Sparked Webinar

August 2024

Acknowledgement of Country

We acknowledge the Traditional Custodians of the land on which we all gather today.

We pay our respect to elders past, present, and emerging and extend our respect to all Aboriginal and/or Torres Strait Islander people, acknowledging the First Peoples as the first scientists, educators and healers.

Agenda

Time	Topic	Presenter/Facilitator
12.00 – 12.05pm	Welcome & introduction	Michael Hosking
12.05 – 12.15pm	Context of Accelerator vs. FHIR applications	Michael Hosking/Michael Wilson
12.15 – 12.25pm	Maintaining FHIR IGs across implementations & architecture considerations/options	Andy Bond (Magentus)
12.25 – 12.35pm	FHIR server deployments integration vs. application servers terminology infrastructure	Marvin Malcolm (Telstra Health)
12.35 – 12.45pm	FHIR in legacy environments, mapping, terminology	Keith Kranz (SA Pathology)
12.45 – 12.55pm	FHIR façade vs. servers FHIR messaging	Sam Blight (Alcidion)
12.55 – 1.00pm	Q&A and Close	Michael Hosking

Sparked Team

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FHIR Expert

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Sparked
HL7 FHIR

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HL7 FHIR

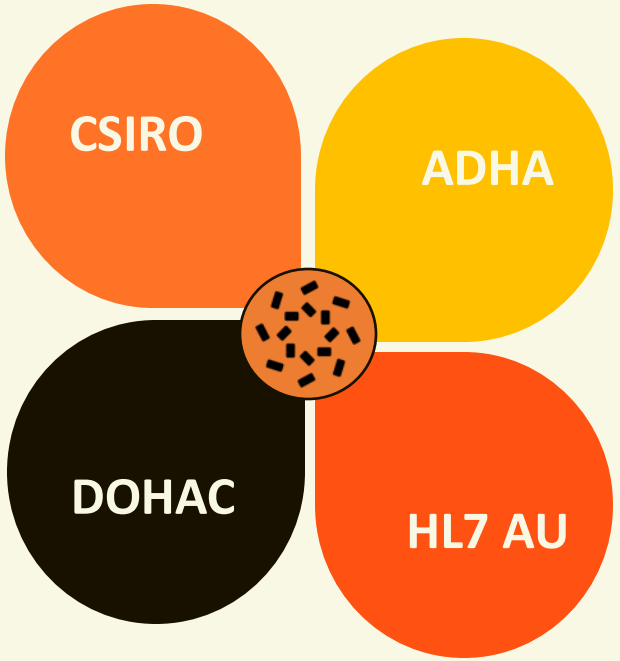
COMMUNITY

comprising **government, technology partners, provider organisations, peak bodies, practitioners, and domain experts**

ACCELERATING

the creation and use of national FHIR standards in health care information exchange

Sparked is supported through a partnership



Standards are only as strong as its community

Over 70 Founding Members and growing

Peak Bodies and Colleges

AAPi Australian Association of Psychologists Inc
ACRRM
Allied Health Professions Australia
AIHW Australian Institute of Health and Welfare
Health Information Management Association Australia
RACGP Royal Australian College of General Practitioners
The Royal Australian and New Zealand College of Radiologists
RCPA The Royal College of Pathologists of Australasia

These organisations **support** the objectives of Sparked and have committed to active participation in the design groups and HL7 AU Connectathons.

We welcome others to register as founding members by 30 August
Contact fhir@csiro.au

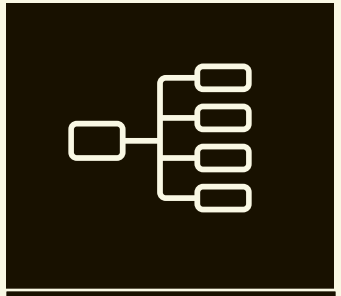
Since our inception, the Sparked community has grown to over

800

sparked.csiro.au

Sparked HL7 FHIR

Sparked Accelerator Scope

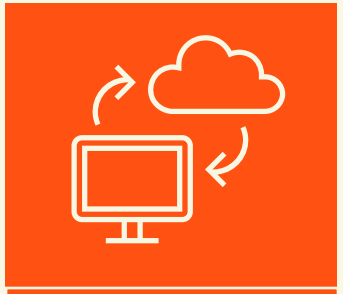


Meaning & Context

Language & Terms

Sharing & Exchange

Testing



Implement

Data for Interoperability (e.g. AU CDI)

- AU CDI - R1
  Published
- AU eReqDI
  Comment review

Clinical Terminology Value Sets

- SNOMED CT and LOINC Value sets
  In development
- RANZCR
- RCPA

FHIR Implementation Guides

- AU Core
  Ballot for working standard
- AU eRequesting
  Ballot for comment

Testing & Piloting of FHIR Standards

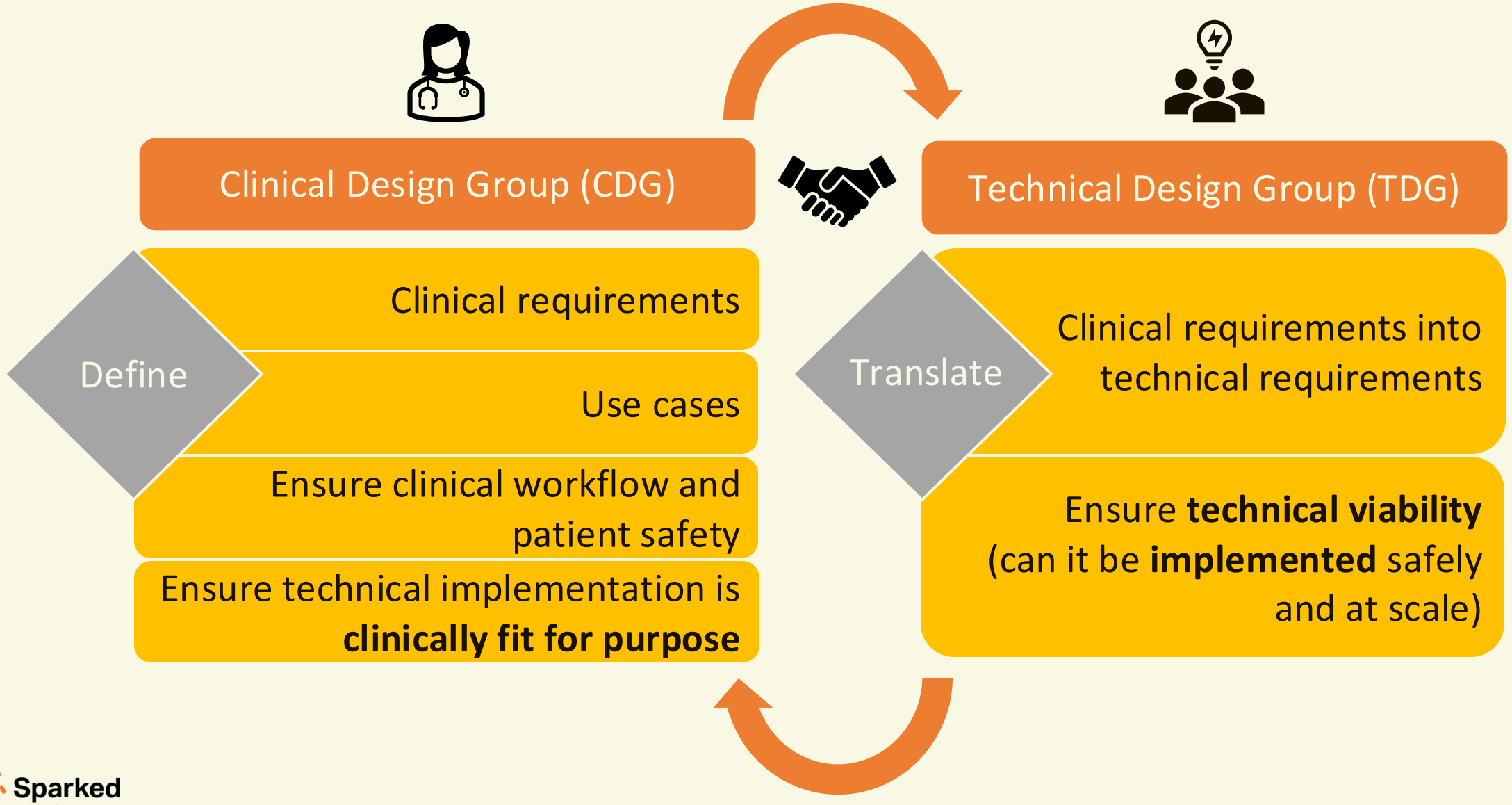
- Testing of FHIR Standards, supported by infrastructure & tooling

Reference Implementations & Testing Service

- Services that support implementation and testing of FHIR based applications

Sparked
HL7 FHIR

High-level process and feedback loop

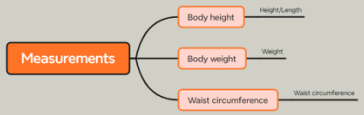


Sparked HL7 FHIR

What is AU Core and Australian Core Data set for Interoperability (AUCDI)?

CDG is here

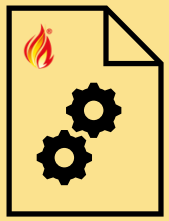
AU CDI



Specifies *"WHAT"* **clinical information** (and corresponding data elements and terms) should be included for data entry, data use and sharing information supporting patient care

TDG is here

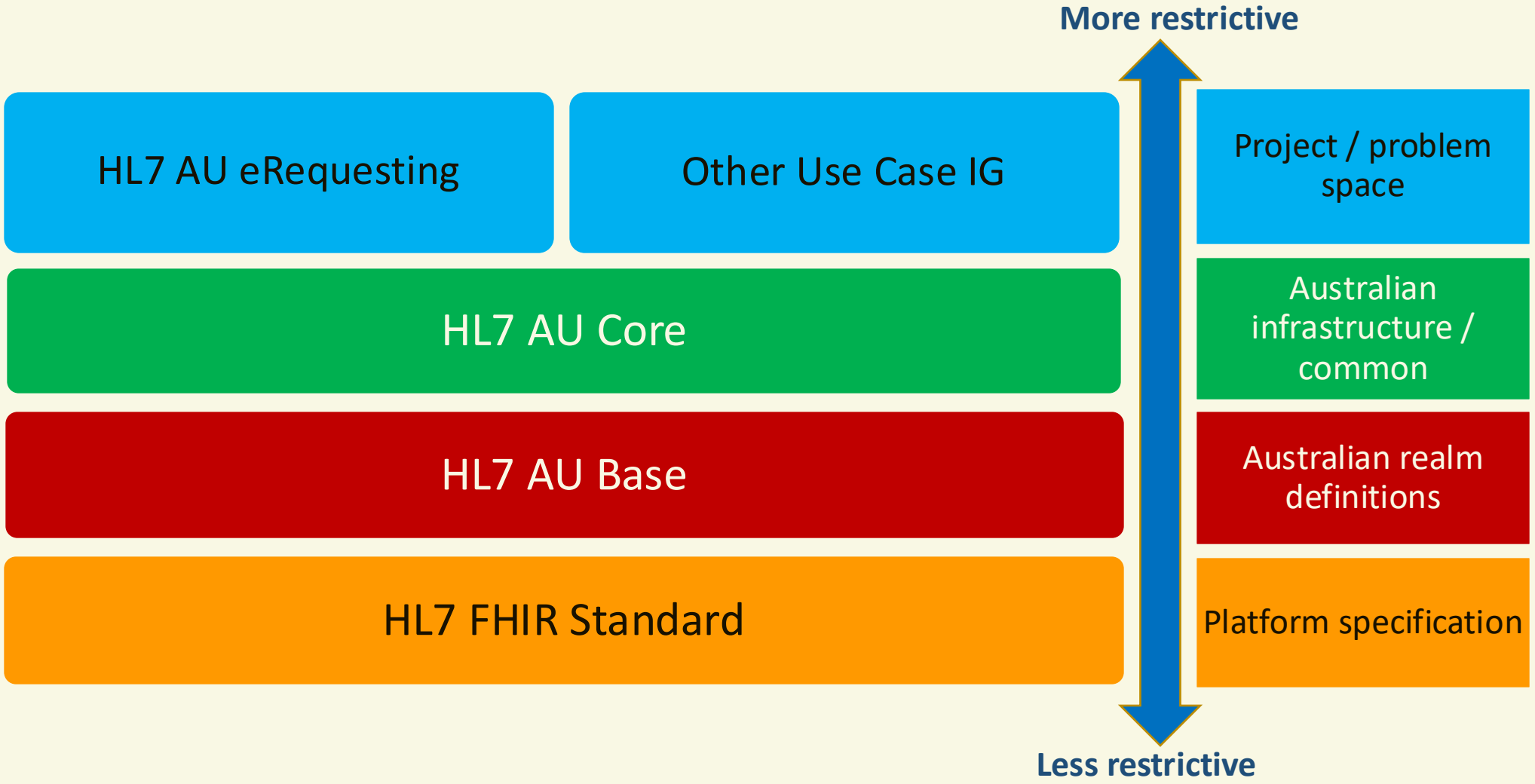
AU Core



Specifies *"HOW"* the core set of data (above) and information should be **structured, accessed** and **shared** between systems

Sparked HL7 FHIR

Relationships between FHIR IGs



Accelerator Vs Implementation

Sparked HL7 FHIR ≠ An **app** or **system**

= A community, iteratively building the data and interoperability specifications for the Australian digital health ecosystem ✓

Sparked

HL7 FHIR

Standards Development (Accelerator)

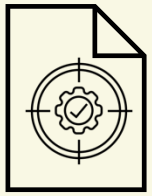
What are we doing?

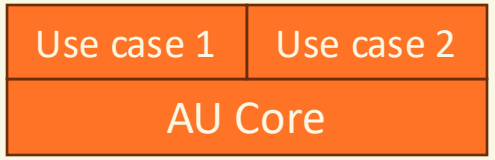
Defining data sharing specifications

Suite of standards

Clinical data standards

FHIR Implementation guides

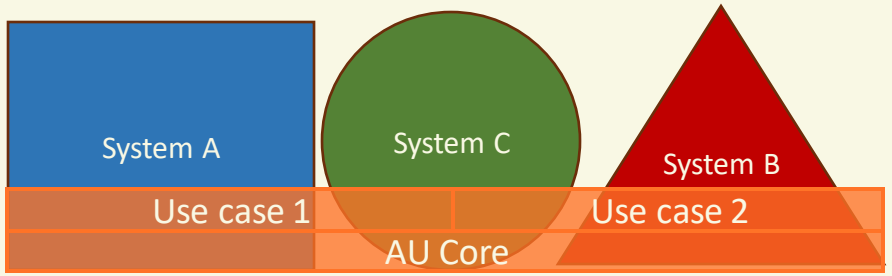




System Implementation

How are they used?

Apply rules in context



Maintaining FHIR IGs across implementations & architecture considerations/options

Andy Bond (Magentus)

Why an Implementation Guide?

- IGs define the data and workflow contract between partners
- Must work across multiple partners to make collaborative care sustainable
- Support at least the common agreement

- Road to mediocrity or enabling innovation?

Magentus

Magentus Practice Management FHIR Implementation Guide

1.2.16 - ci-build

Home | Downloads | Magentus | Bookings | Requesting | Reports | Referrals | Artifacts

Table of Contents > **Home**

Magentus Practice Management FHIR Implementation Guide - Local Development build (v1.2.16) built by the FHIR (HL7® FHIR® Standard) Build Tools. See the Directory of published versions

1 Home

Official URL: **http://fhir.geniesolutions.io/ImplementationGuide/magentus.fhir**	*Version*: **1.2.16**
Draft as of 2024-08-25	*Computable Name*: MagentusPracticeManagement

This FHIR Implementation Guide provides FHIR profiles for the Magentus FHIR Interopability Platform.

The Implementation Guide includes the following profile domains:

- Core - Magentus Core Profiles
- Admin - Financial and Administative Profiles
- Bookings - Electronic Theatre Bookings Profiles
- Requesting - Electronic Diagnostic Request Profiles
- Reports - Diagnostic Report Profiles

- Cross Version Analysis
- IG Dependencies
- Global Profiles
- License
- Copyrights

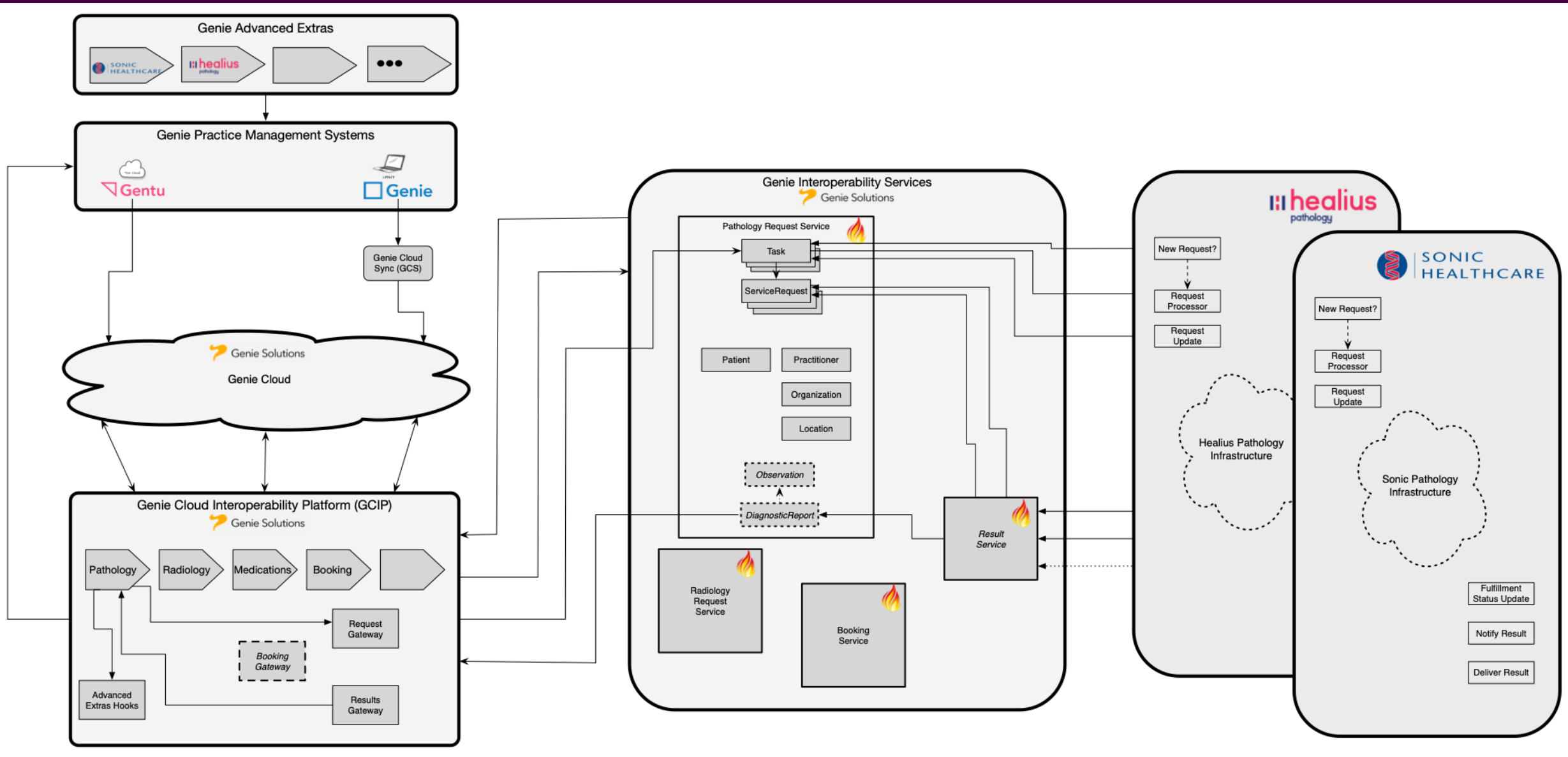
1.1 Cross Version Analysis

This is an R4 IG. None of the features it uses are changed in R4B, so it can be used as is with R4B systems. Packages for both R4 (magentus.fhir.r4) and R4B (magentus.fhir.r4b) are available.

1.2 IG Dependencies

This IG Contains the following dependencies on other IGs.

IG	Package	FHIR	Comment
Magentus Practice Management FHIR Implementation Guide	magentus.fhir#1.2.16	R4	
HL7 Terminology (THO)	hl7.terminology.r4#6.0.2	R4	Automatically added as a dependency - all IGs depend on HL7 Terminology
FHIR Extensions Pack	hl7.fhir.uv.extensions.r4#5.1.0	R4	Automatically added as a dependency - all IGs depend on the HL7 Extension Pack
AU Base Implementation Guide	hl7.fhir.au.base#4.1.2-preview	R4	
HL7 Terminology (THO)	hl7.terminology.r4#5.3.0	R4	
FHIR Extensions Pack	hl7.fhir.uv.extensions.r4#1.0.0	R4	
AU Core Implementation Guide	hl7.fhir.au.core#0.2.2-preview	R4	
International Patient Summary Implementation Guide	hl7.fhir.uv.ips#1.1.0	R4	
HL7 Terminology (THO)	hl7.terminology.r4#5.0.0	R4	
	fhir.dicom#2022.4.20221006	R4	

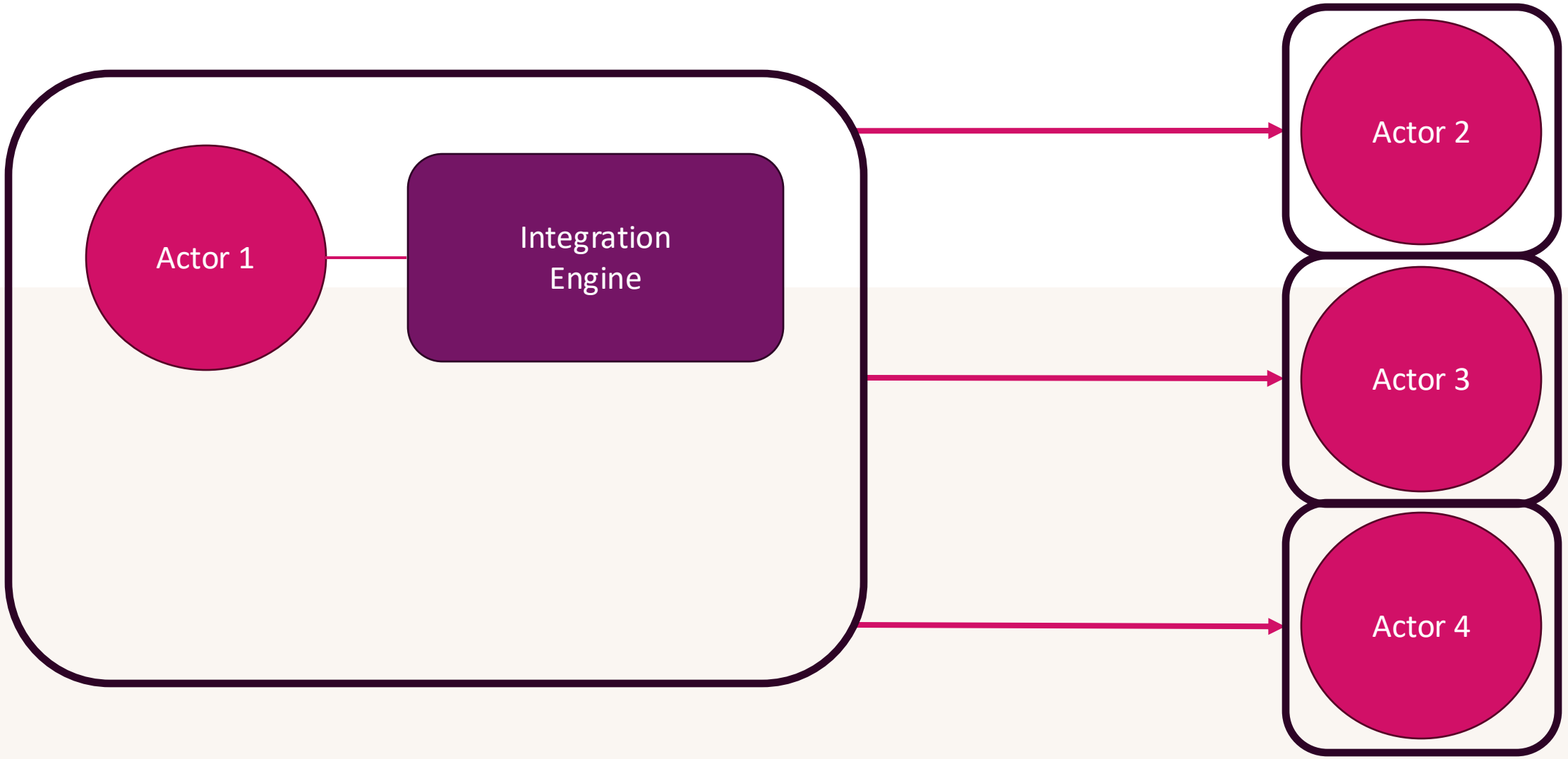

Genie Advanced Extras
SONIC HEALTHCARE
healius pathology
Genie Practice Management Systems
Gentu
Genie
Genie Cloud Sync (GCS)
Genie Solutions
Genie Cloud
Genie Cloud Interoperability Platform (GCIP)
Genie Solutions
Pathology
Radiology
Medications
Booking
Request Gateway
Booking Gateway
Advanced Extras Hooks
Results Gateway
Genie Interoperability Services
Genie Solutions
Pathology Request Service
Task
ServiceRequest
Patient
Practitioner
Organization
Location
Observation
DiagnosticReport
Result Service
Radiology Request Service
Booking Service
healius pathology
New Request?
Request Processor
Request Update
Healius Pathology Infrastructure
SONIC HEALTHCARE
New Request?
Request Processor
Request Update
Sonic Pathology Infrastructure
Fulfillment Status Update
Notify Result
Deliver Result

Maintaining Implementation Guides

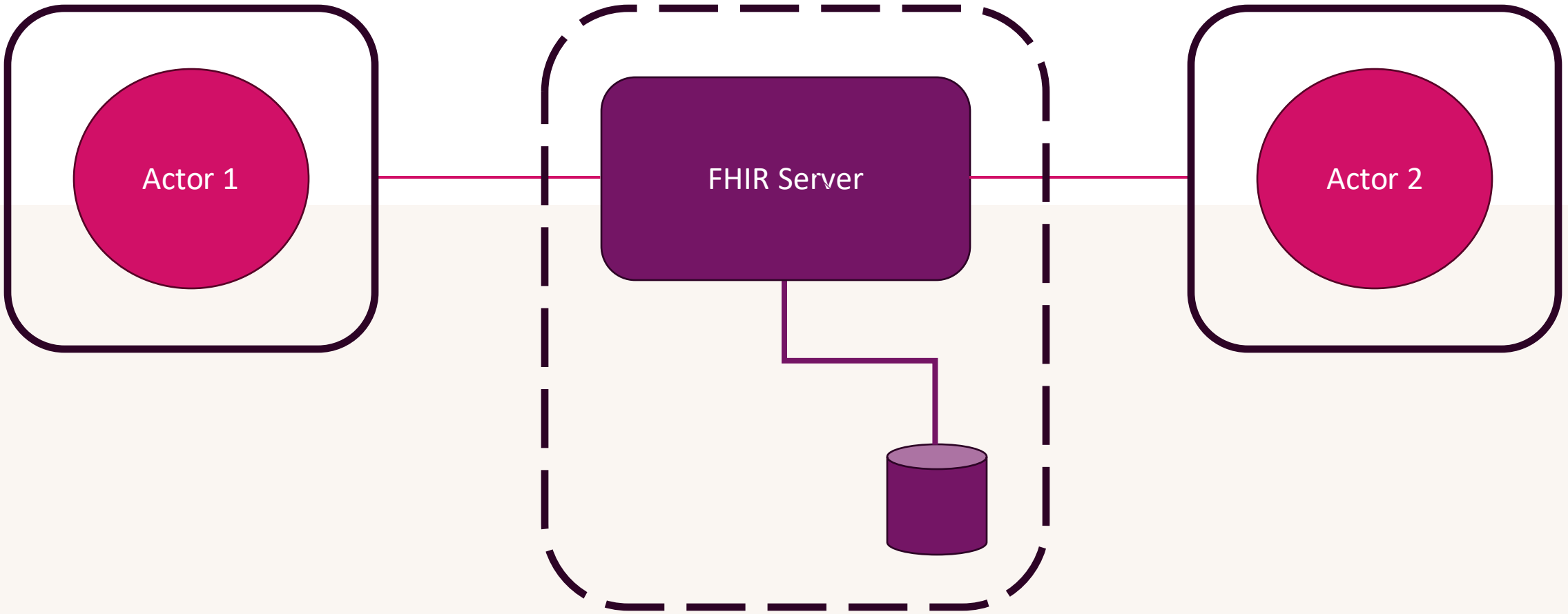
- Be as constraining as required but no more
  - Opportunity for independent partner feature adoption/sophistication
- Put in place foundations for possible future features
- Be thoughtful on Profile, ValueSet foundations including namespaces
- Contained vs independent resources
  - Allowing for multiple options makes for more complicated implementations

- Make the right architecture choice ...

Architecture Options - Traditional

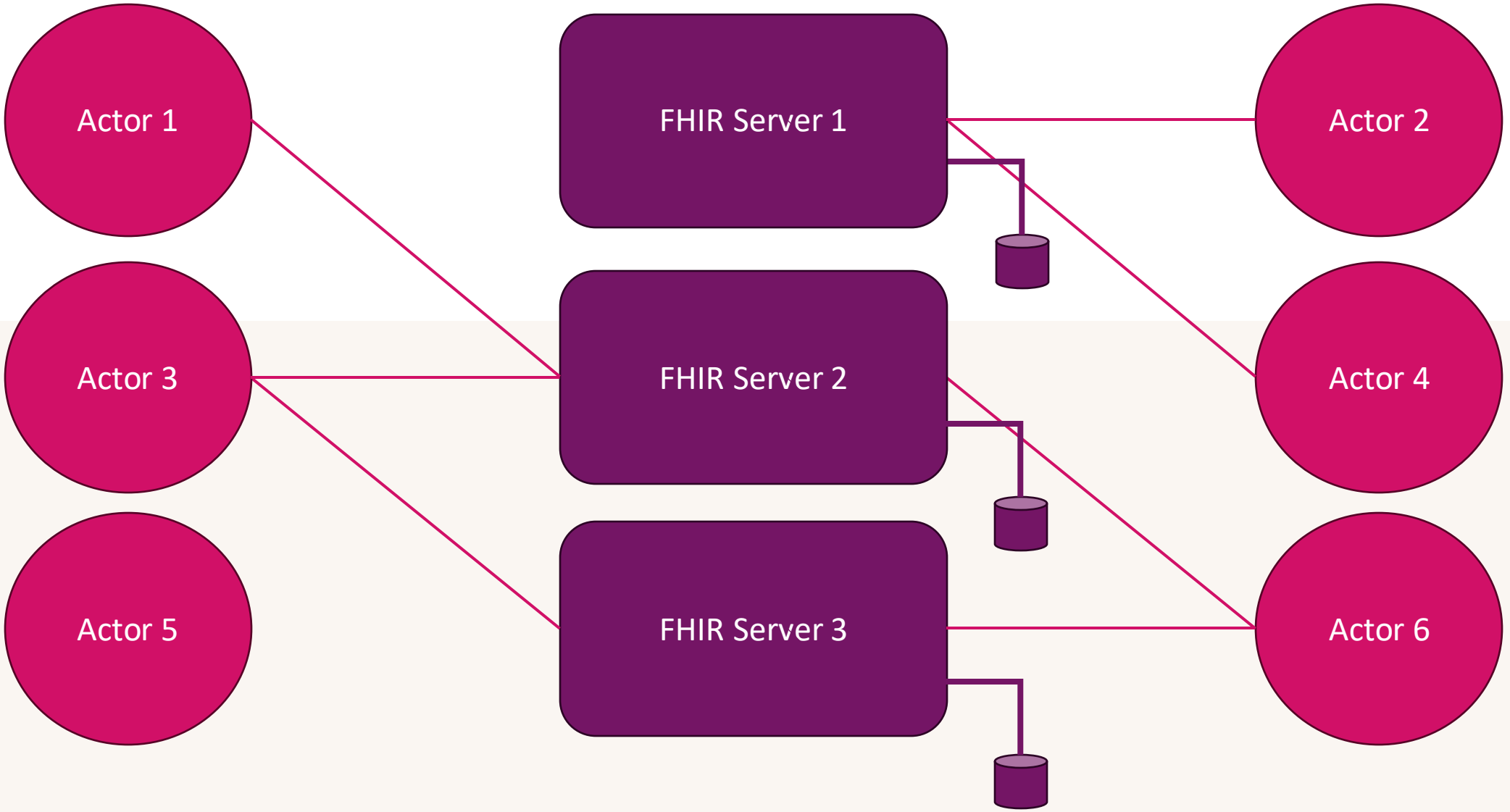


Architecture Options – an Open API



Architecture Options

Open APIs in a competitive marketplace



Lessons Learned

- FHIR is an interoperability contract to support collaborative care, optimised for organisation-to-organisation interworking
- Avoid bespoke partner customisations
- Treat a FHIR API service as a smart data and workflow intermediary
  - A move from directed, point-to-point integrations to discoverable, API-based architectures
  - Network effect of a common API
- Resource versioning is not all it is cracked up to be
- Search sophistication is amazing but re-indexing can be painful

FHIR server deployments integration vs. application servers terminology infrastructure

Marvin Malcolm (Telstra Health)

Health

FHIR Deployments

A Telstra Health Perspective

Health

Observations over the years

Skills

Health

Mixed support in the early days

Few champions and lots of followers

Technical debt was inevitable

FHIR is a fast-moving technology; hard to keep up and have a day job

Copyright Telstra©

Automated deployments

Health

Taken the time to automate deployments and upgrades

Focused on Cloud Native solutions

Automate the configuration

Copyright Telstra©

It’s not your regular SQL application

Health

FHIR search can get complex

If FHIR native, how do you handle the use cases FHIR finds hard?

If FHIR façade, how do you map complex search params to SQL or NoSQL

Approaches to performance

Copyright Telstra©

Data segregation

Health

Adopting common data architecture techniques to the problem

Data aggregation in HIE use cases is always interesting

Use of FHIR Gateways

Copyright Telstra©

Data security

Foundational Capabilities

Infrastructure and operations

Contemporary security standards

Securing data

FHIR Consent

Policy creation UX

Policy enforcement performance

List of multi-disciplinary care team members to correctly apply consent policies

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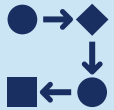
Application design

Health



FHIR is more than just resources

Improving patient care

Supporting legal and regulatory requirements

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Health

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FHIR in legacy environments, mapping, terminology

Keith Kranz (SA Pathology)

SA Pathology
Digital Transformation

SA PATHOLOGY

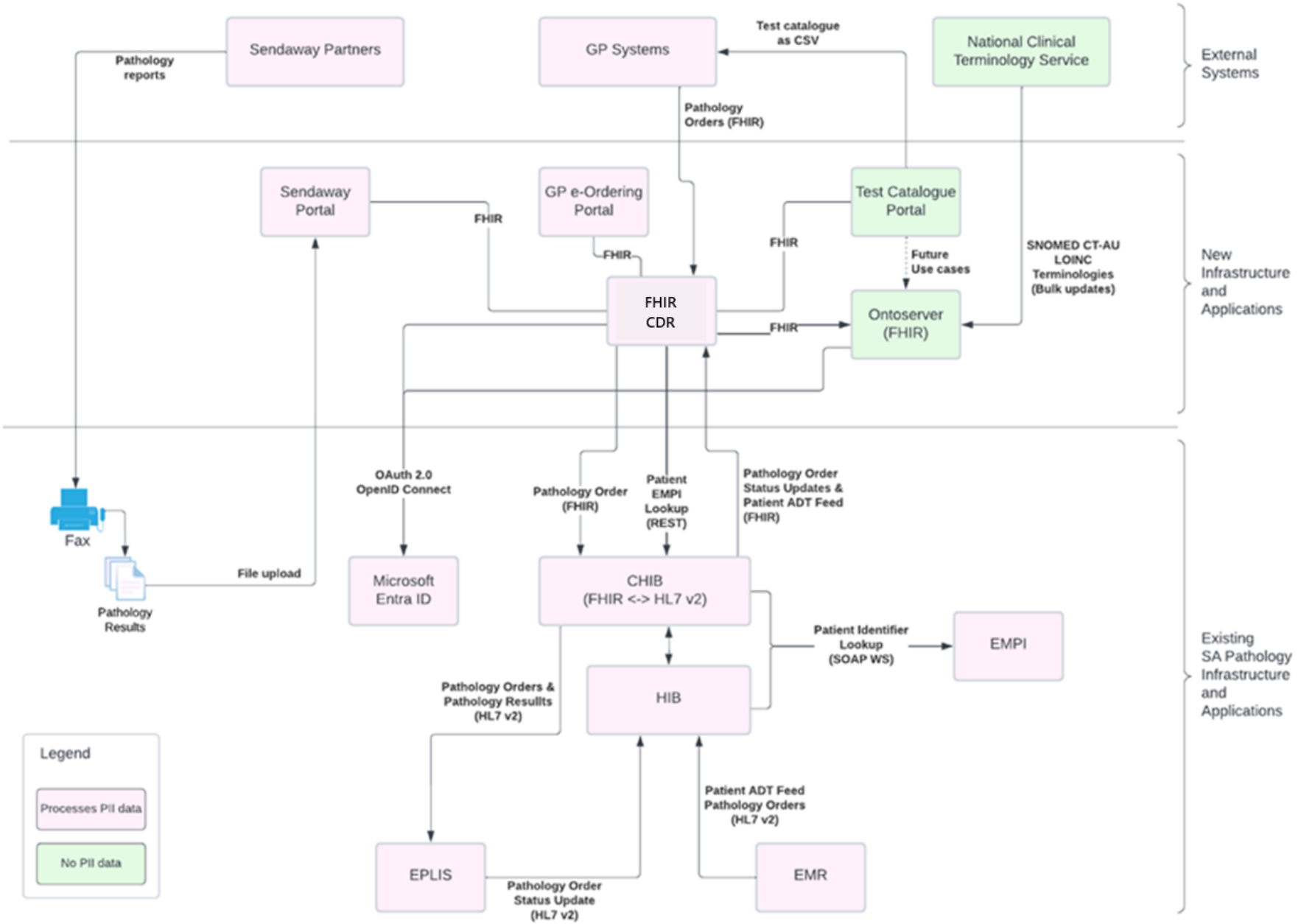
August 2024

Sparked
HL7 FHIR

Committed to FHIR

- Accessibility, Security, Interoperability, Scalability
- Organised data - FHIR resources
- HL7 limited capability – “not self-describing, no tools”
- More agile service channels built on API’s
- Faster build time
- Data Driven rather than Application - Marketplace
- Address gaps in legacy application functionality
- Improved referrer and patient experience
- Improved operational efficiency

Our approach



Terminology

- Standardisation, Universal Language
- Diagnostic Order/Result comparison
- Standardised Pathology Informatics in Australia (SPIA)
- Snomed CT, LOINC, HPO (HUGO)
- A step towards CDS - future trends, automate complex tasks
- Research - create/identify related content
- Minimise complexity
- Significant organisational task, shared learning/knowledge
- NCTS - synchronisation – stage and commit

Integrator – challenges

- “LOT to learn”
- “Converting HL7v2.x.x to FHIR”
- “Not having enough time to dive into the documentation”
- “Ensuring I am using the right IG for object and identifier profiles”
- “the sheer volume of FHIR information available”
- “Access to a nice modelling tool - clinfhir.com”

Integrator - likes

- “gets easier as you use ”
- “living standard, using, improves FHIR itself ”
- “Dynamic searching ”
- “The REST interface”
- “elegance of bundles and how used ”

“*If your intro to FHIR is converting HL7v2.x.x to FHIR, learn FHIR then convert*”

Sources of help

- “HL7.org and HL7.org.au”
- “Interface Engine documentation”
- “Project participants”
- “Youtube resources and dedicated websites”
- Sparked program - https://sparked.csiro.au/index.php/sparked-products-resources/auereqdi/
- Ontoserver - https://ontoserver.csiro.au/site/our-solutions/shrimp/
- Snomed - http://snomed.org/s2sug
  - https://snap.snomedtools.org
- ADHA - education@hl7.com.au (email interest)
  - https://hl7.com.au/training/ (reference website)

FHIR façade vs. servers
FHIR messaging

Sam Blight (Alcidion)

ALCIDION

Sparked FHIR Webinar

Sparked

HL7 FHIR

Sam Blight

28 August 2024

Alcidion and FHIR

ALCIDION

- Miya Precision – our FHIR events based platform
  - First production implementation in 2018
  - Our platform stores data natively in FHIR
  - Active FHIR events bus vs passive FHIR server repository
- Providing the Longitudinal Health Record for the Australian Defence Force JP2060 Health Knowledge Management System
- Through this project extended the platform to include:
  - FHIR Messaging – similar to HL7 messaging with FHIR payloads
  - FHIR Façade – enabling read-only access to the Longitudinal Health Record data

MIYA PRECISION
BY ALCIDION

FHIR core of Miya Precision

ALCIDION

FHIR MESSAGING

Implements a comprehensive integration capability framework to support asynchronous messaging both inbound and outbound from platform

FHIR EVENTS

Platform streams events in FHIR to drive healthcare workflows, clinical decision support and event notifications

FHIR SERVER

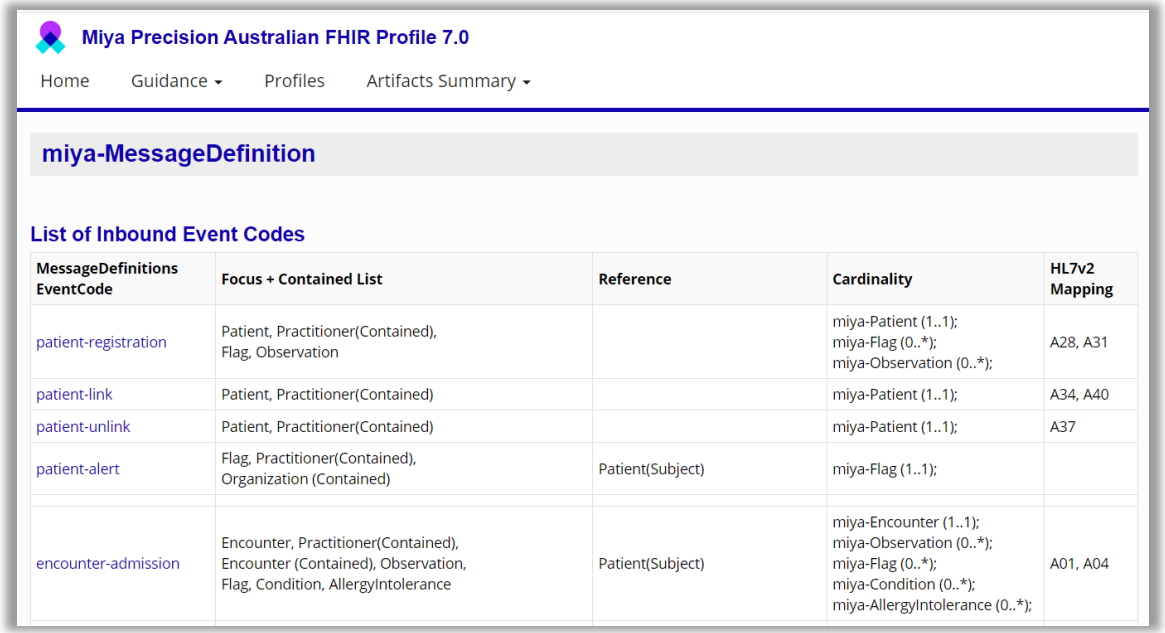
Includes a FHIR repository for data persistence, data validation and lifecycle management

FHIR FACADE

Delivers a FHIR API implementation supporting secure interactions with the platform in an abstracted manner to support version compatibility and access control

FHIR Messaging

- Inbound & outbound FHIR Messaging
  - e.g. encounter-admission is analogous to HL7 A01
- FHIR Message bundle includes
  - MessageDefinition resource defines event code – `encounter-admission`
  - Focus resource(s) – `Encounter 1..1`
  - Supporting resource(s) – `Flag 0..*, Condition 0..*, etc`
- IG details the FHIR Messaging event codes supported



Miya Precision Australian FHIR Profile 7.0

Home | Guidance | Profiles | Artifacts Summary

miya-MessageDefinition

List of Inbound Event Codes

MessageDefinitions EventCode	Focus + Contained List	Reference	Cardinality	HL7v2 Mapping
patient-registration	Patient, Practitioner(Contained), Flag, Observation		miya-Patient (1..1); miya-Flag (0..*); miya-Observation (0..*);	A28, A31
patient-link	Patient, Practitioner(Contained)		miya-Patient (1..1);	A34, A40
patient-unlink	Patient, Practitioner(Contained)		miya-Patient (1..1);	A37
patient-alert	Flag, Practitioner(Contained), Organization (Contained)	Patient(Subject)	miya-Flag (1..1);	
encounter-admission	Encounter, Practitioner(Contained), Encounter (Contained), Observation, Flag, Condition, AllergyIntolerance	Patient(Subject)	miya-Encounter (1..1); miya-Observation (0..*); miya-Flag (0..*); miya-Condition (0..*); miya-AllergyIntolerance (0..*);	A01, A04

https://www.hl7.org/fhir/messaging.html

Active vs Passive FHIR Servers

ALCIDION

- Passive
  - Focus on storage of data in a repository
  - Query server for access to data
- Active
  - Focus on using data to drive clinical and non clinical health care applications
  - Events bus pushes relevant data to subscribers
- Active approach requires
  - Validation of input
  - Automatic completion of tasks, referrals etc upon discharge
  - Generation of derived resources e.g. carry forward observations from previously completed documents and populate clinical record i.e. charts
  - Value sets and terminology translation e.g. emergency activity reporting

FHIR Server Implementation – Our Approach

- Window into our healthcare informatics platform
- FHIR Server vs FHIR Facade
- Uses Fire.ly façade architecture
  - Light weight
  - Avoids need for duplication of data
  - Leverages Miya Precision native FHIR backend and data storage
  - Version and extension agnostic storage
  - Provides a way to manage access, validation and conformance to various versions and national implementations

https://fire.ly/blog/integrating-fhir-with-your-data-architecture-an-overview/

FHIR API

- Read only FHIR API enables open standards access to raw FHIR resources stored in Miya Precision
- Miya Precision FHIR Implementation Guide details FHIR profiles supported

Miya Precision FHIR API - Release Version 7.0.0

2.2.2 Encounter

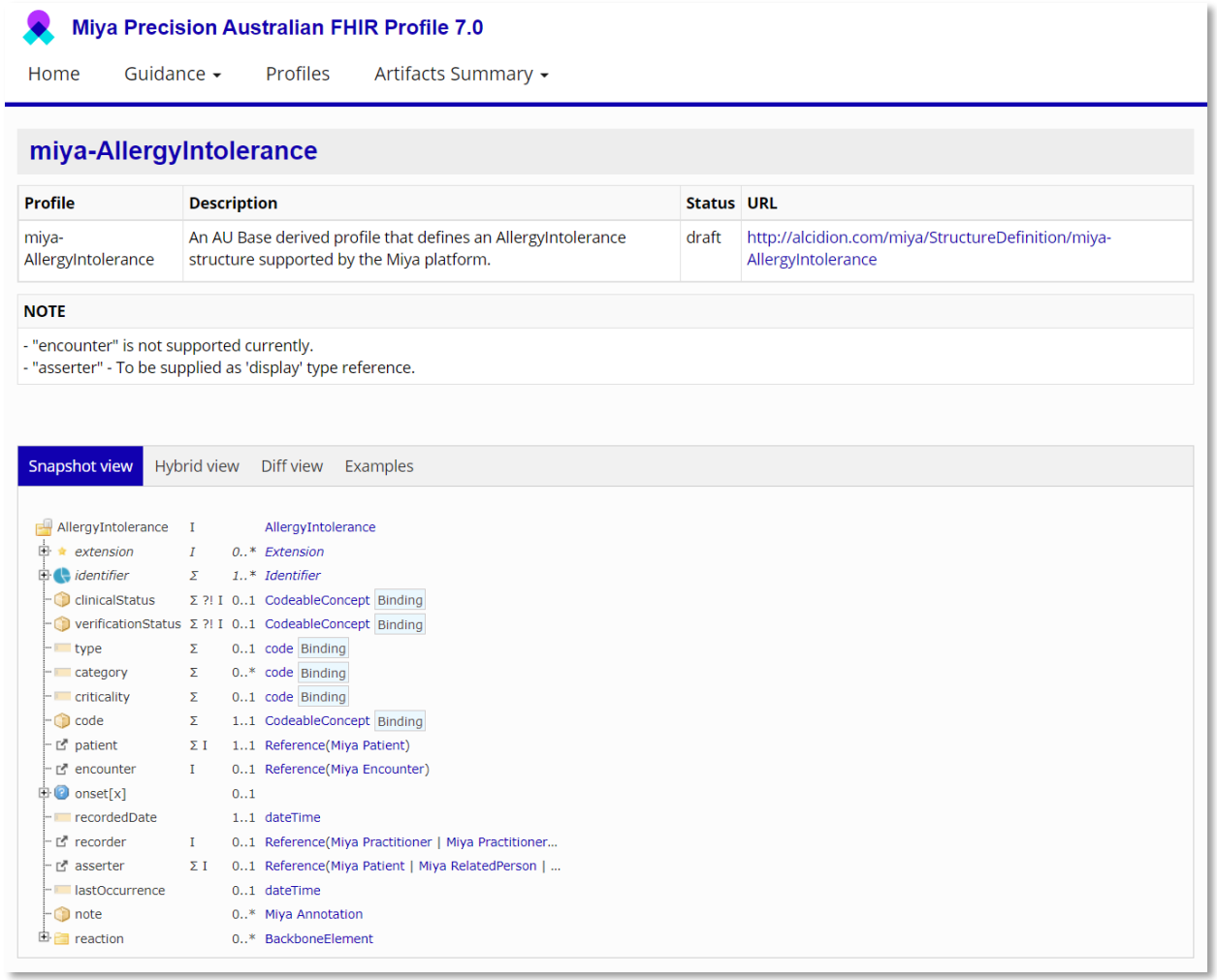
Search Parameter	Example
identifier	https://{environment}/fhir/Encounter?identifier=3f26ff35-f403-5431-8033-c72ae6bdd1ff
status	https://{environment}/fhir/Encounter?status=in-progress
class	https://{environment}/fhir/Encounter?class=theatre
subject	https://{environment}/fhir/Encounter?subject:Patient.identifier=03c80021-789e-5a44-984d-2dc4ea3e8767
periodStart	http://{environment}/fhir/Encounter?date=gt2022-09-01

Table 2-2 Encounter

Miya Precision FHIR Implementation Guide

ALCIDION

- Derived from R4 / AU Base 2/4



Miya Precision Australian FHIR Profile 7.0

Home Guidance Profiles Artifacts Summary

miya-AllergyIntolerance

Profile	Description	Status	URL
miya-AllergyIntolerance	An AU Base derived profile that defines an AllergyIntolerance structure supported by the Miya platform.	draft	http://alcidion.com/miya/StructureDefinition/miya-AllergyIntolerance

NOTE

- "encounter" is not supported currently.
- "asserter" - To be supplied as 'display' type reference.

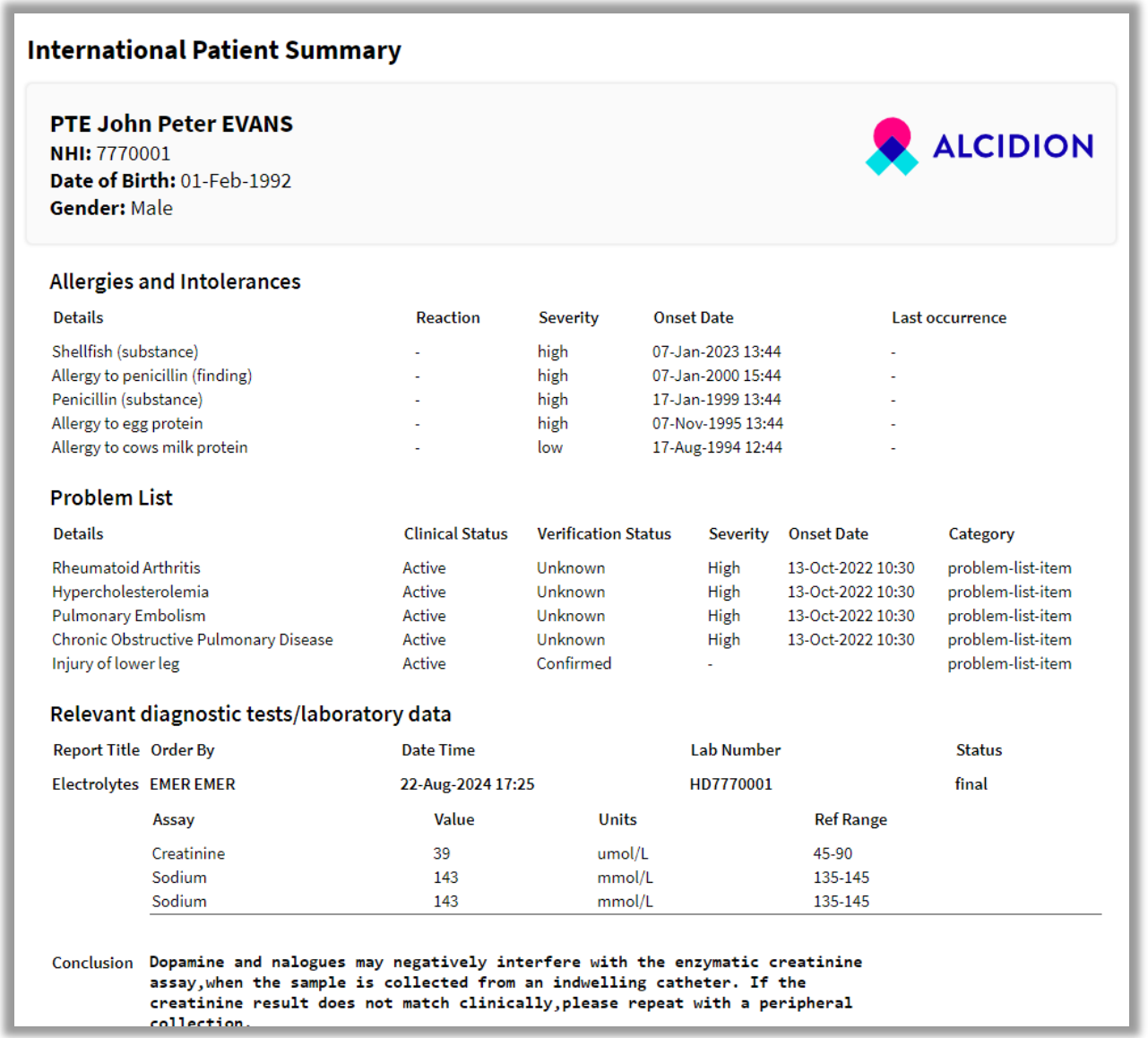
Snapshot view | Hybrid view | Diff view | Examples

AllergyIntolerance	I		AllergyIntolerance
extension	*I*	*0..**	*Extension*
identifier	*Σ*	*1..**	*Identifier*
clinicalStatus	Σ ?! I	0..1	CodeableConcept Binding
verificationStatus	Σ ?! I	0..1	CodeableConcept Binding
type	Σ	0..1	code Binding
category	Σ	0..*	code Binding
criticality	Σ	0..1	code Binding
code	Σ	1..1	CodeableConcept Binding
patient	Σ I	1..1	Reference(Miya Patient)
encounter	I	0..1	Reference(Miya Encounter)
onset[x]		0..1	
recordedDate		1..1	dateTime
recorder	I	0..1	Reference(Miya Practitioner | Miya Practitioner...
asserter	Σ I	0..1	Reference(Miya Patient | Miya RelatedPerson | ...
lastOccurrence		0..1	dateTime
note		0..*	Miya Annotation
reaction		0..*	BackboneElement

FHIR Server Extensibility

- International Patient Summary request plug-in
  - Add /Patient/{{patientID}}/$summary generator
  - Orchestrator over the existing FHIR API

- UK Professional Records Standards Body (PRSB) standard
  - Export discharge summary in FHIR format



International Patient Summary

PTE John Peter EVANS
NHI: 7770001
Date of Birth: 01-Feb-1992
Gender: Male

Allergies and Intolerances

Details	Reaction	Severity	Onset Date	Last occurrence
Shellfish (substance)	-	high	07-Jan-2023 13:44	-
Allergy to penicillin (finding)	-	high	07-Jan-2000 15:44	-
Penicillin (substance)	-	high	17-Jan-1999 13:44	-
Allergy to egg protein	-	high	07-Nov-1995 13:44	-
Allergy to cows milk protein	-	low	17-Aug-1994 12:44	-

Problem List

Details	Clinical Status	Verification Status	Severity	Onset Date	Category
Rheumatoid Arthritis	Active	Unknown	High	13-Oct-2022 10:30	problem-list-item
Hypercholesterolemia	Active	Unknown	High	13-Oct-2022 10:30	problem-list-item
Pulmonary Embolism	Active	Unknown	High	13-Oct-2022 10:30	problem-list-item
Chronic Obstructive Pulmonary Disease	Active	Unknown	High	13-Oct-2022 10:30	problem-list-item
Injury of lower leg	Active	Confirmed	-		problem-list-item

Relevant diagnostic tests/laboratory data

Report Title	Order By	Date Time	Lab Number	Status
Electrolytes	EMER EMER	22-Aug-2024 17:25	HD7770001	final

Assay	Value	Units	Ref Range
Creatinine	39	umol/L	45-90
Sodium	143	mmol/L	135-145
Sodium	143	mmol/L	135-145

Conclusion **Dopamine and nalogues may negatively interfere with the enzymatic creatinine assay,when the sample is collected from an indwelling catheter. If the creatinine result does not match clinically,please repeat with a peripheral collection.**

COMMERCIAL IN CONFIDENCE

Challenges and Lessons Learned

- Extension management and avoiding Z segment overload!
  - AU Base 2/4
  - NHS extensions
  - Vendor specific extensions
- Controlling which extension set(s) are included for a specific customer deployment e.g.
  - Customer extensions
  - Regional extensions e.g. AU, UK etc
  - Alcidion extensions
- De-confliction/reconciliation of ‘similar’ extensions from different sets

Challenges and Lessons Learned

ALCIDION

- Lifecycle management
  - Active FHIR servers rely on the state of one or more resources
  - Quality of the sources of information feeding your server
- Validation
  - Essential to ensure lifecycles are managed
- Access control
  - Limiting who can access what resource(s)
  - Complexity depends on the use case(s) of your solution
- Managing updates to resources from multiple sources
  - Use profiles to control partial updates

THANK YOU

Q & A

Thank you to our speakers

Standards are only as strong as its community

Over 70 Founding Members and growing

Peak Bodies and Colleges

AAPi Australian Association of Psychologists Inc
ACRRM
Allied Health Professions Australia
AIHW Australian Institute of Health and Welfare
Health Information Management Association Australia
RACGP Royal Australian College of General Practitioners
The Royal Australian and New Zealand College of Radiologists
RCPA The Royal College of Pathologists of Australasia

These organisations **support** the objectives of Sparked and have committed to active participation in the design groups and HL7 AU Connectathons.

We welcome others to register as founding members by 30 August
Contact fhir@csiro.au

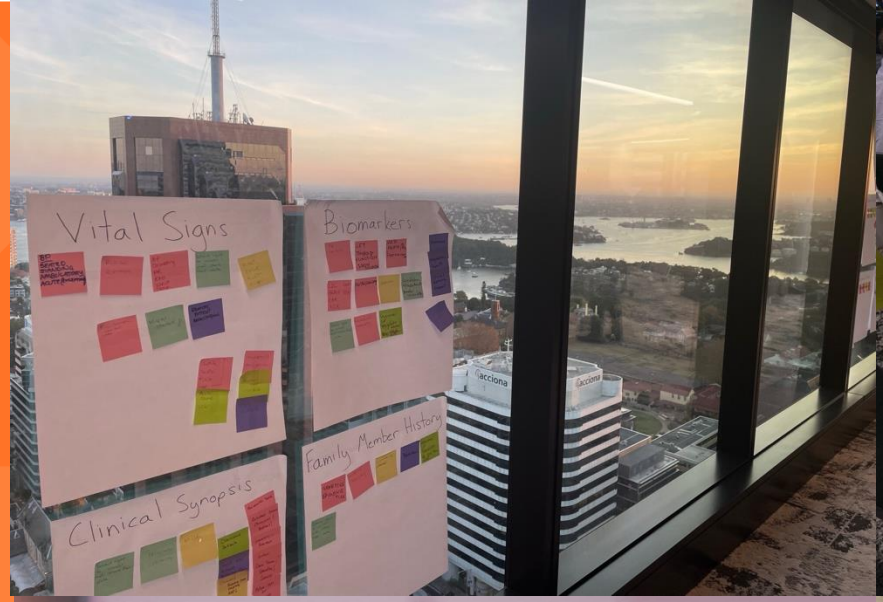
Since our inception, the Sparked community has grown to over

800

sparked.csiro.au

Sparked HL7 FHIR

Register for Sparked



Thank you!

Recording available in the coming days
Please email fhir@csiro.au with any future webinar ideas