openEHR & FHIR
a vendor perspective

Tomaž Gornik, Founder and CEO, Better
Co-chair, openEHR Foundation
Founding partner, Slovenian ECHA Ecosystem
"We have been struggling to make data follow the patient for 25 years! Interoperability is not working! We need a fundamentally different approach."

- Jordi Piera Jimenez
  Director of the Digital Health Strategy Office at Catalan Health Service
"At the moment most live patient data is held by the companies who provide the electronic patient record systems. But it isn’t ‘their’ data. And although isn’t ‘their’ data, too often these systems act as a barrier to accessing it. And it means the data might not be accessible and can’t be properly shared, providing a barrier to the research – innovation”

- Matt Hancock
Secretary of State for Health and Social Care
Rewired, March 18th 2021
"I want to explore whether we can remove this barrier to innovation and separate the data layer from the application layer so providers can offer the application software and the data will be stored separately and securely in the cloud, then we have a consistent data platform across the NHS."

- Matt Hancock
Secretary of State for Health and Social Care

Rewired, March 18th 2021
“COVID-19 crisis provides a ‘burning platform’ for accelerating the data agenda in health care. Health care data is exponentially more powerful if connected, combined and shared”
Data is for life, not just for one system. If we consider that as a principle, we will design and procure systems differently.

Rachel Dunscombe
CEO NHS Digital Academy
Now

Enterprise

Many systems

Limited interoperability

Within one enterprise, typically 200 to 400 systems exist, made up of different technologies and different vendors, many of which are not complementary and where logic is bundled with applications.

Present: Many systems all with intimately bound data logic and applications

In five years

Systemic design
Common standards where data is:
- Provenanced
- Permissioned
- Persistent

Secure
Cloud-based
Modular plug-and-play

Extensible Data layer
Vendor neutral

Logic units

EHR core
Mobile apps
IoT
Voice
Wearables
Implants
Personal devices
Sensors
Billing and reporting
Medical devices
Social determinants
AI
AI
AI

Future: A cohesive technology stack, giving a unified experience for clinicians, professionals and patients; unique data at the center accessed by applications in real time through micro-services
Present-day enterprise systems
Many systems all with intimately bound data logic and applications. Within one enterprise, 200-400 systems can exist made up of several different vendors (many of which are not complementary) and where logic is bundled with the application.

Intermediate-state platform
A more flexible, dynamic infrastructure will be built around existing systems, communicating through modern APIs. In the near term, platform-based systems and legacy EHRs will coexist by maintaining basic functionality in legacy systems while building and innovating in a platform-based environment.

Future-state platform
A cohesive technology stack, giving a unified experience for patients, professionals and consumers; unique data at the center accessed by applications in real time by microsystems.
The Target Architecture Is Clear Enough

Legacy Construction

- User Interface
  - Application
  - Database

Adaptable Construction

- User Interfaces
- Digital Healthcare Orchestrator
- Application Inventory
- Healthcare Data Fabric Mediator
- Data Repository

Building the Digital Health Platform for Provider CIOs, October 2020
Introduction
Putting Data First
Digital Health Platforms
Openehr & Fihr
Use Cases
Better Ltd
Unified, personalised application experience portal and design system

Agile delivery of applications low-code tools

Vendor-neutral data core longitudinal care record

Digital Health Platform
Unified, personalised application experience

Portal and design system

Fast delivery of applications

Low-code tools

Vendor-neutral data core

Longitudinal care record
Unified, personalised application experience portal and design system

Fast delivery of applications low-code tools

Vendor-neutral data core longitudinal care record
Digital Health Platform

Rich care record built around the patient, not institution: “one patient, one record”
Digital Health Platform

Rich care record built around the patient, not institution: “one patient, one record”

Governance of data models
Choice of apps, vendors
Digital Health Platform

Rich care record built around the patient, not institution: “one patient, one record”

Governance of data models
Choice of apps, vendors

Ecosystem of apps, built once
Digital Health Platform

Rich care record built around the patient, not institution: “one patient, one record”

Governance of data models
Choice of apps, vendors

Ecosystem of apps, built once
Gartner believes that truly effective and sustainable open architectures will need a capability for vendor-neutral data persistence, such as utilizing a common schema or set of archetypes and rules for managing structured and unstructured data (for example, a VNA, openEHR or IHE XDS repository). Providing open messaging standards (for example, FHIR, HL7) for data exchange in specific use cases will only go so far in meeting the architectural challenges of digital citizen-centric care delivery.

– Gartner Group
Digital Health Platform Handbook:

“Good planning will involve a risk assessment of the three standards stacks currently approved at the international level (HL7, openEHR, and IHE)”

Building a Digital Information Infrastructure (Infostructure) for Health, Year: 2020
openEHR & FHIR

openEHR optimized for:

• Storage of data in vendor neutral format
• Clinically designed models following “maximal dataset”
• Semantic querying of data through AQL

FHIR optimized for:

• Exchange of information between systems
• Common models following “80/20” rule
• Exposing data through industry adopted API’s

Alastair Allen, 2019
Key principles of our approach

• Digital health platform with open data and open APIs
• Modular and flexible architecture
• Low-code approach to building and assembling an IT portfolio
• User-centered design
• Close collaboration with community
Unified, personalised application experience portal and design system

Fast delivery of applications low-code tools

Vendor-neutral data core longitudinal care record
Platform Architecture

Legend
- Better Portal
- Tools
- Core Services
- Extras
- other products

API
- openEHR/FHIR

Collaboration
- Comms
- Messaging
- Notifications
- Comments

Workflow
- Simple tasks
- CMN/BPM
- Task planning

Decision support
- DMN
- GDL
- Expressions

Demographics
- FHIR

Core data services
- openEHR
- EHR Server
- Doc Store
- Binary Store

Data views
- Monographs
- Cohorts
- View/Cache
- Patient Proxy

Analytics Data Science
- BI / Reporting
- AI / ML
- R
- Text to Struct

Research
- Anonymisation
- Synthetic data
- OMOP

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Integration / Mapping / ETL
- Legacy Data
- Patient Generated Data

Event Processing
- Devices / IoT
- External Cloud Services

Asynchronous / Event Streaming

Legacy Data
- Patient Generated Data

Event Processing
- Devices / IoT
- External Cloud Services
Archetype Designer supports FHIR Terminology Server including browsing & referencing FHIR CodeSystems & ValueSets for coded concepts in openEHR models
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Easily build models, queries and smart forms
Data entry and display
Widgets for advanced display
Incorporate external data through APIs
Web and mobile
Preloaded with rich set of assessment and scales forms
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Preloaded with rich set of assessment and scales forms
Ward List
Patient Summary view
Timeline view
User management
Prebuilt set of commonly used assessments and scores
Web based and responsive design
ADT Integrations
Manage multiple patients safely and seamlessly
A holistic approach for treating patients with multiple chronic conditions
Early identification of deterioration (i.e. Antimicrobial stewardship)
Always have all patient data readily available
Improved communication and collaboration
Reduced ADRs and completely prevented never events
Ready-to-use, flexible, and scalable application for electronic medication management in any hospital department

- State-of-the-art future-proof application for end-to-end medication management
- Helps reduce medication errors and missed doses
- Gain efficiency in medication-related workflows with reduced time spent

Medication management based on an open platform

- intuitive and easy-to-use by clinical staff
- closed-loop medication management
- CE-marked dose calculator
- BI reporting
- successfully deployed in 10 NHS Trusts

Successfully deployed in 10 NHS Trusts
Care plans

ICHOM - PROMs
Create new registries (no-code)
Create care plans (no-code)
Add tasks and reminders
Assign patients to case-specific care-plan (groups and sub-groups)
Fully customisable and easily extendable
CENTRALISED REGISTRY OF PATIENT DATA (CRPD)
Ministry of Health
Slovenia

National environment based on a digital health platform (DHP) providing robust and scalable foundation for exchanging and sharing electronic health records and supporting central applications for 2 million citizens.
Centralised Registry of Patient Data (CRPD)

Core part of the Slovenian national eHealth project with an important mission to improve the quality of health services with effective electronic solutions. It is a crucial component of the national information infrastructure that enables integration of various information systems.

- Data stored around the patient on a **vendor-neutral** clinical data repository providing **longitudinal patient record**
- Integrated care records (ICR) serves as a **single source of “truth”** for the lifetime of the patient.
- Infrastructure for **digital services** based on shared care records
SCOPE

• Medical documentation (discharge summary, clinical notes)
• Structured core data set: diagnoses, allergies, vaccinations, surgical procedures, dispensed medications, diagnostics data (Lab, Imaging),...
• Referral data, Consent document, Access policy data, other relevant information

BENEFITS

• Innovations and rapid development on fit for purpose services and apps (like Covid-19 SMS notification service in 14 days)
• Engaging patients in the care process providing them access to their medical records
• Providing relevant information for all stakeholders involved in a patient care process and improve decision support
• Population health monitoring and epidemiological monitoring
• Data available for research and secondary use

USAGE

• In total 120M documents: 85M structured, 35M unstructured
• Data available for more than 2M individuals (UniqueID) covering over 95% of population
• 1.2M Vaccination records, 3.2M Covid-19 test results (PCR + rapid), 900k PCR reports
Centralised Registry of Patient Data (CRPD) Digital Covid-19 Certificate

Using integrated care record data with already collected data for Vaccinations and test results (Antigen, PCR)

Configure AQL parametrised view for DGC service in 1 hour

- CRPD provides standardised APIs for retrieving relevant data for generating DCC (demographic data, vaccination data, test result data)
- DCC service generates DCC according to defined specifications (structured and digitally signed)
- DCC is available as onDemand document including QR code

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<td>Collecting data</td>
<td>Providing data</td>
<td>Generating DCC</td>
<td>Making DCC available</td>
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- CLINICIAN PORTAL
- VACCINATION REGISTRY (VRC)
- COVID-19 SCREENING
- VACCINATION RECORDS
- COVID-19 TEST RESULTS

- DCC SERVICE
  - DEMOGRAPHIC DATA, VACCINATION DATA, TEST RESULT DATA
  - DCC (PDF, JSON, QR CODE)

- PATIENT PORTAL
- PATIENT MOBILE APP
- VCP EMR

- INTEGRATED CARE RECORDS
- CORE DATA SET (VACCINATIONS, LAB DATA)

- IHE MEDICAL DOCUMENTS
- OnDemand DOCUMENT

CORE interface service

openEHR TEMPLATE: VACCINATION_RECORD
openEHR TEMPLATE: COVID_19_SCREENING
openEHR Template: AQL PARAMETRIZED VIEW
UNIVERSITY HOSPITALS BIRMINGHAM & WEST MIDLANDS CANCER ALLIANCE

Cancer intervention & diagnostics
SUFFOLK & NORTH EAST ESSEX Integrated Care System

Better Platform
Care Planning
End-of-Life
In one day, we achieved:

- Created NEW: Frailty Care Plan including open APIs (in 3 hours)
- Desktop browser: embedded care plan launch
- NHS Smartcard authenticated log in
- Interopen Hackathon Summary

Clinical data repository

- InterSystems
- Interopen
- Better
- Rospect
- IM1
- Desktop browser
- GP or Community system
- Internet
- NHS Smartcard
- Care Identity Server
- NHS Care Identity Service
- TPP
- EmisWeb
- Interopen
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- NHS Care Identity Service
Care planning must support patients, carers, healthcare professionals and system leaders

“I want to ensure my patient’s wishes are met when the time arises.”

“I don’t want to have to repeat the same information over and over again.”

Worries and fears
- I’m overwhelmed already, how is it going to help me and my patients?
- We don’t need a new system
- Bringing the current patients across: they will call the surgery or call me
- Need it all in one place this isn’t just another system

“I don’t have access to the information I need.”
SOMERSET ICS consolidated medication record

Regional medicines platform enables the creation of the ICS patient medication record away from individual provider silos.
OXFORD HEALTH
NHS FOUNDATION TRUST

BetterMeds
Better Portal
Better Platform
THE CHRISTIE NHS FOUNDATION TRUST
Manchester, UK

Better Platform for:
• Clinical forms
• PROMs
• Core EHR
• Research
30+ NHS Trusts and organisations across all 4 nations use openEHR
Introduction
Putting Data First
Digital Health Platforms
Openehr & Fhir
Use Cases
Better Ltd
30 years in healthcare IT

140 employees
Slovenia, UK, Germany

22+ million Patient Records

120+ Customers in 16 markets

1000+ Healthcare providers

15 Partners
SIs, Resellers, OEM
Better improves health and care for all by simplifying the work of health and care teams and accelerating digital transformation underpinned by data for life.
Unified, personalised application experience portal and design system

Fast delivery of applications low-code tools

Vendor-neutral data core longitudinal care record
A New Era of Capability Has Rapidly Evolved
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Monolithic and uneconomical EHRs are impeding digital transformation by blocking data use.

End-to-end disease management will require many apps and applications working with the same data.

Digital Health Platforms offer personalised UX, low-code tools and a vendor neutral data layer.

openEHR is now widely used by the most advanced health systems for data persistence.

FHIR is widely used for data integration and access through standard interfaces.

We need to make use of both!
Thank You!
Better data, Better care

www.better.care