ELNET

GIHF AI

German Israeli
Health Forum for
Artificial Intelligence

Report "Technology & Security"

Implementing FHIR in Healthcare

On March 14, 2023, the German Israeli Health Forum for Artificial Intelligence (GIHF-AI) hosted its second Digital Health Roundtable on the topic of "Technology and Security". Distinguished experts from the German and Israeli healthcare sectors exchanged views implementing the Fast Healthcare Interoperability Standard (FHIR) in healthcare organizations. In their keynotes, Prof. Dr. Sylvia Thun, Director Core-Unit eHealth and Interoperability (CEI) at Charité, and Dr. Uri Lerner, Project Manager at MHS, presented the status quo and use cases of FHIR-implementation in Germany in Israel. The subsequent workshop was led by both keynote speakers and gave participants the opportunity to ask questions, develop ideas for co-operation, and jointly work on recommendations for action. The report complements the March 9, 2023, GIHF-AI Policy Briefing "With FHIR to more use of artificial intelligence in medicine" which was published in preparation of the roundtable including background information to the use cases presented. The following is an initial summary of the recommendations for action developed in the workshop. The ensuing text sums up the key messages from the keynote presentations as well as the workshop. The video recording of the first part of the Digital Health Roundtable (excluding the workshop) is available on the ELNET You-Tube Channel.[1]
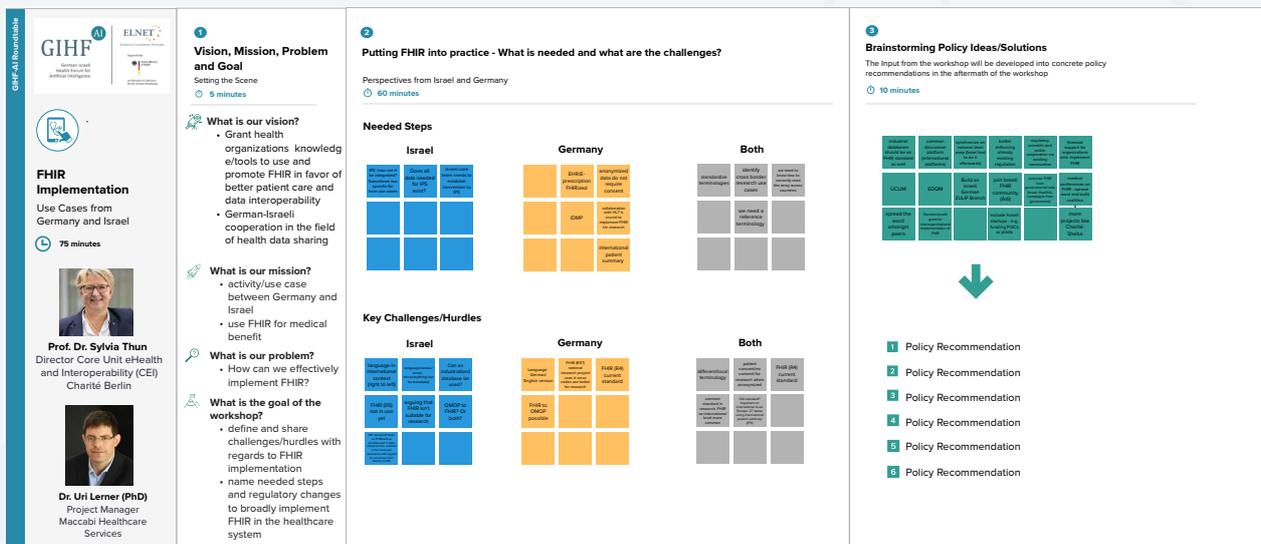

Figure 1: Mural Board produced at the Workshop.

Recommendations for Action

Standardization on international scale

FHIR should be introduced as the prominent international standard for exchanging healthcare information **together with international terminologies and imaging standards**. The implementation and enforcement of existing regulation on FHIR should be improved. FHIR is the key to a coherent health data ecosystem such as the European Health Data Space (EHDS) and it enables cooperation across European borders.

Promotion by government

The **implementation of FHIR must be strongly promoted by the government** to achieve interoperability on a national scale, both in public and in industrial databases. **Timely synchronization of standards** (including terminology in various clinical fields) is crucial to prevent the need to regulate and adjust after health data is fully digitized in various standards.

Financial support for healthcare organizations

Financial support should be granted to organizations who use or want to use FHIR to incentivize the broad implementation of FHIR in public as well as private hospitals, outpatient clinics and practices. Creating the infrastructure and know-how necessary for FHIR-implementation is costly and time-intensive for medical service providers, which is why support is needed.

Promotion and funding of existing initiatives

Existing FHIR-communities, teaching, and conferences on FHIR should be promoted and funded to broaden regulatory, scientific, and public exchange and cooperation via existing communities as well as to spread the word about the advantages of FHIR. International FHIR platforms can serve as facilitators and strengthen ties between the international FHIR-community.

German-Israeli FHIR grant

A German-Israeli grant for interorganizational implementation of FHIR should be set up to pave the way for common projects. This can lead to both more collaboration between German and Israeli hospitals as well as the inclusion of Israeli Digital Health startups. The goal should be the identification and implementation of bilateral research use cases.

Integration of HL7

Health Level 7 International should be closely integrated in the decision-making and regulatory processes. For the purpose of stronger German-Israeli collaboration, it is also recommended to connect the German and Israeli HL7 communities and develop shared projects.

"FHIRizing" without Interfering: Maccabi's Diagnosis Management with the help of FHIR

Based on the presentation of Dr. Uri Lerner, Project Manager, Maccabi Healthcare Services

Israel's second largest Health Maintenance Organization (HMO), **Maccabi Healthcare Services (MHS)**, with 2.6 million members, was the **first HMO in Israel to engage in implementing FHIR**. In order to successfully do so, MHS followed a roadmap that focused on a **small-scale project in the beginning** in order to **learn how to implement FHIR on a large-scale, namely Maccabi's entire Electronic Medical Record (EMR)**. Maccabi's vision for FHIR implementation includes a structured mapping process consisting of three steps: Firstly, **mapping all components of the medical record** (clinical, administrative, services). Secondly, **mapping all data sources** (internal and external). Finally, **FHIR is supposed to be adapted in the entire medical record** resulting in highly flexible and interoperable medical record capabilities.[2]

The presented **diagnosis management use case** started with **understanding the existing internal medical (EMR) and financial data, as well as external clinical and financial data**. EMRs with around 55 million yearly messages, and financial data, with around 1.6 million yearly messages, are coded with local MHS-codes. **External data**, such as medical data from hospitals, with around 3.5 million messages, **can be confidential in part, and will not be shared with the entire organization** (but should be stored as FHIR resource, classified accordingly). Billing data from hospitals and other independent suppliers, with around 880.000 yearly messages, can be coded in ICD-9 and-10 as well as modified ICD-9 codes or unknown codes.[3]

Among the **key learnings from the use case** was that **coding particularities need to be modified for the FHIR conversion**. This enables the inclusion of all the data. Furthermore, there **may be data overlap from the different sources which needs to be taken into consideration**. A challenge during the

FHIR modelling process was **how to "FHIRize" without interfering the data flow** since the data needs to be used during the process. The conversion to FHIR had the positive side effect that the existing data was improved during the process. Lastly, **FHIR implementation comes with a terminology change to SNOMED CT** for example, where mapping is available or manageable within the project's timeframe.[4]

In conclusion, **FHIR implementation needs to be conducted in an organized and well-structured way**. The process needs to be mapped, including business and tech aspects. **Smaller projects in the beginning help to understand FHIR better and conserve scarce resources**. The outcomes can be used for large-scale FHIR implementation later on. One of the most **crucial aspects is the involvement of experts from clinical, medical informatics and digital teams**, as well as the constant promotion of the advantages of FHIR within the organization.[5]

Implementing FHIR on a large-scale in Germany thanks to institutionalized processes

Based on the presentation of Prof. Dr. Sylvia Thun, Director CEI at Charité

Since there are **just a few Electronic Health Records (EHR/EPA) and comprehensive digital EMR in hospitals and outpatient care in Germany** yet, the implementation process of FHIR is quite different than in Israel, where EMRs exist for over 20 years. In comparison to Maccabi's use case and vision plan with the goal to map and transform existing data to FHIR, **Germany has the chance to structurally map data to FHIR from the beginning**. The recently published German digitization strategy from the Federal Ministry of Health emphasizes the need for interoperable data, preparing the ground for broad implementation of FHIR.[6]

One of the **main organizations implementing interoperability in Germany is the Interop Council**. The Council's **roadmap for 2023 and 2024** includes the decision that **new specifications should be based on HL7 FHIR**. The council already uses ICD-

10 and soon ICD-11 as well as SNOMED and LOINC, paving the way for smooth implementation of FHIR. However, **mapping old specifications to FHIR is difficult** since the specifications aren't as detailed as on FHIR. The Interop Council makes sure to **include both patients and doctors** in order to develop the best outcome for all stakeholders involved. Decisions will be made **under the recommendations of ISO, the Joint Initiative Council (JIC) and the World Health Organization (WHO)**, both making sure that FHIR will become the global standard.[7]

The first project of the JIC was the **International Patient Summary (IPS)**. It started off as a **European project** called European Patient Smart Open Services (epSOS*), **initiated in 2008** in order to build an EHR for Europeans. After being **bridged with US specifications within the EU-funded Trillium Bridge project, the IPS became an ISO Standard (ISO 27269:2022)** based on SNOMED ICD-10 and HL7 Clinical Document Architecture (CDA). Today the JIC is working on **mapping to FHIR and also the European Health Data Space (EHDS)** proposal points to IPS on FHIR, setting regulatory framework for data standardization in Germany.[8]

Amongst use cases in Germany specifying FHIR is the **Core Data Set, which is built on the International Patient Summary**. Also, the **German Corona Consensus Dataset (GECCO)** for the standardization of COVID-19 research is based on FHIR, using SNOMED and LOINC. The **EU project ORCHESTRA** (Connecting European Cohorts to increase common and effective SARS-CoV-2 Response) applies GECCO as well.[9]

A successful example of **FHIR implementation in the hospital setting is the IT-cooperation between Charité – Universitätsmedizin Berlin and Vivantes**, enabling exchanging FHIR-based data between all hospitals linked to Charité and Vivantes. One of the biggest use cases of FHIR implementation in Germany is the development and progression of the **German EHR, the so-called elektronische Patientenak-**

te (ePA), which is supposed to be mapped on FHIR. The 2.0 version from 2022 includes data from prenatal care, vaccinations, dentistry, and pediatrics. Its successor, the ePA 2.5 from 2023, will also include data from Digital Health Applications (DiGA), laboratories, telemonitoring and disease management.[10]

Hence, **using FAIR (Findable, Accessible, Interoperable and Reusable) data, enhancing the reusability of data, extracting the maximum benefit from digital data sources, and allowing automatic processing (e.g. by AI) with the help of FHIR,** aids the democratization of medicine. Through the application of FHIR, health technologies will be made accessible globally, healthcare will be improved, innovations fostered, and translational medicine enabled.[11]

Conclusion

The keynote speeches as well as the workshop leads to the **conclusion that although mapping FHIR can be challenging**, especially when health data is already digitized in an EMR like in Israel, it is **worth the effort**. The **FHIR standard is key to a democratic and coherent international health data ecosystem** and will help **improve healthcare and foster innovations such as the use of AI in healthcare**, which is dependent on interoperable data. Therefore, the **implementation of FHIR must be strongly promoted and supported by the government as well as the industry**, which tends to be reluctant in many cases. Use cases have shown that **mapping to FHIR can be dealt with easier by developing roadmaps and focusing on smaller projects** first in order to understand the process better. This **paves the way to large-scale implementation such as in EMRs and EHRs**. In order to convince peers to use FHIR and share experiences, it is necessary to **spread the word and promote the advantages of FHIR**. Furthermore, it is recommended to **join national and international FHIR-communities**, **connect the German and Israeli HL7 communities**, and **develop shared projects**.[12]

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3. **Ebd.**

4. **Ebd.**

5. **Ebd.**

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GIHF-AI is an initiative by ELNET-Germany, a think tank and network organization in the context of German-Israeli relations. We work independently and across party lines on the basis of shared democratic interests and values. Better mutual understanding is promoted through networking and information exchange. Since its founding in 2007, ELNET has focused its work on the topics of foreign and security policy, antisemitism, and innovation.

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An initiative by:

ELNET Deutschland e.V.

Albrechtstraße 22
10117 Berlin
deutschland@elnetwork.eu

gihf-ai.eu

@GIHFAI

CONTACT

Carsten Ovens

Executive Director
ELNET Deutschland

Lea Ledwon

Program Manager GIHF-AI
ELNET Deutschland

Author: Lea Ledwon
Date: 30.03.2023