

# Integrated Digital Transformation System Framework

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Digital transformation is the profound transformation of business and organizational activities, processes, competencies, and models to fully leverage the changes and opportunities of a mix of digital technologies and their accelerating impact across societies in a strategic and prioritized way, with present and future shifts in mind. For instance, an attempt was made to evaluate the present and future research trends in the digitalization of business model innovation.

agile

change management

design thinking

design science research

digital transformation

digital

digital technologies

digital strategy

integrated framework

system development life cycle

## 1. Introduction

In recent years, Digital Transformation has attracted increasing attention from researchers and practitioners <sup>[1][2][3][4][5][6]</sup>. The transformation affects every aspect of a company's business in its entirety and leads to changes in the way of conducting business <sup>[2][7][8]</sup>, and even in its business process models <sup>[6]</sup>. Emerging technologies, such as artificial intelligence, blockchain, robotic process automation (RPA), IoT, big data, cloud, and mobile, are disrupting the marketplace <sup>[9]</sup>. Enterprises are facing a substantial threat from startups, modern IT solutions, and other enterprises who are integrating these technologies into their enterprises in agile processes. Therefore, it is essential to understand the technological options as well as the impact of adopting these technologies in enterprises. Digital transformation is a highly complex, enterprise-wide endeavor <sup>[3]</sup>. Bonnet et al. <sup>[4]</sup> reported that nearly 90% of executives in the U.S. and U.K. are expecting information and digital technologies to make an increasing strategic impact on their overall business in the coming decade. It has become a high priority on the c-level executives' strategic agendas <sup>[4]</sup>. In the current COVID-19 scenario, digitalization is having an impact on the wellbeing of customers <sup>[10]</sup>. Digital transformation received a fast push due to the pandemic. For instance, the teleworking system in Romania was implemented during the pandemic <sup>[11]</sup>. Subsequently, adopting and integrating new digital technologies into the enterprise infrastructure is one of the biggest challenges that companies are currently facing <sup>[12]</sup>.

Digital transformation is the profound transformation of business and organizational activities, processes, competencies, and models to fully leverage the changes and opportunities of a mix of digital technologies and their

accelerating impact across societies in a strategic and prioritized way, with present and future shifts in mind. For instance, an attempt was made to evaluate the present and future research trends in the digitalization of business model innovation [13]. It has an influence on the organization's structure from the interaction of the organization with stakeholders to internal processes and each product of the organization [14]. The digital transformation of the innovation ecosystem is conducted when there are modifications made at two levels of the organization. One is at innovation activities, and the other is at innovation organization [15]. New firms are being set up to bring business models relating to digital innovation and digital transformation to the market and add value [16]. They show high intensity towards optimization, customer interaction, and the utilization of digital technologies. Digital competencies and skills are essential for digital transformation [17], and such skills make a major contribution to digital transformation [18].

Digital transformations depend on several factors, including the nature of the industry in which the company competes, the age and size of the company, the number of legacy tools and processes that must be transformed, and the motivation of company owners and leaders to impact change in their businesses. Several challenges have been identified that are associated with digital transformations, including initiation challenges ('Blind' Challenge, Short-Term View Challenge, omnichannel adaptation, and failing or poor analytics), execution challenges (Technology Integration Challenge, the changing customer experience, and employee pushback), and governance challenges (Aligning Business and IT Challenge, Culture Challenge, lagging, and legacy business models) [5][8][12][19][20].

Current digital transformation approaches are not well-defined or well-established, and the potential has not yet been realized [21][22][23]. To take advantage of digital transformations and unlock new business opportunities and remain competitive, enterprises must create a practical roadmap based on a series of milestones. Such development processes should be transdisciplinary using a balanced mix of traditional system development approaches (such as Agile SDLC and Waterfall SDLC) and creatively designed approaches (such as design thinking) [21][24]. It has been realized that technology alone cannot result in organizational transformation. Strategic use, involvement, and engagement of stakeholders are essential to convert the potential of technology into practice. Therefore, organizations need to adopt long-term, holistic, systems-thinking approaches, including Design Thinking, SDLC, change management, and quality management frameworks, to design and deliver digital innovation, [25]. The effective use of best practices can help to avoid re-inventing wheels, optimize the use of scarce IT resources, and reduce the occurrence of major IT risks, such as project failures, wasted investments, intellectual property theft, data loss and data breaches, system disruptions, failure by service providers to understand and meet customer requirements, and compliance penalties [26].

## 2. Digital Transformation

Digital Transformation is a current, evolving field and it challenges almost all business sectors. It is severely under-researched and more research in the area should be conducted as it is expected to impact all business sectors. Many researchers and practitioners have defined Digital Transformation in different ways. Even businesses define it differently in the same industry. It has a different meaning in various businesses, and even companies in the

same business having a unified definition is difficult to achieve [27]. As such, currently, no commonly accepted definition for the term DT exists. For example, i-scoop [28] defines digital transformation as “the profound transformation of business and organizational activities, processes, competencies, and models to fully leverage the changes and opportunities of a mix of digital technologies and their accelerating impact across society in a strategic and prioritized way, with present and future shifts in mind”. Congdon [29] defines digital transformation as “the integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers”. Westerman et al. [27] defines DT as “the use of technology to radically improve the performance or reach of enterprises—is becoming a hot topic for companies across the globe. Executives in all industries are using digital advances such as analytics, mobility, social media, and smart embedded devices—and improving their use of traditional technologies such as ERP—to change customer relationships, internal processes, and value propositions”. Mazzone [30] defines DT as “the deliberate and ongoing digital evolution of a company, business model, idea process, or methodology, both strategically and tactically”.

As such, digital transformation is about integrating digital technology into all of the functional areas of the enterprise (finance, marketing, production, human resources management, etc.). This requires a fundamental change to how enterprises run their business and how they deliver value to their customers/users. Moreover, digital transformation requires acceptance by the enterprise’s employees since it frequently causes a major change in the operations and responsibilities of employees [31]. This brings up the importance of planning and implementing digital transformation in a bottom-up manner. Bottom-up innovation, used by organizations, has proven beneficial [32][33].

In recent years, enterprises have conducted several initiatives to explore new digital technologies and exploit their benefits. Enterprises need to establish management practices to govern these complex transformations [34]. This requires the formulation of a digital transformation strategy that serves as a central concept to integrate the entire coordination, prioritization, and implementation of digital transformations within the enterprise [34]. The exploitation and integration of digital technologies often affect large parts of enterprises and even go beyond their borders by impacting products, services, business processes, sales channels, and supply chains. The potential benefits of digitization are manifold and include increases in sales or productivity.

Researchers drew their inspiration for the proposed framework from the keywords associated with the definitions of digital transformation, such as “digital disruption, fundamentally changing, faster deployment, digital transformation strategy, integration, stages, and ongoing journey”.

## **3. Theoretical Foundation**

### **3.1. Business Needs Space**

Accurately identifying the business needs is key to ensuring not only that the appropriate digital technology solution is chosen but that it can potentially deliver significant business value. The goal of digitization should not be primarily to increase business efficiency and effectiveness, but also to establish new business models and change the way of thinking for the benefit of users and/or customers. As such, a stage-by-stage IS/IT/business plan is

essential to build a bridge between business and IS/IT, and to align IS/IT strategies with business strategies. The user requirements, user requests, and the existing systems and data need to be fully analyzed for smooth integration of new digital technologies.

Understanding the customer requests and requirements and identifying the business needs early in the process gives a clear understanding of why the change is being initiated. Any digitalized solution option that does not satisfy the business needs and the business goals should be eliminated from consideration because it serves no purpose.

Digital transformation embraces the realignment of technology and new business models to engage digital customers more effectively at every touchpoint in the customer experience lifecycle. Therefore, successful digital transformation begins with an understanding of consumer behavior, preference requirements, and choices. It then leads to major consumer-centric changes within the organization that address these requirements. Such a consumer-centric process has significant consequences for enterprises. Enterprises will need to continue managing existing products and services while developing strategies to manage the shift in the business model.

### 3.2. Problem Space: Design Thinking

The problem space is the current state of the enterprise, where the users/customers and their requirements live. The current state must be understood so that the enterprise can leverage its resources' creativity and innovation to define a new state and a map between the two.

Disruptive technologies, changing customer requirements, a rapidly changing world and markets, and shifting economic and political landscapes have led to complex challenges requiring innovative solutions. To discover these new opportunities and reshape toward digital transformation, many enterprises have turned away from traditional analytical thinking toward design thinking, a method that does not immediately consider a solution upfront, but examines both present and future conditions and parameters of the problem, ultimately exploring alternative solutions.

In recent years, Design Thinking has attracted increasing attention from researchers [\[35\]\[36\]\[37\]](#), companies [\[38\]](#), and the media [\[39\]](#) as a novel problem-solving structured process. Design Thinking focuses on developing innovative products, processes, systems, and solutions by applying design principles to the way people work [\[38\]\[40\]\[41\]](#). Potential solutions are identified through a creative and iterative process, which helps users better manage complexity. In this entry, Stanford's Design Thinking Process [\[40\]\[41\]](#) will be used. It consists of the following five stages: Empathize (Connect with and understand the users); Define (Identify (reframe?) the core problems); Ideate (Brainstorm lots of ideas); Prototype (Narrow down the ideas and build prototypes); and Test (Use the results to support decision-making).

In the last few years, Design Thinking has gained increasing attention from researchers and practitioners [\[36\]\[37\]\[38\]\[39\]\[42\]\[43\]\[44\]](#) as a structured process to solve ambiguous problems [\[45\]](#). Design Thinking focuses on developing innovative products, processes, systems, services, and solutions by applying design principles to the way people



work [38]. Design thinking is a user-centric structured process, given its propensity to connect both enterprises and users in the local context [46]. Design thinking primarily adds value to the problem space.

It is suggested that, typically, the larger a company, the less likely they are to consider design thinking methods as an approach to solving problems due to pressure from stakeholders who value reliability over validity. More recently, however, Kolko [38] identified that a shift is occurring towards utilizing design thinking within larger organizations. This shift is focused on applying the principles of design to how people work to create a design-centric culture within an organization, which removes design from historical associations with aesthetics and craft, and instead elevates the role of design towards imparting a set of principles to all in order to help bring ideas to life [38].

In the early stages of development, the Design Thinking approaches were circular approaches, whereas later ones were sequential [47]. More recently, design thinking has been put forward as a step-by-step method that anyone can follow and has become widely popular and used. The rapid acceptance of design thinking as a technique has, however, become a cause for concern for researchers and practitioners. To prevent design thinking from being applied superficially, advocates argue that design thinking should be seen as a series of overlapping domains, as opposed to a sequence of orderly phases [39]. Kolko [38] indicated that design thinking “works extremely well for imagining the future. But it’s not the right set of tools for optimizing, streamlining, or otherwise operating a stable business”. He added that design thinking “helps people and organizations cut through complexity. It’s great for innovation”.

### 3.3. Solution Space

The solution space is where products, services, processes, maintenance, and experiences fulfilling users/customers live. The solution can only be as good as the problem if discovered and understood. The solution is determined by producing new ideas, models, and prototypes that potentially solve the problem.

The challenge for managers lies in deciding when to move from the problem space to the solution space. As a rule, a certain amount of validation about the problem must be considered before commencing with SDLC. Moving from the problem space to the solution space should carefully consider the strategic fit and the portfolio fit. The project’s fit with the portfolio’s markets and technologies is tied to the overall business strategy [48]. Moving from the problem space to the solution space should be considered a Go/No-Go decision.

Several methods and techniques are used for the system-development life-cycle (SDLC), such as the waterfall and agile approaches. The goal of the SDLC is to bring the problem space to the solution space. The SDLC lives entirely in the solution space, along with other solution structured processes such as agile.

Agile is an approach and scrum of building a product or service based on a process of continuous iteration. Iteration allows cycling within a phase and between phases. Therefore, there is always a way to move back and forth between the problem and solution space [43]. With each iteration, the design thinker’s knowledge will increase in both the problem and the solution space, until an acceptable state of the solution has been found [47].

### 3.4. Operational Space

The operational space is where things are conducted within an organization. In the operational space, organizations continuously monitor the consumer/user requirements and competitor landscape, confirming strategic direction and tracking the progress against the market performance to ensure continuous improvements. This continuous monitoring process should be used as an input (feedback) to the business needs space.

Researchers draw on international best practice standards, such as the Information Technology Infrastructure Library (ITIL) (Axelos (2019-02-18). "ITIL® Foundation, ITIL 4 edition". Axelos), to pragmatically tailor approaches providing "good practice, culture, scale, and a right-fit/optimal" result better suited to the proposed system framework. This is more appropriate, achievable, and affordable.

ITIL is a set of detailed practices for IT service management (ITSM) that focuses on aligning IT services with the needs of the business. It helps to drive the organization in an instrumental, visionary, and unified direction. ITIL v4 is grouped into five major components: service value chain, guiding principles, practices, governance, and constant growth [49]. ITIL 4 provides "the guidance organizations need to address new service management challenges and utilize the potential of modern technology in an era of cloud, Agile, DevOps and transformation" [50].

There are many operational challenges across industries that the c-suites face on a daily basis, such as Optimizing Service Delivery, Rising Operational Costs, Shortage of the Papers' Forms, Communication Barriers with On-Field Professionals, Difficulty in Tracking and Third-Party Billing, Inefficiency in Meeting Customers' Demand, Failing to Capture Accurate Information from the Field, Unprepared Field Personnel, the Business Shows No Signs of Improvement, and Dealing with Unsatisfied Customers [51]. These challenges and many others need to be monitored and controlled by business leaders to align business services and IT services with business needs. This will help in linking the five domains of the proposed system framework.

### 3.5. Change Management

The business environment in today's competitive climate is very complex and needs a deep study. As such, change management has been widely investigated. Change management is defined by Moran and Brightman [52] as "the process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing needs of the marketplace, customers and employees".

Change management must be an essential piece of the general improvement strategy of any organization. Most organizations perform change tasks just toward the end of the improvement initiative. This is an incapable strategy, since it does not give adequate opportunity to individuals to adapt to evolving conditions. Change management tasks ought to start related to the beginning of an improvement initiative. Further change management arrangements ought to agree with the various periods of the improvement initiative.

Change is a recurring process. To implement change effectively, one needs to be doing several things at the same time. Change management cycles repeatedly go through the following phases (**Figure 1**):

- Assess for change (understand the current situation);
- Prepare for change (determine the desired state);
- Plan for change (develop a change plan);
- Implement the change;
- Sustain the change (track and stabilize the results);



**Figure 1.** Change management cycle. Source (<https://www.innerworkcompany.com/change-management-process/>, accessed on 6 April 2020).

Change management activities must operate at a high level today, since the rate of change is greater than ever <sup>[32]</sup>. Change must be viewed as an integrated, dynamic, and continuous process of organizational improvement. It is not a matter of “adding on” or “adding in” new or missing functionality of capability to the current environment.

In the era of digital transformation, there are several brutal consequences if organizations fail to build the capacity to change quickly and efficiently [53]:

- Organizations cannot keep up with their competitors (where the marketplace has been disrupted by new entrants);
- Recovery is tough (after a decline);
- The engagement of employees becomes far more difficult (engaged workers);
- Employees suffer from change fatigue;
- Business performance deteriorates rapidly (profit and market share).

In the era of digital transformation, there is an urgent need to replace the contingent style of change management with the need to accommodate emergent change, in which there is a need to establish the capability to process change on an as-needed and more 'immediate' basis and not wait until the pressure for change builds up to the point that urgent and significant step changes are required.

Having a holistic and progressive approach to change management helps to define and characterize an organization and contributes positively to the need to present a positive image to the organization's stakeholders, such as users, customers, suppliers, potential employees, and the 'competition'.

## 4. Proposed Integrated Digital Transformation System Framework (IDTSF)

Recent research has been largely concerned with guiding certain aspects of digital transformation; it has not addressed a holistic approach to the development and implementation of an enterprise's digital transformation strategy [54]. Some researchers argue for a digital business strategy that combines IT and business strategy [55].

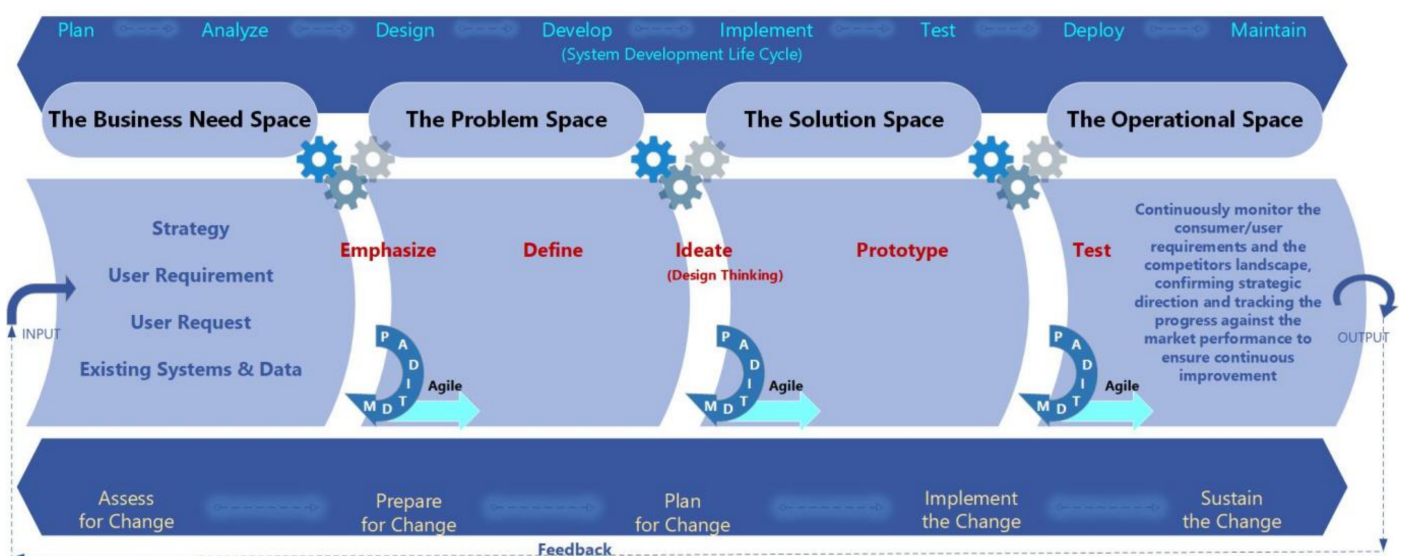
Though a digital business strategy may indicate a company's wide digital business vision, it typically lacks a clearly specified guideline on certain transformational steps and how to approach digital transformation and implement a well-defined digital transformation strategy [3][56].

Capgemini and MIT [5] discuss how to overcome digital transformation issues and challenges to successfully achieve the business goals and objectives. Organizations need to do more to gain value from their IT investments, while also envisioning more radical, new ways of running their business. Capgemini and MIT [5] state that successful digital transformation comes from "reshaping the organization to take advantage of valuable existing strategic assets in new ways". The risk-taking in digital transformation is becoming "a cultural norm as more digitally advanced companies seek new levels of competitive advantage" [57].

To resolve transition issues, development, implementation, deployment, and operational challenges, and to reduce the deployment risk, researchers propose an Integrated Digital Transformation System Framework (IDTSF). The IDTSF integrates the five domains that, in concert, are essential for the formulation and implementation of a digital transformation deployment: business needs space, problem space, solution space, operational space, and change management space.

To address these objectives, the conceptual model was developed using a system theory approach as a modeling technique to map the workflow of an identified structured processes product. System theory is deemed useful for this research, because it allows the development of process models from a multi-level perspective [58], which is necessary for considering all five types of structured processes. Furthermore, system theory usually includes the specification of system or system elements' boundaries to delimit the object of interest from everything else [59]. Such boundaries are required to model inputs and outputs of information flows. Moreover, the proposed model can integrate other data and processes [60], such as process parameters or information flows. Therefore, the visual concept of the new generic reference model will be developed based on system theory by the observation and analysis of the structured processes that help the organization to avoid common failures when deploying digital transformation initiatives.

As shown in **Figure 2**, the joint framework is to have one integrated framework drawing from the five identified domains and the identified structured processes. Integrating the joint framework with the other organizational activities will guarantee the seamlessness of the deployment and the integration of digital technologies into the enterprise. The joint framework allows enterprises to (1) implement a single and integrated method that delivers value to the customers/users; (2) set priorities to accomplish their strategic goals and objectives; (3) keep up with digital trends to stay effective and relevant to the customers/users; (4) seamlessly and rapidly integrate emerging technologies into their infrastructure; and (5) lower costs through the whole value chain.



**Figure 2.** Integrated Digital Transformation System Framework.

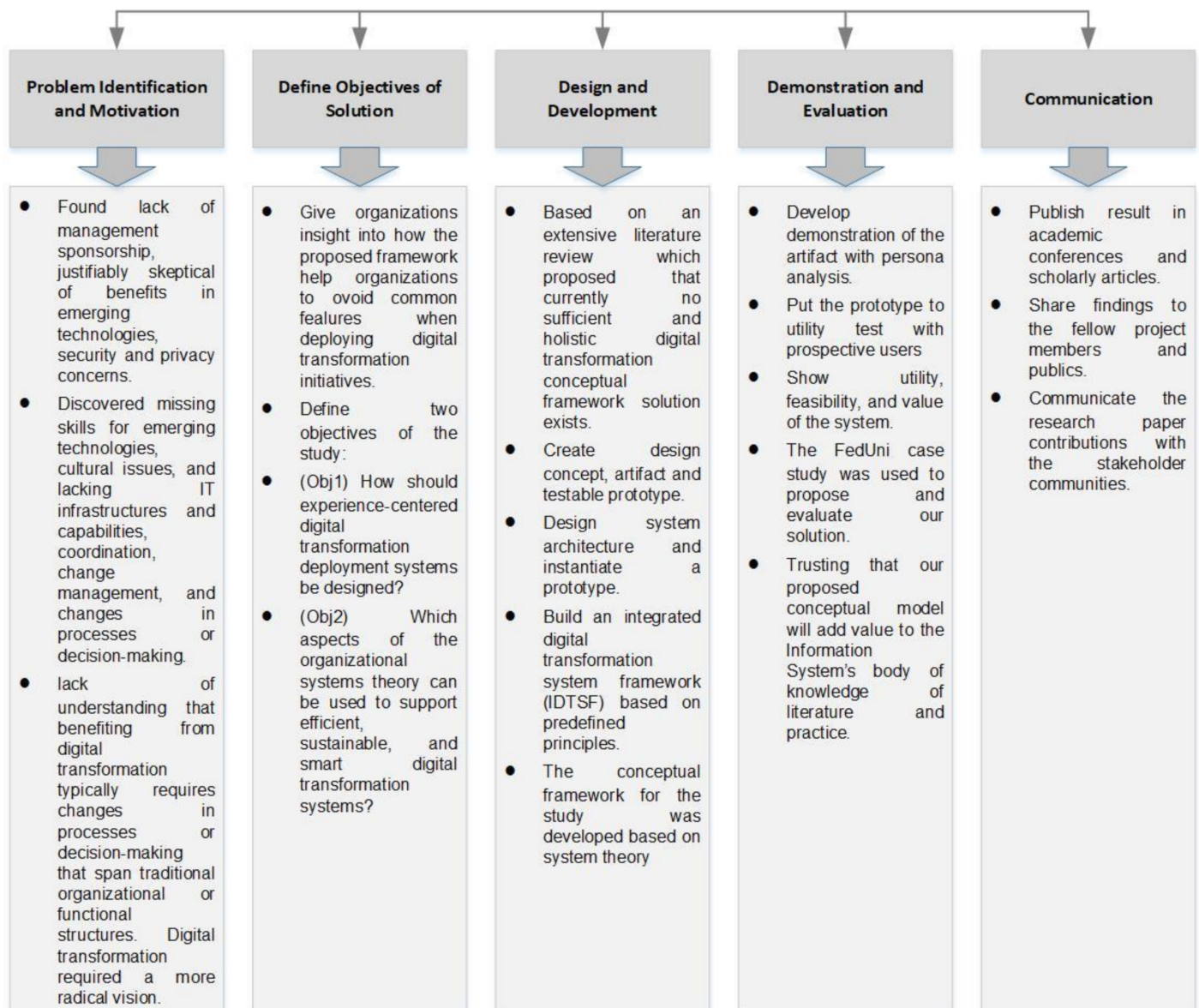


As seen in **Figure 3**, the five domains of the IDTSF fit together like the cog wheels of a perfect machine—moving one cog influences and activates all other cogs.



**Figure 3.** IDTSF components.

In response to the first research question, researchers utilized the DSR and the ISDSR methodologies using the FedUni case study to design the experience-centric IDTSF model. Researchers followed the five steps (problem identification, design, and development, demonstration, evaluation, and communication) of the DSR process to develop the IDTSF model. **Figure 4** below displays an overview of researchers' study results mapped in the design science research structure.



**Figure 4.** Integrated Digital Transformation System Framework by using the Design Science Research Methodology.

## References

1. Nikolova, Z.; Antonova, R. Enterprise Product Management in the Digital World. In Smart Technologies and Innovation for a Sustainable Future; Al-Masri, A., Curran, K., Eds.; Advances in Science; Technology & Innovation (IEREK Interdisciplinary Series for Sustainable Development); Springer: Cham, Switzerland, 2019.
2. Haverkort, B.R.; Zimmermann, A. Smart Industry: How ICT Will Change the Game! IEEE Internet Comput. 2017, 21, 8–10.



3. Hess, T.; Mat, C.; Benlian, A.; Wiesböck, F. Options for Formulating a Digital Transformation Strategy, Digital Transformation is a High-Priority Management Challenge. *MIS Q. Exec.* 2016, 15, 123–139.
4. Bonnet, D.; Ferraris, P.; Westerman, G.; McAfee, A. Talking 'bout a Revolution. *Digit. Transform. Rev.* 2012, 2, 17–33.
5. Westerman, G.; Calm ejane, C.; Bonnet, D.; Ferraris, P.; McAfee, A. Digital Transformation: A Roadmap for Billion-Dollar Organization. MIT Center Digit. Bus. Capgemini Consult. 2011, 21, 8–10.
6. Lucas Jr, H.C.; Goh, J.M. Disruptive technology: How Kodak missed the digital photography revolution. *J. Strateg. Inf. Syst.* 2009, 18, 46–55.
7. Harvard Business Review (HBR“Digital Transformation in the High-Tech Industry:” Briefing Paper Sponsored by SAP ). 2014. Available online: [https://hbr.org/resources/pdfs/comm/sap/18764\\_HBR\\_SAP\\_High\\_Tech\\_Aug\\_14.pdf](https://hbr.org/resources/pdfs/comm/sap/18764_HBR_SAP_High_Tech_Aug_14.pdf) (accessed on 25 April 2022).
8. Demartini, C.G.; Benussi, L.; Gatteschi, V.; Renga, F. Education and Digital Transformation: The “Riconessioni” Project. *IEEE Access* 2020, 8, 186233–186256.
9. Gallego, A.; Kurer, T. Automation, Digitalization, and Artificial Intelligence in the Workplace: Implications for Political Behavior. *Annu. Rev. Political Sci.* 2022, 25.
10. Akram, U.; F  l  p, M.T.; Tiron-Tudor, A.; Topor, D.I.; C  pu  neanu, S. Impact of digitalization on customers' well-being in the pandemic period: Challenges and opportunities for the retail industry. *Int. J. Environ. Res. Public Health* 2021, 18, 7533.
11. Ionescu, C.A.; F  l  p, M.T.; Topor, D.I.; Duic  , M.C.; Stanescu, S.G.; Florea, N.V.; Coman, M.D. Sustainability Analysis, Implications, and Effects of the Teleworking System in Romania. *Sustainability* 2022, 14, 5273.
12. Kutnjak, A. COVID-19 Accelerates Digital Transformation in Industries: Challenges, Issues, Barriers and Problems in Transformation. *IEEE Access* 2021, 9, 79373–79388.
13. Mostaghel, R.; Oghazi, P.; Parida, V.; Sohrabpour, V. Digitalization driven retail business model innovation: Evaluation of past and avenues for future research trends. *J. Bus. Res.* 2022, 146, 134–145.
14. Kane, G.C.; Palmer, D.; Phillips, A.N.; Kiron, D.; Buckley, N. Strategy, Not Technology, Drives Digital Transformation; MIT Sloan Management Review and Deloitte University Press: Westlake, TX, USA, 2015.
15. Kozanoglu, D.C.; Abedin, B. Understanding the role of employees in digital transformation: Conceptualization of digital literacy of employees as a multi-dimensional organizational

- affordance. *J. Enterp. Inf. Manag.* 2020, 34, 1649–1672.
16. Bican, P.M.; Brem, A. Digital business model, digital transformation, digital entrepreneurship: Is there a sustainable “digital”? *Sustainability* 2020, 12, 5239.
  17. Yang, W.; Liu, J.; Li, L.; Zhou, Q.; Ji, L. How could policies facilitate digital transformation of innovation ecosystem: A multiagent model. *Complexity* 2021, 2021, 8835067.
  18. Hanelt, A.; Bohnsack, R.; Marz, D.; Antunes Marante, C. A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *J. Manag. Stud.* 2021, 58, 1159–1197.
  19. Freshdesk. The 5 Biggest Digital Transformation Challenges (And How to Overcome Each One). Available online: <https://freshdesk.com/general/digital-transformation-challenges-blog/> (accessed on 16 August 2019).
  20. Fill, H.-G. Enterprise Modeling: From Digital Transformation to Digital Ubiquity. In *Proceedings of the 2020 15th Conference on Computer Science and Information Systems (FedCSIS)*, Sofia, Bulgaria, 6–9 September 2020; pp. 1–4.
  21. Masuda, Y.; Zimmermann, A.; Shepard, D.S.; Schmidt, R.; Shirasaka, S. An Adaptive Enterprise Architecture Design for a Digital Healthcare Platform: Toward Digitized Society–Industry 4.0, Society 5.0. In *Proceedings of the IEEE 25th International Enterprise Distributed Object Computing Workshop (EDOCW)*, Gold Coast, Australia, 25–29 October 2021; pp. 138–146.
  22. Mergel, I.; Edelmann, N.; Haug, N. Defining digital transformation: Results from expert interviews. *Gov. Inf. Q.* 2019, 36, 101385.
  23. Osmundsen, K.; Iden, J.; Bygstad, B. Digital Transformation: Drivers, Success Factors, and Implications; MCIS: Petaling Jaya, Malaysia, 2018.
  24. Bargh, M.S.; Troxler, P. Digital transformations and their design–renewal of the socio-technical approach. Timmermans J. (Hg.) *Hoger Beroepsonderwijs* 2020, 2030, 335–377.
  25. Thite, M.; Bhatta, N.M.K. Soft systems thinking approach to e-HRM project management. In *e-HRM*; Routledge: London, UK, 2018; pp. 42–56.
  26. Majdalawieh, M. Advancing Digital Transformation: Integrated Digital Transformation Framework for a Successful Deployment. In *Proceedings of the International Conference on Industrial Engineering and Operations Management*, Toronto, ON, Canada, 23–25 October 2019.
  27. Westerman, G.; Calm ejane, C.; Bonnet, D.; Ferraris, P.; McAfee, A. Digital Transformation: A Roadmap for Billion-Dollar ORGanizations; Research report, enter For Digital Business; MIT SloanSchool of Management CapGemini Consulting MIT Sloan Management Review: Cambridge, MA, USA, 2011.

28. i-scoop. Digital Transformation: Online Guide to Digital Business Transformation. Available online: <https://www.i-scoop.eu/digital-transformation/> (accessed on 10 April 2022).
29. Congdon, L. CIO, Red Hat, Interviews: Tech and Business CXO Talk. 2015. Available online: <https://player.fm/series/interviews-tech-and-business/lee-congdon-cio-red-hat> (accessed on 10 September 2015).
30. Mazzone, D.M. Digital or Death: Digital Transformation—The Only Choice for Business to Survive Smash and Conquer, 1st ed.; Smashbox Consulting Inc.: Mississauga, ON, Canada, 2014.
31. Bonnet, D.; Westerman, G.; McAfee, A. Leading Digital: Turning Technology into Business Transformation; Harvard Business Review Press: Boston, MA, USA, 2014.
32. Saka, A. Internal change agents' view of the management of change problem. *J. Organ. Chang. Manag.* 2003, 16, 480–496.
33. Belda-Miquel, S.; Pellicer-Sifres, V.; Boni, A. Exploring the contribution of grassroots innovations to justice: Using the capability approach to normatively address bottom-up sustainable transitions practices. *Sustainability* 2020, 12, 3617.
34. Matt, C.; Hess, T.; Benlian, A. Digital Transformation Strategies. *Bus. Inf. Syst. Eng.* 2015, 57, 339–343.
35. Everest Group. New Everest Group Report Finds Enterprises Are Adopting Digital and Seeing Initial Success, but Struggles Come in Scaling and Sustaining the Transformation Effort. 2018. Available online: <https://www.everestgrp.com/2018-08-78-enterprises-fail-scale-sustain-digital-transformationinitiatives-everest-group-says-old-school-operating-models-blame-press-release-46192.html/> (accessed on 10 March 2022).
36. Volkova, T.; Jākobsone, I. Design thinking as a business tool to ensure continuous value generation. *Intellect. Econ.* 2016, 10, 63–69.
37. Shapira, H.; Ketchie, A.; Nehe, M. The integration of design thinking and strategic sustainable development. *J. Clean. Prod.* 2017, 140, 277–287.
38. Kolko, J. Design thinking comes of age. *Harv. Bus. Rev.* 2015, 93, 66–71.
39. International Council on Systems Engineering (INCOSE). Systems Engineering Vision 2020 (INCOSE-TP-2004-004-02); International Council on Systems Engineering: San Diego, CA, USA, 2007.
40. Brown, T. Design thinking. *Harv. Bus. Rev.* 2008, 86, 84–92.
41. Plattner, H.; Meinel, C.; Weinberg, U. Design THiNK!NG—Innovation Lernen, Ideenwelten Öffnen München: Mi- Wirtschaftsverlag. Roe D. 2019. “6 Digital Transformation Challenges Enterprises Need To Overcome”. *CMS Wire* 28 March 2019. 2019. Available online:

<https://www.cmswire.com/digital-workplace/6-digital-transformation-challenges-enterprises-need-to-overcome/> (accessed on 16 August 2019).

42. Stewart, S.C. Interpreting design thinking, Editorial. *Des. Stud.* 2011, 32, 515–520.
43. Lindberg, T.; Gumieny, R.; Jobst, B.; Meinel, C. Is there a need for a design thinking process. In *Proceedings of the 8th Design Thinking Research Symposium, University of Technology, Sydney, Australia, 19–20 October 2010*; pp. 243–254.
44. Lindberg, T.; Meinel, C.; Wagner, R. Design Thinking: A Fruitful Concept for IT Development? In *Design Thinking*; Meinel, C., Leifer, L., Plattner, H., Eds.; Understanding Innovation; Springer: Berlin/Heidelberg, Germany, 2011.
45. Tilmann, L.; Raja, G.; Birgit, J.; Christoph, M. Is there a need for a design thinking process? In *Design Thinking Research Symposium*; Israel Institute of Technology: Haifa, Israel, 2010; pp. 243–254.
46. Johansson-Sköldberg, U.; Woodilla, J.; Çetinkaya, M. Design thinking: Past, present and possible futures. *Creat. Innov. Manag.* 2013, 22, 121–146.
47. Cross, N. Designerly ways of knowing. In *Design Thinking: Characteristics and Promises*; Birkhauser, E.A., Møller, C., Sérié, M., Boer, H., Eds.; ResearchGate: Berlin, Germany, 2013; ISBN 978-90-77360-16-3.
48. Behrens, J.; Patzelt, H. Corporate entrepreneurship managers' project terminations: Integrating portfolio-level, individual-level, and firm-level effects. *Entrep. Theory Pract.* 2015, 40, 815–843.
49. AXELOS. ITIL management practices. In *ITIL Foundation, ITIL 4 Edition*; The Stationery Office: London, UK, 2019; ISBN 978-0113316076.
50. BMC. ITIL 4: The Beginner's Guide to ITIL. Available online: <https://www.bmc.com/blogs/itil-4/> (accessed on 8 October 2019).
51. FieldTitan. Top 10 Field Service Management Challenges and How to Address Them. Available online: <https://www.getfieldtitan.com/top-field-service-management-challenges/> (accessed on 8 October 2019).
52. Moran, J.W.; Brightman, B.W. Leading organizational change. *J. Workplace Learn. Empl. Couns. Today* 2000, 12, 66.
53. Miller, D.; Proctor, A. *Enterprise Change Management: How to Prepare Your Organization for Continuous Change*; Kogan Page Publishers: London, UK, 2016.
54. Hansen, R.; Sia, S.K. Hummel's Digital Transformation Toward Omnichannel Retailing: Key Lessons Learned. *MIS Q. Exec.* 2015, 14, 51–66.

55. Bharadwaj, A.; El Sawy, O.A.; Pavlou, P.A.; Venkatraman, N. Digital Business Strategy: Toward a Next Generation of Insights. *MIS Q.* 2013, 37, 471–482.
56. Bain & Company. Global Digital Insurance Benchmarking Report 2015–Pathways to Success in a Digital World. 2015. Available online: <http://www.bain.com/publications/articles/global-digital-insurance-benchmarking-report2015.aspx> (accessed on 1 October 2017).
57. Kane, T.; Owens, A.; Marinell, W.; Thal, D.; Staiger, D. Teaching Higher: Educators' Perspectives on Common Core Implementation; Center for Education Policy Research, Harvard University: Cambridge, MA, USA, 2016; p. 56. Available online: <http://cepr.harvard.edu/files/cepr/files/teaching-higher-report.pdf?m=1454988762> (accessed on 25 April 2022).
58. Scharnhorst, A.; Börner, K.; Besselaar, P. Understanding Complex Systems; Springer: Berlin/Heidelberg, Germany, 2012.
59. Mella, P. Systems Thinking: Intelligence in Action; Springer: Milan, Italy; New York, NY, USA, 2012.
60. Knigge, L.; Cope, M. Grounded visualization: Integrating the analysis of qualitative and quantitative data through grounded theory and visualization. *Environ. Plan. A* 2006, 38, 2021–2037.

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