

FHIR in the Enterprise

Mo Unewisse, Chief Architect @ SAP



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Who am I?

- Name: Mo Unewisse
- Company: SAP, Walldorf
- Background:
 - Chief Architect @ SAP Health
 - Partner/Extensibility Enablement
- mail: mohammed.unewisse@sap.com



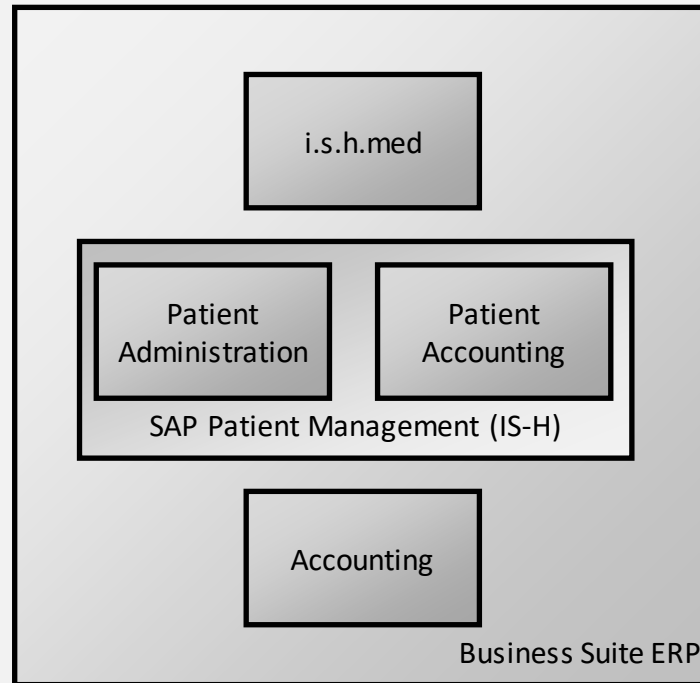
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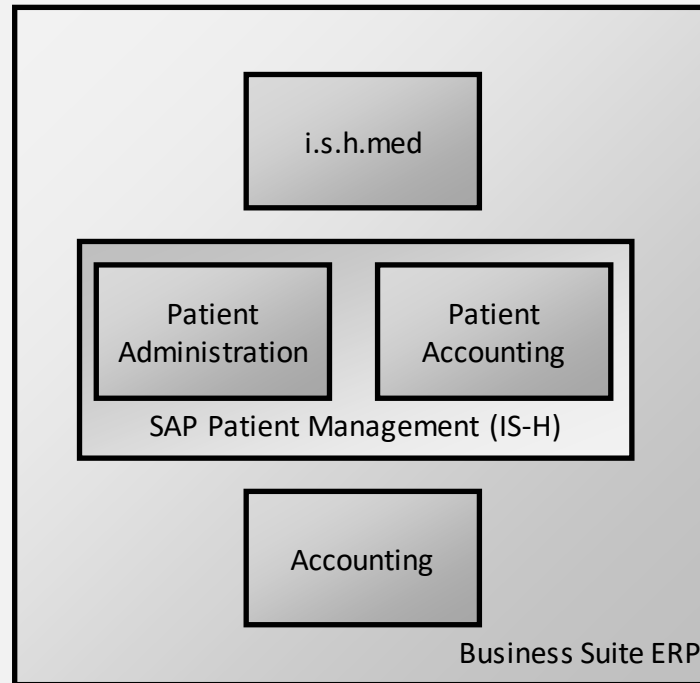
Agenda

- Context
- FHIR Messaging
- Profiling & Extensibility
- Translation

SAP Patient Management – since 1995

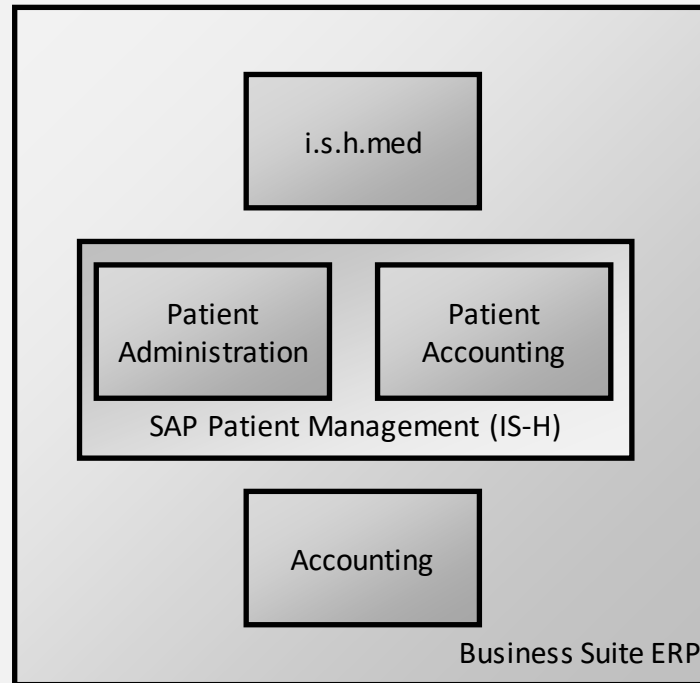


SAP Patient Management – since 1995

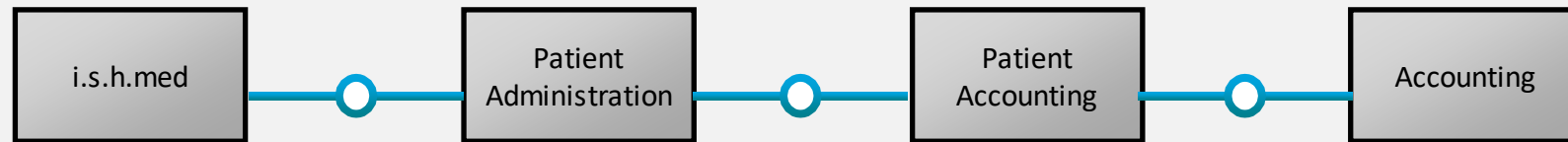


	Tables	Screens	ABAP-Statements (Line ofCode)
IS-H (\i.s.h.med)	8.000	5.400	7.300.000
i.s.h.med	6.200	4.800	9.700.000
SD	9.200	5.300	4.300.000
FI	22.800	13.500	16.600.000
CO (inclCO-PA)	6.300	4.900	4.700.000
MM	7.300	4.000	4.800.000

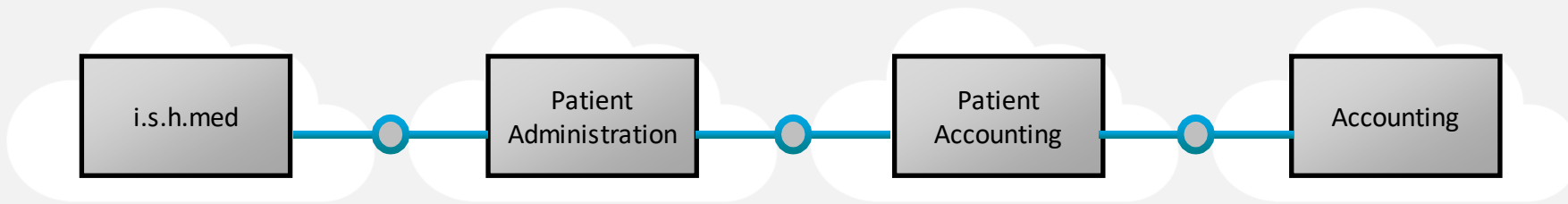
From Monolith to Independent Modules



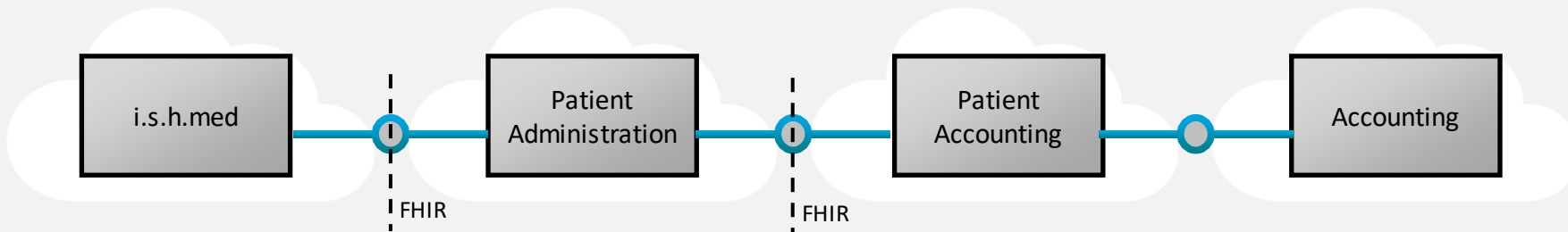
From Monolith to Independent Modules



From Monolith to Independent Modules



From Monolith to Independent Modules

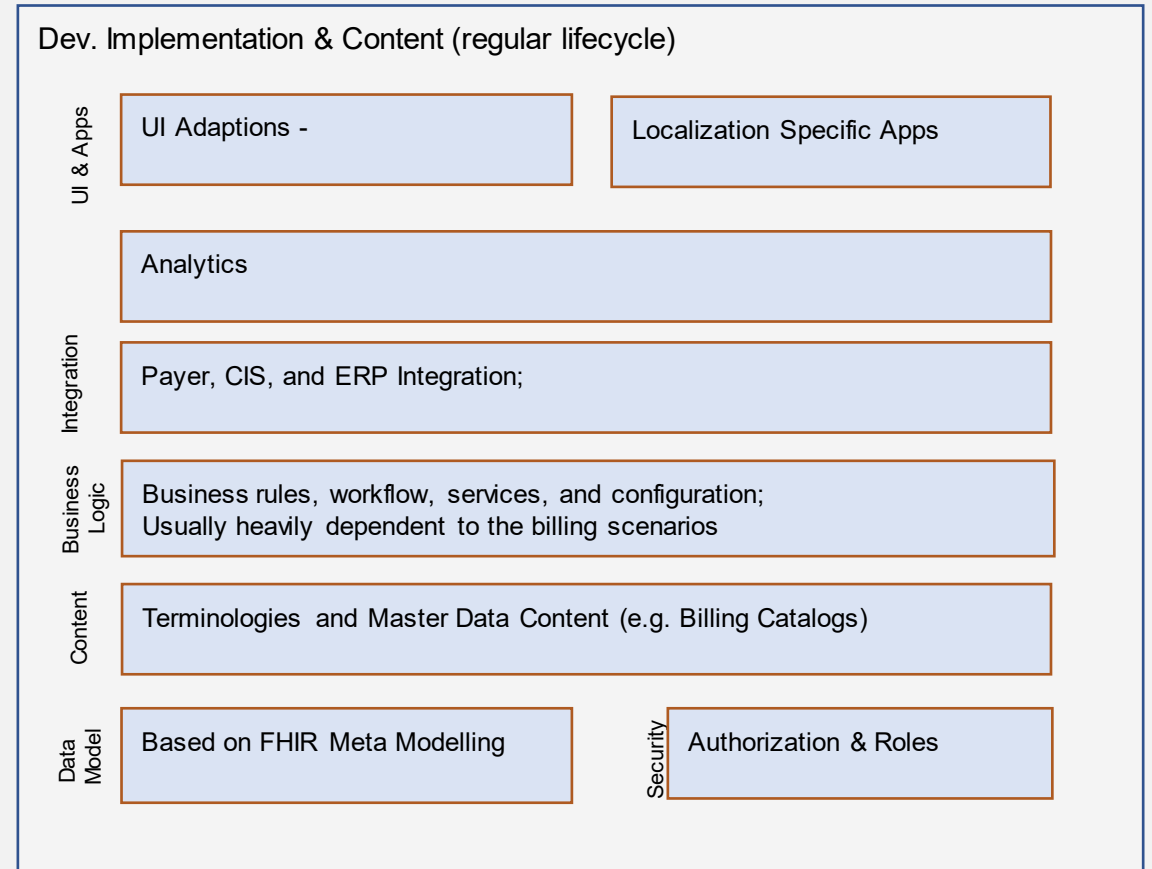
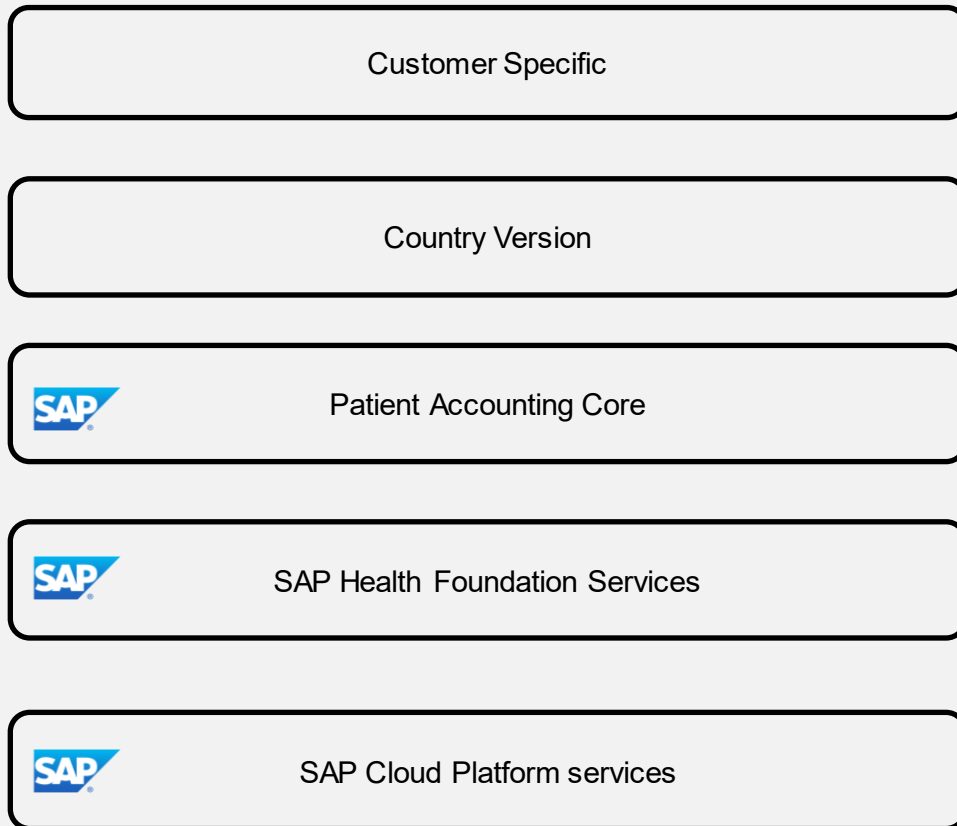


Architecture Decisions

Holistic usage of FHIR not only for interoperability

SAP Health Applications are build on top of SAP Cloud Platform (Cloud Foundry - PaaS)

Logical and technology layers



Enterprise Readiness -> SAP Product Standards

- **Accessibility**
SAP Software can be used by everyone, including people with disabilities
- **Business Configuration**
Configuration Content as part of the product
- **Functional Correctness**
Completeness and Correctness
- **Globalization**
Translation, Functional localization, internationalization
- **Licensing**
Opensource and third Party Software
- **Operations & Support**
Business processes, system landscape operations, Supportability
- **Performance**
Good Performance and Scalability
- **Security and DPP**
State of the Art Security Concept, Vulnerabilities, legal requirements...
- **Software Lifecycle**
Implementation, Update, Upgrade, Migration..
- **UX Consistency**
Consistent UX across products and technologies

Enterprise Ready FHIR

Using FHIR

- FHIR Messaging
- FHIR Profiling & Extensibility
- FHIR Translation
- FHIR Versioning
- GraphDefinition, GraphQL
- Terminologies
- Conformance Resources
- Security
- ...

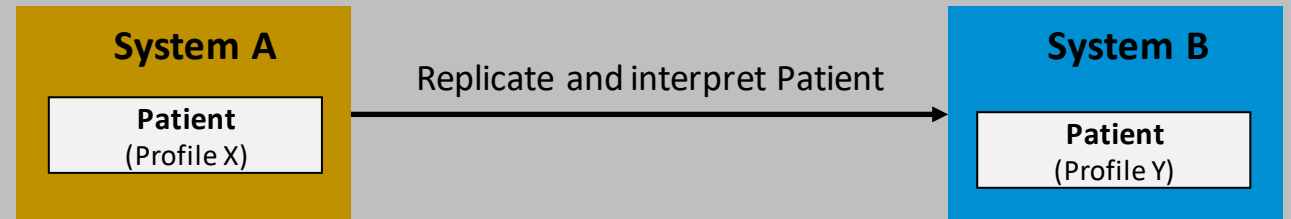
Adapt SAP Technology for FHIR Usage

- Open UI5 FHIR
- FHIR to SAP Hana (DB) Mapping
- Business Rules in FHIR
- SAP CI (Cloud Integration) on FHIR
- Authorization with FHIR (e.g. attribute based auth through FHIRPath)
- ...

FHIR Messaging

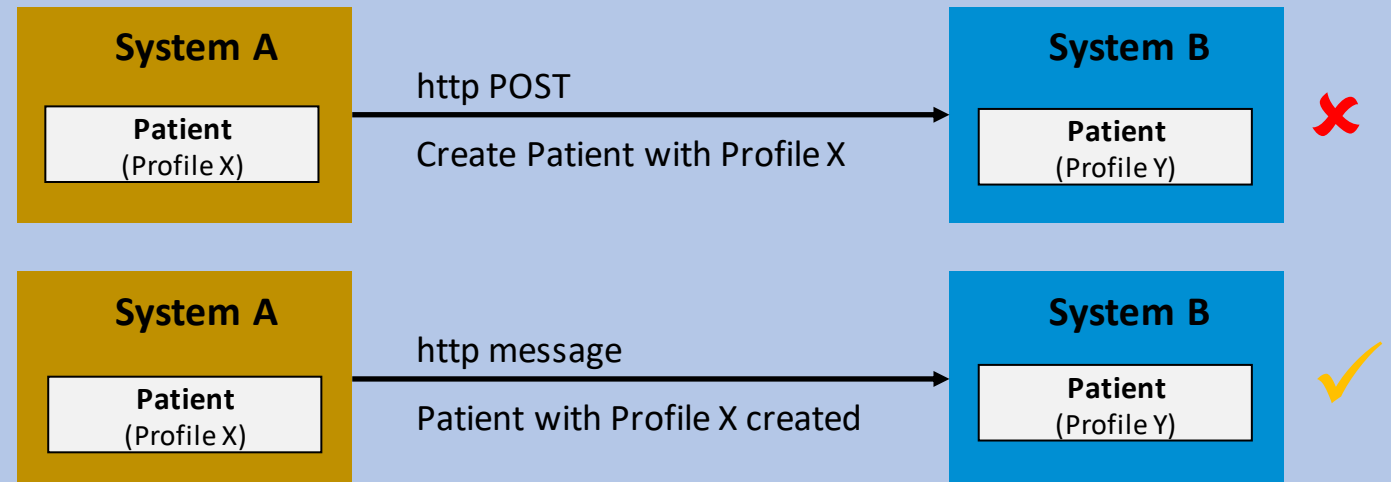
Requirements

- Integration of independent systems
 - no Client-Server relation
 - Systems with different scope and
 - different FHIR profiles
- Loose coupling
 - System availabilities not connected

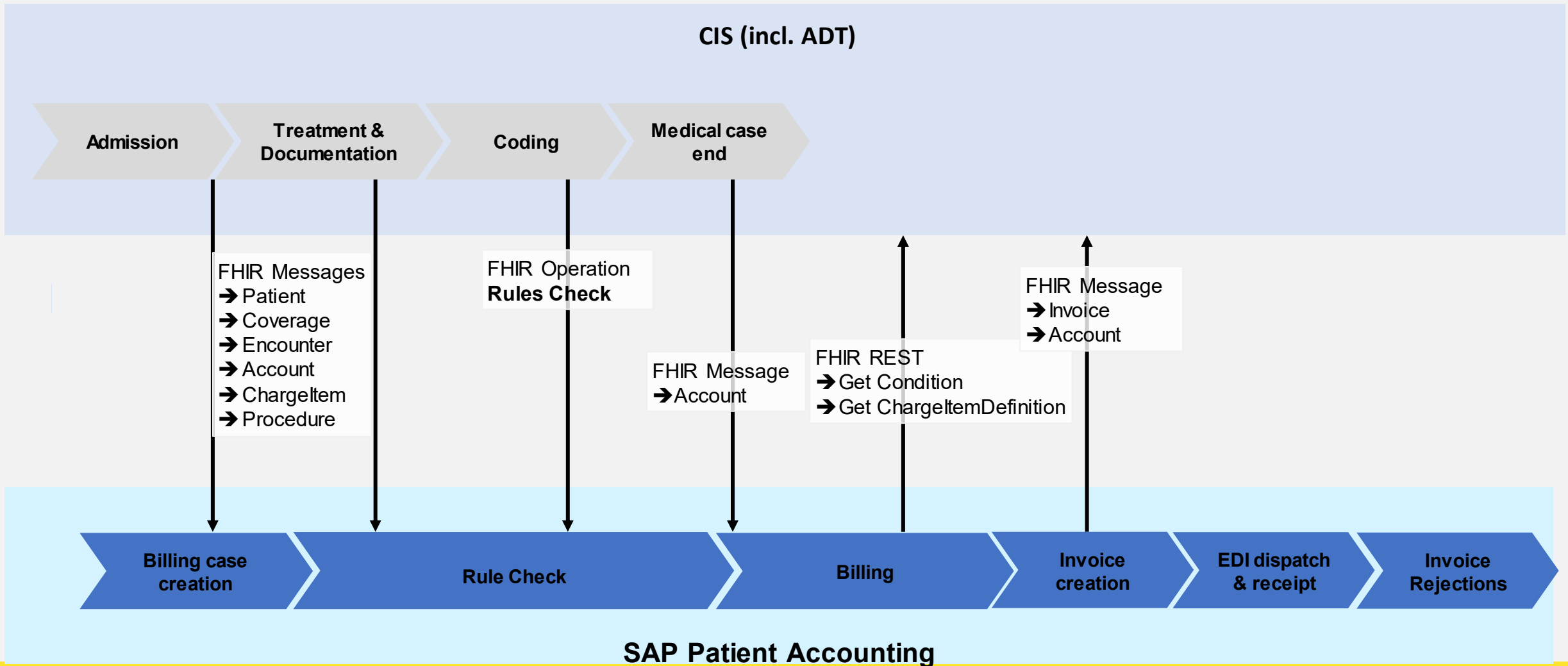


Solution approach

- Message based data replication
 - For the 80% case
 - RESTful mainly for read access



FHIR Messaging



FHIR Messaging – Event types

Generic Events

- The guiding principle is that “**CUD**” events (created, updated, deleted/canceled) are defined per resource.
- Examples: patient-created, encounter-updated

Higher Level Events

- Admission Created, Discharge Created
- Account Ready for Billing
- Manchester Triage Performed

FHIR Messaging – Open Points and Discussions

- No standardized Event Types
- No standardized MessageDefinitions
- Re-Evaluate Subscriptions

FHIR Profiling and Extensibility

Customer Specific

Country Version



Patient Accounting Core



SAP Health Foundation Services

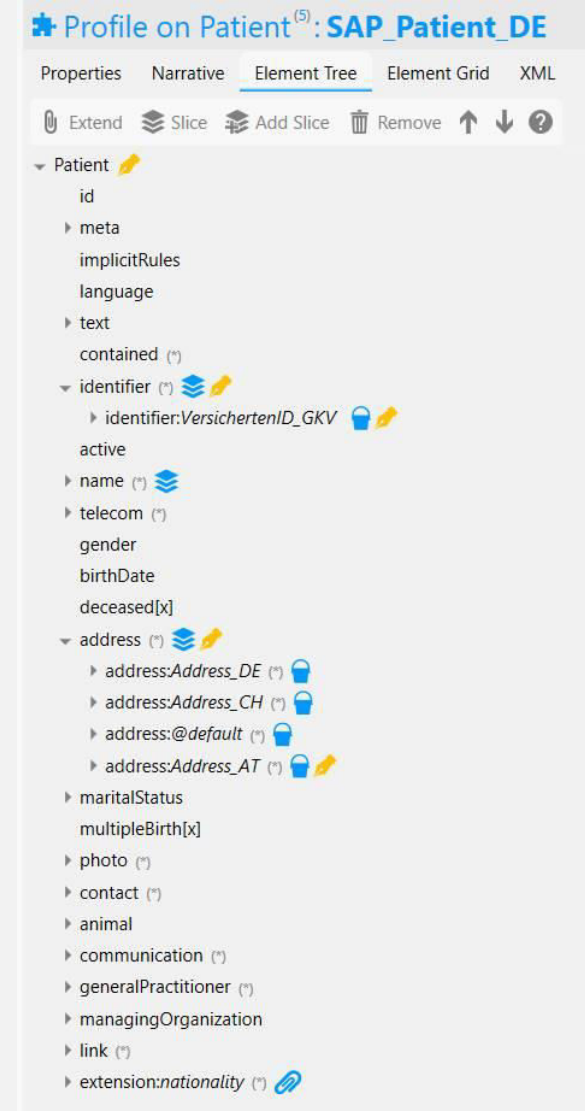


SAP Cloud Platform services

- Applications will provide base profiles
 - Partners / Customers extend here
- Where Profiles are not enough
 - Bring in new resources into FHIR Standard
 - Exceptional: Proprietary Resources
- Base **Individuals** Profiles will already contain country specific extensions (how to solve “cross country” patients)

FHIR Profiling / Extensibility

- National profiles can't reused 1:1 on application level.
- Each SAP Health product has a different patient profile.
- Align on shared extensions

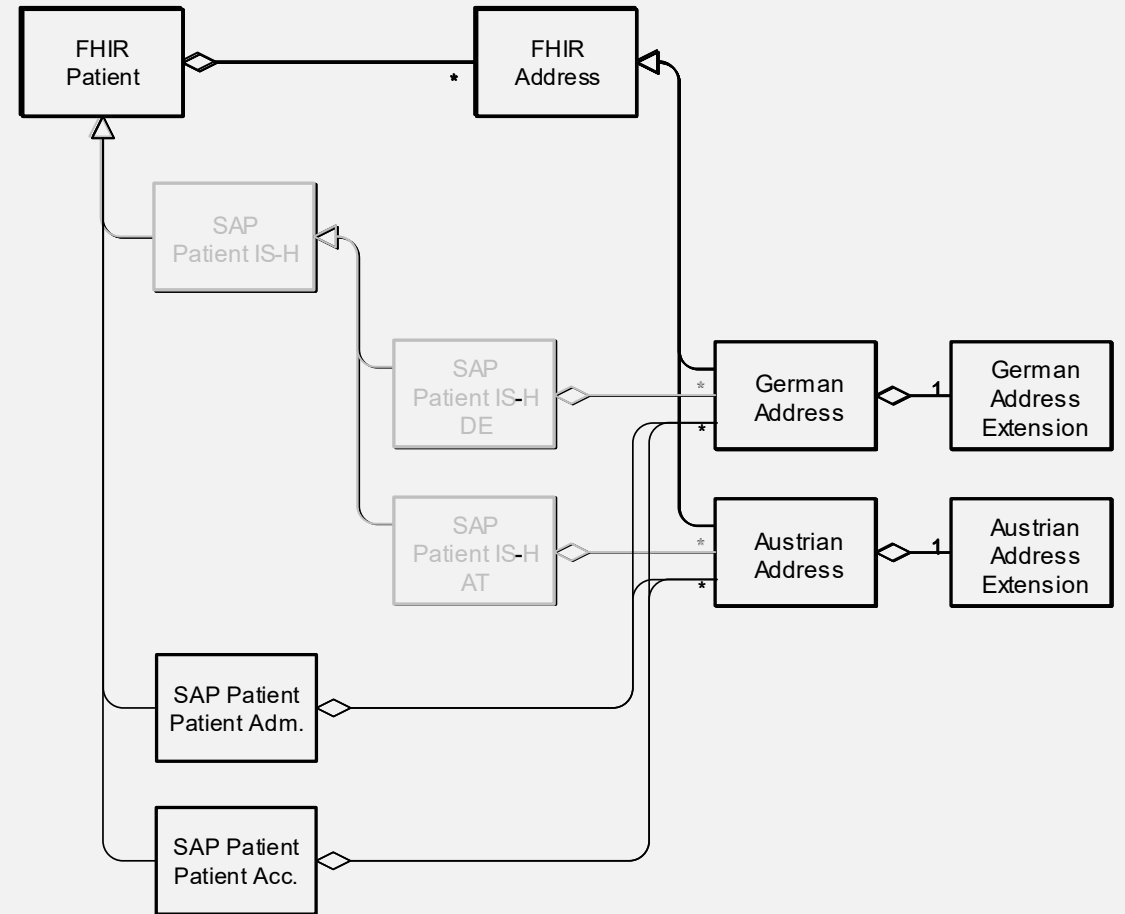


The screenshot displays the 'Element Tree' view of a FHIR profile named 'Profile on Patient⁽⁵⁾: SAP_Patient_DE'. The interface includes tabs for 'Properties', 'Narrative', 'Element Tree', 'Element Grid', and 'XML'. Below the tabs are icons for 'Extend', 'Slice', 'Add Slice', 'Remove', and navigation arrows. The tree structure is as follows:

- ▼ Patient
 - id
 - ▶ meta
 - implicitRules
 - language
 - ▶ text
 - contained (*)
 - ▼ identifier (*)
 - ▶ identifier:VersichertenID_GKV
 - active
 - ▶ name (*)
 - ▶ telecom (*)
 - gender
 - birthDate
 - deceased[x]
 - ▼ address (*)
 - ▶ address:Address_DE (*)
 - ▶ address:Address_CH (*)
 - ▶ address:@default (*)
 - ▶ address:Address_AT (*)
 - ▶ maritalStatus
 - multipleBirth[x]
 - ▶ photo (*)
 - ▶ contact (*)
 - ▶ animal
 - ▶ communication (*)
 - ▶ generalPractitioner (*)
 - ▶ managingOrganization
 - ▶ link (*)
 - ▶ extension:nationality (*)

FHIR Profiling / Extensibility

- National profiles can't reused 1:1 on application level.
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FHIR Profiling – Open Points and Discussions

- Internal Discussion: Minimum Profiling (not used elements to cardinality 0)
- Profiles as Projections
- Tooling for Partners and Customers

FHIR Translation



Language support:

- Spanish
- English
- German
- French
- Dutch
- Italian
- Greek
- Hebrew
- Turkish
- Croatian
- Catalan
- Portuguese
- Russian
- Chinese

FHIR Translation

- We will follow <http://hl7.org/fhir/languages.html>
- CodeSystem - Designations
- Be able to translate single instances in multiple languages (especially „master data“)
 - <https://www.hl7.org/fhir/extension-translation.html>
- In the „meta-data“
 - <http://hl7.org/fhir/extension-elementdefinition-translatable.html>

```
1  {
2    "url" : "http://hl7.org/fhir/StructureDefinition/translation",
3    "extension" : [{
4      "url" : "lang",
5      "valueCode" : "de"
6    },{
7      "url" : "content",
8      "valueString" : "einige übersetzte Wörter"
9    }]
10 }
```

```
{
  "code": "de",
  "display": "German",
  "designation": [{
    "language": "nl",
    "value": "Duits"
  },{
    "language": "ru",
    "value": "Немецкий"
  }],
  {
    "language": "zh",
    "use": {
      "system": "http://terminology.hl7.org/CodeSystem/designation-usage",
      "code": "display"
    },
    "value": "德语"
  }
}
```


FHIR Translation – Open Points and Discussions

- Questionnaire (in multiple languages)
- No Translatable Datatype
- FHIR Standard Valuesets translated?
- Looking forward for upcoming R5 in the domain of Multi Language Support.
- How to integrate in SAP's translation infrastructure



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