CASE STUDY

InfoBANCO: revolutionising the use of health data for clinical decision-making, research, and planning

Quick summary of InfoBANCO

- InfoBANCO's vision is **to transform the governance and use of health data** by building an advanced digital health platform that **improves clinical decision-making**, **research**, **innovation**, and **management processes**.

- **This regional infrastructure** of the Region of Madrid **is standard by design**, and enables the governance, modeling, persistence, exchange, and exploitation of health information through international best practices.

- InfoBANCO was implemented by NTT Data, VeraTech, RHEA and Better as a platform provider, who together with SERMAS designed, developed, and implemented **a technologically and functionally state-of-the-art solution**.

- All health data from the ecosystem of the Region of Madrid were modeled, harmonised, and stored in **openEHR format**, using the **Better digital health platform**.

- The project was co-funded by the Regional Ministry of Health, the Spanish Ministry of Science and Innovation, and the European Regional Development Fund (ERDF), and was implemented at the **Hospital Universitario 12 de Octubre**, which is **one of the most prestigious national and international healthcare centres**, and in the Primary Care of the Community of Madrid.

Introduction

In a data-driven world, achieving longitudinal and comprehensive access and utilisation of health data has become an essential goal in healthcare. However, the reality we face is one of a scenario composed of multiple information silos that make data captive to their local models of health information governance and persistence.

InfoBANCO is an innovative digital health project developed in the Spanish region of Madrid, which is based on health information standards to build a neutral space of entirely usable and interoperable data with full clinical significance. This platform serves clinicians, researchers, and managers, providing them with quality data for decision-support processes, evidence generation, and learning within the healthcare system.

This case study examines the design, implementation, impact, and future projections of InfoBANCO, a pioneer openEHR project in Spain on such a scale, in the Madrid, Spanish, and European context. It also illustrates the power of modelling and storing health data with full semantics to extract maximum value from it.

Background and challenges

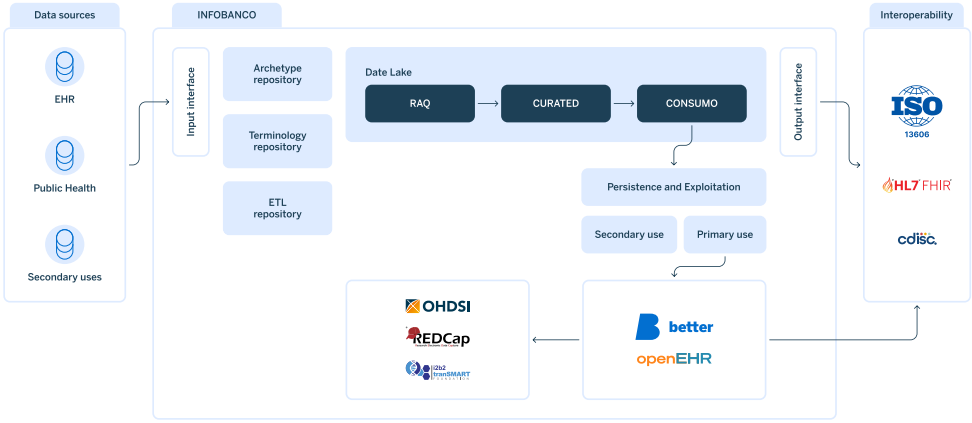
The digital health landscape in Madrid and Spain faced a critical problem of heterogeneous and obsolete information systems, resulting in fragmented data held captive in local management and persistence models. This compartmentalisation prevented healthcare professionals from having full access to the generated data, consequently impacting the quality and coordination of care and secondary use. These challenges highlighted the need to separate the governance layer and semantic persistence from the local data interaction layers by the information systems of the Madrid Region. Thus, the Department of Health of the Madrid Region recognised the need to evolve the fragmented puzzle of healthcare data towards a neutral and harmonised space that combines health data to streamline, democratise, and facilitate their use in healthcare, research, innovation, and management.

With the aim of establishing a neutral, flexible, and patient-centered environment that promotes data use and exchange, InfoBANCO was born to revolutionise the landscape of healthcare data in Spain through the use of openEHR.

openEHR is an open standard that has been designed for modelling and persistence of health information, and to collect this information in a clear structure and well-modelled framework. It moves the entire landscape from an app-centric architecture to a data-centric one, and offers a path from siloses of data to longitudinal, person-centred, **data for life**.

Setting up the architecture

InfoBANCO's technical architecture is based on the agnostic use of health information standards, that is, each one for the purpose for which they were conceived. Thus, aspects such as modelling, persistence, exchange, and exploitation of data in healthcare and secondary use were distributed in different standardised components:



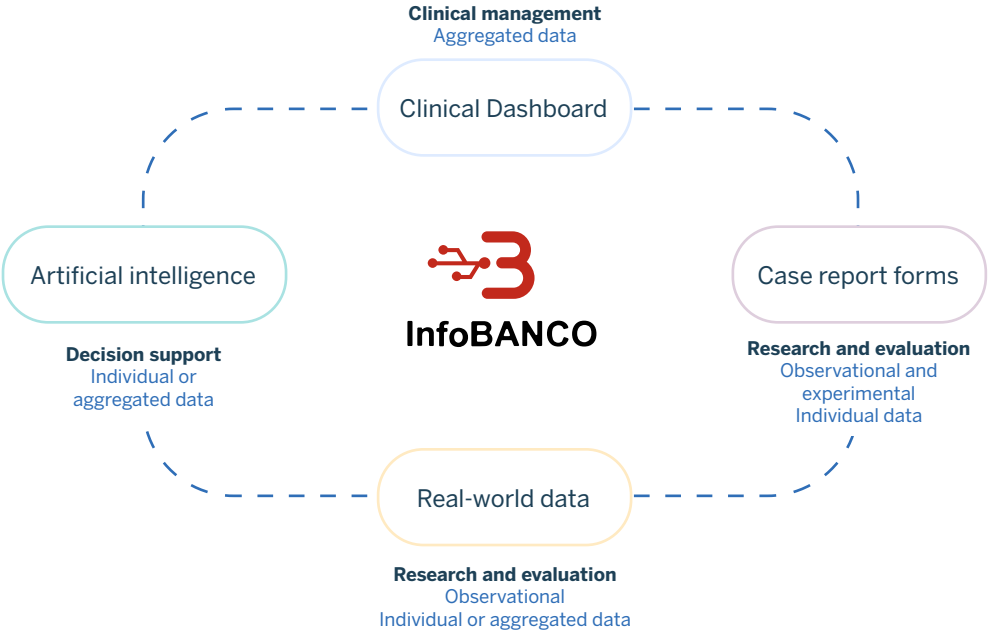
Architecture scheme of the InfoBANCO platform.

Data lake that centralises data from healthcare, research, and management information systems, according to local formats.

Better digital health platform for health information modelling and persistence of clinical, phenotype and genomic data in openEHR format, where raw data is harmonised according to the SERMAS's set of clinical archetypes in a neutral, detailed, and flexible manner.

Data-based services from the openEHR platform, consisting of two types: interoperability outputs for data retrieval and exchange, and persistence and exploitation outputs for decision support, research, and clinical management.

Thus, data could be extracted from multiple heterogeneous sources and centralised in a single data lake for later harmonisation. This harmonisation was possible thanks to the modelling of health information, common for the entire region of Madrid, based on openEHR, and its persistence in the Better digital health platform. From this common and neutral core, the different interoperability outputs (HL7 FHIR, ISO 13606, CDISC) and analysis (OMOP CDM, i2b2, REDCap) were generated.



I believe openEHR will take part in ambitious regional and national projects that are well planned, to give the tools of the new generation to the shared health records or the data federation.

Pablo Serrano Balazote
Former scientific coordinator of the InfoBANCO project

Implementation

InfoBANCO was designed and implemented in the combined effort of SERMAS (Madrid Health Service) together with NTT Data, VeraTech, RHEA, and Better. This innovative project presented unique challenges, transitioning from public procurement to execution, but the effective collaboration between all parties involved ensured a successful implementation of the project.

The project was finalised in June 2023, when the technological data platform became fully operational. At that time, a subset of data of the first 100,000 patients from Hospital Universitario 12 de Octubre and Primary Care of Madrid were uploaded to the platform. The platform is designed to accommodate the information of the 6.5 million active patients in the Madrid Region, as well as historical data generated in its regional data ecosystem.

InfoBANCO positions us as a national and international reference in digital health, driving the adoption of the openEHR within the Spanish National Health System and promoting interoperability and data reuse in line with the European Health Data Space (EHDS). This achievement is attributed to the hospital's commitment to digital transformation, the multidisciplinary effort of medical informatics teams, clinical departments, biomedical research groups, and the support of the Madrid Region, Spain, and the European Union."

Juan Luis Cruz Bermúdez
Director of Digital Transformation,
Hospital Universitario 12 de Octubre

The implementation of InfoBANCO not only involved implementing the platform described above, but also necessitated the definition and management of various levels of governance. These four governance levels were integral to the project's success, providing a comprehensive framework for managing different aspects of the project:

- **Information models and semantics:** selection and application of different standards for modelling, persistence, exchange, and exploitation.
- **Data sources:** definition of the processes to request access and include information from a new data source on the platform.
- **Technological infrastructure and security:** platform management to comply with service agreements and technical and legal security requirements.
- **Data access and use:** definition of the processes to access the data-based services and tools that InfoBANCO provides.

In addition, governance and technological platform are supported by a strong multidisciplinary training program (technical and functional) that covers both the operators and managers of the platform and the clients of the data-based services offered.

The templates used in InfoBANCO were created using the existing archetypes offered by the openEHR community. More than **35 existing archetypes** from the international Clinical Knowledge Manager (CKM) were used to create **21 templates** representing data such as demographics, encounters, health problems, phenotypic and genomic data, medication prescription and administration, immunisations, family history and clinical observations, laboratory, and patient-reported outcome measures (PROMs).

Impact

> The InfoBANCO project represents a true revolution in the way health data is managed and used in the context of the Madrid Region, Spain, and Europe. The initial implementation of InfoBANCO at Hospital Universitario 12 de Octubre and Primary Care of Madrid generated a series of key milestones in the field of healthcare, clinical research, and medical informatics:

- **First implementation of an openEHR platform in the Spanish National Health System** (SNS).
- **First combination of data in openEHR format** transformable to HL7 FHIR, OMOP, CDM, and CDISC **in a single platform**.
- **First exchange of data between primary care and hospital levels**, in standard format with full semantics in SERMAS, with the capacity to interoperate and federate nationally and internationally.
- **First validation and implementation of an AI model** developed in another country (NHS Scotland's SPARRA model) in SERMAS.
- **First interoperability and combination process of structured phenotype and genotype data** in openEHR and FHIR formats between 2 SNS hospitals.
- **Spanish leadership by Hospital Universitario 12 de Octubre** in the international data consortia of ISARIC (Oxford University), 4CE (Harvard University), and TriNetX.
- **More than 50 scientific publications** based on InfoBANCO components and data.
- **Spanish National Health Informatics Award** granted to Hospital Universitario 12 de Octubre for innovation in health data management through InfoBANCO.

InfoBANCO has shown that making an initial effort in modelling and standardising the collection of health data is an investment that yields better healthcare, management, and research tools. Hematology Department of the Hospital Universitario 12 de Octubre has transformed its EHR so that health data is centred in the patient throughout the healthcare process and this real-world data is reused in the management of cohorts and clinical research.

Joaquín Martínez López
Head of Hematology Department,
Hospital Universitario 12 de Octubre

Evolution and expansion

With the solid platform already implemented, **InfoBANCO plans to expand its scope**, not only to increase the catalogue of archetypes and volume of data uploaded but **to include other advanced features and functionalities**. These include disruptive aspects such as the capacity of natural language processing to complete structured data according to archetypes and components for developing and **validating AI models from openEHR data** to provide complete and real-time support for clinical decision-making. The final idea is to deploy the platform and its services across a broad federated network of regional hospitals, creating a complete and interconnected data landscape.

This expansion will allow for complete access to health data, contributing to more agile, equitable, and efficient use of data throughout the region. The translation of the platform and the knowledge generated in its design and **implementation to the Spanish National Health Data Space** and, analogously, to the European Health Data Space will also be addressed. This scalability does not represent a great technological challenge for InfoBANCO due to its multi-standard approach by design and the focus on platform governance and multidisciplinary training of the teams involved.

We expect InfoBANCO to be an example project that other hospitals and regions in Spain and Europe will follow. The path of harmonising data in neutral, flexible, and open formats to offer person-centred care and democratise the use of data to achieve a true health system that learns through data is the one we should all follow.

Miguel Pedrera Jiménez
Digital Health Specialist, Better

Conclusion

The InfoBANCO project, pioneer in the use of openEHR in Spain, has allowed the harmonisation of health data in the Community of Madrid, starting with the Hospital Universitario 12 de Octubre and Primary Care of Madrid, and has set a new precedent in digital healthcare in Spain and Europe. It is a testament to the transformative power of harmonising data with open and neutral formats, moving from an application-centred to a new person-centred paradigm and lifelong longitudinal health data.

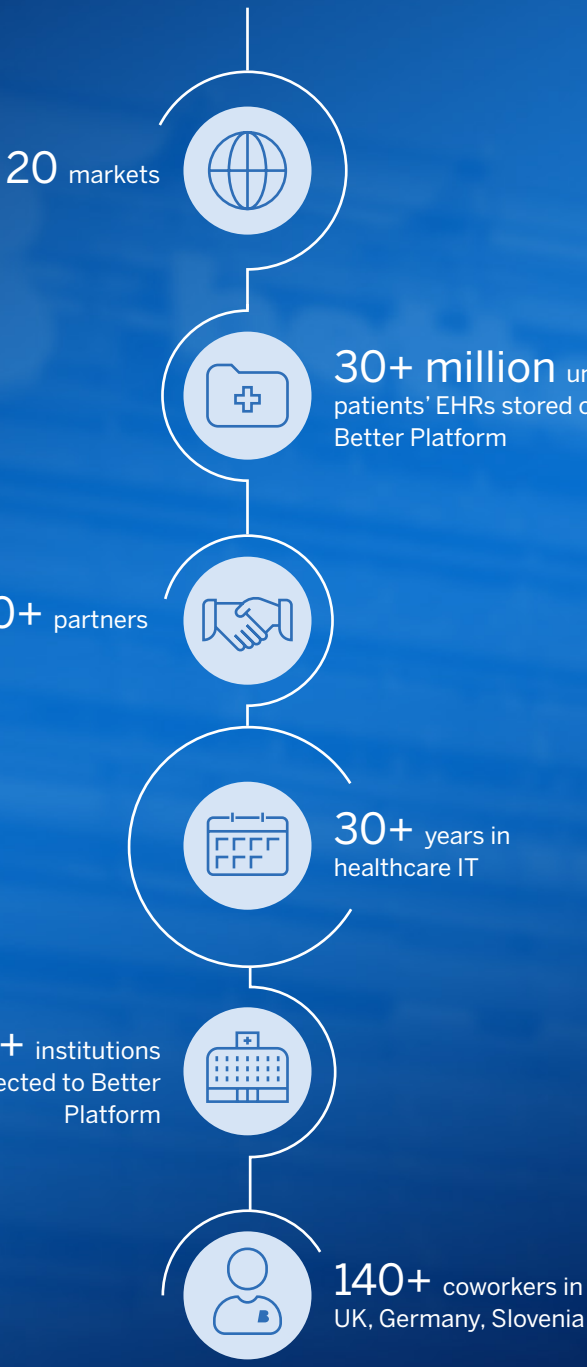
Having data in openEHR format means an evolution in current and future digital ecosystems, which is allowing improvements in lines of work such as decision support, precision medicine, value-based healthcare, epidemiological surveillance, or evidence generation. Because information is modelled and stored in an openEHR format, it can be combined, federated, exploited, or shared among different organisations and providers without losing its meaning or context.

With everything already achieved and with future plans well outlined, InfoBANCO could mark the future of openEHR projects in Spain and Europe, promoting an advanced healthcare ecosystem based on intraoperable, interoperable, and reusable data.

The knowledge we will get in the Infobanco project will help us understand what are the challenges to implementing openEHR standard. If clinical registry models are standardised, we can use them both in the fundamental primary purpose of giving patient care without boundaries, without transitions, but it will also be useful for secondary use.

Pablo Serrano Balazote
Former scientific coordinator of the InfoBANCO project

Better in numbers



About Better

Better has been transforming healthcare for 30 years with the market-leading openEHR digital health platform, electronic prescribing and medication administration solution, and the low-code tools that help healthcare organisations rapidly build applications that suit their specific needs.

- We focus on **simplifying the work of health and care teams** by designing solutions that are user-friendly and focus on improved outcomes for citizens, clinicians, and organisations alike.
- We **accelerate digitalisation** and build personalised digital applications by using low-code development tools. They accelerate the development process, and with the help of a drag-and-drop UI, clinicians can create applications precisely as they want.
- We advocate for **data for life** and strive for all health data to be **vendor-neutral** and easily accessible in clinical data repositories throughout the person's life.

We are recognised as an **innovator and thought leader** in several key markets and the worldwide leader in **openEHR**-based products that help build healthcare organisations of the future.

With Better digital health platform, we have been named a Representative Vendor in the **2022 Gartner® Market Guide for Digital Health Platforms**.

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