Improved patient journeys: ERP transformation and the radical deployment of process management across 500,000 nursing days at Hirslanden

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Abstract. Process orientation and digital management contribute significantly to an organization's overall productivity and quality improvement. While this is well-documented across organizations, sectors, and industries, there is little research to validate the leverage of process management and the systematic analysis and standardization of processes in the healthcare sector [1]. This study demonstrates the utilization of business process management (BPM) technology at one of Europe's leading private hospital groups, Hirslanden, to standardize internal processes across almost 500,000 nursing days within 18 clinics. The ambitious "Hirslanden 2020" modularization and transformation program encompasses process models and standardized processes across growth and leadership initiatives to serve as a knowledge base for over 100,000 patients across a variety of specialist disciplines; promoting digitization, automation, and continuously improving internal processes for business and ERP transformation. The leverage [1] of Signavio BPM technology at Hirslanden is delivering the highest standards in medicine and operations, globally. This paper demonstrates the direct and indirect effects on performance (identified as patient satisfaction and financial performance) through enhanced process standardization/optimization and ERP transformation (defined as workforce conditions, operational performance, and clinical quality). The innovative process conditions of Hirslanden 2020's "HIT2020" rollout wave have a significant positive effect on patient satisfaction, workforce conditions and silo-dismantling, operational efficiency, and financial performance. Through the unique deployment of BPM in a healthcare setting, Hirslanden continually secures business and process transformation by balancing price and quality against efficiency and wellbeing through systematic process testing within modern healthcare continuous improvement projects (CIPs) [2].

Keywords: ERP Transformation, Business-IT Alignment, Improved Patient Journeys.

1 Introduction

The challenges facing healthcare professionals can be matters of life and death. The consequences of decisions on operational efficiency, service stability, and ROI can break governments and change communities. Worryingly, even the wealthiest countries are struggling. According to the UK regulator CQC's State of Care report, the National Health Service (NHS) is at full stretch and offers little comfort for those who rely on it functioning efficiently and effectively in the future [3]. The lack of effective healthcare processes and collaboration between local health and

care services is resulting in people unable to access community-based care and support services that would avoid unnecessary admissions to hospital, which in turn leads to increased demand for acute services [3]. With this, if the objective of healthcare trusts and care service providers worldwide is to reduce costs without decreasing the quality of patient care, health leaders must use modern process technologies and strategic planning to balance price and quality, against efficiency. For example: According to recent official European statistics [4], Germany, Sweden, and France had the highest current healthcare expenditure relative to GDP among the EU member states.

1.1 Optimizing processes for rapid healthcare response

While process management does not cure personal healthcare problems, the approach can modernize core processes and systems to support new clinical practices, regulatory standards, cost reimbursement methods, and corporate governance regulations [5]. Indeed, the BPM framework [6] offers all this whilst optimizing processes and responding rapidly to changing healthcare and life sciences (the science of health promotion) attributes. Hirslanden Private Hospital Group, headquartered in Switzerland, has been implementing the “Hirslanden 2020” strategy program since 2014, with further adoption across clinics from 2018 onwards. The process improvement and business transformation roll-out waves center on improved patient journeys (“Patient First”), and includes “GROW2020” too. The aim here is to standardize the development of inpatient treatment, with an added focus on optimizing existing and new services—and to offer faster access to specialists and treatments, whilst fostering business units/models aligned with governmental regulations. Plus “WE2020”, to facilitate group identity by placing people at the center of change to support and effectively facilitate transformation (Fig. 1).

1.2 Business-IT alignment for “Patient First” initiatives

By fine-tuning the business-IT alignment strategy and micro process design, Hirslanden can better scan best practices and standardize efforts for actionable feedback loops. With this, the clinics are gradually relieved of administrative back-office tasks and can concentrate on their core work: Patient care and wellbeing. By unifying processes, the patient journey naturally develops in tandem with Hirslanden’s modernized core processes and systems to support new clinical practices, regulatory standards, cost reimbursement methods, and organizational governance [7].

Signavio CJM technology helps Hirslanden to establish a group-wide business model that furthers the “Patient First” initiative, with uniformed and simplified processes, patient journeys, and a reduction in process variants, IT system complexity, and streamlined organizational structures. This outside-in, patient-centric perspective enables healthcare professionals to better understand what individuals experience throughout the entire patient journey mapping, whilst highlighting touch points for strategic outreach that improves both engagement and satisfaction. By seeing through the eyes of the patient, enhanced “moments of truth” will upgrade efficiency and staff effectiveness by removing operational chokepoints for improved healthcare initiatives—optimizing processes for the rapid response to health, social, and economic needs.

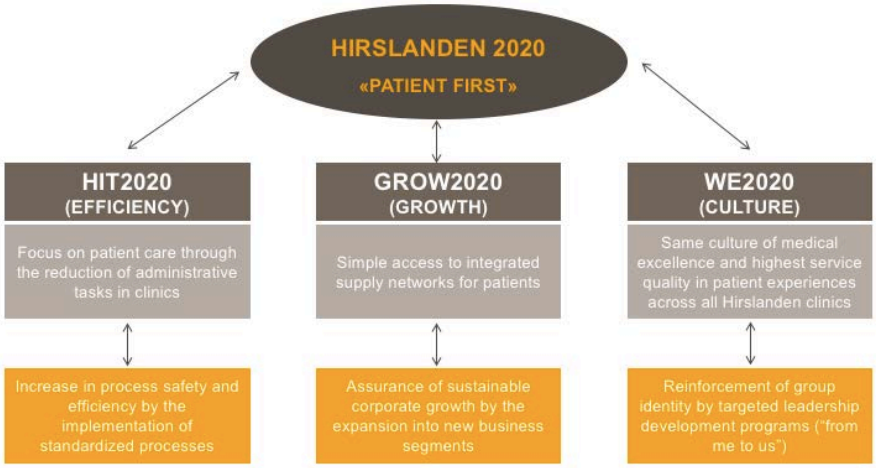

Fig. 1 The three pillars of the "Hirslanden 2020" program.

1.3 Standardized processes for improved patient journeys

Highlighting Hirslanden's use of Signavio BPM technology in a healthcare setting, their usage predicts a significant return on investment (ROI) as an effective institution, and in the resulting improvements in patient care and patient journeys.

Key data demonstrate:

- The application helped physicians and nurses to reduce the amount of time and resources they devoted to administrative purposes;
- Staff reported real benefits regarding resources optimization and quality improvement;
- Automatic workflows for staff helped with the planning/performing of medical exams and reduced human error, meaning the quality of data and reliability of the pathway scheduling have been seriously improved.

The hospital group also noted that BPM empowers:

- The sharing of knowledge and information across business units with a holistic approach towards problem-solving by reducing silos;
- A structural approach to gap AS-IS to To-Be processes;
- Collaborative and ad-hoc problem solving, e.g. patient care activities;
- Access and integration of clinical repository data for follow-up activities;
- Clinical data collection and consolidation in one central repository and patient/data documentation execution in the same IT system.

As this is a developing transformation, the quantitative results of internal Hirslanden process optimization studies have yet to be published. However, internal figures already demonstrate that workforce conditions and clinical quality prove to have a significant positive effect on patient satisfaction. Given that Hirslanden is a joint-stock company and must finance their investments, the potential risk of business transformation is high, and thus new process orientation benefits are an essential antecedent of improved patient experience and financial performance.

2 Situation faced

In light of severe cost containment and increased competition with the introduction of the DRG-based payment system, Swiss hospitals are more than ever in need of ways to operate effectively. A reason for this is that some interventions are treated as ambulatory, and not stationary, which generates less revenue for hospitals based on tariff systems. Yet, the Swiss healthcare system takes a leading position among the member states of the Organization for Economic Co-operation and Development (OECD), and its high performance is reflected in having the second highest above average life expectancy of all OECD nations, 83.7 years [8a]. Also, the number of primary care doctors and hospital beds per resident are among the highest of all industrialized countries. However, Switzerland also faces significant health care expenditures: In 2017 the costs of health care across the final consumption of health care goods and services was second only to the US, at around 12% of GDP [8b].

2.1 ERP transformation imperatives for patient-centricity

Patients expect high-quality service on demand, whether they are unfortunate enough to experience an accident or require elective treatment. Still, Swiss hospitals are increasingly being pushed into competitive market structures. Moreover, the healthcare industry has historically been a manually intensive business, with patient admissions, charts, billing, and care performed in a hands-on manner. Against this backdrop, Hirslanden needed to standardize their process models (with restrictions due to DRG regulations) and ERP system towards a more patient-centric approach. This reduces inefficiencies and eliminates waste to keep the cost of healthcare from spiraling, whilst synergizing hospital sites by aligning process and infrastructure. Investing in more robust information systems paved the way for Hirslanden to optimize processes and coordinate the exchange of information required to deliver quality patient care. For example, business-IT alignment has three main ‘directions’ at Hirslanden (fig 2).

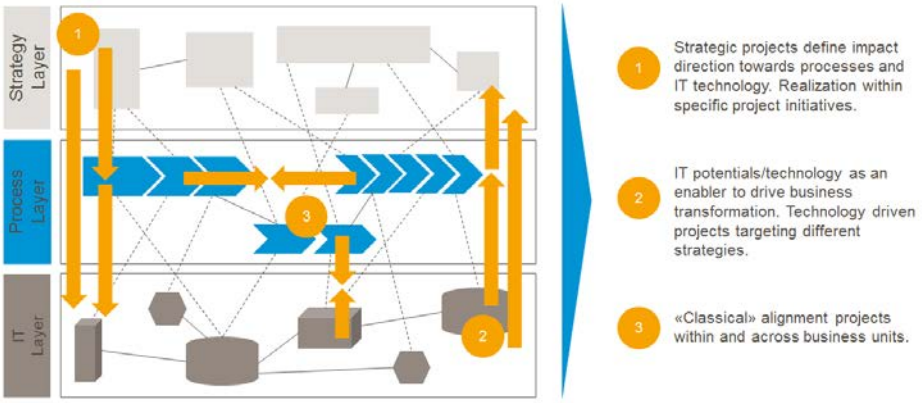

Fig. 2 Business-IT alignment realized by different project types. Arrows represent processes across artifacts and the strategy/IT layer [9].

In other words, Hirslanden needed to deliver healthcare functions for a common understanding of strategy targets, while meeting the expectations of an overwhelmingly digital customer base, who expect a more online service, e.g. patient appointments and care provision. Hirslanden had

to do this whilst balancing difficult change management and acceptance nuances, with staff from various backgrounds facing process standardization for the first time. Also, competition between hospitals is rising and the main differentiation factor is quality, so by giving doctors the ability to focus on their core activities (treatment and diagnosis), Hirslanden has seen a radical improvement in healthcare delivery and services. But this required the unique process-driven leverage of "HIT2020" to standardize data, respond to developments in the industry, reduce errors, improve the bottom line, and provide a higher level of patient care. Indeed, Switzerland has one of the lowest average lengths of stay in hospitals (ALOS) within the OECD, and this is often used as an indicator of efficiency and care standard [10].

However, new process orientation and the organic evolution of healthcare Enterprise Resource Planning (ERP) systems [11], also meant Hirslanden was further hampered by challenges including manual or only partially automated processes, and complex, historical policy and tight regulations within admin and SAP®. Another significant obstacle is the complexity of healthcare (diagnosis and treatment) in general, where standardization is very difficult to implement on the level of direct patient treatment. To further upgrade the impact of robot-led automation and CPIs to guarantee readiness for new technologies and the leverage of patient processes, there was also a requirement for a solid understanding of legacy systems, and an overview of automation opportunities. Switzerland is one of the world's leading deployers of surgery robots in the healthcare sector [12], and this requires a deep understanding of AS-IS processes within AS-IS organizational structures. Process mining initiatives can then provide critical insights throughout the automation and any separate Robotic Process Automation (RPA) journey, from defining the strategy to continuous improvement and innovation. Hirslanden faced increased manual labor with company-wide changes splintering into a variety of challenges, both strategic and on the day-to-day level.

Further challenges faced by Hirslanden include:

- Disparate processes in different clinics: Without process standardization, the security of processes decreased, and business operations became too complicated due to a break in the chain of optimization dependencies;
- Latest technology: Process management needed to be established as a 'new language', because few healthcare providers anywhere in the world adopt the approach;
- Heavily regulated environment: Process documentation facilitated the implementation of regulatory requirements (ISO standards, SwissMedic) and quality management;
- Change management as a team effort: Required the support of all involved and the fresh understanding of a modern process culture.

2.2 Company-wide disruption: Better connecting processes for further systemic differentiation

With this, Hirslanden required a holistic ERP platform based on single data points and a process model across finance, supply chain, and human resources to support the emerging operating model. The same platform also needed to be flexible enough to allow for the assimilation of new entities, and support embedded cross-operational best practice, whilst allowing clinic variants in the very infrequent case where standardization was impossible. For example, across different services in different clinics. In a commercial world that revolves around differentiation, it was

no longer practical to rely on systems that merely deliver the same results as everyone else. With significant investments already made in ERP systems, healthcare providers across the globe must tackle the challenge of how to refresh, update, or transform legacy ERP systems to better connect with their processes; a further form of systemic differentiation.

Reaching across people, processes, customers, technology, data management, and risk management, Hirslanden's ERP transformation is nothing less than a company-wide disruption. Starting from the definition of targets on a strategic level to the specification of processes over the nomination of use cases and requirements (Fig. 3). New processes, new ways of working, new paths through the system and questioning the value and need for customization are all critical aspects of such an initiative, whilst avoiding the pain of historical time and revenue issues, and ensuring more manageable cost strategies.

Further situations faced include:

- The need for "Systems of Differentiation" vs. the use of "Systems of Record";
- Modern ways to analyze and standardize processes;
- The requirement for a process-centric approach to reduce change fatigue;
- A way to make smarter use of process data to evaluate and accelerate change.

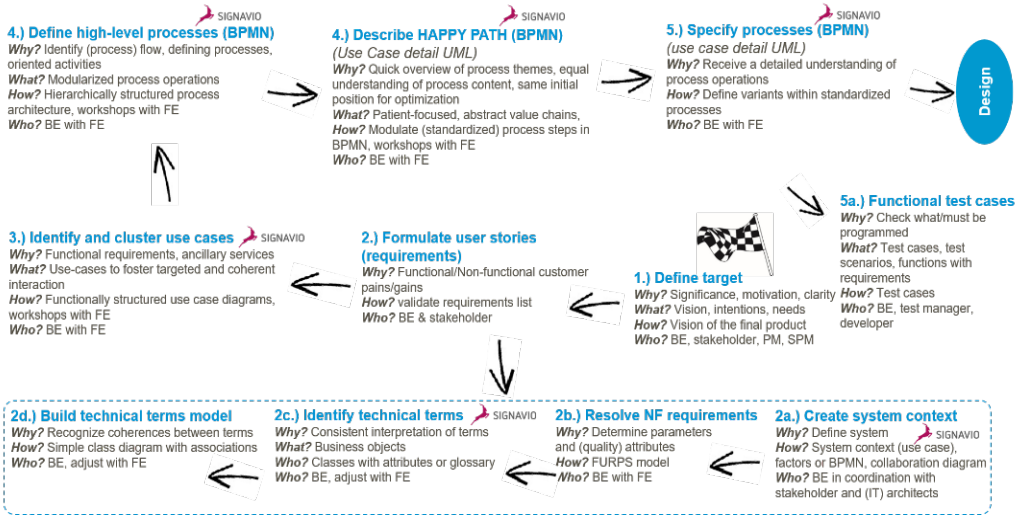

Fig. 3 The procedure model of process modeling within "HIT2020".

3 Action Taken

However, process orientation—especially in healthcare—cannot be achieved in a "big bang'' [13]. Capabilities need to be developed in sync to allow a sustained adaptation of work practices that might be fundamental to governance. Also, the scope of process orientation adoption is not limited to technology (e.g. workflow support software tools), organization (e.g. clinical pathway

specifications), or people (e.g. developing collaboration across functional silos). Instead, process orientation needs to integrate all these capability areas [14]. However, whilst process management is repeatedly named as a practical approach for improving quality while reducing costs and resources, healthcare's ongoing shift to value-based care, simplified and improved patient journeys, and targeted ROI has put pressure on hospitals to understand better the true cost of delivering care [15]. Regardless of whether it's per individual episode of care or per disease state or diagnosis, this need for better insight into the cost of care, coupled with the obsolescence of the ERP systems that many hospitals have in place, has triggered interest in cloud-based ERP transformation systems.

For Hirslanden, Enterprise Resource Planning refers to the integrated, real-time management of core business processes to better support the assimilation of new entities with embedded cross-operational best practices. The problem is many infrastructure and operations (I&O) leaders don't know where to begin when initiating an IT monitoring strategy for evolved business intelligence, which Hirslanden is establishing based on Signavio processes.

Further demonstrating the uniqueness of Hirslanden's strategy of standardized ERP transformation across clinics, a 2016 US report found that fewer than 30 percent of hospitals had an ERP system in place [16]. Investments in electronic health records, cybersecurity, the transition to ICD-10, population health management, and analytics were all named as a higher priority than ERP, according to the survey. While 30 percent seems low, it is not far from average: Software Advice recently found that only one-third of enterprises across major verticals use an ERP system, with another 44 percent using disparate systems [17]. But for healthcare groups to succeed over the coming decades, strategies must involve more than constant big-dollar upgrading or restructuring. Within this state of perpetual flux, adaptive ERP technology is helping Hirslanden not only to keep up with industry developments but also with the expansion of technology-enabled patient experiences and improved patient journeys.

3.1 Five steps to successful ERP transformation

Initiated in 2014, Hirslanden's ERP transformation is based upon five steps across effective planning, testing, and change management within a scalable ERP transformation project (Fig. 4). The business transformation model has increased the efficiency of technology investments, the understanding of business-IT alignment challenges, and significantly reduced the financial and operational risks associated with healthcare and technical change [18].

With this unique process standardization, Hirslanden employees can operate across various locations to provide their patients with the care they need and deserve (Fig. 5). This includes administrative processes like an admission of new patients or invoicing, as well as crucial processes such as the coordination of doctors and attending physicians. Although these processes are fundamentally similar, in the past they were carried out differently at different Hirslanden sites. The long-term aim of process standardization across all Hirslanden clinics is to drive the flagship value of "Patient First", and offer superior services for improved wellbeing. With this, process standardization at the medical group helps:

- Improve patient care / Improve patient security / Drive patient value;
- Relieve the individual clinics of administrative burden for increased patient focus;
- Develop universal standards for patient care / Act more efficiently / Simplify processes;
- Harmonize the application landscape of the group.

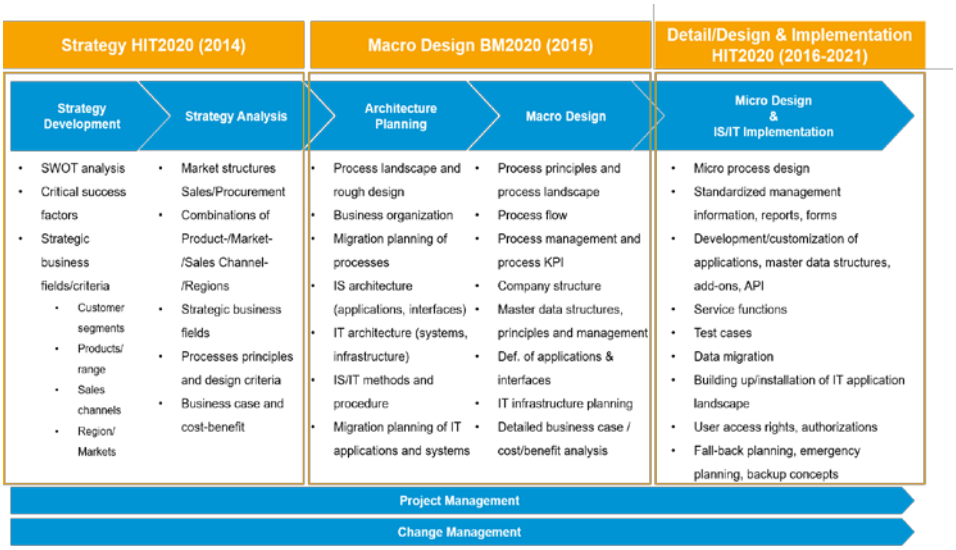

Fig. 4 The five steps of the "Hirslanden 2020" transformation project.

Against this backdrop, standardizing Hirslanden's processes also contributes to strengthening data security and process improvement initiatives, especially in relation to the General Data Protection Regulation (GDPR) [19]. Patients will experience smooth and secure processes, and employees benefit from a systematic approach to daily hospital routine. At the same time, regulatory requirements are reliably implemented with Signavio Collaboration Hub being deployed as a central knowledge base for internal processes. Staff can access a universally viewable overview of the process map as well as all sub-processes. The collaborative capabilities of the software solution provide users with the ability to share these processes and develop them in Signavio Process Manager, and then automate transparently in Signavio Workflow Accelerator.

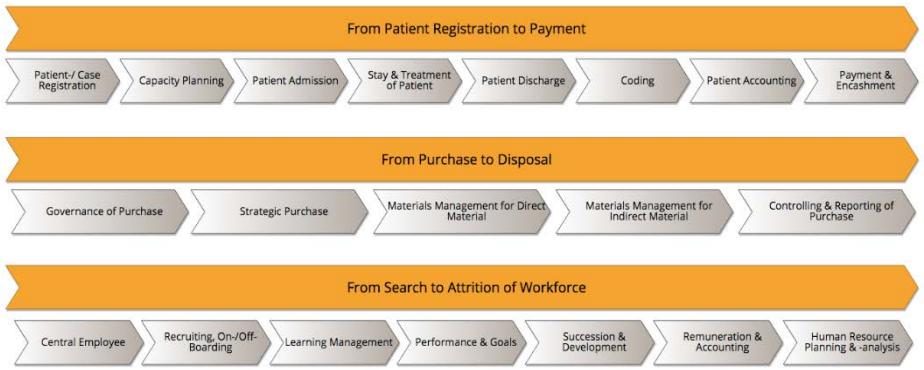

Fig. 5 End-to-End process standardization of "HIT2020".

3.2 Process mining and future process management initiatives

To increase the value of process management in healthcare, the implementation of business intelligence must include KPIs, risk-management information, and then be mapped with corresponding processes. Signavio's process mining technology can then detect bottlenecks and foster CPI support with process standardization and optimization.

To support process standardization throughout the group, Hirslanden uses Signavio (Fig. 6).

- Signavio Process Manager: Full project support across the whole corporation using process-driven requirements engineering, and the entire documentation of core administrative processes, as well as other medical and nursing processes;
- Signavio Workflow Accelerator: Automation catalyst for numerous functionalities across information routing, escalation management, and task distribution;
- Signavio Collaboration Hub: Involvement of all employees in process documentation and active process development using a collaborative commenting function.

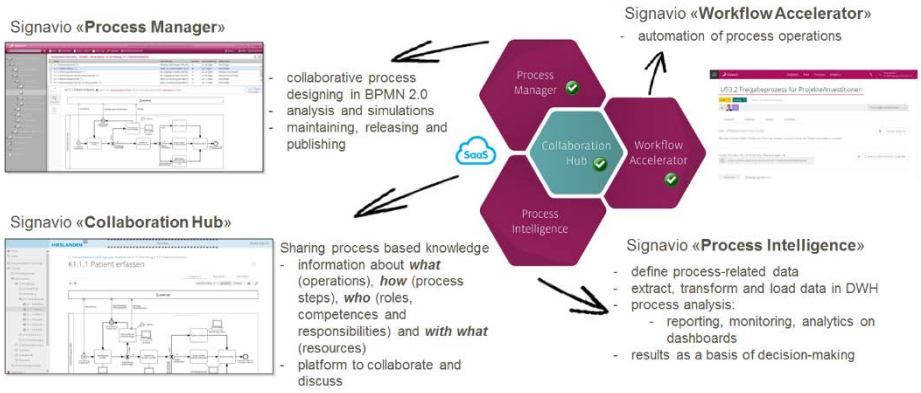

Fig. 6 Signavio process management components.

This utilization can also cross different IT architectures or any ERP system, including SAP®, which has the added benefit of making networks more scalable. Cloud-based IT infrastructure can also enable rapid computing for different types of data and systems from the physical network across all nodes of the healthcare supply chain. Signavio offers integration with next-generation S/4HANA enabling even simpler business-IT alignment at Hirslanden. In this context, ROI comes from the reduction in the total cost of ownership, the increase in productivity of business and process intelligence, and the application of development and improved business processes. For example: Hosted workspaces can modernize IT infrastructure, without adding significant capital expenditure. Healthcare companies can then work to customize and implement a secure and effective cloud-based enterprise quality management (EQM) strategy.

3.3 Unique process standardization in healthcare

As part of Hirslanden's standardization journey, the organizational structure of process management is critical, with representatives in clinics as well as process owners and managers from specific business units, collaborating closely (Fig. 7). By utilizing BPM, the implementation includes both a process management and a document management system (DMS), which goes

hand-in-hand with user acceptance of process standardization, because DMS functionalities are linked and processes occur within Signavio technologies.

"HIT2020" is establishing a unique group-wide business model for standardized and simplified processes across IT systems and organizational structures. This is increasing the efficiency of existing care so that clinics can dedicate time to core business models.

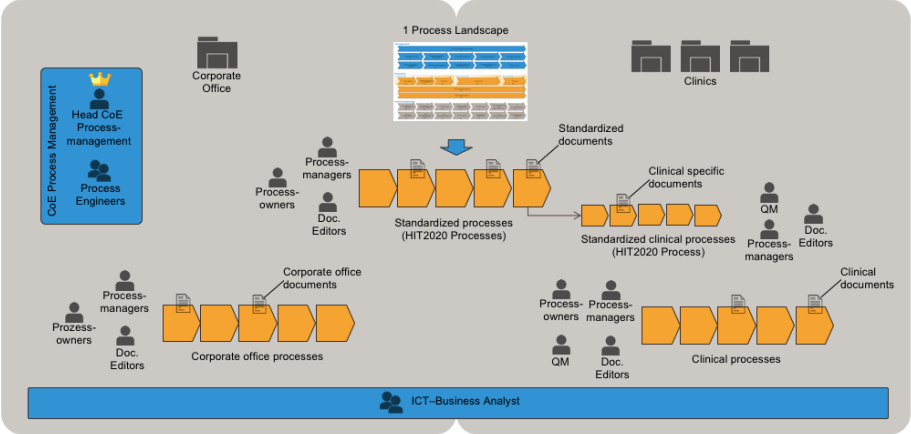

Fig. 7 The organizational structure of process management across the clinics.

4 Results Achieved

Less than a year since the introduction of Signavio software, the first successes of Hirslanden's organization-wide process initiative are evident. With over 1,700 BPMN processes created, 425 process maps produced, and 8,245 documents filed, process management is greatly facilitating day-to-day tasks. These outcomes will continue to increase in scale and benefits as more clinics onboard, especially for cross-departmental processes, as digital needs grow and transform, and the need to renovate the operational environment with new functions becomes apparent. According to Gartner, "business alignment will need to be redefined to deliver successful digital experiences" [20]. Thus, further business-IT alignment in healthcare requires next-generation standardization. Hirslanden and Signavio bring the streams together towards a common endpoint, where business and technology activities are linked, and the leadership teams operate almost interchangeably.

Just consider the move away from traditional on-premises solutions. As unification becomes more widespread, business-IT alignment within healthcare will increasingly be impacted by the consumerization of IT, where corporate and personal technology, such as mobile technology, will dramatically change the provision and consumption of healthcare [21]. In this regard, there is a growing expectation that patients should have access to the same technologies at home and the doctor's surgery. But a more fundamental implication of business-IT alignment at Hirslanden is the changing nature of corporate IT. In short, roles that were traditionally embedded within IT departments are now formally integrated into Hirslanden's business models. This has significant implications for IT infrastructure within the group because staff can be deployed reliably, safely, and cost-effectively across the enterprise and applications to tackle any pain points that arise (Fig. 8).

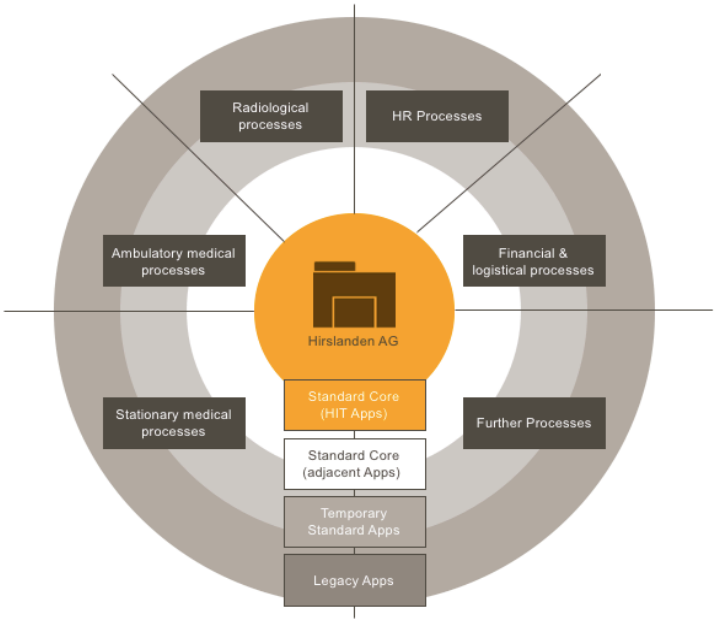

Fig. 8 Levels of standardization across Hirslanden applications. Covering all four areas from standardized to legacy apps.

To back this, healthcare stakeholders struggling to manage clinical, operational, and financial challenges envision a future in which new business and care delivery models, aided by digital technologies, may help to solve today's health problems. This goes hand-in-hand with building a sustainable foundation for affordable, accessible, high-quality healthcare [22].

4.1 Process management for effective "Patient First" healthcare

However, Hirslanden is not only differentiating itself through technological progress, but foremost through their understanding of patients' needs, human behavior, organizational structure, and drive for effective organizational change and governance. Through better business-IT alignment, BPM has improved the efficiency of health services to provide a higher quality of care and patient journey. Radical process standardization supports Hirslanden to deliver and enhance their capabilities through self-service and improved case management, whilst keeping pace with policy changes and patient needs.

This includes:

- Process optimization in 18 clinics for almost 10,500 employees;
- Intuitive process modeling with Signavio Process Manager;
- Better collaborative functions with employee participation and inclusion;
- A central knowledge base using Signavio Collaboration Hub, enabling the team to develop their processes further;
- More transparency, efficiency, and security through standardization;
- Web-based software solution, available around the clock, 365 days-a-year, making it suitable for the complex operations of medical needs.

5 Lessons learned

Globalization. Consolidation. Regulation. To nail global healthcare challenges, Hirslanden is continually evolving and learning through reassessed and standardized business processes to better align with the changing economic environment [23]. This move by Hirslanden was triggered by several imperatives, including patients and stakeholders demanding more innovative healthcare processes at more competitive prices, while the cost of doing business is rising, potentially jeopardizing aggressive revenue growth targets.

A process management approach is also modernizing core processes and systems to support new clinical practices, personalized outreach, regulatory standards, cost reimbursement methods, and to meet government regulations. Indeed, the BPM framework offers all this whilst optimizing Hirslanden's processes for the rapid response to changing healthcare and life sciences attributes. Another lesson of implementing process management at Hirslanden, has been to identify segments of a business process that can be automated. Often, these were employee choke points where information was collected and handled manually. In such cases, the system now provides email notifications and reminders, in combination with web-based forms, to prompt workers to perform tasks and keep things moving [24]. Also, emergency healthcare delivery at Hirslanden involves a variety of interrelated activities conducted from the admission to a clinic until the time of the patient's exit. Because these activities are inter-departmental processes that include at least two departments, there was a need to provide the appropriate technological infrastructure for automating and managing these processes.

5.1 Workflow automation to enable healthcare professionals

This layer of workflow automation at Hirslanden also provides visibility across processes that otherwise would occur out of sight of the eagle eye of corporate information systems. Since the healthcare sector is so regulated, having better-documented processes, along with auditing of how they are carried out, helps the hospital group with compliance issues. Business process management technology is also providing significantly improved levels of management, collaboration, and timeliness for clinical research studies [25]. For example: The tracking of clinical trials and investigations, including the number of patients seen and whether patient reports meet industry standards and research protocol. From this, Thomas Kuhn, Hirslanden Head CoE BPM, categorizes the benefits of process management at Hirslanden as the "3 As." They give medical professionals the power to:

Adapt: Reducing the time to implement change;

Align: Providing visibility & governance across the decision management life cycle;

Act: Sensing and responding to actionable situations, based on precise information about any detected event.

5.2 Process mining and robotics in global healthcare

In the future, Signavio's process mining initiatives will further enable Hirslanden to manage process challenges beyond the boundaries of implementation, with evaluation across the proof of concept (PoC) for any proposed improvements, and by extracting relevant information from a homogenous data set. By harnessing this raw data and continuously monitoring end-to-end processes, the group can further regulate potential risks and ongoing improvement opportunities, too. The powerful combination of process discovery, healthcare robotics, and conformance checking supports a future-state collaborative approach to process improvement at Hirslanden

[26]. In turn, this is driving improvement in AS-IS incident management processes as well as removing exceptional and unwanted process steps, by increasing visibility and transparency across IT processes. Data based process mining with the use of Signavio Process Intelligence will further analyze the different working habits across teams and individuals, decreasing incident resolution times, and subsequently improve patient impact cases via the discovery and validation of automation opportunities.

A further example of where process mining and strategic alignment will enable Hirslanden, is IT incident management. Here, "incident" is an unplanned interruption to an IT service, which may be complete unavailability or merely a reduction in quality. The goal of the incident management process is to restore a normal service operation as quickly as possible, and to minimize the impact on business operations. Incident management is a critical process in Information Technology Infrastructure Library (ITIL).

If we consider the UK-based CQC report once again [3], we can further extend the business case for process management solutions across global healthcare here too. The report shows up to 20% of hospital referrals in England are unnecessary, thanks to the lack of connectivity between care providers and the subsequent need for improvement in care record sharing. So, by deploying a process management tool across all clinics, like Hirslanden is achieving, the handoff between departments becomes smoother, the process for record keeping is clearer, while transparency and accountability are tightened for improved patient journeys.

5.3 Hirslanden also notes the improved:

- Understanding of the hospital ecosystem and urgency of issues: Since ineffective behavior often results from a lack of knowledge of one's actions, the analysis helped clarify how current practice results in problems and complexity in the organization and IT ecosystem. This analysis was critical to avoid chasing silver bullets and to align all the stakeholders around a shared understanding of the issues they needed to address.
- Sharing of a company vision to challenge the existing business model: A key driver behind the Hirslanden ERP and business transformation program was uniting the entire company around one shared vision, enabling the new business model to be tested under any number of conditions. It was essential to examine the internal part of the business model and the relation to patients. Forming systematic steps enabled a transparent and flexible change agenda, where the shared vision functions as a long-term guide.
- Agile implementation of processes via focused sprints and multidisciplinary teams: Given that business transformation involves change across organizational boundaries; it logically requires interdisciplinary teams for success. This is a part of the Hirslanden ERP transformation where the use of certain agile principles helped because multidisciplinary teams were deployed in iterations and could continuously learn and adjust.

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