



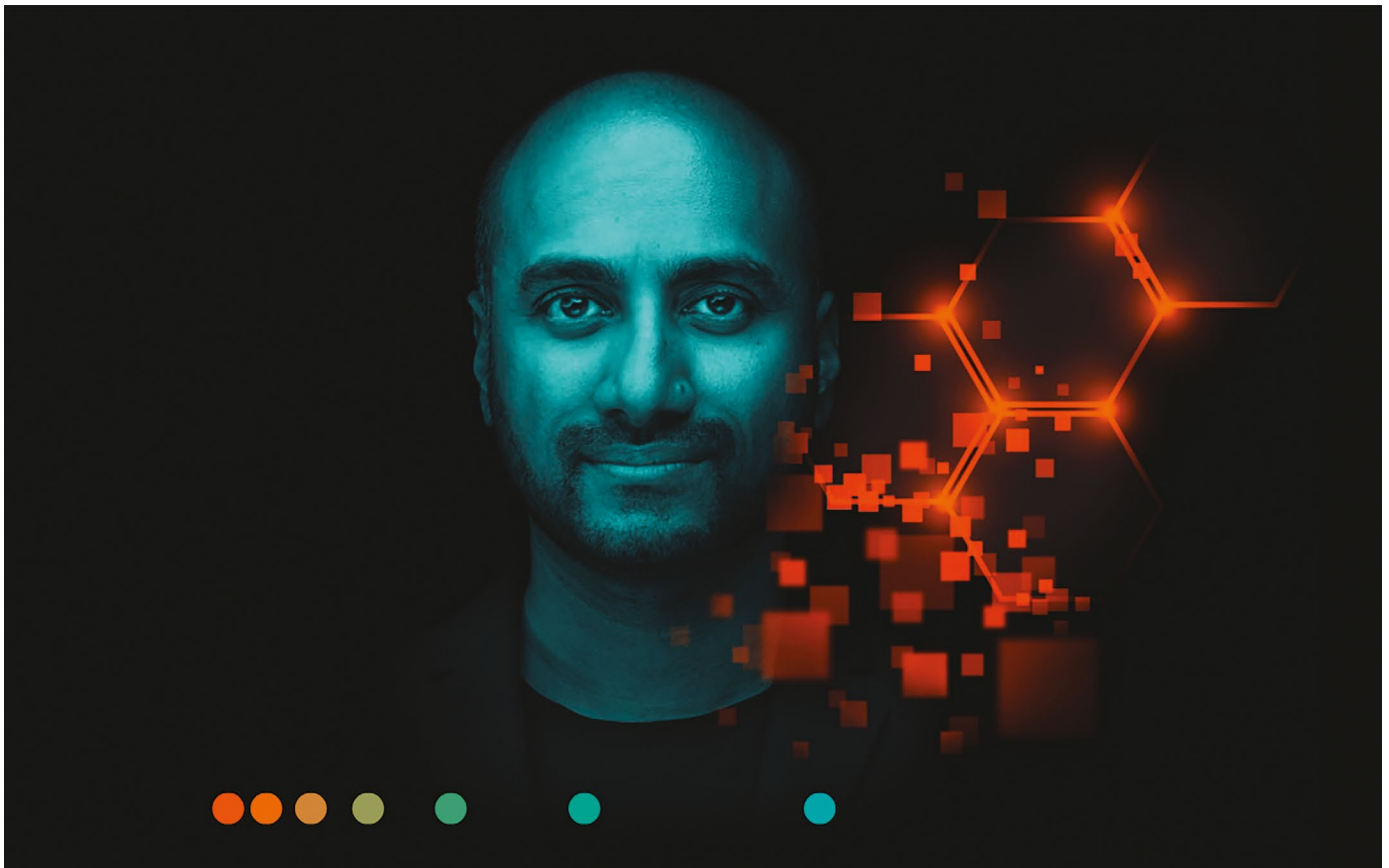
Data Integration and Decision Support Along the Patient Pathway

An overview of a decision support platform that offers holistic decision support along the continuum of care, bringing together a wide variety of healthcare data from diverse IT systems with a vendor-neutral design and user-friendly solutions.



Key Points

- As healthcare processes become more digital, there has been tremendous growth in health data from electronic medical records, image databases, and other fragmented IT systems.
- Clinicians could benefit from data integration from various sources, including clinical, radiological, laboratory, genetic and pathological findings, and an overview of behavioural and social conditions.
- Siemens Healthineers' Teamplay digital health platform offers features and applications that support operational decision-making, improved workflow and more informed diagnostic and therapeutic decisions for optimal outcomes.
- Siemens Healthineers' AI-Pathway Companion integrates clinical guidelines, individual risk stratification and patient preferences.





In a healthcare system that is rapidly turning digital, smart integration of data has now become increasingly important. However, there are several barriers along the patient pathway that make this task challenging. Often, data is inaccessible or too extensive to evaluate or analyse. There are also instances when information is overlooked and guidelines are ignored. This results in inefficient management of data that could otherwise be utilised more effectively for more informed and improved clinical decisions.

What is needed is a unifying approach that utilises digital applications powered by Artificial Intelligence (AI). This model could better support operational decisions, optimise care processes, and improve diagnostic and therapeutic decisions. Also, a more holistic approach would enable greater interaction and coordination between care teams and patients and help healthcare systems realise the goal of patient-centred care.

Healthcare has been, and will always remain, a process of healing that is not only dependent on data but also a strong patient-doctor interaction. However, as healthcare processes become more digital, there has been tremendous growth in health data from electronic medical records, image databases, and other fragmented IT systems. This data can play a critical role in facilitating complex healthcare decisions when clinicians are faced with multiple conditions, complicated symptoms and difficult diagnostic and treatment options. During such times, clinicians could benefit from data integration from various sources, including clinical, radiological, laboratory, genetic and pathological findings, and an overview of behavioural and social conditions.

This can be achieved by using digital technologies that can help improve decision-making and provide healthcare providers with the decision support they need along the patient pathway. This data should ideally be delivered in a user-friendly manner through a platform that is simple and flexible to use, and that can bring together patient information from diverse IT systems and data sources. The goal of such a platform would be to provide clinicians with a more comprehensive picture of the patient so that they can make decisions more holistically.

Challenges of Data Integration

While this concept seems easy to implement in theory, there are several challenges and barriers to overcome. First, there are often situations where relevant patient data is not available, or it is too labourious to retrieve it when needed. Studies show that doctors in intensive care units often have to sift through thousands of individual data points to extract the information they need (Herasvich et al. 2018). There is also sufficient evidence to show that a large proportion of electronically stored patient data is never used in the inpatient or the outpatient setting (Pickering et al. 2013; Hirbar et al. 2018).

There are several reasons why patient data is still underutilised. There is a lack of analytics expertise. Also, clinicians have to deal with a large volume of data. This can be difficult to handle and can lead to distraction, dissatisfaction and burnout

(Ruppel et al. 2020). Healthcare is more or less facing an information overload, making the data integration and digitalisation process more complex. There is also inefficient filtering of the data that is available (Shirky 2008). Therefore, what healthcare needs are advanced digital solutions that can improve the analysis of patient data and present this data in a user-friendly and clinically meaningful way.

Using Smart Data Integration and Decision Support

Digital decision support can help overcome these barriers. Advanced clinical support systems have the ability to encompass clinical guidelines, patient data summaries, condition-specific order sets, diagnostic support and relevant reference information. An efficient and advanced decision support system would provide both general and person-specific information while filtering and organising valuable data. This can help improve diagnoses, treatment decisions and patient outcomes.

There is significant clinical evidence to demonstrate the value of advanced decision support systems. Studies show that machine learning algorithms can help avoid unnecessary CT scans in children with minor head injuries (Bertsimas et al. 2019); also, advanced decision support in oncological care can increase adherence to guidelines, reduce treatment costs and ease physician workload (Klarenbeek et al. 2020).

Siemens Teamplay Digital Health Platform

Siemens Healthineers has developed a comprehensive decision support solution. The Teamplay digital health platform offers features and applications that support operational decision-making, improved workflow and more informed diagnostic and therapeutic decision-making for optimal outcomes. Teamplay also enables doctors, nurses and patients to connect more easily, thus providing a basis for patient-centred care and shared decision-making (Figure 1).

The Teamplay digital health platform operates system- and vendor-neutral through various interoperability standards. It allows data from existing IT systems within an organisation to be integrated and shared across institutional boundaries such as hospitals, outpatient practices and pharmacies. The core philosophy behind the platform is to support decision-making along the patient pathway by providing a flexible and uniform IT solution. This is done through various individual applications and extensions, which are available via an integrated digital marketplace. Siemens Healthineers' Teamplay solution addresses multiple problems in various clinical fields, including radiology, oncology and cardiology.

Siemens Healthineers also offers the AI-Pathway Companion, a software system for data-driven decision support. The AI-Pathway Companion integrates clinical guidelines, individual risk stratification (CMS 2014) and patient preferences. This helps clinicians make evidence-based and transparent recommendations for different treatment options. It also helps

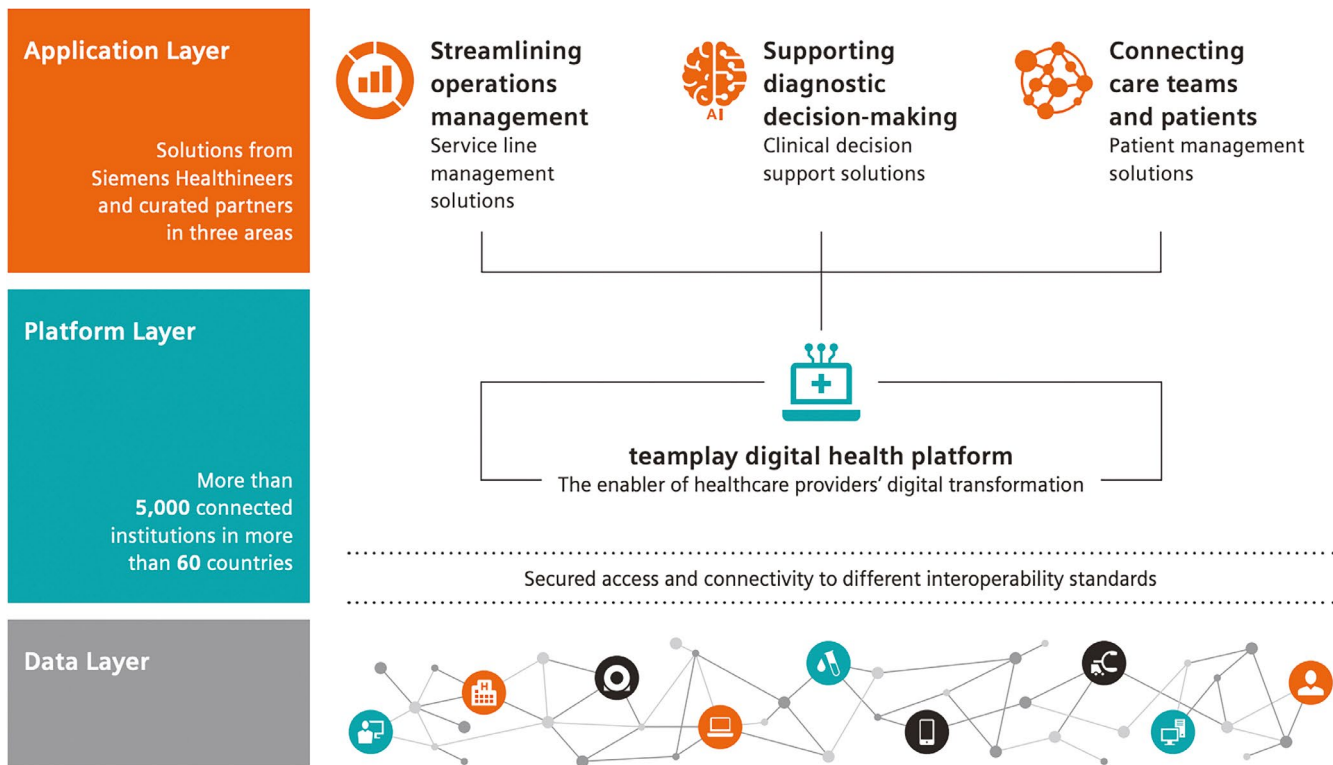


Figure 1: Basic principle of the “teamplay digital health platform”

Data from a wide variety of IT systems can be integrated and then used by individual applications to improve the care process in its various dimensions. Image Credit: Siemens Healthineers

clinicians map out where a patient is in the treatment pathway and facilitates discussion between patient and doctor. Similarly, Siemens Healthineers' eHealth solutions include various software packages that allow patient-specific data exchange across institutions and better communication between care teams and patients.

Digitalisation - The Future of Healthcare

According to an international survey, three out of four healthcare executives believe digital platforms that connect things and people and foster innovation will enable their organisation's business strategy (Elliott et al. 2018). Siemens Healthineers offers solutions that can make this possible. Its digital

health platform is a flexible tool that understands the importance of data for healthcare. Siemens Healthineers provides more than 40 apps, a third of which are AI-powered, for six different specialties. These apps enable advanced and customised digitalisation for a wide range of healthcare providers and healthcare situations.

Siemens Healthineers Teamplay digital health platform does not require any major investment or restructuring. It is an interoperable system with a vendor-neutral design. It can integrate existing and different IT components and enable a step-by-step approach. It is the ultimate solution to ensure smart data integration, holistic decision making and improved patient outcomes. ■

REFERENCES

Bertsimas D, Dunn J, Steele DW et al. (2019) Comparison of Machine Learning Optimal Classification Trees With the Pediatric Emergency Care Applied Research Network Head Trauma Decision Rules. *JAMA Pediatr* 173:648-656.

CMS – Center for Medicare and Medicaid Services (2014) Clinical decision support: more than just 'alerts' tipsheet. Available from https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/ClinicalDecisionSupport_Tipsheet-.pdf

Elliott J, Nguyen C, Tanguturi P (2018) Digital platforms will define the winners and losers in the new economy. *Accenture digital platforms survey*. Available from https://www.accenture.com/_acnmedia/PDF-85/Accenture-Digital-Platforms-Pov.pdf#zoom=50

Herasevich V, Pickering B, Gajic O (2018) How Mayo Clinic Is Combating Information Overload in Critical Care Units. *Harvard Business Review*. Available from <https://hbr.org/2018/03/>

[how-mayo-clinic-is-combating-information-overload-in-critical-care-units](#)

Hribar MR, Biermann D, Goldstein IH, Chiang MF (2018) Clinical Documentation in Electronic Health Record Systems: Analysis of Patient Record Review during Outpatient Ophthalmology Visits. *AMIA Annu Symp Proc* 2018:584-591.

Klarenbeek SE, Weekenstroom HHA, Michiel Sedelaar JPM et al. (2020) The Effect of Higher Level Computerized Clinical Decision Support Systems on Oncology Care: A Systematic Review. *Cancers* 12:1032.

Pickering BW, Gajic O, Ahmed A (2013) Data utilization for medical decision making at the time of patient admission to ICU. *Crit Care Med* 41:1502-1506.

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