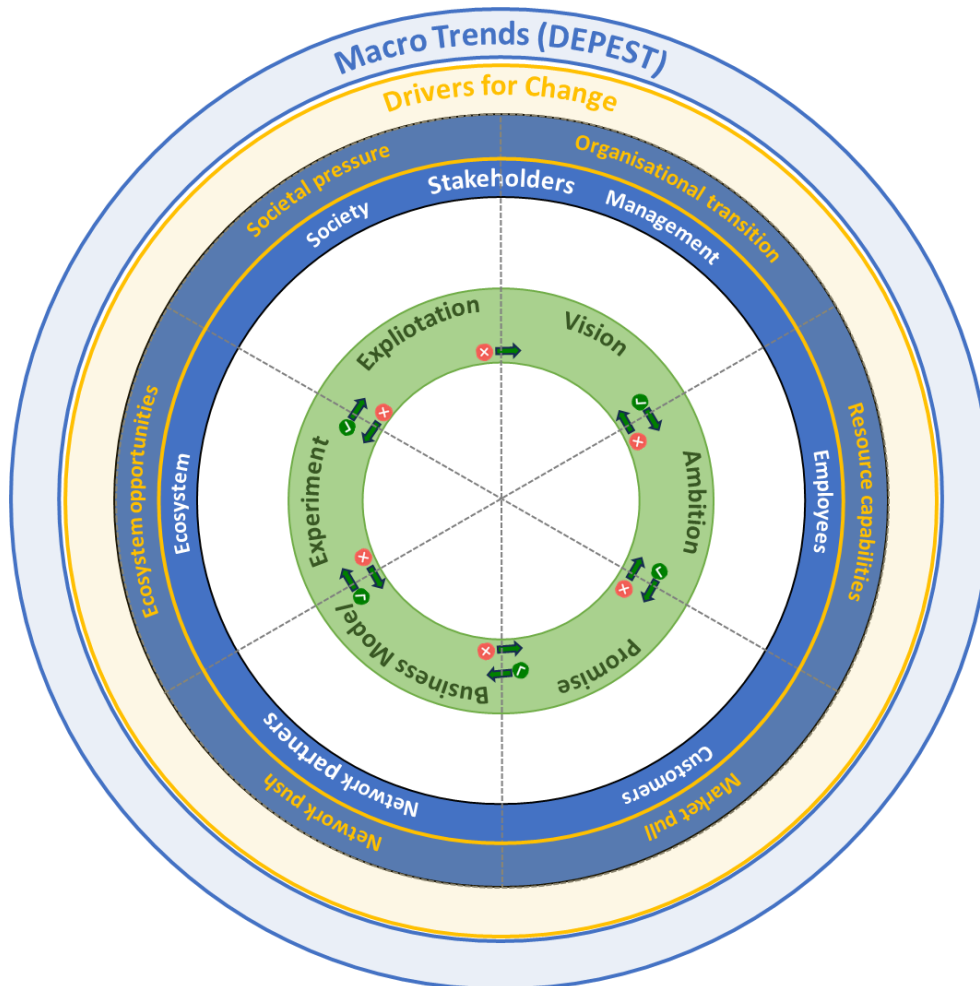

FIGURE 3 - DRIVERS FOR CHANGE

To complete a phase, two categories of conditions for change need to be met. First, the company needs to master capabilities needed to perform the tasks associated with this phase. Failure to master these capabilities will result in an inability to reach the goal of that phase (Teece, 2007). Secondly it is imperative that the execution of capabilities is supported by organisational resources, in particular availability of time, funding, managerial mandate and expert staff (O'Connor *et al.*, 2008). When these conditions are sufficiently met, the company should be able to deliver an appropriate result for the phase (Figure 4).
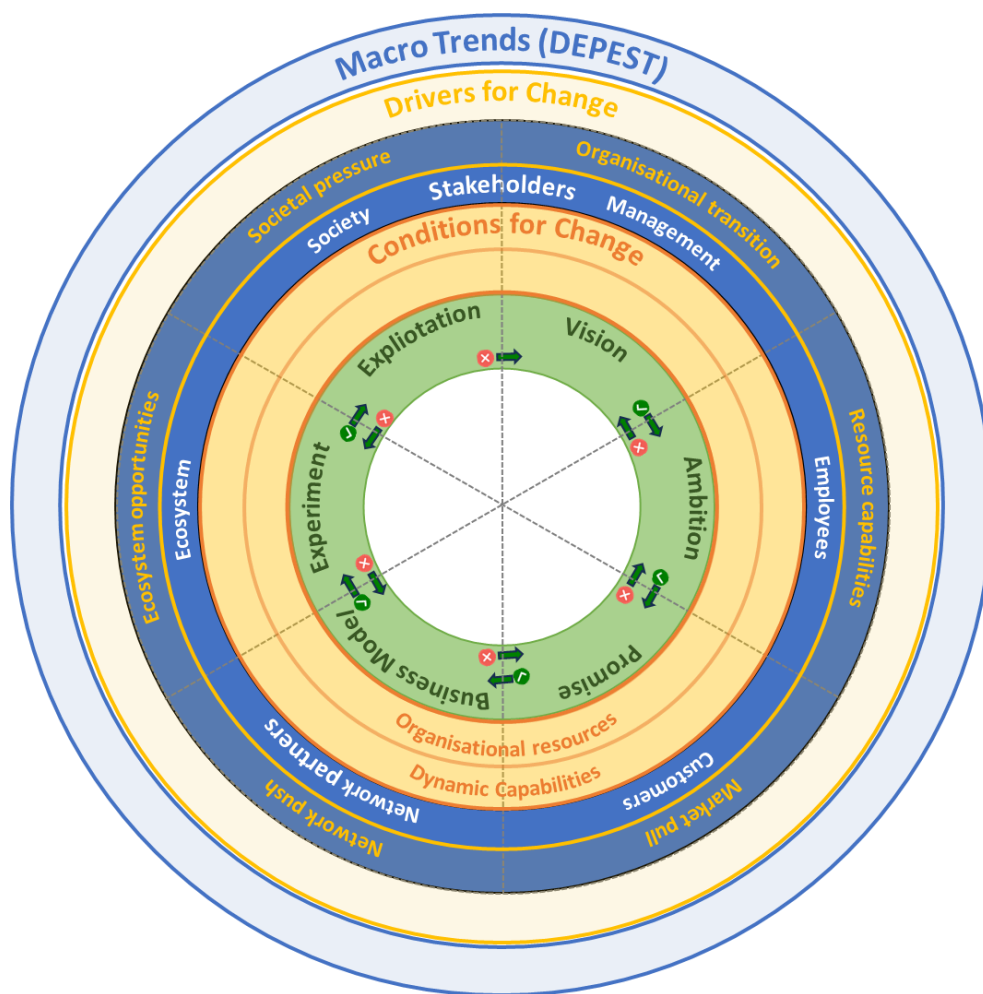

FIGURE 4 - CONDITIONS FOR CHANGE

Succesfull completion of the phase depends upon yet another factor: the ability to avoid barriers for change. This consists two specific catagories: the ability to assure the willingness of the focal stakeholder group and the ability to assure that the focal stakeholder group possesses the resources, skills and fundig to fullfill their role in the process (figure 5). In our experience the success of a digital servitization process is highly dependent on stakeholder commitment. However when network partners are committed to fulfill their role in a new business model, but lack the resources, skills or corporate mandate to actually participate, the BMI-proces is destined to fail. In other words: when stakeholders lack the capacity to fullfill their respective roles in the digital servitization process, this will result in a serious barrier to change (Ten Have Change Management, 2013). Having dealt with barriers (all lights on green) in one phase it is time to move to the next phase in the digital servitization process.
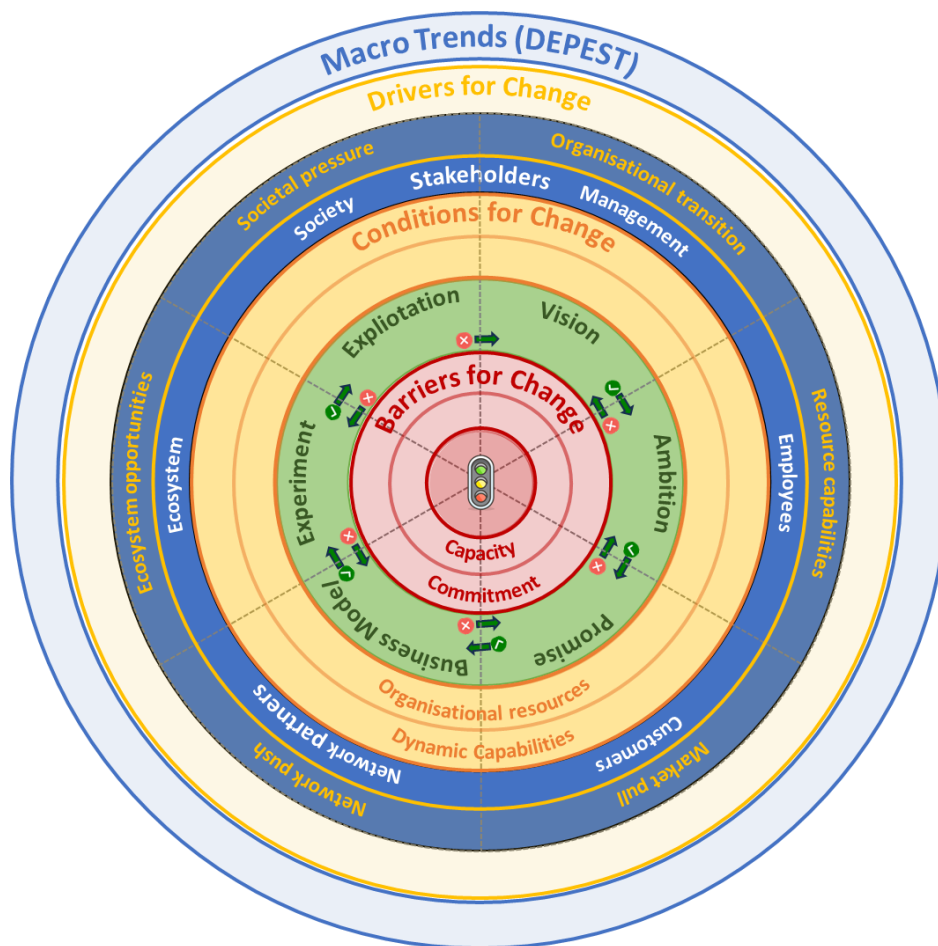

FIGURE 5 - BARRIERS FOR CHANGE

Keywords

Digital servitization, Business model innovation, Tool development, Process Framework, SME

References

Alghisi, A. and Saccani, N. (2015) 'Internal and external alignment in the servitization journey–overcoming the challenges', *Production Planning & Control*, 26(14–15), pp. 1219–1232.

Amit, R. and Zott, C. (2020) *Business Model Innovation Strategy: Transformational Concepts and Tools for Entrepreneurial Leaders*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Baines, T. *et al.* (2020) 'Framing the servitization transformation process: A model to understand and facilitate the servitization journey', *International Journal of Production Economics*, 221, p. 107463.

Baines, T.S. *et al.* (2009) 'The servitization of manufacturing: A review of literature and reflection on future challenges', *Journal of manufacturing technology management* [Preprint].

Berkley, B.J. (1996) 'Analyzing service blueprints using phase distributions', *European journal of operational research*, 88(1), pp. 152–164.

Cho, C. and Lee, S. (2011) 'Taxonomy of technology roadmaps in service areas', in *First International Technology Management Conference*. IEEE, pp. 462–467.

Favoretto, C. *et al.* (2022) 'From servitization to digital servitization: How digitalization transforms companies' transition towards services', *Industrial Marketing Management*, 102, pp. 104–121.

Frankenberger, K. *et al.* (2013) 'The 4I-framework of business model innovation: A structured view on process phases and challenges', *International journal of product development*, 18(3/4), pp. 249–273.

Grandinetti, R. *et al.* (2020) 'Fourth industrial revolution, digital servitization and relationship quality in Italian B2B manufacturing firms. An exploratory study', *The TQM Journal*, 32(4), pp. 647–671.

Ten Have Change Management (2013) 'De verander- kracht van nederland'.

Khanra, S. *et al.* (2021) 'Servitization research: A review and bibliometric analysis of past achievements and future promises', *Journal of Business Research*, 131, pp. 151–166.

Kohtamäki, M. *et al.* (2019) 'Digital servitization business models in ecosystems: A theory of the firm', *Journal of Business Research*, 104(May), pp. 380–392. Available at: https://doi.org/10.1016/j.jbusres.2019.06.027.

Kowalkowski, C. *et al.* (2015) 'What service transition? Rethinking established assumptions about manufacturers' service-led growth strategies', *Industrial marketing management*, 45, pp. 59–69.

Kowalkowski, C. *et al.* (2017) 'Servitization and deservitization: Overview, concepts, and definitions', *Industrial Marketing Management*, 60, pp. 4–10.

Le-Dain, M.-A. *et al.* (2023) 'Barriers and opportunities of digital servitization for SMEs: the effect of smart Product-Service System business models', *Service Business*, pp. 1–35.

Liu, H. and Yang, H. (2019) 'Managing network resource and organizational capabilities to create competitive advantage for SMEs in a volatile environment', *Journal of Small Business Management*, 57, pp. 155–171.

Martinez, V. *et al.* (2010) 'Challenges in transforming manufacturing organisations into product-service providers', *Journal of manufacturing technology management* [Preprint].

Martinez, V. *et al.* (2019) 'Exploring the journey to services', in *Handbook of Service Science, Volume II*. Springer, pp. 377–407.

Miller, K. *et al.* (2021) 'Business models big and small: Review of conceptualisations and constructs and future directions for SME business model research', *Journal of Business Research*. Elsevier, pp. 619–626.

O'Connor, G.C. *et al.* (2008) *Grabbing Lightning: Building a Capability for Breakthrough Innovation*. John Wiley & Sons.

Paiola, M. *et al.* (2021) 'Digital servitization and sustainability through networking: Some evidences from IoT-based business models', *Journal of Business Research*, 132, pp. 507–516.

Paiola, M. *et al.* (2022) 'Paths toward advanced service-oriented business models: a configurational analysis of small-and medium-sized incumbent manufacturers', *Technological Forecasting and Social Change*, 182, p. 121774.

Paiola, M. and Gebauer, H. (2020) 'Internet of things technologies, digital servitization and business model innovation in BtoB manufacturing firms', *Industrial Marketing Management*, 89, pp. 245–264.

Paschou, T. *et al.* (2020) 'Digital servitization in manufacturing: A systematic literature review and research agenda', *Industrial Marketing Management*, 89, pp. 278–292.

Pati, R.K. *et al.* (2018) 'Business model design–performance relationship under external and internal contingencies: Evidence from SMEs in an emerging economy', *Long Range Planning*, 51(5), pp. 750–769.

Pirola, F. *et al.* (2020) 'Digital technologies in product-service systems: a literature review and a research agenda', *Computers in Industry*, 123, p. 103301.

Radas, S. and Božić, L. (2009) 'The antecedents of SME innovativeness in an emerging transition economy', *Technovation*, 29(6–7), pp. 438–450.

Teece, D.J. (2007) 'Explicating dynamic capabilities - the natre and microfoundations of (sustainable) enterprise performance', *Strategic Management Journal*, 28, pp. 1319–1350. Available at: https://doi.org/10.1002/smj.

Valtakoski, A. (2017) 'Explaining servitization failure and deservitization: A knowledge-based perspective', *Industrial Marketing Management*, 60, pp. 138–150.

Zhang, W. and Banerji, S. (2017) 'Challenges of servitization: A systematic literature review', *Industrial Marketing Management*, 65, pp. 217–227.