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Digital Roadmapping

Purpose, Phase and Perspectives



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Thijs Broekhuizen (RUG) and David Langley (TNO and RUG)

Developing digital roadmaps help managers to explore and determine the direction of digital transformation for their organizations. The act of developing a systematic digital roadmap fosters an understanding of the purpose of digitalization, how to attain digital skills and resources needed to attain the digital transformation goals, and drives organizational change in a coordinated and effective way. Digital transformation is a risky and uncertain journey, full of unexpected events, where important decisions rely on imperfect information.

Although planning may seem ineffective in such uncertain and highly volatile settings, we argue that digital roadmapping can be an important first step for success. While the desired destination and strategies will differ per firm, carefully developing a roadmap - involving the definition of goals, the exploration of alternative paths, and the implementation and validation of selected digital initiatives - will help organizations to progress in their digital transformation journey in an effective and impactful manner.



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The Idea in brief

The Issue	The Response	The Bottom Line
Digital transformations are risky and complex to manage. Devising a roadmap of the digital transformation journey can help organizations to navigate the uncertain road to success.	After synthesizing a simple step-by-step approach to guide the phases of digital transformation, we introduce four perspectives that help managers to ask the right questions to avoid blind spots and develop a richer understanding of the potential value and risks of digital transformation.	The framework supports an open dialogue with internal and external stakeholders to develop a clear digital goal, and devise a plan to navigate from the present to the future.

Introduction

Roadmaps are used for navigating from point A to B, and help organizations to navigate from the present to the future (Simonse, Hultink, & Buijs, 2015). It describes a detailed plan to guide progress toward the attainment of a goal. Constructing and executing digital transformations can be daunting, and roadmaps offer organizations a way to translate such transformations into manageable parts and activities that help to plan the redeployment and (re)allocation of resources, attain digital skills and tools, and implement digital initiatives to generate value.

This chapter tries to answer the following questions:

- What is digital roadmapping and why do we need it?
- How to develop digital roadmaps, and which steps to follow?
- How to avoid common pitfalls?

Digital roadmaps: What are they and why do we need them?

Digital roadmapping tries to answer the following three questions:

- Where do we stand?
- Where do we want to go?
- How do we get there?

Similar to strategy, digital roadmapping tries to map out and pave the road to get to a preferred point of reference. The activity is characterized as a design activity, in which managers work collaboratively to exchange and integrate insights from multiple functions and stakeholders for strategy development. This is done with the help of visual tools—sketches, mockups, models, and drawings—and communication tools—brainstorming, Delphi method, and scenario analysis. In this chapter, we assume that organizations want to engage in the pervasive form of digital transformation. In this respect, organizations use digital transformation to introduce a new business model with the help of digital technologies or data. Such an undertaking is highly risky, as it involves a major overhaul of the organization by, for instance, reprogramming of the organization's values and identity, the development of new capabilities, and the introduction of new partnerships, practices, and routines. Furthermore, the development of new business models also involves a major market risk. While new technologies may provide additional product or cost benefits, consumers and markets may not be attracted (yet) by the new value proposition and offering.

A digital roadmap can take along employees in the journey and enable different teams to work on different parts of the transformation while staying aligned. Digital transformation initiatives are useful to empower employees to take initiative, to develop a capability to deploy technologies, and to test whether proposed ideas work and create the intended customer value. A roadmap thus helps to coordinate individual efforts, reduces re-inventing the wheel, and mitigate possible interpersonal coordination conflicts. The existence of a roadmap will help to channel employees' inputs in more constructive ways. Yet, it is important to realize that digital transformation is a highly uncertain process with many unknowns. A roadmap may not fully take away this uncertainty and risk, but should rather be considered as a point of reference that helps to steer the organization in the 'right' direction, and helps to determine what projects and initiatives to undertake; it should not be confused with a detailed blueprint of how to get from point A to point B.

How to develop digital roadmaps, and which steps to follow?

Much has been written on the use of roadmapping for organizational change in the management literature, covering aspects such as the development path of specific technologies (Alcantara & Martens, 2019), how to design and develop specific products (Münch, Trieflinger, & Lang 2019; Al-Ali & Phaal, 2019), and the strategic implications of such developments for the business model of the firm (Phaal, Farrukh, & Probert 2007; Reuver, Bouwman, & Haaker, 2013; Westerman, Bonnet & McAfee, 2014). Roadmapping has also been implemented across a wide range of societal transformations, for example defining organizational objectives and activities in the nano tech revolution (Martin, 2016), enhancing sustainable business practices (Ahmed & Sundaram 2012) and focusing on the transition to renewable energy (Amer & Daim 2010; Daim, Amer, & Brenden, 2012). Additionally, it has been implemented at different organizational scales, from the level of a specific organizational unit (Kim, Beckman, & Agogino, 2018), for the firm itself (Albright & Kappel, 2003), and even for entire global industries (Zheng & Kammen, 2014). Because of this broad implementation of the idea of roadmapping, when managers at an individual firm are faced with the challenge of managing their organization's digital transformation, it is not a simple task to find the appropriate approach and take the appropriate steps. Despite the extensive attention to roadmapping across disciplines, to our knowledge there is no accessible overview to aid organizations in roadmapping their digital transformation. In Figure 1, we synthesize the existing relevant roadmap methodologies into a simple step-by-step approach that individual organizations can easily apply to guide their own digital transformation.

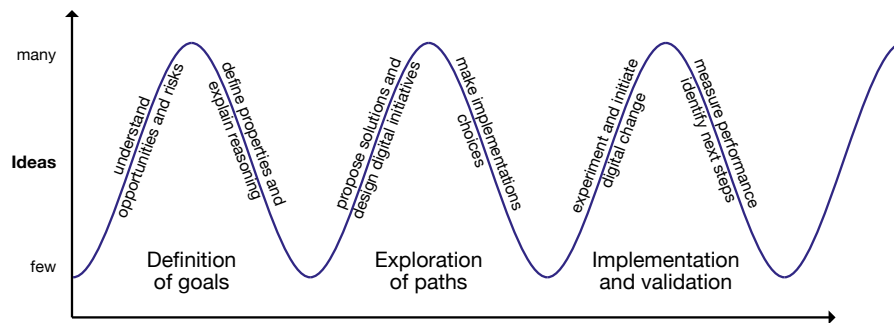


Figure 1: The phases of digital roadmapping

Phase 1: Definition of goals

Understand opportunities and risks: Explore the challenges that the digital economy brings to your organization, both in terms of new possibilities and potential difficulties. Your organization is not the first to undergo a digital transformation and, although each situation is different, there are many lessons to be learned from others' experiences.

Define priorities and explain reasoning: Make choices about the most important goals, in terms of their relevance and impact on your organization, and how achievable they are in practice. Define the timescale within which they may be achieved, preferably in a stepwise, iterative manner. Explain the reasons why these specific goals have been prioritized to help others in your organization align their thinking with the same goals.

Phase 2: Exploration of paths

Propose solutions and design digital initiatives: Creatively explore possible solutions to meet your stated goals, considering the technology, human resources, business processes and possible changes to your products or services.

Make implementation choices: Decide upon the designs and solutions that you will implement in the short term. These sprints are iterative and smaller, achievable implementation choices allow progress to be made without very high investment in time or budget.

Phase 3: Implementation and validation

Experiment and initiate digital change: Now that you have made specific choices, the transformation can be put into practice. By considering the small steps forward to be a form of experimentation, your organization will learn and adapt as you gain experience in digital change. Be realistic and open about what you expect from employees and external partners.

Measure performance and identify next steps: Keeping your stated goals in mind, assess the extent to which the objectives are being met and what needs to be improved in the next iteration. Be aware that the assessment of the performance of your digital transformation could include its impact on your employees, suppliers, customers, finances and on your position in the value chain.

Generally speaking, we can divide roadmapping into three main phases: definition of goals, exploration of paths, and implementation and validation. First, the definition of goals sets out what the organization wants to achieve and develops priorities that will guide different parts of the organization to work towards a unified objective.

This phase also entails coming to a clear understanding of the various pressures, expectations, risks and opportunities that digitalization presents to the organization, and then deciding on a set of SMART (specific, measurable, achievable, relevant and time-dependent) goals. Second, the exploration of different paths towards the defined goals allows an organization to compare and analyze a wide range of ideas and possibilities. This exploration covers a number of key areas of development within the organization, including human resources, organizational processes, and products or service innovation that may dramatically change what the organization does and the relationships it has with other organizations. Third, the implementation and validation of digitalization initiatives guides the organization towards reaching the defined goals by undertaking activities and changes in an interactive way to maximize their realized impact.

These three phases are not carried out in a simplistic sequential fashion, but should be undertaken in short sprints (Al-Ali & Phaal, 2019). Using sprints in a connected and iterative fashion, organizations can speed up their digitalization capability development as they gain cumulative insights from one sprint to another. It is difficult to prescribe how long a sprint should last, as each digital transformation process is different, but typically the first phase of defining goals could be completed within a week while the third phase of implementation and validation will need longer to achieve. Within each sprint there is first a rapid diversification of ideas and potential choices, followed by a structured convergence towards a single choice based on predefined criteria. This iterative, three-phase approach has the benefit of encouraging progress and enabling decision-making, without requiring immediate large-scale investments or commitments to long-term, uncertain future scenarios. In this sense, it resembles the Agile approach to software development that prioritizes adaptive planning and flexible responses to changes in requirements. McGrath (2010) explains that this lean approach helps managers to deal with the high unpredictability of market responses, and speeds up a firm's learning processes with relatively low risks.

Rather than following a planned approach making huge upfront investments ("large hockey sticks") with unlimited downside risks, organizations should rather develop a discovery approach and make a number of small-scale experiments ("small hockey sticks") to test their specific market assumptions (McGrath, 2010) (see Figure 2). The potential gains of a single planned approach may seem more attractive to begin with, but experience shows that the accumulation of improvements through the discovery approach is both less risky and more profitable.

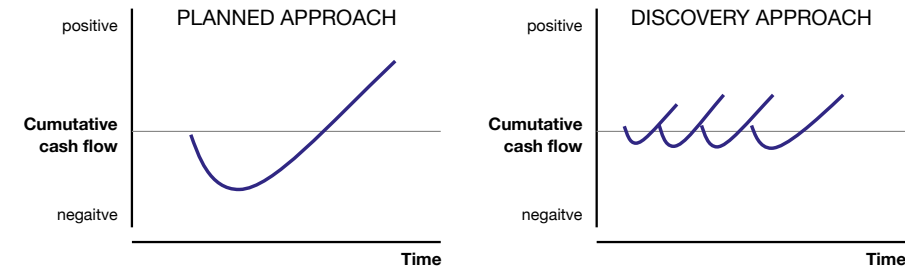


Figure 2: Planned vs. discovery approach (Source: McGrath, 2010)

Phase 1: Definition of goals

In phase 1, the organization adopts an outside-in approach to understand the challenges and opportunities that the digital economy brings to its industry, along with a shared knowledge of how to address digital transformation. Using this understanding, it can then narrow down the set of challenges to define hypotheses and desired outcomes that will serve as a focus and to establish a shared objective within the organization.

Diverging to understand opportunities and risks

This exploratory step helps the organization to understand the changes that digitalization can bring about, and the relevance of these changes for operation. The idea here is to collect information on a wide set of processes, technologies, and organizational implications. The sources of information for this step are extremely diverse, including desk and market research, interviews with experts on digital technology, organizational change, and digital innovation, and creative workshops with employees, customers, or suppliers, who can voice their opinions about the changes happening all around the organization and its industry, brought about by digital transformation. This divergence should be continued as long as the opinions about changes and their implications provide additional insights. If new sources of information only repeat what has already been found, then the point of saturation is reached and the process can move to the next step.

The aim is to build upon notions put forward in order to expand and deepen the organization's overall understanding of what digital transformation implies. At the end of this exploratory, divergent step, the organization should have a long list encompassing the most relevant digital developments, have clarity on how other similar organizations have undergone digital change, and have an explicit list of requirements and expectations of their most important stakeholders, upstream and downstream in the value chain.

As an example, consider a medical center where a small group of general practitioners cares for the health of the local community. The doctors realize that society is undergoing widespread digitalization, and they need to respond by implementing a digital transformation in their medical center. In this first step of the phase of defining their goals, they engage in a series of activities to explore what digitalization could mean for them. They do this by reading up on how other general practitioners have implemented digitalization, discussing new functionality and new technology with IT consultants, as well as liaising with other medical organizations, including their local hospital, physiotherapists and home-care organizations. Additionally, they set up a series of workshops with a selection of their local community in order to gauge the knowledge level and the expectations with respect to digital technology.

Converging to define goals

To rationalize the goals, the organization should prioritize and make choices about what it wants to achieve, and why. The focus in this phase is very much on the organization itself, its strategy, processes, people, and products or services. The synthesis of external developments should lead to the identification and careful description of important objectives so that everybody in the organization has a shared understanding of the objectives and why they have been chosen. At the end of this analytical, convergent step, the organization has a short list of the top priority digitalization goals that can be achieved within a specified timeframe.

In our example of the medical center of general practitioners, the doctors can carry out a number of facilitated workshops where they and their key stakeholders discuss the long list from the divergent step, leading to the prioritization of the two most important goals: offering their clients the ability to share personal health information gathered via devices at home, and providing access to data to other health professionals in the region whilst adhering strictly to privacy regulations. Both of these goals may be iteratively met to differing degrees by smaller steps throughout the planned period of five years. So, for example, the ability for clients to share their personal health information could start in the first month by asking diabetes patients to type in their glucose levels to the center's digital platform, but after a few years it may lead to an integration with a number of proprietary digital systems automatically uploading indicators from blood pressure, through sleep patterns and activity trackers.

Phase 2: Exploration of paths

In the second phase, the organization proposes and sketches a range of digital solutions in order to explore different potential ways of achieving the prioritized goals set out in the previous phase. This creative step makes use of the understanding of opportunities and risks, and then narrows down the selection of digital design initiatives to a shortlist that can be implemented easily.

Diverging to sketch digital solutions and their organizational implications

An organization needs to explore the key areas of development within the organization that are affected by the digital initiatives. Digital transformation may require different organizational qualities and place new demands on human resources, organizational processes, and new products/service development. At the end of this exploratory, divergent step, the organization should have a longlist of digital solutions, including the basic contours of their designs. The exact details on the most appropriate design will be developed in the third phase.

Continuing our example of the medical center of general practitioners, in this step to propose solutions and design digital initiatives the doctors may sketch possible solutions to facilitate the exchange of personal health information using medical devices. Doctors may need to be trained in communicating the benefits to the system and individuals in order to motivate clients to share personal information. Medical devices and data sharing infrastructure that protect the privacy of clients need to be found. Furthermore, changes to organizational systems and supportive staff may need to be designed to facilitate the interaction with clients in a trustworthy and secure way. Finally, an activity can be undertaken to explore solutions that provide feedback to clients, display information in an understandable way, and promote the desired implications for client's treatments or lifestyles.

Converging to make implementation choices for the digital initiatives

To rationalize the exploration of digital solutions and the consequences these may carry for organizations, the relevant managers need to make decisions on which of the designs will best meet the demands of the prioritized objectives, and which will be implementable considering the strategic fit of the new designs with existing products and processes, as well as the likely costs and uncertainties involved. Often, in practice, an organization may choose to link multiple projects in a stepwise manner to attain difficult-to-achieve outcomes in the longer term. In order to do this, they may prepare a sequence of digital projects and specify how they build upon each other. At the end of this analytical, convergent

step, a single digital initiative, or a small set of related initiatives, has been chosen that is both implementable and that meets the defined objectives.

In our example of the medical center of general practitioners, the doctors may select a number of suppliers that offer products that meet the criteria for safe and secure use. A business case may be created on which to base choices about which solutions provide the right benefits within budgetary limitations. Furthermore, to facilitate adoption of such medical devices, implementation choices can be made about how to design the care process including the communication toward the patient, the internal operations, and the reimbursement process with insurers.

Phase 3: Implementation and validation

In this third and final phase, the organization adopts an inside-out approach and experiments with the digital initiative(s) designed in the previous phase. Through rapid experimentation through pilots that foster digital change, it is possible to learn about the viability of the design, adapt implementation where necessary and develop a clear understanding of the impact of the digitalization both within and beyond the organization's boundaries. Using this understanding, it can then narrow down and prioritize the next steps in the process of digital transformation.

Diverging to experiment and initiate digital change

By implementing the small design steps in practice, the digital transformation process can be started. Following the principles of the agile software development process, the small steps may be seen as a form of experimentation and adaptive learning whereby it becomes possible to adapt to progressive insights, quickly adapt the planning and project requirements, and continually enhance the understanding of the problems to be solved. This may lead to the development of new knowledge that can be shared and internalized. At the end of this exploratory, divergent step, the organization should define specific metrics against which the desired outcomes will be measured and how the progress of projects can be monitored.

In our example, small experiments can be carried out in which multiple product solutions or client interfaces are tested. Metrics could capture the experiences of medical staff, clients and suppliers in these experiments, for example by noting the challenges they face or measuring their anxiety. Following this, adjustments can be made to the designs of the implementation choices, and the next design step can provide improvements to reduce or remove this anxiety. These small steps in experimentation and adaptive learning can test different digital solutions, and the assumptions held by their designers, in practice.

In order to be able to identify and monitor whether the digital solutions provide the intended benefits to the internal and external stakeholders, doctors can create a set of metrics. These may include metrics on the early detection of health problems, the degree to which clients experience greater control over their recovery process, and the extent to which they share relevant information in a timely fashion.

Converging to measure performance and identify next steps

In the convergent stage, organizations should assess the degree to which they have attained the desired goals and what needs to be addressed in the next iteration. If progress is below expectations, measures should be initiated to overcome the deficiencies and a frank and open discussion with stakeholders can help the organization to benefit from the insights generated. The cost-benefit analysis needs to include a suitable breadth of indicators relating to all relevant organizational processes and the digital initiative's impact upon various stakeholders and the organization's market position. One main advantage of this validation step, and one main reason for adopting small, achievable steps in an iterative fashion, is that it provides convincing, and realistic, evidence of the benefits of digital transformation. At the end of this analytical, convergent step a well-developed conclusion can be derived that will foster support for the next iteration of the digital transformation process.

To distill learnings from the implementation of digital solutions, and to identify the next steps, the doctors collect and analyze the metrics identified in the previous step so that they can infer the effectiveness of the selected new products or methods compared with those of existing methods. Doctors may not only analyze immediate changes to their clients' information sharing, but also the indirect, long-term benefits and costs of using the new digital approach or method for both clients and for the medical center itself. Additionally, they may partner with health insurance companies to analyze effects on cost efficiency and overall quality adjusted life years. Furthermore, with greater scale and more data, segmentation can be used to determine for which types of clients (age, gender, social status, education, health conditions) a digital solution is most effective, and what additional supportive measures can be used to limit possible disadvantages and negative effects. The knowledge derived from the implementation and validation of digital solutions, whether they are immediately successful or not, can be internalized and applied to other parts of the organization in the subsequent steps in the digital transformation process.

How to avoid common pitfalls? Using four perspectives.

Apart from the sequencing of activities, an organization should also consider what value needs to be created, and how to attain this. In order to avoid common pitfalls and avoid

blind spots, we suggest to use four perspectives to ask the right questions as these perspectives provide a rich and complementary view to increase their understanding of the potential benefits and risks of digital transformation: governance, customer, organization and digital platform. Table 1 explains these perspectives and indicates the key questions that can guide organizations' decision making, foster meaningful conversations with stakeholders, and the development of a well-thought strategy for digital transformation. These should help with the implementation of an effective digital transformation strategy.

Table 1. Four perspectives on digital transformation

Perspective	Focus	Key questions
Governance	The governance of the digital transformation process in terms of actors, responsibilities, incentives and transactions.	What are the key actors within and external to the organization? How can these actors' responsibilities, incentives and transactions be managed to enhance efficiency for the benefit of the organization?
Customer	The way customer value is created through digital transformation.	What does the customer value and want? How can the organization offer the desired products and services in the right manner?
Organization	The act of putting things into a logical order, defining tasks and routines for digital transformation.	How to organize the transition from the present to the future? How to overcome employee resistance? How to resolve employee resistance and ensure employees' digital readiness, such that they embrace and deploy digital tools and technologies?
Digital learning platform	The installment of a platform fostering learning, continuous improvement and innovation.	How to stimulate learning and guarantee the internalization of knowledge? How to ensure continuous improvements, and how to introduce innovations within existing (digital) infrastructures?

Using a governance perspective

The governance perspective informs managers about the actions that must be taken to ensure that the digital transformation is successful. Governance is a broad concept that includes the set of actors, responsibilities, incentives and transactions needed to achieve an organization's goals (Mergel, Edelmann, & Haug, 2019). The principal actors include the shareholders, management, employees, suppliers, customers, regulators, the environment and the community at large. When the organization's governance is well developed, all these stakeholders act in a way that enables the organization to operate efficiently.

The value to the organization of undergoing a digital transformation can be realized in numerous ways and, at the same time, there are equally many challenges to ensure that the governance is optimized through the process of change. Areas of relevance requiring significant attention from the upper management include the organizational processes, the business model, technology implementation, management of the digital transformation initiatives, risk management and potential changes to the governance structure itself (Sambamurthy & Zmud, 2012).

As the digital transformation proceeds, organizations typically undergo a shift in the way that they operate, what they offer to their customers, and the way that they interact with other organizations. These changes will not immediately be understood or accepted by all employees or other stakeholders, particularly for those people who see changes to their roles or responsibilities as being undesirable. Conflict can emerge within the organization, or with suppliers and customers, when the logic of operating in the pre-digital era and the new digital logic need to be aligned (Besharov & Smith, 2014). Before all processes and parts of the organization and its network are aligned, each logic may prescribe actions that are incompatible with the other logic. For the governance to run smoothly, this situation needs to be understood, accepted, and appropriate steps must be taken to quickly align the two perspectives.

In order to align the range of differing opinions and ways of working, a useful approach is to make the incentives impacting on each actor explicit. Incentives may be highly diverse. Employees are, obviously, incentivized by being paid for their work, but there are many other, less obvious incentives at play. These include status, self-determinism, collegiality, societal impact and more. Equally, an organizations suppliers and customers may be incentivized to adopt and work with the digital transformation, or their incentives may encourage them to block progress or fear losing out. Good governance results in all incentives being aligned so that all processes run smoothly, and with internal and external stakeholders feeling fairly remunerated.

Guiding questions:

- Who are the relevant actors within and outside the organization?
- Which dependencies between actors change because of a digital initiative?
- Do these actors commit to the digital transformation and do their responsibilities, incentives and transactions change as a result of digital transformation?
- What are potential negative consequences of digital initiatives for each type of actor?
- Are changes to their incentives possible in order to align their efforts with the new organizational objectives?

Using a customer perspective

Ultimately, customers need to be attracted to the organization's new digital value proposition. A value proposition is the promise made by an organization about how its products or services benefit its customers, in terms of saving them time and effort, improving their situation, or in any other way (Massa, Tucci, & Afuah 2017). Adopting a customer-centric perspective begins by understanding the target customer, what the customer values in terms of what they want to gain and also the difficulties they want to avoid ('pains'), as well as what is feasible for the customer to understand and put into use in practice.

As an example, a high school set up a new mobile chat application per mentor class, very typical of many schools, so that parents and teachers could interact easily without the need to organize time-consuming meetings every time an issue arises. The parents, in this example in the role of customers of the school, took enthusiastically to the new application and shared their thoughts and opinions on a wide range of matters. Initially this led to an increase in their perceived value as topics of concern were quickly dealt with. However, after some time, it emerged that certain parents were particularly keen to express their negative opinions and complain about perceived shortcomings on the part of the school. The social atmosphere generated by this negative discussion became a problem for the teachers, particularly as it could quickly become harsh with aggressive tones, who felt they had to react very quickly to prevent problems from escalating. Other parents became influenced by the vociferous minority and the general level of satisfaction declined. Adapting to this, the teachers asked parents to return to making physical appointments to discuss problems, as they noticed that the emotions would calm down after a while and a reasonable discussion would solve almost all problems without bothering other parents. The digital application was then more effective at sharing experiences on less-charged topics.

There is the danger that managers, who are personally invested in the digital transformation, may be overly positive about the value of their new digital products and business

model without being open to see the difficulties that the customers may have with the change, such as switching costs necessary from a non-digital to a digital solution. In general, there are two ways that a digital initiative creates value for the customer. First, there are sustainable improvements to the customer's current way of operating or product. For example, by speeding up access to information or by automating laborious tasks. Second, there are wholly new functions and possibilities that do not replace earlier products and services but that create completely new forms of value (Christensen, Raynor, & McDonald, 2015). By taking a customer perspective, for example by holding focus groups with representative customers, managers can gain an understanding of their wishes and abilities to accept and adopt the new value proposition, as well as their views on new difficulties arising.

Taking the customer perspective a step further, the development of a digital initiative should start, not with the benefits to the organization, but with defining the new value proposition through focusing on the customers' experience. What do customers themselves think about the change? How quickly can they adapt their understanding of what is possible? What are they worried about in terms of new problems and challenges? Once it becomes clear how to create the most value for the customers, the organization can then adapt its design of the digital initiative to fully meet those needs.

Guiding questions:

- What value will be created for the customer? What do potential customers say about the new service offering?
- What aspects of the digital initiative do the customers understand, and what aspects do they not (yet) understand? Are customers digitally ready and able to attain digital value?
- Is the new value proposition an incremental change to existing practices or a wholly new form of value?
- What narrative is used to convince customers of the new digital service offering? What possible negative consequences exist for customers, and does the organization truthfully reflect those potential risks?
- Are customers or its representatives (e.g. consumer associations) involved in a panel of advisors throughout the digital transformation process?

Using an organization perspective

The organization perspective informs managers about the activities needed to inform and convince employees in the digital transformation. At the start, a digital team needs to be assembled capable of understanding how value can be created digitally, and what organizational consequences digital transformation bring to the organization.

Research of Libert, Beck, & Wind (2011) hints that effective teams are multidisciplinary and have technological and market knowledge. Teams should also have senior support and the mandate to reallocate resources and change internal structures as a part of digital transformation. Naturally, the team members need to be bought in and be passionate about the digital transformation process.

A key aspect that the digital team needs to consider and resolve is employee resistance. Employee resistance is likely given that digital transformation introduces change and uncertainty (Matt, Hess, & Benlian, 2015). Employees likely resist the proposed changes and need to be convinced of the reasons and objectives of digital transformation, especially when the change involves major changes to their daily tasks, and requires a possible new role and identity for organizations within value systems. Digital transformation involves a culture-driven process in which new organizational values need to be installed. To address the feeling of a mismatch about the employee's identity and the new

organizational identity, it is important that employees are taken along in the transition toward new organizational values. Communication is therefore an important part of the organization of digital transformation. Organizations that undergo such radical change should repeatedly explain the reasons behind the digital transformation to employees, such that they are reminded of why the changes are necessary, and why the existing way of working is no longer desirable. Employees may challenge the idea that the traditional way of working is outdated. To facilitate acceptance, communication needs to highlight that old routines and ways of working are not inherently bad, but that novel ways may fit better in achieving the objectives of the organization.

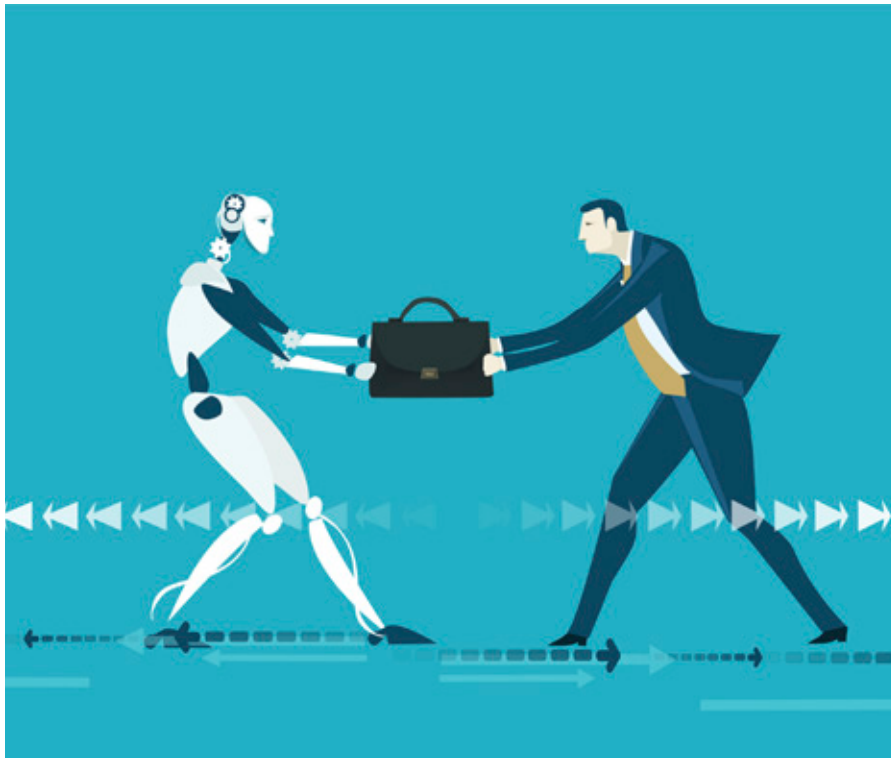
Finally, employees may experience technological anxiety when they are forced to work with new and unfamiliar technologies (Meuter et al., 2003; Mokyry, Vickers, & Ziebarth, 2015). Employees may feel incompetent and be concerned with their job security as digitalization may render their tasks obsolete or replace them completely with robots. Effective supervisor and peer support may improve employee attitudes and behaviors toward digitalization (Nguyen & Broekhuizen, 2021). Supervisors can stress the importance of digital transformation and introduce new incentives that legitimize the need for change. Peers can help employees to overcome practical problems by demonstrating solutions and provide how-to instructions. Naturally, traditional training programs aimed at learning how to perform digital tasks can foster employees' confidence, ability and acceptance of new technologies.

Guiding questions:

- How to design a team capable of organizing the transition from the present to the future
- What organization culture is needed for digital transformation?
- How to resolve employee resistance and ensure employees' digital readiness, such that they embrace and use digital tools and technologies effectively?
- What requirements are placed upon employees' digital skills, and how can supervisor and peer support enhance employee confidence, ability and acceptance of new technologies?

Using a digital learning platform perspective

The digital learning platform provides the foundation of organizational learning, continuous improvement and innovation. To coordinate the digital initiatives and secure the learnings from digital initiatives and pilots, it is recommended to build a digital platform that informs users about the current status of projects and registers malfunctions.



As mentioned in the organization perspective, it is important to creating an organization receptive of digital change. Hence, it is important to install a culture directed at learning and experimentation, and that is tolerant towards making mistakes. Mistakes and blunders are unavoidable in such risky organizational pervasive endeavors. Rather than penalizing those individuals who have made the mistake, it is recommended to install a “fail fast, learn fast” culture, and let them share their lessons learnt from digital project initiatives to avoid similar mistakes happening in the future. A common practice to promote such a culture includes the introduction of “f#ck-up awards” that are handed out to individuals who have provided an opportunity for the organization to learn by failing.

Another effective way to detect, share and monitor errors is to install effective incident processes, and to build in detection systems or make people responsible for the reporting and addressing of mistakes. To internalize knowledge and distribute this knowledge to newcomers, it is important to build a repository of knowledge. Instruction videos, templates, and how-to guides may provide a check list and a blueprint of how to resolve common issues. Especially, when key digital personnel leave the organization it is important to know what capabilities and learnings these key persons have accumulated, what activities they have performed, and what kind of training they have had. The tracking of learning paths of individual employees can enable newcomers to follow similar learning paths in order to quickly build a thorough understanding of the digital processes within the organization.

Digital platforms provide the backbone of organizations and may serve as a perfect communication platform. High demands are placed on the development of such a communicative digital platform, as it transforms and communicates data input into valuable business insights. On the one hand, the digital infrastructure should be resilient and consistently perform the primary activities being resistant to external shocks. On the other hand, it should also be flexible enough to incorporate novel features as business models, products and services, and partnerships evolve over time. Transformation managers should realize that digital transformation is a continuous process that does not end after the launch of a new digital business model. Hence, sufficient means should be available to update and reinvigorate the existing business models. Organizations need to prepare for updates and continuous innovation to seize the opportunities provided by new developments and circumstances.

Conclusion: Ready to Act?

In this chapter, we have addressed the question of whether and how a digital transformation can be planned using digital roadmapping. There are many uncertainties and risks involved in a digital transformation, and these pose a significant challenge to managers. By designing and implementing a roadmap of the digital transformation journey, managers take small but important steps to help their organizations navigate their way to optimal digital transformation.

After synthesizing a simple three-phase approach guiding managers through the phases of digital transformation, we introduce four perspectives that help managers to ask the right questions to avoid blind spots and develop a richer understanding of the potential value and risks of digital transformation. The approach put forward supports an open dialogue with internal and external stakeholders to develop a clear digitalization objective, and to design and implement a plan to navigate from the present situation to realize significant improvement in the future.

The digital roadmapping approach is no “silver bullet” or simple recipe for success, due to the complexities and uniqueness of each organization and each practical situation. It also requires substantial investment in time and resources, and the chances of failure are still high. Nonetheless, by following this approach, the organization becomes activated and informs and engages relevant stakeholders to participate jointly in a transition with the aim to realize mutual benefits.

Finally, it is worth highlighting the fact that despite its high risks a well-implemented digital roadmapping process provides striking potential benefits to the organization in question, and to its customers. Appropriate and responsible use of the data made available has two key effects. First, it allows the organization to make better decisions by providing more accurate information into processes and problems that occur. Second, it enables the organization to be more receptive and responsive to technological changes. These two effects reinforce one another; having more accurate information makes the improved flexibility even more valuable (Drnevich & Croson, 2013). Therefore, managers are well- advised to consider the purpose, phases, and perspectives involved in digital roadmapping.

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