

Spanning boundaries to boost network engagement along implementation processes of digital technologies: evidence from a multiple case study in hospitals

Vincent Peters

*Department of Information Systems and Operations Management,
Tilburg University, Tilburg, The Netherlands*

Bieke Henkens

*Department of Marketing, Innovation and Organization, Ghent University,
Ghent, Belgium and*

*Department of Industrial Engineering and Innovation Sciences,
Eindhoven University of Technology, Eindhoven, The Netherlands*

Tom A. E. Aben

*Department of Information Systems and Operations Management,
Tilburg University, Tilburg, The Netherlands and
Warwick Business School, University of Warwick, Coventry, UK, and*

Melissa De Regge

*Department of Marketing, Innovation and Organization, Ghent University,
Ghent, Belgium and
Strategic Policy Cell, University Hospital Ghent, Ghent, Belgium*

Abstract

Purpose – This study investigates how boundary spanners realise network engagement during the implementation of digital technologies in healthcare operations, focusing on how actors connect diverse stakeholder groups across organisational, functional and professional boundaries.

Design/methodology/approach – A multiple case study was conducted in two hospitals implementing comparable digital technologies with contrasting outcomes. Data were collected through archival documents and two rounds of semi-structured interviews. By means of inductive analysis, we identified boundary-spanning roles and their contribution to network engagement across organisational, functional and professional boundaries.

Findings – The findings show that boundary-spanning roles operate not in isolation, but as a constellation that jointly activate, embed and legitimise across diverse groups of actors. Through this constellation, actors cross organisational, functional and professional boundaries, thereby supporting the implementation of digital technologies in healthcare operations.

Originality/value – This study contributes to healthcare operations literature by moving beyond single-organisation adoption models and introducing a network-based perspective on technology implementation. It advances boundary-spanning theory by conceptualising how boundary-spanning roles enable engagement across multi-actor networks, addressing a gap at the intersection of digital technology, healthcare operations and



implementation. Practical principles are provided to guide managers in defining, supporting and leveraging boundary-spanning roles during technology implementation in healthcare operations.

Keywords Digital technologies, Healthcare operations, Boundary-spanning roles, Network engagement, Multiple case study

Paper type Research article

1. Introduction

Rising demands and stakeholder expectations, combined with increasingly restricted resources (Dobrzykowski *et al.*, 2014), make operational challenges – such as care coordination, resource use and pathway efficiency – a central concern in healthcare operations management (e.g. De Regge *et al.*, 2019). Digital technologies are widely positioned as solutions to address these challenges (Avinash and Joseph, 2024). This is because digital technologies have the potential to improve operational efficiency by, for example, lowering costs of medical procedures, improving capacity efficiency and improving (clinical) outcomes (e.g. Keesara *et al.*, 2020; Mukherjee and Sinha, 2020). Despite these potential benefits, implementations of digital technologies in healthcare often fall short after initial adoption by individual employees (Ebad, 2020; Kaplan and Harris-Salamone, 2009). While extant research dominantly focused on adoption of digital technologies in healthcare, managers continue to struggle with generating sustained, network-wide engagement with digital technologies over time (Sharma *et al.*, 2022).

Introducing new technologies in healthcare operations is particularly challenging due to the inherently complex and multidisciplinary nature of the services offered by healthcare organisations (De Luca *et al.*, 2025; Johnson *et al.*, 2020; Tucker *et al.*, 2007). Healthcare professionals are typically grouped together based on their (narrow) specialties, with limited communication across specialties, creating strong siloes in healthcare organisations (Lau *et al.*, 2024; Silander *et al.*, 2017). Within these groups or siloes (often reflected in the organisational boundaries of departments, wards or units), particular routines, practices, responsibilities and ways of working emerge (Waring *et al.*, 2015). When introducing an organisation-wide technology, each of these groups needs to be effectively engaged with this technology. In addition to these groups of healthcare professionals, there are also other groups of actors that need to be engaged with the new technology, including patients, administrators and policymakers, each driven by different and often diverging priorities and goals (Mauro *et al.*, 2024). Considering this networked nature of healthcare operations, it is essential not only to stimulate engagement from the individual (siloe) group of actors that are involved with new technologies, but also to foster engagement across each of these groups of actors (Mele *et al.*, 2023). This network engagement (Okazaki *et al.*, 2021) is difficult to realise in practice due to the complex and siloe nature of healthcare operations and hence requires mechanisms that can engage each of these individual networks with the same new technology.

To understand how network engagement among diverse actors can be facilitated, we introduce the concept of boundary-spanning roles. They can function as bridging mechanisms in healthcare networks, as they connect otherwise separated (groups of) actors and support the interaction and resource integration required for network engagement (Aldrich and Herker, 1977; Feldman and Pentland, 2003). Yet existing research has paid limited attention to how boundary-spanning roles operate at the intersection of digital technology implementation, healthcare operations and multi-actor networks. To the best of our knowledge, only a very limited number of studies explored boundary-spanning in contexts that involve new healthcare technologies (e.g. Janssen and Abbasiharofteh, 2022). These studies mostly focus on boundary-spanning activities during R&D processes and do not discuss boundary-spanning roles during implementation processes, where engagement must be created across diverse stakeholder groups. Consequently, little is known about how boundary-spanning roles realise network engagement in the implementation of digital technologies, particularly in healthcare operations. Against this background, this study investigates the following research question:

RQ1. How can boundary-spanning roles realise network engagement among groups of actors involved with the implementation of digital technologies in healthcare operations?

To address this question, we conducted a multiple case study on the implementation of a digital technology in two hospitals. This study contributes to boundary-spanning research (e.g. [Aldrich and Herker, 1977](#); [Canal Vieira et al., 2026](#)) by showing that boundary-spanning roles should not be considered in isolation, but as a constellation of complementary roles that support network engagement. More specifically, we identify three higher-order meta-functions (“activating”, “embedding” and “legitimising”) through which these roles contribute to engagement across organisational, functional and professional boundaries. In addition, we contribute to network engagement research (e.g. [Okazaki et al., 2021](#)) by showing that engagement during implementation depends on how boundary-spanning work is distributed and sustained across different actor groups. The three meta-functions are interdependent, which helps explain why network engagement is sustained in some implementation trajectories and weakens in others. In doing so, we also contribute to the broader Operations and Supply Chain Management (OSCM) dialogue on how emerging operational phenomena can be used to extend theoretical conversations ([Roehrich et al., 2025](#)). From a practical perspective, the study provides guidance for managers on identifying relevant stakeholders, defining and supporting boundary-spanning roles, and sustaining engagement throughout technology implementation.

2. Theoretical background

2.1 Implementation of digital technologies in healthcare operations

Digital technologies not only drastically reshape the delivery of healthcare services ([Holmström et al., 2019](#); [Hügler and Grek, 2023](#)), but they also trigger innovations in healthcare operations ([Dai and Tayur, 2020](#)) that can help healthcare professionals improve care delivery and meet growing demand. Examples of innovations brought by digital technologies include remote patient monitoring (RPM) ([Martin-Khan et al., 2015](#)), robotics ([Mukherjee and Sinha, 2020](#)) and telemedicine platforms ([Dhunoo et al., 2024](#)).

To effectively leverage new digital technologies in healthcare operations, successful implementation is essential but challenging due to the complex and multi-disciplinary nature of these operations ([De Luca et al., 2025](#); [Tucker et al., 2007](#)). Healthcare professionals in hospitals, for example, are typically grouped into their respective specialisms with limited communication between the different specialisms ([Lau et al., 2024](#)), leading to the creation of specific work practices, routines and hierarchies ([Waring et al., 2015](#)). As such, hospitals consist of various siloes ([Hügler and Grek, 2023](#); [Silander et al., 2017](#)) and each of these siloes needs to be convinced of the merits of a new digital technology. Moreover, the various networks (i.e. the siloes) need to be engaged with each other ([Schiffelers et al., 2025](#)).

In addition to the networks of actors within the hospital, the introduction of new digital technologies often extends beyond organisational boundaries. This requires the integration of the technology into inter-organisational processes as well, prompting focal organisations to reconsider their relationships with key suppliers ([Holmström et al., 2019](#); [Paolucci et al., 2021](#)). Existing research has extensively examined the impact of digital technologies at the organisational level (e.g. [Delke et al., 2023](#); [Seyedghorban et al., 2020](#)) and supply chain level (e.g. [Maghazei et al., 2022](#); [Søgaard et al., 2019](#)). However, digital technologies also have implications for societal and industry levels, influencing broader institutional arrangements ([Vial, 2019](#)), which is especially relevant for healthcare operations.

Taken together, digital technologies are likely to induce significant changes, not only within the focal organisation (e.g. a hospital) and its supply chain (e.g. medical device suppliers), but also in how healthcare is regulated, delivered and experienced. A narrow focus on the organisational or supply chain level thus limits our understanding of key actors like

regulators, patients and public institutions (Rouidi *et al.*, 2022). Rather than concentrating solely on operational improvements for a single actor within a single organisation, there is a growing need to adopt a more dynamic, multi-actor and networked perspective on the implementation of technologies in healthcare operations (Dai and Tayur, 2020). Therefore, the present study considers the implementation of digital technologies in healthcare operations from a network-based perspective, one that extends beyond the focal organisation and its immediate supply chain to also include other networks of actors.

2.2 Network engagement in healthcare operations

In OSCM, engagement refers to the active involvement and commitment of stakeholders, ranging from internal employees to external partners, in achieving shared organisational goals (Pagell and Wu, 2009). Prior literature, however, has mainly focused on the engagement of individual actors in the role of patients (Liu *et al.*, 2024) or employees (e.g. Graham *et al.*, 2023), whereas healthcare operations often necessitate the involvement of multiple actors in the wider network (Ryan *et al.*, 2024). Networks are defined as inter- and intra-organisational systems where multiple actors coordinate activities to deliver value, share resources and improve service delivery (Provan and Kenis, 2008). Specifically, healthcare networks are characterised by a wide array of actors, each playing distinct roles and typically include hospitals, primary care providers, public institutions, insurance companies, non-governmental organisations and increasingly, private technology firms, among others. According to Ferlie and Shortell (2001), the complexity of healthcare delivery necessitates collaboration among “loosely coupled systems” or siloes where each actor brings unique expertise and operational practices. The diversity of actors introduces operational challenges such as workflow misalignment (Beirão *et al.*, 2017; Parmigiani and Rivera-Santos, 2011).

The operational complexity of such networks creates a growing need to understand how groups of actors should jointly support the successful implementation of novel technologies in organisational settings (e.g. Mele *et al.*, 2023). Here, network engagement refers to the motivational state of groups of actors to use the new technology during healthcare operations (Hollebeek *et al.*, 2014; Okazaki *et al.*, 2021). While extant research sheds light on how network engagement emerges through shared goals, trust and coordinated activities among network actors, it remains underexplored how such engagement can be actively fostered and sustained during complex implementation processes involving multiple networks of stakeholders. Addressing this gap, we turn to the concept of boundary-spanning roles to better understand the mechanisms through which network engagement can be facilitated.

2.3 Boundary-spanning roles in healthcare networks

To realise successful implementation of digital technologies, engagement between networks of actors within healthcare operations must be actively facilitated (Tee *et al.*, 2019). Understanding the structural arrangements within the network is the first step, followed by exploring how these networks of actors interact. This interactional perspective provides insights into how networks function and, in turn, how digital technologies can be effectively implemented (Johnson *et al.*, 2021). Collaboration within and across networks is essential for actors to access each other’s resources. However, the inherent complexity of healthcare networks often impedes collaboration. To address this, we use the concept of boundary-spanning roles.

Drawing on boundary-spanning work (Bettencourt and Brown, 2003; Razmdoost *et al.*, 2023), we define boundary-spanning roles as the actions that are carried out by actors, often referred to as boundary spanners (Canal Vieira *et al.*, 2026), to bridge different (networks of) stakeholders within and beyond organisations. These boundary-spanning roles are particularly salient in operations and innovation contexts, where performance depends on the effective transfer of knowledge across organisational, functional and professional boundaries (Tushman, 1977). Here, organisational boundaries separate actors belonging to different

organisations, whereas functional boundaries separate specialised departments or units within the same organisation, and professional boundaries distinguish communities of professionals with different bodies of expertise, norms, values and ways of working (Tushman, 1977; Greenhalgh *et al.*, 2004; Canal Vieira *et al.*, 2026). In the context of digital technology implementation in healthcare, these boundaries frequently intersect, as actors may simultaneously belong to different organisations, functional units and professional communities. Their intersection creates differences in language, knowledge and interpretive frames that complicate coordination and knowledge transfer (Silander *et al.*, 2017). Our study therefore examines boundary-spanning roles across all three types of boundaries rather than treating organisational boundaries as the sole locus of boundary spanning. Accordingly, in OSCM, boundary-spanning roles are not merely communication channels, but actors who translate knowledge, mobilise relationships and enable organisations to assimilate innovations and adapt operational practices across boundaries (Greenhalgh *et al.*, 2004).

Seminal work identifies two core functions of such roles: information processing and external representation (Aldrich and Herker, 1977). Over the years, these roles have been carved out further in light of various contexts and processes (e.g. frontline service employee spanning boundaries with customer (Bettencourt and Brown, 2003), first-tier suppliers spanning boundaries in supplier development initiatives (Jia *et al.*, 2021)). Notably, prior literature studying technology-driven innovations in healthcare operations mainly focuses on (generic) boundary-spanning roles that aim to foster individual stakeholder engagement (e.g. Jefferies *et al.*, 2019; Klecun *et al.*, 2019). As a result, these insights fall short in explaining how boundary-spanning roles foster network engagement, especially considering digital technology implementation in healthcare operations (as shown in Table 1).

Insights into boundary-spanning roles across networks of stakeholders within and beyond organisational boundaries are scant, even though early boundary-spanning work by Aldrich and Herker (1977) shifted attention away from viewing organisations as a whole and neglected the boundaries within an organisation. Extant research has mainly foregrounded roles that bridge individuals, such as gatekeepers, communication stars, frontline employees or public managers, whose personal ties link internal and external domains (Bettencourt and Brown, 2003; Tushman, 1977). OSCM research therefore increasingly frame boundary spanning as a

Table 1. Examples of studies on boundary-spanning roles in technology-driven healthcare innovations

Source	Technology	Engagement	Boundary-spanning roles
Aarhus and Ballegaard (2010)	Technology-assisted self-care at home	Individual engagement (customer)	Boundary objects and importance of boundary work without specifying roles
Jefferies <i>et al.</i> (2019)	Telehealth	Individual engagement (customer)	Customers' boundary-spanning roles • Functional adaptations • Relational adaptations • Translational adaptations
Klecun <i>et al.</i> (2019)	Electronic health records	Individual engagement of multiple actors (e.g. doctor, customer)	Importance of boundary spanners without specifying roles
Cresswell <i>et al.</i> (2020)	Digital health innovations	N/a	Importance of boundary spanners without specifying roles
Cruess and Sternszus (2026)	Technological advancements	N/a	Importance of boundary spanners without specifying roles
The present research	Digital technologies	Network engagement	Constellations of boundary-spanning roles
Source(s): Authors' own work			

network function shaped by knowledge flows, brokerage, asymmetries and shared responsibility (Canal Vieira *et al.*, 2026; He *et al.*, 2026).

Meanwhile, boundary-spanning literature regarding the implementation of digital technologies is often restricted to the role of technology as boundary spanner (e.g. Sharp *et al.*, 2021), thereby abstracting out the role of human actors' boundary-spanning roles to foster network engagement along the implementation process. Here, digital technologies are often treated as boundary objects that coordinate social worlds, which can underplay the human work through which technologies become meaningful, legitimate and actionable (Levina and Vaast, 2005). In fact, digital implementation in complex networks therefore requires human boundary spanners who translate clinical, operational, technical and policy logics across organisational, functional and professional boundaries (Canal Vieira *et al.*, 2026; Greenhalgh *et al.*, 2004).

In summary, while existing boundary-spanning and engagement research highlights the importance of coordination mechanisms and actor involvement, little is known about the specific boundary-spanning roles that enable such network engagement. We extend this theoretical foundation by examining boundary-spanning roles that connect and engage networks of actors during the implementation of digital technologies in healthcare operations.

3. Methods

3.1 Research design

To examine how boundary-spanning roles facilitate network engagement involved in the implementation of digital technologies in healthcare operations, we opted for a multiple case study approach (Yin, 2009). This approach was appropriate because the phenomenon under study is processual, context-dependent and embedded in multi-actor healthcare networks, where the digital technology implementation needs to cross organisational, functional and professional boundaries. By adopting a case study approach, we were able to study network engagement in relation to the implementation context in which it emerged, and to examine how boundary-spanning roles contributed to connecting actors, supporting interactions and enabling resource integrations across different stakeholder groups.

This study has an exploratory nature to further explore and contribute to the growing (yet still limited) research stream that takes a multi-actor perspective on the implementation of digital technologies (Dai and Tayur, 2020; Rouidi *et al.*, 2022). We do this by providing detailed insights into the role of boundary spanners during the implementation of digital technologies in healthcare operations. Rather than testing predefined relationships, the study aims to develop a contextualised understanding of how such roles are enacted in practice and how they shape network engagement across groups of actors. This orientation is particularly relevant in hospital settings, where digital technologies often cut across existing organisational, functional and professional boundaries, and require engagement from diverse networks of actors.

Our case study approach provides the boundary of our unit of analysis (Ragin and Becker, 1992): the set of boundary-spanning roles enacted by human actors during the implementation process. Focusing on these roles rather than individual actors allowed us to move beyond individual-level adoption and examine how network engagement is facilitated across the different stakeholder networks. This role-based focus is important because the same actor may enact multiple yet distinct boundary-spanning roles, while similar roles may also be distributed across different actors over time.

Through employing a theoretical sampling logic (Barratt *et al.*, 2011), we identified two cases that involved a similar type of digital technology, but with different implementation outcomes. Opting for cases with *common antecedents* in our sampling (Eisenhardt, 2021) provided us with the opportunity to investigate how the implementation processes towards the different outcomes unfolded over time by ensuring that the starting positions of the two cases were similar. The two cases that we selected concerned the implementation of a digital

technology aimed at enabling remote patient follow-up and supporting patient-centred care through digital interaction. Furthermore, we ensured that in both cases, implementation required coordination across clinical departments, IT units and external stakeholders (e.g. patients, primary care providers and policy actors). The two cases also followed different implementation trajectories: Case A represents a successful implementation that was scaled and embedded in routine practice, whereas Case B represents an implementation that stalled and was ultimately discontinued. We also opted for two cases from two different hospitals to enhance the generalisability of our findings. These contrasts were theoretically relevant because they allowed us to compare how network engagement unfolded around a similar digital technology and in different hospitals. More specifically, it enabled us to examine how boundary-spanning roles were enacted, sustained or constrained across the two cases, and how these differences shaped the implementation trajectory.

3.2 Data collection

Following [Ragin and Becker's \(1992\)](#) conceptualisation of cases as theoretically bounded units of analysis, and consistent with [Siggelkow's \(2007\)](#) argument that case studies derive their strength from rich, internally coherent empirical sources rather than any single data collection method, our data collection approach draws on multiple sources to capture the phenomenon within its defined boundaries. This approach ensures methodological rigour and enables data triangulation ([McCutcheon and Meredith, 1993](#)). First, we gathered extensive archival data for each case, including web pages, news articles, project reports, annual reports, audio-visual material and meeting notes (see [Table 2](#) for a summarised overview of all data and [Tables A1 and A2 in Appendix A](#) for a detailed overview). These materials provided valuable longitudinal insights into the implementation trajectories, the institutional context and decision-making processes. Their analysis enabled us to reconstruct the implementation processes, identify key challenges and understand the structural and procedural factors influencing implementation.

Table 2. Overview of data collected

	Case A <i>Remote patient monitoring</i>	Case B <i>Digital patient platform</i>
Archival data	• Case descriptions (4 pages) • Webpages and newspaper articles (287 pages) • Reports; internal and external (663 pages) • Audiovisuals related to remote patient monitoring (123 min)	• Case descriptions (3 pages) • Webpages and newspaper articles (114 pages) • Reports; internal and external (332 pages) • User manuals of the platform (200 pages) • Audiovisuals related to the platform (16 min)
Interview data – Round 1	• Duo interview (118 min) a. Project leader 1 virtual care centre b. Nurse virtual care centre • Application developer (22 min)	• Project leader clinical (39 min) • Project leader process (58 min) • IT project coordinator (23 min)
Interview data – Round 2	• Chief Medical Information Officer (CMIO) (26 min) • Project leader 2 virtual care centre (26 min) • Software supplier (22 min) • Gastroenterologist (23 min) • Virtual care nurse (26 min)	• IT leader (Head of Care applications) (34 min) • Lead application manager (36 min) • Physician (33 min) • Duo interview (32 min) a. Cardiology nurse consultant 1 b. Cardiology nurse consultant 2

Source(s): Authors' own work

Second, the archival data were complemented by semi-structured interviews with key stakeholders involved in the implementation processes, including various healthcare professionals, IT staff, project members and hospital management. These interviews enabled us to capture detailed accounts of how actors interacted, how roles were enacted and how network engagement evolved over time. We conducted two rounds of interviews across both cases. The first round (February–March 2024) focused on reconstructing the implementation processes, identifying key stakeholders and mapping interactions across the network. The second round (March–April 2026) consisted of follow-up interviews with key stakeholders in both cases, which were used to further probe emerging themes, clarify interpretations and iteratively refine our understanding of the boundary-spanning roles and network engagement dynamics identified in the data. This iterative data collection process is consistent with an inductive research approach, in which data collection and analysis inform each other over time (Barratt *et al.*, 2011). In total, we conducted 14 semi-structured interviews in Dutch with 16 respondents across both rounds. Interview durations ranged from 22 to 118 min. All interviews were audio-recorded, after receiving approval from the interviewees, and transcribed verbatim. The interview protocols for both rounds can be found in Appendix B.

The combination of archival data and interviews allowed us to reconstruct implementation processes, identify key actors and capture both formal structures and lived experiences of engagement across the network.

3.3 Data analysis

We conducted an inductive qualitative analysis, using boundary-spanning roles and network engagement as sensitising concepts to guide interpretation. The analysis was inductive in the sense that we allowed role patterns, engagement mechanisms and implementation dynamics to emerge from the empirical material. At the same time, concepts from the literature on network engagement and boundary-spanning roles provided an initial analytical orientation without imposing a predefined coding structure. This enabled us to remain open to unexpected empirical patterns while progressively relating the emerging findings to relevant theoretical constructs.

The data analysis proceeded in two stages. First, we conducted a within-case analysis for each case (Barratt *et al.*, 2011). In this phase, the research team familiarised itself with the data, mapped the network of actors and reconstructed the implementation trajectory in both cases. Rather than coding boundary-spanning roles as static categories, we examined how different actors functioned as boundary spanners across specific moments in the implementation process. We adopted the definition of boundary spanners by Canal Vieira *et al.* (2026), conceptualising them as actors to bridge different (networks of) actors within and beyond organisational settings. Following the identification of these boundary spanners, we further analysed the types of boundaries they crossed (i.e. organisational, functional and professional boundaries), allowing us to specify how boundary spanners contributed to, or constrained, the emergence of engagement across the network. This stage allowed us to develop a processual understanding of how network engagement unfolded within each implementation context.

Second, we conducted a cross-case analysis to identify patterns of convergence and divergence between the two cases. The comparison focused not only on which boundary-spanning roles were present, but also on how they emerged, accumulated or weakened over time. By comparing a successful and an unsuccessful implementation of a digital technology, we examined how variation in the enactment, sequencing and distribution of boundary-spanning roles shaped network engagement. This allowed us to analyse, for instance, whether specific roles were concentrated in a few actors or distributed across the network, whether roles alternated or reinforced one another across implementation phases, and whether gaps or discontinuities in role enactment constrained engagement. This comparative logic enabled us to move beyond a descriptive listing of roles and develop a more processual understanding of

the meta-functions (i.e. activate, embed and legitimise) through which boundary-spanning roles facilitate network engagement in healthcare operations.

Throughout the analysis, the research team adopted an insider–outsider approach (Wadham and Warren, 2014). Two authors (VP and MR), who were directly involved in data collection, led the coding and interpretation, while the other two authors (BH and TA) acted as critical reviewers by challenging emerging interpretations and alternative explanations. Regular team discussions supported reflexivity, consistency in coding and analytical rigour.

To enhance credibility, we triangulated findings across our archival and interview data and systematically linked empirical evidence to emerging theoretical constructs. Additional interviews, particularly across clinical departments, could have added contextual variation but were unlikely to generate fundamentally new insights into the identified boundary-spanning roles. Recurring patterns were observed across interviews, with no substantively new roles emerging in later stages; subsequent data confirmed and refined rather than extended the coding structure. We, therefore, concluded that data saturation was reached, although further data could have enriched contextual detail.

Supporting quotes were selected to illustrate not only the boundary-spanning roles and meta-functions identified, but also how these roles emerged, evolved and interacted throughout the implementation process. For each quote, we indicate the specific source, code and case if it originated from the archival data or the specific job title of the interviewee and case if it originated from the interview data. A full list of archival materials and their codes is provided in Tables A1 and A2 of Appendix A.

4. Results

This study examines the implementation of two similar types of digital technologies in two distinct hospitals, each initiated around the same period. The overarching aim was to enhance patient empowerment and integrate remote care functionalities within existing care practice. While both initiatives were embedded in broader institutional strategies to innovate care delivery, they differ in setting, scope and outcomes.

The two cases were selected because they are comparable in terms of technological scope, yet differ in implementation outcomes, allowing us to analyse how network engagement unfolds under contrasting conditions. Case A was situated in a large general hospital in the Netherlands with a regional care remit, while Case B resided in a university hospital in Belgium, primarily focused on tertiary and highly specialised care. Both hospitals aim to integrate digital health technologies into standard practices, but with different emphases: Case A prioritised RPM and regional care collaboration, while Case B focused on structured patient education, follow-up and secure digital interaction.

4.1 Within-case analysis

4.1.1 Case A – remote patient monitoring application. Case A involves the implementation of RPM in a Dutch general hospital to improve general disease management and patient self-efficacy. RPM involves the use of digital technologies to collect medical and physiological data from patients in non-clinical settings and transmit these data to the hospital for evaluation and follow-up. Patients input their health-related data via a mobile application, either manually or through wireless devices and sensors that automatically record and transmit measurements. When recorded values exceed predefined thresholds, the digital technology generates alerts, prompting patients to repeat measurements or respond to additional symptom-specific questions, thereby enabling continuous monitoring and remote intervention. The main aim was “to strengthen patients’ self-management and resilience, enabling them to take a more active role in managing their condition” (NEW29,35; WEB41; DOC01, Case A).

At the core of the network is the focal organisation (the general hospital), which hosts several key actors involved in the implementation of RPM. These include the central project team, clinical departments, a virtual care centre (VCC) as a dedicated unit for RPM, as well as supporting functions such as IT, R&D and hospital management. The network further comprises a broad set of external actors, including patients and informal caregivers, primary care providers, technology suppliers and health insurers. In addition, regulatory and governmental bodies shape the conditions for implementation, while wider sector actors such as other Dutch hospitals and professional networks become involved as the digital technology gains traction. The full network of actors, as depicted in [Figure C1 \(Appendix C\)](#), highlights the organisational, functional and professional boundaries that need to be spanned to realise network engagement.

The implementation process started as an RPM pilot in 2018 within a small number of self-selected medical departments (cardiology, pulmonology), initially targeting patients in two care pathways: chronic obstructive pulmonary disease and heart failure. This early phase aimed at assessing both the technical and organisational feasibility of RPM and was initiated by medical specialists who intrinsically believed in the potential of RPM for “their” patients. In particular, the pilot focused on evaluating patients’ ability to engage with monitoring technologies and mobile applications, while simultaneously allowing the organisation to learn how such practices could be integrated into daily care practice: *“Also for us, to, well, it was a kind of feasibility study at the time. That took the form of a pilot”* (Interview CMIO; DOC02; REP04, Case A). As pilot insights emerged, the cardiology outpatient clinic took a leading role for initial engagement surrounding RPM technology in the hospital. Cardiology care professionals, but especially the cardiologist, took on boundary-spanning roles in which they attempted to translate their clinical needs to technological desires.

The pilot was positively evaluated in 2019 by all involved actors as shown in patients’ testimonies: *“This [remote monitoring] works perfectly for me as it allows me to receive the right care, at the right moment and at the right place”* (NEW04; WEB 21,22, Case A). The positive outlook led to the expansion of RPM into two additional care pathways: hypertension and cardiac rehabilitation. While cardiology showed strong intrinsic motivation to adopt RPM driven by positive prior experiences and established trust following the pilot, implementation in internal medicine department was initially met with resistance. This resistance centred on concerns about surrendering established responsibilities and uncertainty regarding professional roles in a remote care setting: *“They had to let go of what they had been doing for years and entrust it to us, raising questions about what their role would then still be”* (Interview virtual care nurse, Case A).

Over time, these tensions were addressed through active boundary-spanning efforts, in which the project lead and team worked closely with internists to articulate the value of RPM in relation to both patient outcomes and operational challenges, such as waiting lists and capacity constraints. By framing RPM as a way to improve patient care while also alleviating systemic pressures, and by tailoring this narrative to the concerns of the internal medicine specialty, the team was able to foster engagement with the technology. This highlights how boundary-spanning activities such as translating the implications of RPM to different professional groups and coordinating diverse interests were important for generating network engagement and realising the expansion of the innovation beyond its initial pilot setting.

When COVID-19 arose in 2020, the hospital capitalised on their successful initial pilots and was among the first hospitals in the Netherlands to offer remote COVID-19 care. The pandemic not only created momentum for ramp-up but also provided a window of opportunity to engage actors across the network. The urgent need to reduce hospital visits legitimised remote forms of care and lowered prior resistance among healthcare professionals. At the same time, it exposed the limitations of earlier, only partially embedded remote practices. Prior to COVID-19, elements such as telephone/video consultations as part of RPM were already in use, but these remained loosely integrated within care pathways and patients were still required to attend the hospital for specific

diagnostics. As a gastroenterologist in Case A noted, “it [RPM] was not really embedded in the care pathway [...] patients still had to come to the hospital”.

Since in-person visits were no longer allowed, remote care shifted from optional to necessary, forcing integration of RPM into routine care. This required coordination across clinical departments, IT and external technology partners, as well as ongoing translation of RPM into different care pathways and patient groups. The project lead was detrimental for this coordination, as he was the one before, during and after the pandemic who induced the technology. The project lead played a pivotal role in this coordination by maintaining close feedback loops with clinicians, ensuring rapid adjustments to the technology and care processes, and enabling healthcare professionals to actively shape the implementation. As one respondent noted: “It was not just talking, you could actually change things [...] if you said something should be different, it would be adjusted and shown back to you” (Interview Gastroenterologist, Case A). This dynamic was observed across multiple care pathways, including inflammatory bowel disease, where the pandemic triggered the rapid alignment of previously disconnected practices and the adoption of digital tools such as the mobile app (REP05; AVS01, Case A). In this way, COVID-19 acted not only as a catalyst for adoption, but as a means for embedding RPM within existing care processes.

In 2020 and 2021, the COVID-19 pandemic was used as a catalyst to accelerate the adoption of RPM, creating urgency to engage both healthcare professionals and patients in remote care. As workflows and technical infrastructure matured, the project expanded gradually to include a broader patient population and additional medical specialties. This materialised in the establishment of the VCC, a centralised ward within the hospital from which tele-nurses remotely monitor incoming patient data, with follow-up by medical staff when required (NEW01,16,29,35, Case A). Nurses staffing the VCC played a central role, which they sustained throughout this implementation. They were not only responsible for reviewing incoming patient data but also for initiating patient contact based on incoming data, coordinating care follow-up and acting as the main communication bridge between patients and medical specialists. Their clinical judgement ensured that remote data were meaningfully integrated into decision-making processes. Throughout this development, continuous feedback loops and technical adjustments were required, and the project transitioned from innovation to routine clinical practice.

In the period 2023–2025, RPM gradually grew and scaled over time, resulting in a total of 43 care pathways included and a total of 6,000 patients receiving remote care (DOC03,04; WEB40,41, Case A). These care pathways include various patient groups, ranging from chronic conditions (e.g. inflammatory bowel disease, multiple sclerosis) to postoperative care (e.g. bowel surgery, hip surgery). Rather than relying on top-down implementation, the project team actively engaged different medical specialties through dialogue, in which the potential value of RPM was translated to fit local clinical contexts. For example, when approaching new clinical departments, professionals were explicitly invited to reflect on how RPM could alleviate pressures in their own practice, such as reducing outpatient visits or inpatient admissions, thereby linking the technology to pressing constraints. Similarly, in specific care pathways such as headache care at the neurology department, RPM was positioned to improve consultation efficiency by enabling more structured and data-informed patient interactions: “In the headache pathway, it already helps when patients have kept a diary [in the digital portal]: you can say very concretely, ‘look, I’ve recorded it here,’ and you can see that over the past six weeks it occurred, for example, four times per week and lasted this long. This makes the outpatient consultation more efficient and allows the professional to get more out of it” (Interview virtual care nurse, Case A). These efforts illustrated how engagement was not a given but actively facilitated through ongoing boundary-spanning activities, in which the project team connected the technological views to the situated needs and priorities of diverse actors.

In 2025, the hospital began exploring the inclusion of primary care patients, aiming to relieve pressure on regional general practitioners (GPs) and extend RPM beyond the hospital

setting. Looking ahead, the goal for the coming years (2026 and beyond) is to further extend RPM across a broader range of care pathways in both primary and secondary care, with the aim of supporting disease management and strengthening patient self-efficacy at scale (NEW26,31,48). The anticipated continuation and expansion of RPM is underpinned by a shared vision across all regional network actors, centred on improving patient care, which provides direction and sustains momentum, even in the face of setbacks. As one respondent noted: *“If you start from a shared vision that everyone supports [...] you overcome challenges and find ways to move forward”* (Interview software supplier, Case A). Continued organisational commitment remains critical, as scaling RPM requires investment decisions and, in some cases, “managerial courage” to prioritise innovation despite constrained margins and external financial pressures. The strength of relationships across organisational, functional and professional boundaries, particularly between hospital actors, primary care providers and external partners, is considered a potential decisive factor for future success and is essential for sustaining network engagement with the digital technology in the long run.

4.1.2 Case B – digital patient platform. Case B concerns the implementation of a digital patient platform (DPP) in a Belgian university hospital. The DPP was introduced to support patients throughout their cancer care pathway by providing personalised information, enabling secure communication with care providers and facilitating remote monitoring of symptoms, toxicities and side effects. The platform combined an informational component, offering personalised care-path information, with an interactive component through which patients could complete questionnaires, register symptoms and trigger alerts to care providers (DOC01,03,04,05,21,25, Case B). The main aim was to support patients beyond the hospital setting, anticipate complications and prevent avoidable readmissions.

Within the hospital, key actors included oncology and non-oncology clinical departments, physicians, nurses, nurse specialists, head nurses, the IT department, IT care applications, the strategic policy cell, the hospital innovation fund and a university-affiliated research group responsible for the scientific component of the project. These actors were connected through a project team and, later, a steering committee that brought together clinical, IT, managerial and scientific representatives (DOC06,07,08,09,10,11 Case B). Beyond the hospital, the network included patients and family caregivers, GPs, external hospitals, a specialised eHealth platform and software partner, an external IT helpdesk, a cancer research NGO that provided funding, and federal and Flemish policy actors involved in eHealth infrastructure, reimbursement and data privacy regulation. The actor network involved in Case B, as depicted in [Figure C2 \(Appendix C\)](#) illustrates the multiple organisational, functional and professional boundaries across which network engagement had to be established.

Within this network, the implementation trajectory can be understood as a process in which network engagement initially emerged through strong clinical ownership but gradually weakened as the platform expanded beyond its original oncology setting. The DPP originated in oncology, where care professionals identified a need to monitor patients at home during treatment and to provide timely information and support. Engagement was therefore initially generated bottom-up by care professionals who recognised the potential of e-health for their patients (REP01,02; WEB06; NEW03, Case B). One oncology project lead explained that the initiative emerged after exposure to e-health projects at international oncology conferences, where clinicians saw clear added value for their own patient population. The project was described as *“Really from the care level”*, driven by the question of *“What will this mean for the patient?”* and as *“Very operationally oriented”* (Interview project leader clinical, Case B).

In this initial phase, boundary-spanning roles emerged around the translation of clinical needs into technological possibilities. Oncology care professionals articulated the clinical problem and provided the content of the care pathways, while IT actors helped to determine the technical infrastructure through which the platform could be developed. The university partner supported the scientific and evaluation components. This early collaboration was experienced as constructive because actors from different domains gradually learned to understand each other’s language and priorities (DOC03, Case B). One respondent described the early project

group as “*An enthusiastic group*” and recalled that “*The two worlds*” of care and IT came closer together: “*We are starting to understand each other*” (Interview clinical project coordinator, Case B). The oncology phase was therefore marked by relatively similar goals between clinical, technological and scientific actors. Care professionals did not just adopt a predefined technology; they actively contributed to shaping it. The platform was developed as a customised solution, based on iterative input from care providers and patients. As the project leader clinical in Case B explained: “*The content comes from us*”, and the project evolved through repeated adjustments: “*We adjusted every time what we needed and which features had to be added*”. This created a form of network engagement in which clinical actors, IT actors and scientific partners were mutually involved in developing and refining the platform.

As the platform gained visibility, engagement began to extend beyond oncology. Several other departments expressed interest in developing their own care pathways and questionnaires. This expansion created a need for new boundary-spanning roles. A coordinator was appointed to support non-oncology departments, inform and train users, develop content and act as a liaison between care and IT. This role was explicitly described as: “*An informing, training, supporting, content and liaison function between IT and care*” (Interview project leader process, Case B). In this phase, boundary spanning shifted from the co-development of an oncology platform towards the translation of the platform across different departmental contexts.

However, this expansion also revealed the fragility of engagement beyond the original oncology setting. Although many departments were interested in the platform, this interest did not always translate into sustained ownership. At least 10 departments wanted a care pathway and questionnaires on the DPP. Yet once departments realised that they had to provide the care-path content and questionnaires themselves, they dropped out. The respondent added: “*No time was usually the reason*” and “*It all comes on top of everything else*” (Interview project leader process, Case B).

This pattern shows that network engagement did not automatically scale with the technology. In oncology, engagement had emerged from a clearly felt clinical need and was carried by actors who had helped define the problem and develop the solution. In other departments, engagement was often more conditional. The DPP was seen as potentially useful, but also as additional work that had to be absorbed into already pressured clinical routines. The coordinator could support departments in thinking through how the platform might fit their work processes, but departments still had to provide content, inform patients, connect them to the platform and follow up the data generated by the system. As the project leader process in Case B noted, even when she could help to see how it could be fitted into their work processes, implementation still blocked because: “*Coupling, informing and following up patients requires extra work*”.

A central bottleneck occurred at the point where the DPP had to become part of routine clinical work. The platform required care providers to connect patients manually through the electronic patient record. This coupling activity became a critical but fragile boundary between project-level engagement and actual patient use. As one respondent explained: “*If you are not coupled, you cannot use it*” (Interview lead application manager, Case B). In practice, many eligible patients were not connected to the platform, which resulted in low user numbers. The same lead application manager observed that: “*As long as the care provider has to link this manually, it has no success*”. Engagement, therefore, stalled not because the technology was perceived as difficult to use, but because the work required to activate and sustain use was not sufficiently embedded in departmental routines.

Differences between departments further shaped how engagement unfolded. In some departments, clinical ownership was stronger because key physicians or nurses actively supported the platform and motivated colleagues and patients. In others, engagement remained weak because local leaders did not take up ownership. An IT-care applications manager in Case B reflected on differences between departments, stating that: “*If there is no ownership, it does not succeed*”. He explained that support actors could introduce the technology and help

adapt workflows, but that this was insufficient if a department head did not communicate to the team that the new way of working had to be adopted. This suggests that boundary-spanning roles were not only needed at the interface between care and IT, but also within departments, where local leaders had to legitimise the technology and embed it in everyday practice.

Over time, the role configuration around the DPP became increasingly uneven. Although a coordinator and steering committee were introduced, these structures did not provide sufficient mandate to bring together departments, IT and management around the platform. The project leader process in Case B described her own role as: *“Clearly expressed and relatively well described”* but added that she: *“Never had the feeling that there was a real mandate”*. She further noted that: *“Everyone continued to look mainly from their own department”* and that there was no overarching group feeling, even though such a group orientation had been more visible at the beginning of the project.

This lack of mandate constrained the evolution from project-level engagement to network-level engagement. Although each department appointed a responsible project member, the project remained largely dependent on a small number of central actors who kept the implementation going. The project leader process in Case B explained that: *“From each department, a project responsible was appointed”*, but that she and another project lead were the ones who kept it going. Boundary-spanning roles remained concentrated rather than becoming distributed across the network. This concentration made the project vulnerable once expansion required departments to take ownership of their own workflows and patient follow-up.

As implementation progressed, tensions also increased between clinical and IT actors. In the early phase, collaboration between care and IT was described as productive, but later phases were marked by disputes over usage levels, additional functionalities and further development (DOC09,10,11,17,18, Case B). The project team requested improvements such as automatic coupling to electronic patient record orders, but IT actors increasingly questioned additional investment because the platform was not used enough (DOC16,17,18, Case B). This created a circular dynamic: usage remained low because patients were not systematically coupled to the platform, while further IT support was difficult to obtain because use was considered too low. A physician in Case B described this explicitly as a *“Vicious circle”*.

The deterioration of interaction was also visible in formal project communication. In a summary of the final meeting, the atmosphere at the end of the project was described in terms of a *“Freezing of the wish list”*, uncertainty about *“Technical development, no longer in collaboration with IT”* and *“Strongly disturbed”* communication between care providers and IT (Interview project leader process; DOC10,11,17,18, Case B). The same respondent noted that concerns raised in working group meetings *“Received no hearing at higher level”* and that, as a result, many people dropped out (Interview project leader process, Case B). Thus, rather than functioning as a stable bridging structure, the formal coordination arrangements became insufficient to maintain engagement across the network.

The discontinuation of the DPP was therefore not simply a technical decision but reflected a gradual weakening of network engagement across multiple boundaries. Clinical engagement remained present among motivated actors but was not sufficiently transferred to departments as routine ownership. IT engagement shifted from development and support towards prioritisation and resource constraints. Management engagement remained limited, particularly in terms of providing mandate, staffing and workflow integration. The project leader clinical in Case B reflected that higher management had been involved *“Too little and too late”*, and that senior actors had not been sufficiently part of the bottom-up story from which the project had emerged.

This weakening became particularly visible when support for the DPP was discontinued. Project actors experienced this as a rupture in an initiative that had previously felt participatory and supported. The project leader clinical in Case B stated that, for years, the project had felt like *“A very supported and participatory project”*, but that *“Suddenly it shifted”*. Another reflected that the project had remained too dependent on central project actors: *“We remained project owner, but the departments never tried to take it over, so we actually remained project owner for too long”* (Interview project leader process, Case B).

Case B therefore shows how boundary spanners can activate network engagement during the early phases of digital technology implementation, while also illustrating how engagement can weaken when such boundary spanners remain fragile, isolated and insufficiently embedded in the network. The absence of sustained process ownership within departments, limited managerial mandate and insufficient integration into routine workflows constrained the transition from project-based engagement to durable network engagement. In Case B, the DPP did not fail because boundary spanners were absent, but because they were not sufficiently embedded, distributed and legitimised across departments.

4.2 Cross-case analysis: boundary-spanning roles in the formation of network engagement

The cross-case analysis shows that network engagement was not enabled by the sole presence of motivated actors, but by how boundary spanners emerged, shifted and became embedded across the network. In both cases, these boundary spanners crossed organisational, functional and professional boundaries by enacting various roles to ensure that the digital technology was accepted by the users, integrated into existing work routines and supported by the larger organisational and institutional context. However, the two cases differed markedly in how these boundary-spanning efforts evolved over time. In Case A, boundary-spanning roles became progressively distributed across the network and were supported by managerial mandate, regional legitimacy and operational structures, which were present from the onset. In Case B, similar roles emerged during the early phases of implementation but remained concentrated in a small number of project-level actors and were insufficiently transferred to departments, management and external partners. This difference shaped whether stakeholder involvement developed into sustained network engagement or not.

Across the two cases, we identified seven boundary-spanning roles: clinical champion, experience champion, process champion, translator, internal advocate, external advocate and bridge builder. The same actor could enact multiple roles, while similar roles could shift between actors over time. Rather than understanding these roles in isolation, we conceptualise these as a constellation of boundary-spanning roles that jointly realise three meta-functions: activating, embedding and legitimising (see Figure 1). The following sections explain how these meta-functions emerged across the two cases and jointly enabled network engagement.

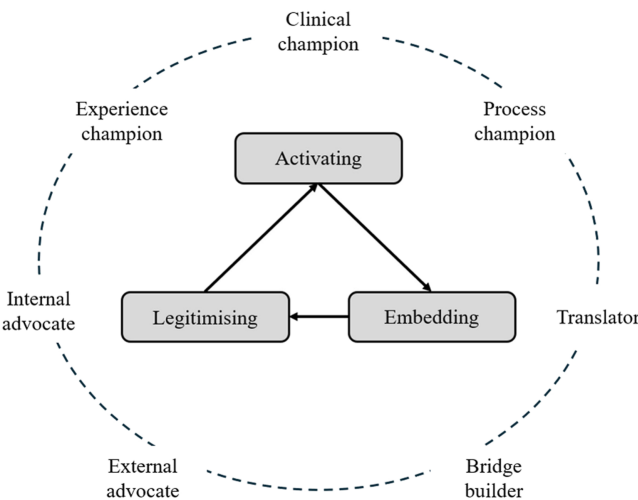


Figure 1. Meta-functions and boundary-spanning roles

4.2.1 Activating. This meta-function captures the emergence of engagement by generating commitment and participation among network actor groups across functional and professional boundaries. Activating is realised through the activities of clinical or experience champions as boundary spanners. In both cases, commitment and participation initially emerged through actors who articulated and demonstrated the clinical and experiential value of the technology across different groups of actors. Clinical champions were important because they linked the view of technology-oriented actors (e.g. IT) to the clinical value of the technology for actors involved in care delivery (e.g. doctor, nurse, patients), thereby crossing functional boundaries. To stimulate participation across groups of the latter actors, and hence cross professional boundaries, clinical and experience champions framing the care value and share own experiences, respectively. In Case A, early success experiences with RPM for COVID-19 patients were shared to activate other departments and patient populations: *“We started small, with 200 patients and it turned out to be a huge success for the COVID patients. This success was actively used to engage other departments with other patient populations”* (REP14, Case A). In Case B, clinical commitment was also present, especially in oncology, where clinicians and nurses participated in discussion with technology developers to shape the content of the DPP and hence believed in its value (Interview project clinical lead; REP02; DOC01,02,03, Case B). However, activation of engagement across network groups in Case B remained more dependent on a limited group of clinical and project actors, whereas in Case A, over time, it became connected to a broader group of boundary spanners.

4.2.2 Embedding. This meta-function reflects stimulating engagement by ensuring new practices are integrated into existing routines and structures across groups of actors in the network. Our findings show that this meta-function is closely related to the boundary-spanning activities that actors with the process champion and translator role undertook. Rather than remaining confined to individual departments or teams, network engagement was facilitated through the streamlining of workflows, the distribution of responsibilities and the establishment of organisational structures that enabled collaboration across functional and professional boundaries. In Case A, embedding was facilitated by the VCC which established RPM as a distinct organisational entity that actors could refer to, allowing for scalability across multiple clinical departments (DOC01; NEW01,16,29,35, Case A). This enabled common RPM practices to be implemented across medical specialties despite differences in patient populations. The process champions coordinated the redesign of care processes, while translators supported communication of different perspectives, knowledge and language across functional and professional boundaries. For instance, a cardiologist acted as a boundary spanner by translating clinical needs of different groups of actors (e.g. doctor, nurse, patient) into technological requirements. This resulted in engagement that moved beyond initial enthusiasm into incorporation in daily care routine. In Case B, embedding was considerably more difficult. Although project coordinators acted as translators between care and IT and supported departments in developing care-path content, responsibilities remained concentrated among a small group of central project actors. As the platform expanded, translation became more difficult and the process champion role was not sufficiently transferred to the clinical departments. Consequently, departments struggled to adapt workflows and take responsibility for patient coupling and follow-up, as indicated by various interviewees in Case B. This prevented engagement from emerging across groups of actors.

4.2.3 Legitimising. This meta-function reflects enabling engagement by building mandate, credibility and institutional support. Our findings indicate that this meta-function is realised through the boundary-spanning roles of the internal advocate, external advocate and bridge builder. Internal advocates played an important part by communicating the clinical value of the technology to management actors in the organisation across functional boundaries, while bridge builders and external advocates, respectively, connected to groups of actors outside of the organisation and generated credibility for them by going beyond their organisational boundaries. In Case A, internal advocates created legitimacy by connecting RPM with hospital strategy and securing board-level commitment, while external advocates engaged with

insurers, regional partners and policy actors active outside the hospital’s organisation. Bridge builders complemented the advocate roles by connecting actors across organisational boundaries, allowing legitimacy established within one part of the network to extend to others. This became visible through the strengthening of relationships with regional partners, insurers and other hospitals, creating a broader coalition around RPM implementation: “*Ultimately, the relationship with all those parties is the most decisive factor for success*” (Interview Project Lead, Case A). In Case B, internal legitimacy proved more fragile. Although the project benefitted from a steering committee and committed project members that went in discussion with management, thereby trying to bridge functional boundaries, respondents indicated that senior management was insufficiently connected to other groups of actors. The absence of a clear mandate from senior management constrained the ability of boundary spanners to bridge departments, secure resources and maintain commitment as organisational priorities shifted. This reduced legitimacy weakened network engagement over time, especially when IT priorities shifted and continued investment in the platform became contested.

In summary, the cross-case analysis shows both which boundaries are crossed and that boundary-spanning roles enable network engagement through three meta-functions, which activate actors around a shared care problem, coordinate routines and structures, and legitimise the implementation within and beyond the focal organisation (see Table 3).

4.2.4 Interdependency of meta-functions. When plotting the meta-functions throughout the implementation process of both cases, our empirical evidence reveals that they represent complementary and mutually reinforcing functions through which boundary-spanning roles can enable network engagement.

Table 3. Meta-functions and boundary-spanning roles to facilitate network engagement

Meta-functions	Goal	Boundary spanners	Boundaries spanned
Activating	Generating commitment and participation	<i>Clinical champion</i> Bridges actors across professional and functional boundaries by framing the clinical value of the technology	Functional; Professional
		<i>Experience champion</i> Bridges different professional groups of actors by articulating and demonstrating the value of the technology through experience	Professional
Embedding	Ensuring new practices are integrated into existing routines and structures	<i>Process champion</i> Links actors across functional boundaries to integrate new technology-enabled practices into routines and workflows	Functional
		<i>Translator</i> Bridges functional and professional boundaries by communicating different perspectives, knowledge and language into shared understanding	Functional; Professional
Legitimising	Building mandate, credibility and institutional support	<i>Internal advocate</i> Spans functional boundaries to secure organisational support, resources and internal mandate	Functional
		<i>External advocate</i> Spans organisational boundaries to achieve credibility by other institutions	Organisational
		<i>Bridge builder</i> Connects otherwise disconnected groups of actors across organisational boundaries	Organisational

Source(s): Authors’ own work

As shown by our findings, the cases differ not because the seven boundary-spanning roles were present in one case and absent in the other, but because the roles evolved and engaged with the three meta-functions differently. In Case A, boundary-spanning roles became distributed, mutually reinforcing and institutionally supported. In Case B, they remained more fragmented, concentrated and weakly mandated. Successful implementation therefore required more than the mere presence of boundary spanners. It is also affected by the interdependency between the roles and their achievement of the meta-functions. Considering the interdependency of the meta-functions from activation to embedding to legitimisation (see Figure 1), the absence of one function deteriorates the ability for the others to grow, which results in a downward spiral of network engagement. An upward spiral of reinforcing network engagement is generated by boundary spanners that build on each other in achieving their meta-functions. In Case A, the RPM technology soon was connected to a broader regional vision for digitally supported care aimed at improving the well-being of all municipality inhabitants by 2025. This created a shared goal in which legitimisation was already a solid foundation on which boundary spanners could build to fuel the other meta-functions. As the CMIO explained: *“It all starts with a bit of courage on the part of the executive board. They were the ones who stuck their necks out and gave us the freedom to engage in remote patient monitoring”* (Interview CMIO; AVS08; NEW50, Case A).

In Case B, engagement also emerged among clinicians and project members who strongly believed in the platform (Interview project leader clinical; DOC01,03,04, Case B). However, this engagement by the boundary-spanners was not sufficiently backed by process ownership (i.e. activation), cross-departmental coordination (i.e. embedding) or management mandate (i.e. legitimisation). The project leader process in Case B stated that *“Management had not joined us”* and that there were *“No roles at management level”*, while the IT leader in Case B stressed that implementation only works when *“The lead lies with the business, with care itself”*. The contrast therefore does not suggest that Case B lacked motivated individuals to take up boundary-spanning roles. Rather, it shows that motivation alone was insufficient when boundary-spanning roles remained concentrated, weakly mandated and insufficiently interrelated to build on each other and achieve the three meta-functions to realise network engagement.

5. Discussion

The analysis of our two cases provided detailed insights into the implementation process of digital technologies within healthcare operations. The implementation of digital technologies in healthcare operations induces changes in the very fabric of how healthcare organisations are structuring and managing their operations. These technologies will have a significant impact on how people will be able to provide treatment to patients, but also how patients will receive healthcare services (Bendoly *et al.*, 2026). Hence, implementing technologies requires the engagement of a large set of actors, both operating within the organisational boundaries of the hospital (i.e. internal actors) and outside the hospital (i.e. external actors). This constellation of internal and external actors can be conceptualised as a network. Achieving engagement within such a network requires the involvement of actors that (as demonstrated in our cases) take on boundary-spanning roles. These boundary-spanning roles serve as critical links between networks of actors and the digital technologies being implemented, ensuring not only their commitment to the implementation process but also the acknowledgement of their diverse perspectives and concerns.

To cater to the various types of actors, our findings suggest that the value of boundary-spanning roles lies in how they combine and interact to enable engagement across multi-actor healthcare networks. While prior literature has studied core functions of boundary-spanning roles (Aldrich and Herker, 1977), which have been carved out in light of diverse contexts, prior literature often examines these roles side-by-side and as stable roles over time. In contrast, our data show that digital technology implementation is not driven by single roles separately, but

by multiple boundary-spanning roles that activate, embed and legitimise network engagement along the implementation process. To conceptually capture these constellations, the data analysis unravelled seven identified boundary-spanning roles that were further grouped based on higher-order meta-functions they aimed to achieve to facilitate network engagement: (1) activating, (2) embedding and (3) legitimising. These meta-functions do not replace the seven individual roles. Instead, they reflect how boundary spanners can reinforce each other in facilitating engagement at the network level. As became clear from our findings, these meta-functions are complementary and mutually reinforcing. Based on this, we were able to develop a model that explains how the three meta-functions are interdependent and require the constellation of seven roles (see [Figure 1](#)).

Activating revolves around generating commitment and participation by network actors. This meta-function is primarily performed by clinical champion and experience champion roles. Clinical champions connect technology views with clinical work, while experience champions spearhead patient perspectives showing the relevance and meaning of the technology. Together, this meta-function activates engagement by bridging technology actors to two other groups of actors: healthcare professionals and patients.

Embedding reflects the work required to ensure that new practices are integrated into existing routines and structures. This meta function is mainly fulfilled by process champion and translator roles. Process champions focus on linking actors across functional boundaries to integrate new technology-enabled practices into routines and workflows in each of the care pathways to standardise the way each care pathway uses the core functionality of the new digital technology. Translators, in turn, enable mutual understanding across network actors. The contribution of the meta-function lies in bridging actors that are new to the technology, allowing network engagement to become incorporated in day-to-day practice.

Legitimising captures the work of building mandate, credibility and institutional support. This meta-function is performed by both advocate roles and the bridge builder role. Internal advocates secure organisational support and resources by spanning boundaries with management levels, while external advocates engage institutional network actors such as governments, insurers and partner organisations. Bridge builders connect otherwise disconnected actors and networks of actor, facilitating engagement at the network level. The goal of this meta-function is to enable network engagement to gain institutional traction, realising sustained implementation and providing fertile ground for future implementation trajectories.

In sum, these three meta-functions shift the current focus from individual boundary spanners and their roles in isolation to our constellation of boundary-spanning roles that can be enacted by various boundary spanners. This responds to calls in the literature to move beyond static role typologies and towards a more processual understanding of implementation of technology in networked settings (e.g. [Langley et al., 2019](#); [Razmdoost et al., 2023](#)). Our contribution, therefore, is not the introduction of new roles *per se*, but the identification of three meta-functions enacted by one or more boundary spanners that together activate, embed and legitimise change that boost network engagement, which is essential along the implementation process of digital technologies in healthcare operations.

5.1 Theoretical implications

The main contribution of our article lies in identifying three meta-functions of boundary spanners in implementation processes involving the introduction of new technologies (see [Figure 1](#)). We show that such implementation processes depend not only on patient engagement, but more so on the organisational and process structures that shape the overall network engagement, which is in line with recent studies by [Goradia and Chandrasekaran \(2025\)](#) and [Mukherjee et al. \(2025\)](#). By examining two cases in which the focal hospitals sought to implement new technologies, one that was successful and one that was

unsuccessful, and by identifying three meta-functions for boundary spanners, we contribute to three distinct theoretical areas.

First, we contribute to theory on the implementation of digital technologies in healthcare operations, particularly within hospital settings. Both of our cases involved the introduction of technologies that substantially altered the healthcare operations in the cases. While extant research predominantly examines how organisations as a whole implement a new technology (e.g. [Wang et al., 2026](#)), our study focuses on the larger network of stakeholders involved in the implementation process. Rather than focusing solely on the implementing organisation, or on specific departments, individuals or patients, we argue that the broader network of actors must be engaged throughout the implementation process. In doing so, we move beyond traditional adoption models and introduce a network-based perspective on technology implementation, in which we especially emphasise the importance of the presence of three meta-functions for boundary spanners.

Second, we contribute to the literature on network engagement since implementing digital technologies involves a network of actors who must be meaningfully engaged throughout the process ([Damschroder et al., 2009](#); [Ferlie et al., 2005](#)). Insufficient engagement can lead to resistance or even rejection of the technology. Extending prior work that often focuses on individual stakeholder engagement (e.g. [Jefferies et al., 2019](#); [Klecun et al., 2019](#)), we gain insight into network engagement as a whole. Moreover, prior work tends to focus on single actor groups ([Rowe and Frewer, 2005](#)), while the present research sheds light on how boundary-spanning roles can bridge diverse networks of actors within and beyond hospitals in which digital technologies are implemented. We specifically demonstrate how network engagement can be realised through multiple boundary spanners, each performing a distinct and complementary boundary-spanning role.

Third, we extend OSCM research on boundary spanning by moving beyond the predominant focus on studying individual boundary spanners (e.g. [Jefferies et al., 2019](#); [Shou et al., 2022](#)). Our findings show that digital technology implementation in healthcare relies on constellations of complementary boundary-spanning roles operating across overlapping organisational, functional and professional boundaries. The contribution therefore lies not in identifying new boundary-spanning roles *per se*, but in theorising how these roles jointly realise three higher-order meta-functions (i.e. activating, embedding and legitimising) through which network engagement is created and sustained throughout the implementation process. We also show that the realisation of boundary-spanning roles and meta-functions is interdependent over time but does not follow a one-size-fits-all path as they are shaped by the specific institutional complexities of healthcare operations. In fact, the interplay between roles and meta-functions helps explain why network engagement can be realised in some implementation trajectories but not in others (e.g. [Razmdoost et al., 2023](#)). This provides a more nuanced picture of how digital technologies are implemented in complex, networked environments.

The three meta-functions can also be interpreted through the lens of modularity theory, particularly the interface literature ([Johnson et al., 2021](#); [Voss and Hsuan, 2009](#)), as they capture higher-order coordination required to integrate different network actors involved in digital technology implementation. Modularity research has traditionally focused on how well-defined interfaces enable coordination between loosely coupled components, often through formalised and standardised interaction rules within products, processes, services or information systems ([De Blok et al., 2014](#)). Our study suggests that in multi-actor healthcare networks such interfaces are not pre-defined but must be actively enacted and maintained. From this perspective, boundary-spanning roles can be understood as interfaces that enable connections across diverse actors, practices and institutional contexts.

The three meta-functions identified, activating, embedding and legitimising, highlight how boundary spanners are continuously enacted through interaction rather than fixed in advance as in product settings ([Fixson, 2005](#)). This could extend prior modularity work by showing that, particularly in complex service settings, realising effective modularity depends not only

5.2 Practical implications

The insights derived from our two case studies hold important implications not only for theory but also for managers implementing digital technologies in healthcare operations. Successful implementation requires more than managerial effort alone; it depends on a network of engaged stakeholders operating across organisational boundaries. To support managers in developing and maintaining such engagement, we summarise four key principles below.

The first key principle, “*Identify the stakeholder network*”, calls on managers implementing digital technologies in healthcare operations to identify and involve all stakeholders affected by these technologies, including those situated beyond the organisational boundaries. As such technologies fundamentally reshape operational processes (Bendoly et al., 2026), implementation should be considered not only from an organisational perspective but also from the perspectives of the various stakeholder groups. Early and meaningful engagement helps streamline technological objectives with stakeholder expectations and enhances acceptance across the network. This principle primarily supports the activation of engagement, as it establishes the foundation for connecting the technology to the interests and concerns of diverse network actors.

The second principle, “*Define boundary-spanning roles*”, highlights the importance of moving beyond stakeholder mapping towards specifying the actors responsible for network engagement. These actors enact boundary-spanning roles and may take one or more roles (including clinical champion, process champion, experience champion, internal advocate, external advocate, translator and bridge builder). Clear delineation of these roles is essential to prevent ambiguity, particularly when a single actor assumes multiple roles. In doing so, this principle operationalises the three meta-functions by ensuring that activating, embedding and legitimising are assigned and enacted.

The third principle, “*Enable boundary-spanning roles*”, urges managers to ensure that actors assigned to these roles are adequately equipped to perform them. This involves providing both functional resources (such as time, budget and mandate) and soft resources (such as recognition and agency), thereby ensuring that boundary-spanning constitutes a substantive and supported responsibility rather than an ancillary task. This is especially critical for embedding, as integrating the digital technology in daily care practice requires actors to actively manage routines across professional, organisational and functional boundaries. At the same time, enabling these roles strengthens legitimisation efforts by signalling organisational commitment.

The last principle, “*Engage through boundary-spanning roles*”, underscores the need for authentic and ongoing engagement with stakeholders. Boundary-spanning roles should not be used merely to promote or impose technological adoption; rather, they are essential in integrating diverse stakeholder perspectives with the objective of innovation. This principle cuts across all three meta-functions, as it reflects ongoing work through which engagement is activated, embedded and legitimised across the network.

5.3 Limitations and directions for future research

Even though this study identified and conceptualised boundary-spanning roles essential for realising network engagement during the implementation of new digital technologies in healthcare operations, it is not without limitations. These limitations, however, offer valuable opportunities for future research.

First, the research was deliberately confined to the hospital sector, which restricts the generalisability of the findings. By focusing on two comparable hospitals implementing similar digital healthcare technologies, internal validity was strengthened, yet external validity remains limited. The identified roles have not been examined in other organisational contexts.

Nevertheless, given the structural similarities across healthcare service delivery systems, the findings may be transferable within the broader healthcare domain. Future studies are encouraged to validate and refine the proposed three meta-functions in diverse organisational settings, drawing on alternative selection criteria such as organisational size, market competition or institutional culture. In particular, comparing bottom-up and top-down implementation trajectories could provide insights into whether different implementation approaches require different constellations of boundary-spanning roles. Beyond healthcare, research could also explore these meta-functions in other public service sectors such as education, infrastructure or law enforcement, where digital technologies similarly demand engagement with a larger network of stakeholders.

Second, this study focused on a single type of technology, namely digital healthcare platforms. Future research could compare whether different technological innovations such as artificial intelligence (AI), smart products or robotics require different constellations of boundary-spanning roles and alter the relative importance of the three meta-functions, or not. Studying the implementation of (agentic) AI is particularly relevant as this technology is thought to increasingly reshape OSCM in the near future (Roehrich *et al.*, 2025). As emerging agentic AI solutions can act as autonomous agents next to human agents, rather than other AI or digital tools that are mostly standalone tools with predefined properties, ongoing interactions between them will lead to (major) adjustments to roles, processes and responsibilities within organisations (Wilhelm *et al.*, 2026). Future research could therefore examine whether activating, embedding and legitimising network engagement remain primarily human boundary-spanning roles, or whether these become increasingly realised through evolving human–technology configurations.

Finally, our data were cross-sectional and collected near the end of two large implementation projects. Although interviewees reflected on how boundary-spanning roles and engagement evolved over time, this study could not capture these temporal dynamics longitudinally. As network engagement and boundary spanning are processual in nature, future longitudinal research could provide deeper insight into how engagement is activated, embedded and legitimised throughout the implementation process.

6. Conclusion

This study examined how boundary-spanning roles realise network engagement during the implementation of digital technologies in healthcare operations. Drawing on a multiple case study, we show that implementation success depends not merely on stakeholder involvement or individual champions. Rather, it depends on the extent to which boundary-spanning roles are enacted across the healthcare network.

Our findings identify three meta-functions of boundary-spanning roles: (1) activating, (2) embedding and (3) legitimising. Rather than focusing on individual boundary spanners, we show how a constellation of boundary-spanning roles together enables network engagement in multi-actor healthcare networks. The successful case demonstrates how these meta-functions became integrated across actors, routines and organisational structures, whereas the unsuccessful case reveals how concentrated and weakly legitimised boundary-spanning efforts constrained the development of sustained network engagement.

Supplementary material

The supplementary material for this article can be found online.

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Corresponding author

Vincent Peters can be contacted at: v.j.t.peters@tilburguniversity.edu