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New shared laboratory system for all of Central Norway

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The merging of fourteen different installations will improve the flow and quality of laboratory services.

Every year, the hospital laboratories in Central Norway Health Authority process nearly 20 million laboratory analyses, and the level of activity is growing year by year. This development requires appropriate tools for automation, efficiency enhancement and electronic interaction. The most important factor is the laboratory software, commonly referred to as the *laboratory information management system* (abbreviated LIMS, LIS or LMS), or what here will be termed the 'laboratory solution'. The laboratory solution is the very hub of the laboratory wheel and incorporates all aspects of the informatics involved, from reception of samples and labelling to pipetting and instrument integration, to interpretation of results, statistics, quality control, sample storage and access management. The laboratory solution will thus easily become an Achilles' heel if its functionality fails to keep pace with medical, technological and legislative developments over time.

The laboratory solutions in Central Norway Health Authority have been ripe for replacement for a long time. Many of the solutions that are currently in use were installed around 30 years ago, and suffer from comprehensive and serious deficiencies (1). In February 2016, the management group for e-health in Central Norway Health Authority therefore approved the HMN LAB project, established to procure and implement a joint and future-oriented laboratory solution for the region. The choice fell on the Beaker laboratory solution, supplied by Epic Systems Corporation (2).

With Beaker, Central Norway Health Authority is offered a modern laboratory solution encompassing functionalities that we have previously lacked, for example sample tracking and advanced decision support. Equally important is the fact that the solution will also be *shared* across laboratory disciplines and locations in the region. This will represent a major

transition from the current situation, where existing software has been installed in local 'silos' in different locations (Figure 1a and figure 1b). A shared laboratory solution will provide a basis for better and more transparent laboratory services, and less need for repeated sampling. A shared laboratory solution is also likely to help encourage more collaboration between the laboratories, which may help improve the laboratory services themselves as well as their resource use. However, a shared system also represents a whole new set of challenges, not least in terms of standardisation. Configuring of five laboratory disciplines in three hospital trusts spread out over nine different locations into a single data system places high demands on conformity in the baseline data and clear rules as to who will decide what.

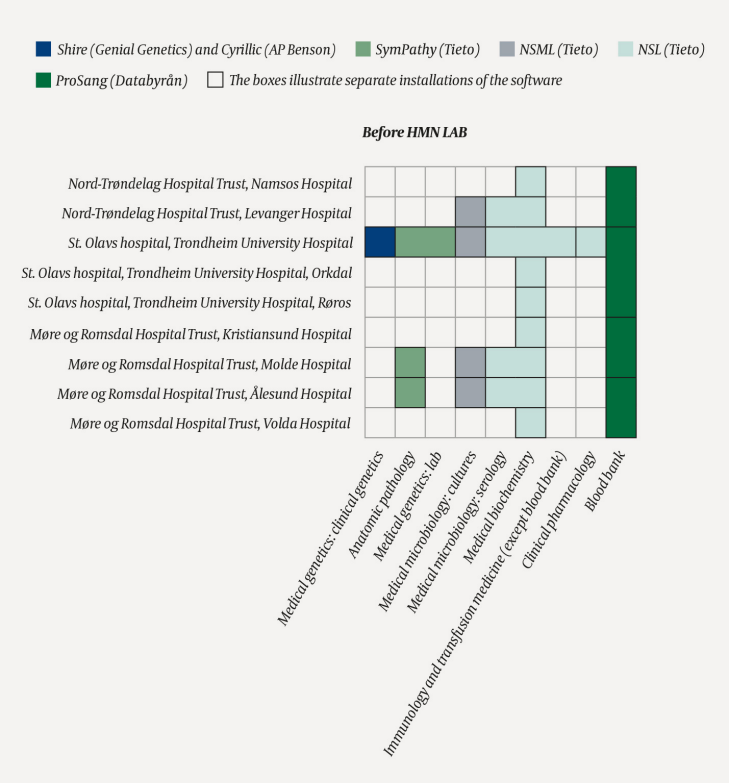

Figure 1a *Overview of laboratory systems and installations in Central Norway Health Authority before and after the implementation of Beaker. Here, the current situation is outlined.*

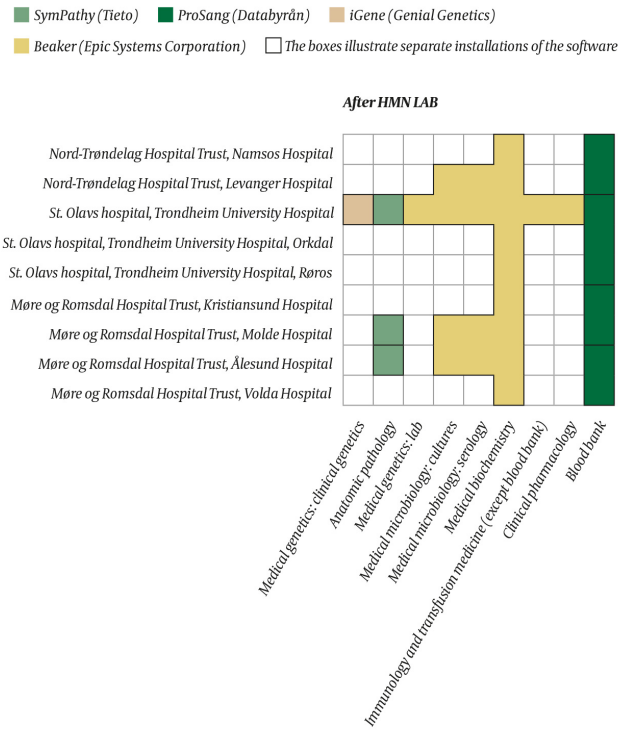

Figure 1b *This shows the situation planned for 2020 when the implementation of the Beaker laboratory solution has been completed. As seen in the figure, the changes not only consist of new colours (new system), but also fewer boxes (= shared systems). Each colour illustrates different laboratory data systems, and the black lines separate the different installations (silos) of each system.*

Future solution

The system will be launched at St Olavs hospital, Trondheim University Hospital in November 2019 and in Møre og Romsdal Hospital Trust and Nord-Trøndelag Hospital Trust in June 2020. Initially, the change will be more obvious for the laboratories than for the requisitioners, since the user interfaces for requisitioning of and results from laboratory services are linked to the patient records systems. However, Central Norway Health Authority is also undertaking a total replacement of all patient records systems through the Health Platform ('Helseplattformen') project, the launch of which is planned for 2021 (2). This project has involved separate public procurement on behalf of hospital trusts and municipalities in Central Norway, unrelated to the procurement of a laboratory solution by the hospital trusts.

When these previously existing barriers related to computer technology are dismantled, provisions are made for the introduction of seamless laboratory services throughout the region

It was recently decided that the contract for the Health Platform project will be signed with the same supplier as the one chosen by the laboratories (3). Having electronic health records and a laboratory solution in the *same* software package is good news for the region. We can thereby avoid the electronic game of 'Chinese whispers'/'telephone' that may occur in the exchange of messages between different records and laboratory systems, and where we know from experience that details of the analyses and associated semantic nuances may be lost. In the future solution for our region, the requisitioner will be able to see the result of a urine culture on her screen in the Health Platform, and see exactly the same test result that the laboratory doctor can see in Beaker. The test result is stored in a single location with no need for forwarding. The solution will also enable the requisitioner to see results elements that are difficult to exchange by way of current electronic messaging standards, such as images, tables and figures. Administrative maintenance, such as changes to a laboratory's test catalogue, may be performed in one operation and in a single location.

When these previously existing barriers related to computer technology are dismantled, provisions are made for the introduction of seamless laboratory services throughout the region.

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