UNIVERSITÄT
LEIPZIG

Medizinische Fakultät

Frank - van Swieten - Lectures 2020

Design of a health information system for the treatment of COVID-19 patients in Leipzig, Germany

Leipzig, June 2020

Course AISGW at University Leipzig

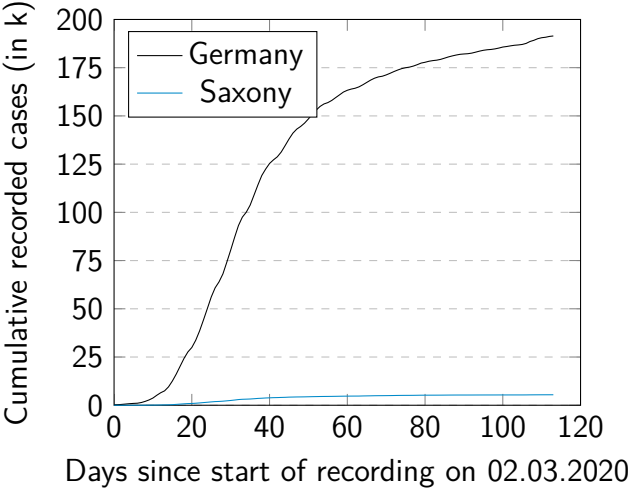
imise.

Outline

Who are we?

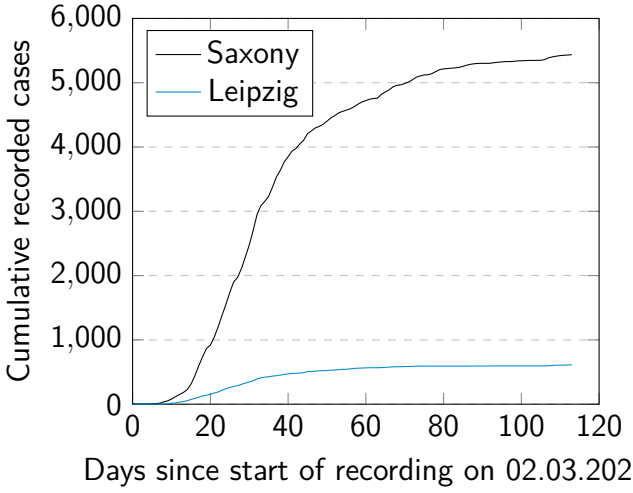
- five students of computer science at the University of Leipzig
- course "AISGW" by Prof. Dr. Winter, Ms. Jahn, Dr. Schneider, Mr. Stäubert
- varying experience in computer science and health information systems

Current COVID-19 situation in Germany and Saxony



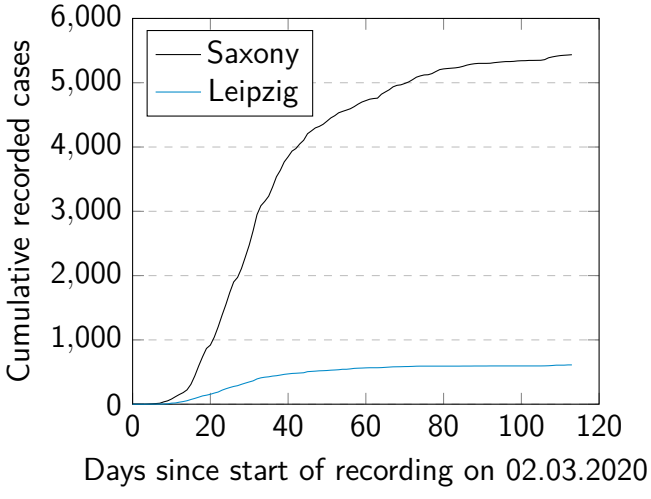
- case data provided by RKI
- total population:
  83149 k / 4072 k
- total cases:
  191 k / 5.4 k
- cases / 100 k citizens:
  230.2 / 133.3
- total casualties:
  8914 / 222
- new cases (7d):
  2920 / 48

Current COVID-19 situation in Saxony and Leipzig



- total population: 4072 k / 588 k
- total cases: 5436 / 611
- total casualties: 222 / 12
- cases / 100 k citizens: 133.3 / 103.9
- new cases (7d): 48 / 13

Current COVID-19 situation in Saxony and Leipzig



- total population: 4072 k / 588 k
- total cases: 5436 / 611
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- cases / 100 k citizens: 133.3 / 103.9
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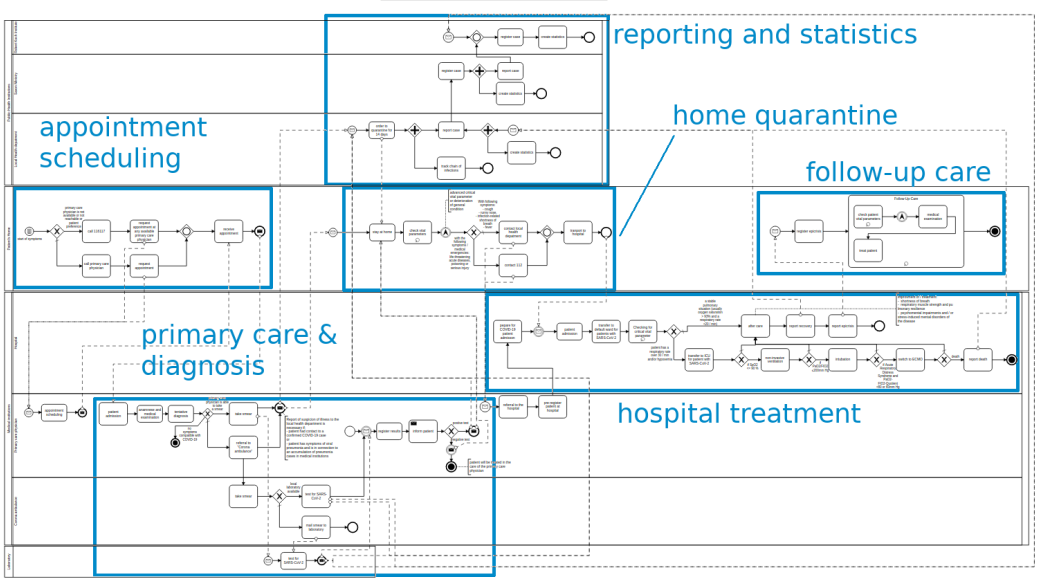
Legal situation

- family gatherings with max. 50 persons
- visits to hospitals and retirement homes

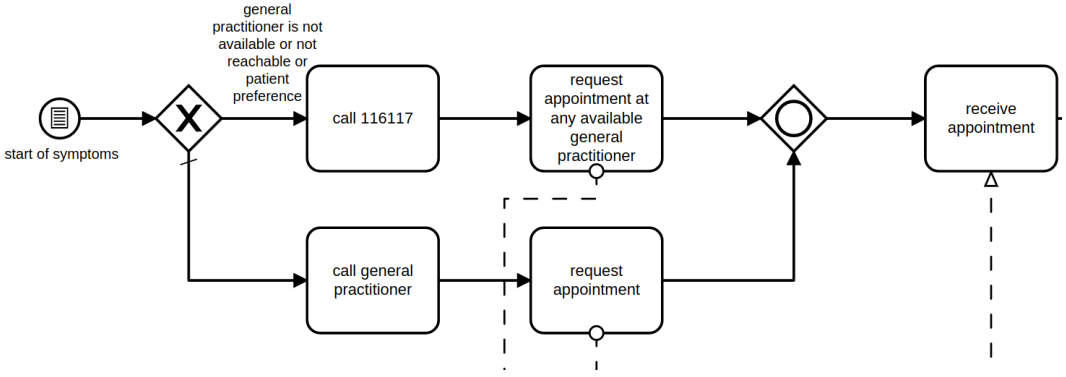
Overview of the process model



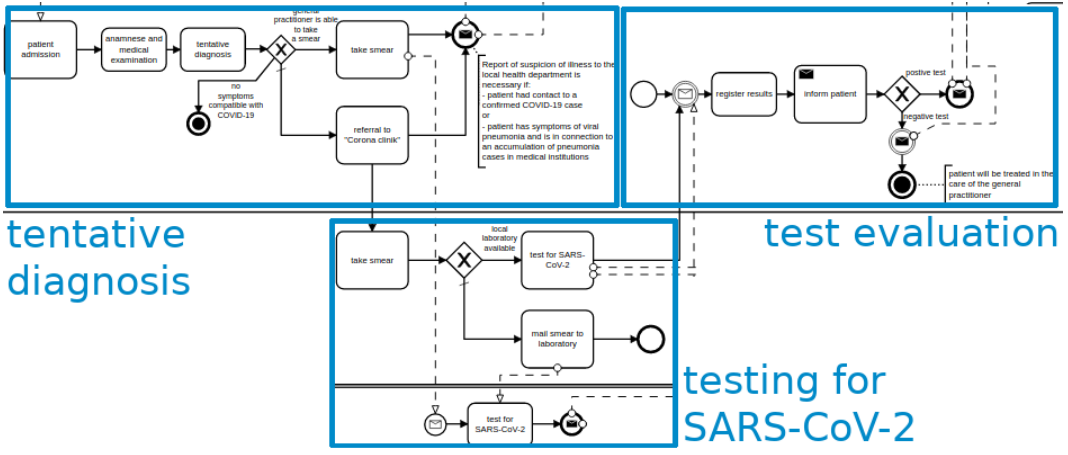
Assumptions & Simplifications

- Because of the rapidly changing landscape of measures and applications in this ongoing crisis, this model is limited to factual situation from 2 weeks ago.
- We assume that all patients first contact their general praticioner to receive primary care and to get tested for COVID-19.
- For statistical purposes, all diagnosed COVID-19 cases are assumed to be Leipzig residents.

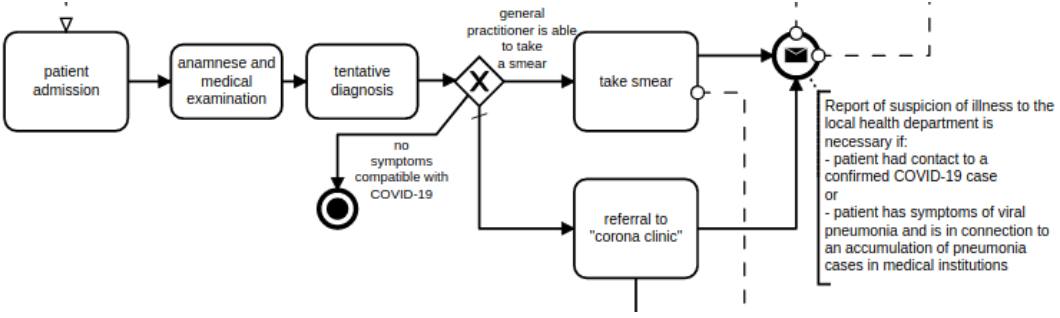
Appointment scheduling (@ patient's home)



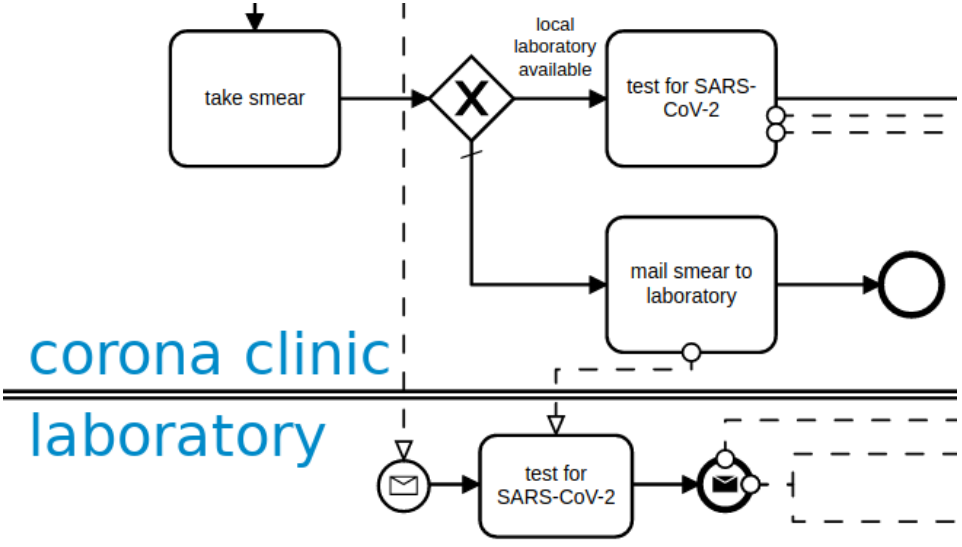
Overview of primary care & diagnosis



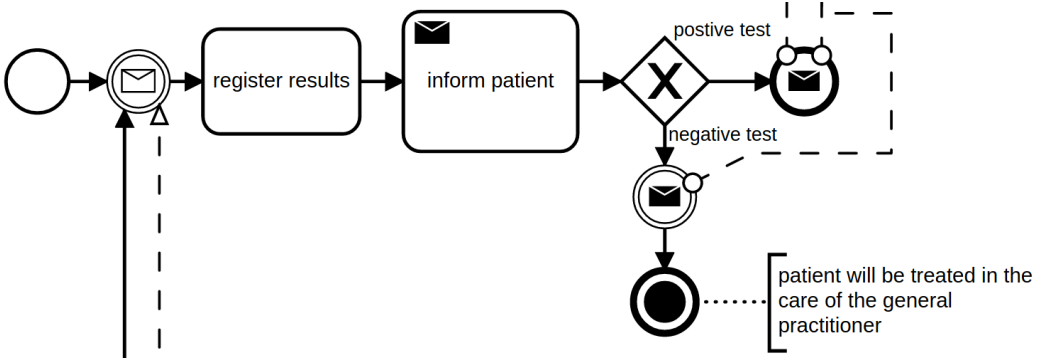
Tentative diagnosis (@ general practitioner)



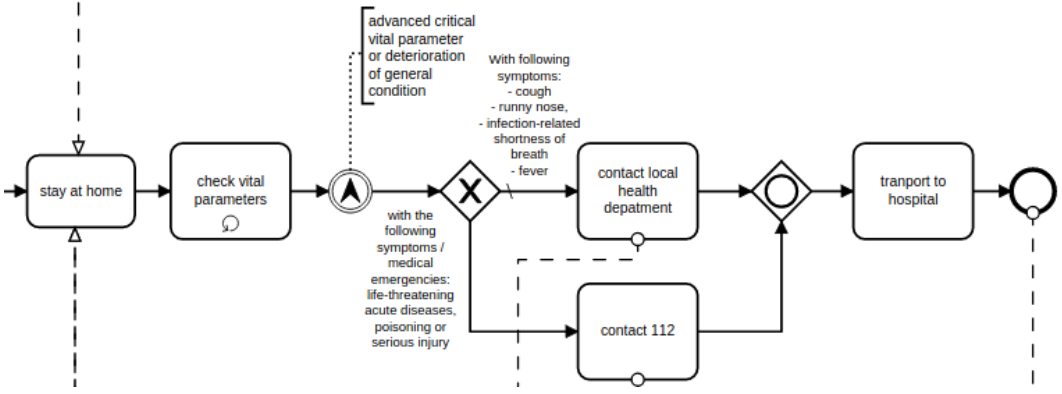
Testing for SARS-CoV-2



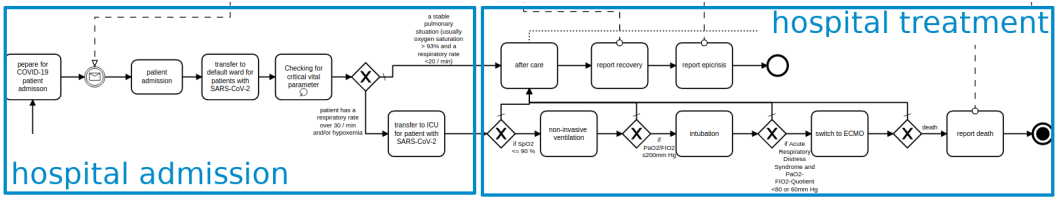
Test evaluation (@ general practitioner)



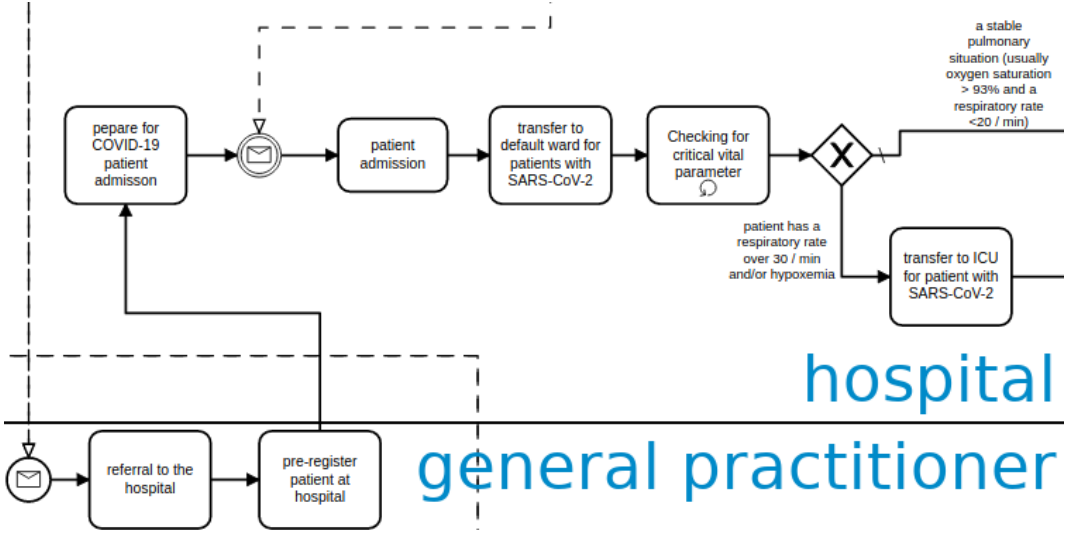
Home quarantine (@ patient's home)



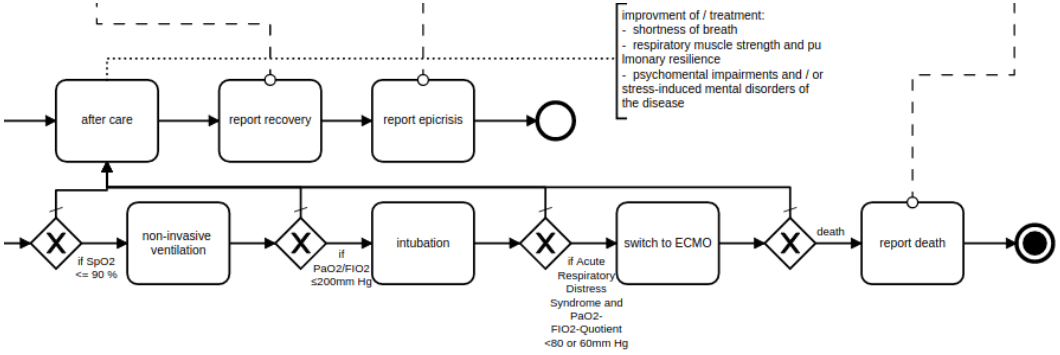
Overview: Hospital admission & treatment



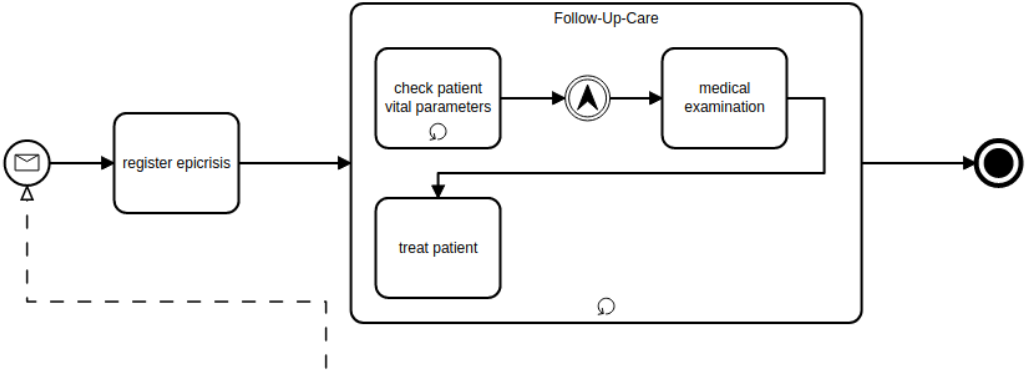
Hospital admission



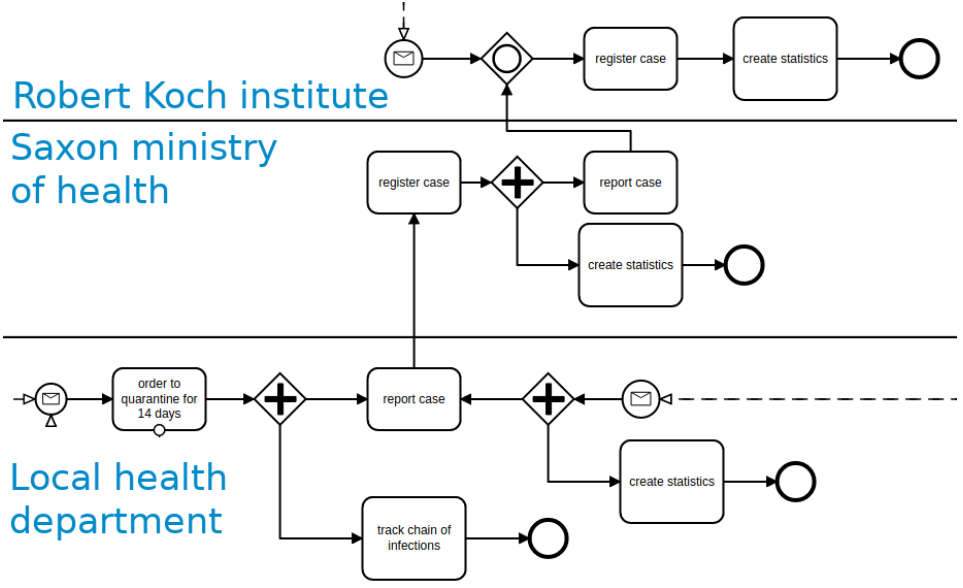
Hospital treatment (@ hospital)



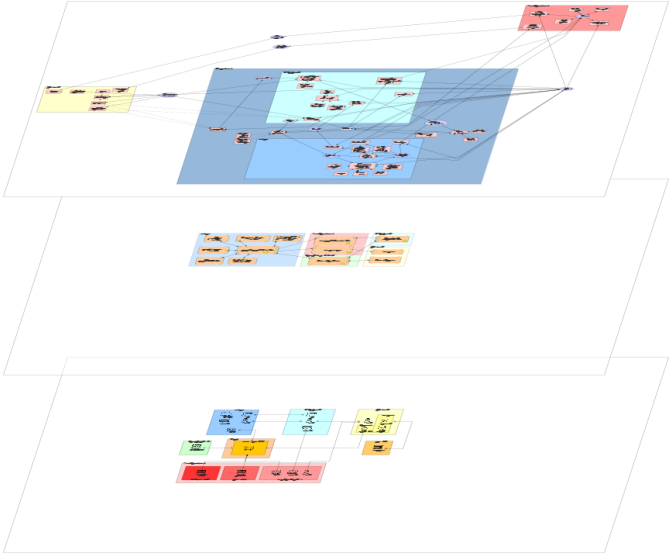
Follow-up care (@ patient's home)



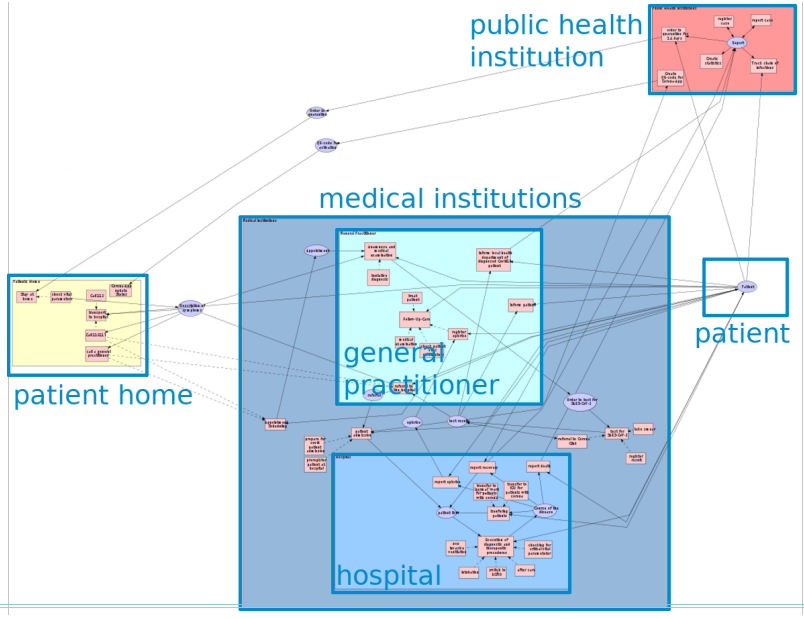
Reporting & statistics



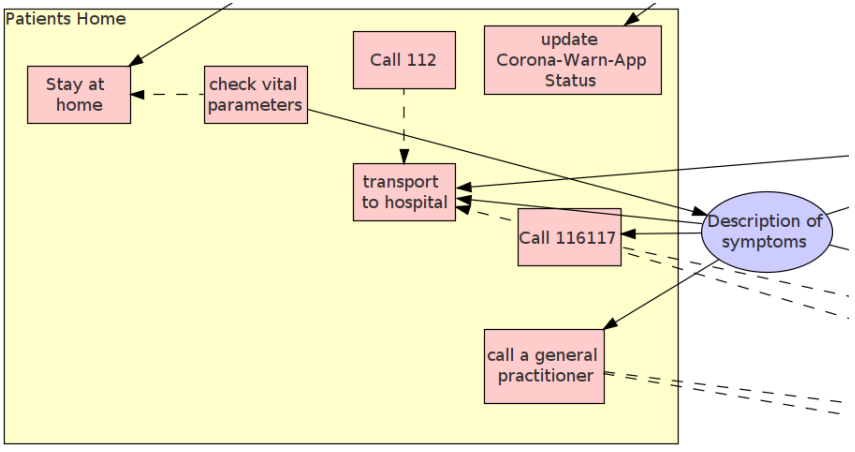
Overview: $3LGM^2$ model



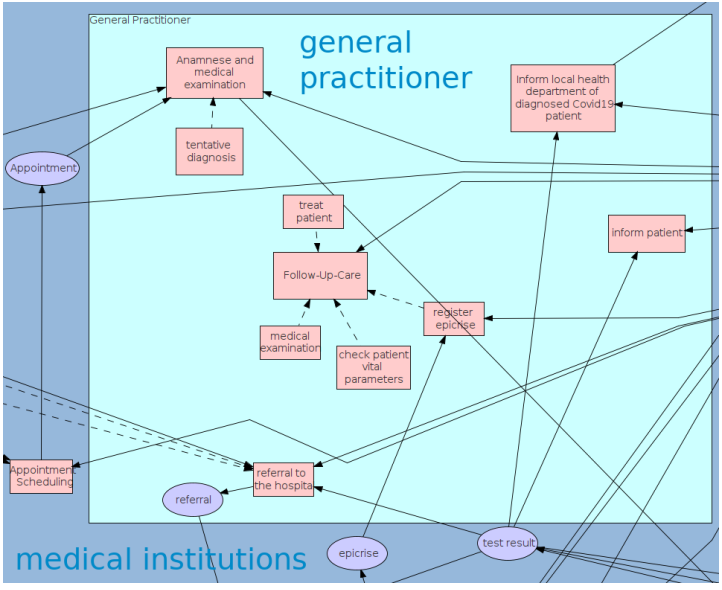
Overview: Domain Layer



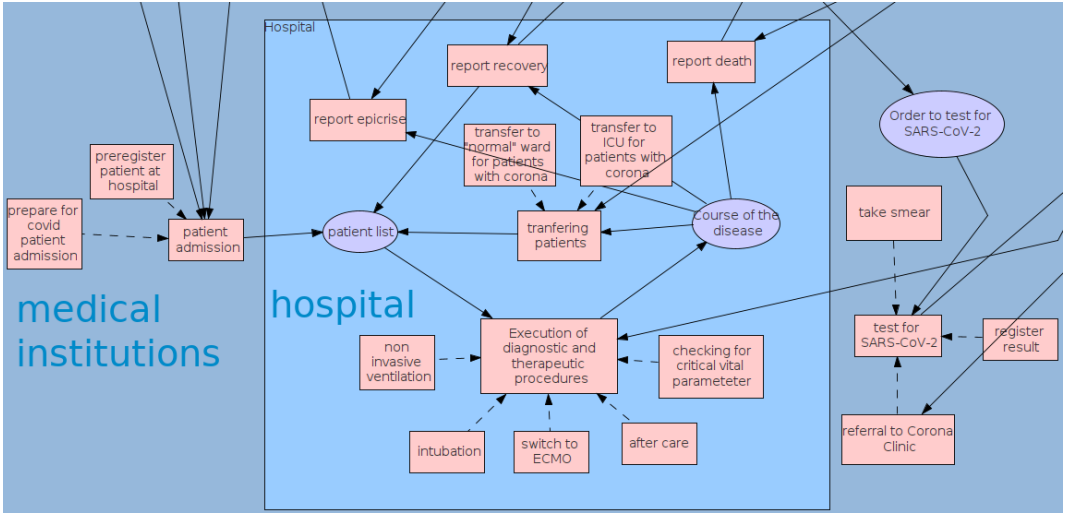
Domain layer: Patient home



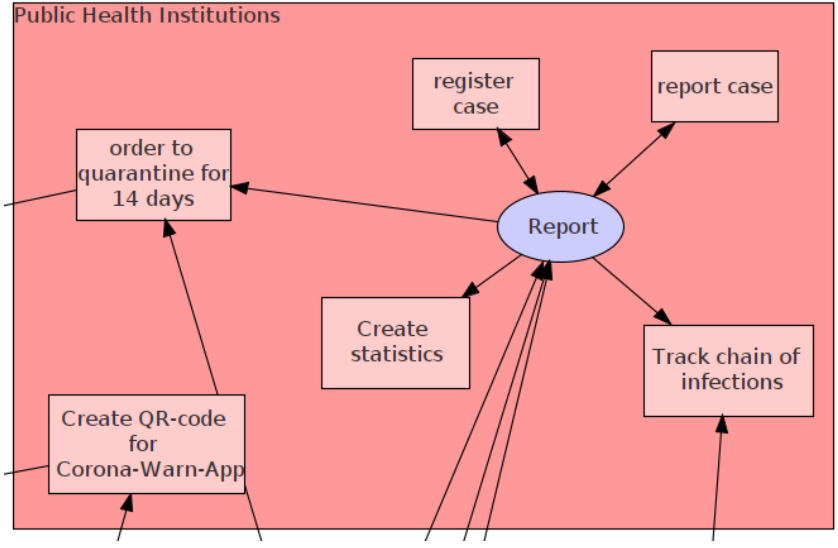
Domain layer: General practitioner



Domain layer: Hospital



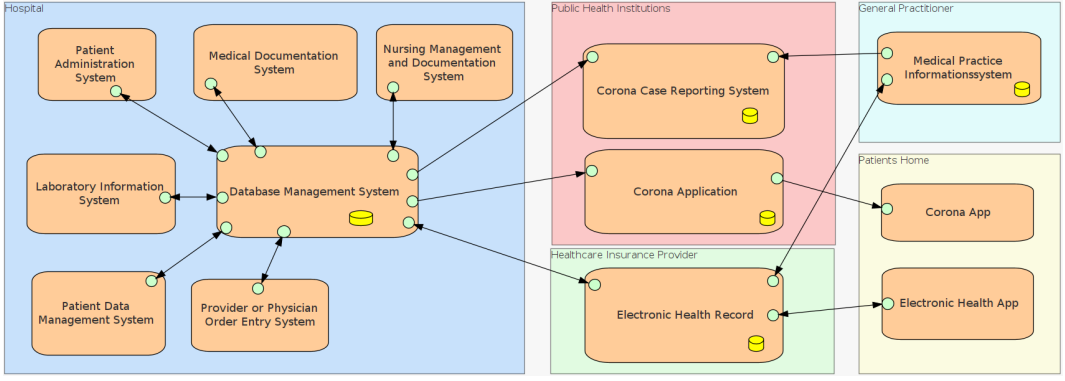
Domain layer: Public Health Institutions



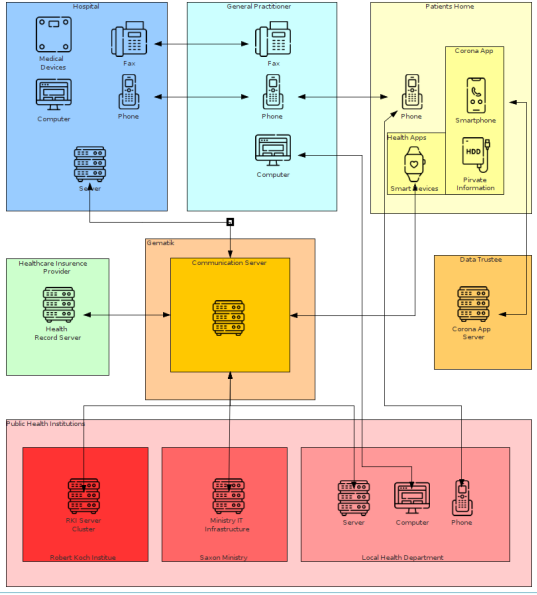
Assumptions & Simplification

- There is a single, shared data standard (FHIR) in the HIS.
- There is a single, centralized database in the HIS.
- There is a central communication server under the control of a trustable institution (Gematik).
- There is a eletronic health record available for each patient.
- There is a smartphone app (Corona-Warn-App) with a sufficient adoption rate to track and help to disrupt chains of infection.

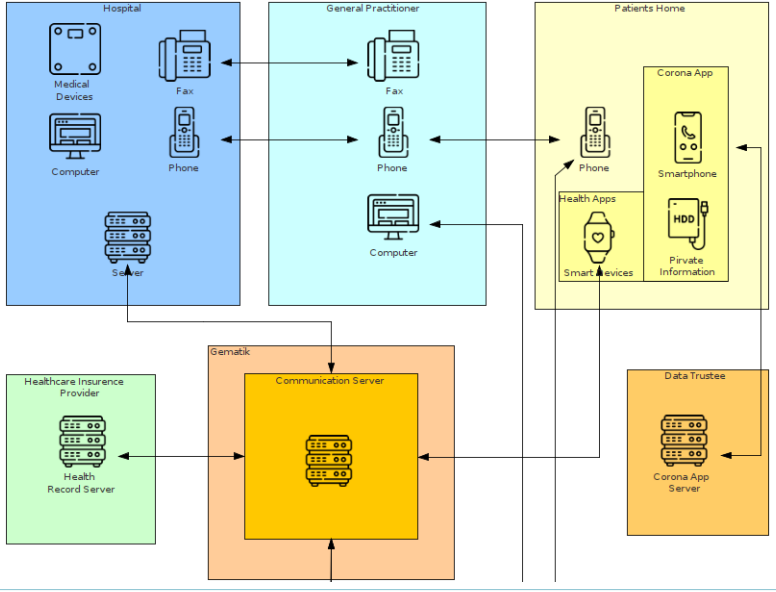
Logical tool layer



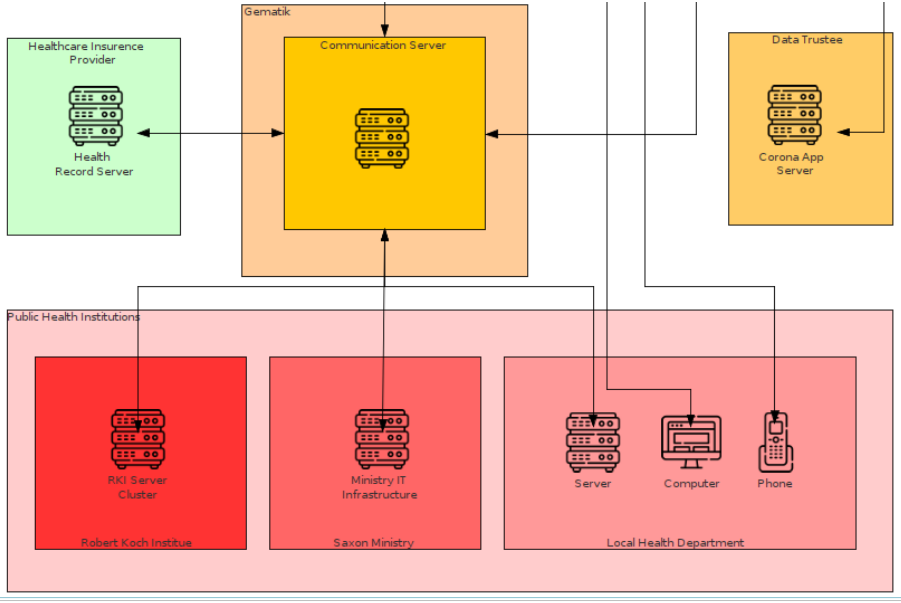
Overview: Physical tool layer



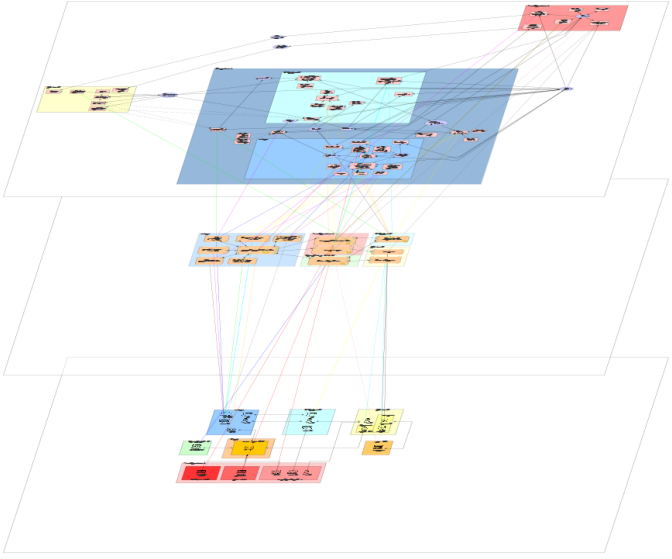
Physical tool layer



Physical tool layer



Overview: Interconnected $3LGM^2$ model



Discussion

Thank you for your attention.
You can find our all our models on Github:

- `https://github.com/AISGW2020/Corona_HIS`

Do you have any questions?

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THANKS!

Course AISGW at University Leipzig
Institute for Medical Informatics, Statistics and Epidemiology (IMISE)

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Backup Slides: Matrix View