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SW platform for heterogeneous health care data integration

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PICASO

Problem Addressed

- How can well-being of people with chronic diseases be positively influence by ICT
- How can costs for health care of chronic diseases be optimized
- Background:
  - Number of 60 + persons will grow by more than 60% in 2050 population
  - Chronic diseases with comorbidities are quite common for 60+ age group
- GOAL: to support care specialists with ICT solution that helps them to obtain Holistic view on health condition of patient with comorbidities
- ICT challenges:
  - Integration of sensitive health data from heterogeneous sources
  - Visualization of information and visualization of data

Integration – adressed challenges - law/ethical

- Plenty of law based and ethical restrictions – e.g. :
  - Data should not leave Hospital if not necessary
  - Patient has be able to see who and when saw his data
- ODS – running in Hospitals
  - Each night filled with new data from HIS
- Meta-data registry and orchestration running at Public cloud
  - Data about data in ODS. Updated after new data occurs there
  - Translation of patients ID into UPID
  - Accessible over internet (https) from PICASO tools by authenticated clinician with proper authorization
  - Orchestration of data from more ODSes
  - Filtering based on authorization
- Any action in clinician tools is logged (possible block-chain)

Integration – addressed challenges data hetrrogenity

- Interpretation of data from various HISes and from home monitoring devices
- Common Information Model (CIM) based on the TO-BE user stories was proposed
- CIM is basis for DB schema of ODS
- Implementation of data mapping from HIS to ODS is prerequisite
- Data categorization for access management in Matadata registry
- Devices has their proxies and are mapped to the model in Semantic middle-ware LinkSmart
  - Measured data are enriched with date from model
  - Data are pushed into ODS

Visualisation – challenges/requirements

- Clinicians should get patient centric view on data (categories) available in form of 'mind map' in the clinician tools
- The view should be interactive, meaning that general overview is presented first and it can be expanded

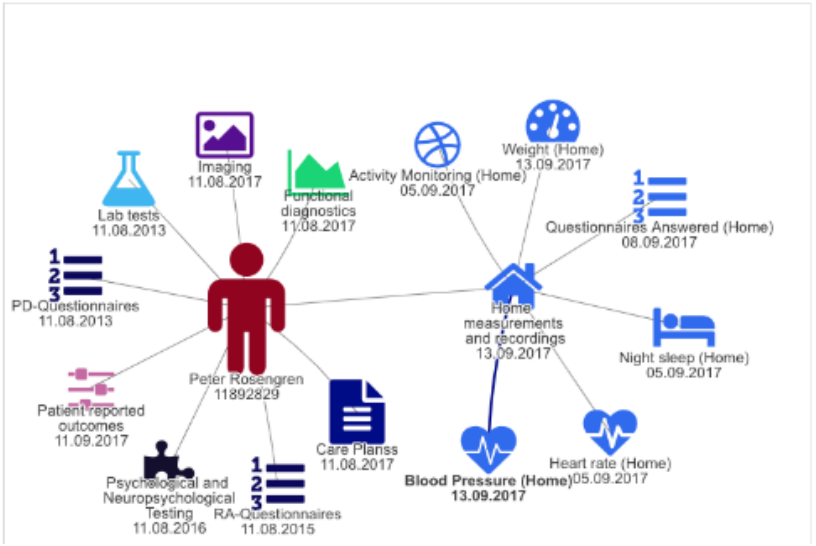
- The tools should provide interactive chart view on data representing measured history of values
- The history of events as well as follow ups should be displayed as interactive time-line

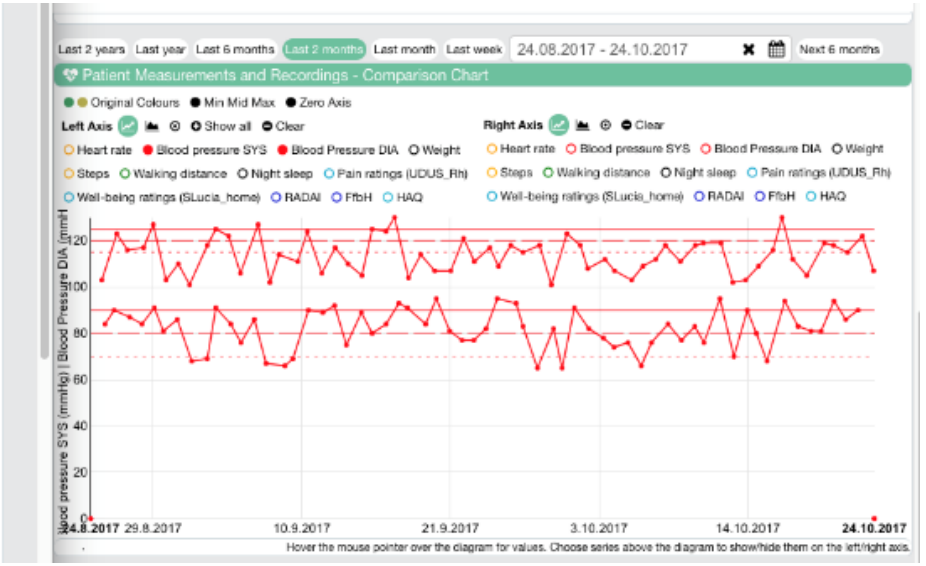
- These views should run in web browsers and should be usable by PC and tablets

Visualisation – tech solotion

- vis.js - Network with Font Awesome icons employed to cover mind map view on data categories – tool is called Data Resource Browser (DRB)
- vis.js Graph2d and Timeline was employed to cover the chart view and time-line view on data – tool is called Clinician Manager (CM)
- Angular applications (TypeScript)
- Available features of these vis.js technologies combined with TypeScript programing enable to fulfill requirements
- Navigation from DRB to CM works from leaf data categories or from list of data available that is displayed under the mind map

Visualisation – sample and demo





Demo on my local machine, or
Online video: https://www.youtube.com/watch?v=t2OCZl6hW4Y

Conclusion

- Presented tools for clinicians that display integrated health data should help to grasp complex view on overall patient's condition and gives information about recent activities of other clinicians
- We hope less double-examination will be performed (affect well-being and costs)
- Potential for examination/monitoring of health state without presence (affect well-being and costs)
- The trial starting from January 2018 will tell more and will provide evaluation of our concept (some evidence usable in scientific papers)

Thanks for your attention

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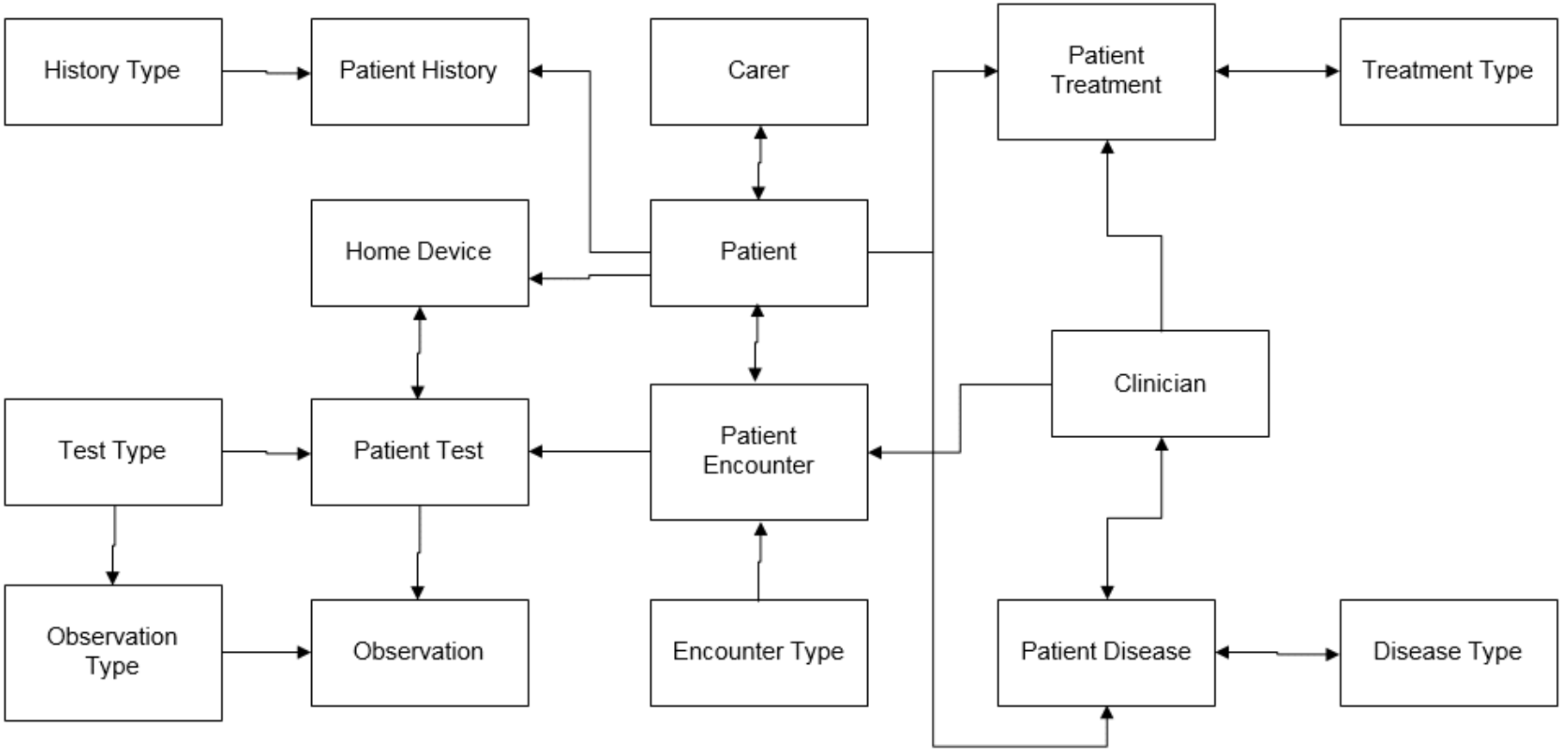
Back-up slide: Integration - CIM

- Proposal of CIM and ODS (that implements CIM)



Back-up slide: Integration – Meta Data structure

MetaData Registry: the record

Typical metadata record contains:

UPID of creator of the data: who created the data,
typically clinician

UPID of target of the data: to whom data concern,
typically patient

Type of data: data type is represented as combination of category / datatype,
e.g: home_measurements / heart_rate, or functional_diagnostics / EEG

DateTime, when record was created (e.g. when
clinician inserted data on diagnosis, medication, ..)

If needed, DateTime interval, when this data is valid