

Key aspects influencing the scaling of digital remote care: A case from a Norwegian hospital region

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Abstract. Digital remote care (DRC) is one means to contribute to digital transformation (DT) in the healthcare sector; a sector where DT has a long way to go before reaching its potential to be a significant contributor to the fulfilment of the need for more efficient, effective and up-to-date services. In this longitudinal case study, we investigate a Norwegian hospital region's efforts to carry out ambitious transformations with DRC; in particular, we follow the DRC trajectories at one of the region's hospitals. We aim to explore DRC and how it can scale through expansion, both in functionality and within the organisation to accommodate large-scale health information infrastructures. Our contribution to the information systems literature lies in providing a rich description of the challenges that emerge in relation to DRC initiatives and how such issues are addressed. We also contribute to the DRC practices by identifying four key aspects related to scaling and by deriving six lessons learned for planning and implementing DRC initiatives.

Keywords: Digital Transformation, Digital Remote Care, e-Health, Scaling.

1 Introduction

How to organise future healthcare is an emerging issue in developed countries such as Norway due to the ageing population, the shortage of healthcare personnel, the increase in the number of multi-morbid patients with complex demands, and high expectations from the citizens [1, 2]. Decreasing the workload of the traditional hospital and finding new strategies to deliver hospital services make digital transformation (DT) a highly relevant phenomenon. Taking advantage of information and communication technology (ICT) is perceived as a remedy to reduce the demands for both financial and human resources [3] and to lighten physicians' burden of treating patients with non-serious cases and performing less demanding tasks, so they can focus on proactive care [4].

Offering digital remote care (DRC) is an emerging strategy for hospitals [3, 5]. DRC refers to the activities enabled through digital systems when following up on patients outside a healthcare institution. Several researchers have addressed challenges concerning DRC, but these continue to be valid research areas [6-8].

However, DT in the hospital sector is not a straightforward process. For decades, hospitals have implemented a variety of ICTs sourced from various vendors, includ-

ing systems for patients' electronic health records (EHRs), laboratory systems, logistic systems, sensors, diagnostic facilities and medical automation. Hence, over time, a complex ICT landscape has evolved. Medical specialisations' interdependencies in their processes and data requirements, a variety of decision-makers at different levels of healthcare systems, rapid technological advancements and shifting regulatory requirements add to the complexity [9]. In our research, these large portfolios of clinical ICT systems are perceived as information infrastructures [9]. An information infrastructure can be defined as 'a shared, open (and unbounded), heterogeneous and evolving socio-technical system (which we call installed base) consisting of a set of IT capabilities and their users, operations, and design' [10]. Scaling in information infrastructures concerns both extensions of services for a specific system and geographic or organisational spreading of the system [11].

Adding new DCR solutions that entail new work practices is regarded as a digital innovation [12]. However, innovation with subsequent scaling in health information infrastructures (HIIs) can be difficult to achieve due to its socio-technical nature [13, 14]. Nonetheless, many DRC solutions have some characteristics of platforms and lightweight IT, which may facilitate faster innovation in such HIIs by adding new modules or replacing existing functions with new apps [15]. In this longitudinal case study, we examine DRC approaches in a hospital region at both regional and local levels and ask, '*What are the key aspects that influence the scaling of DRC?*'

Our findings show that at the regional level, a paradigm shift is occurring in the technological architecture to facilitate control over its HII, and rapid development of new services. In contrast, in local hospitals, existing platforms are used for lightweight IT solutions that facilitate shorter implementation times. From a local initiative, we derive our contributions to the DRC literature by presenting four key aspects of scaling DRC and by offering six lessons learned in this regard.

2 Digital Transformation (DT) and Digital Remote Care (DRC)

DT occurs when organisations use ICT to significantly change their service delivery models (including changes in their business models), which is implicitly integrated into their strategies [16]. Using ICT to provide hospital services outside of the traditional arenas and making the patients active participants in their treatments hence involve DT. Different terms are used for this concept, for example, *digital and remote care* [17], *digitally enabled remote care*, *e-health*, *telehealth* and *telemedicine* [18, 19]. Nevertheless, we use the term DRC which 'includes the activities/actions that enable [...] the patient[s], outside the traditional arenas where patients meet healthcare professionals, [to] acquire, register and share clinically relevant information about their state of health electronically, for the purpose of providing information or guidance for [their] self-mastery, and/or [to] provide decision support [for] diagnosis, treatment or follow-up [by] healthcare professionals' [20].

DRC can be sorted into several categories, depending on how the patient treatment is provided. The simplest form is probably the patient's video consultation with the physician. It is then a digital polyclinic (also named a user-managed polyclinic), where

the patient has access to a consultation based on one's need. A solution that makes use of a digital polyclinic facilitates the digital collection of patient data through self-reporting (e.g., tests and functional measurements to assess the need for further follow-up). Furthermore, the patients themselves can send in-person consultation requests if their conditions worsen; thus, consultations are based on needs, not on the calendar. Another form involves solutions where the treatment is mediated through digital channels. An example is cognitive behavioural therapy for depression and anxiety, where the patient takes course modules with central concepts.

One more form of DRC is the extension of the hospital's network to the patient's home (e.g., letting clinicians remotely set the parameters for operating haemodialysis machines). A home hospital is another opportunity for DRC. Patients at a home hospital are supposed to be inpatients but stay home, and a clinician may travel to a patient's residence to adjust the medical technical equipment (MTE) and check the patient's condition. For these two latter forms, the patients may be followed up, as described under the digital polyclinic category as well.

Some DRC solutions appear as platforms to connect patients and clinicians, with the possibility to communicate with a diversity of MTE and other relevant systems. A common feature of these platforms is that follow-ups on patients occur without being bound by time and place. There are separate apps for patients, which can receive measurements from equipment via Bluetooth and have functionality for surveys/forms, chats, video consultations and self-treatment plans.

A common aim of the DRC solutions is to provide DT with either revised or completely new work processes. The work process is changed when the patient becomes an active participant (e.g., the patient can put a syringe and receive a nurse's guidance via a video link). Another example is when nurses are enabled to take action on patients' information, under specific conditions, to lessen the workload of physicians.

Altogether, the benefits of DRC from the hospitals' perspective include (among others) freeing up time for clinicians to spend on patients who need it more [21], offering treatment at an earlier stage in the course of the disease [21] and enabling each physician to treat more patients [22]. For patients and society at large, reduced travel time, and consequently, decreased pollution, cost and need to take time off from work, are important additional benefits [23, 24]. Moreover, the travel itself can be very painful and exhausting for some patients.

However, there are many barriers to DRC. Some factors influence the suitability of DRC use on the patients' side, such as lack of digital readiness and competence to give informed consent [25]. From the DRC providers' side, privacy, legal and ethical issues are important matters that they have to deal with [26]. Of course, medical experts' acceptance of DRC is vital for its adoption [7]; it must deliver the quality required by physicians [14]. Moreover, clinical trials have experienced unrealistic or false measures that have triggered alerts regarding critical values [8, 27]. There might also be organisational resistance and cultural barriers; thus, finding strategies to encourage willingness among clinicians is critical for adoption and scaling, which is an area for future research [14]. Although DRC is a promising approach, in Norway, the initiatives are uncoordinated and characterised as pilot projects with an uncertain future [28]. Therefore, it is interesting to understand how DRC initiatives can be sus-

tained and scaled in terms of developing or reconfiguring technology to manage new patient groups and to be spread across hospitals [8].

3 Method

By conducting a longitudinal interpretive case study [29], we seek to gain an in-depth understanding of how DT unfolds in the hospital sector.

3.1 Study Context

In Norway, hospitals are public and organised as health trusts (HTs) owned by four regional health authorities (RHA). We investigate the South Eastern RHA (SERHA), which is the largest region serving 3,100,000 citizens. SERHA has 11 HTs (9 somatic, 1 for purchasing and 1 for ICT operations). The latter is called Hospital Partner (HP). SERHA had 82,700 employees and an annual turnover of 101,3 billion NOK in 2022. SERHA's scope of responsibilities includes ICT strategy, among others. Investments in ICT are made at the regional level, and to some degree, at the local level. To reduce the demands for both financial and human resources and to satisfy citizens' expectations for modern healthcare, political guidelines (issued in 2019) advice HTs to take advantage of ICT and move more of the care services to patients' homes [3].

SERHA had already decided to establish more healthcare services outside hospitals in their plan, as stated in its plan from 2018 [30]. The plan points to five focus areas; one of them involves new ways of working, including better use of technology. SERHA emphasises supporting lightweight ICT, mobile solutions and innovation, as well as modernising and standardising its infrastructure to facilitate the new strategy.

It is worth mentioning that the development plan published in 2022 [22] reflects the new ICT strategy. The plan discusses and suggests how to use technology to move treatment as close to the patient as possible, as long as quality is maintained [22].

3.2 Data Collection and Analysis

This paper's empirical evidence comes from primary and secondary data. The primary data were collected from September 2021 to August 2023. The main sources are summarised as follows: related to SERHA's regional strategy – two 2-hour meetings, 6 formal interviews (each for 1 hour) and observation of one 45-minute regional board meeting; related to DRC in general – 3 conferences, 30 45-minute webinars and 2 seminars; and related to local DRC initiatives across the HTs at SERHA – 21 semi-structured and open-ended interviews (lasting 45 minutes on average) and 3 formal meetings with a total of 28 informants (lasting 80 minutes on average). Nine of the 21 interviews and all of the 3 meetings were held with informants from Opal HT.

The formal interviews were held as video conferences, recorded (except two) and transcribed verbatim. The interviewees were selected by means of a purposeful sampling strategy to 'identify people with great knowledge and/or influence (by reputation) who can shed light on the inquiry issues'[31].

The secondary data comprise government white papers, national and regional strategy reports, regional status reports, articles from the press and documents from each HT's website explaining the DRC initiatives. In sum, we reviewed approximately 50 PDF documents and 50 web pages.

The data provided rich empirical descriptions. First, we loaded all data into NVivo (a tool for qualitative studies) and coded the data according to our interests. Our first analysis showed that some HTs had higher numbers of DRC initiatives, so we decided to follow one of these HTs, Opal. In the recurrent interviews with Opal representatives, we asked them questions on the status of its overall initiative, challenges and events that had influenced the scaling capability of the DRC platform and each DRC solution's. After carefully reading the interview transcripts and reviewing the coding, we prepared a detailed narrative of Opal's DRC trajectory.

4 Findings

First, we present our findings in relation to the strategies at the central and the local levels. Next, Opal's story is presented. Opal is one of the HTs with the most DRC initiatives in production. Four phases have been identified from significant incidents during their trajectories that influenced the scaling of DRC solutions across the HT.

4.1 Central (SERHA) and local (HTs) strategies for DRC

The regional development plan for SERHA issued in 2018 [30] had an important strategy of moving treatments closer to patients and using new and modern technologies as means of ensuring sufficient capacity in the specialist health service. Among others, with digital channels, SERHA could achieve increased involvement of patients, who could then take over some of the tasks themselves. Furthermore, SERHA pointed to the digital polyclinic as an important aspect. However, experiences showed that due to the forms of agreement, it would be difficult to adopt solutions from one hospital to another. Therefore, SERHA wanted a closer involvement in projects from the regional level to ensure the reuse of technological solutions and agreements [30].

Based on both national and regional strategies, SERHA started an investigation in October 2020 to explore new ways of addressing the need for new services related to DRC. The investigation concluded with a recommendation to purchase an intelligent business process management system, internally named the *process platform*. The process platform may improve the hospitals' change capability and the coordination and automation of the work processes involving many ICT systems and departments. Importantly, the process platform is part of SERHA's new technical architecture under construction (e.g., with new integration services to facilitate the data flow between new apps to the core systems). In December 2021, the SERHA board decided to purchase a process platform. The contract with Pegasystems was signed in April 2023.

Over the same period, SERHA realised that there were around 70 DRC initiatives across their HTs [22]. To make the purchasing process smoother for the HTs and to

enable economies of scale, they entered into a framework agreement with six suppliers of platforms for DRC in February 2023.

From our investigation of the 9 somatic HTs, we found that in 2021, three of them had purchased a DRC platform from which they could innovate. Other HTs had partnership agreements with various vendors to run time-limited projects. Additionally, the COVID-19 pandemic compelled SERHA to quickly arrange a regional procurement of two DRC solutions, one for psychiatry and the other for video consultations.

Nonetheless, SERHA had no strategy for DRC when in 2019, Opal started to explore how to address DRC in general. Opal's principal idea was to build an ecosystem around a chosen platform, which could thus be a link between all of the different clinical professional systems and MTE.

4.2 Opal's DRC journey

Pre-phase (2017–2019): Some scattered, individual initiatives. At Opal, some clinicians wanted to make the treatment of or communication with their patients digital (i.e., facilitate a connection from the patient's home to the hospital and vice versa). To cite an example, for the section on home hospitals for kids, they started a project to search for possible DRC solutions in 2017. The project manager, alias Olivia, was a nurse in the section, who stood behind the initiative. The aim was to use the DRC solution for all this section's patient groups. The section started with children who had newly diagnosed diabetes.

The first patient was included in the new DRC solution in the summer of 2020, followed by 43 patients (3–4 at a time) in the subsequent year. However, this was an inadequate solution, with a lack of integration into the core systems (e.g., electronic patient records [EPRs]), consequently burdening the nurses with the extra work to register the data from the DRC app to the core systems or on paper schemas. Moreover, a lot of unexpected work had to be performed before 'going live'. Since Opal had no or little experience with such procurements, it was a long and tedious process:

'When I started the project, I thought that this was a project for a year, but after a year, I had not achieved anything. This became a difficult project because it was very lengthy and influenced by many things that I could not control on my own' (Olivia).

For this first DRC project, the manager had some help in the process but did a lot on her own and spent much time on things she would never do again:

'I had written both the DPIA [Data Protection Impact Assessment] and the data processing agreement. I had no experience with these, but I sent them to someone at Opal who could verify. [...] Today, there are in-house employees who can assist in that work, but those people were not around when we started our project' (Olivia).

Additionally, no budget was reserved for the project. This project was terminated in the next phase since another vendor won the contract as a superior DRC supplier.

The next phase started when the manager of the Medical Technology and E-Health Department asked one of the employees, alias Oscar, to investigate how they could help four additional departments to move their DRC initiatives forward.

Investigation phase – September 2019–December 2021: From idea to production. Oscar soon observed similarities in needs across the projects. All projects needed

forms and questionnaires, four required a video solution, and three needed transfer of measurement from MTE. The specific MTEs were to measure pulse, oxygen saturation and blood pressure, and transfer measurements from dialysis machines. He also found that many other departments could have the same needs. It was important for Opal to speed up the process; therefore, only the hospital's needs were assessed, not the requirements of other institutions (e.g., municipalities). After this investigation, the hospital granted money to develop the overall DRC initiative.

A plausible solution would be to ask if the HP had the solutions that covered these needs, but they did not: *'We quickly found out that the Hospital Partner didn't have anything that covered these needs, so we realised that we had to make an acquisition'* (Oscar). At that time, SERHA had started to look for strategies for DRC, but waiting for SERHA was not an option since Opal had unsatisfactory experiences with SERHA and the lengthy processes.

In March 2020, Opal started to write the requirements for a new DRC system. It should be scalable across departments and patient pathways. At the same time, the COVID-19 pandemic occurred, and a regional video acquisition from Whereby was completed at a record speed. Opal started with Whereby as early as March of that year. For the same reason, progress was made on a regional acquisition of Checkware for psychiatry; Opal also bought this since it was in line with the wishes of the psychiatric clinic staff. Furthermore, a network solution to connect haemodialysis machines to the hospital's network was ordered from HP.

In the following, we focus on the story of Opal's new DRC platform (alias RemCare) since this is an initiative apart from the regional architecture. First, in January 2020, Opal held meetings with 11 different vendors. This was followed by a written requirement document, published in June 2020. Oscar emphasised avoiding writing requirements on the things they did not know: *'We were very careful to describe only the needs. [...] It was then up to the vendor how they would solve it [each problem] – then we could assess whether the solution would be good enough'* (Oscar).

Finally, they wrote a contract with RemCare on the 18th of March 2021, and in October 2021, the solution went into production with the first patient.

With the purchase of RemCare, which is a software as a service solution, additional operational tasks emerged, such as the management of encryption keys, follow-ups of daily operations and legal matters. Opal proposed to both HP and SERHA that HP could take on this role, including being a cloud broker. Opal argued that this should be an HP function, serving the whole region. However, HP was not interested, and SERHA did not want to address the challenge. Therefore, Opal created its local operating organisation; a DCR team would be responsible for the local operation of RemCare (e.g., creation of new forms, publication of forms, assistance to clinicians if they had problems, and user registration and maintenance). Nevertheless, HP helps with the integration between the RemCare platform and the EPR system (Dips).

The integrations with SERHA's central systems are linked to access management and the retrieval of demographic data from Dips. A manager in the integration department at HP, alias Sofia, explained that all activities linked to the systems operated by HP must go via its integration platform. *'After all, there are FHIRs [Fast Healthcare Interoperability Resources], and there are different types of standards*

and technologies that are preferred that the suppliers must conform with to be allowed to connect and retrieve data' (Sofia). Since HP focuses on reusability, it uses standard components and standard integrations. Thus, *'[...] for Opal, there were many of the calls [where] we could just build on previous work [...] and connect to RemCare at the other end'* (Sofia).

One of the challenges encountered during this phase involved allowing parents to gain access to their children's digital information. Access to children's information is strict (e.g., some parents are banned from accessing such information). Norsk Helsenett, with its web platform, Helsenorge, has this overview; therefore, Opal ordered an integration between RemCare and Helsenorge. However, this integration is problematic to achieve.

Importantly, Opal intended to use RemCare as a platform for further innovation and to connect other vendors to the platform. They have started the work to connect the specialist system, Glooko, that collects data from diabetes equipment. The agreement is that RemCare must ensure that third-party vendors would follow the data processing agreement, *'and that is important because we cannot keep up with this race'* (Oscar).

When the first five projects obtained their DRC solutions, and work was in progress to scale up RemCare to cover additional departments, we argued that the investigation phase was over. Oscar, as the main entrepreneur, has moved to other investment areas since then. The main strategy for scaling is to focus on other departments that have shown interest ('low-hanging fruits').

By the end of this phase, a video solution and a solution for psychiatry were in place. RemCare had enrolled 150 patients from the endocrine department and approximately 6 children from the home hospital. Furthermore, the DRC solution for haemodialysis (with a secure network from the hospital to the patient's home) has started. **Consolidation phase – December 2021–May 2022: From projects to daily operation.** This phase started when the initial DRC project was finished (RemCare 'went live'). The DRC team had the lead. The section manager, alias Max, explained the team's current focus on seeing how the use of RemCare could accelerate and scale more organically. The staffing of the DRC team changes, and the professional composition remains under discussion. However, clinical insight is crucial: *'There is something in the translation. [...] To see the potential in digital solutions is one thing. To see how it can affect the clinical processes and change them is another ballgame. I think it is important to see technology as more than just the IT part. We also need to consider the utilisation of the technology'* (Max).

A couple of weeks after the main project was finished, the frequency of the meetings with the RemCare vendor and HP was gradually changed from daily to weekly, and by the new year (2023), to monthly with the vendor and as needed with HP. The DCR team held daily status meetings. Starting in January 2023, the team also reports monthly to the 'Digital Renewal' board at Opal.

The team aims to be a point of contact for the clinics regarding DRC. Opal can start new initiatives on the RemCare platform without running the traditional project regime in SERHA – a regime that makes the period from idea to production lengthy. Max stated this clearly: *'Here we go for a solution – we have a transaction-based cost*

model [...]. Then there is a joint incentive for both us and the vendor to keep using the solution more and more.'

During the consolidation phase, it was still a challenge to connect parents and children. Another remaining challenge is RemCare's integration with Glooko; how to build a secure connection and how much data should be stored in the RemCare platform are issues to be resolved. Nevertheless, Opal's intention to introduce RemCare to other departments is making progress, even if it entails new ways of working, as expressed by a DRC team member, alias Mia:

'Now, we are on a completely different planet than before. Now we must start by explaining what DRC is and selling [it] in a completely new way of thinking and working. What we clearly see is that we need managerial anchoring as high up as possible in each division to find [out what really should be done].'

Mia explained that they received a lot of 'good ideas from various clinicians', but they let the division director select the ones to embark on 'because there is quite a large variation in the maturity of adopting digital solutions, quite simply'. To accomplish their work, the team has created a roadmap, which starts with a presentation of the DRC platform and a conversation about the expectations from them and the clinic. Furthermore, they specify the estimated time and the steps from A to Z in the process.

By the end of the phase, 400 patients and 4 patient groups were using the RemCare platform. Furthermore, two new patient groups will soon embark on the platform, and the team will work on four additional pathways. This phase ends when the DRC team is given a full-time leader dedicated to scaling DRC across Opal.

Accelerating phase – May 2022–onward: Steady growth. This phase started when the DRC team was strengthened with a full-time leader with a healthcare background, alias Julia. Now, they want to reach out to more departments with RemCare. The team leader's main tasks are to hold development meetings with the vendor, spread the word across the departments and participate in a variety of management meetings to have the DRC initiative anchored in several places. Five months after Julia's entry, Mia stated: *'The big change is that we have brought in Julia as the team leader. Then we can work in a completely different way than before. [...] I think it has been absolutely necessary since there is quite a lot to be done at many levels.'*

In the first year of the accelerating phase, the strategy had been to onboard the departments that had shown interest, as Julia said, *'We have chosen the path of least resistance and use those who are motivated – and use their good stories to motivate others.'* After one and a half years in production, many have heard of the positive effects of DRC. In particular, the results from the endocrine department have given credibility to the overall DRC initiative. Nonetheless, much of the team's time is spent on advocating the initiative in the HT and reaching agreements on what to do.

There are three remaining major challenges related to integrations across other systems. The first is the integration with Glooko, which lacks the patients' personal identification numbers, making it difficult to ensure that the right patient is connected. However, Opal has accepted that patients shall identify themselves with their birth numbers, but the integration is not yet finished. The second challenge involves the connection between parent and child. Helsenorge has not prioritised this because it is costly and financing is unclear; hence, the project is on hold. Nevertheless,

Helsenorge agrees with Opal that this is a national issue. The third challenge is the issue around data sharing, which is crucial for the scaling and development of the platform. Over the last two years, the DRC team has experienced integration issues as time- and resource-consuming. Continuing with the approach that RemCare should be the only solution is under pressure because other systems encounter the same challenges as Glooko's concerning how much data should be transferred to the RemCare platform. In this regard, Julia stated, *'One-to-one integration is not sustainable. Thus, we imagine that we would rather try to achieve another form of data flow.'*

During the investment in RemCare, other DRC projects at Opal's pulmonary medicine department did not use the RemCare platform. One of the projects started in 2018 to follow-up on chronic obstructive pulmonary disease (COPD) patients, in collaboration with municipalities. The municipalities are the ones that have an agreement with another vendor. However, Julia is concerned about the future of the COPD project since it is funded by the Norwegian Directorate of Health. Opal's management is afraid that all the good work will be lost when the project ends, as they have observed in several other DRC projects. *'Thus, both the project leader and I are very keen on keeping the pathway/service running when the project ends, and it is a possibility to continue to operate this on the platform that we are on [RemCare]'* (Julia). The second project has been the follow-ups on patients with lung cancer using yet another system (this is now on hold due to financial issues). Two others are specific systems for asthma follow-up and sleep apnoea follow-up. RemCare lacks the functionality to replace these systems because they are aimed at explicit diagnoses.

To sum up, by the end of the accelerating phase, the DRC team's efforts and advocacy for RemCare led to enthusiasm among clinicians around DRC. The numbers have risen to 1500 enrolled patients spread over 12 patient groups. Opal has also been involved with eight other vendors that have specific systems for DRC. Moreover, there is a need to collaborate with regional and national organisations on the resolution of integration and authentication issues.

5 Discussion

Regarding our research question – *What are the key aspects that influence scaling of DRC?* – we have investigated both regional and local approaches to DRC in a Norwegian hospital region. The region stands for a centralised approach, with the purchase of the process platform and a strategy to develop its own DRC solutions. Interoperability across the ICT landscape and standardisation of technology, as well as of patient treatments, are fundamentals in the strategy. In contrast, several local hospitals stand for a decentralised approach, where they buy their own DRC platforms on which they want to innovate in collaboration with the vendors. Nevertheless, the SERHA has procured a DRC solution for the treatment of psychiatric conditions. A rapid implementation of the psychiatry system across the region occurred during the COVID-19 pandemic. However, we argue that it was equally important that the treatment was approved by the national organisation that assesses new methods in the specialised health service, and it had successful results from other health regions,

where it was embraced by the clinicians and the patients. Barriers, such as lack of medical evidence and trust, were removed [7, 14], as were complicated procurement concerns about privacy and legal issues [26]. Moreover, the system was integrated with the core EPR, which is vital for scaling digital innovations in HIIIs [12].

While the SERHA has carried out its investigation with the process platform, there have been so many local procurements that it has entered into a framework agreement with some relevant DRC suppliers. This is intended to ease the burden on the hospitals in a demanding purchasing process, as well as to gain some control over the number of systems in their information infrastructures. Since the regional initiative with the process platform has not progressed further than the trials can start, we would like to point out the experiences of Opal, one of the local hospitals, which has so far been successful with its approach. Opal's DRC initiative faced many challenges and gained useful experiences during the trajectory. We discuss the most prominent themes and present these as key aspects.

Exhausting and complicated processes. Concerning DRC solutions, it is well known that privacy and legal issues are time-consuming and may stop the development of new DRC solutions [26, 32]. At Opal, we observed that even at a large hospital, it was difficult to find qualified personnel to help resolve ICT security and legal issues. However, when Opal's management team wanted to invest in DRC and realised the need for such support, they sought an organisational structure for internal assistance. Surprisingly, the region, represented by both SERHA and HP, did not want to put up a structure to help their HTs in such matters. We argue that a regional office – or even better, a national office – should be in place to help not only Opal but also all other HTs deal with these complicated issues. SERHA could perhaps reuse some of its lessons learned from the procurement of the DRC system for psychiatry. When introducing DRC, security and privacy must be managed in proper ways; otherwise, the entire HII could be endangered [33]. This leads to the first lesson learned: Establish organisational support for purchasing ICT systems and resolving ICT security and legal issues.

Finance and value from DRC. Opal had to employ creative means to pay for the RemCare platform. Furthermore, the lack of billing codes integrated into the services was perceived as an obstacle to further scaling. Prior research has shown that partnerships with vendors and managers who have a positive attitude towards new payment models can facilitate DRC innovation, rather than those in opposition because the value of the work is not made visible as a financial return [34]. This leads to the second lesson learned: Implement billing codes in the solutions to enable the valuation of the DRC solution.

A plethora of systems, vendors and other stakeholders leads to integration challenges. The prominent issues involved integrating with third parties and solving how to share data with different specialised systems. Another issue was the question of how much data should be stored in RemCare as a specific EPR system on the side of the general one. Integration and interoperability can be achieved through standards, but this has proven to be difficult due to the lack of standards and protocols [32, 35]. Not only do such collaboration problems slow down project development, but the data might be inconsistent, and if Opal cannot assure that the same ERP of a person is

accessed in different systems, it can be disastrous for the patient [32]. This leads to the third lesson learned: Be patient but unwavering in the efforts to achieve the necessary integrations.

A successful DRC team. The team at Opal has succeeded in creating enthusiasm with the subsequent scaling of RemCare across the HT. One of the success factors for scaling was the right mix of the team members, both clinicians with a good understanding of implementing ICT and IT personnel with extensive experience in a hospital context. The team advocated the DRC initiative by telling successful stories from their hospital. Furthermore, they streamlined the onboarding process and had anchoring at the clinic level as a prerequisite for onboarding; it would be insufficient with just idealistic clinicians[12]. They also received fruitful feedback and engaged in dialogue through regular meetings with the DRC initiative’s user forum. The approach used in the organisation of the DRC team is in line with the experiences from other countries, which point to the necessity of having the right people work on scaling telemedicine programmes, and the ones with knowledge of the core business should be in the lead [34]. This leads to the final three lessons learned: Staff the DRC team with a mix of clinicians and IT people. Share a credible example to advocate the DRC initiative. Make a roadmap to be followed – from idea to production.

Table 1 summarises the findings.

Table 1. Summary of the key aspects that influence the scaling of digital remote care (DRC) solutions, with respective lessons learned.

Key aspects	Lessons learned
Exhausting and complicated processes	Establish organisational support for purchasing ICT systems and resolving ICT security and legal issues
Finance and value from DRC	Implement billing codes in the solutions to enable the valuation of the DRC solution
A plethora of systems, vendors and other stakeholders lead to integration challenges	Be patient but unwavering in the efforts to achieve the necessary integrations
A successful DRC team	Staff the DRC team with a mix of clinicians and IT people. Share a credible example to advocate the DRC initiative. Make a roadmap to follow from idea to production

6 Conclusion

In this study, we investigate a Norwegian hospital region’s (i.e., SERHA’s) effort to take advantage of DRC to establish more healthcare services outside hospitals. We contribute to the information systems literature with an enhanced understanding of the complex processes concerning implementation and planning for DRC. Our findings show that SERHA wants control over the deployment of different DRC solutions to avoid inequality in healthcare services across the region and to reduce the number of systems to be operated. While it takes time to set up the regional strategy, we find that many of the local HTs have separate initiatives and have come a long way in implementing new services. By discussing the success of one of the local HTs, we have

identified four key aspects that influence the scaling of DRC and have derived six lessons learned from its experience regarding these aspects. Since the findings are obtained from a single case, they may not be generalised to other hospitals. Thus, this study has limitations that provide opportunities for future research, such as examining other hospitals and comparing the results with ours. Despite the limitations of our findings, they may serve to inform hospital managers about scaling DRC.

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