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The evolution of requirements on XBRL - a shift from data exchange to data integration ... to data usage?

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Research Objective

1) What have been the original requirements and expectations towards XBRL?

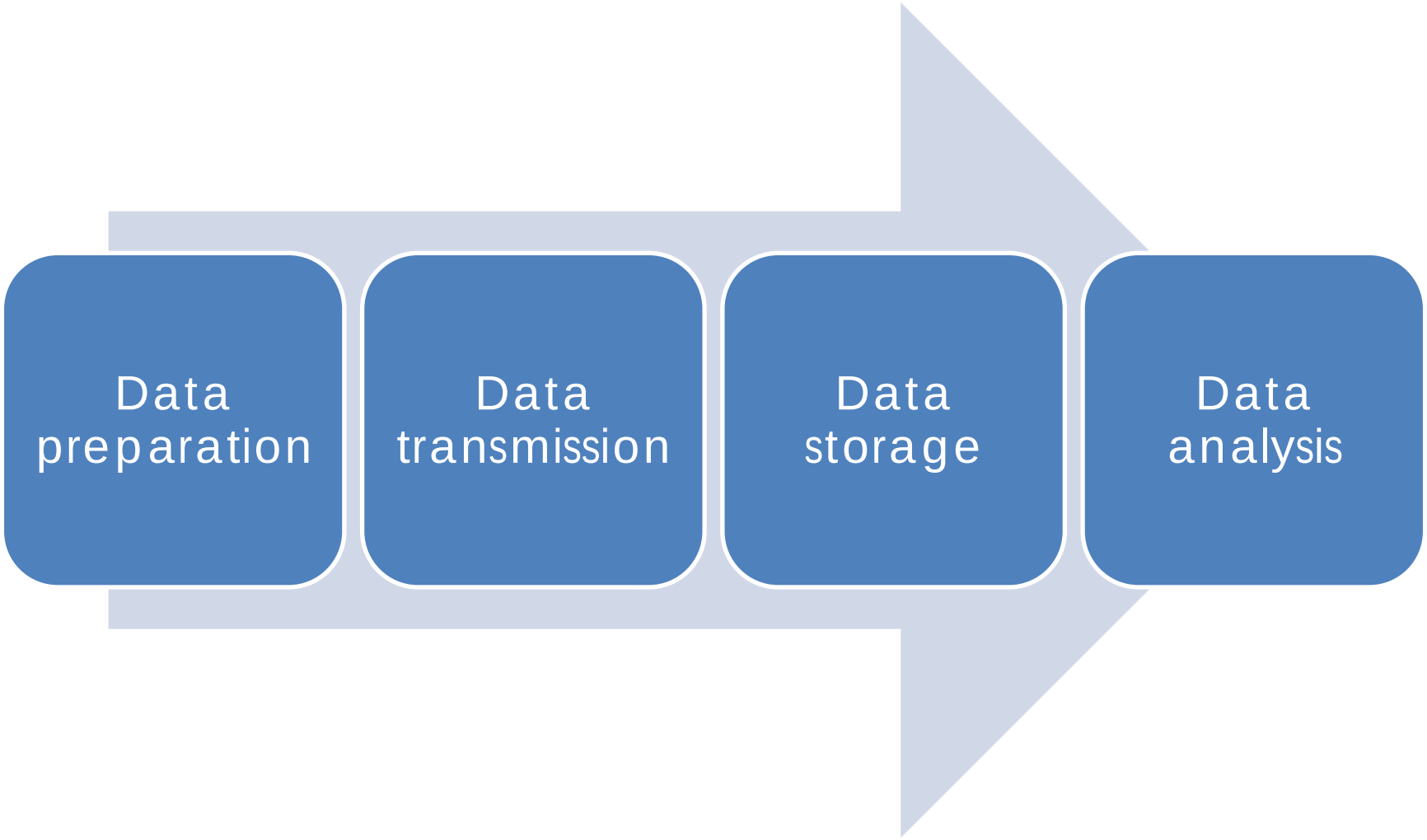
2) What has XBRL become (instead)?

3) What is actually done with XBRL in practice (for analytical purposes)?

Research goal: Utilization of the full potential of XBRL in analytical purposes!

Grand challenge: Getting a concept down to earth!

„Classical“ data processing steps



Existing discussions

- XBRL to harmonize language.
- Task | process automization because of XBRL.
- XBRL just for data transmission.
- XBRL for data modelling.
- XBRL for analytical purposes.
- Regulatory reporting architecture (chicken) and Business Intelligence architecture (egg) vice versa ...
- ...

What have been the original requirements and expectations towards XBRL?

- Charles Hoffman wanted computer applications to be able to effectively **exchange information** between each other (Karen Kernan 2009, p. 3)

- This implies:
  - Seamless and quick electronic exchange of business information.
  - No need for re-keying information from one format to another.
  - Enhancing reusability (Pinsker, Li 2008, pp. 47-48).

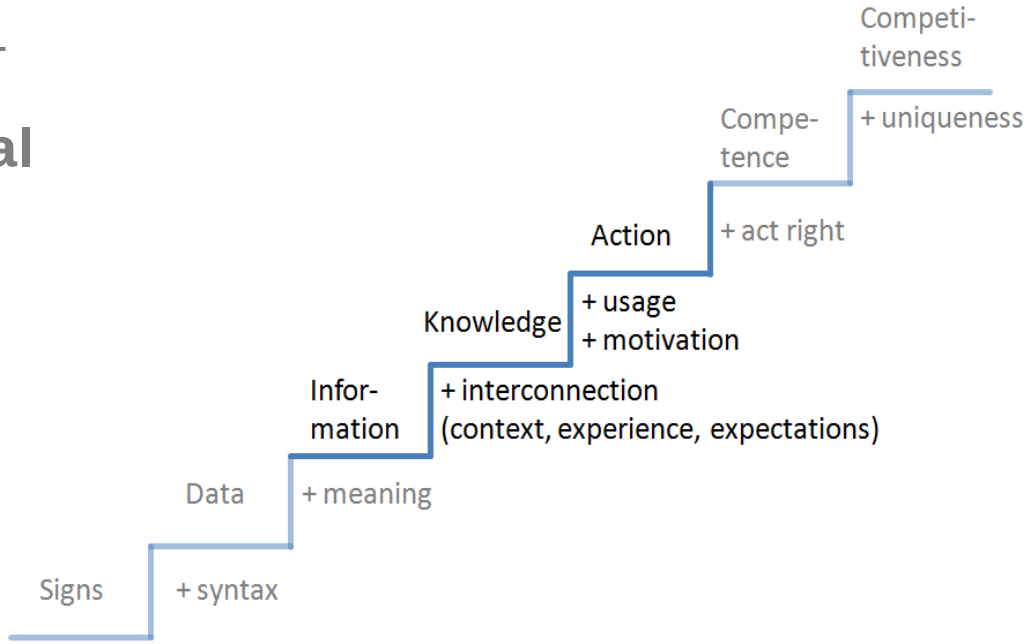
What has XBRL become (instead)?

- XBRL 2.1 base specification for **creation, exchange and comparison** of business reporting information:
  - includes meta-data for hierarchical representation and arithmetic expressions.

  VS
- Further specifications and **additional meta-data:**
  - XBRL Dimension 1.0 for multi-dimensional definition of concepts.
  - Formula 1.0 for validation and transformation of XBRL instance facts.
  - Table Linkbase 1.0 for tabular layouts of facts.
- Allow for more **flexible navigation** through information, to **assure data quality** and to **enable rendering** (XII 2016a),
- but work on single, isolated XBRL instance files.

What is actually done with XBRL in practice (regarding analytical purposes)?

- XBRL-formatted information has to be **pre-processed for deeper analyses.**
- "The main limitation of XBRL tools is their **limited support for cross analysis of financial information** [...] inherited from [...] from XML." (Garcia, Gil 2010, p. 3)
- Information that cannot be connected with **other current information or information stored in the past** is useless for their consumers (North 2010, p. 37).



Relationship between Information, Knowledge and Action based on North (North 2010, p. 36)

What is actually done with XBRL in practice (regarding analytical purposes)?

- Pre-procession includes **ETL and shredding** of XBRL instance files:
  - "In many or most use cases XBRL instance documents will be **loaded into a BI data warehouse**." (Alles, Debreceny 2012, p. 88) .
  - "**ETL** will have **normalized-away the semantic uniqueness** that its DTS had in the original form." (XII 2016c)
  - "**Shredding** generally fails to preserve some of the XML-centric aspects of stored data." (Rys et al. 2005, p. 946)
  - **XML/XBRL vs. SQL/MDX**: Divergent technologies as "**integration barrier**" (Spies 2010, p. 405).

What is actually done with XBRL in practice (regarding analytical purposes)?

- **Consequences** of ETL and shredding:

✓ Derive **warehouse data models** from XBRL taxonomies (based on concepts, labels, and dimensions).

✓ **ETL processes** for facts.

✓/✗ Possible, but **bespoke/proprietary** solutions.

✗ Preserve **rendering metadata** (table linkbase).

✗ Preserve **assurance metadata** (formula linkbase).

What is actually done with XBRL in practice (regarding analytical purposes)?

- **Reasons**:
  - **„Integration barrier“**: Source (= taxonomy) and target (= warehouse) do not match.
    - **Where** to store rendering and formulae information?
    - **How** to store this information (format)?
  - Relevant **use / problem cases** for preserving considered meta-data:
    - application of **formulae** to integrated data pool, e.g. **across periods and entities.**
    - **avoid changeovers** between applications for tabular views, standard reports, and OLAP.

From XML to JSON … any benefit for the users?

- JSON is used to transmit and store structured data; it is a data format to support serialization. Especially web applications and mobile apps in relation with JavaScript, Ajax, or WebSockets are using this format to transfer data between clients and servers.

- Instead, XML is a structure describing language; JSON is a syntax convention and not declarative. There are neither information regarding the size of the object structure nor the validity of the instance. Therefore, JSON has benefits at rigid interfaces, XML at flexible interfaces.

- JSON is reducing overhead compared to XML, because the construction is more simple and due to this reason easier readable.

Example – back to the roots?

```
{ „Issuer": "Xema",
"Number": "1234-
5678-9012-3456",
„Covering": 2e+6,
„Currency": "EURO",
„Owner": {
„Surname":
"Mustermann",
„First_Name":
"Max", „male": true,
"Hobbies": [
„Horseback riding",
„Golf", „Reading" ],
„Age": 42, „Kids": [],
"Partner": null } }
```

JSON: 226 Byte

```
<Credit Card
Issuer="Xema"
Number="1234-5678-9012-
3456" Covering="2e+6"
Currency="EURO"> <Owner
Surname="Mustermann"
First_Name="Max"
male="true" Age="42"
Partner="null"> <Hobbies> <
Horseback riding </Hobby>
<Hobby>Golf</Hobby>
<Reading</Hobby>
</Hobbies> <Kids/>
</Owner>
</Credit Card>
```

XML: 279 Byte

Potential contributions to the XBRL community!

- **Analytical** (importance of integration) as well as a **constructive** (enabling integration) **approach.**
- Question no. 3 will point out the **need for data integration and related weaknesses** of XBRL.
  - Functionalities like rendering (table linkbase) and validation/assurance (formula linkbase) are **restricted to processing single files** and ETL leads to a **potential meta-data loss.**
- Exploring a way to **preserve XBRL-specific meta-data through ETL** and making it accessible in an integrated data store.
- Upcoming ideas: **changing the basis of XBRL** from XML to more ontology-oriented and therefore better database-compatible semantic-web languages like OWL, RDF or data formats like JSON.
- **Expand the process in scope** "by which users receive, find, compare and analyze information" (and not just shorten it) (Alles, Debreceny 2012, p. 88).

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