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PUBLIC

Charité: Building a Scalable Healthcare and Medical Research Platform

Berlin’s Charité is one of Europe’s largest university hospitals. For years, its nephrology department has been developing a documentation and research platform called TBase. When the hospital decided to bring TBase to scale and make it available to other departments, it needed **a platform that was flexible** and easy to adapt to different specialties. The platform would have to be a robust research and documentation tool that guaranteed the highest standards in patient data security. Charité turned to SAP.

THE BEST RUN SAP

Improving Research and Care with a Scalable Platform Built on SAP HANA®

Before: Challenges and Opportunities

- Provide a flexible platform that ensures continued leadership in healthcare and research.
- Reduce labor-intensive upkeep of parallel research databases.
- Create a clinical documentation platform that captures important research data.
- Improve patient care through interoperability between hospitals, insurers, and patients.

Why SAP

- SAP HANA® extended application services and SAPUI5 allow for flexible front-end HTML5 development in different popular runtime environments like Node.js, Python, or Java.
- SAP HANA enables real-time data processing and analytics and secures communication, data storage, and application services.
- SAP Fiori® enables statistics and other data visualizations integrated in one flexible and consistent UI.
- SAP Web IDE toolset simplifies development of innovative SAP Fiori applications.

After: Value-Driven Results

- Clinicians and researchers work in a single shared, integrated platform.
- Platform flexibility allows developers to easily produce tools specific to clinical and research needs.
- In-memory technology vastly accelerates data processing for researchers compared to legacy databases.
- Digital patient records lay the foundation for innovative patient care using AI methods and telemedicine.
- Open research platform that supports charitable projects and knowledge transfer.

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"The TBase platform secures our position as a global leader in innovative medical research and healthcare."

Dirk Raschke, SAP HANA Application Architect, Charité

11
Nobel Laureates who made their name at Charité

4,000
dedicated medical researchers there today

Charité University Research Hospital
Berlin, Germany
www.charite.de/en/

Industry
Healthcare

Products and Services
Healthcare and Medical Research

Employees
15,000

Featured Solutions
SAP HANA, SAP Fiori

Secure Patient Information and Streamlined Medical Research

In 1996, Charité and Humboldt University began developing a clinical research database for kidney transplant patients. Previously, the doctors and researchers involved in performing or studying kidney transplants used two separate databases, as was common elsewhere in the medical world. In one database, clinicians kept electronic patient records. In another, researchers maintained validated datasets designed for easy search and analysis. Recognizing the inherent inefficiency of running parallel systems, Charité decided to build one database that proved functional for both clinicians and researchers. They called it TBase.

With TBase, clinicians now entered data that was not only relevant for patient care but formatted in such a way that it was also valuable to researchers. As related medical science has developed, so has TBase. Usage in nephrology became routine in 1999 at Charité's main campus, and the system was live at all three Charité campuses by 2006. Beginning in 2007, all nephrology patient records were kept in TBase.

When Charité opted to deploy TBase to other outpatient departments – such as endocrinology, rheumatology, neurology, cardiology, gastroenterology – the hospital faced several problems. For one, like in nephrology, disparate research and clinical databases needed to be combined. The task was made more difficult by the disease-specific parameters relevant to the different specialties. It wasn't just about folding together datasets, in other words. It was about building a flexible platform that each department could make its own.

Laying the Groundwork for Breakthroughs in Documentation and Research

SAP HANA®'s in-memory technology processes unstructured and structured data in real time, and since transactional and analytical processing is performed in-memory, data is available immediately. Analyses that once took hours now take minutes. This speed makes it possible to perform, for example, real-time analyses, predictive analyses, the analysis of big datasets – some of which might include terabytes of data – machine learning, and more. SAP HANA also enables advanced integration functions, including data virtualization, replication, and bulk loading.

SAP® Web IDE for SAP HANA simplifies application development. With SAP Web IDE, Charité's developers can create in-house applications for specific departments and specialties, and the SAP Fiori® UI allows researchers to easily visualize data. Since the web development tool is provided through SAP Cloud Platform, it makes university-wide projects possible. The environment supports JavaScript, Java, Python, and other popular languages.

On the front end, the web-based electronic health record incorporates the latest HTML5 technology. TBase features a standardized UI and documentation supported by SAPUI5 that can run on all end-user devices, so doctors are free to use a tablet or a computer, checking information and storing data on the fly.

The backend system built on SAP HANA includes single sign-on (SSO), SAML, and other security features. The patient information stored on SAP HANA stays protected with the latest encryption and verification techniques, so only those involved in a patient's treatment can access his or her records.

"In 2020, we will start with real-time home monitoring together with telemedicine and will incorporate first prediction models into TBase. All these novel features will bring patient care to another level."

Prof. Dr. Klemens Budde, Nephrology, Charité

Providing Innovative Treatment Methods and Data Researchers Can Trust

With SAP, Charité took TBase to a new level. It's now rolling TBase out to physicians and researchers across a wide range of specialties. What was once a tool specific to the treatment and research of kidney transplant recipients has become a documentation and research platform with comprehensive digital patient records. The platform simplifies physicians' work lives and streamlines research at a growing number of departments throughout the hospital. Interoperability between clinics, health insurance providers, and patients on a federal level promotes better patient treatment, especially in rural areas.

Open interfaces, programming languages, and technologies provided by SAP HANA® safeguard Charité's ability to easily find the personnel it needs to build features into the platform that are specific to different disease treatments. Patient information is made available for immediate analysis, for both researchers and physicians.

Of course, patient data protection is of the utmost importance. The SAP HANA security framework safeguards that information, and doctors and researchers can work knowing their platform operates within the necessary legal requirements and compliance regulations. Charité has therefore been able to further intensify digital transformation in outpatient departments, which significantly improved information exchange between physicians in the best interest of their patients.

The technical foundation provided by TBase is one that Berlin's medical professionals can rely on for years to come, ensuring the city's place as a leader in research and healthcare.

700,000

outpatient cases at Charité in 2018

30,000

nephrology patients migrated from old database

80

scientific publications resulting from the TBase platform published in last 10 years

The Future of Medical Care and Collaborative Research

Charité's TBase developers are currently working to bring the system to the doctors and researchers in endocrinology, rheumatology, neurology, cardiology, pediatrics, psychiatry, and gastroenterology.

Many of these specialists and outpatient departments require, or could benefit from, specific applications related to their disease and treatment specialties. The flexibility of the platform means existing applications can be brought into TBase – or when that's not possible developed on the platform itself.

These initiatives will no doubt improve patient care and research, but it's when looking further into the future that TBase's possibilities become truly exciting. It's easy to see how the flexible platform could be adapted to medical advancements brought about using AI, or how machine learning could be incorporated into its research tools. Additionally, TBase could one day form a solution that incorporates concepts like telemedicine.

Concerns surrounding patient privacy are the reason TBase isn't running in the cloud yet, from where Charité doctors could reach and treat patients almost anywhere on earth. But a platform based on SAP HANA® provides all it takes to resolve such privacy issues. A future in which TBase is not just a system used at Charité but one used across Germany, or the world, might be closer than we think.

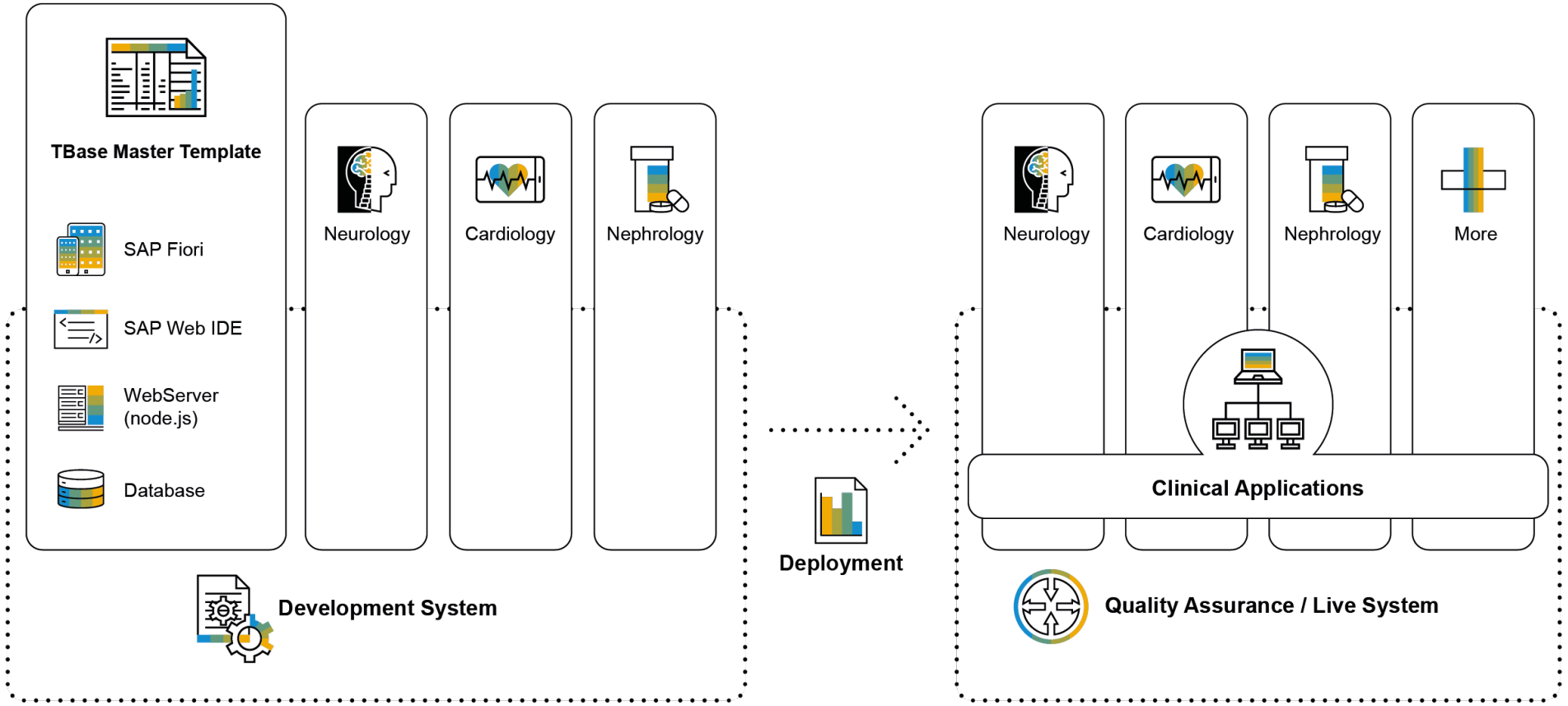
Soon, Charité wants to intensify collaboration between outpatient departments and other university hospitals. There are plans to provide the TBase platform to charitable projects for free.

"Our data must be easy to capture, secure, and access for doctors, nurses, and patients. For the first time, this is now possible on our SAP HANA platform with our developed solution TBase@Charité. Thanks to the Charité team! Well done!"

Martin Peuker, CIO of Charité

SAP® Software Architecture at Charité

The components and tools from the SAP HANA® extended application services (XSA) development environment that Charité used in its development of the TBase electronic patient record are shown below.



TBase Applications running on SAP HANA extended application services

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