

Engagement for the Norwegian Directorate of Health

***- Commissioned by the Ministry of Health and
Care Services***

Gartner survey of EHR suppliers and systems
in the Norwegian market

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Management summary

Gartner has conducted a survey of vendors that provide Electronic Health Record (EHR) solutions. The survey includes Gartner's existing research covering large international vendors and selected vendors with a presence in Norway. The total number of vendors included in this report is 16, divided into three groups; (i) six global enterprise EHR vendors, (ii) four selected EHR vendors and (iii) six selected primary healthcare EHR vendors.

All vendors in group (i) are covered by Gartner's yearly research of the global EHR market. These vendors were given a short questionnaire that contained questions only related to the Norwegian and Nordic market that were used to enhance the existing data collection. The analysis conducted on group (ii) and (iii) was based on a questionnaire with questions relevant for this particular survey. Gartner conducted on needs basis additional interviews with group (ii) and (iii) vendors to complete the answers and to verify our understanding. The survey did not include a system analysis.

Gartner has developed a model in which EHR solutions are categorized as generation one to five, indicating the maturity of the solution and the richness of the functionality provided. The three groups mentioned above are clearly separated between generation two and three. The EHR solutions found in the Norwegian market are mainly generation two, none have reached generation three. Whereas the solutions provided by the six global enterprise EHR vendors, have reached generation three¹ and are expected to start reaching generation four within the next couple of years, the leaders possibly as soon as 2015. There are no generation five solutions in the world today. The Global Enterprise EHR vendors are more functionally mature than the vendors found in Norway, especially within advanced capabilities such as clinical decision support, clinical workflow and clinical display/dashboards. These are the most distinct areas of difference between generation three and generation two. Across the globe, despite clear differences in ownership, payment schemes and regulatory requirements, the processes of care and the practice of clinical medicine are more similar than different.

We expect that the leading vendors will have used about ten years moving from generation three to generation four. To reach generation four requires a clear strategy, long term perspective, a large customer group to secure revenue and to be able to fund an extensive research and development (R&D). Because of the huge R&D investments needed to meet the expectations of customers, users, patients and changes in society, only large, well-funded companies will likely be able to survive long term in the EHR market. We expect the market to consolidate, recently exemplified by the announced acquisition of Siemens Health Services by Cerner². The deal is expected to close in early 2015. Many companies have substantially underestimated the time and effort required to succeed in this market. The local vendors have a clear disadvantage, since they are not exposed to best practices from other geographies. That combined with the difference in resources available for R&D, makes local vendors riskier in the long run. Norwegian vendors and products have a very strong position in Norway, which may indicate that local understanding, references as well as proximity are viewed as essential when vendors are chosen. The downside of this is that a majority of Norwegian healthcare delivery organizations (HDOs) are not getting the benefits of global best practices and mature clinical support systems. Due to the limited size of the Norwegian market, the innovation and R&D potential will continue to stay on a modest level.

The Nordic HDOs is perceived as extensive users of EHRs. This implies that the Nordics should be an interesting market for the global vendors. Several of the global enterprise EHR

¹ The first in 2005 and all within 2010/11

² This was announced after the data analysis had been completed; hence it is not covered in the vendor analysis later in the report.

vendors are already present with solutions in the Nordic market, but not yet with their enterprise EHR solutions. The Norwegian EHR market is divided between hospitals and primary healthcare organizations. There is one dominant vendor that provides solutions to Norwegian hospitals, DIPS, while there are several vendors providing solutions to primary healthcare.

EHR's are mature and thoroughly tested products, but there are no widely accepted standard of interoperability that has been implemented by the vendors. This implies that true interoperability between different solutions is not yet possible. The only successful examples of a common electronic health record that are used for clinical decision support and clinical workflow are in regions that have selected a common integrated solution that is used throughout the whole spectre of health services. It is worth noting, that Gartner has not yet seen integration work in a big scale on a more advanced level. Gartner is unaware of any HDO that has successfully evolved a best-of-breed (i.e. combining several vendors' packages) environment into a fully functioning Generation 3.

Citizens expect more patient-centric and personalized care spanning the care delivery spectrum. With an increasing average lifespan, a rising pressure to cut healthcare costs while enhancing the quality of care, the need for automation, advanced functionality and analysis support will increase, and will hence increase demands on EHR systems. The amount of clinical knowledge is well beyond the abilities of unassisted human cognition.

This survey indicates that the gap in functionality between solutions currently applied in Norway and the functional needs going forward is significant, and that the distance to the leading vendors will continue to be substantial and will probably increase in the coming years. There is also no evidence to show that local vendors will have the capabilities, both in R&D and financially, to close the gap soon.

Introduction

EHR Definition

An EHR is an electronic health record system that contains patient-centric, electronically maintained information about an individual's health status and care, focuses on tasks and events directly related to patient care, and is optimized for use by clinicians. The EHR provides support for all activities and processes involved in the delivery of clinical care within a single health organization.

Enterprise EHR is an EHR designed to cover the continuum of care and must have as a minimum both inpatient and outpatient functionality. An enterprise EHR is an integrated, not interfaced, point-of-care system that provides functionality for an acute care facility — including medical/surgical wards, the emergency department (ED, or accident and emergency [A&E] in some countries), intensive care unit (ICU), surgical theaters, and labor and delivery suites — and attached ambulatory/outpatient clinics and owned practices. The acute care functionality must also include the pharmacy.

Gartner recognizes that, in some countries, pharmacists aren't directly involved in the closed-loop medication process and don't review every order, yet this is a requirement in many countries and is, therefore, included in the definition.

A complete enterprise EHR, in addition to the minimum requirements listed above will cover the full continuum of care — acute care, ambulatory, behavioral health, home care and long-term care facilities. Not all HDOs will include all care venues, but an enterprise EHR system must address the needs of all settings and service lines.

EHRs are composed of eight core capabilities (described in more detail in “What is good EHR?”):

- System management
- Interoperability
- Data model
- Clinical workflow
- Clinical decisions support
- Clinical documentation
- Clinical display
- Orders management

Background

Gartner has been engaged to conduct an EHR survey on behalf of the Norwegian Directorate of Health. The survey has been commissioned by the Ministry of Health and Care Services.

The survey includes local and international players that are or have an intention to deliver EHR (EPJ/PAS) solutions and services to Norwegian HDOs. The objective of the survey is to provide a survey of existing vendors and solutions in the Norwegian market.

Scope of survey

The survey has a focus on financial strengths and viability of vendors, as well as system functionality and viability. The survey is based on the vendors' response to a questionnaire and additional interviews with selected vendors to clarify and supplement the answers given in the questionnaire. The survey did not include an analysis of the systems.

The vendors listed in the “2013 Magic Quadrant for Global Enterprise EHR Systems” are included and additional information was collected from these vendors to understand their position towards the Norwegian market. The level of detail in this survey is not as detailed as required for the Magic Quadrant. The study does not cover HIEs (Health Information Exchange systems). HIEs are systems that provide the capability to transfer data electronically between disparate health care information systems while maintaining the meaning of the exchanged information.

Although general vendor surveys can be a useful tool as a base for vendor evaluations, it should not be used as the sole selection criterion or replace a detailed and thoughtful RFI or RFP. There might be good business reasons for vendors to choose a narrower focus than some of their competitors and, therefore, not qualify for Gartner’s Magic Quadrant. Similarly, vendors that have less mature products may not yet be executing at peak level. There is no reason to reject players or vendors outside the Gartner Magic Quadrant, and it is not always correct to choose a market Leader. What matters most, is the match — or mismatch — among vendor viability and performance, product capabilities and customer needs. How well the vendor is able to deliver an effective solution for a client’s business issues, in terms of the product and the underlying support and services, should be the determining factor.

Survey and methodology

Criteria for selecting vendors for the study

The scope of the survey has been patient health records that can be used in active analysis and care of patients (EHRs), not repositories collecting static data about patients (HIEs). It is the last versions of the systems that have been analyzed.

The focus of the survey has been global vendors currently in the Gartner Magic Quadrant, viable EHR vendors mentioned in the Magic Quadrant (not yet making the cut), and selected EHR vendors currently in the Norwegian market. This implies that potentially viable Nordic players are not part of this analysis.

From these criteria, Gartner deduces the following three categories of vendors and systems that will be subject for the analysis and assessment in this report:

1. Global enterprise EHR vendors
2. Selected EHR vendors
3. Selected primary healthcare EHR vendors.

Method for data collection and analysis

This survey is not a Gartner Magic Quadrant, however, the base for the survey is the same as for the Gartner’s Magic Quadrants, visualizing the positioning of selected vendors, based on questions and criteria’s covering both company and products.

Gartner’s Magic Quadrant covers only enterprise EHRs delivered in at least two continents, hence none of the local and existing EHR vendors in Norway qualify for the Magic Quadrant.

A specific survey for the selected EHR vendors and selected primary healthcare EHR vendors was undertaken in order to assess EHR suppliers and systems in the Norwegian market. A detailed questionnaire was sent to the selected EHR and primary healthcare EHR vendors, and additional interviews with the vendors was undertaken to complete the answers and to verify our understanding as needed.

For the global enterprise EHR vendors, in addition to existing Gartner Research, a simple questionnaire was used to gather information concerning their ambition and strategy in a Nordic market perspective.

Gartner has assessed the answers based on Gartner best practice, product maturity, financial viability, completeness of answers, etc. to clarify how mature the different vendors and products are.

Evaluation criteria

Evaluation Criteria for Global enterprise EHR vendors (Gartner Magic Quadrant)

Ability to Execute – an evaluation of a vendor's Ability to Execute based on the quality and efficacy of the processes, systems, methods or procedures that enable vendor performance to be competitive, efficient and effective, and to positively affect the vendor's revenue, retention and reputation. Ultimately, vendors are judged on their ability and success in capitalizing on their vision.

Completeness of vision – an evaluation of a vendor's vision on its ability to convincingly articulate logical statements about market direction, innovation, product improvements, customer needs, competitive forces and how well they map to Gartner's understanding of market needs. Ultimately, vendors are rated on their understanding of how market forces can be exploited to create opportunity for the vendor.

Evaluation Criteria for Selected EHR vendors and Selected primary healthcare EHR vendors

Gartner have evaluated the vendors on product maturity and their ability to convincingly articulate logical statements about the market, innovation, product improvements, customer needs and how well they map to Gartner's understanding of market needs. The evaluations of these vendors are solely based on their answers.

Viability of product

Gartner have evaluated viability of the vendors' product based on the survey answers to Eight Core Capabilities giving an indication of product functionality and maturity, and the Health Service Coverage describing which of the health service areas that are covered by the solution.

- **Product/Service** — the breadth and depth of the EHR including an assessment of maturity evaluation, number of full implementations, continuum of care supported, patient engagement, and care management
- **Number of sites** — the number of sites fully using the EHR.

Viability of Company and Strategy

Gartner have evaluated the vendors' viability based on survey answers on areas that enable vendor performance to be competitive, efficient and effective, and to positively affect the vendor's revenue, retention and reputation.

- **Overall viability** — the vendors financial situation, the ability and likelihood of continued presence with sufficient investment in the product and continue advance the state of art in the product
- **Market responsiveness and track record** — the ability to sense and respond to changing market and competitive conditions as well as a measure of performance

- **Marketing execution** — the clarity, quality, creativity, and efficacy of programs designed to deliver the organization's message
- **Market understanding** — the ability of the vendor to understand buyer needs and translate these needs into products and services
- **Marketing strategy** — indicates a clear, differentiated set of messages
- **Innovation** — assessment of direct, related, complementary, and synergistic layouts of resources, expertise, or capital for investment and research & development.

What is happening in the world of health care

Healthcare delivery is becoming more accountable, coordinated, collaborative and centered on the patient.

Healthcare providers are growing in size, complexity and operating networks of capabilities. As such, they are focusing on the strategies and technologies that reduce costs and enable the organization to scale, bring together, and leverage financial and clinical information to drive performance and quality, and deliver new operating models.

Opportunities to innovate come from a range of vendors — from those that provide necessary tactical solution to immediate problems to those that enable an HDO to enter new areas of coverage.

Electronic health records (EHRs) and related telemedicine and care management systems are components of transformational programs being leveraged worldwide to support clinical excellence, improve efficiency and slow increases in the cost of care.

Best practice globally; these systems are part of a continuous quality improvement framework delivering evidenced-based, patient-centric personalized care spanning the care delivery spectrum, from face-to-face to fully virtual encounters. They are important components of a population health strategy. While clinically focused, such transformation initiatives touches on other important solutions, like analytics and scheduling. No other healthcare IT initiative is likely to be as complex, face more opposition or have greater potential to transform the organization and its healthcare delivery.

Strong drivers for EHR in society

Healthcare leaders worldwide are confronted with a nexus of healthcare forces that is transforming the industry with new models of care delivery and payment. These forces include:

- Reform efforts and changes in the **role of government** in healthcare
- Fundamental **changes in the nature of healthcare delivery** and the practice of medicine, making it more personalized, precise, collaborative, evidence-based and outcome-driven, and extending the sphere of care beyond hospitals and physicians' offices
- **Structural changes in the industry**, combined with government austerity measures, which are blurring traditional roles, consolidating players, redefining payment and risk models, and resulting in the emergence of integrated health enterprises
- The growing **empowerment of consumers/patients** and their increasing responsibility/ involvement in their healthcare decisions. Patients expect automation and information accessibility
- **Redefined healthcare demands**, partially the result of aging populations and increased presence of chronic disease, and characterized by changing payer expectations, more patient choices, increased responsibilities and healthcare tourism.

Global Strategic Planning Assumption(s)

By 2017, public attention and IT innovation directed at the problem of wrong or delayed medical diagnosis will equal that directed at therapeutic errors.

By 2017, 30% of patients will regularly use mobile social commerce apps to engage their healthcare provider and access their health information.

Through 2017, annual spending on medical informatics needed for EHR optimization will trend toward five times initial informatics costs.

Hence, the need for comprehensive and integrated solutions are prerequisites for a transformation in Healthcare in Norway, that supports growing needs in both analytical support and to engage the patients through channels of convenience. This will come with a significant increase in spend on IT.

What is a good EHR?

The amount of new clinical knowledge is well beyond the abilities of unassisted human cognition. EHR systems must evolve to provide much more support for clinicians and patients. Advances in genomics, further clinical automation, greater reliance on analytics, a transition from data to information, and increasing integration of disparate clinical systems will ultimately result in more personalized, proactive and coordinated care.

The fundamental change that is occurring in healthcare is driving a need for a systematic approach to the creation and maintenance of clinical content in a form that can be easily included in the EHR system. Integrated enterprise EHRs facilitate the practice of evidence-based medicine and enable the reduction of *unnecessary* practice variations. This leads to improved quality of care and reduced costs.

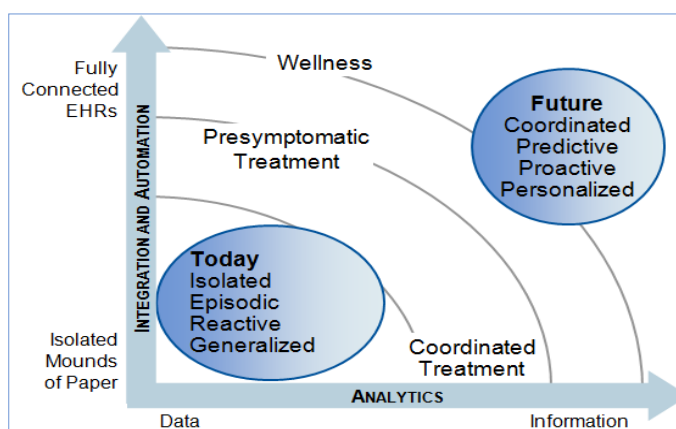


Figure 1 - EHRs Must Evolve to Meet the Needs of the Future (source Gartner)

HDOs use mature EHR systems to provide automated support for their acute care and ambulatory clinical activities, and to support the activities of all clinicians and interact with other caregiver automation systems to provide support for the clinical care process. Capabilities, such as clinical decision support, computerized physician order entry and clinical workflow, are essential components of 21st century medical practice.

An EHR is an integrated point-of-care system, covering the entire continuum of care, optimized for use by clinicians containing patient-centric, electronically maintained information about an individual's health status and care, focusing on tasks and events directly related to patient care. It is composed of eight core capabilities:

- *System Management (SM)* — a rich set of functionality and services that are focused on making the overall system easier to understand, configure, provision, maintain, and monitor
- *Interoperability (IO)* — the system must be able to interact with other systems within a given enterprise, but requirements for extra-enterprise interoperability are becoming increasingly important as well

- *Data Model (DM)* — there must be a flexible permanent data store that includes controlled medical vocabulary functionality
- *Clinical Decisions Supports (CDS)* — sophisticated support for clinical care processes incorporating rules, branching logic, and decisions
- *Clinical Workflow (WF)* — provides support for the processes involved in clinical care, as well as the information needed
- *Clinical Documentation (CDoc)* — the ability to capture all clinically important information at the point of care, and must be capable of importing relevant data from other clinical systems
- *Clinical Display (CDisp)* — the ability to present information in a meaningful manner
- *Orders Management (OM)* — support for physician order entry, medication orders, test requests, and consultations.

Based on these capabilities, Gartner has put forward a five-stage model¹ visualizing how enterprise EHR systems will evolve. Gartner's view is that EHR offerings will evolve through five generations, transforming from very simple systems that provide results reporting into very complex, fully integrated systems focused on the tasks directly related to promoting wellness and providing medical care for individuals across the entire healthcare continuum, within a single healthcare enterprise.

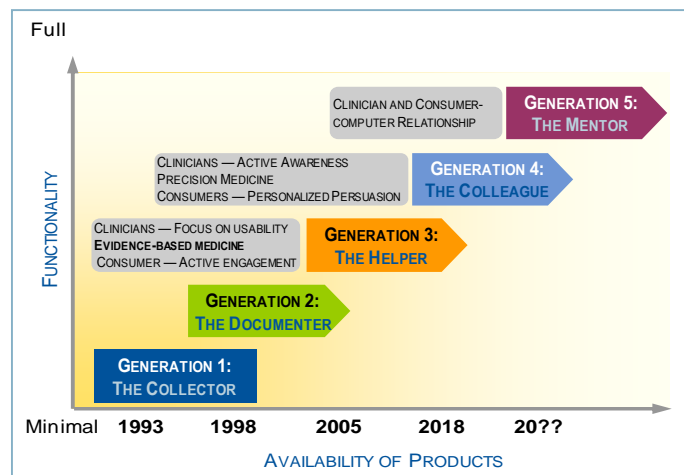


Figure 2 - Five Generations of EHRs (source Gartner)

In determining the generations of EHRs, eight core capabilities are determined and the progression of functionality is assessed against these capabilities. A given EHR product may have some increased functionality in certain areas, but to be considered an n-generation product, it must at least have all of the basic capabilities listed for that generation. In addition, each subsequent generation must have all of the capabilities of previous generations.

Gartner's view is that EHR systems have and will continue to gradually evolve through these five generations, transforming from very simple systems into very complex, tightly coupled and sophisticated applications that can guide clinicians when appropriate.

Generation 1 systems are simple systems that are essentially results-reporting tools that enable multiple users to access clinical data that previously may have been scattered among several systems or available only in a paper chart for one individual at a time.

Generation 2 systems are basic systems that clinicians can use at the point of care to begin to document, rather than merely access, clinical data.

Generation 3 systems have the technical capability to bring evidence-based medicine to the point of care. Functionality for multiple care venues is required. Generation 3 products have been available since 2005. Generation 4 products are not expected before 2015.

Generation 4 products "The Colleague," are more advanced systems that provide more sophisticated, clinically relevant data synthesis, presentation and navigation options along with richer and more complex clinical decision support capabilities. The requirements this

¹ Gartner research report; Gartner's 2007 Criteria for the Enterprise CPR (G00149693)

generation must support represent the natural evolution that all workflow/rules-driven applications will traverse. Next generation EHRs will be compelled to deal with data and decision support differently because of the explosion of new medical knowledge in areas such as predictive and prescriptive analytics, evidence-based practice research, and new realms of enhanced diagnosis and treatment decision support stemming from areas such as genomics and patient behavioral risk research.

At this time, Gartner has not yet described the requirements for Generation 5, since Gartner does not believe it serves anyone's interest to predict HDO requirements more than a decade into the future.

An illustration of the capabilities required becoming a generation 3 EHR is visualized in the spider diagram, showing the different levels of the functionality for the eight core capabilities required (in percentage) for gen 1, gen 2 and gen 3 types of EHRs.

| | |
|-------|-----------------------------|
| SM | System Management |
| IO | Interoperability |
| DM | Data Model |
| CDS | Clinical Decisions Supports |
| WF | Clinical Workflow |
| CDoc | Clinical Documentation |
| CDisp | Clinical Display |
| OM | Orders Management |

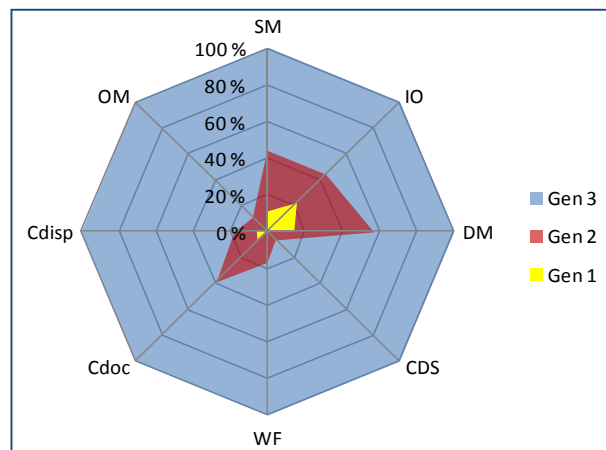


Figure 3 – Capabilities in three generations (source Gartner)

As the figure illustrates, there is a huge gap between generation 2 and 3. It requires a long term dedication both in terms of research and development and in investment to reach full generation 3. The journey from generation 3 to 4 implies a further step up in complexity and the organizations that reaches this level will likely be larger corporations with strong capabilities in R&D, a large and stable customer base and strong financial muscles.

The Global Enterprise EHR systems present in the Gartner Magic Quadrant for Global Enterprise EHR systems (2013) all qualify for generation 3 level, and are steadily investing and working their way well into generation 4 type of systems. The selected EHR vendors in this survey have not reached Generation 3.

Gartner seldom see smaller, local and regional EHR vendors with generation 3 maturity. Most of them are investing, working their way out of generation 1 and 2 and moving into generation 3 maturities. Even though the maturity is varying and some vendors have more mature systems, Gartner still recons most of them still have to invest heavily for several years to complete generation 3 maturity, during which time the leading Global Enterprise EHR vendors will have moved further into Generation 4 maturity.

Essential capabilities in the systems, to achieve most country and HDO objectives are scalability, integration, access to information, and capability to extract data in a way it is possible to analyze. It is worth noting, that Gartner has not yet seen integration work in a big scale on a more advanced level. Gartner is unaware of any HDO that has successfully evolved a best-of-breed (i.e. combining several vendors' packages) environment into a fully functioning Generation 3.

The Healthcare Provider IT Solution Map

The healthcare provider market consumes a wide and ever-expanding array of solution segments. Gartner defines a solution as a repeatable set of IT resources (hardware, software or services) that is assembled to perform a specific institutional function.

The solution map details the broader solution areas (foundational; corporate and institutional administration; revenue cycle; core care delivery; ancillary care delivery; and mobility) that contain individual solutions. The figure below details the Gartner healthcare providers' solution map.

The EHR solutions exist in a wider portfolio of solutions and requirements for integration are continuously increasing. The solution map put the EHR in a broader picture and into the ecosystem of care. Enterprise EHR solutions have incorporated several functional modules illustrated in the figure and will continue to increase the coverage of the solution map.

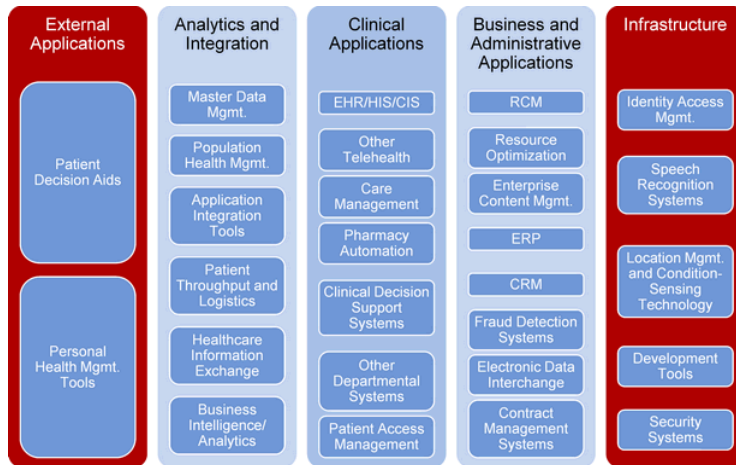


Figure 4 – The healthcare provider IT solution map (source Gartner).

Hype cycle for Health care provider applications

EHRs are the major transformative application suite that has dominated IT agendas and placed dramatic, new demand on IT infrastructure and operations management in the health sector for well over a decade.

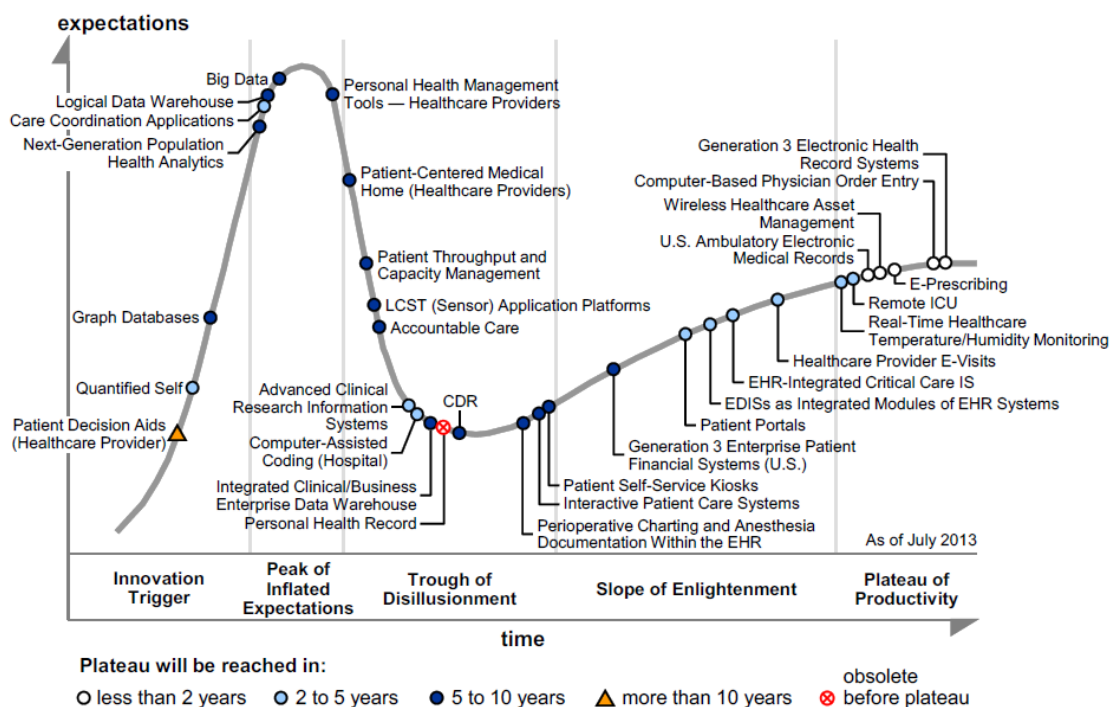


Figure 5 – Gartner Hype cycle for Healthcare Provider Applications, Analytics and Systems July 2013

In this Hype Cycle, the progress of technologies is evaluated against the midsize to large U.S. hospital and health system market because the U.S. can be seen as a microcosm with a good representation of early, mainstream and lagging adopters. The U.S. has provided a living laboratory for many of the early lessons learned in the adoption of Generation 3 electronic health records (EHRs), and the new operations challenges and opportunities that EHRs trigger, such as clinical-data-enabled analytics.

The justification of position and adoption speed of EHR in the Hype Cycle is relative to the U.S. market, where Generation 3 EHR systems have been available the longest, and where implementations are proceeding fastest.

This and previous Hype Cycles shows that, in average, it takes five to 10 years or more for new solutions to reach mainstream adoption among hospitals and health systems. It has taken Generation 3 EHRs over 10 years to get beyond the plateau of productivity in the US (greater than 50% adoption) alone. There are two important take-aways from this:

- It takes an unusual regulatory or market event for solutions to move more quickly
- Early-adopter HDOs can gain a differentiated advantage from both applications and analytics for two to seven years when they select high- or transformational-value areas for their innovations. Meanwhile, many HDOs that don't co-develop or beta in new areas can also differentiate from average organizations for several years by being highly effective "fast followers" that push for higher value realization from the same software as the leaders are using.

EHR activity is increasing globally with many governments encouraging use, hospitals recognizing the potential of EHR systems and with more mature products available. Generation 3 EHR systems have been available for more than eight years.

- Generation 3 capabilities, such as clinical decision support, computerized physician order entry and clinical workflow, are essential components of 21st century medical practice
- There is less discussion about the value of EHR systems, mature enterprise EHR systems are no longer "nice to have," but rapidly becoming mandatory from government incentives.

When correctly implemented, these systems' ability to reduce unnecessary practice variations and deliver more evidence-based care is compelling. To take full advantage of the EHR system, HDOs should:

- Approach these systems as part of a clear and ongoing clinical transformation program effort (requiring process re-engineering, ongoing clinical decision support and workflow evaluations, as well as clinical content life cycle management)
- Enforce a strong and clear clinical/IT governance structure
- Review their current solutions and assess whether the solution providers will be able to reach an advanced and integrated state that is required to meet the demand and quality standards going forward.

EHR vendor landscape and trends

Healthcare systems in many countries are struggling with escalating costs, inconsistent quality and lack of access to timely care. Business and technology leaders of HDOs worldwide are struggling to confront fundamental changes in the industry across both financial and clinical arenas.

EHR vendors include firms that sell only EHRs, and "megasuite" vendors that offer EHRs and a broad range of other applications for hospitals (such as departmental, imaging, administrative, financial and analytic applications).

As Gartner has observed in other sectors, only large, well-funded companies are likely to survive long term in a particular market. This is mainly due to market consolidation forces and the huge R&D investments needed to meet the expectations of stakeholders and end users. This will most probably also be the case in the EHR market.

Many EHR vendors serve only one country. Many began selling administrative systems, and their products are designed to meet the specific administrative requirements of their countries (such as scheduling, coding, billing and reporting). However, their EHR offerings usually lack advanced features, such as medication order entry, workflow capabilities and clinical decision support.

Across the globe, despite clear differences in ownership, payment schemes and regulatory requirements, the processes of care and the practice of clinical medicine are more similar than different.

To gain an international reach, some vendors have pursued a strategy of acquiring many single country vendors. These firms have tended to maintain their country-specific applications, making needed enhancements but not trying to move customers to a new global application. The risk of this strategy is that development resources need to be split among the various product lines, and customers can become frustrated by the limitations of the country-specific EHRs, are tempted by the promise of more-advanced EHRs from global players, and soon look to other vendors to support their needs.

The desire for an open-source EHR continues, although there has been little success in creating a vibrant open-source EHR community, and none of the efforts have produced an EHR that would meet the inclusion criteria for Gartner's Magic Quadrant.

HDOs seeking an enterprise EHR have qualitatively better options to choose from today than in the past. With vendors continuing to focus considerable resources toward their development efforts, it is critical that HDOs match their needs and timetables with vendors' product road maps. HDOs that have selected or implemented an EHR can use e.g. Gartner's Magic Quadrant as a gauge to determine whether their vendor of choice is keeping pace with competitors or whether there may be a possible problem that needs attention.

Implementation of EHR around the world

With rising pressure to cut healthcare costs while enhancing the quality of care, private and government-owned HDOs are increasingly implementing clinical automation solutions, especially enterprise EHRs. Some countries are further along. In the case of the U.S., approximately 80% of hospitals have at least selected and started implementing an EHR, although only roughly 20% have reached the point at which more than 75% of all nursing and physician documentation, as well as potential medication and non-medication orders, are directly entered into the system by clinicians.

Other countries with extensive use of enterprise EHRs include Canada, Australia, the Netherlands and the Nordic countries. Interest in enterprise EHRs is growing in the rest of Western Europe, as well as in the Middle East and Latin America, and in certain countries in the Asia/Pacific region.

Outside the U.S., there's still confusion about the definition of an EHR and whether an integrated enterprise EHR is preferable to linking disparate systems through HL7 messaging, APIs, Web services or clinical portals. Gartner believes that integrated EHRs will prevail, but it will take time.

Around the world, many HDOs are seeking to implement commercial enterprise EHRs, either from local vendors or from those that have multinational offerings. Although some entities are opting to build their own systems, this is not the norm. Most seek commercial products from local vendors or those with global offerings.

Public and private hospitals and integrated healthcare delivery systems continue to move toward full electronic health record system implementation. Deploying EHR systems and optimizing their value remain a top priority for HDOs, and the ability to deliver is essential. However, for HDOs making selection or replacement decisions now, a "classic" view of EHR usability and functionality should not be the only perspective for selecting long-term partners. Vision and core competencies for the future must also be carefully probed.

Anticipate that the entire effort might as much as double organizations' IT budgets as percentages of operating expense totals because of access, infrastructure, security, data center and uptime/business continuity investments related to the EHR system.

If implemented correctly, a mature and advanced EHR system can:

- Automate support for a wide variety of clinical activities that affect virtually all caregivers and patients
- Reduce the rate of medical errors
- Eliminate unwarranted practice variations
- Improve operational efficiency
- Compensate for the shortage of skilled healthcare workers by streamlining previously manually intensive workflows.

While the envisioned benefits are many, they are not immediately apparent. Too often those who are ill-informed think that all that is required is to get clinician adoption. The truth is that it takes substantial time and effort to obtain the full value of an EHR system.

Advanced EHR systems continue to be the largest and most transformational application investments for HDOs in this century. The EHR's computerized physician order entry (CPOE) capability, listed as high-value and hot now, often is the first arena to provide a clear improvement in enterprise conformance to safety protections and evidence-based medicine by enabling the standardization of order sets, providing medication safety advice and sending an alert to the physician at the time of order.

To make the EHR truly transformational, the HDO must direct more attention to high-impact clinical decision support and leverage the data via analytics.

Global EHR vendors in the Nordic market

A general Gartner observation is that Global Enterprise EHR vendors are more functionally mature than locally based regional vendors, especially within core capabilities such as Clinical Decision Support, Clinical Workflow and Clinical Display/dashboards. This is the most distinct areas of difference between more mature EHRs and previous generations.

The Nordic market is perceived to be extensive users and early adopters of EHRs. This implies that the Nordics should be an interesting market for Global EHR vendors. Several of the leading enterprise EHR vendors are already present with solutions in the Nordic market, but not yet with their enterprise EHR solutions. Epic is on their way with implementation and support of EHR in Denmark, so this is about to change.

A reason for the low penetration of global EHRs in the Nordics can be that the Nordics have used EHR for quite some time, so the local vendors are established, have knowledge of the local environment and have solid references in the Nordics.

Especially the Norwegian market seems to be very focused on local Norwegian products, which may indicate that local understanding, references as well as proximity are viewed as essential when vendors are chosen. The downside of this is that a majority of Norwegian HDOs are not getting the benefits of global best practices and mature clinical support systems. Due to the limited size of the Norwegian market, the innovation and R&D potential will continue to stay on a modest level.

Vendor survey

In the first section of this chapter, we provide a short description of the vendors in the first category, the *Global enterprise EHR vendors*, which are the vendors in the Gartner Magic Quadrant for Global Enterprise EHR Systems for 2013.

In the next two sections, we provide an analysis of the answers to the survey undertaken for the two remaining categories (category 2 and 3); *Selected EHR vendors* and *Selected primary healthcare EHR vendors*.

The table below shows the vendors in category 2 and 3 and the answers they have provided for systems coverage of the 11 health care services asked for in the survey.

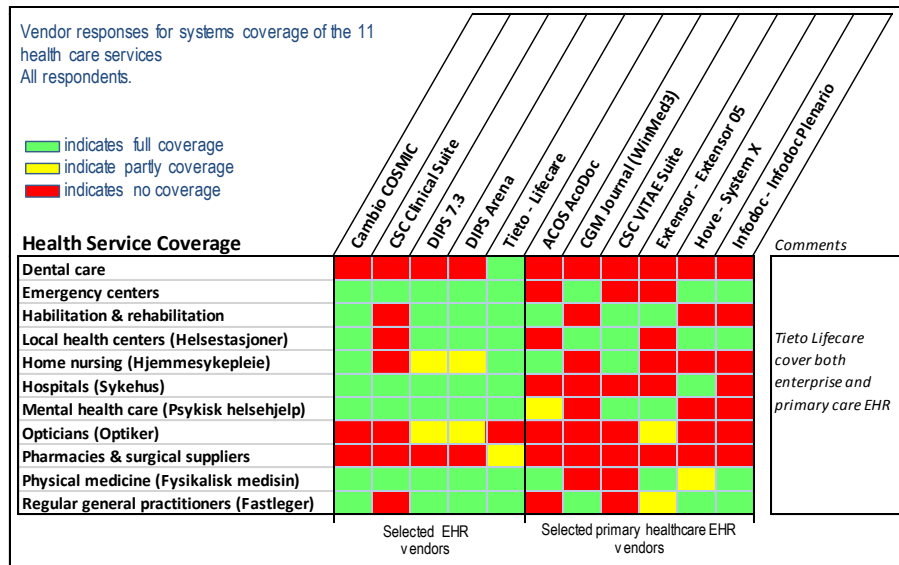


Figure 6 – Vendor responses for systems coverage of the 11 health care services (source Gartner)

The responses from these vendors visualize the differences between the different categories. The systems have hence been grouped into the two categories:

Selected EHR vendors

- Cambio with COSMIC
- CSC with Clinical Suite
- DIPS with DIPS 7.3
- DIPS with Arena
- Tieto with Tieto Lifecare (inc. Gerica)

Selected primary healthcare EHR vendors

- ACOs with CosDoc
- CGM with Journal (WinMed3)
- CSC with The VITAE Suite
- Hove Medical with System X
- Infodoc with Plenario 2.17
- Extensor with Extensor 5
- Tieto with Tieto Lifecare (inc. Gerica).

Global enterprise EHR vendors

The information in the following section is mainly from Gartner 2013 Magic Quadrant. A new version of the Magic Quadrant will be available in the end of the summer of 2014.

Gartner defines a global enterprise EHRs as those that:

- Meet Gartner's definition of an enterprise EHR
- Have attained at least Generation 2 status
- Are actively marketed and sold in more than one continent. A system sold in more than one country in a single region does not qualify as a global EHR.

Allscripts

Allscripts' enterprise EHR, Sunrise Acute Care, has good basic functionality combined with strong decision support. However, a lack of sustained profitability and limited market success have led to repeated changes in leadership, starting before the Allscripts merger with Eclipsys in 2010, and most recently in December 2012. These changes have resulted in confusion and delays in needed forward progress in providing integrated support across the continuum of care. While Sunrise Acute Care does include ambulatory and ED modules, Allscripts is taking steps to improve the functionality of the product by aggregating expertise from its stand-alone product lines. This should result in a stronger enterprise EHR, but some of these efforts will take several years to reach fruition.

Note that a version of its revenue cycle integrated with the EHR was released late last year. This year, Allscripts acquired dbMotion and Jardogs to enhance its patient engagement and community medicine efforts as part of its population health strategy. With Sunrise Acute Care, Allscripts is targeting English-speaking organizations around the world. In recent years, the company, which is based in the U.S., has had success in the Asia/Pacific region, notably a large contract in South Australia. However, Allscripts signed many fewer new contracts in the past year than any of its global enterprise EHR competitors. The company has EHR contracts in the U.S., Canada, Singapore, Australia, Italy and the U.K.

Strengths

- Allscripts has substantial healthcare IT market experience
- Allscripts is focused entirely on healthcare IT.

Cautions

- Erosion of its market base — with several prominent HDOs replacing Sunrise with competitors' products — has weakened Allscripts' overall enterprise EHR position
- The company's overall portfolio, gained primarily through acquisitions, is broad but not fully integrated, and Sunrise Acute Care could have stronger functionality for certain care venues (for example, ED, operating room and ambulatory).

Representation, plans and support for the Nordic market

Allscripts' European expansion target countries and regions where English or Latin-based languages are most commonly used.

Generally, implementation and support are handled by internal resources. However, Allscripts is developing a hybrid model with local partners, where appropriate, that allow local providers to undergo training in implementation and support supervised by Allscripts.

Cerner

Cerner, which is based in the U.S., has more years of experience in the international market than most of its competitors, and was one of the first global megasuite vendors. It has a large revenue base outside the U.S. Although many non-U.S. customers would not meet Gartner's definition of having a full EHR system, they are on the path toward full implementation. Cerner continues to have a strong product line and remains innovative in its search for new growth opportunities. Its enterprise EHR continues to get stronger, and in the past year, the company signed more net new EHR contracts and has implementation in more countries than most of its competitors. The company is actively pursuing and winning deals around the globe. The company has Millennium EHR implementations in the U.S., Canada, the U.K., Ireland, Australia, France, Egypt, the Gulf region, Germany, Austria, Spain, South America, Mexico, the Caribbean and Malaysia.

Strengths

- Cerner is a large, entirely healthcare-IT-focused company that has been consistently strong financially, with a solid understanding of global markets and a coherent strategy for penetrating them
- The top executive/cofounder team has been consistently very strong at long-term business, product and service strategy.

Cautions

- Cerner's revenue cycle products are improving but still remain less mature than those of some competitors. This is important because changing models of care require tighter linkages between clinical and nonclinical functionality
- Perceptions of development, implementation, operations, service and support are improving, but clients still express the wish that it could be "easier" to do business with Cerner.

Representation, plans and support for the Nordic market

Cerner does not have any offices in the Nordic countries, but is actively pursuing the Nordic market and has implementations and support in Denmark and Finland the last four years, but not of EHRs. Cerner has been engaged in the Norwegian market for a number of years, has a dedicated Norwegian team and are members of IKT Norge.

The support strategy for Norway involves partners, which will be chosen based on their delivery track record in Norway. Cerner is partnered with a number of the biggest global companies.

Epic

Epic, based in the U.S., has one of the most complete enterprise EHR products, and it has an excellent track record for software development and predictable implementations — a trend that continues as it enters the global market. Epic has the strongest integrated patient portal compared with its competitors. The company remains very strong in the U.S. market, and is growing its presence in Europe and elsewhere. The company has EpicCare contracts in the U.S., Canada, the Netherlands, Singapore and the UAE, and it recently signed its first contract in the U.K.

Strengths

- Epic has a very strong top executive team that stays in close contact with clients and emerging requirements
- It has a strong core competency in software, with a consistent track record for making realistic promises and delivering on them in a timely fashion.

Cautions

- It is too early to see the full results, but Epic continues to improve its analytic and care management solutions (a perceived weakness), and has recently released a formal population management module
- Its marketing strategy, which is focused on word-of-mouth recommendations, has worked well in the U.S. and, although it is too early to say conclusively, may be starting to gain momentum in some international markets.

Representation, plans and support for the Nordic market

Epic are on their way with implementation and support of EHR in Denmark and has plans for an office there. When fully rolled out to the Danish customer, Epic will be used for care (hospitals, clinics and healthcare institutions) for 42% of the population of Denmark - the largest integrated EHR implementation in Europe.

Epic's services, including installation and ongoing support, are provided by own employees in combination with sub-contracting third-party providers on specific portions of the project (e.g. language support) that work under the supervision of Epic staff.

InterSystems

InterSystems, headquartered in the U.S., are a global software technology vendor with a great deal of international healthcare experience. It entered the EHR market with its purchase of Australia-based TrakHealth and its TrakCare system in 2007. TrakCare is not sold in the U.S., but of all the global enterprise EHR products developed outside the U.S., TrakCare is the most mature. TrakCare has a smaller installed base than some of its competitors, but InterSystems has done very well in selling and successfully implementing the product in multiple countries on four continents. TrakCare has been implemented in more languages than most of its competitors. TrakCare is installed in more than 25 countries, including France, the U.K., Scotland, Italy, the Gulf region, India, China, Thailand, Australia, Brazil and Chile.

Strengths

- InterSystems have extensive global experience with multiple languages and countries, leverage its global presence, and are financially strong
- InterSystems have a well-developed analytics capability.

Cautions

- The TrakCare product lacks a dedicated ICU module, although its clients are using base functionality in those units
- TrakCare signed fewer net new contracts in the past year than some of its competitors, but did so in more countries than most of its competitors.

Representation, plans and support for the Nordic market

InterSystems has offices, implementation and support in Finland and Sweden, but not of EHRs. The HealthShare health informatics platform is the foundation of the Danish and Swedish national HIE initiatives.

Support is provided by internal resources engaged in partnership with the clients. The strategy for potential clients in Norway is not decided and will be chosen based on what would be the most appropriate course of action - either develop a local support team, leverage existing support teams in other Nordic/European countries, or leverage local partners.

Meditech

Meditech, a U.S.-based vendor with more than 30 years of global experience, is well-established in the small-and-midsized-hospital market, and has shown its ability to scale to large facilities with as many as 1,200 beds. Note that, once again this year, we evaluated only the 6.0 platform.

Meditech has one of the most complete fully integrated megasuite products, including the EHR, patient access, revenue cycle and some ERP functionality. Its integrated clinical functionality supports some care venues that many competitors don't have or that are not integrated with the rest of the EHR (notable examples include long-term care and home health). The majority of its EHR implementations are in English, but it does have a Spanish version. Most Meditech customers remain loyal and supportive of its product enhancement cycle. Meditech again signed more contracts in the past year than most of its competitors. The company has EHR contracts for its 6.0 platform in the U.S., Canada, the U.K., Ireland, the Middle East, Africa, Australia, the Bahamas, Singapore and South America.

Strengths

- Meditech has strong, long-tenured top management
- Meditech knows how to build software, sets accurate expectations for delivery and has a well established implementation methodology.

Cautions

- Meditech is enhancing its existing ambulatory capabilities, but has not yet delivered the new version of the ambulatory module, and still lacks dedicated modules for ICU, and labor and delivery (although clients are using base functionality in those areas)
- The perception of difficulty in data migration to 6.0 remains following early difficulties.

Representation, plans and support for the Nordic market

Meditech's offices are in the United States only. In Europe Meditech provides active implementation and support in Ireland and the UK. Beyond the areas in which they are already installed, they are looking to expand into additional English or Spanish-speaking markets and have currently no marketing efforts in the Nordics.

All support is provided through dedicated Meditech staff with no outsourcing. There is no strategy stated for a potential entrance to the Norwegian market, but in general the implementation and support strategy is relatively the same for all customers.

Siemens (i.s.h.med)

Siemens acquired i.s.h.med in 2008. The product is built on SAP technology, requires SAP ERP and Patient Management, and follows the SAP delivery and release cycles. It is not marketed in the U.S. The i.s.h.med product has made significant strides in the past year and has been implemented in more countries and in more languages than most if not all of its competitors. Siemens has i.s.h.med EHR contracts in Austria, Belgium, Chile, China, Colombia, the Dominican Republic, Germany, Hong Kong, Israel, Italy, Jamaica, Kuwait, Mexico, the Netherlands, New Zealand, the Philippines, Russia, Singapore, Spain, Turkey, the UAE and the U.K.

Strengths

- Clinical functionality is fully integrated with administrative and financial functionality

- The product has a large customer base of hospitals that use SAP for ERP and Patient Management.

Cautions

- While the product has improved, the perception remains that it is not as functionally strong as some of its competitors
- The product has limited but growing experience with ICU implementations.

Representation, plans and support for the Nordic market

Siemens is planning to provide implementation and support in all countries that have an interest in a scalable clinical information system based on SAP technology.

Siemens has offices in Norway, Denmark, Finland and Sweden but has no implementation of Siemens i.s.h.med in the Nordics. There are plans for entering the Finish market and Siemens is participating in a bid as a subcontractor right now for one of the largest groups of hospitals in Finland (approximately 26 hospitals and 34 health stations). Siemens is present in the Norwegian market with Doculive an Electronic Patient Journal system in use at Oslo Universitetssykehus and Helse Midt-Norge.

Siemens use a global partner system to provide implementation and support (based on SAP). SAP ERP is already installed in a number of hospitals in Norway. SAP partners are already active in Norway with their product suite into which i.s.h.med can be fully integrated.

Siemens (Soarian)

Siemens Soarian continues to improve. Siemens now has a clearer international strategy than in previous years. Siemens signed more net new Soarian contracts in the past year than many competitors. Siemens has Soarian EHR contracts in the U.S., Canada, Germany, Austria, the Netherlands, Switzerland, Portugal, Sweden and the U.K.

Strengths

- Soarian is the only product that was designed at its inception around a commercial workflow engine
- Siemens is a large multinational company with a large presence in healthcare and a highly respected healthcare IT CEO.

Cautions

- The product lacks dedicated modules for ambulatory (general availability of a new module is expected later this year), labor and delivery, and the operating room (Siemens has an integrated OR module for its customers in Europe, but partners with Surgical Information Systems [SIS] in the U.S.)
- Soarian has limited experience with its new ED module, and a new, more robust physician documentation module is expected to be generally available later this year.

Representation, plans and support for the Nordic market

Siemens Soarian has offices in Norway, Sweden, Denmark and Finland and active implementations and support in Sweden. Siemens use a global partner system to provide implementation and support.

Selected EHR vendors

There are a large number of EHRs being developed and sold in single countries or regions, and their absence from the Gartner Magic Quadrant reflects the definition of the market and is not necessarily a reflection of the value or viability of those products. Below we present the selected EHR vendors based on vendor responses.

The systems in this category do not qualify as enterprise EHRs according to the minimum definition of enterprise EHR in chapter *EHR Definition* (Cambio and DIPS do not include functionality for Intensive Care Units, and all lack functionality within pharmacy).

Cambio

Cambio has provided Enterprise EHR solutions primarily in regional installations for the continuum of care for over 20 years. The design goal of the current product, Cambio COSMIC, is to support primary, secondary and tertiary care in a single EHR.

Cambio's head office is in Sweden and they have 370 employees. The primary geographic coverage is the Nordics and UK, but Cambio is not currently in the Norwegian market.

Cambio COSMIC provides a complete functional coverage for the continuum of care, except for ICU and diagnostic services. In addition to the core capabilities, COSMIC also provides Theatre management support, Maternity and Obstetric support, shared care plans with community care, etc.

Cambio COSMIC is an international standard product, designed and built as an integrated solution. Focus is on close and long-term cooperation with customers on all markets, guaranteeing a strong roadmap. There is a new release of Cambio COSMIC each year and customers are strongly recommended to upgrade every year.

Cambio COSMIC supports virtually all standards for communication of information. It supports the use of international terminologies and complete informatics structures as Snomed CT since this is a key enabler for the ability to transport clinical knowledge over natural language barriers. Cambio has a number of integrations using national or international standards.

Cambio aims to be early adopter of new technology as well as to set new trends in healthcare, shown by the ability to provide COSMIC on tablets, patients' access to the EHR and regional wide implementation of embedded advanced CDS.

Strengths

- Cambio is continuously analyzed by Gartner as a potential future Magic quadrant vendor, but isn't e.g. present in multiple continents, which is a Gartner requirement for being considered a global player
- COSMIC has fairly full coverage of healthcare areas, which limits the needs for integration
- Cambio has experience with full scale regional implementations (e.g. Jämtlands län), and even nationwide implementation (Greenland), even if the regions are fairly small
- COSMIC handles both primary and secondary care as well as highly structured data content. Customers are running some of the largest clinical data warehouses in the world covering virtually all healthcare information for their populations.

Cautions

- Cambio is a small company with low turnover, who even made a small loss in 2013 (preliminary figures provided by Cambio).

CSC

CSC is an American company providing a variety of IT services and solutions. They service a number of sectors, including public sector, healthcare, manufacturing, banking and capital markets, technology and consumer services, energy and natural resources, insurance and travel and transportation.

CSC is a global provider of Healthcare solutions with more than 100 million patient records in their EHR systems and has over 20 years of experience in healthcare. CSC opted not to share information about revenue and income from EHR with Gartner.

CSC is the largest healthcare IT provider in Denmark (even most of it is not for EHRs), actively working within primary care and secondary care. CSC state that they are in the process of expanding healthcare business in Norway. A part of the strategy is to leverage the existing CSC organization in Norway and expand the healthcare capabilities within the CSC Norway organization.

CSC may include partners in the implementation and support delivery organization. Current support in Norway is focused on other industries, and delivered out of the offices in Oslo and Bergen combined with on-location resources and off-shore resources. Further healthcare implementation and support resources are currently available from Denmark.

CSC has different healthcare products marketed as individual products, but the products are also integrated into an eco-system offering. The eco-system includes CSC Clinical Suite, amPHI Prehospital Record, CSC VITAE Suite as well as other modules and components. As a part of CSC Global healthcare strategy this will also be extended to other modules and components, currently marketed under other product names in non-Nordic markets. The product Gartner consider amongst the selected EHRs, is the CSC Clinical Suite.

Strengths

- CSC is a financially viable global player. CSC has several offices in the Nordics, including Oslo and Bergen. The main office for CSC healthcare is in Aarhus, Denmark, and healthcare implementation and support resources are currently available from Denmark
- CSC has a major footprint in healthcare in Scandinavia and in Denmark CSC is the largest healthcare IT provider.

Cautions

- The CSC Clinical Suite seems not as functionally strong as some of its global EHR competitors, e.g. when it comes to Clinical Decision Support and order management.

DIPS

DIPS have been in the Norwegian market since 1987. Currently DIPS has over 80 000 end users in Norwegian hospitals. DIPS includes medicine management, operation theatre planning, nursing plans, order entry and management, request handling, booking, ADT, LIS, RIS in an integrated way. The solution does not include ICU, pharmacy, labor and delivery. DIPS is interfaced with a number of partner applications for MTUs, specialist systems, reporting purposes and patient systems.

The DIPS systems have been evolving through three major phases, the first phase DIPS (1987-2000), the second phase DIPS EPJ/PAS (2000-2014/16) and the third phase DIPS Arena from 2014/16 and onwards.

The new DIPS Arena will be a three layered SOA based system with a new client (user interface) and a dynamically structured journal based on OpenEHR standards and

archetypes. The planned central function in DIPS Arena will be a structured patient record database with an internally developed clinical process workflow engine.

The currently available DIPS system is the DIPS 7.3. The first implementation of a limited number of modules of DIPS Arena is due in October 2014 at the Oslo University Hospital. Essential differences between 7.3 and Arena are described below.

DIPS 7.3

DIPS 7.3 states that it provides solutions for health services within the following areas; emergency centers, habilitation & rehabilitation, local health centers, hospitals, mental health care, physical medicine and regular general practitioners. In addition it partly supports services for home nursing and opticians.

Strengths

- DIPS is the biggest player today in Norway covering 85% of the hospitals. The solution is thoroughly tested in the Norwegian market.

Cautions

- DIPS is a local vendor with limited business outside of Norway (even if they answer that there are plans for expanding to Sweden and Finland)
- The development is project based, i.e. financed by clients on an ongoing basis. This approach makes it challenging to follow a consistent roadmap and could make it difficult to focus resources and be in the forefront of development
- DIPS have limited functionality when it comes to e.g. Clinical Decision Support and Clinical Workflow.

DIPS Arena

DIPS Arena builds on the functionality in DIPS 7.3 and will continue doing that for a number of years. DIPS Arena is mainly a new client. The product strategy is to gradually replace 7.3 functionality with new Arena modules. This will be realized through an iterated, gradual and project-based development, until DIPS version 7.3 functionality is completely replaced (according to plan by 2016). Arena will include some new features such as:

- A more modern user interface
- Ability to dynamically structure the journal
- Clinical and administrative process support.

The new EHR is based on openEHR¹ and the use of OpenEHR archetypes for structured storage. The openEHR specifications are based on European/Australian research and development in EHRs and new paradigms, including what has become known as the archetype methodology for specification of content.

The DIPS Arena will be based on a model driven architecture. The current version (7.3) of DIPS was to large degree a solution for sharing electronic documentation with simple process support. DIPS state that DIPS Arena will have improved capabilities for managing structured information, workflow, process planning and control.

Strengths

- DIPS is the biggest player today in Norway
- DIPS build on a SOA architecture

¹ *OpenEHR is an open standard specification in health informatics that describes the management and storage, retrieval and exchange of health data in electronic health records (EHRs).* (Wikipedia).

- DIPS Arena can be introduced and used step by step by different user groups and must co-exist with previous versions of the DIPS system the next couple of years.

Cautions

- DIPS is a small local vendor with limited business outside of Norway
- Development is project based, i.e. financed by clients on an ongoing basis. This approach will make it difficult to be in the frontline of development
- DIPS Arena is under development and is not tested by the market
- OpenEHR and archetypes is an example of CIMIs¹ (Clinical Information Modeling Initiative). CIMI and thus OpenEHR are regarded by Gartner to be an immature standard.

Tieto - Lifecare

Tieto is a large Nordic IT services company providing full life-cycle services for both private and public sectors. The company has global presence through its product development business and the delivery centers. Tieto focuses on the following business areas: Financial Services, Public, Healthcare & Welfare, Manufacturing, Retail & Logistics, Telecom, Media & Energy and Product Development.

Tieto has 15000 employees in total, 1125 working with EHR. The EHR solution suite is called Tieto Lifecare Healthcare Information System (HIS) and is implemented in Finland, Sweden and Norway, with hospital implementation only in Finland and with welfare solutions in Sweden and Norway. The system supports Finnish, Swedish and Norwegian. Tieto has about 75% market share of the Finnish Private Hospitals and clinics, 11 (out of 15) of central hospitals, 76 (out of 154) of primary healthcare.

Tieto has offices in Oslo, Molde, Spydeberg and already has support in Norway with own resources, but also co-deliver with partners where applicable for program management, change management and organizational development.

The Lifecare is an integrated solution for Primary care, Secondary care; Medical services, Elderly and home care, and Family and childcare. It is a solution that covers both enterprise and primary healthcare. Thus, in this survey, Tieto is a part of both the *selected EHR vendor* survey and the *selected Primary Healthcare EHR vendor* survey with the Tieto Lifecare IT Solution.

The primary healthcare functionality is covered by an integration of the former Tieto Gerica to the Tieto Lifecare IT Solution. The Tieto Gerica solution is used mainly within the Norwegian municipality healthcare. Tieto Gerica has a strong position and cover at present over 50% of the Norwegian population in need of healthcare services and approximately 150 Norwegian municipals.

Strengths

- Tieto is a financially stable and big player in the Nordics for IT services and has a strong position in the healthcare market

¹ The OpenEHR is not a standard that is visible in the Hype Cycle for Healthcare Provider Technologies and Standards, 2013, it is part of several initiatives mentioned as CIMI "Clinical Information Modeling Initiative" in the Hype Cycle. CIMI is very low on the hype. There is still a long way to go before the impact of CIMI or other detailed clinical modeling efforts becomes clear to the developers and users of EHR systems. We include it on the Hype Cycle primarily to keep it on the radar screen of academic users and other developers of clinical systems.

- Tieto provides an integrated modular system that supports most of the healthcare sector and has a proven track record (for parts of the healthcare sector) in Norway, Sweden and Finland.

Cautions

- Even if the focus is on the Nordics, Finland is the only place with hospital EHR implementation.

Selected primary healthcare EHR vendors

The primary healthcare EHRs normally don't have the same breadth of functionality as the enterprise EHRs, since they are adapted, specialized and optimized to support one or more specific healthcare services, where a full enterprise EHRs would probably be unnecessary complex and expensive. The functionality that is included in the solutions depends on what client segments and health services coverage the vendors are targeting.

The most important service coverage and differentiator relative to an enterprise EHR, is the functionality and ability to serve hospitals, this coverage do not the primary healthcare EHRs have.

ACOS – CosDoc

ACOS is a Norwegian software company which develops and implements software solutions and applications for public and private sector. EHR represents approximately 20% of ACOS's business. The ACOS CosDoc's patient management system is used in large municipalities, individual nursing homes and private care organizations. Based on the individual recipient CosDoc keeps track of the beneficiary's needs and municipal services.

ACOS CosDoc is built on standards for communication with other stakeholders in the healthcare services.

Strengths

- A Norwegian company with Norwegian clients and onsite support in Norway
- They do development in close collaboration with clients and partners
- ACOS has been fairly successful in their niche providing solutions for 83 municipalities.

Cautions

- ACOS is a small and locally based company. With 22 employees in EHR, there is little room for innovation, research and proactive development.

CGM

CGM's head office is in Germany and they have 3600 employees. CGM has nearly 400,000 Customers in 43 Countries and subsidiaries in 19 Countries.

CGM provides different EHR systems in different regions, supporting different sections of the health sector and with diversified functionality. In Norway CGM is present with CGM Journal (previously known as CGM WinMed3).

The current system implementations in Norway cover emergency centers, local health centers, and regular general practitioners. CGM has 500 contracts on CGM Journal in

Norway, of these 260 are CGM general practice, 220 CGM health center, 20 CGM specialist practices, and 3 CGM emergency services. CGM focus on providing a common platform, with modules tailored for the respective segments.

The CGM Journal (formerly WinMed3) provides solutions for health services within the following areas; emergency centers, local health centers and regular general practitioners.

Strengths

- CGM is a medium size organization that has been in the market for 25 years. They have aggressive plans to expand (with an objective of 30% annual growth). The EHR systems are implemented in different countries so they are used to handling different cultures, health care set ups and languages
- CGM already has implementation and offices with full organization in Norway; Service, Support, Product Development, Management, Sales & Marketing.

Cautions

- CGM provides many different systems (best-of-breed), but has not provided any specific information about how these can be connected and the level of interoperability between them
- The Product suite seems somewhat fragmented, based on interfaced applications and do not appear as a fully integrated suite.

CSC VITAE Suite

CSC is an American company providing a variety of IT services and solutions. They service a number of sectors, including public sector, healthcare, manufacturing, banking and capital markets, technology and consumer services, energy and natural resources, insurance and travel and transportation. CSC is not known as a software development company – but rather to acquire products.

CSC is a global provider of Healthcare solutions with more than 100 million patient records in their EHR systems and has over 20 years of experience in healthcare. CSC opted not to share information about revenue and income from EHR with Gartner.

CSC is the largest healthcare IT provider in Denmark, actively working within primary care, secondary care as well as payor markets. CSC state that they are in the process of expanding healthcare business in Norway. A part of the strategy is to leverage the existing CSC organization in Norway and expand the healthcare capabilities within the CSC Norway organization.

CSC may include partners in the implementation and support delivery organization. Current support in Norway is focused on other industries, and delivered out of the offices in Oslo and Bergen combined with on location resources and off-shore resources. Further healthcare implementation and support resources are currently available from Denmark.

CSC has different healthcare products marketed as individual products, but the products are integrated into an eco-system offering. The eco-system includes CSC Clinical Suite, amPHI Prehospital Record, CSC VITAE Suite as well as other modules and components. As a part of CSC Global healthcare strategy this will also be extended to other modules and components, currently marketed under other product names in non-Nordic markets.

The CSC product offering for primary healthcare EHR, is the CSC VITAE Suite. The CSC VITAE Suite providing solutions for health services within the following areas; habilitation & rehabilitation, local health centers, home nursing and mental health care. The system do not provide services for general regular practitioners, but the VITA Suite have interfaces to general practitioners systems.

The CSC VITAE Suite covers approximately 40% of the Danish market.

Strengths

- CSC is a financially viable global player. CSC has several offices in the Nordics, including Oslo and Bergen. The main office for CSC healthcare is in Aarhus, Denmark, and healthcare implementation and support resources are currently available from Denmark
- CSC has a major footprint in healthcare in Scandinavia and in Denmark CSC is the largest healthcare IT provider
- The CSC product suite is one module in the CSC eco-system offering that constitutes a fully integrated suite.

Cautions

- CSC has as of today, no track record for implementation of the CSC VITAE Suite in Norway.

Hove Medical

Hove Medical is a Norwegian company with 39 employees that was established in 2001.

Hove Medical provides an EHR system for primary health care, System X. It is a solution for emergency centers, private hospitals, local health centers, regular general practitioners and some physical medicine. Hove Medical currently has approximately 400 EHR implementations in Norway and one in China. In Norway, the System X is primarily used as a system for general practitioners.

Hove Medical plans to provide services in Europe, Asia, Africa and South America, but will first focus on Norway to increase its market share.

Strengths

- Norwegian company with Norwegian clients, onsite support in Norway
- They have been fairly successful in providing solutions for health services within emergency, local health centers, small hospitals (private) and regular general practitioners.

Cautions

- Hove Medical is a small, local company with marginal profit
- With 39 employees, revenue of 21 mill NOK and net income of 0,3 mill NOK (2013) there is little room for innovation, research and development.

Infodoc

Infodoc AS is a supplier of medical records system for primary and specialist health services. Infodoc is a Norwegian company, started in 1983 and is a nationwide provider of EHR with 30 employees. Infodoc is located in Bergen.

The system Infodoc Plenario is positioned for smaller medical offices to large institutions and health centers. The solution consists of four main parts; journal, appointment diary, finance and electronic messaging. The functionality and information in the program is role based covering the various professions and roles in medical offices and clinics. The software is based on Microsoft .NET Framework.

The current version Infodoc Plenario 2.17, is an EHR for emergency, local health stations, general practitioners, physical medicine and contract specialists. The EHR System provides system management, interoperability, data model, clinical documentation and data capture capabilities, order management capabilities. All customers use physician documentation, computerized physician order entry and nursing documentation.

Infodoc only partly provides clinical display/ dashboard and clinical workflow capabilities. The system does not support clinical decision support.

Infodoc has 530 contracts in Norway, 74 signed last year.

Strengths

- Infodoc is a local company that knows the region well. They have been an actor in the Norwegian market since 1983 that knows Norwegian clients and has onsite support in Norway
- Infodoc has been fairly successful in their niche, providing solutions for health services within emergency, local health centers, physical medicine and regular general practitioners.

Cautions

- Infodoc is a small, local company with marginal profit. With 30 employees, revenue of 25,8 MNOK and net income of 0,035 MNOK (2013) there is little room for innovation, research and development.

Extensor

Extensor AS is a Norwegian based company focusing on health caretakers that work interdisciplinary. Extensor delivers EHR system that addresses all aspects of patient management. The systems are ideal for use in multidisciplinary clinics, institutes, rehabilitation agencies, occupational health services, institutions and small hospitals. Currently, the system is not widely used by regular general practitioners. They have been active since 2004 and currently have 9 employees.

Currently Extensor only has business in Norway, but they plan to expand to Sweden. The Extensor 05 system is sold to about 500 healthcare companies, and has almost 2000 users. So far, Extensor has offices in Bodø and Oslo.

Extensor 05 is based on the Microsoft .NET Framework. The software consists of several fully integrated modules of functionality. The modules are delivered according to individual needed, thus the user only uses relevant modules and functions covering the required professions and roles.

Strengths

- A Norwegian company with Norwegian clients and onsite support in Norway
- They have been fairly successful in their niche providing solutions for health services within habilitation and rehabilitation, mental health care, physical medicine and to some extent for regular general practitioners
- Module based and fully integrated system for multidisciplinary use.

Cautions

- Extensor is a very small and locally based company
- With 9 employees and revenue of 7.8 mill NOK, there is hardly no room for innovation, research and development.

Tieto - Lifecare

For Tieto Lifecare, please refer to the Tieto Lifecare section (page 25) in the above chapter *Selected EHR vendors*.

Visma

Even though Visma is not primarily in the healthcare sector, Visma is an active player in parts of the Norwegian health market providing solutions primarily within the part of the primary care the municipals are responsible for (Local health centers). Visma decided not to respond to the Gartner survey and will hence not be described further in this report.

Vendor comparisons

This chapter compares vendors and solutions from different perspectives. Gartner has not done a comparison between the three categories, Global Enterprise EHRs, Selected EHRs and Primary Healthcare EHRs on a detailed level regarding product maturity and functionality. It is not possible to place any of the selected vendors in The Gartner MQ, since they do not qualify for the MQ.

The differences between the categories are visualized in the figure below, indicating the different stages of maturity for the three categories of EHR solutions and the level of integration, automation and leverage of information (i.e. data put in context). The global Enterprise EHR solutions are all generation 3 moving towards generation 4, while the selected EHRs have not yet reached full Generation 3.

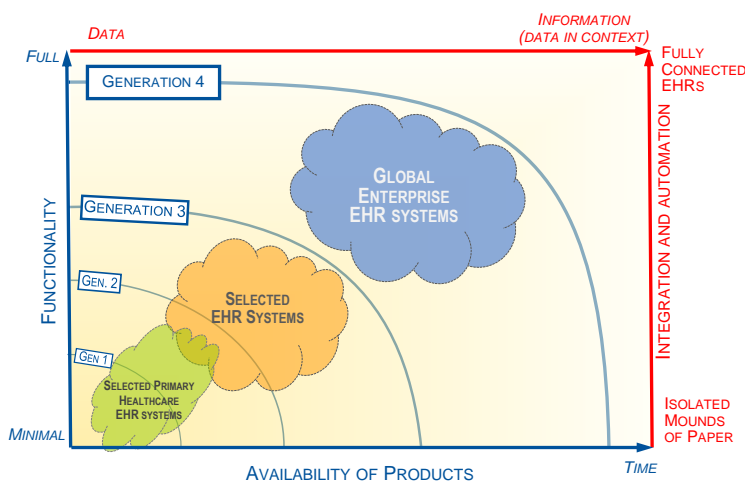


Figure 7 – Overview comparison between the analyzed EHR categories (source Gartner)

In this section, the three categories of systems are presented using different graphs. The first category, “global enterprise EHR vendors” will be presented using the Gartner Magic Quadrant for Global Enterprise EHR systems. The next two categories, will be presented using the evaluation criteria as described in section *Evaluation Criteria for Selected EHR vendors* in chapter *Survey and methodology*.

Global Enterprise EHR systems

Gartner Magic Quadrants provide a graphical representation of a marketplace at a specific time period. It is a visual analysis of how vendors' measure against a set of Gartner defined criteria.

Magic Quadrants provide a competitive positioning of four types of technology providers, where market growth is high and provider differentiation is distinct:

Magic Quadrants provide a graphical competitive positioning of four types of technology providers, where market growth is high and provider differentiation is distinct:

Leaders - execute well against their current vision and are well positioned for tomorrow.

Visionaries - understand where the market is going or have a vision for changing market rules, but do not yet execute well.

Niche Players - focus successfully on a small segment, or are unfocused and do not out-innovate or outperform others.

Challengers - execute well today or may dominate a large segment, but do not demonstrate an understanding of market direction.

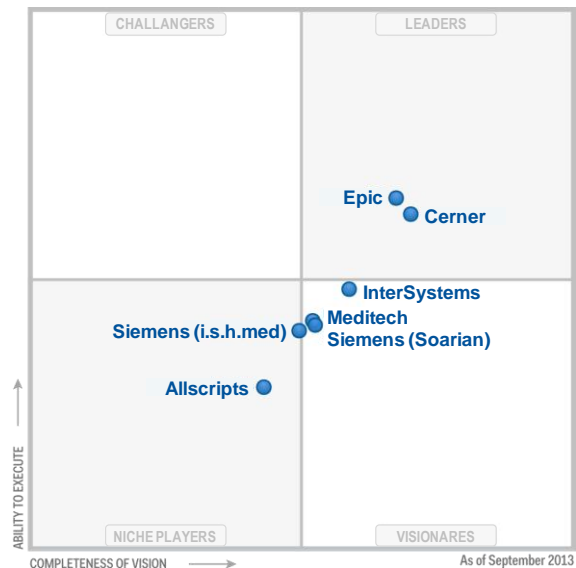


Figure 8 – Gartner 2013 Global Enterprise EHR Magic Quadrant

In the Magic Quadrant, vendors are evaluated based on their Ability to Execute in the overall global market — not on how well they may be doing in any one submarket (for example, a single country). The Magic Quadrant presented here represents a snapshot from August 2013. Things have likely changed somewhat and a new Magic Quadrant will be due by the end of the summer of 2014.

Selected EHRs

Even though the presentation scheme used for this evaluation is similar to the one used in the Gartner Magic Quadrant, *the quadrant presented here has different axis*. To enable a coarse comparison between the Selected EHR systems, the assessment criteria and parameters has been amended and modified. As examples; global presence and sales in more than one continent are not an issue, pharmacy and maternity are not included, there is no minimum generation level required and criteria such as business model, sales execution, operations, industrial strategy etc. are not included¹.

Although functionality is important for placement on the quadrant, it is essential to understand that vendor evaluations include criteria other than functionality. As the products in the market mature and vendors compete for business within this market, they become functionally similar. It is important to look at the level of innovation and predictable delivery of product enhancements, the reliability of product enhancements, the quality of support, and the completeness of product suites beyond the core clinical requirements.

¹ For criteria used in the evaluation see section "Evaluation Criteria".

It is equally important to recognize that the connection between an HDO and a vendor will be a long-term relationship, thus we take into consideration the vendors' abilities to meet and anticipate future market requirements, and to put forth and deliver on a technical and business vision that will enable their clients to excel in the years to come.

The figure is a visualization of selected EHRs positioned in a matrix based on the two axes;

- Viability Product
- Viability of Company and Strategy.

The position of DIPS Arena is marked with a red circle. DIPS Arena has a more modern architecture and represent an improved potential for implementing future functionality compared to DIPS 7.3. It is currently based on DIPS 7.3 functionality and has added little new functionality. DIPS Arena has a lower position relative to DIPS 7.3 in the vertical “Viability of product” dimension because there is no proven implementations of DIPS Arena today.

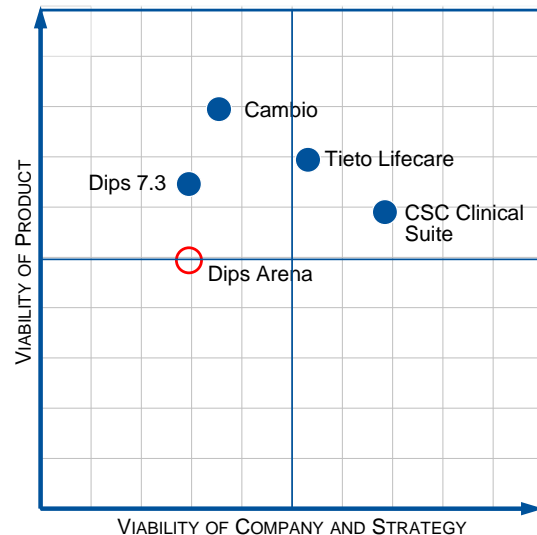


Figure 9 – Comparison Selected EHRs (source Gartner)

Selected primary healthcare EHR vendors

The primary healthcare EHRs don't have the same breadth of functionality as the selected EHR's. Since the comparison with selected EHRs would be misleading, these systems are presented in a quadrant of their own, as shown below.

The Norwegian primary healthcare vendors and systems (ACOS, Hove, Infodoc and Extensor) are fairly equal. They are of approximately the same size, but small compared to CGM, CSC and Tieto.

Except for ACOS, who serve large municipals and, nursing homes and private care organizations, they basically serve the same market thus the functional level are approximately the same and well adapted to the Norwegian market.

The solution CGM Journal provided by CGM is the formerly WinMed3, a solution made for the Norwegian marketplace.

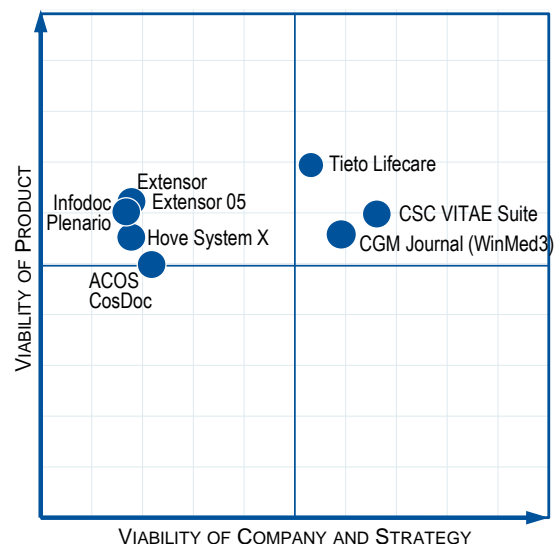


Figure 10 – Selected primary healthcare EHRs (source Gartner)

CSC are not present in Norway with their solution, but have made delivery in Denmark as well as Sweden. The CSC VITAE Suite is marketed as an individual product, but is integrated into an eco-system offering that covers all provider parts of healthcare.

Tieto is present in the primary healthcare EHR market in Norway with the product Gerica that is primarily used within the municipality healthcare sector. The Gerica solution is branded different in different countries, but is a part of the integrated Tieto Lifecare solution.

Global enterprise EHR vendor representation in the Nordic market

None of the global enterprise EHR vendors currently has implementations in Norway. Below is a summary of the vendor's current implementations in the Nordics and level of interest in Norway (based on survey answers).

| VENDOR | ALREADY HAVE SOLUTIONS IMPLEMENTED IN THE NORDIC MARKET | ALREADY HAVE IMPLEMENTED EHR IN THE NORDIC MARKET | PROBABLY INTERESTED IN NORWAY IF OPPORTUNITY ARISES | ACTIVELY STATES PLANS TO ENTER THE NORWEGIAN MARKET | NO STATED PLANS FOR NORWAY |
|---------------------|---|---|---|---|----------------------------|
| ALLSCRIPTS | | | | | X |
| CERNER | X | | | X | |
| EPIC | X | | X | | |
| INTERSYSTEMS | X | | X | | |
| MEDITECH | | | | | X |
| SIEMENS (I.S.H.MED) | | | X | | |
| SIEMENS (SOARIAN) | X | | | X | |

Table 1 – Global vendor responses regarding representation in the Nordic market

Core capabilities for selected EHR vendors

None of the selected EHR vendor's solutions fulfills the requirements for generation 3 EHRs. Breaking the eight core capabilities down based on vendor supplied answers to each core capability, shows that all vendors are fairly mature in Systems Management and Interoperability, but lack maturity especially within Clinical Decision Support and Workflow Capabilities (two complex areas that will require a huge amount of investments).

Within the areas of Clinical Documentation, Display and Orders Management the survey answers indicate Cambio and CSC are fairly mature and that DIPS and Tieto are not far behind.

DIPS Arena represent an improvement compared to DIPS 7.3, but, since there are no proven implementations of the Arena yet, it use functionality in DIPS 7.3 and has provided little new functionality, Arena should be viewed as a potential promise of future functionality and capabilities. DIPS Arena is essentially a new client (user interface) solution. Compared to DIPS 7.3 this pays off in the Clinical Display core capability

All over, the survey shows that Cambio with it's rich set of core capabilities in Cosmic provide the most mature solution of the selected EHR vendors.

Core capabilities for Selected Primary Healthcare EHRs

The Primary Healthcare EHR systems are not full Enterprise EHRs, and are generally less rich in functionality. Thus, comparing the functionality in these systems with the eight core capabilities for enterprise EHR systems is not completely fair.

The primary healthcare EHRs coverage of the eight core capabilities is visualized in the table below, showing "partly coverage" and "no coverage", confirming lack of functionality in areas such as clinical decision support, workflow and order management and the different needs in the different healthcare sectors.

| Capability | System management | Inter operability | Data model | Clinical decision support | Clinical workflow | Clinical documentation | Clinical display/dashboard | Order management |
|------------------------------|-------------------|-------------------|------------|---------------------------|-------------------|------------------------|----------------------------|------------------|
| Vendor | | | | | | | | |
| ACOS CosDoc | Yes | Yes | Yes | Partly | Partly | Yes | Yes | Yes |
| CGM Journal (WinMed3) | Partly | Yes | Yes | Partly | No | Yes | Yes | Partly |
| CSC Vitae suite | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes |
| Extensor Extensor 05 | Yes | Yes | Partly | Partly | Partly | Partly | Yes | Partly |
| Hove Medical System X | Yes | Yes | Yes | Partly | Yes | Yes | Yes | Yes |
| Infodoc Plenario | Yes | Yes | Partly | Partly | Partly | Partly | Partly | Partly |
| Tieto Lifecare | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Table 2 – Vendor responses regarding available core capabilities in their solutions

Health care services covered by selected EHRs

The tables below shows the vendors' answers regarding the systems' coverage of the eleven health care services covered in the survey. Green indicates full coverage for a particular health care service, yellow indicates partly coverage and red indicates no coverage.

Selected EHRs

The vendor supplied description of systems coverage indicate approximately the same health services coverage with two major exceptions.

CSC Clinical Suite covers fewer health services than the other solutions. Presently the suite does not cover habilitation and rehabilitation, local health centers, home nursing or general practitioners'.

Tieto Lifecare covers more health services than the systems from the other vendors.

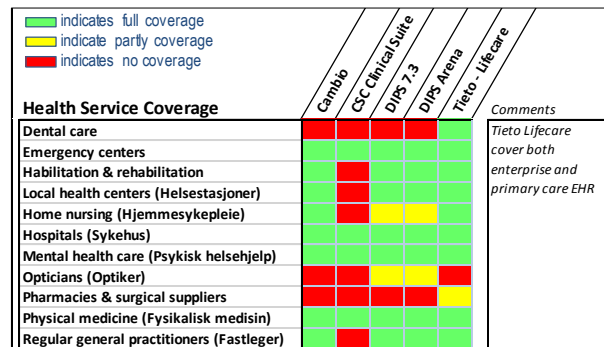


Figure 11 – Vendor responses to health service coverage (source Gartner)

Selected Primary Healthcare EHRs

Within primary health care EHR systems, the systems have very different coverage, depending on their focus markets.

ACOS along with Extensor and to some degree CSC cover primarily primary care for municipals, and other public and private care organizations.

CGM, Hove and Infodoc primarily target the emergency centers, local health centers and general practitioners.

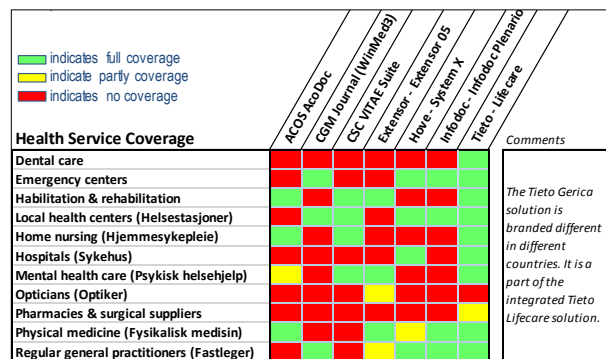


Figure 12 – Vendor responses to health service coverage (source Gartner)

Tieto with Lifecare (incl. Gerica) on the other hand, seems to be the primary healthcare vendor with the best coverage, covering all services except for pharmacies and surgical suppliers (partly coverage) and opticians.

Market share analysis of the Norwegian market

The analysis below is based on participating vendors' revenue in the Norwegian market. DIPS is the only EHR in category two "selected EHR vendors" in the survey, the rest are Primary care vendors (PCV).

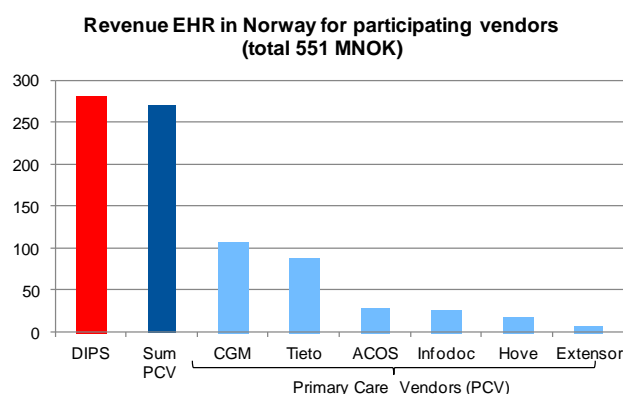


Figure 13 – Revenue of participating vendors present in the Norwegian market (source Gartner)

Financial analysis of vendors

The financial figures below are based on publically available information (yearly reviews on websites, proff.no, ratsit.se, etc.), except for the information about number of employees, where we could collect comparable data directly from the survey.

The numbers are from 2013, except for some companies (marked with a *) where the numbers are from 2012, since there is no publically available information for 2013 yet.

| Vendor | Revenue (MNOK) | EBITDA (MNOK) | # of employees | # of employees EHR | R&D (14% of Revenue) | Adjusted R&D |
|--|----------------|---------------|----------------|-----------------------------------|----------------------|--------------|
| Global Enterprise EHR Vendors | | | | | | |
| Allscripts Healthcare Solutions inc. | 8 171 | -761,0 | 6 000 | 6000 | 1 144 | 1 144 |
| Cerner Corp | 17 323 | 3 427,0 | 14 682 | 14 682 | 2 425 | 2 425 |
| Epic | 10 117 | N/A | 6 690 | 6690 | 1 416 | 1 416 |
| InterSystems | 2 755 | N/A | 1 300 | N/A | 386 | 386 |
| Meditech* | 3 557 | 1 140,0 | 4 039 | 4039 | 498 | 498 |
| Siemens AG | 653 551 | 43 925,0 | 362 000 | 52 000 (healthcare) 4700 (EHR) | 91 497 | 1 188 |
| Selected EHR Vendors | | | | | | |
| Cambio Healthcare systems AB* | 171 | 29,0 | 370 | 370 | 24 | 24 |
| CSC | 84 477 | 6 290,0 | 80 000 | N/A (8000 healthcare) | 11 827 | 1 183 |
| DIPS ASA | 280 | 60,0 | 207 | 207 | 39 | 39 |
| Tieto group | 13 602 | 717,0 | 15 619 | 1 125 | 1 904 | 137 |
| Selected Primary Healthcare EHR Vendors | | | | | | |
| ACOS | 117 | 17,4 | 116 | 22 | 16 | 3 |
| CGM | 3 740 | 795,0 | 4 000 | 1 000 | 524 | 524 |
| Extensor* | 7 | 0,1 | 9 | 9 | 1 | 1 |
| Hove Medical Systems AS* | 17 | 0,1 | 39 | 39 | 2 | 2 |
| Infodoc AS | 26 | -0,2 | 30 | 30 | 4 | 4 |

Table 3 – Financial comparison between vendors (source Gartner)

The column "Approximation of R&D" is an estimate added to indicate potential for R&D, based on average percentages of R&D spending (14%) and total revenue for the company. These are *not actual R&D numbers provided by the vendors*. The column Approximate EHR R&D indicates R&D spending relative to the EHR part of the business based on the number of employee within the EHR business area.

Number of employees working with EHR per vendor

There is a considerable difference in capabilities (competence, capacity and resources) between the local Norwegian vendors, the vendors with a Nordic reach and the international vendors with a global reach.

These capabilities will play a role especially within R&D and the ability to conduct large and complex programs.

Vendors not included have not given Gartner numbers for employees working with EHR. Red columns are used to separate the global enterprise EHR vendors from the others.

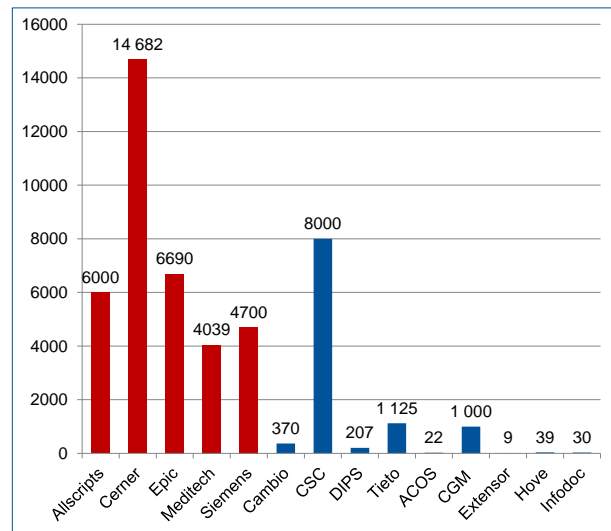


Figure 14 – Vendor responses regarding number of employees (source Gartner)

Approximate revenue for EHR per vendor (MNOK)

Below is an overview of revenue for EHR for the different vendors. Some vendors did not want to reveal their EHR revenue, so some figures are based on approximations.

For CGM, Siemens and Tieto Gartner has done an approximation based on number of employees based on $(TOTAL\ REVENUE * (NUMBER\ OF\ EMPLOYEES\ EHR / NUMBER\ OF\ EMPLOYEES))$.

CSC and InterSystems opted to not reveal their revenue for EHR or their number of employees in EHR, so they are not included in this overview.

Red columns are used to separate the global enterprise EHR vendors from the others.

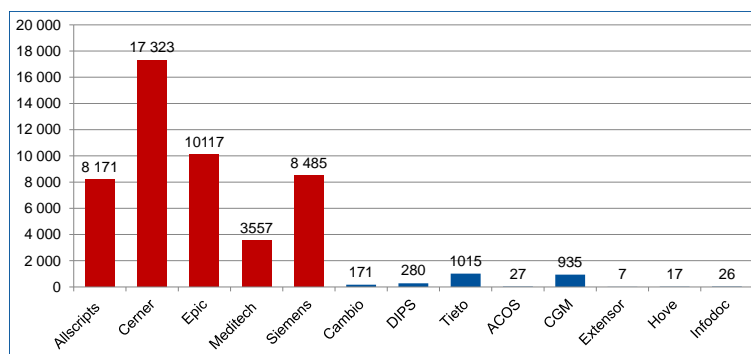


Figure 15 – Approximated revenue for HER (MNOK) (source Gartner)

Approximate spending on Research and Development (R&D)

For the column R&D in Table 4 – Financial comparison between vendors, we have used 14% of revenue as a figure to illustrate different companies' ability to invest in R&D. *These are not actual R&D numbers provided by the vendors, but estimates based on averages to illustrate R&D potential.* Spending on R&D varies between companies and sectors, and some companies reinvest a lot of money into R&D while others minimize investments.

The figure 14% is derived as an average percentage based on EU report “*EU R&D Scoreboard - The 2012 EU Industrial R&D Investment Scoreboard*”. This report list the top 1500 R&D investors globally. From this list we selected all European and North American companies in the sector *software and computer services*, removed all with extreme values and ended up with a total of 96 companies spending an average of 14,1 % of total revenue on R&D.

Red columns are used to separate the global enterprise EHR vendors from the others.

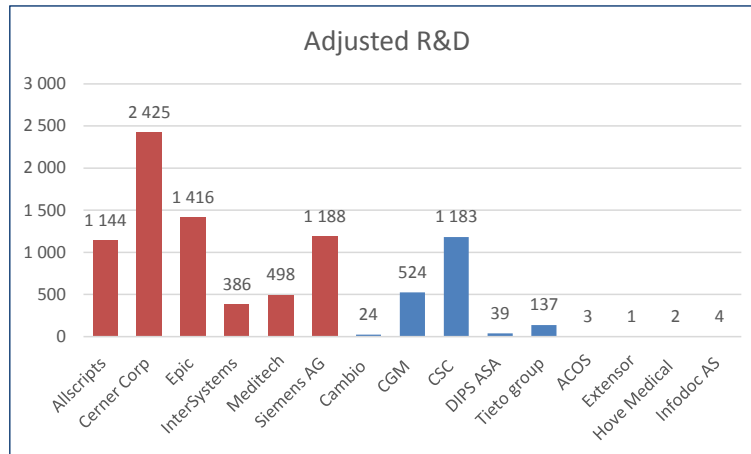


Figure 16 – Approximated potential for R&D based on revenue (MNOK) (source Gartner)

Amongst these 96 companies we find Allscripts Healthcare Solution, Cerner, CGM CompuGroup Medical and Tieto. This, and the 2013 Cerner¹ Annual Report stating that Cerner in the period from 2004 to 2013 in average spent 15,3% of the revenue on R&D yearly, indicates that using 14% is a fair assumption. One might argue that for small companies and start-ups the R&D spending is far greater than 14%, but the nominal value is still low. We have kept the R&D share of revenue the same for all for the sake of the comparison.

As can be seen in the figure, the global EHR vendors are able to invest far more into innovation, research and development in all aspects of their product coverage. These vendors invest annually between 400 MNOK and 2,5 billion NOK in R&D and product enhancement.

In comparison, the selected (local) EHR vendors can annually manage to spend between 25 – 140 MNOK.

The big selected EHR vendors (CGM and CSC) can spend approximately the same as the global EHR vendors.

These figures is based on a derived % for R&D, and not on actual figures provided by the vendors. But, the comparison is realistic, the global and big vendors do have the opportunity and far more muscles to invest heavily in products and services, thus the gap between big global vendors and small local vendors will increase over time.

As stated before, because of the huge R&D investments needed to meet the expectations of stakeholders for EHR, only large, well-funded companies will likely be able to survive long term in the EHR market. Many companies have substantially underestimated the time and effort required to succeed in this market.

¹ www.cerner.com/uploadedFiles/Content/About_Cerner/Investor_Relations/Cerner_2013_annual_report.pdf

Attachments

Essential areas to consider regarding EHR going forward

Promise of EHR

Originally thought of mostly as a patient safety measure to replace illegible paper charts, EHRs are now used to reduce unnecessary practice variability, collect quality metrics, provide a platform for telemedicine/remote care, assist in care management and feed billing systems.

As more enterprise EHRs are implemented, there is increasing negative press regarding their actual value and significant push-back from clinicians about usability and productivity concerns. The value obtained from EHRs (both perceived and actual) varies greatly among HDOs, and this provides both lessons and opportunities for improving value.

The state of medical knowledge exceeds the cognitive abilities of clinicians and requires collaboration across a team of healthcare providers. If chosen, implemented and utilized in a thoughtful manner, EHRs can provide support to optimize care and minimize costs, and can engage clinicians and patients in a more structured, guided and evidence-based approach to care. Public hospitals, private hospitals and integrated delivery systems are therefore increasingly seeking to purchase and implement electronic health record (EHR) systems. Some common reasons for choosing to implement EHRs are stated below.

- A growing desire to **reduce unnecessary clinical practice variations** in order to improve patient safety and overall clinical outcomes
- The **move from a paper-based system** to a digital means of creating, viewing, storing and leveraging medical records, and executing core processes — in part to address the desire for concurrent access to online patient data in structured form instead of having it locked in single-access paper charts
- The need for a tool to improve the **efficiency of an entire care team** in order to reduce mistakes and delays in diagnosis, treatment and management of patients
- There is a need for **advanced analytics** to get greater operational efficiency, better public health planning and more-collaborative relationships with medical research organizations
- **Consumer expectations** have increased. Patients expect automation and information accessibility
- **Error reduction and patient safety**: These have become visible and political priorities in many countries
- Support of payment, reimbursement and workload **accounting requirements**: In many countries, such requirements are becoming more complex, which, in turn, necessitates that an EHR is able to ensure that the right information is being collected to support these requirements
- Improved **financial outcomes**: HDOs desire near-term/sustained revenue gains, improved capacity or improved profitability, and cost/productivity improvements.
- Improved **patient engagement, experience** and satisfaction
- Improved **nonpatient stakeholder satisfaction**: HDOs have other stakeholders that they must treat as customers, including physicians who decide to refer a patient to a hospital and public/ private payers that contract for services.

Larger HDOs that have learned to think and act like a system should be able to harness high value from electronic health records (EHRs) and cost accounting systems, and demonstrate a performance curious culture. Any information sharing, manageability, conformity, agility, financial sustainability and resource leverage challenges are much tougher to tackle under loose federation organizing principles and operating models.

Challenges with EHR

The implementation of EHR is much more mature in the US than in the rest of the world. Lack of organizational readiness and willingness to commit to process change and high cost has resulted in sluggish progress toward widespread full implementations of EHR.

Inhibitors to EHR investment include:

- The direct (licensing) and indirect (IT infrastructure upgrades, integration, personnel, support and so forth) **costs** associated with an EHR
- The **difficulty of predicting** and measuring an EHR's clinical and financial **benefits**
- The difficulty in developing a **business case** necessary to procure funds for an enterprise EHR
- The lack of **adequate staffing levels** within local hospitals to deploy, sustain and develop an EHR
- The lack of **clinical leadership** to help drive implementations of enterprise EHRs
- The lack of **availability** of advanced EHRs in many countries
- The poor **track record** of EHR vendors in some countries
- The lack of EHR commitment from **senior executives**
- The unwillingness of clinical leadership to **change clinical processes** to derive value from an EHR
- The **complexity** of creating and maintaining clinical content for the EHR.

There are still technical inhibitors for more extensive collaboration and information exchange between (or for that matter even within) hospitals. Today with a few exceptions it is not possible to enter data in one system and then move that data in machine usable form to another system. Effective interoperability requires exchange of clinical decision support rules and the need to be able to deal with workflows across systems – none of this is even remotely possible today. The only time Gartner has seen successful interoperability is when one solution and one instance has been used for a region.

The limitations has lead to that there has been no real success where a common repository of data was effectively used. Today the alternative is to download data to create a longitudinal record. Use of that record requires logging into to a second system (and thus stepping out of normal clinical workflows) and then it is up to the clinician to recognize and use critical data elements.

Budgetary constraints are causing some HDOs to consider a best-of-breed approach or to purchase a less functionally mature product with the belief that this will be a less costly approach (which is true in the short term but has proved false in the long term). HDOs often operate under the hope that a best-of-breed approach will suffice for the next few years and gradually lead to a full EHR. However, they often underestimate the cost, difficulty and complexity of interfacing such systems. Gartner is unaware of any HDO that has successfully evolved a best-of-breed environment into a fully functioning Generation 3 EHR.

It is important that HDOs set realistic expectations regarding the functionality that can be obtained and the clinical and other benefits that might accrue from using any EHR system. Depending on business drivers, it may be better to wait until a Generation 3 system can be implemented. However, if waiting isn't an option, HDOs must ensure that stakeholders are aware of the trade-offs in selecting a less advanced system, and recognize that it may be necessary to replace the system if it fails to evolve into a Generation 3 system.

The past two decades have had a focus on internal issues and largely been directed at creating impactful relationships between clinicians and IT systems through EHRs. That effort will seem almost trivial compared to the new IT directions to engage patients and enable a real-time health system.

Healthcare continues to experience a dramatic expansion in IT's value, including clinical applications and analytics, far more diagnostic and therapeutic decision support, plus new patient-facing IT and social media uses. That journey will be severely hampered by inadequate governance, resource constraints, waves of physician resistance and roiling vendor marketplaces. Shortages of clinical informatics professionals to optimize electronic health record (EHR) and IT impact are a challenge for developed and developing countries.

Technology

It is essential that everybody recognizes that EHR implementation is a clinical program, not a series of IT projects.

The desire for an open-source EHR continues, although there has been little success in creating a vibrant open-source EHR community, and none of the efforts have produced an EHR that would meet the inclusion criteria for Gartner's Magic Quadrant.

HDOs implementing electronic health record systems often underestimate infrastructure requirements. CIOs and CTOs must take these requirements into account or risk poor performance, service interruptions and unscheduled downtime that can adversely impact patient care.

- Many healthcare delivery organizations (HDOs) lack the necessary technical infrastructure to address the demands of an electronic health record (EHR) implementation
- Many HDO CIOs fail to allocate adequate funds for technical infrastructure in their EHR business cases, or to conduct adequate pre-implementation infrastructure planning
- HDOs often receive financial incentives for implementing EHRs, but not for the associated — and essential — upgrades to their technical infrastructure.

It is hence essential to maintain an unwavering focus on the IT infrastructure and services necessary to deliver a responsive and highly available EHR system. This often implies introduction of processing, storage, network, power and cooling redundancies as well as deploying end-user experience monitoring tools to measure performance and availability, and to compensate for functional gaps.

Considerations for implementation of EHR

Realistic expectations and plans

Many healthcare delivery organizations (HDOs) fail to set realistic expectations for the scope of their electronic health record (EHR) implementations or the time needed to deliver them. HDOs often struggle to budget adequately to cover the costs of change management and implementation disruptions for the EHR implementation. Many HDOs also fail to recognize that the EHR implementation process starts with a strong, working partnership with their chosen vendor.

It is hence central to confront the inherent complexity of EHR implementation. Develop a plan that targets training and process improvements, and ensures resources to cover any skills gaps. Go beyond the planning basics; review required and available funding, and other resources to ensure coverage of the technical infrastructure, communications, interfaces and legacy data conversion. This will help to avoid the embarrassing task of redoing the plan and asking for substantially more resources later.

Articulate what your long-term expectations are. Do not implement a clinical system for its own sake, as if adoption were the goal.

Develop an internal work plan that goes beyond standardized project management methodology. Create an adaptive, realistic, comprehensive tool for effectively navigating tough EHR implementation issues, and for defining clear benchmarks and metrics in terms of time, budget, and key milestone achievement.

Find clinical leaders who focus on truly meaningful use that can change how medicine is practiced and prepares the HDO for increased collaboration to be advocates for the change. Facilitate a well-designed, widely communicated and effective support structure for clinicians. This cannot just be available in the initial phases of implementation.

HDO executives must lead and CIOs must champion efforts to strengthen today's generally weak information governance and data stewardship. HDO CIOs often severely underestimate just how tough and time-consuming it is to build strong information governance, and to bake accountability for data quality into the health system.

If HDO CIOs fail to take action, poor electronic health record usability will reduce clinician adoption and negatively impact benefits. Honest portrayal of the current limitations of EHRs, along with recruitment of clinicians to aid in improvement efforts, will help HDOs to maximize the use and value of their investments in clinical systems.

It is also essential that you don't consider the implementation as a one off initiative. Do not make assumptions about clinical adoption and usage of the EHR. Instead, develop specific usage metrics, and conduct regular clinical usage audits and actively work with vendors and end users to improve the usability of your EHR system.

Cost

HDO CIOs are often challenged about initial and ongoing costs of electronic health record systems. CIOs need to work with clinical sponsors to communicate EHR total cost of ownership in order to better explain why EHRs are one of the most expensive projects HDOs undertake.

Too often, essential aspects of long-term successful EHR projects are overlooked in the initial cost estimates of the project. In part due to leadership's lack of knowledge about total cost of ownership (TCO), significant ongoing EHR expenses are often construed as an indication of IT mismanagement. It is hence advisable to work with EHR project sponsors and clinical leaders on a formal TCO methodology to help ensure that key EHR costs are not overlooked when calculating and communicating EHR budgets.

Considerations concerning vendor selection

Vendors developing, marketing and selling EHRs for local geographies are facing increased competition from larger companies that compete multinationally. As mentioned earlier, the processes of care and the practice of clinical medicine are more similar than different and it will continue to more equal and aligned. Choosing between a local vendor and a multinational vendor can be difficult, but there are good reasons to seriously weigh the benefits of the nonlocal vendor, such as:

- Superior leverage - larger pool of resources and leveraging of experience from earlier-adopting countries
- Capability
- Better positioned for innovation – to be in front in innovation requires considerable research and development (R&D) investments.

Local vendors do have competitive advantages such as:

- *Local knowledge* - greater insight and understanding of local Norwegian regulations and conditions that set standards and requirements to systems and focus for evolution

- *Within arm's length reach* – Makes communication and required attention far easier. This is important, especially when complex and critical systems are concerned
- *Vendor Size* - Local vendors are small and heavily dependent on the market they operate in, they also often sell only to the EHR market. Thus, they are more likely to give existing and local customers due attention.

Gartner predicts that to meet the expectations of stakeholders, only large, well-funded companies will likely be able to survive a long term position in the front of the EHR market. Many companies have substantially underestimated the time and effort required to succeed in this market, and many small locally based companies will experience increased competition as a consequences of scarce funds for R&D.

A typical characteristic of small local vendors is development through customer financed projects. This makes the vendor continuously preoccupied with serving different customer requirements, which again may result in a kind of ad-hoc based and not strategically product development, whereas a big multinational vendor with a solid customer base, can achieve a better foundation for R&D, collecting information from all clients and supply improvements based on structured research and updates.

Healthcare has been, is and will for the near future increasingly be a megasuite-vendor-dominated industry for its core needs. Many HDOs have begun or completed at least the first phase of implementing their enterprise EHR systems, and most vendors are using an 80/20 out-of-the-box implementation plan.

Riding the wrong horse for too long when it comes to strategic vendors can erode a HDO's ability to thrive in the ever-challenging healthcare environment. During the next five years, many HDOs around the world will be facing important and sometimes wrenching decisions regarding which core application vendors they should be going forward with.

HDO application needs are dominated by megasuite vendors that are key to an HDO's success; their road map recommendations have a prominent place in strategic plans. Executive, manager and user loyalty, industry publicity/recognition, and comfort that accrue to strategic vendors over time can be so deep, and contemplating their severance so painful for leaders, that they can turn a blind eye to a vendor's failure to keep pace with new needs. HDO executives should strive to keep the right balance between HDO needs and vendor loyalty by instituting a strategic vendor management program and reassess, at least annually, whether core vendors are the right long-term fit.

Negotiate contract terms and modifications aggressively. Really, you won't hurt your vendor's "feelings." Ensure that terms make it easy to do business for the long haul and add attractive new products/services at good price points.

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