



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

Introduction

COVID-19 in Germany, Saxony and Leipzig

Process model

Assumptions & Simplifications

3LGM² model

Domain layer

Assumptions & Simplifications

Logical tool layer

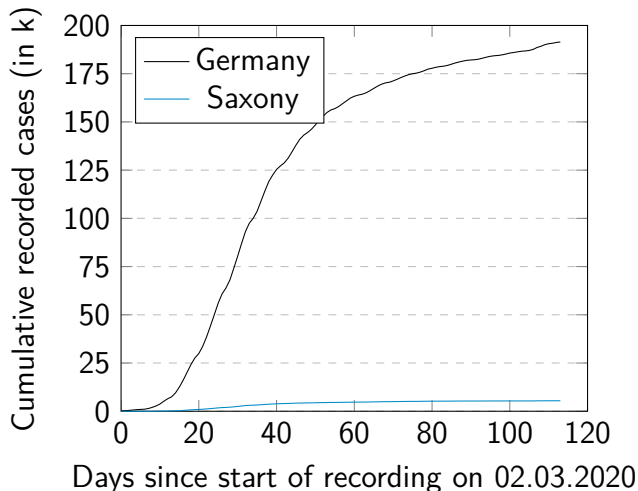
Physical tool layer

Discussion

Who are we?

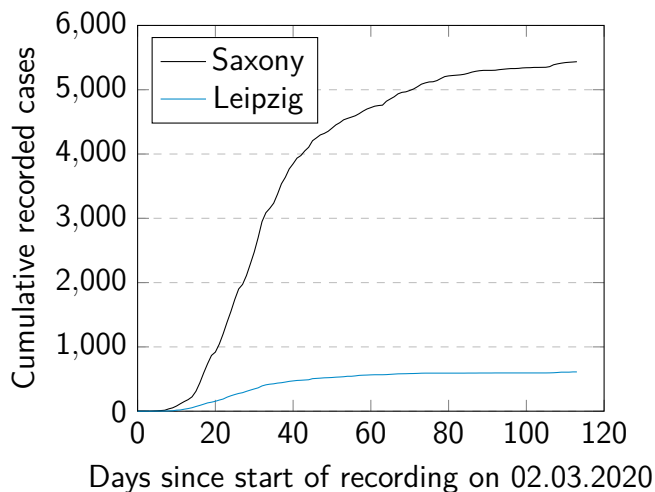
- ▶ five students of computer science at the University of Leipzig
- ▶ course "AISGW" by Prof. Dr. Winter, Ms. Jahn, Dr. Schneider, Mr. Stäubert
- ▶ varying experience in computer science and health information systems

Current COVID-19 situation in Germany and Saxony



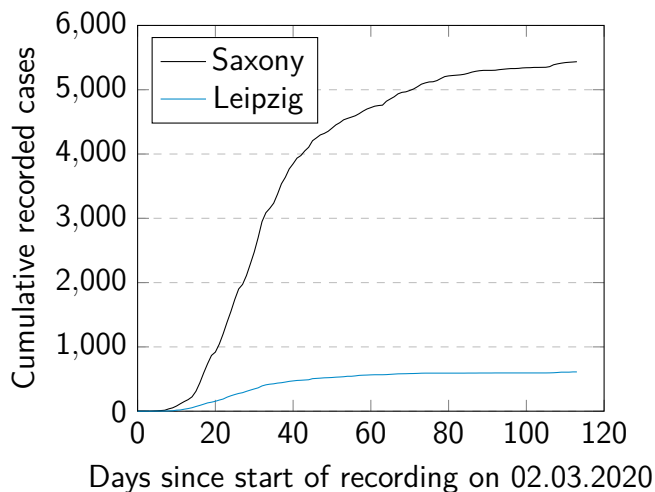
- ▶ case data provided by RKI
- ▶ total population: 83149 k / 4072 k
- ▶ total cases: 191 k / 5.4 k
- ▶ cases / 100 k citizens: 230.2 / 133.3
- ▶ total casualties: 8914 / 222
- ▶ new cases (7d): 2920 / 48

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

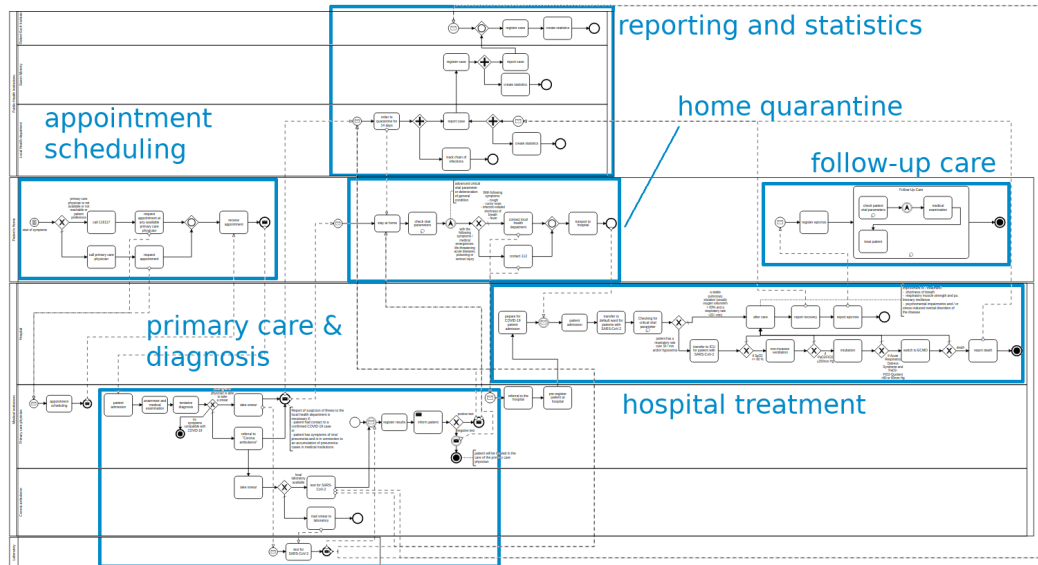


- ▶ total population: 4072 k / 588 k
- ▶ total cases: 5436 / 611
- ▶ total casualties: 222 / 12
- ▶ cases / 100 k citizens: 133.3 / 103.9
- ▶ new cases (7d): 48 / 13

Legal situation

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

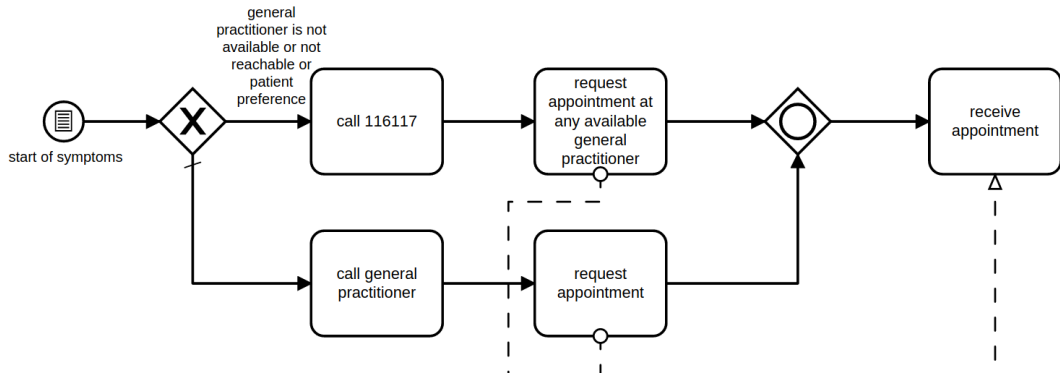
Overview of the process model



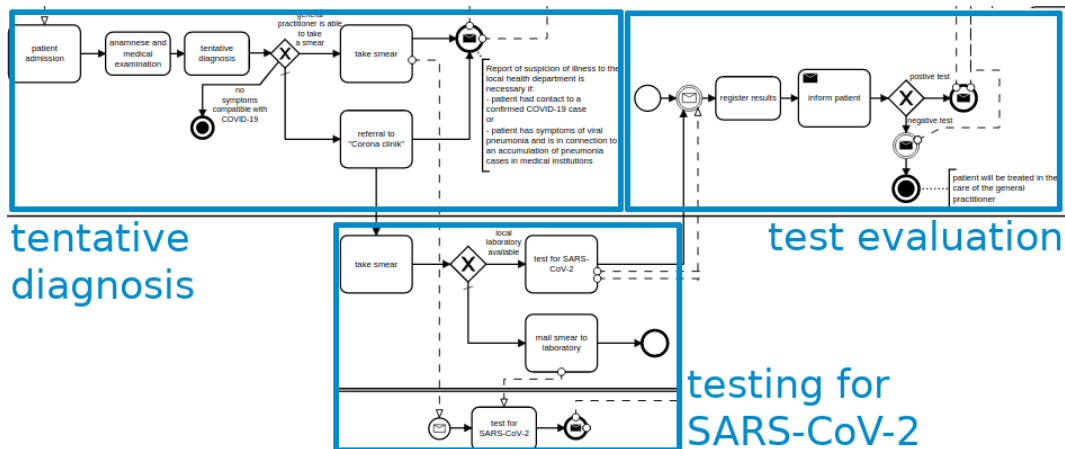
Assumptions & Simplifications

- ▶ 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 practitioner 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.

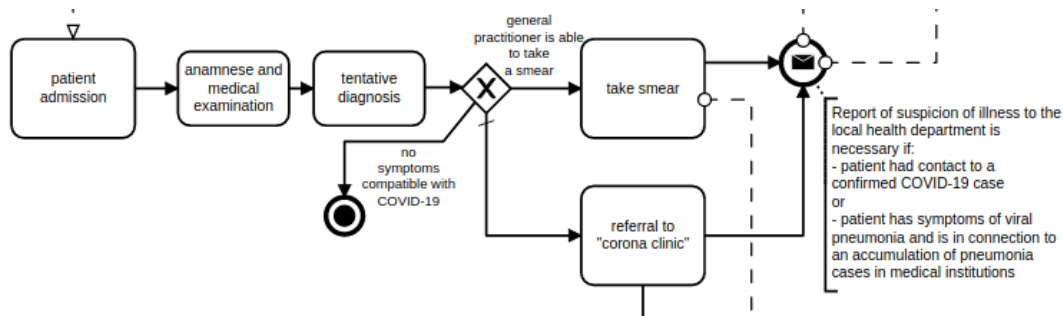
Appointment scheduling (@ patient's home)



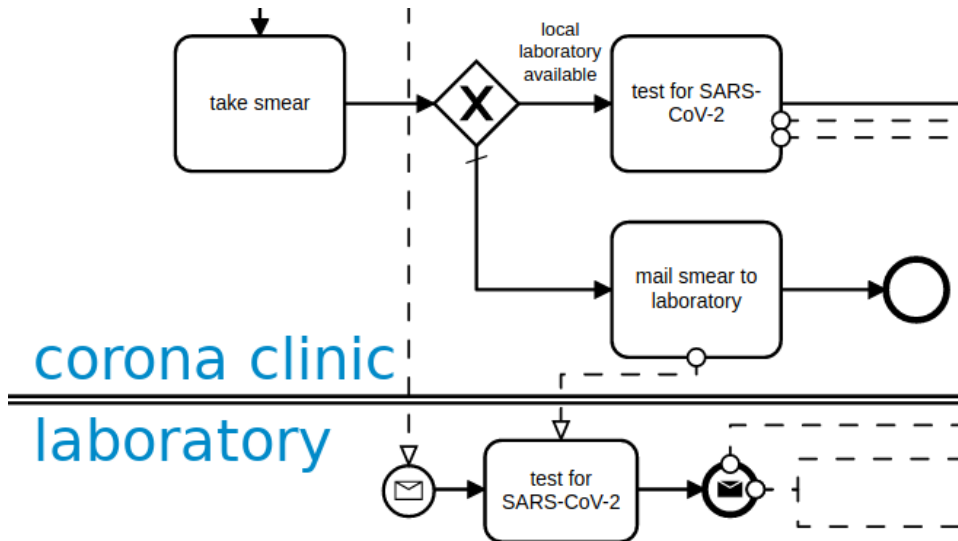
Overview of primary care & diagnosis



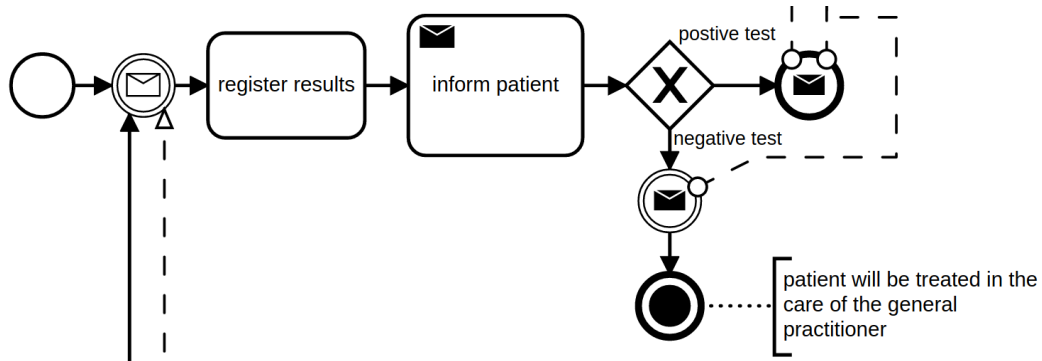
Tentative diagnosis (@ general practitioner)



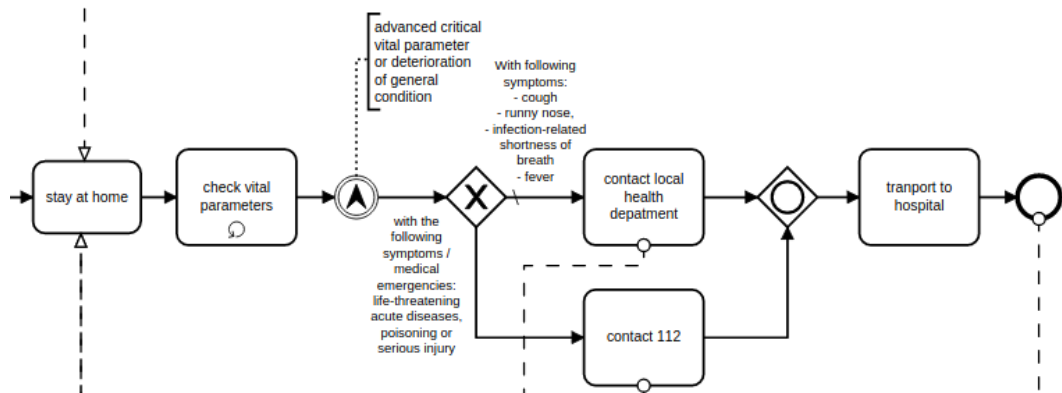
Testing for SARS-CoV-2



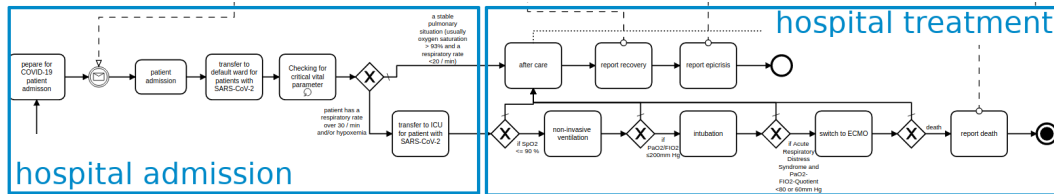
Test evaluation (@ general practitioner)



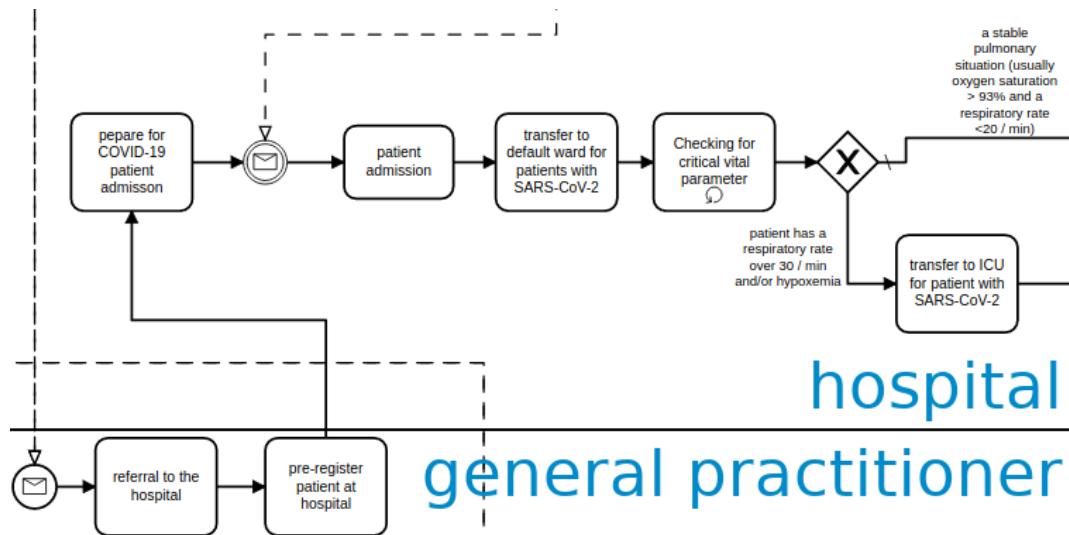
Home quarantine (@ patient's home)



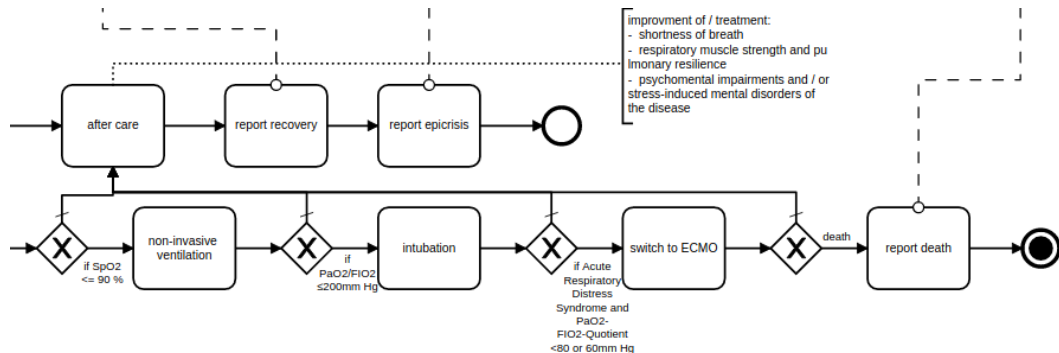
Overview: Hospital admission & treatment



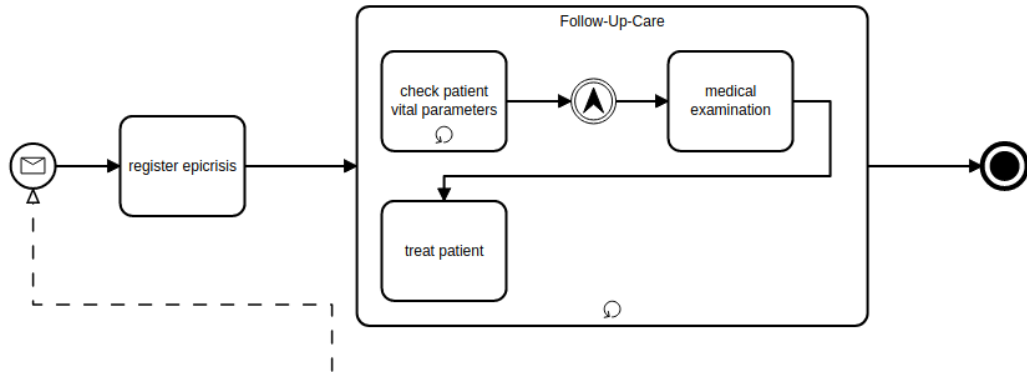
Hospital admission



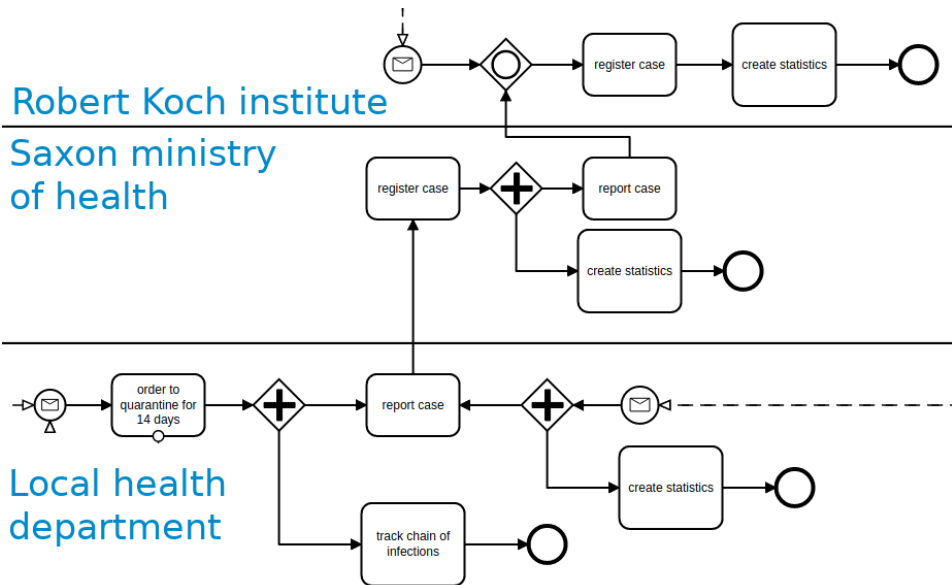
Hospital treatment (@ hospital)



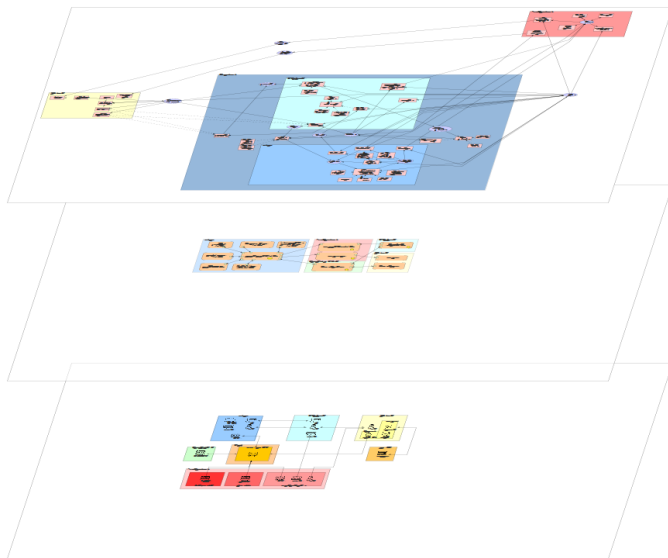
Follow-up care (@ patient's home)



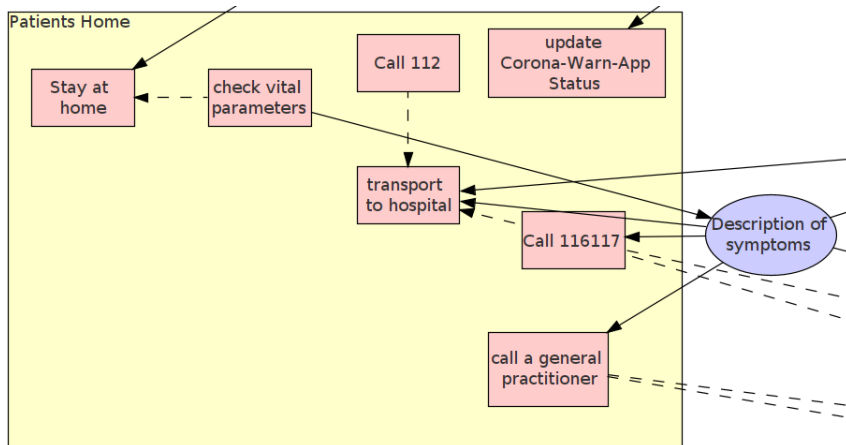
Reporting & statistics



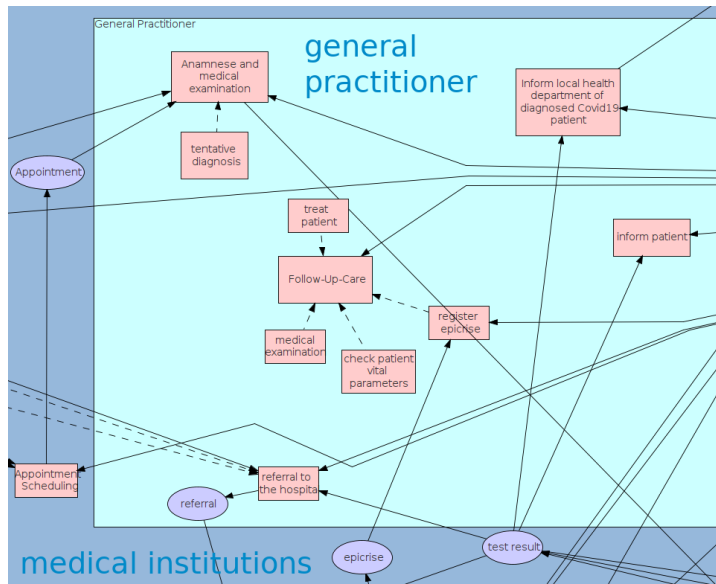
Overview: 3LGM² model



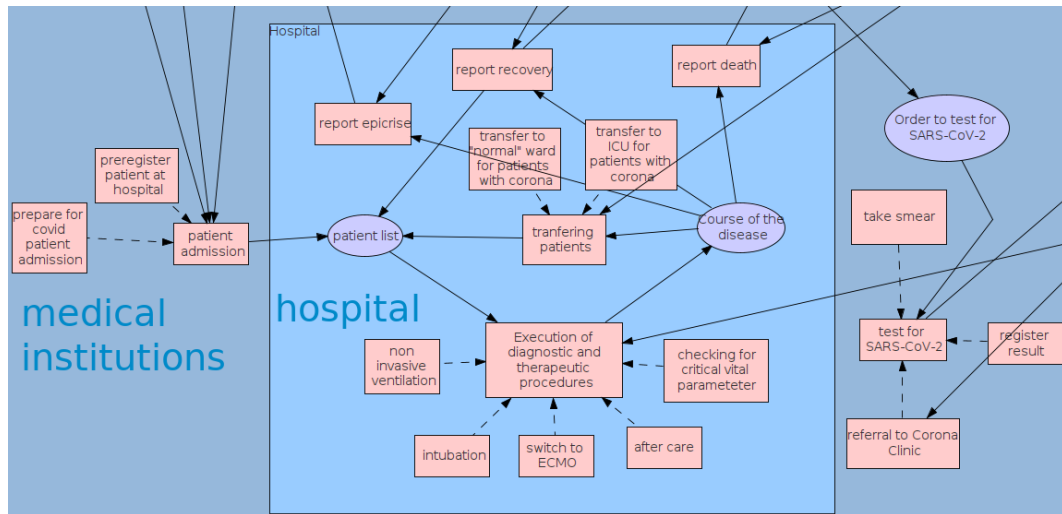
Domain layer: Patient home



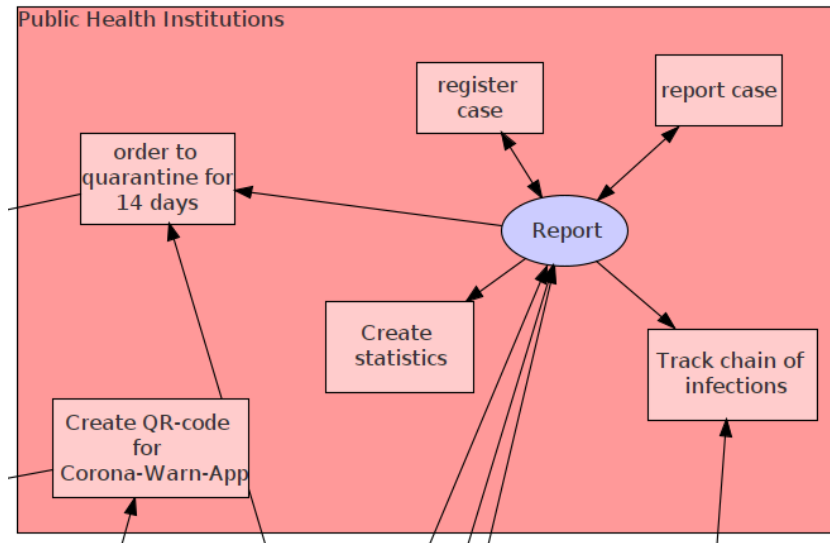
Domain layer: General practitioner



Domain layer: Hospital



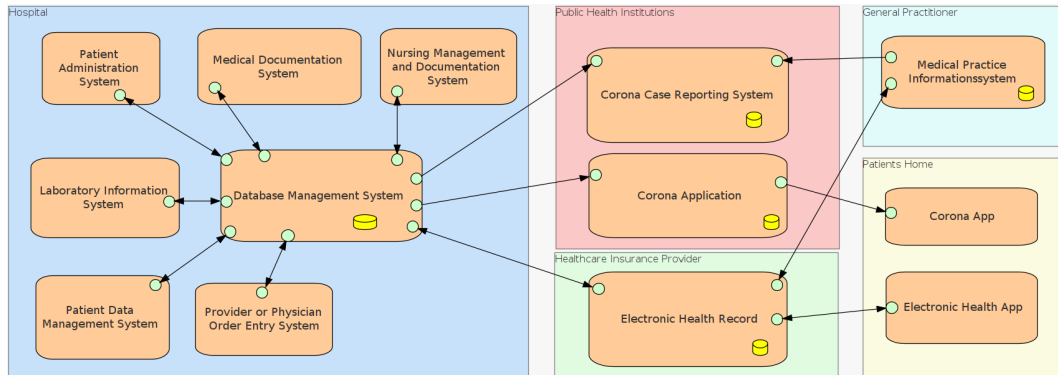
Domain layer: Public Health Institutions



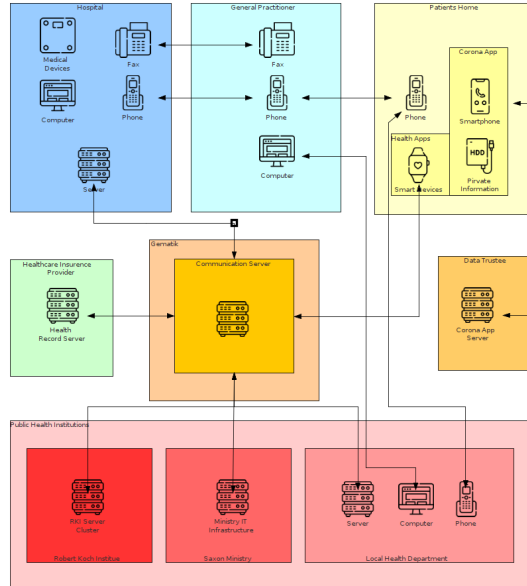
Assumptions & Simplification

- ▶ 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 electronic 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.

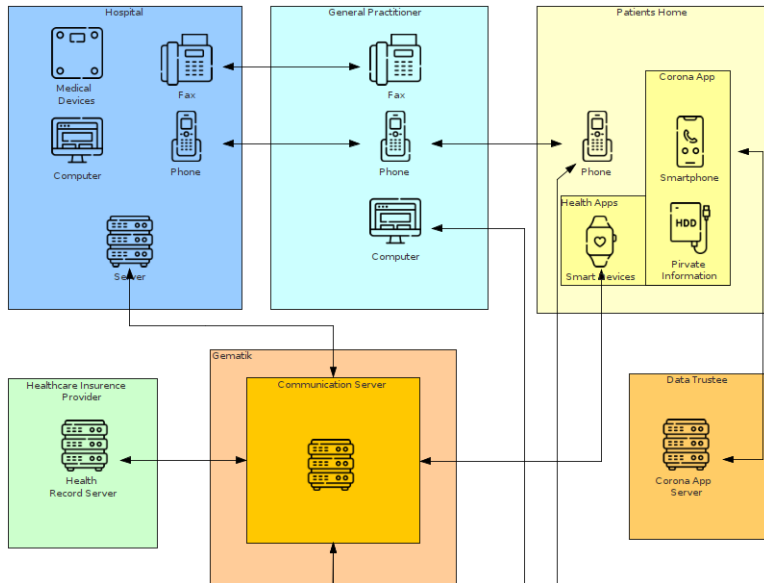
Logical tool layer



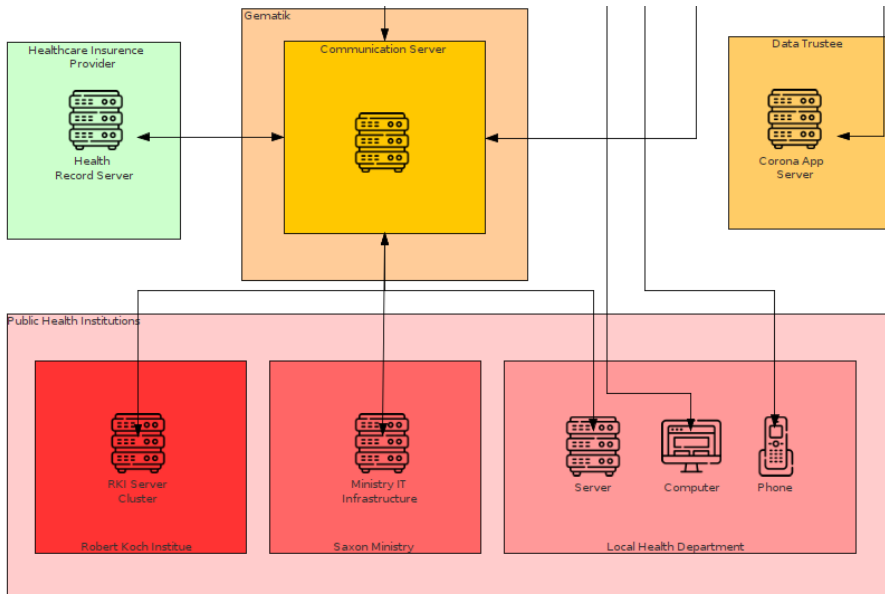
Overview: Physical tool layer



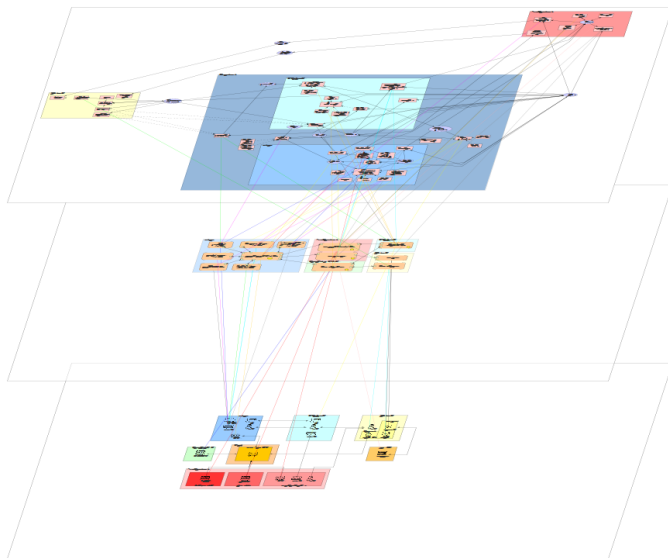
Physical tool layer



Physical tool layer



Overview: Interconnected 3LGM² 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)

www.imise.uni-leipzig.de

Backup Slides: Matrix View

[illegible]

	Appointment	Course	Description of disease episode	Order to quarantine	Order to isolate	Patient	QR-code to use for SARS-CoV-2 patient test	QR-code for activation internal report	Test result
after care									
Anamnesis and medical examination	■	■	■	■	■	■			
Appointment Scheduling	■				■				
Call 112			■						
Call 116117	■		■		■				■
call a general practitioner	■		■		■		■		■
check patient vital parameters				■					
check vital parameters			■	■					
checking for critical vital parameter		■			■	■			
Corona-App update Status							■		
Create QR-code for Corona-App									■
Create statistics						■		■	
Execution of diagnostic and therapeutic procedures	■			■	■				
Follow-Up-Care				■	■				
Inform local health department of diagnosed Covid19 patient								■	■
inform patient					■				■
intubation		■		■	■				
medical examination				■	■				
non invasive ventilation		■		■	■				
order to quarantine for 14 days				■				■	
patient admission					■	■		■	■
prepare for covid patient admission					■	■		■	■
preregister patient at hospital					■	■		■	■
referral to Corona Clinic				■					■
referral to the hospital			■		■			■	■
register case								■	
register episode			■						
register result:				■					■
report case								■	
report death		■			■				
report episode		■	■		■			■	
report recovery		■			■	■		■	
Stay at home				■					
switch to ECMO		■			■	■			
take smear					■				■
tentative diagnosis	■		■		■				
test for SARS-CoV-2									■
Track chain of infections								■	
transferring patients		■			■	■			
transfer to "normal" ward for patients with corona					■	■			
transfer to ICU for patients with corona		■			■	■			
transport to hospital			■						
treat patient					■				