USING DATA WAREHOUSES TO OPTIMIZE HEALTH CARE DECISION MAKING

Brodinova S[1*], Ihl M[1], Hormayer V[1], Miksch F[2], Böhm S[2], Kollmann I[2], Hainz R[2], Skoumal M[2]
[1]solvistas GmbH, Austria, [2]Pensionversicherungsanstalt, Austria,
[*]sarka.brodinova@solvistas.com

Motivation

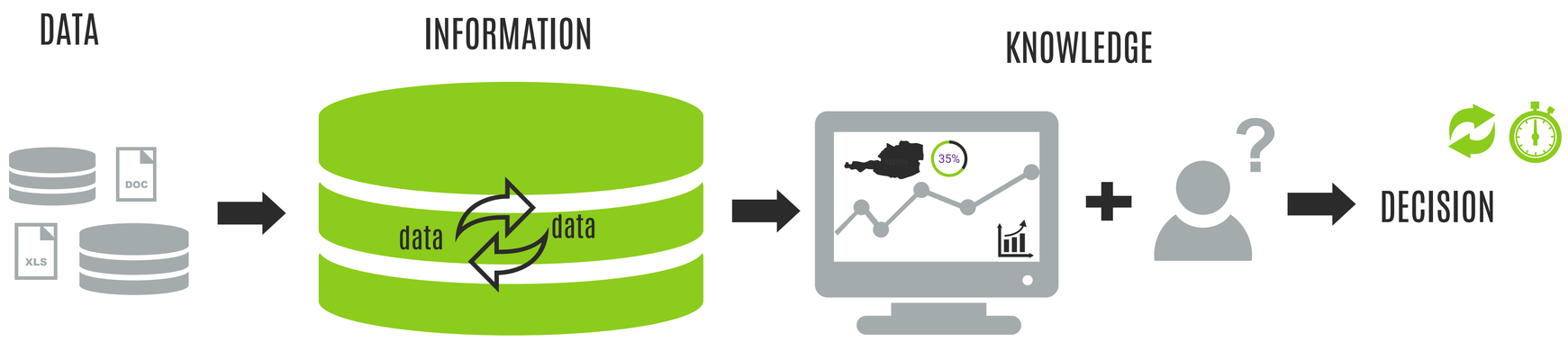
Challenges for decision makers

- multiple versions of the truth
- long prolongation of delivering the required information
- often complicated or long reports
- partially incomplete information

The ideal situation for a decision maker

+ a single version of the truth
+ near real-time information
+ user-friendly form of delivered information
+ complete information using full potential of available data

Solution with Data Warehouse



Data

- records or observations
- e.g. a patient lives in downtown Vienna

Information

- transformed data into the right context
- e.g. it takes a patient one hour and half to get to the nearest rehabilitation center

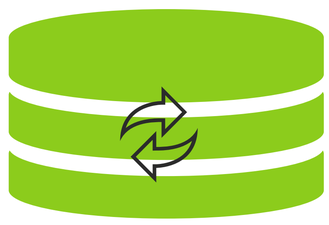
Knowledge

- information combined with experience and judgment of a decision maker
- e.g. the medical rehabilitation system in Austria needs more facilities

1. Staging Layer

- collection of all available data from different sources
- data actualization from sources on regular basis (weekly, daily)
- capturing data changes

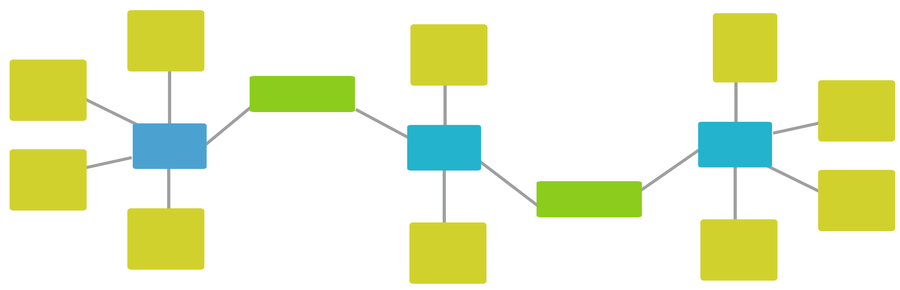
2. Integration Data Layer



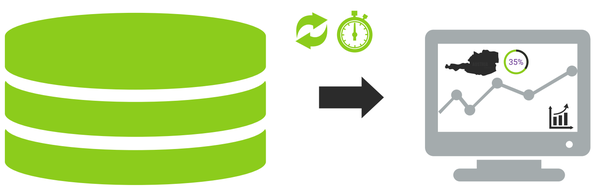
- consolidation of all collected data
- full auditability due to
  - differentiation between technical loading dates and effectivity dates
  - origin of data records
- integration of business and hard rules
- privacy and security control of sensible data
- flexible towards changes in the architecture of source systems and requirements

Data modeling according to the **Data Vault** concept with 3 basic objects (Linstead & Olschimke; Building a Scalable Data Warehouse with Data Vault 2.0):

- **hubs** - unique identifier of business objects (e.g. patients, rehabilitation facilities)
- **links** - relations or transactions between business objects (e.g. rehabilitation stay of a patient in a rehabilitation center)
- **satellites** - changeable attributes or properties of business objects or transactions (e.g. address of a patient, location of a rehabilitation facility)
- **mapping tables** - denotations of business codes (e.g. ICD-Code)



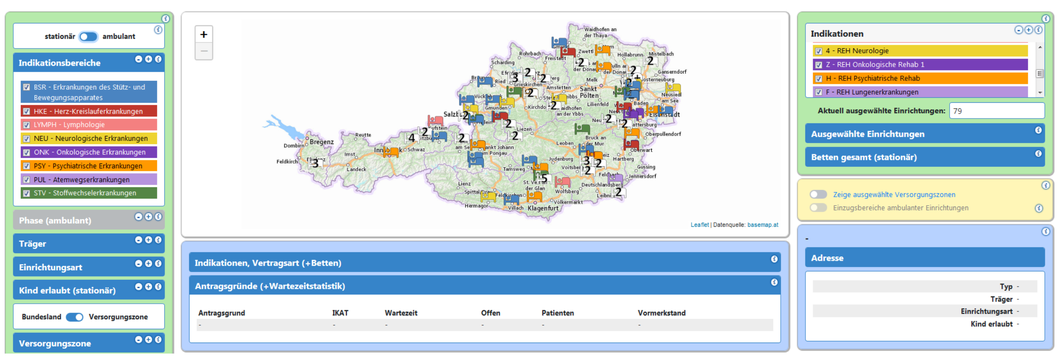
3. Information Mart



Preparation of information for decision makers

- descriptive statistics
- statistical and analytical approaches
- machine learning models
- artificial intelligence procedures

Use Cases in Medical Rehabilitation System



Rehabilitation planning: The Rehab Map that provides insights about existing and proposed rehabilitation facilities. The benefit of the map lies in collecting information from three different data sources: rehabilitation, geospatial, and population data.

Long-term Rehabilitation Effectiveness Monitoring: A platform for effectively auditing the success of completed rehabilitation measures. This utilizes the capacity of the DWH to supply a historization of relevant information both before and after the rehabilitation treatment.

Rehabilitation Utilization Monitoring: An interactive dashboard for assessing ongoing rehabilitations. Results can be evaluated e.g. by scrutinizing specific aspects such as diagnosis, age or facilities. The information is provided by the DWH automatically on a monthly basis.