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Suppliers of existing systems in municipal healthcare facing the arrival of large-scale EHR suites

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Abstract. With backing from national health authorities, large-scale Electronic Health Record (EHR) suites have increasingly entered the European healthcare market. An overall goal with these systems is that they are supposed to cover the needs of the healthcare workers in the hospitals, nursing homes, home-care service, and GP clinics. The EHR suites will replace existing EHRs in their targeted area. However, the national and regional authorities cannot directly instruct municipalities and GPs to take part in such endeavors. There may therefore still be ways for the suppliers of existing systems to compete for market shares and provide municipalities and GPs with viable alternatives. We want to explore these questions by focusing on how the suppliers of existing EHRs in the municipalities maneuver under the imminent threat from an EHR suite. Empirically, we focus on the three principal suppliers of EHR systems to the Norwegian municipal healthcare market. They are facing the introduction of a large-scale EHR suite in Central Norway in 2022 combined with the long-term national ambition of a common EHR system for the rest of the municipal health sector in Norway. Conceptually, we draw on the information infrastructure literature.

Introduction

With backing from national health authorities, large-scale Electronic Health Record (EHR) suites have increasingly entered the European healthcare market. Some

notable examples are the US-based companies Epic, Cerner, and Allscripts, the largest players in the US healthcare market with a market share of 28, 26, and 9 percent, respectively (Business insider 2020). The above-mentioned Epic has also found its way into the Nordic countries, with installations in Finland and Denmark and a planned implementation in Norway in 2022.

An overall goal with EHR suites is that they are supposed to cover the needs of the healthcare workers in the hospitals, nursing homes, home-care service, and general practitioner (GP) clinics. They also enable patients to access their own healthcare data. Moreover, EHR suites are expected to ensure that clinical information is available in real time whenever requested, thereby contributing to standardizing and streamlining workflows and patient pathways. The EHRs also offer extensive structuration of the clinical content, which is a condition for decision support, integration, clinical research, and so on. However, such ambitions are often paired with centralized governance of the entire IT portfolio. EHR suites are supposed to offer that.

It goes without saying that the EHR suites will replace existing, and more specialized, EHRs in their target area. This includes existing EHRs in hospitals, home-care services, nursing homes, and GP clinics. Consequently, the suppliers of the existing EHRs may be bound to withdraw from this market segment to explore opportunities elsewhere. However, although large-scale EHR suites may have backing from national authorities, there is no way national authorities can directly instruct municipalities and GPs to implement these EHR suites (at least not in Scandinavia). The municipalities are independent political entities and the GPs are autonomous entrepreneurs (Hertzum et al. 2021), thereby implying that both municipalities and GPs must be persuaded or incentivized to participate.

Accordingly, in the face of EHR suites, there might still be ways for the suppliers of smaller existing systems to compete for their market shares and provide municipalities and GPs with viable alternatives. In this paper, we want to explore these issues further by focusing on the suppliers of existing EHRs in the municipalities and how they maneuver. Therefore, we pose the following research question: What countermeasures is it possible for suppliers of existing EHRs to implement to withstand the arrival of a large-scale EHR suite?

Empirically, we focus on the three principal suppliers of EHR systems to the Norwegian municipal healthcare market. These suppliers face the arrival of Epic's large-scale EHR suite in Central Norway in 2022 and the national ambition of a common EHR system for the rest of the municipal health sector in Norway.

Conceptually, we draw on the information infrastructure literature to account for our wide empirical scope. We consider the information infrastructure as consisting of a heterogeneous ensemble of technologies and people with no centralized control (Edwards 2007; Star and Ruhleder 1996). This fits with our regional and national scope. There is no centralized governance structure for specialist care, municipalities, and GPs altogether. The municipalities are self-

governed political entities, GPs are individual entrepreneurs, and the regional health authorities govern the hospitals. The distributed governance of the information infrastructure may constitute a major challenge for large-scale EHR suites because it means that the various stakeholders must individually opt in to the system.

Method

This study adheres to a qualitative and interpretive research approach (Klein and Myers 1999; Walsham 1995). Consistent with this approach, we aim to shed light on how the three suppliers of EHR systems in the Norwegian municipal healthcare market assess their future options when a large-scale EHR suite makes its way into Central Norway. The principal supplier in the municipal segment in Central Norway is TietoEVRY, but the suppliers Visma and DIPS Front also have small market segments.

We found it useful to interview all three suppliers because all of them have opinions about the Health Platform program and the national authorities' plan for a common EHR platform for the municipal health sector in Norway.

The data collection consists of three one-hour interviews (autumn 2020 and spring 2021) of top healthcare-segment managers from the three suppliers. In two of the interviews, two managers participated. In the text, the managers will be referred to as Manager-1 to Manager-5. The first and the second author conducted and recorded the interviews on zoom. In addition, we interviewed a key representative from the municipal health service in Central Norway in the spring of 2021. As background sources, we also include six interviews of the Health Platform management in 2018, nine interviews of GPs in Central Norway in 2019, and interviews of 10 healthcare professionals in Tromsø municipality during the autumn of 2020. All interviews were transcribed for analysis.

The Health Platform program in Central Norway

The Health Platform is a regional program owned by the Central Norway Regional Health Authority and Trondheim municipality. In 2019 it signed a contract with Epic Systems Corporation on acquiring and implementing the Epic EHR suite in the whole region, including all the hospitals, GP clinics, nursing homes, and home-care services (Ellingsen and Hertzum 2020; Hertzum and Ellingsen 2019). The Health Platform is also a pilot for the national goal of "one citizen - one record" (Direktoratet for e-helse 2018).

As a suite system, Epic is rather self-contained. Most of the functionalities needed for health personnel are supposed to be provided by Epic, either as ready-

for-use functionality or through configuration. Such a system does not encourage extensive collaboration with other system suppliers.

There are around 44,000 healthcare workers and 720,000 citizens in Central Norway. Of the three hospitals in the region, the university hospital in Trondheim, St Olav's Hospital, is the largest. The university hospital will replace its current EHR from Cerner with Epic. The nursing homes and home-care services are supposed to replace the systems Profil and Gerica, and the GPs are supposed to replace their current EHR systems CGM (CompuGroup Medical) and System X.

When it comes to implementation, the 64 municipalities in the region and the GP clinics have the option to participate. As one of the owners of the program, Trondheim municipality is committed to implement Epic per default, but many of the other municipalities have yet to commit fully to the program. In this regard, some municipalities feel that they are facing considerable pressure to opt in. However, there appears to be growing skepticism among the municipalities:

> 'What really provokes me and makes me curse so that I get a high blood pressure is when some of my colleagues in other municipalities say that the municipalities have no choice; we just have to do this and are stupid if we do not join because then we will be left behind (...). The thing is that we have a choice: We have the Health Platform and we have three commercial suppliers.' (Municipal consultant)

Some of the concerns revolve around Epic's development of new functionality for the municipalities where the users have not been able to see what they get:

> 'You don't replace an otherwise reliable EHR with something you haven't seen, you just don't do it. No municipality replaces an economy system or case management system without seeing what they get, but in health, it is apparently fine.' (Municipal consultant)

They are also concerned about to what degree they can influence future developments in stiff competition with other user groups. The resulting situation creates opportunities for the existing suppliers.

The suppliers and their customers

There are three suppliers in the Norwegian municipal EHR market. In alphabetic order, the first supplier is *DIPS Front*, formerly known as ACOS Levekår. In 2019, DIPS ASA acquired ACOS Levekår to supplement their hospital-based EHR, which covers around 85% of this market. DIPS Front has 38 employees, but if the rest of the DIPS organization is included, then the total number of employees is around 300. DIPS Front's EHR system for the municipal market is Cosdoc. DIPS Front serves approximately 75 municipalities (corresponding to around 21% of the municipalities). The largest customer groups are located in Northern and Western Norway).

The second supplier is *TietoEVRY*, an international company with 24000 employees all over the world and around 4600 in Norway. TietoEVRY's EHR for the municipal market is Gerica, which is implemented in approximately 107

municipalities. Currently, much development occurs around the mobile solution "Life Care mobil pleie". The supplier has many large municipalities among its customers in the South Eastern part of Norway. Taking the population size in the municipalities as a measure, TietoEVRY has around 50% of the municipal market in Norway.

The third supplier is *Visma Enterprise AS* with 11000 employees in Europe and around 500 in Norway. Of these, 110-120 employees work in the healthcare segment with a revenue of NOK 100 million related directly to EHR. Visma's EHR system is Profil, but a new version called "Flyt Omsorg" has been in development for some time and is almost ready to enter into use. The largest customer groups are in Eastern, Western, and Northern Norway. Visma has the largest market share of the three suppliers when counting the number of municipalities, which amounts to around 200.

Table I. The 12 most populous municipalities in Norway (SSB 2021) and their EHR systems

1	Oslo	Gerica	7	Drammen	Gerica
2	Bergen	Profil	8	Asker	Gerica
3	Trondheim	Gerica	9	Lillestrøm	Gerica
4	Stavanger	Cosdoc	10	Fredrikstad	Gerica
5	Bærum	Profil	11	Sandnes	Profil
6	Kristiansand	Profil	12	Tromsø	Profil

In Norway, the municipalities are the lowest administrative and political elected level. From January 1, 2020, there are 356 municipalities in Norway, a reduction from 422 municipalities in 2019. The largest municipality is Oslo with close to 700,000 citizens and the smallest is Utsira with close to 200 citizens. According to the suppliers, the collaboration between the supplier industry and the municipalities is good and they express that they work closely together. This reflects that the EHR systems have been in use for considerable time, at least two of the systems have been in use for over 20 years. These two systems started out as archive and case management systems, which still is an important part of health-related municipal work. In addition, they include many things (e.g., kitchen, storage, dry cleaning, and washing) that go far beyond the care process:

> 'It is not a top score, but the users are relatively satisfied. And then the doctors are very dissatisfied because it is not the way they are used to working in their GP systems. But it is because you have to take care of very many different user groups around a patient.' (Manager-2)

The suppliers recognize that over the years, their systems have come to lack up-to-date functionality. Especially, there has been complaints about the clinical functionality and integrations within and across the healthcare sector. Thus, while the municipal healthcare sector has changed, the suppliers have not followed up with changes in their EHR systems.

A key problem according to the suppliers is that the municipalities have not allocated funds for evolving the EHRs. This opinion is shared by some of the personnel working in municipal healthcare:

> 'The municipalities are not willing to pay anything for these systems. At the same time, they try to put everything into them.' (Physician municipality)

The reason for this is a combination of poor municipal finances and the fact that the budget is set by the political (and administrative) level, not by health personnel. As a result, the continued development of EHRs is not a high priority. However, the suppliers acknowledge that they are co-responsible for this state of affairs:

> 'The municipalities have invested very little for many years. In other words, next to nothing. And we have not done that either, to be completely honest. We have been very careful with the investments because we have not made much money from it.' (Manager-1)

This reflects an arrangement with some sort of stability: the average municipality pays around NOK 150,000 per year for an EHR. Clusters of municipalities tend to use the same EHR system due to long-term regional cooperation, and due to the fact that municipalities seldom change suppliers.

Related to the municipalities that are involved with Epic, the three suppliers are surprised that some municipalities apparently are willing to invest much more in Epic than in their current EHR systems.

> 'I have read a number of case presentation to the municipal board from the councilors in the municipalities about whether they should join the Health Platform or not, and then the money is not exactly a problem, because then they are willing to spend many millions more than they do on today's solutions.' (Manager-5)

> 'We are aware that for the Health Platform, the municipalities will pay almost NOK 300 per citizen per year, while with us it is probably between NOK 7 and 11 [...]. The Health Platform probably includes more functionality though, and if we add in something related to child health clinics and so on, we come close to NOK 20 per citizen. So, there are extreme differences here.' (Manager-2)

Countermeasures

The suppliers consider multiple options to maintain their market share in the municipal health sector in Norway. Five options (discussed in the following) stand out as countermeasures to the arrival of large-scale EHR suites such as Epic.

Offer the municipalities appealing alternatives

The three suppliers emphasize that they need to be much more proactive in relation to the municipalities and present good alternatives to large-scale EHR suites. One of the suppliers pointed out that they now have listened to their customers and started to invest more in making new solutions.

The managers explain that the new products (new EHRs, mobile, and cloud-based solutions) in the pipeline focus specifically on core care-related work tasks in nursing homes, care homes and home-care services. This stands in contrast to the Health Platform's plan to offer one solution for all the 18 occupational groups in the municipality. This general-purpose approach may make things unnecessarily complicated. One manager said:

> 'I have yet to see a project that succeeds in bringing together the physiotherapist, occupational therapist, wellness center, prison health service, child health clinic, nursing home, and GPs in a municipality into a common system.' (Manager-1)

Relatedly, another manager argued:

> 'We always get the best results when we can develop a solution for a specific workgroup, and not for something else, for example, a mobile solution for homecare nursing and a physiotherapy solution for physiotherapists, etc.' (Manager-5)

Although the suppliers adhere to a more narrowly focused strategy regarding the scope of the functionality of their EHRs, the suppliers acknowledge that the users need to collaborate across the healthcare sector and among different professional groups. However, as they see it, this does not need to be accomplished in one all-encompassing system.

Interestingly, the suppliers experience that the municipalities increasingly are willing to pay more when they understand that they can get more modern and cloud-based solutions.

Collaborate on supplying an eco-system of integrated systems

The three suppliers recognize that municipal healthcare is heterogeneous and involves many domains and subdomains. Instead of using one system for all needs, an alternative is that the suppliers must collaborate, for instance as part of an eco-system to be able to deliver the best solution for a specific domain.

> 'Our goal is to be a driving force for a digital eco-system on a market-leading platform. We will open up our products to realize data-driven opportunities and we will focus appropriately over time together with leading customers to reduce risk.' (Manager-4)

> 'We are working on a kind of sandbox where we look at how we can make it easier for others to innovate in and around our product. The needs are so complex that we must make arrangements so that they can be covered by different suppliers, but simultaneously ensure that the user experience is seamless and good.' (Manager-3)

As an illustration of a collaborative effort between the suppliers, one manager referred to a demonstration at Ehin (the largest national e-health conference in Norway) where DIPS, TietoEVRY, Checkware, and a supplier of a GP system presented a seamless information flow across their systems.

Although the three suppliers express a positive attitude toward collaboration, none of them envisages collaboration with Epic given its closed and self-contained character.

Inspire local innovation

Both the consultant in the municipalities and the three suppliers are concerned about the possibilities for locally initiated innovations. Instead, the suppliers apply user-centered agile approaches when they design systems and when they take part in optimization processes. One supplier emphasized that it had good experiences with "Design Thinking" and had participated in several local innovation projects. Thus, as suppliers, they provided key technical competence and proactively suggested new solutions to future needs. Typically, users were too caught up in their hectic workday to foresee these needs.

The same supplier mentioned an innovation that the users had been very satisfied with, namely the mobile solution. At present, the supplier worked extensively on developing this solution further. In this regard, they were quite surprised that Epic apparently cannot provide a mobile solution and had told future Epic users that they could just use a personal computer instead. The users will probably experience this as a setback and may appreciate other suppliers that are more attentive to locally expressed needs and wishes.

On the user side, there are worries that the current ownership of the Health Platform will make local innovation more difficult. The regional health authority owns 60%, while Trondheim municipality owns 40%.

Build a strategic partnership with the largest municipalities

Among the three suppliers, there appears to be increasing interest in building a strategic partnership with the largest municipalities. Several of these municipalities are quite resourceful and are moving forward with themselves in the driver's seat. This is well recognized by the suppliers, who point out that a strategic partnership will make close, top-level collaboration with these municipalities necessary. Such collaboration could be very rewarding. One manager said:

> 'Until now we have mostly talked to system administrators in the municipalities, but we should talk much more with the councilor or the municipal director within the health service.' (Manager-4)

As an illustration, the largest municipality, Oslo, has initiated an ambitious project named "Metropolitan Emergency Room." TietoEVRY is working with Oslo on this project at a strategic level. In addition, Visma has expressed interest in delivering its EHR system to the nursing homes in Oslo and finds Oslo's "Metropolitan Emergency Room" initiative interesting and innovative.

When it comes to Central Norway, TietoEVRY has been invited to visit several municipalities to discuss the future market prospects before the municipalities decide whether to commit themselves to participating in the Health Platform program.

Adhere to the national recommendations and directives

The three suppliers are positive about the national recommendations and directives, which they consider very important. They are willing to invest in their development and try to adhere to them as best they can.

Some of the recommendations and directives are to provide integration with national systems, including the national core record ("Kjernejournal"), citizens' access to their health information ("Helsenorge"), citizens' dialogue through Helsenorge ("Digihelse"), IPLOS reporting ("Individbasert pleie- og omsorgsstatistikk"), e-prescriptions, standards for e-messages, and the recent registration and reporting of COVID-19 tests and vaccination. The suppliers also support the future shared medication list ("Pasientens legemiddelliste"), which will collect information about all a patient's medication in one system.

Given the modest user-initiated development in the sector, it appears that most of the development in the municipal sector is driven by national recommendations and directives. Nonetheless, the suppliers underscore that providing integrations with the national systems involves a lot of work. Furthermore, they often have to deliver this work within short deadlines and, therefore, may have to postpone their own development activities.

Conclusion

The current EHR suppliers in Central Norway have started to reinvent themselves in preparation for the increased competition for market shares after the regional decision to introduce Epic's large-scale EHR suite in 2022. At present, the health sector is served by an array of systems, each targeting specific areas and user groups. The current suppliers consider five strategies for countering the regional, and national, ambition of replacing his array of systems with one generic system:

- Offer the municipalities appealing alternatives
- Collaborate on supplying an eco-system of integrated systems
- Inspire local innovation
- Build a strategic partnership with the largest municipalities
- Adhere to the national recommendations and directives

The large municipalities, which want to run their own development processes, appear a particularly important partner in maintaining interest and competence in locally developed solutions for the municipal health sector.

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