HL7 Fast Healthcare Interoperability Resources (FHIR)

Under the abbreviation FHIR, HL7 works on its latest approach for interoperable exchange of healthcare information (Health Level Seven International, 2018b). This started in 2011 and HL7 FHIR targets to improve the drawbacks of HL7 v2 & v3 i.e. data inconsistency in v2 and furthermore the fact of decreased interest of the community to implementing v3 due to its complexity. Therefore HL7 FHIR aims to provide a new alternative in context of simplicity of implementing interoperability standards, without loosing data integrity and overall consistency. Hence, HL7 FHIR is strongly aligned to previously developed HL7 standards and content models i.e. the HL7 RIM. HL7 FHIR includes several advantages derived from HL7 v2/v3 & CDA and additionally extends these. An example is, comparing CDA with FHIR, that CDA supports the exchange of data with clinical relevance, but lacks integration of non-clinical information such as financial aspects. Another fact is that CDA is limited to establish documents targeting only patients (Bender and Sartipi, 2013). On the other hand both, CDA as well as HL7 FHIR, require the data to be human readable including information on how this should be done (Health Level Seven International, 2018a). The previously stated target of "simplicity", is not only covered through the HL7 FHIR approach and specification, but furthermore by support of the latest technologies like RESTful architecture, XML, JSON, HTTP(s) and service-oriented architectures (SOA) to exchange both, messages and documents (Health Level Seven International, 2018f). This provides well known setup for engineers and supports fast application in several contexts like cloud based solutions, EHR, PHR, HIS and smartphone or tablet Apps. HL7 publishes HL7 FHIR as a Standard for Trial Use (STU) and currently HL7 FHIR release 3 (STU 3.0.1) is the active version, which can be found in (Health Level Seven International, 2018b).

HL7 FHIR supports the approach of modularity through definition of "resources". These resources include defined information and can be combined in different ways to fulfill requirements derived from several application areas in healthcare. In healthcare typically a system grows over time, as new requirements and application fields are added continuously. HL7 FHIR tries to contribute to this fact through its modular approach and the possibility of defining and integrating "extensions" according to project requirements. These can be integrated in HL7 FHIR resources in case the resources defined in the standard are not yet sufficient to provide a solution for a defined need (Health Level Seven International, 2018d). All resources share common characteristics as indicated in figure 2.5. This example shows a patient resource as an example.

Each resource has an identifier element and a meta-data section describing the context of the resource. The text section depicts the human readable information using HTML. Subsequent the extension-element supports to include content which is not defined by the actual resource. Finally the last section includes the standard data from the resource specification e.g. in this case the identifier of the patient, name, gender, birth date and further data. HL7 FHIR provides several resources for clinical requirements like patient, provider, medication and diagnostics recourses, but additionally for e.g. financial concerns and other requirements. HL7 FHIR provides a modular setup and the focus on modern lightweight technologies and provides broader application as stated before. However, combinations of standards might make sense in some aspects, especially if it comes to the requirement of reports of results, which by nature are document based.
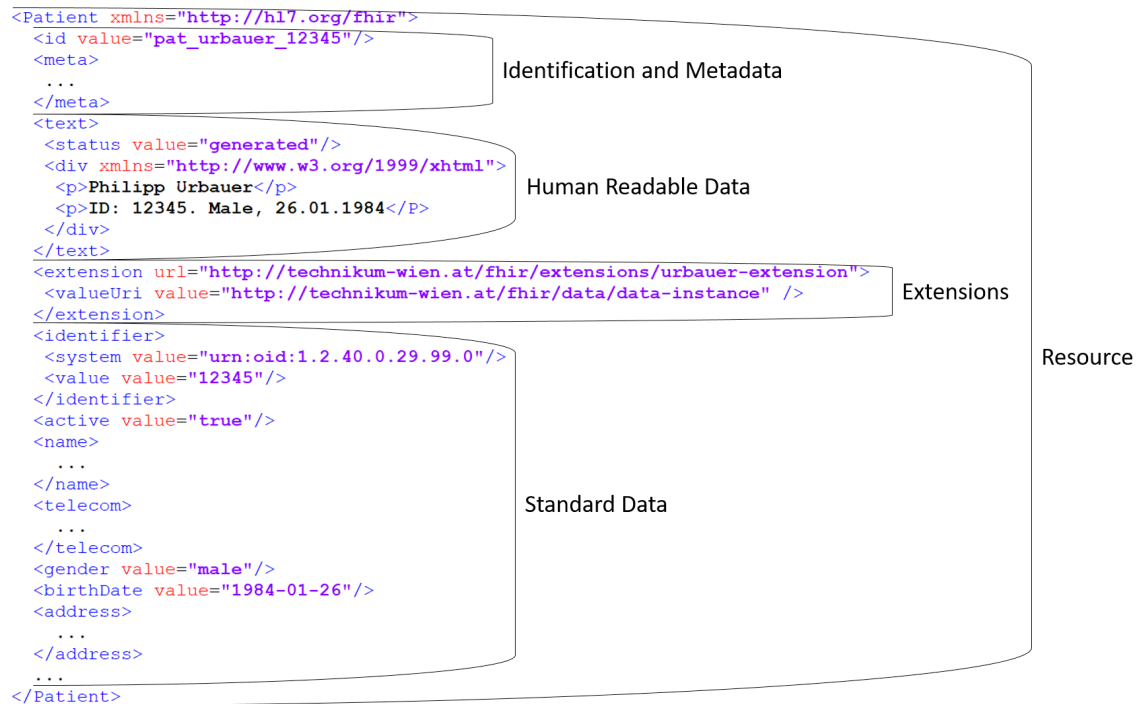
```xml
<Patient xmlns="http://hl7.org/fhir">
  <id value="pat_urbauer_12345"/>
  <meta>
    ...
  </meta>
  <text>
    <status value="generated"/>
    <div xmlns="http://www.w3.org/1999/xhtml">
      <p>Philipp Urbauer</p>
      <p>ID: 12345. Male, 26.01.1984</P>
    </div>
  </text>
  <extension url="http://technikum-wien.at/fhir/extensions/urbauer-extension">
    <valueUri value="http://technikum-wien.at/fhir/data/data-instance" />
  </extension>
  <identifier>
    <system value="urn:oid:1.2.40.0.29.99.0"/>
    <value value="12345"/>
  </identifier>
  <active value="true"/>
  <name>
    ...
  </name>
  <telecom>
    ...
  </telecom>
  <gender value="male"/>
  <birthDate value="1984-01-26"/>
  <address>
    ...
  </address>
  ...
</Patient>
```

- Identification and Metadata
- Human Readable Data
- Extensions
- Standard Data
- Resource

Figure 2.5 – Shows an example patient resource to describe the common characteristics of HL7 FHIR resources in general, according to the specification shown in Health Level Seven International (2018b).

References

Bender, D. and Sartipi, K. (2013). HL7 FHIR: An agile and RESTful approach to healthcare information exchange. In Proceedings of CBMS 2013 - 26th IEEE International Symposium on Computer-Based Medical Systems, pages 326-331.

Health Level Seven International (2018a). Comparison-cda - FHIR v3.0.1. [online available:] https://www.hl7.org/fhir/comparison-cda.html, (last access: 2018-03-08).

Health Level Seven International (2018b). Index - FHIR v3.0.1. [online available:] https://www.hl7.org/fhir, (last access: 2018-03-08).

Health Level Seven International (2018d). Observation - FHIR v3.0.1. [online available:] https://www.hl7.org/fhir/observation.html, (last access: 2018-02-17).

Health Level Seven International (2018f). Summary - FHIR v3.0.1. [online available:] https://www.hl7.org/fhir/summary.html, (last access: 2018-01-14).