EPI infrastructure: A dynamic infrastructure to secure data sharing in healthcare applications

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The EPI project aims to provide self/joint management of medical treatments throughout the healthcare cycle by effectively utilising data usage with scientific algorithms. As an end result, the EPI project processes health data having various sources, governance, and ownership to formulate a personalized outcome of diagnostics, prevention, advice in a real-time effective manner, hence acting as a health digital twin. The EPI project considers the infrastructure which will support the system's data sharing.[fig1]

The need for a dynamic infrastructure in healthcare

- ➔ Achieving secure health data sharing can result with an efficient and effective health care cycle
- ➔ Adaptive infrastructure to enforce a different set of rules for a specific duration of time with the aim of supporting numerous use cases
- ➔ Avoid the "one fits all" security standards

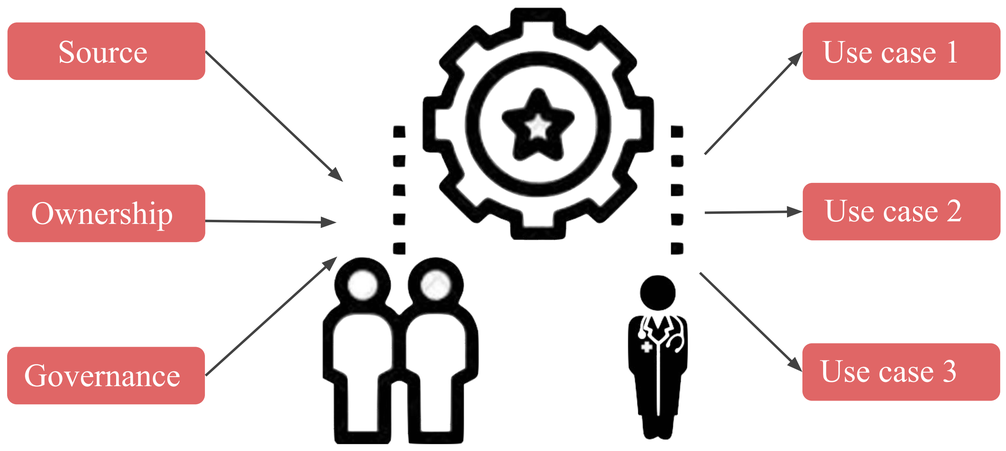


Fig1: The high level view of the infrastructure's considered inputs and outputs

The workflow of building the EPI infrastructure/ application scenario

Rules Translation → Information Flow Control → EPI infrastructure

First, the requirements/ regulations/ consent are translated in to a set of rules that will dictate source, destination, and data shared.

Translate(requirements) = ΣRules

That can be better represented as a set of matrices.

Allowed / Denied

r00	r01	r02	r03	r04
r10	r11	r12	r13	r14
r20	r21	r22	r23	r24
r30	r31	r32	r33	r34
r40	r41	r42	r43	r44

⊕

Supported / Unsupported

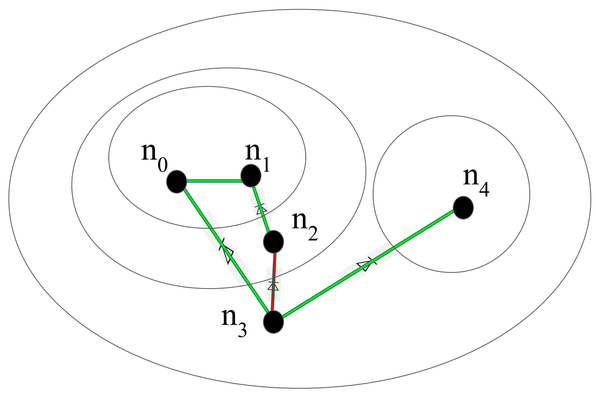
f00	f01	f02	f03	f04
f10	f11	f12	f13	f14
f20	f21	f22	f23	f24
f30	f31	f32	f33	f34
f40	f41	f42	f43	f44

Second, the rules are applied to the infrastructure through IFC mechanisms. This maps to what is allowed/denied. The following arguments ideally should align with what is supported in terms infrastructural attributes.

Apply(Rules, infrastructure) = ΣIFC

Resources are defined as infrastructural attributes. Each network node has to a set of attributes. Nodes relevant to a specific application are segregated to EPI areas to help map to what is supported/not supported.

Build(Infra-Attributes) = infrastructure



The Architecture

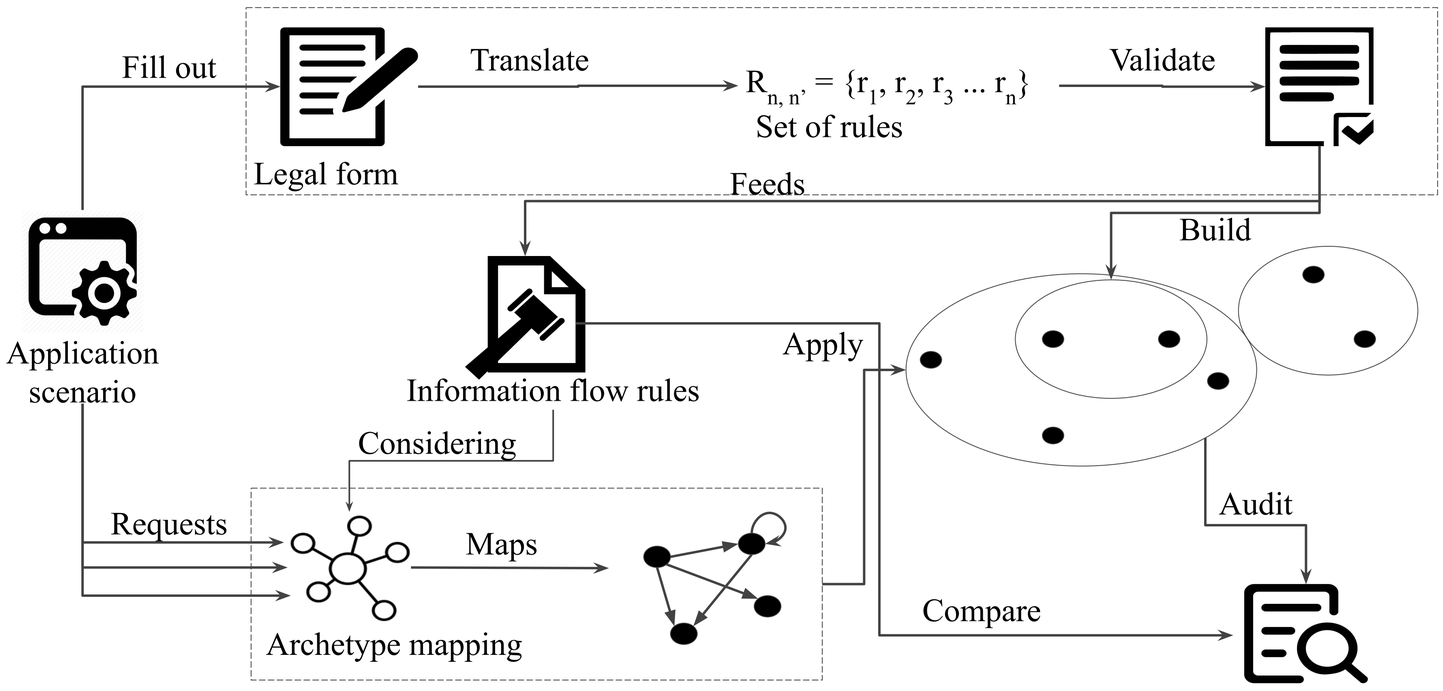


Fig2: The high level view of an EPI architecture

Conclusion

As a result, the architecture will build a different infrastructure/ application request. The future steps of the project will be:

- Bridging the attribute gaps to make other requests feasible
- Auditing information flows
- Evaluate security and complexity of the system

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