

Assessing digital capabilities for digital transformation—The MIND framework

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Abstract

With the rise in the advances and adoption of digital technologies and evolving business dynamics, we live in an era where many organisations are embarking on digital transformation. To stay relevant, however, organisations struggle to comprehensively outline the digital capabilities they have or need in relation to the digital transformation objectives they aim for. This struggle stems from the paucity of knowledge and practical guidance on how to assess the digital capabilities of organisations relative to their desired digital transformation goals. This paper presents a framework (MIND Framework) for assessing digital capabilities in four critical areas – Management (M), Infrastructure (I), Networking/Sourcing (N), and Development (D) – abstracted from prior literature. The framework assesses digital capability status

Consider this scenario: Omega is an organisation with strong expertise in a particular niche in the automotive industry. With the advancements of new digital technologies and increasing competition from tech-savvy startups, Omega has decided to embark on digital transformation. They realise they need to develop digital capabilities for such a transformation. However, they are unsure of the capabilities they need and how relevant their current digital capabilities are for their transformation ambition. This is a problem facing many organisations embarking on digital transformation. Some end up duplicating efforts, missing essential digital capabilities, wasting investments, being frustrated, and ultimately failing or learning the hard way.

'Companies that struggle with becoming truly digital fail to develop digital capabilities to work differently...' – Westerman et al., 2014.

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in each area in relation to the organisation's stated digital transformation goals. MIND, which is an outcome of a multi-year design science research project, helps organisations assess their current capability status and create a pathway for navigating from their current status to the desired transformation state. In this article, we describe an in-depth application of the MIND framework in assessing the digital capabilities of an incumbent company in the digital transformation process. Based on this, we illustrate how the framework can provide valuable insights and attitudinal shifts in an organisation's digital transformation efforts. We further abstract from the case to demonstrate how the assessment of an organisation's digital capabilities can provide valuable insights and critical input for any organisation embarking on a digital transformation journey. We conclude with a detailed guideline on how organisations can apply the MIND framework in their transformation journey.

KEYWORDS

assessment method, design science research, digital capabilities, digital transformation, MIND framework, practise and policy

1 | IMPORTANCE OF DIGITAL CAPABILITIES IN DIGITAL TRANSFORMATION

Digital transformation has become a business imperative for many organisations today. This trend is especially so for organisations facing the threat of digital disruption or new digital technology-propelled entrants and competitors in their business domain. This is also driven by the pace of digital innovations, plus the rapid advances and adoption of digital technologies (Vial, 2019). The opportunities and affordances provided by these digital technology advances are leading to evolving business dynamics in many industries (Svahn et al., 2017). To respond, organisations need conscious efforts to create new value propositions and digital offerings (Folkmann et al., 2022; Ross et al., 2019; Weill & Woerner, 2018). In order to leverage these promises of digitalization, many organisations have considered digital transformation to be a necessary path towards achieving this (Baiyere et al., 2020). Besides the plethora of opportunities that digitalization offers, another driver for digital transformation by many organisations is the potential for digital disruption (Chan et al., 2019). Many organisations are concerned about the threats due to digitalization and have realised that in order to survive, they need to digitally transform their business, processes, and offerings (Sebastian et al., 2017; Weill & Woerner, 2018).

Indeed, for many organisations, the foray into digital transformation is driven by the recognition of potential opportunities or threats inherent in the advancement and uptake of digital technologies in conjunction with its encroachment in their traditional business territory (Salmela et al., 2022). However, with such a backdrop, many organisations have resorted to approaches that tend to keep the focus on immediate goals; building new digital value offerings; attending to competitive pressures; or striving to capitalise on opportunities (Chanas et al., 2019; Salmela et al., 2022; Svahn et al., 2017). While valuable, such disparate foci veils managers from a strategic

positioning that comprehensively leverages the requisite digital capabilities required for their digital transformation goals.

Digital transformation, like many other transformations, depends on an organisation's ability to develop new requisite capabilities. However, organisations struggle to systematically and comprehensively assess the degree of match or mismatch between their digital capabilities and those required to achieve their desired transformation. We define digital capabilities as the ability of a firm to integrate, build, and reconfigure information technology cum organisational resources and competencies in order to project and respond adequately to the strategic and operational demands of its business environment in a digital age (Matt et al., 2015; Ritala et al., 2021; Uhl et al., 2018; Westerman et al., 2012). Hence, although the need for digital transformation is clear, a key challenge for many organisations is the lack of helpful knowledge of the required digital capabilities. Moreover, many traditional organisations have difficulty identifying these digital capabilities. In particular, there is difficulty in integrating and recombining traditional/organisational resources with internal and external digital resources necessary to build the necessary digital capabilities. Business managers in such contexts are in the dark as digital capabilities is an untypical term in their vocabulary, particularly since digitalization represents an unfamiliar domain to them.

It is surprising that although the landscape of digital transformation frameworks offers valuable guidance for companies aiming to manage digital transformation (Ross et al., 2019; Stamford, 2014; Weill & Woerner, 2018; Westerman et al., 2014), there is notable oversight in their attention to digital capabilities as a pivotal consideration. Even the frameworks that are cognizant of the significance of digital capabilities (Westerman et al., 2014) fall short of providing practical guidance for assessing requisite digital capabilities relevant for a digital transformation journey. This struggle stems from the lack of knowledge and practical guidance that organisations can draw on in conducting such assessments (Li et al., 2018; Ritala et al., 2021; Wulf et al., 2017). Yet, the challenge is of pressing importance and urgency. Due to the centrality of digital capability in digital transformation (Westerman et al., 2012), a logical question for most is – *how can an organisation assess the digital capabilities it needs relative to its digital transformation goals?*

For many companies at the cusp of imminent digital disruption, this is a critical question in need of urgent answers. According to a Forbes study (Rogers et al., 2016), the responsibilities of chief information officers and chief executive officers will mostly entail formulating and implementing digital business strategies and facilitating digital transformation. Similarly, the study predicted that digital transformation will not be solely a digital/IT unit responsibility but will expand across their organisational value chain. This has become the trend in many industries (Ritala et al., 2021; Zimmer et al., 2023). With this trend, it becomes imperative that organisations digitally transform their existing businesses to benefit from the possibilities of digital innovations and actively navigate away from the threats of digital disruptions to their organisational processes and current business models (Nwankpa & Roumani, 2016). In order to do that, however, getting clarity about the status and positioning of the essential digital capabilities is a necessary step for the transformation agenda.

We present the MIND framework (which includes the MIND Canvas and its accompanying MIND Process) – MIND for short – as a practical framework that organisations can employ in assessing their digital capabilities relative to their goals in a digital transformation journey. MIND is explicitly designed to help organisations outline the digital capabilities they need relative to their digital transformation goals in a way that allows them to formulate actionable activities that can facilitate the achievement of their goal. The premise of how MIND helps organisations achieve this is grounded in the idea that achieving a digital transformation goal requires that the organisation knows (a) its current status and (b) the needed actions to be taken relative to the goal. Essentially, both the status and actions reflect the necessary digital capabilities relative to the intended digital transformation goal. While most organisations may have a sense of the digital capabilities they currently have and a sense of the digital transformation goals they aspire for, the blindspot is typically the needed capabilities that will complement their existing capabilities and enable them to accomplish their transformation goal. In line with our research question, MIND is focused on providing a qualitative approach for finding the needed digital capabilities, while concurrently identifying the relevant existing digital capabilities, and translating the overarching digital transformation goals into measurable digital capability goals.

2 | BACKGROUND

2.1 | Digital transformation and the need for digital capability assessment

Digital transformation has taken on a plethora of meanings in both scholarly and practitioner discourse (Hanelt et al., 2021; Verhoef et al., 2021; Wessel et al., 2021). Recent scholarship such as Wessel et al. (2021), Vial (2019), and Baiyere et al. (2020) have illuminated our understanding of what digital transformation is. In particular, Wessel et al. (2021) provided a much-needed conceptual distinction between digital transformation and IT-enabled organisational transformation. This paper draws on Wessel et al. (2021) and Baiyere et al.'s (2020) conceptualization of transformation. In this view,¹ digital transformation differs from IT-enabled transformation in that it entails leveraging digital technologies to redefine an organisation's value proposition rather than leveraging digital technology to strengthen it. Consequently, such digital transformation leads to the emergence of a new organisational identity with some semblance of a tech company as opposed to a reinforcement of the existing identity seen in IT-enabled transformation (Wessel et al., 2021). Baiyere et al. (2020) provide a vivid analogy by comparing digital transformation to the transformation of a larva to a butterfly as opposed to IT-enabled transformation, akin to the transformation of a cub to a lion.

In a bid to help organisations navigate the process of digital transformation, several frameworks have been put forward. Each of these frameworks sheds light on certain aspects of the digital transformation journey and helps organisations with valuable insights and guidelines for the process. Some of these frameworks are summarised in Appendix A.

Each framework provides a scaffolding that should guide an organisation through navigating the flux of the digital transformation process. Despite these commonalities, there are wide variations between the frameworks. While some begin with an analysis of the current status of the organisations (e.g., the pathways framework), others jump straight into a prescriptive mode of what needs to be done. An implicit assumption that seems to be shared among many of the frameworks is as though digital capabilities are available for organisations to leverage at will and they remain silent on the need to assess them relative to the digital transformation goals. Attending to this issue is important given that it has long been acknowledged in the general organisational change literature that the ability to reconfigure an organisation's capabilities plays an important role in navigating transformational change (Helfat & Peteraf, 2003; Rumelt, 1995; Sambamurthy et al., 2003; Teece et al., 2016).

It is this specific gap that our framework attends to. In essence, the MIND framework aims to help managers better streamline their digital transformation-related options and initiatives from a digital capability perspective. This represents a departure and strategic shift from the drift that characterises how many organisations approach digital transformation. In MIND, managers can find an approach that directs managerial discussions strategically rather than the firefighting approach that fails to pay due attention to the digital capabilities needed. We detail how MIND can be used to address these identified gaps in the rest of the paper.

Figure 1 presents an overview of MIND in action and how the different stages of the framework attend to different pertinent aspects of the digital transformation journey. First, Stage 1 of MIND helps organisations translate their digital transformation goals to digital capability goals. The subsequent Stages 2 and 3 are focused on assessing the relevant digital capabilities that the organisation possesses or needs relative to the specified goals. Different stages provide feedback for refining and retuning the goals iteratively.

It is important to note that MIND is designed specifically for digital capability assessment rather than digital capability acquisition or development, or the overarching digital transformation strategizing, among other related issues. The design of MIND is such that it allows each organisation the latitude to decide on the most fitting approach for their context in terms of the specifics of digital capability acquisition or development. Hence, despite

¹See Wessel et al. (2021) and Baiyere et al. (2020) for a more thorough engagement in delineating digital transformation and IT-enabled organisation transformation. It is beyond the scope of this piece to offer a detailed review of this ongoing scholarly discussion.

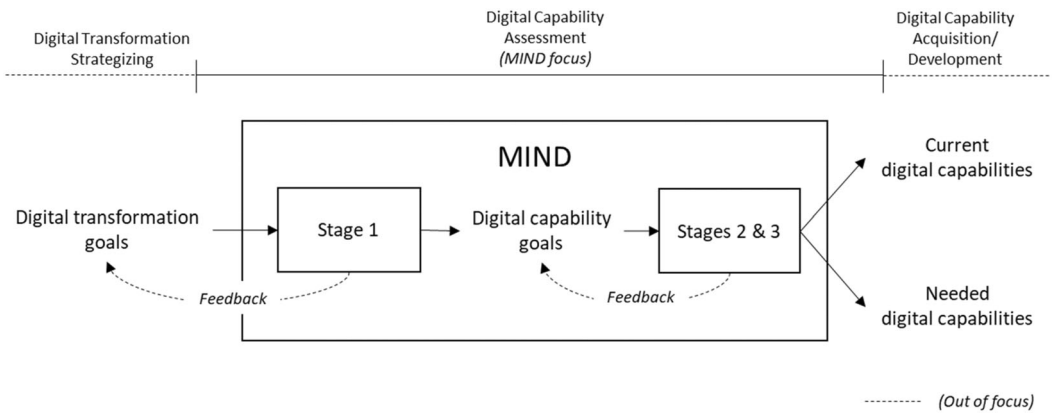


FIGURE 1 Overview of the scope of MIND.

the value that MIND brings, it is worth noting that it is not intended to attend to the entire lifecycle of digital capability challenges during digital transformation by itself. However, MIND does offer a starting point to be able to do this by requiring ‘Measures’ that serve as a guardrail and sensitising device for approaching other digital capability-related endeavours. While providing assessment is valuable, MIND does not end there. It also allows for the formulation of actionable steps that organisations can follow in addressing identified issues from the assessment and a basis for cross-checking their efforts with measurable metrics. In general, the different elements of MIND help organisations know what needs to be attended to – without imposing a one-size-fits-all universal approach.

2.2 | The alpha case

Alpha is one of the world's leading providers of manufacturing automation. The company focuses specifically on automation for the metal manufacturing industries as well as the provision of robotic solutions. The company is part of a group within a holding company that traces its history to the early 1900s. This is indicative of a company that has carried over legacy and traditions from its long history. At the same time, it signals a company that has undergone significant transformation in its past. Today, the company occupies a leading position in its specific sector of the automation business. One of its distinctive hallmarks is its signature control software accompanying its automation hardware. The combination of the software and the hardware has further cemented the company's lead in its industry. The software has been hailed as unparalleled in its domain by both customers and analysts in the industry.

Yet, the advances in digital innovations and technologies, plus the shifting trends and rising competition in its market domain, are beginning to impact the company's position in recent years. As an example, the company is seeing increasing competition from unexpected entrants, particularly software companies. While in its history, the business has been firmly considered to be in the area of engineering and provision of hardware, and the competition has been mapped accordingly, the emergence of these breed of competitors presents a different type of challenge. With its engineering legacy in hardware and machinery – in which it has excelled – the company and its traditional competitors are bound by capital investments and physical technology products. In general, the competition has always been about the superiority of the hardware in conjunction with some software-embedded features and controls that distinguish Alpha from the competition. However, these emerging competitors are competing in the same market and promising similar value with just software. This implies that these companies do not have to worry about capital-intensive machinery and can, therefore, compete at a much lower price point. The business model of these

companies (Osterwalder et al., 2010) is to excel in the software functionalities required in automation and then opt for any required hardware from any engineering companies that best meet their needs.

This trend was akin to the disruptive business model adopted by startups such as Uber and Airbnb, where they do not need to own capital-intensive assets to provide value to the customers (Libert et al., 2014). These, among many other digital-induced threats as well as digital-induced opportunities, have led Alpha to consider embarking on a digital transformation as a pertinent imperative in order to navigate its changing business landscape. These all happened during a period when the company was facing struggles with its profitability due to this emerging digital competitive landscape, which elevated the transformation agenda to the top of its priorities. In fact, its value propositions were very much machine- and hardware-focused, and there was a recognition that this was needed to reflect the emerging shifts of the digital age. Another observation driving the digital transformation is the realisation that the company's reputation is firmly rooted as a machine-producing manufacturing company, but it is also widely acknowledged as one of the few with some software-related competency in that sector. This was considered an opportunity that could be leveraged to position the company as a digital partner to other manufacturing companies. Yet, the process of how to get to this desired point was unclear.

The journey began with the employment of a new CEO who was considered to be a visionary and had the zeal to see the company take the digitalization route. However, it became clear after this initial attempt to bring digitalization into the company's strategy after the first 2 years that the current fabric and makeup of the organisation would require a reboot to be able to make progress in embracing digitalization as a strategic objective. The processes and mindset of the whole company were intrinsically wired to think like an engineering company. Since this was still the main source of revenue, this digitalization attempt ended with a strategy that mainly reinforced and reemphasized the existing ways of doing things.

Another attempt was made to incorporate digitalization into the strategy of the organisation and to embark on a digital transformation. Considering the challenges of the initial digital transformation attempt, a chief digital officer (CDO) was employed to lead this change. The CDO was tasked with spearheading the digital transformation and had the mandate to bring digitalization into the new attempt at formulating an organisational strategy. With this effort, a new strategy was formulated that had digital at its core. With this digital-centric strategy, the digital transformation agenda was established, and a new business unit was created called the digital business unit (DBU); new digital initiatives like the Internet of Things were initiated, and a reshuffling of the organisational workforce was launched. The DBU, in particular, was established to have a cross-functional role with two overarching responsibilities related to the organisation's transformation. First, the DBU was to have a profit and loss responsibility akin to other business units in the organisation. This means it is required to develop new digital offerings and create new value propositions for clients based on data and emerging digital technologies. Second, the unit was also expected to infuse digital business concepts into the operations and value propositions of the other business units in the organisation. Hence, it served as the digital transformation engine of the organisation.

With an agenda for digital transformation driven by the top management, one of the first issues that became apparent was the need for clarity in knowing the existing digital capabilities of the organisation, more so because this was new for the company. However, considering that the company had an in-house software development team and had developed some digital innovations in the past, some digital capabilities existed in-house. Hence, it became necessary to understand the organisation's current digital capabilities and the digital capabilities required to achieve the set-out transformation goals. It is in this bid that the MIND framework was deployed, and it proved to be a useful approach for their digital capability assessment.

3 | MIND FRAMEWORK FOR DIGITAL CAPABILITY ASSESSMENT – AN OVERVIEW

MIND – Represents the core categories of an organisation's digital capability labelled as digitalization – *Management | Infrastructure | Networking/Sourcing and | Business Development Capabilities*. The MIND framework provides a means

of assessing an organisation's digitalization capability. To borrow from Peter Drucker – ‘If you can't measure it, you can't manage it,’ which suggests that if it can be measured, it can be improved. MIND is a qualitative assessment framework that helps organisations assess their current digital capability status and create a pathway for navigating from their current status to the desired digital transformation state. The MIND framework is developed as a simple, practical, industry-neutral approach for organisations interested in assessing their digital capabilities relative to their core organisational goals. The framework has been developed in accordance with the principles of design science research (Baskerville et al., 2018; Peffers et al., 2007), and it has been evaluated (Hevner et al., 2004) in two prior contexts before the instantiation in the case of Alpha presented in this paper. Prior to this third iteration in the development and instantiation of MIND, we first had a pilot evaluation for a university and a second iteration in a forum with Chief Information Officers (CIOs) of several organisations. The instantiation in Alpha represents a holistic implementation of the framework following the input from the prior two development and evaluation iterations.

Fundamentally, the MIND Framework is structured around two main building blocks. These are the MIND Canvas and Process. These building blocks are further subdivided into constituent parts. In overview, The MIND Framework is principally made up of:

1. **Mind Canvas**

- o *MIND Dimensions* (4 macro capabilities – composed of several micro capabilities)
- o *MIND Toolkits* (3 Instruments – balanced score card (BSC), status map, and capability matrix)

2. **Mind process**

- o Stage 1 (strategy phase)
- o Stage 2 (canvas phase)
- o Stage 3 (analysis phase)

3.1 | **MIND canvas**

Central to the utility of the framework is the MIND Canvas (See Figure 2). The MIND Canvas provides a qualitative measure of the position of the business/digital objectives as viewed from the lens of the digital capabilities that define the organisation. The MIND Canvas is structured to stimulate actionable insights for decision-makers about

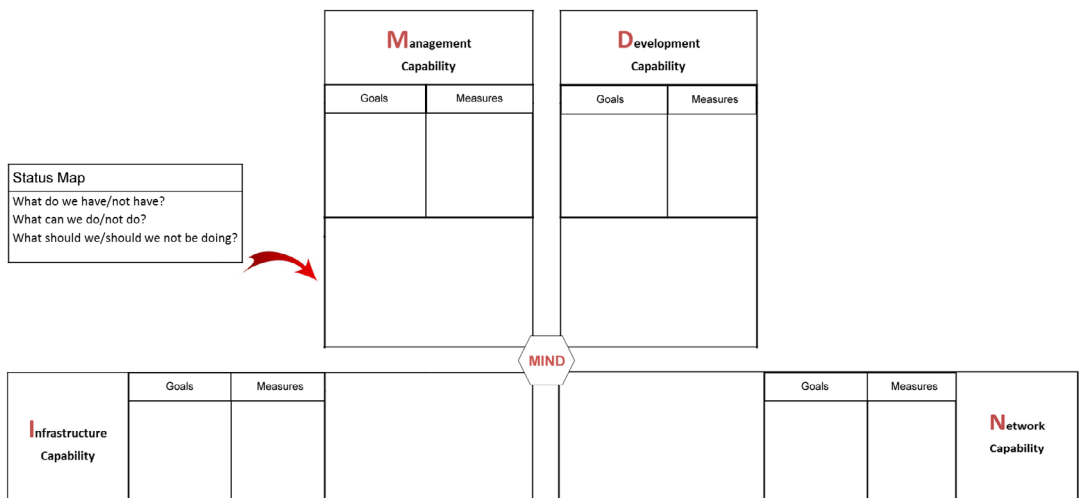


FIGURE 2 The MIND Canvas.

their digital capability's status relative to where the organisation aims to be. In what follows, we provide a brief overview of the dimensions of the Canvas.

3.1.1 | The MIND dimensions

The MIND dimensions are the key pivot around which the framework revolves. The four dimensions represent a unified categorisation of digital capabilities classifications from prior research (Matt et al., 2015; Peppard, 2018; Uhl et al., 2018; Westerman et al., 2012). The acronym MIND emerged as an apt anagram from a literature review aimed at synthesising the current knowledge about IT and digital capabilities. The MIND micro capabilities represent the constituent capabilities that make up the four MIND dimensions. The dimensions represent a comprehensive coverage of digital capabilities in prior literature, and the constituent foundational capabilities that have been identified in prior research under different classifications of Digital and IT capabilities (Bhatt & Grover, 2005; Peppard & Ward, 2004; Ritala et al., 2021; Sambamurthy et al., 2003; Uhl et al., 2018; Westerman et al., 2012). Table 1 gives the distribution of the capabilities (referred to as micro capabilities relative to the MIND capabilities in this context).

It should be noted that certain micro capabilities can extend in theory, beyond one dimension. However, the categorisation of the micro capabilities under the respective MIND dimension is representative of the dimension that is much closer related to the foundational principle of the macro capability. Capabilities, by their nature, are synergistic. Synergy is about joint action or co-action. This implies that most capabilities do not work in isolation or provide optimum value as a solo capability, but rather, such capabilities work in consonance with other capabilities (Ritala et al., 2021; Sambamurthy et al., 2003).

Digital management capability

This capability refers to the ability of the organisation to plan and orchestrate its digital resources towards making strategic decisions and choices in alignment with the organisation's overall goals and vision (Cragg et al., 2011; Peppard & Ward, 2004). It holds a long-term perspective on the direction of the digital agenda the organisation should aim at. The digital management capability of an organisation is primarily the dimension of MIND Canvas that captures the capacity to translate organisational goals to strategic digital activities. It also works as the capability that supports the organisation in the choice of various strategic and operational options based on the level of other digital capabilities. Within the four MIND dimensions, the 'M dimension' is indicative of the capacity of an organisation to appropriately manage and position its digital resources – knowledge, skills, competences, personnel, assets, and relationships within its digital domain as dictated by the dynamic nature of its business landscape (Sambamurthy et al., 2003).

TABLE 1 MIND constituent micro capabilities.

Management capability	Infrastructure capability	Networking capability	Development capability
- Planning	- DT (digital technology) objects	- Relationship assets	- Business system thinking
- DT governance	- DT personnel	- Informed supply	- Business-DT relationship
- DT management	- DT operations	- Informed buying	- Knowledge richness
- Strategic vision	- DT knowledge	- Contract facilitation	- Development agility
- change management	- DT infrastructures	- Contact monitoring	- Process richness
- entrepreneurial alertness	- Human-DT Skills	- Vendor development	- Systems development
- business & strategic thinking	- DT architectures	- External DT partnerships	- DT business spanning
			- Internal DT partnerships
			- Business process integration

Digital infrastructure capability

The digital infrastructure capability dimension describes the actual affordances provided by an organisation's tangible and intangible digital/IT resources (physical assets and human competences) (Bharadwaj, 2000; Bhatt & Grover, 2005). It can be compared to the capability provided or possible because of the tools possessed in a toolbox. In operational terms, this analogy can be extended with a simple scenario of having a hammer. Having a hammer means there is a resource that provides the potential capability to hit a nail. Similarly, having a carpenter in an organisation means the competence to hit nails already exists, and therefore there is a capability to do this. In essence, the 'I dimension' defines the human and technological digital/IT base, which determines the extent to which the organisation can exploit the benefits of its digital/IT investments (Fink & Neumann, 2007; Fürstenau et al., 2019).

Digital networking/sourcing capability

This MIND dimension deals with the ability or degree with which an organisation can harness the wealth of digital capabilities that exist or reside outside the direct jurisdiction of its organisational borders (Bharadwaj et al., 1999; Cragg et al., 2011). We live in an era where open innovation; social networks; co-opetition; crowdfunding/sourcing, and other collaborative phenomena are indispensable considerations for organisations to thrive (Salmela et al., 2022). It becomes imperative for organisations to have a dimension of digital capability that caters to their ability to leverage on this impetus to bolster their existing digital capability base.

Basically, this digital capability dimension builds on the knowledge that no single organisation has all the capabilities it needs at all times (Peppard & Ward, 2004). Therefore, whenever there is a need to utilise a capability that is not present within the organisation, the ability; speed, and effectiveness with which it can access; utilise and take advantage of such *external* digital capabilities determines its digital Networking/Sourcing Capability. In the recent digitalization era, where most organisations' operations are entwined and directly reliant on their relationships with their external environment, the 'N dimension' represents an organisation's aptitude for identifying, acquiring, and absorbing digital value from outside its immediate business environment.

Digital business development capability

This is the capability of an organisation to deploy its digital resources to meet the current and emerging operational/service needs of the organisation. This dimension of MIND Canvas relates to the degree of alignment of the digital activities with the organisational operations (Lu & Ramamurthy, 2011; Wade & Hulland, 2004). The ability of the organisation to swiftly and effectively meet the demands of the business via a reconfiguration of its digital resources or to enable the creation of new businesses is captured by this capability. Additionally, the ability to facilitate operational communication between the digital and business sides of the organisation is one other indicator of the Digital-Business capability dimension. Summarily, the 'D dimension' defines how well the digital activities of the organisation can fit, align and/or adapt to the business objectives and organisational direction (Ravichandran & Lertwongsatien, 2005).

In overview, the objective of the MIND framework is to help organisations translate their digital transformation goals into four manageable (M-I-N-D) digital capability *goals*. Based on the established digital capability goals, the framework then enables the organisation to evaluate their *current status* (i.e., the *now*) relative to these goals. Subsequently, MIND provides a facility for the organisation to outline *key activities* (i.e., the *how*) needed to fill the identified gaps in their current digital capability.

3.1.2 | MIND toolkits

The MIND toolkit is made up of three main instruments based on extant business analysis techniques and principles. These are: an adaptation of the balanced scorecard – BSC, a Status Map and Capability Matrix. Each of the instruments has been adapted from their initial makeup and aimed at serving a specific function in the MIND framework.

The principles that were found relevant and helpful for the goal at hand have been adopted, modified or enhanced to fit with the practical application of MIND. Basically, the adapted BSC provides strategic utility to MIND; the Status Map provides a snapshot view of the positioning of an organisation's digital capability, while the Capability matrix incorporates the digital capability concepts into the framework.

An adapted balanced score card (BSC)

The BSC is a strategic sense-making device (Kaplan & Norton, 2007) that has been widely used for both practical and theoretical applications. The BSC has been positioned as an instrument that evaluates the intangible input or value of a digital investment as opposed to the traditional view of evaluating the value of an investment by its financial returns alone. It has been applied in different contexts and industries for many reasons, with some common reasons being its simplicity and the balanced four (4) perspectives it offers. Also, the adapted BSC provides an evaluation measure that represents organisational measurement as a process of enhancing the vision and strategy of an organisation. In its basic form, the BSC is designed to afford business managers a fast and all-inclusive assessment of a business's strategic state and to provide a performance measure for the organisation along different metrics. It does this without neglecting assets that provide intangible value or contribution to the organisational performance.

MIND is an instrument with the aim of gauging the strategic status of an organisation's digital capability relative to the organisation's strategy. Additionally, digital capability is one of the value additions of digital investments that cannot be solely evaluated based on financial return-on-investments calculations. Furthermore, since the balance scorecard has been designed with these two critical principles in MIND, it logically presents itself as a plausible instrument to anchor the design of the MIND framework around, among many other considered options. Therefore, the sensitivity of the adapted BSC to intangible assets and its capacity to take tacit value-contributing resources into consideration in its assessments makes it stand out as a useful and relevant framework to be adopted. This is particularly the case due to the fact that digital capability, as captured by the MIND framework, is about both physical/tangible elements and soft/abstract elements of the digital capabilities that symbolise any organisation.

One of the key strengths of the BSC is its insistence on indicating the measure for every set goal in its four perspectives. This is the core strength of the BSC that has been borrowed for inclusion in the MIND framework. This is obvious in the *Goal* and *Measures* column of the MIND Canvas as illustrated in Figure 3. This element of the BSC

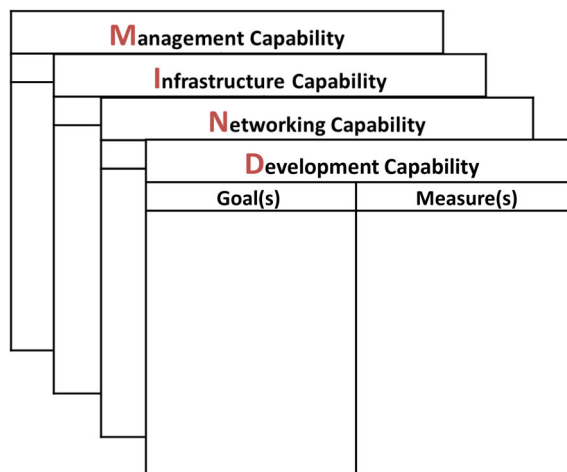


FIGURE 3 Goals and measures as components of MIND adapted from BSC.

primarily ensures and enforces accountability and tracking of the progress of the preset goals in a strategic orientation or it outlines the parameters that would be used in evaluating organisational performance along the four BSC perspectives in a performance orientation.

The four perspectives of the adapted BSC have also been adopted as recommended Key Performance Indicators for establishing representative measures for each stated goals of the MIND dimensions² (see Table 2). These are used as the parameters on which the progress towards the set MIND goals would be assessed. The mapping of the adapted BSC perspectives to the MIND performance indicators is as follows: *Finance, Customer, Learning/Innovation and Process* Performance Indicators. These represent a supporting guide for coming up with measures for goals that organisations can adopt or tweak to reflect their particular contexts (See Table 2).

Status map

In contrast with the adapted BSC which is oriented towards the future and strategic goals, the Status Map analysis is an instrument that is usually aimed at examining the current status of an organisation or a specific evaluation unit/focus of evaluation. While the BSC gives an evaluation of the strategic positioning of an organisation with respect to particular perspectives and also evaluates the performance of an organisation in relation to a pre-specified goal, the Status Map analysis looks into the existing/potential negatives and positives that are associated with reaching that goal.³ This is indicative of the fact that the Status Map analysis is positioned to provide a representative snapshot view of its item of analysis at a point in time. Its value arises from its capacity to highlight areas that are in need of attention towards attaining desired organisational goals.

Adopting the Status Map analysis as one of the valuable instruments for MIND comes from its capacity to provide an assessment of both the internal features of an organisation and the external characteristics of the operational environment of the organisation. The MIND framework is similarly structured to take both the internal digital capabilities of an organisation alongside the external digital capabilities required to achieve its goals into account in order to get a holistic picture of the digital capability of the organisation. As reflected by the Networking Dimension of the MIND framework, the external digital capabilities around an organisation's goal is an important dimension that should not be neglected. Therefore the foundational principle of the Status Map analysis to consider both internal and external perspectives makes it a valuable tool in assessing an organisation's digital capability.

The MIND framework utilises *three pivotal questions* (see Figure 4), which are presented to a representative number of participants within the organisation to extract the Status Map of each capability. While the Status Map

TABLE 2 Examples of indicators that can be used as measures for MIND goals.

Finance Indicator	x% reduction in cost y% increase in sales...
Learning Indicator	Acquired ability to do A Demonstrated B skills
Process Indicator	X times faster processing ... Gain efficiency of Y in ...
Customer Indicator	Increase satisfaction by a% Attract b% more customers

²Basically, the BSC mandates a clear articulation of the organisation's goals (for example time, quality, performance...) with respect to each perspective and subsequently requires a translation of the goals to specific set of actionable measures by identifying what measure is appropriate for each stated goal. Similarly, the implementation of the strategic phase of the MIND framework rests its foundational footing on the same logic and goals-measurement relationship.

³Additionally, despite the valuable contribution and insights provided by the BSC in the MIND framework, it however, on its own does not give an indication or assessment of the strengths, weakness, opportunities and threats that are inherent with each capability or MIND dimension which is the core strength and purpose of the Status Map analysis framework. In adopting the Status Map for the MIND framework and using it to complement the BSC, the MIND framework is by design structured to provide a means of assessing organisational IT capabilities with respect to a defined goal and also assessing its alignment with the overall direction of the organisation along with identification of the areas that require attention and areas that can be leveraged towards achieving the goals.

What do we have/not have? What can we do/not do? What should we/should we not be doing?

FIGURE 4 MIND status map questions.

helps with highlighting the strengths and weakness of the organisation's digital capability akin to the SWOT analysis, the difference in the application of Status Map in MIND is that, rather than analyse the status and produce floating insights, the MIND ensures that every Status Map analysis is relative to a predefined goal. This enforces that the resulting Status Map analysis provides a focused view of the status of each capability relative to a measurable goal. With this procedure in place, the result of the Status Map should reveal what capabilities are strong, weak or lacking in achieving that particular stated goal. The three anchor Status Map questions address the 'have/not have' to identify lacking, surplus or redundant capabilities while the 'Do/Cannot Do' reveals what the organisation is presently capable of or incapable of towards attaining its goal. The third question is prescriptive as it highlights what 'should/should not' be done to highlight areas that are potential opportunities or threats in relation to the stated goal.

Furthermore, in the digital domain, it is a generally accepted knowledge that the rate of change and advancement in digital is very fast paced. Consequently, it can be logically inferred that by knowing the strengths and weakness of a digital capability can be a valuable knowledge in order to either 'avoid hesitating and missing key opportunities or being the fool that rushes in.' Such knowledge as provided by MIND is expected to help organisations in making better informed decisions in relation to their digital strategy and digital capability investments. In summary, the value of the Status Map matrix in MIND is to specifically provide a means of evaluating the strengths and weaknesses, as well as identifying potential sources of threats and opportunities that are inherent in the digital capabilities of an organisation.

Capability matrix

The Capability Matrix represents the amalgamation of the other toolkits into the MIND Canvas (Figure 2). It is composed of the MIND matrices. Each matrix encapsulates a particular M-I-N-D dimension, a BSC toolkit and a Status Map combined – for an illustration of the I-matrix, see section 3.2.2. This structure enables the canvas to be decomposed into each of the MIND dimensions for analytical and pragmatic purposes. This is an important aspect of the toolkit that delineates the three phases in the MIND process that we describe next. In essence, the capability matrix is the glue that holds all the other components of the canvas together, and its salience is pronounced in the analysis phase when all the inputs are collated.

MIND Canvas in summary 003A

- The MIND dimensions enforces *specificity* of the digitalization or digital transformation goals.
- The measure component of the adapted BSC enforces *measurability* of the MIND goals.
- The status map component enables the *aggregation of capability insights* about the standing of the capabilities relative to the MIND goals.
- The capability matrix allows for the top management team and organisational members to *collectively outline and shape the translation of the transformation goals and the requisite capabilities*.

3.2 | MIND process

The MIND process is structured to take place as a 3-phase workshop with individual and participatory output from respondents. These will principally happen in three meetings with different members of the selected participants.

The expected participants are selected members of the digital unit (if any), IT staff, business staff and other stakeholders who have some understanding of the digital trends as well as the internal status of digital-related capabilities within the organisation. The level of participants should ideally range from top to middle-level members of the organisation. An overview of the process is presented in Figure 5.

Much care should be taken in selecting the participants of the workshops. The quality of the output is dependent on the quality, experience and relevance of the participants to the organisational goals. This selection process is idiosyncratic to each particular organisation as different organisations have their own heuristics for deciding who would be relevant for such an exercise. In Alpha, the selection was made mostly by (a) the Chief digital officer, who holds a seat at the top management level of the organisation and seats as a member of the strategy board. In conjunction with (b) the innovation director who typically leads the planning and coordination of different workshops in the organisation. He has a wide overview of the people in the organisation, and he is very experienced in identifying individuals within the organisation who would be valuable to innovation projects. He is generally considered a connector that refers to people with different expertise and stimulates internal and external collaborations. Lastly, (c) one of the researchers was involved in the process to articulate the type of expertise that would be necessary for each phase of the MIND process.

3.2.1 | Stage 1: Strategy phase

This stage involves the adapted balanced scorecard (*What?*). The aim of this stage is to establish the strategic goal of each of the M-I-N-D capabilities relative to the overarching vision and direction of the whole organisation. Firstly, the implementation activity begins by identifying and clearly stating the *Who?* Since this is a strategic exercise, ideally, the participants of this stage should be representatives of the organisation at the top management level with a digital/strategy mandate for the organisation. The adapted BSC has two columns to be filled – first the goals and then the corresponding measure (see Figure 6). Therefore, after setting the goals, they are required to set measures that can be used to assess the goals to avoid setting floating goals that cannot be measured. To guide this process, they use the four perspectives of the balanced scorecard to state their measures. An example measure for a set goal could be – result in: (i). Finance – 10% cost reduction, (ii) Customer – 10% increase in customer satisfaction... among

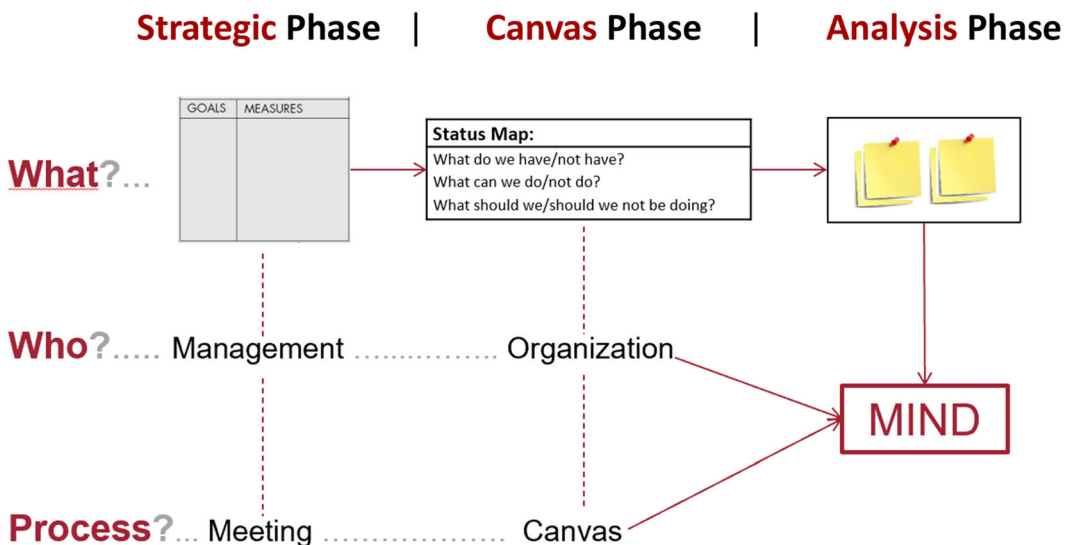


FIGURE 5 Overview of the MIND process.

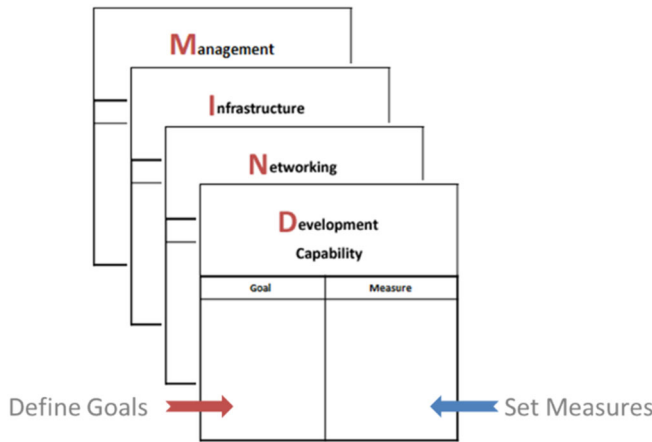


FIGURE 6 Allocation of goals and measures in the strategy phase.

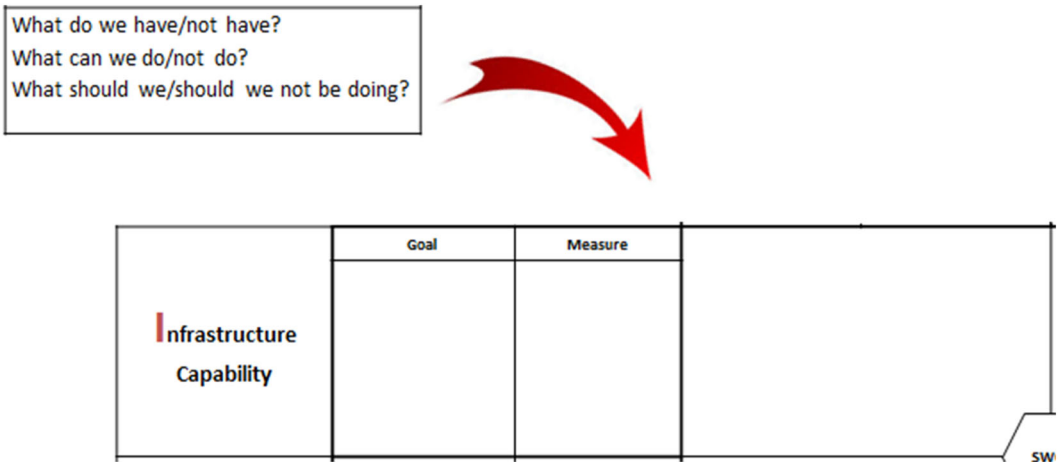


FIGURE 7 Representation of the status map canvas for the infrastructure capability.

other possible measures. The last item in this stage is the *Process/How?* question. This basically states that the stage will be conducted via an organised strategy setup meeting.

3.2.2 | Stage 2: Canvas phase

The aim of this stage is to get a Status Map of the current IS capability situation that characterises the organisation. The *What?* In this stage is the Status Map analysis using the three key questions highlighted in Figure 7. The *Who?* in this case, involves a larger group of participants. A representative number from the digital/IT and the business should preferably be present to carry out the exercise. Participating members from the business side should ideally be digital aware. This is an important phase as the quality of the output is very much dependent on the quality of the input. One or more participants from the Strategy phase in stage one should be present. This is necessary so as to have someone to explain the goals that were established in that stage as input to this stage.

The *Process/how?* of this stage requires the use of a canvas-like concept where each participant provides his/her answers to the three questions for each of the M-I-N-D capability dimensions (see Figure 7) and affixes (post-it or via an app) to the corresponding capability on the canvas. The Status Map questions are not answered arbitrarily. Rather the participants are constrained to focus and relate their response for each MIND with respect to the Goals transferred from the strategy stage. Thus, ensuring a concerted evaluation focus. For triangulation purposes, a second iteration of this process is done, but this time, the participants are grouped in threes. Together, each group repeats the process and discusses their thoughts for each MIND dimension vs Goals. At the end, their final consensus would also be added to the canvas.

3.2.3 | Stage 3: Analysis phase

This is the final phase of the input process for MIND implementation. At this point, the ‘post-its’ (or online data – if conducted digitally) are then collected and clustered (see Figures 8 and 9) within each M-I-N-D Capability Matrix. This should ideally include at least one representative from the organisation and at least one external reviewer (either researcher or consultant). This is aimed at having a degree of objectivity as required in clustering principles and also to a balancing mechanism with an insider who better understands the contexts and an outsider who understands the framework and is not biased by the context.

At the end of this, the MIND Canvas should be analysed to reveal snapshots of the current strengths and weaknesses of the IS capability relative to the stated goals.

In addition, the MIND Canvas should not be clustered to provide Status Map information only but should be also analysed to help in eliciting unique insights and suggestion for decision makers. This should be structured to inform

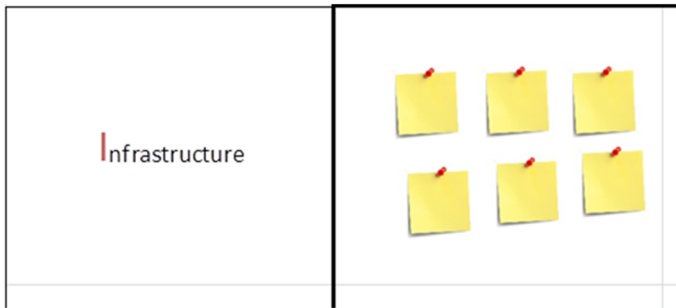


FIGURE 8 Illustration of collected response from the status map segment.



FIGURE 9 Illustration of clustered responses.

them on how to position their digital capabilities to reflect their desired goal and perhaps more importantly, to steer them towards achieving the set out measures. Depending on the measure set for each goals, the MIND Canvas could be steered to provide cost saving avenues by revealing redundant capabilities. These among other value adding benefits are expected achievements after the implementation of the MIND framework.⁴

4 | DEPLOYING MIND TO ASSESS DIGITAL CAPABILITIES IN ALPHA

Given the rising awareness in Alpha that they do not know the digital capabilities that they have and their relevance to their digital transformation goals, it was clear that the company needed a way to assess their readiness for the digital transformation journey. Importantly, there was a sense of uncertainty about the digital capabilities required to attain these digital transformation goals. This became the impetus to leverage the researchers' ongoing research on digital capabilities to cocreate MIND as a framework for attending to this challenge. MIND was instituted in Alpha primarily as part of a research project to help the company assess its digital capabilities and the level of its digital readiness with respect to its desired digital transformation plans. There were three phases, each of which happened as three different workshops (see Table 3).

4.1 | MIND stage 1: Strategy phase (translating the digital transformation goals)

In this phase, the objective was to translate the organisation's digital transformation goals as outlined in the organisation's strategy, into the four dimensions of M-I-N-D. Due to the strategic nature of the content and discussion at this stage, the invited members for this workshop included members of the organisation strategy team, the heads of different product units, and lead representatives from the IT and digital business unit. In total, there were eight participants and two facilitators in this workshop.

The task for the participants was to individually highlight what their digital M-I-N-D capabilities goals should be in order for them to achieve the outlined strategic objectives of the company. They then collectively cluster the

TABLE 3 Overview of the three phases and workshops.

MIND stages	Workshop	Purpose	Participants
<i>MIND Stage 1</i>	Strategy phase workshop	To translate the organisation's digital transformation goals as outlined in the organisation strategy into the four MIND dimensions.	<ul style="list-style-type: none"> • 8 participants • 2 facilitators
<i>MIND Stage 2</i>	Canvas phase workshop	To outline the current status of the company's digital capabilities with regard to each of the MIND goals from the strategy phase.	<ul style="list-style-type: none"> • 19 participants • ~3–5 remote participants • 3 facilitators
<i>MIND Stage 3</i>	Analysis phase workshop (and follow-up meetings)	To collate and make sense of the insights collected and generate an overview of the different digital capabilities identified as relevant for the digital transformation as well as the current status of each capability.	<ul style="list-style-type: none"> • 3 participants • ~7 follow-up meetings with different stakeholders

⁴Organisations should be able to continue using the output of MIND after the workshop. A facility to do this is the recommended periodic measurement of their progress relative to the desired goal. If the goal should later change, the measures should be changed accordingly. The change may only require a repeat of the Strategy Phase (Stage 1). However, if the organisation wants to have further understanding of what can be changed or adjusted in order to meet the stated goal, they should then proceed to the Canvas Phase (stage 2) and Analysis Phase (Stage 3), for that specific MIND dimension.

different ideas into overarching MIND capability goals. The guiding question for this phase is: ‘to contribute to achieving digital transformation goals, what should our digital M-I-N-D be aimed at?’ This process is repeated for all the MIND dimensions. Subsequently, they were requested to collectively outline the different measures that can be used to evaluate when the stated goal has been achieved or to indicate a measure of progress towards achieving the goals. The logic behind the measures is to: first, help them recalibrate the formulation of their MIND goals and to ensure that the goals they have come up with are specific, measurable, assignable, realistic, and time-bounded. Second, the measures activity ensures that the goals set are not just floating goals but goals where the progress can be observed and determined over time (See MIND Process in section 3 for a description of the generic process).

After the workshop, a meeting was scheduled with the CDO and innovation manager to review the results of the workshop. The emerging MIND goals were then more carefully refined and distilled into two goals per MIND dimension from this exercise. These became the input for the second stage of the MIND process. Figure 10 gives an illustration of the outcome of the first stage of the MIND process.

4.2 | MIND stage 2: Canvas phase (establishing the current status)

This phase of the MIND process happens as a second workshop, which took place a week after the first workshop. The objective of this phase was to outline the current status of the company's digital capabilities with regard to each of the MIND goals that were developed in the strategy phase workshop earlier. Considering that the assessment of different capabilities would depend on each observer's vantage point and perspective, this phase of the MIND

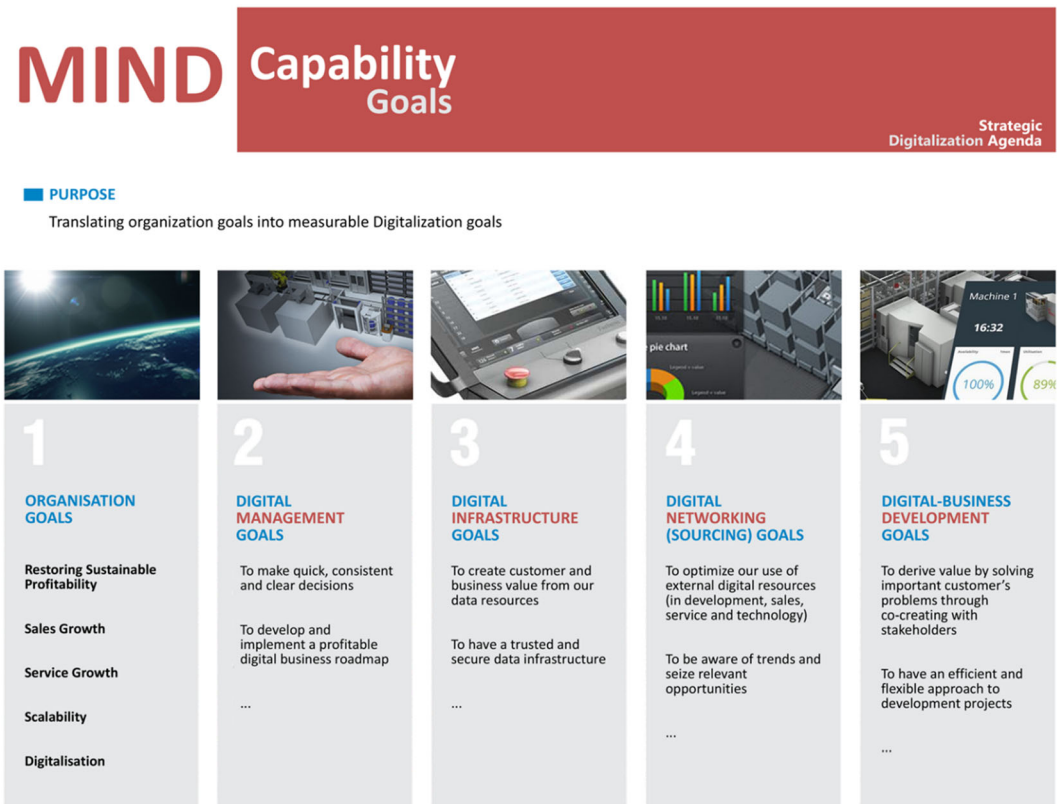


FIGURE 10 Illustration of alpha's MIND capability goals.

process involves a larger number of participants drawn from different parts of the organisation. This is consistent with the recognition that insights can be tapped from the wealth of employees' knowledge (Benbya & Leidner, 2018; Reibenspiess et al., 2022). There were 19 participants in this phase of the workshop and three facilitators. In addition, some participants joined the workshop via remote connection from other branches of the company in other countries. The participants were distributed such that there were representatives from the digital business unit, IT department, senior management, sales and marketing, product management, project management, and customer service.

The participants were then structured into groups of about 3–5. The task for the participants was to evaluate each of the MIND goals from the previous workshop with three questions as outlined in the Status Map. First, the participants reflected on each goal and individually outlined what they consider Alpha *currently possesses and what it is capable of doing* with regard to the goal. Second, they repeated the process, but this time they were asked to outline what Alpha *lacks and what it is currently incapable of doing* in order to achieve the stated goal. Lastly, they repeated the process and submitted their suggestions and recommendations on what the company *should or should not do* in order to address the capabilities it currently lacks and also how they may capitalise on capabilities that they currently have. Third, this process is then followed by a tallying process where each group discusses the output. Then every participant reads through each of the submitted responses and distributes 5 points to the submissions they consider most pertinent towards achieving the transformation goals across all the groups. The whole process is then repeated for each of the MIND dimensions.

4.3 | MIND Stage 3: Analysis phase (developing the action plan)

In this phase, the objective was to bring together the insights collected from the two earlier workshops and generate an overview of the different digital capabilities identified as relevant for the digital transformation as well as the perceived status of each capability. This phase was conducted as a meeting with three participants who had gone through the generated insights prior to the meeting and made a preliminary conception of what was emerging. The results were clustered around the highly ranked items that emerged from the tallying done in the prior workshop. Each emerging cluster was then evaluated by the CDO, the innovation manager and a researcher with respect to its relevance and importance for the digital transformation journey. The clusters were then repositioned into the three dimensions of the Status Map – (a) from an internal perspective, what are the digital capabilities of Alpha, and what is their current status? (b) what capabilities are lacking but required in order to achieve the transformation goals? And (c) what are the activities needed to fill these gaps.

Once an overview of the capabilities status was outlined, the focus of the analysis shifted to developing the suggested activities and fine-tuning them to be implementable. To prioritise the activities, an Impact versus Urgency matrix was created. The activities were then positioned in the matrix based on how high or low the impact of an activity is, along with how high or low it is in urgency. Figure 11 illustrates how the results were positioned in the impact matrix.

The next part of the analysis happened over several meetings and discussions between the CDO and the leadership of the digital business units and interactions with the research team. The discussion centred on how to go beyond the digital capability assessment to map the required activities needed to bridge the digital capability gaps identified from the workshop. Hence, the MIND activity document was developed iteratively such that each activity was assigned to someone and tied back to a measurable MIND goal. Figure 12 gives an example of the MIND activity lists from a preliminary analysis (with anonymized names).

In overview, the three phases provide an avenue to (a) translate the digital transformation goals to corresponding digital capability goals (b) assess the status of the organisation's digital capabilities relative to the digital transformation goals, and (c) outline an action plan in the form of necessary activities for the development of the required digital capabilities. Figure 13 provides a diagrammatic overview of the process.

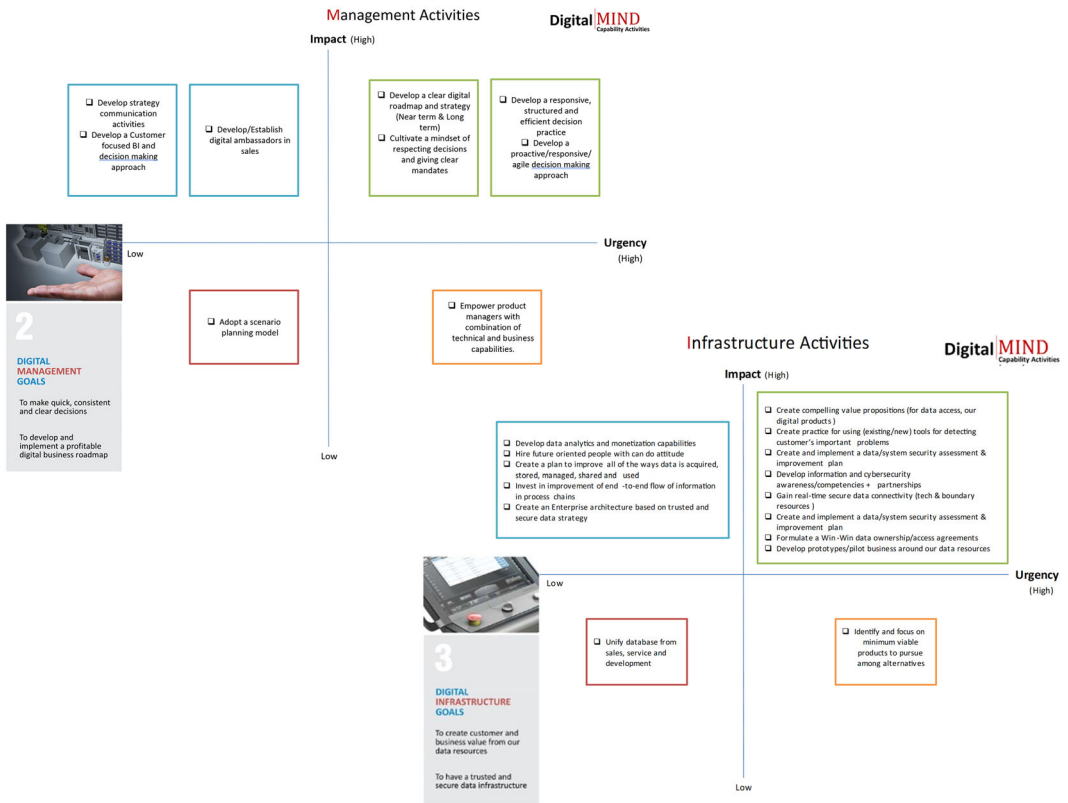


FIGURE 11 (a and b) Illustration of identified MIND activities and their prioritisation in alpha.

5 | KEY OUTCOMES OF THE DIGITAL CAPABILITY ASSESSMENT

The digital capability assessment exercise yielded multiple beneficial results for Alpha. Chief among them is the attainment of their ambition to digitally transform. In line with our definition of digital transformation (Baiyere et al., 2020; Wessel et al., 2021), Alpha has undergone a digital transformation. First, the company has significantly redefined its value proposition. Initially, the company saw itself as being in the business of selling hardware machinery to other manufacturing companies. However, the company's value proposition now includes a portfolio of digital innovations and digital services. These include digital offerings such as becoming a leading provider of automation software for the industry, leveraging data collected by their machines for new Industrial Internet of Things business models, and positioning themselves as a digital consultant for other manufacturing companies in the manufacturing sector. One of the executives presented a reflection of the digital transformation as follows: ‘Most of it has been... we have dealt a lot with all of the ways of work(ing), for example agile, that's one of the biggest things. We have organised ourselves in a way that we have digital business unit which is capable of concentrating on software development or offering development (on one side), and then, on the other hand, (we) design the process to ensure digital earnings (and that) we have digital capabilities as enablers. So, yeah, that's it. Big things, huge. And lots of details.’

Second, the company's identity has gradually morphed from being just another manufacturing company to becoming a manufacturing company with some appearance of a tech company in its identity. This shift in identity is recognisable from how the company is being perceived by other manufacturing companies, such that they are willing to approach Alpha for digital consultancy. This is also apparent in the changing landscape of the company's competition as it was no longer only competing with manufacturing companies. Instead, it gradually saw itself competing with other tech companies like Siemens, and also comparing itself with other digital platform companies. Lastly, this

DIGITAL MANAGEMENT CAPABILITY

Goal	Activities	Responsible	Progress Interval
To develop and implement a digital business roadmap Measures ✓ Creation of an executable roadmap ✓ Ability to position progress along roadmap with tangible metrics	<input type="checkbox"/> Develop a clear digital roadmap and strategy (Near term & Long term)	John	By August
	<input type="checkbox"/> Develop/Establish digital ambassadors in sales	Philips K.	Monthly review
	<input type="checkbox"/> Adopt a scenario planning model	Paul and Jane	Bi-Monthly review

DIGITAL INFRASTRUCTURE CAPABILITY

Goal	Activities	Responsible	Progress Interval
To create customer and business value from our data resources Measures ✓ Increase number of customers with on-line access to data ✓ Growth of data and data utilization based offering ✓ Increase in sales from data and data utilization based offering ✓ Number of negotiated partnership and successful contracts to collect/access/share data ✓ Increased capabilities in data monetization	<input type="checkbox"/> Create compelling value propositions (for data access, our digital products)	Paul and Jane	Revised Bi-Monthly
	<input type="checkbox"/> Formulate a Win-Win data ownership/access agreements	Linda and Henry	Bi-Monthly review
	<input type="checkbox"/> Develop prototypes/pilot business around our data resources	Paul and Jane	Bi-Monthly review
	<input type="checkbox"/> Identify and focus on minimum viable products to pursue among alternatives	Tina	Bi-Monthly review
	<input type="checkbox"/> Develop data analytic capabilities	Philips and Kambi	Bi-Monthly review
	<input type="checkbox"/> Unify data from sales, service and development	John	Next quarter
	<input type="checkbox"/> Hire future oriented people with can-do attitude	Tina	Next quarter
	<input type="checkbox"/> Establish technology & boundary resources (technical e.g. APIs and cooperative e.g.	Harri & Tomi	

FIGURE 12 Examples of MIND activity documents.

gradual shift in identity is also becoming apparent in that the composition of the company's workforce has gradually evolved from just a handful of software developers to a situation where about 1/5th of the workforce are now holding software or digital-related roles. See Table 4.

In what follows, we outline some of the key results and values derived by utilising MIND to assess the company's digital capabilities and how this contributed to the organisation's unfolding digital transformation. We highlight how the organisation members reflect on the value of the MIND exercise via excerpts from interviews with key stakeholders conducted during and after the MIND process.

5.1 | Opened up digital capability knowledge and translation of digital transformation goals

The key objective of the MIND framework is to enable organisations to assess their digital capabilities relative to their desired digital transformation goals. Consequently, the key output of the workshop could be summarised as:

(a) Alpha was able to translate its digital transformation goals to the level that it can be related to four manageable digital capabilities goals (see Figure 10 with MIND goals). (b) In addition, it enabled an alignment between Alpha's digital transformation goals and the required digital capabilities. (c) It subsequently provided an aggregate of insights about the capabilities required for Alpha to attain its digital transformation. Additionally, Alpha was able to not only identify the digital capabilities that it needs but also to have an outline of its current status with regard

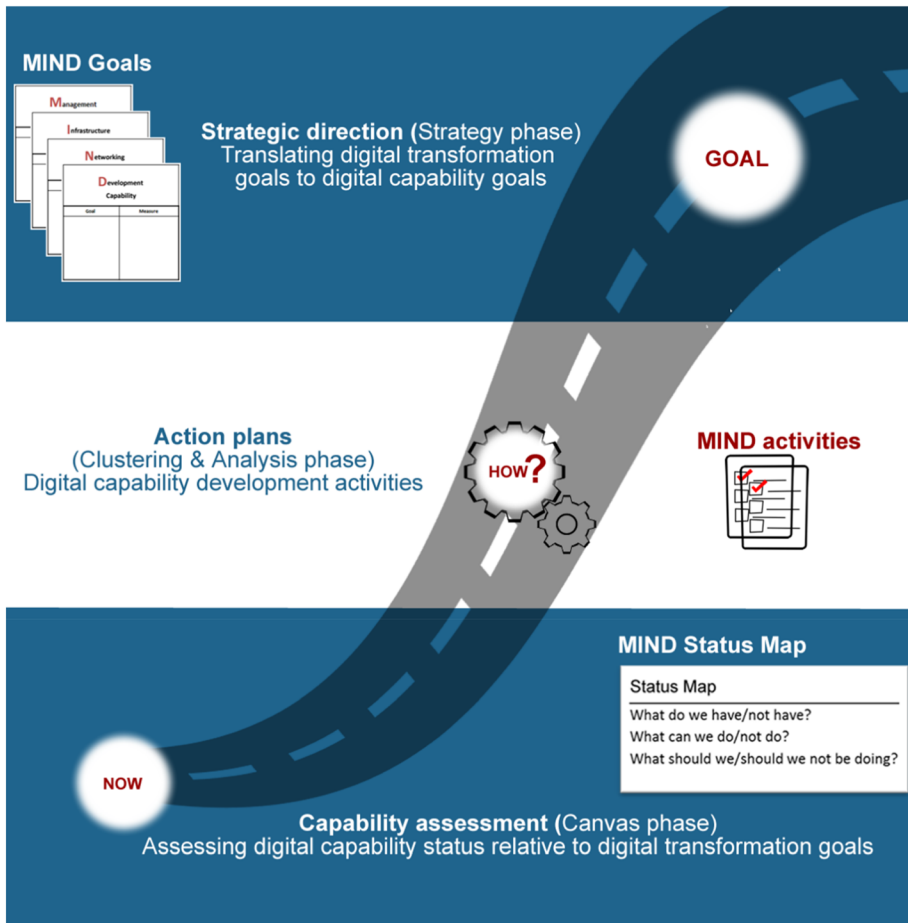


FIGURE 13 A pathway overview of the MIND process.

TABLE 4 Overview of some digital transformation outcomes.

Sample digital transformation metrics	Before digital transformation	After digital transformation
Value proposition	Providing clients with solutions to meet their manufacturing automation needs	Providing clients with additional services (e.g., IoT), consultancy, training that leverages but extends beyond manufacturing automation.
Identity	Manufacturing company selling machines and competing with other manufacturing companies	Now seen as a company selling software and digital services and competing with digital technology companies.
Workforce	About 2% had software/digital business related role	About 20% had software/digital business related role

to these capabilities (see Figure 12 with activity lists). (d) Lastly, the knowledge of the digital capability status provided key input for the subsequent future strategic plans of the newly established digital business unit and the organisation as a whole. One of the digital business leaders expressed how they translated the big digital transformation

ambition into miniature goals that spring from the understanding derived from MIND as follows: 'We are not that much talking about digitalization nowadays, it is kind of broken down into smaller things (MIND dimensions). And I'm not even trying to talk about digitalization that much, because it confuses people. Instead, we're talking about kind of, okay, what we do with the data, data quality, robotic process, automation, software development, ways how we do software development, IoT platform, things like that. Like, (how do we) develop financial reporting process and then automate that. These are kind of pieces of digitalization, but if you talk about digitalization as a concept it is too difficult to comprehend, it is too vague. So, we need to break down the elements of digitalization into smaller comprehensible pieces that can be kind of understood, that can be handled and processed inside the organization (like MIND).'

5.2 | Initial implementation plan for digital business unit

Since the digital business unit was a newly created entity within Alpha, the output of the MIND framework was helpful in formulating the early steps to be taken along the digital transformation journey. The results identified pressing issues and helped bring key priorities to the fore. For example, it became clear from the exercise that competing with the current revenue model was not sustainable or applicable to the potential digital offerings that should come from the digital business unit. However, this would require significant nurturing and training of the current sales team in order to achieve this. Furthermore, the results highlighted the need to forge certain key alliances and partnerships in areas of weak digital capabilities (e.g., in data analytics). Hence, many of these identified digital capability shortcomings became points where action was instituted. In an interview discussing the value derived from MIND, one of the executives highlighted how the capability knowledge derived about their data quality became a priority and an area of focus leading to the formulation of a data strategy as follows: 'Yeah, because it's (i.e., data is a digital capability) that lies beneath, under the hood really. There is a lot of things that it's an enabler (of) on the offering side and in the digital enterprise side. For example, the data quality in our systems, enterprise systems, ERP and ... is really, really bad (at the moment). ... So, this kind of basic enabler (is a capability) that we (realise we) can do something (about). For example, more intelligent fleet management and maintenance services. We don't even know what (data) we have and where (they are). That is kind of scary! So, that's (why we need) data strategy, the focus point here is ensuring data quality first... And, of course, that requires that we need to understand the processes (and capabilities).'

5.3 | Acquired new digital capabilities

In line with the objective of the MIND framework and as informed by the results of the workshop, a number of digital capability development activities were embarked on. A year later, many new digital capabilities have been developed or acquired by Alpha. For example, it emerged that the company lacked the capability to develop and deliver projects in an agile manner, which would stifle the intended goal of fast prototyping and experimentation. This was traced back to the prior dominant mindset of working with the waterfall project methodology, which was well suited to the hardware products but considered a bottleneck if the stated transformation goals were to be achieved. Hence, Alpha embarked on intensive agile development training for its staff, particularly the digital business unit team. Furthermore, the initiative has led to unleashing the creativity of the software team from the prior constraint of limiting their thoughts to developing solutions for embedded systems to the freedom to think outside the box. Other capabilities were acquired by employing new talents with desired skills in areas identified from the workshop as weak capability spots. For example, the output led to the development of data management capabilities. 'For example, regarding the cloud services and data storage. Where do we actually have the data, who owns it, how we can secure the data is safe, in relation to the requirements that is most vital. That's something we need to (pay attention to). All this is part of the (new) data strategy ... how we handle data. Now, we have been forced to focus on these kind of

simple things first. Data quality, to make sure that regarding all the systems, for example, we know where everything is. That's kind of pretty simple requirement and you would maybe kind of expect that it would be okay, but it's not.' Other digital capabilities were acquired by leveraging on partnerships. This draws from the emphasis on the Networking/Sourcing dimension of the MIND framework. Besides technical and business partnerships, Alpha has also actively leveraged research partnerships with leading institutions and universities across the globe.

5.4 | Foundation for digital strategy

The results of the digital capabilities assessment became the initial foundation for the formulation of a digital strategy by the digital business unit. This can be attributed to the fact that MIND enabled the creation of actionable strategies (see Figure 12 with activities list). The MIND results also became the first cornerstone for developing the digital strategy because it was able to highlight the current status of the organisation's digital capabilities relative to where they intend to go. Its importance came from the fact that it provided a platform to know existing capabilities and then cross them against the required digital capabilities required for the digital transformation journey and then provide actionable activities towards achieving this. An interview with the CDO reflected this as follows: 'So one thing that's clear is it (i.e., the digital transformation agenda) has evolved, but it (i.e., MIND) was very useful as a foundation, and for thinking (about) the current goals of the organization. The ideas were transferred into the X matrix, which has been even further reworked towards a digital strategy. So in essence, (MIND) was a foundational tool. Then (we) also like the fact that the co-creation with other members was one of the values that it brought because you could source ideas from different people in the company. And then it was the validation of some of the ideas you've been thinking of in the strategic level and (in validating the organisational strategies).'

This knowledge gave a natural basis for articulating the digital strategy since the leadership is now aware of where the blind spots that need to be addressed are and the existing capabilities that can be leveraged in their transformation. A year after the digital capability assessment, the expression of the content of the strategy has changed as well as the status of the capability, but the underlying foundation and direction forged from the assessment remain valid and intrinsic to the current digital strategy of Alpha. This was reflected in the affirmation by the CDO: 'So... we can say MIND provided the foundation for the current goals and the current digital strategies that we are now following. So it is a foundational tool.'

5.5 | Influenced rethinking digitalization in organisational strategy

Besides the digital strategy specific to the digital business unit, the workshop's output also led to the rethinking of the positioning of digitalization in the larger organisational strategy. Prior to the workshops, digitalization was singled out as one of the strategic projects. However, after the results and insights gathered from the exercise, the position of digitalization in the organisational strategy was revised. The current revision now acknowledges digitalization as an intrinsic part of every other strategic project of the organisation as opposed to the earlier silo positioning. The implications of this are far-reaching because it implies that digital transformation is not considered the sole responsibility of the digital business unit but a journey involving all the organisation's different units. The output of the MIND framework was used to present a strategic roadmap of how the organisation sees itself on a projected timeline across three horizons, as shown in Figure 14.

It is striking to note that the organisation has made several significant strides in all the items projected as strategic ambitions in Horizon 2 (with the exception of blockchain). They now have value propositions that stem from software-driven, platform-driven and data-driven offerings. However, the vision laid out for Horizon 3 seems to have

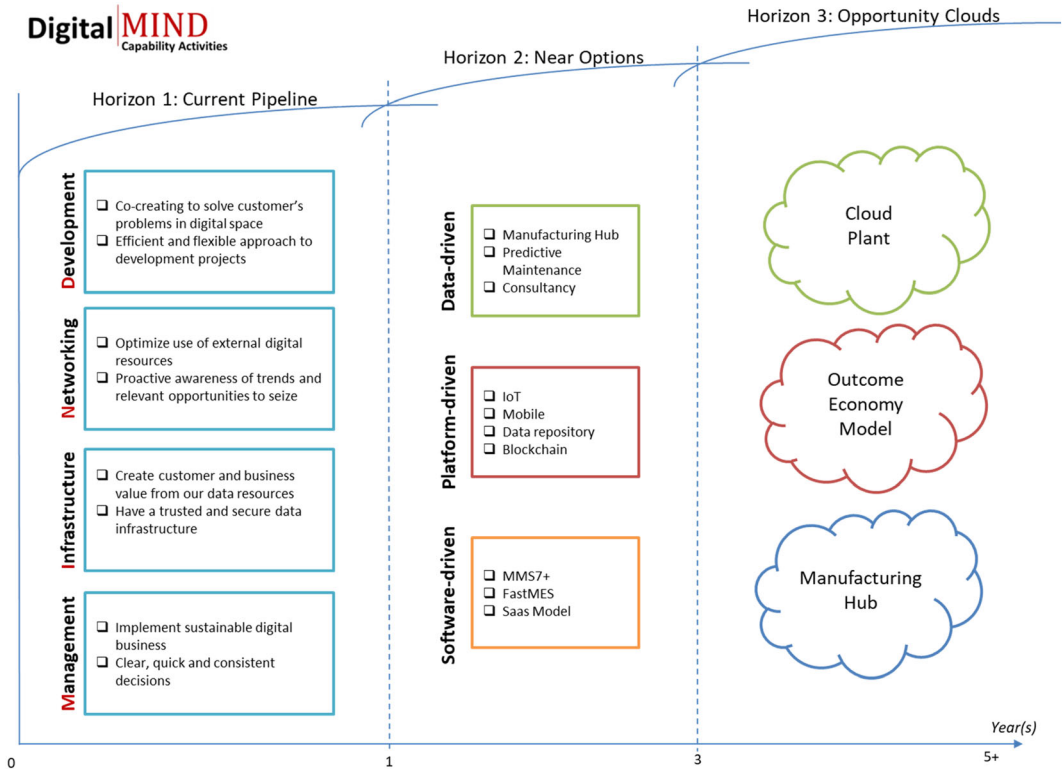


FIGURE 14 Digital roadmap.

evolved into new ambitions for the organisation and is currently reformulated. This roadmap that emerged from adopting MIND played an important role in shaping the digital transformation path taken by the organisation.

5.6 | Attitudinal shifts towards digital transformation

One of the emerging messages in the digital transformation literature is that it is not all about digital technology. Rather, changing the mindset of the people in an organisation to understand and be receptive to digital transformation could be the most pivotal aspect of the transformation process (Kane, 2019). In this regard, one of the outcomes of implementing MIND is the attitudinal shifts in the reception and engagement with digital transformation in the organisation. Because MIND facilitated the digital transformation discourse and provided a means to have a shared understanding of the organisation's digital transformation ambition, it alleviated resistance and, as a consequence, improved the process. These attitudinal shifts can already be inferred from the quotes thus far. For example, interview respondents mentioned that MIND has helped them to 'talk (more) about' and 'comprehend' the organisation's digital transformation ambition, to be '(less) scared of big data' and to consider themselves 'co-creators' in steering the process. A key value of this attitudinal outcome is that involving key stakeholders during the MIND process, rather than a strictly top-down approach, has enabled the organisation to secure commitment and a favourably buy-in of the digital transformation message. This is particularly so as more organisational members could identify as co-creators of the direction of the company's digital transformation. All these outcomes point to how the attitudinal shift towards digital transformation alleviated resistance and smoothed the digital transformation process.

5.7 | New digital offerings

Lastly, one of the main items on the digital transformation agenda of Alpha was the ability to create new digital offerings. This was essentially one of the core areas in which the organisation hopes to see itself transforming. Hence, besides transforming internally, the mandate of developing and selling digital offerings as well as coming up with different business models, was a propelling force for the new digital business unit. A manager of the digital business unit highlights this – over a PowerPoint slide showing the digital offerings as highlighted in the digital strategy – as follows: ‘Yeah, the (digital transformation goals driven by the new digital business units involves digital) offering development in general. Of course, digitalization informs software and services internally, and the capabilities are connected. It’s software and digital services. So, it is here. This is what we do internally (i.e., software development), and this is how we utilise the external resources (i.e., digital services).’ A year after the digital capability assessment and the utility of the results, Alpha now has several digital products in its portfolio and is set to make its biggest standalone software product launch. Hence, Alpha is gradually transforming itself from a hardware-focused company to a provider of digital products and services for the manufacturing industry. The goal is to eventually position itself as a trusted digital partner for the manufacturing industry. The follow-up effort after the digital capability assessment is one step in the journey – albeit one that has proved essential.

6 | LESSONS LEARNT AND RECOMMENDATIONS

6.1 | Co-assess: Involving key stakeholders to minimise inertia

One of the key lessons from the assessment of digital capabilities in Alpha is the value of involving stakeholders in the process. These can be unpacked under two reasons. Firstly, having different stakeholders from the organisation provides a unique opportunity to see things differently. In this case, a number of insights that emerged would likely not have emerged if the workshops were conducted with just IT and digital business unit employees. Secondly, the fact that key stakeholders were part of the assessment process makes them supporters and change agents who could serve as important champions against resistance and friction to the execution of the identified digital capability development activities. For example, there were moments of friction with competing ideas in terms of the direction to take. In these situations, we observed that the participants of the MIND workshop were able to point back to the discussions and output of the workshop to find a common ground for reorienting the organisation’s digital transformation from being stalled. This is an important lesson, as many digital transformation projects are beset by different forms of resistance and inertia dynamics. Managers embarking on a digital capability assessment may find this useful in navigating such opposing forces.

6.2 | Prioritise: Identify key digital capabilities

At the end of the MIND workshops, there were lots of very important and relevant activities highlighted. This can be a challenging part of the process, particularly when there are so many sensible options to pick from. Our recommendation from experience, in this case, is that it is best to take a critical look at the list of activities and make a conscious choice to prioritise activities in relation to their value and urgency to the digital transformation objective. On a critical reflection of the case, this would qualify as one of the shortcomings that we observed that was arduous at the onset for the managers. Many activities were positioned as high impact and high urgency, and fewer activities were positioned as less important or less urgent. While this may appear a sound way to go when making these choices and looking at them in a document, it can be a barrier in practise. In reality, organisations have limited bandwidth in terms of what they can do at one given time. Mostly because there are limited resources to do everything

at once. Hence, our recommendation is to consider a critical approach in deciding what activities to prioritise. In Alpha's case, the Impact vs. Urgency Matrix became the eventual tool that proved to be effective along with some critical prioritising discussions among the managers. While this can also find value for other organisations, we acknowledge that organisations can also come up with their own approach for prioritising that suits their operations best.

6.3 | Establish Progress metrics: Ensure all goals have corresponding measures

One of the key lessons learnt from evaluating the MIND artefact in three contexts is that there is a tendency to set 'floating goals' that are hard to measure. Yet, the importance of establishing progress metrics that serve as a compass for the activities cannot be overemphasised. In many cases, the initial formulated goals may sound interesting on the face of it. However, they fall apart when probed for corresponding measures. Our recommendation is to ensure every goal is accompanied by a measure. This could be something similar to the SMART criteria (Doran, 1981) – i.e., goals that are Specific, Measurable, Assignable, Realistic, and Time-bounded. In addition, we have noticed that participants may struggle with assigning measures to goals. Our observation is that this might be a signal that the goal is not properly formulated and needs a rethink. We have come up with a supporting guide for coming up with measures for goals. This is presented in Table 2. The measures can be looped through to see which measure is most suitable for tracking the progress of a stated goal. However, these are presented as guides. Organisations can come up with measures that best capture the stated goal or measures that are familiar or more appropriate to their own context.

6.4 | Take steps: Strategize but constantly execute

A lesson that emerged by observing how Alpha engaged with the results of the digital capability assessment is the interplay between strategizing and execution. The digital capability assessment was intended to be a precursor to the formulation of a digital strategy that would serve as a digitalization roadmap for the company as well as the digital business unit. However, the process of formulating the digital strategy has been ongoing for months and has gone through several iterations to improve and make it better. Despite this, a number of initiatives have been embarked on that emerged from the digital capability assessment. Drawing from these, our recommendation is not to hold off execution until the perfect digital strategy is ready. Rather, organisations may benefit from taking steps towards executing the insights and identified key activities from the digital capability assessment while still maintaining the momentum of their strategizing efforts. This is akin to what scholars such as Day and Schoemaker (2016) have described under the banner of experimenting with digital technologies and continuously learning from the experience. This, we suggest, is an avenue to learn by doing rather than waiting to get the perfect strategy in place before realising the potential as well as constraints that digital technology affords. We think this is particularly important because the possibilities of what one can do with digital technologies unfold like the peak of a mountain. This is such that it is only when you get to the peak that is visible that you can then realise that there is another peak that is possible, which initially may have been hidden from view. This capacity of technology means there is an advantage in tinkering with digital technologies and the imagination of people to unlock their latent potential.

7 | LIMITATIONS AND OPPORTUNITIES FOR FUTURE RESEARCH

At the heart of the MIND framework lies the four dimensions of M, I, N, and D. While this provides an overarching synthesis of the current state of the literature, rarely does a body of knowledge stay still. We recognise that there is

value in future research extending these dimensions to capture emerging insights about digital capabilities. We call on future research to consider opportunities to extend the dimensions to reflect the realities of recent contemporary situations in research and practise. Such endeavours should be cognizant of the comprehensiveness and coherence that binds the current framework together while providing illuminations to areas that may be hidden by focusing on just MIND or those that may become obsolete or in need of refinement. We believe this will be a continuous research opportunity that can occupy scholarship in this area in the coming years.

Another area that future research could build on the MIND framework is the extension of the framework to attend to issues of digital capability acquisition or development. We note that there are other issues along the life-cycle of possible capability challenges during digital transformation that remain outside the scope of MIND. Although the core focus of MIND is on digital capability assessment, it, however, offers a starting point and a critical compass for other key phases, such as digital capability acquisition and development. In particular, the 'Measures' component of the framework provides a practical apparatus that organisations can leverage to reflect on their performance as they put the results of the assessment into an actionable plan for digital capability acquisition/development. Still, this remains an entirely open area of exploration for future research for which our work can serve as a foundation.

Although the development of MIND has involved stakeholders from diverse industries, its application in a full-fledged digital transformation context has been in the manufacturing industry – i.e., Alpha. In addition, Alpha represents a company with a specific size, resources, establishment age, and at a specific stage in its digital transformation process. This raises the question of the transferability and generalizability of MIND to other industrial and transformation contexts. This suggests that there are ample opportunities to further evaluate the MIND framework in other contexts. Despite this recognition, MIND has been designed to be generic enough that it can be applied in other contexts with due attention to the specificities of each context. In particular, it is worth noting that the framework is not idiosyncratic to Alpha or a particular context. Its generic appeal also comes from its development on other existing frameworks that have been time-tested across contexts, e.g., the Balanced Score Card (Kaplan & Norton, 2007). We thus call for future research to consider examining its efficacy in different industries and change contexts that go beyond digital transformation. For example, assessment of digital capabilities in contexts such as pursuing growth, new market entrance, sustainable/green transformations, foresight about possible futures or launching new products (Christmann et al., 2024; Kotlarsky & Sekulic, 2023; Zimmer et al., 2023). The opportunities and possibilities for future research and application of MIND can usher in a new frontier in this digital era in which attention to requisite digital capabilities opens up how we strategically navigate the threats and opportunities inherent in these contexts effectively.

DATA AVAILABILITY STATEMENT

The data of this study are available from the corresponding author upon reasonable request and within the limits of the binding confidentiality agreement.

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APPENDIX A

The aim of Table A1 is not to provide an exhaustive list but to highlight some of the existing efforts in this area and to provide an indication of the space filled by the proposed MIND framework.

The frameworks all take a holistic view of digital transformation. A common trend among the frameworks is their emphasis on establishing or clarifying the goals/objectives of the digital transformation. Also, there seems to be an emphasis that goes beyond technology to the people and the non-technological aspects of the transformation in each framework. In general, the frameworks provide a means for communication and deriving a shared understanding of the digital transformation objectives among the organisation members. Typically, such frameworks allow for the development of benchmarks, metrics, or status measures that could provide tangible and meaningful indications of progress as well as spotlight areas in need of more attention.

The emphasis also varies across the frameworks, suggesting that the most appropriate framework would depend on the most pertinent issue of concern for the transforming organisations. For example, while the Six-step framework takes a centralised, top-down and business-focused perspective, the 5 building blocks framework takes a more decentralised, bottom-up and technology-focused perspective. These do not necessarily imply that one is wrong and the other correct but signifies a difference in what each framework can illuminate in the digital transformation process. While each framework illuminates an aspect of digital transformation and brings value to the process, rarely do they give salience to the role of the organisation's digital capability in the process. This inattention to the assessment of digital capabilities in these digital transformation frameworks leaves a lacuna in their utility for practical purposes. Without an aposite assessment of the fit and capability needs, it is difficult to know what capability to reconfigure or leverage for the transformation. Arguably, this is equally true for digital transformation, if not more so (Ritala et al., 2021; Westerman et al., 2014).

Of all these frameworks, the Leading Digital framework is perhaps the only framework that highlights digital capabilities as one of the core pillars deserving attention in navigating digital transformation. The Leading Digital framework provides a high degree of sensitivity to digital capabilities as one of the core building blocks that deserves attention. It provides a compelling integration of digital capabilities and leadership capabilities as key considerations for transforming into a Digital Master – that is, companies that use digital technologies to drive significantly higher levels of profit, productivity, and performance (Westerman et al., 2014). The framework refers to digital capabilities as the 'what' of technology. However, our review of digital capability literature suggests that digital capabilities represent more than digital technology. Note that our use of the term 'digital' in digital capabilities is not in the binary 0's and 1's bitstring sense (Faulkner & Runde, 2019) that is typically attributed to the digitization ontology but rather we draw on the digitalization ontology of digital as expounded by Baiyere et al. (2023), and Gradillas and Thomas (2023).

The Six-step Digital Transformation framework is similar to the Leading Digital framework in that it also acknowledges digital business capabilities as one of its steps. However, capabilities are seen as predominantly about workforce skills or expertise, which is a swing of the pendulum to a rather different direction from what the Leading Digital framework considers digital capabilities. To be clear, the description of digital capabilities in the Leading Digital framework acknowledges that there are different facets to it (i.e., leveraging digital technologies in: customer engagement, operational processes and new business models). While the framework gives a vivid account of why digital capabilities are important, the specific process of assessing and supporting the development of such capabilities remains a gap that requires attention and further elaboration. An observable challenge with this is that while most practitioners would likely agree with the high-level arguments about the need to develop a digital capability, they typically yearn for specific guidance to follow in identifying the relevant digital capabilities for their particular transformation goal. This need is particularly so as the framework quickly elevates the focus to other pertinent digital transformation issues at a more macro level.

In overview, several frameworks exist that provide valuable guidance for firms' endeavours to manage their digital transformation. However, considering all the reviewed digital transformation frameworks together reveals that little attention has been paid to digital capability assessment. Furthermore, even frameworks that acknowledge the need for digital capabilities provide little actionable guidance on assessing and understanding the required digital capabilities. This leaves managers with a lacuna in their attempt to draw on these prior frameworks in assessing their current digital capability status relative to the digital capability needed to achieve their digital transformation goals.

TABLE A 1 Examples of some digital transformation frameworks.

Framework	Core components	Digital transformation focus	Developed by
Pathways framework	<ul style="list-style-type: none"> • 2 Dimensions: <ul style="list-style-type: none"> ◦ Operational efficiency ◦ Customer experience • 4 Quadrants: <ul style="list-style-type: none"> ◦ Silos & Spaghetti ◦ Industrialised ◦ Integrated experience ◦ Future ready 	The framework helps organisations position their current status and map the most appropriate pathway among four alternatives for transforming towards becoming a future ready organisation for the digital era.	Woerner et al. (2022); Weill and Woerner (2018) Massachusetts Institute of Technology, Center for Information Systems Research – MIT CISR.
Leading digital framework	<ul style="list-style-type: none"> • 2 Dimensions: <ul style="list-style-type: none"> ◦ Digital capabilities ◦ Leadership capabilities • 4 Levels/quadrants: <ul style="list-style-type: none"> ◦ Beginners ◦ Fashionistas ◦ Conservatives ◦ Digital masters 	The framework aims to provide a means for organisations to leverage their digital and leadership capabilities in transforming into digital masters.	Westerman et al. (2014); Westerman et al. (2012) Capgemini Consulting and MIT Initiative on the Digital Economy
The 4D framework	<ul style="list-style-type: none"> • The Four D's <ul style="list-style-type: none"> ◦ Discover ◦ Design ◦ Deliver ◦ De-risk 	The framework provides an approach for setting a digital ambition, architecting the elements for the transformation, and systematically approaching the digital transformation journey.	Dahlström et al. (2017) McKinsey
Six-step digital transformation framework	<ul style="list-style-type: none"> • Six steps <ul style="list-style-type: none"> ◦ Create the right mindset and shared understanding ◦ Find the right leaders ◦ Launch a digital business center of excellence ◦ Formulate a digital strategy to respond to opportunities and threats ◦ Find, develop and acquire digital skills ◦ Create new digital business capabilities 	The framework outlines six crucial steps that are necessary for an organisation's leadership to effectively navigate the digital transformation journey and build a successful digital business.	Stamford (2014); van der Meulen and Rivera Gartner Inc.

TABLE A 1 (Continued)

Framework	Core components	Digital transformation focus	Developed by
5 Building blocks framework	<ul style="list-style-type: none"> • 5 Building blocks <ul style="list-style-type: none"> ◦ Operational backbone ◦ Shared customer insight ◦ Digital platform ◦ Accountability framework ◦ External developer platform 	<p>The framework outlines key building blocks that organisations need to consider as they decide on how to transform and design their organisations to attain their desired digital transformation objective.</p>	<p>Ross et al. (2019); Ross et al. (2018) MIT Center for Information Systems Research – MIT CISR.</p>