

INTERNET OF SERVICES LAB

Service-centric Networking

Introduction SNET



Established in December 2009

- Prof. Dr. Axel Küpper
- Part of *TU Berlin* and
Telekom Innovation Laboratories

Information

- <http://www.snet.tu-berlin.de>

Research Areas

- Cloud Computing
- Data Science
- Social Computing
- Ubiquitous Computing

Other Courses

- *Mobile Services (ST)*
- *Geschäftsprozesse und IT-Dienste (ST)*
- *Prog 2 (ST)*
- *Webtechnologien (WT)*
- *Electronic Commerce (WT)*
- *Digital Communities (WT)*

Project organization

Project organization

- In this project, you will work in a small team on a given task
- You will need to define a working plan for your project and organize the teamwork
- There will be meetings with your supervisor(s) on a regular basis where you report what has been done and discuss the next steps

What you will learn

- Teamwork and team organization: Communication and problem solving
- Project work: Organizing a project and assigning tasks
- Research: Evaluating existing solutions

...but not

- Coding

Project organization

Prerequisites

- Good knowledge of computer science
- Practical experience in object-oriented programming and software design
- Communication in English

Good to have (depending on the topic)

- Profound knowledge and experience in
 - Web Services (Protocols and APIs)
 - Mobile Computing (especially Android)
 - DBMS (e.g. SQL)
- Experience with IDEs (e.g. Eclipse) and Version Control Systems (especially git)

Project organization

You will be working together in small teams

- Each team will get a specific topic
- ca. 3-5 students per topic
- Teams will have to organize themselves, i.e. come up with a project plan etc.

Working mode

- The project has 9 ECTS (approx. 6 SWS)
- Project duration: 15 weeks

Workload per person per week

- Expected: 18 – 22 hours

Project organization

Meetings

- Milestone presentation: **Wednesday May 17th, 14:00 – 17:00, MAR 6.011**
- Final presentation: **Wednesday July 26th, 14:00 – 17:00, MAR 0.011**
- Furthermore, there will be regular meetings with the supervisors

Talks

- Milestone presentations: **10 minutes + 5 minutes Q&A**
 - Present the topic in detail, tasks, project plan and distribution of work among students
- Final presentations: **20 minutes (demo included) + 5 minutes Q&A**
 - Present the meaningful results and significant demonstration video
- Each student needs to present at least one time
- Every supervisor grades every presentation!
- Use our template

Attendance

- Attendance to all appointments is mandatory

Project organization

Teams are required to define a project plan

- Define and assign tasks
- Estimate each tasks time consumption
- Track who worked on what task for how long

Project documentation

- To be handed in on the day of final presentation, **Wednesday July 26th** (hard deadline!)
- Ask for feedback during the project
- Use our (Latex) template

Project organization

Project focus and grading

- Result implementation (25%)
- Process of the project (25%): includes group organization, distribution of workload, project plan, etc.
- Presentation (25%)
- Documentation (25%)
- For a criteria list see the module description

=> every group member has to contribute to every pillar!

Tools and Infrastructure

- TUB Gitlab
 - Repository: GIT
 - Wiki
 - Ticketing system
- The implementation results must be handed in in a reproducible way
 - E.g., using Docker container
 - Clear build process and files
- If needed, we can provide you with:
 - Mobile devices
 - Linux or Windows root server (tubIT VMs)

Registration

- **We register you** – the self-enrollment via QISPOS is deactivated
 - Some majors accept this course in several study areas/pillar (computer engineering, business informatics, etc.). The system doesn't allow the assignment to a specific study area/pillar. This means: **We still register you, but after finishing this course you have to go the examination office and move this course to your preferred area/pillar.**
 - **Exception:** you want to have this as an additional course, e.g. extracurricular studies (Studium Generale) or carry over to master studies -> Registration via Yellow Page ("Zusatzmodul")
 - To allow us to register you, you have to proceed with the electronic registration process before the 1st milestone meeting. The presentation is the first exam element, so after signing you are not able to resign the course!
- All students need to clarify for themselves if they can use the credits in their TUB subjects

TOPICS



#1: Web-based Group Recommender System

Felix Beierle, Sebastian Göndör

Web-based Group Recommender System



Current Situation: Single User Recommendation

URL

Hello User X, buy this:



URL

Hello User X, watch this:

- 1. The Boondock Saints
- 2. Her
- 3. Transformers 3
- 4. ...



URL

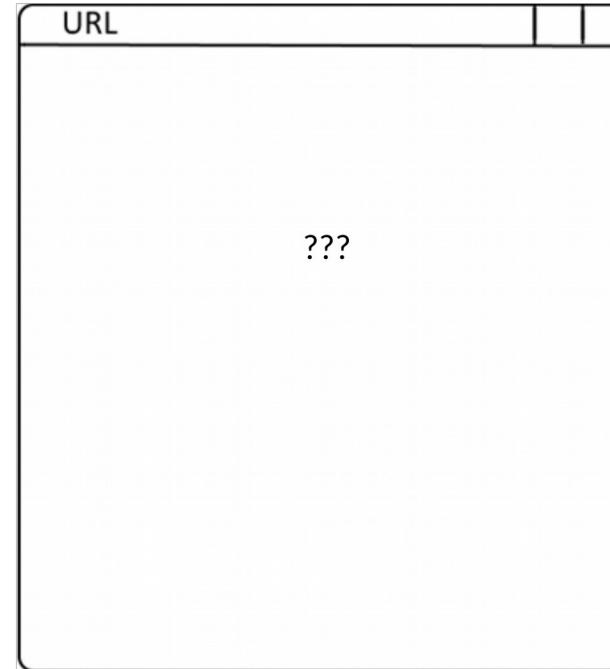
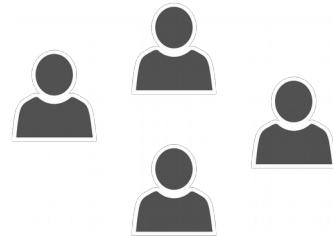
Hello User X, listen to this:

- 1. Pink Floyd – Time
- 2. The Beatles – Run For You Life
- 3. Rihanna – Work
- 4. ...



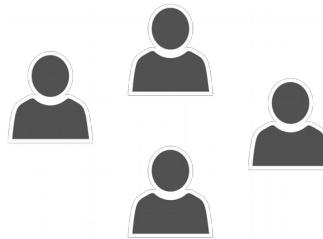
Web-based Group Recommender System

User Group Scenario



Web-based Group Recommender System

User Group Scenario – Goal



URL		
Hello Group X, listen to this:		
1. Metallica – Moth Into Flame		
2. Jimmy Hendrix – Are You Experienced?		
3. Rihanna – Work		
4. ...		

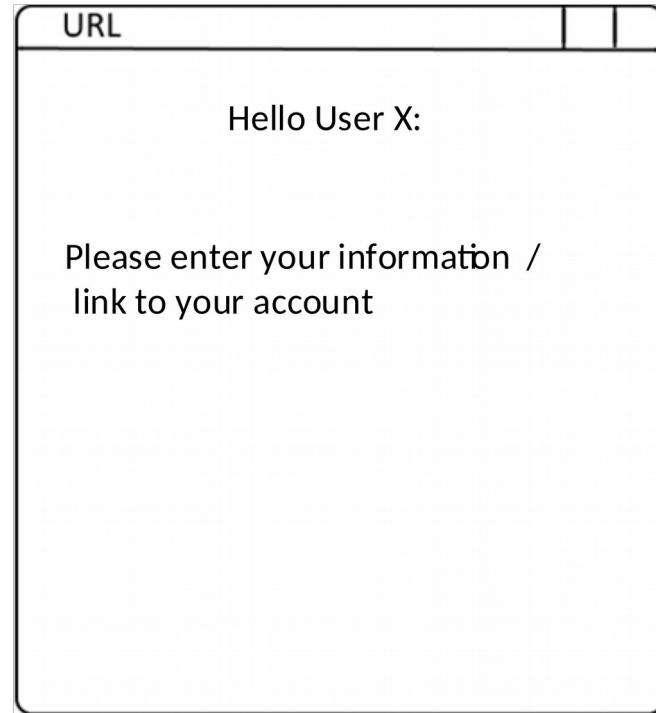


URL		
Hello Group X, watch this:		
1. The Usual Suspects		
2. Mad Max: Fury Road		
3. Transformers 2		
4. ...		



Web-based Group Recommender System

Where does the data come from?



Web-based Group Recommender System

Use existing service providers



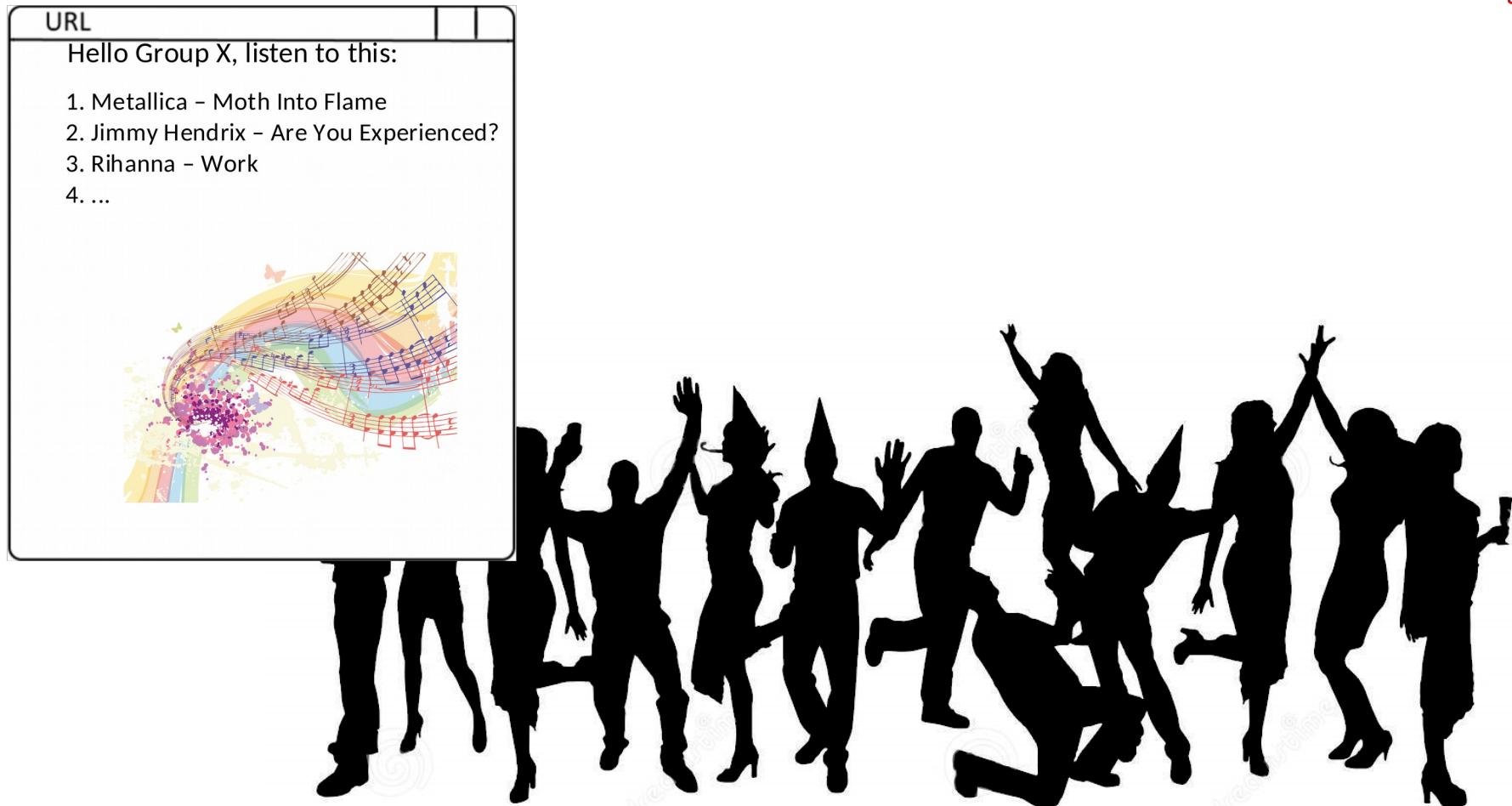
Web-based Group Recommender System

Admin interface



URL		
<input checked="" type="checkbox"/> Aggregate Profiles <input type="checkbox"/> Aggregate Recommendations		
Select Aggregation Strategy :		
<ol style="list-style-type: none">1. Least Misery2. Most Pleasure3. ...		

Web-based Group Recommender System



Web-based Group Recommender System

Data source Admin page Group Rec. System

URL		
Hello User X: Please enter your information / link to your account		

URL		
<input checked="" type="checkbox"/> Aggregate Profiles <input type="checkbox"/> Aggregate Recommendations		
Select Aggregation Strategy :		
1. Least Misery 2. Most Pleasure 3. ...		

URL		
Hello Group X, listen to this:		
1. Metallica - Moth Into Flame 2. Jimmy Hendrix - Are You Experienced? 3. Rihanna - Work 4. ...		
		

Web-based Group Recommender System

Tasks:

- Research
 - papers, software and technologies, existing services
 - Design
 - architecture, interfaces
 - Implementation
 - at least music group recommender system
 - Evaluation
 - functionality of the system, group rec. algorithms
- Documentation

Tools:

- GitLab
- Slack

#2: BCIDM: IDENTITY MANAGEMENT IN THE BLOCKCHAIN

Sebastian Göndör

Bitcoin:

- Decentralized cryptocurrency
- Uses blockchain to log all transactions
- Crafted transactions can be identified

Blockchain:

- Distributed database maintaining a list of ordered records (blocks)
- => Blockchain allows to store data that cannot be manipulated at a later time*

Identity Management:

- IdM (ISO 29115:2013):
 - Entity: Something that [...] can be identified [...]
 - Identifier: Attribute that uniquely characterizes an entity
 - Identity: Set of attributes related to an entity
- Basically: Assign an identifier and attributes to an entity and make it verifiable*

Project Sonic:

- Decentralized, self-asserted identities
- Users create digitally signed data records, which are decentrally managed

* For risks and side effects read scientific publications and discuss the topic with your supervisor

So what is BCIDM?

- Building a blockchain-based, distributed system for self-asserted identities for Distributed Online Social Networks (DOSN) in the Sonic ecosystem

Your mission, should you choose to accept it:

- Research the state of the art regarding to identity management and blockchains
- Conceptualize and design a service to manage self-asserted identities in a blockchain
- Implement and evaluate the designed solution



What should be in your toolbox:

- OOP in Java 8
- PKI (RSA/EC)
- HTTP/REST

Knowledge/experience beneficial to have:

- Distributed systems
- P2P (DHT)
- IdM (OpenID, OAuth, OpenIDConnect)
- API design

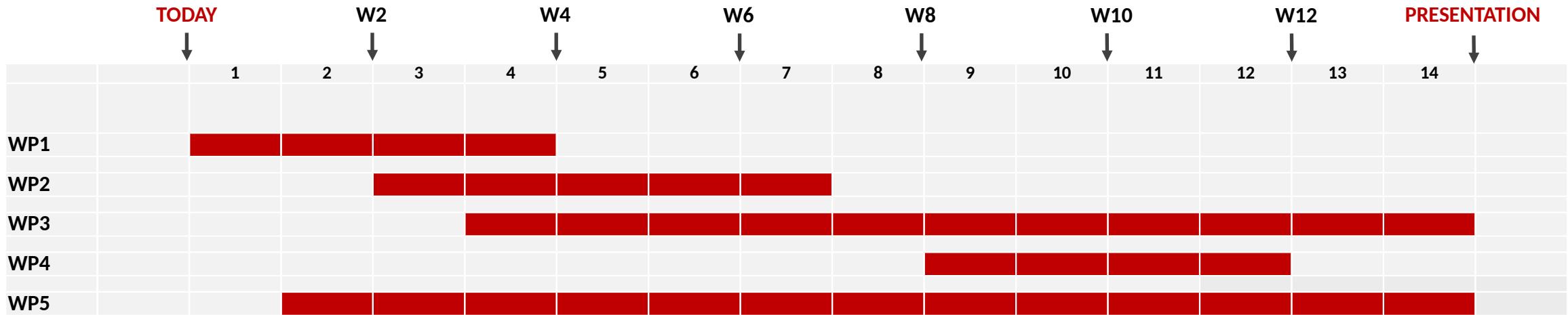
What you will work with additionally:

- Blockchain
- Maven, Git
- Docker
- SpringBoot

What you will get

What you will learn

- What the blockchain is, how it works, and how to use it
 - Work in a R&D project in a team
 - Stick to a project plan
 - Organize yourself
 - Design and develop a REST-ful web service
 - Research current state of technology
 - Work with state of the art technology
 - Optional: Author a scientific publication about the project
- Project plan
 - Bootstrapped Git-repository with code and docs
 - Project management tool with a Wiki and issue-tracking
 - Starting material



#3: AUTOMATIZED LOGGING DATA MANAGEMENT FOR TELECOMMUNICATION SYSTEMS

Boris Lorbeer | Tanja Deutsch

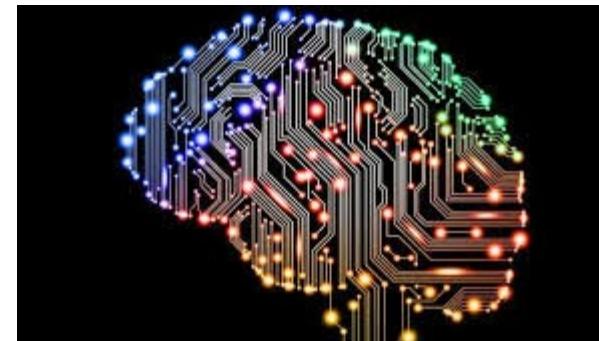
Syslog Analysis

- Computers log information about their current state
- This can lead to huge amounts of data
- Operators have difficulties to read and evaluate all the events

Date	Time	Facility	Priority	Host Name	Message Text
2023-09-25	10:49:29	local6	Warning	10.191.4.3	10.191.4.3 [13:39:14.571] (7) -> 10.21.5.40:49499[49736]
2023-09-25	10:49:30	local6	Warning	10.191.254.107	This is Syslog test message number 200.
2023-09-25	10:49:30	local6	Warning	10.191.196.407	This is Syslog test message number 201.
2023-09-25	10:49:30	local6	Warning	10.191.196.408	This is Syslog test message number 202.
2023-09-25	10:49:30	local6	Warning	10.191.196.409	This is Syslog test message number 203.
2023-09-25	10:49:30	local6	Warning	10.191.196.410	This is Syslog test message number 204.
2023-09-25	10:49:30	local6	Warning	10.191.196.411	This is Syslog test message number 205.
2023-09-25	10:49:30	local6	Warning	10.191.196.412	This is Syslog test message number 206.
2023-09-25	10:49:30	local6	Warning	10.191.196.413	This is Syslog test message number 207.
2023-09-25	10:49:30	local6	Warning	10.191.196.414	This is Syslog test message number 208.
2023-09-25	10:49:30	local6	Warning	10.191.196.415	This is Syslog test message number 209.
2023-09-25	10:49:30	local6	Warning	10.191.196.416	This is Syslog test message number 210.
2023-09-25	10:49:30	local6	Warning	10.191.196.417	This is Syslog test message number 211.
2023-09-25	10:49:30	local6	Warning	10.191.196.418	This is Syslog test message number 212.
2023-09-25	10:49:30	local6	Warning	10.191.196.419	This is Syslog test message number 213.
2023-09-25	10:49:30	local6	Warning	10.191.196.420	This is Syslog test message number 214.
2023-09-25	10:49:30	local6	Warning	10.191.196.421	This is Syslog test message number 215.
2023-09-25	10:49:30	local6	Warning	10.191.196.422	This is Syslog test message number 216.
2023-09-25	10:49:30	local6	Warning	10.191.196.423	This is Syslog test message number 217.
2023-09-25	10:49:30	local6	Warning	10.191.196.424	This is Syslog test message number 218.
2023-09-25	10:49:30	local6	Warning	10.191.196.425	This is Syslog test message number 219.
2023-09-25	10:49:30	local6	Warning	10.191.196.426	This is Syslog test message number 220.
2023-09-25	10:49:30	local6	Warning	10.191.196.427	This is Syslog test message number 221.
2023-09-25	10:49:30	local6	Warning	10.191.196.428	This is Syslog test message number 222.
2023-09-25	10:49:30	local6	Warning	10.191.196.429	This is Syslog test message number 223.
2023-09-25	10:49:30	local6	Warning	10.191.196.430	This is Syslog test message number 224.
2023-09-25	10:49:30	local6	Warning	10.191.196.431	This is Syslog test message number 225.
2023-09-25	10:49:30	local6	Warning	10.191.196.432	This is Syslog test message number 226.
2023-09-25	10:49:30	local6	Warning	10.191.196.433	This is Syslog test message number 227.
2023-09-25	10:49:30	local6	Warning	10.191.196.434	This is Syslog test message number 228.
2023-09-25	10:49:30	local6	Warning	10.191.196.435	This is Syslog test message number 229.
2023-09-25	10:49:30	local6	Warning	10.191.196.436	This is Syslog test message number 230.

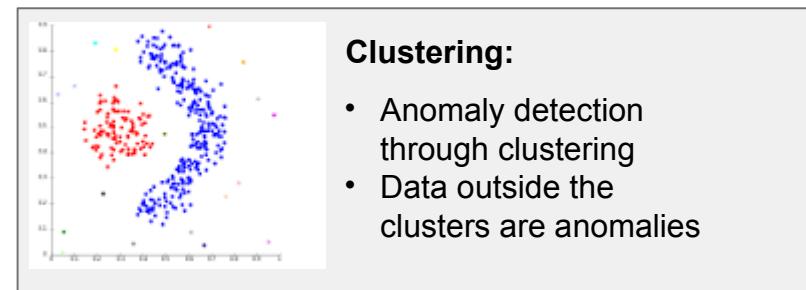
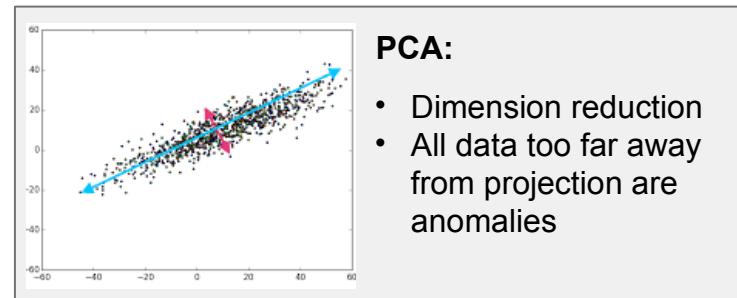
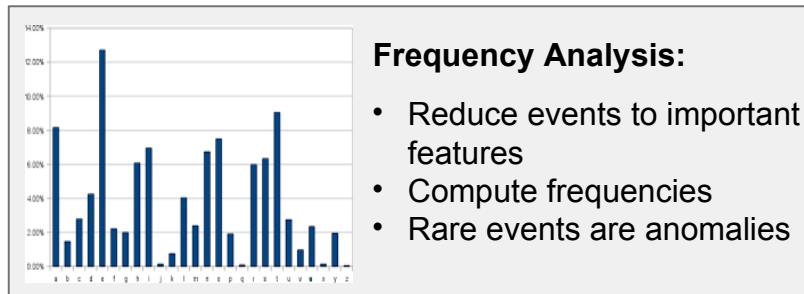
Questions we want you to answer:

- How can this be automated?
- Can machine learning help?
- How does this scale?



Syslog Analysis

Machine Learning: Anomaly Detection



Syslog Analysis

Make it scale

- What are the complexities of the methods?
- How does all this scale?
- Use Spark or Flink or H2O or Storm or ...

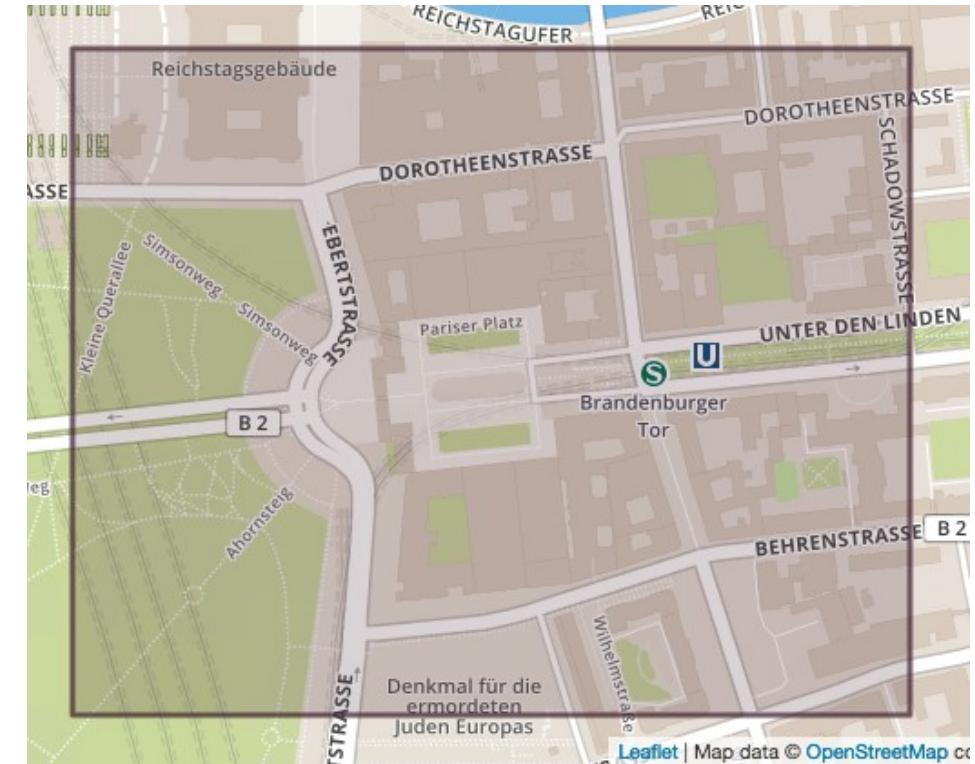


#4: SEMANTIC GEOFENCING

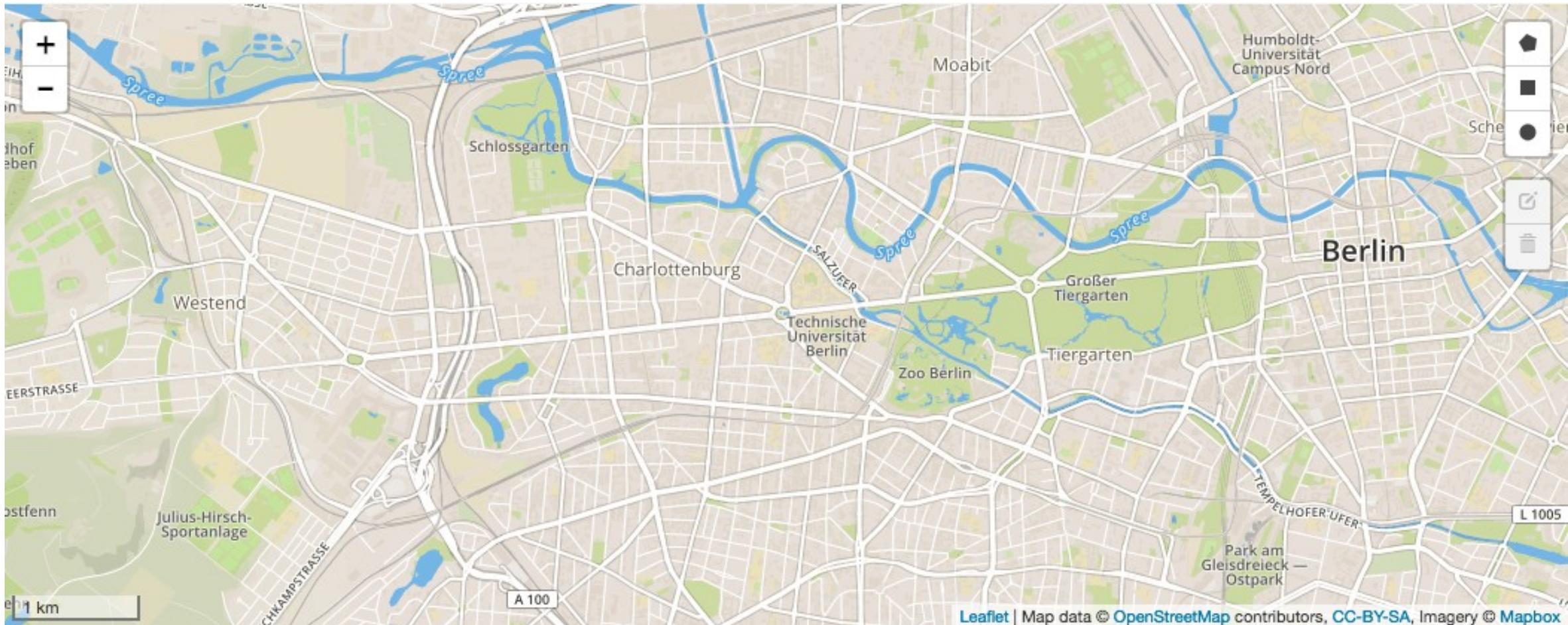
Sebastian Zickau

Geofencing

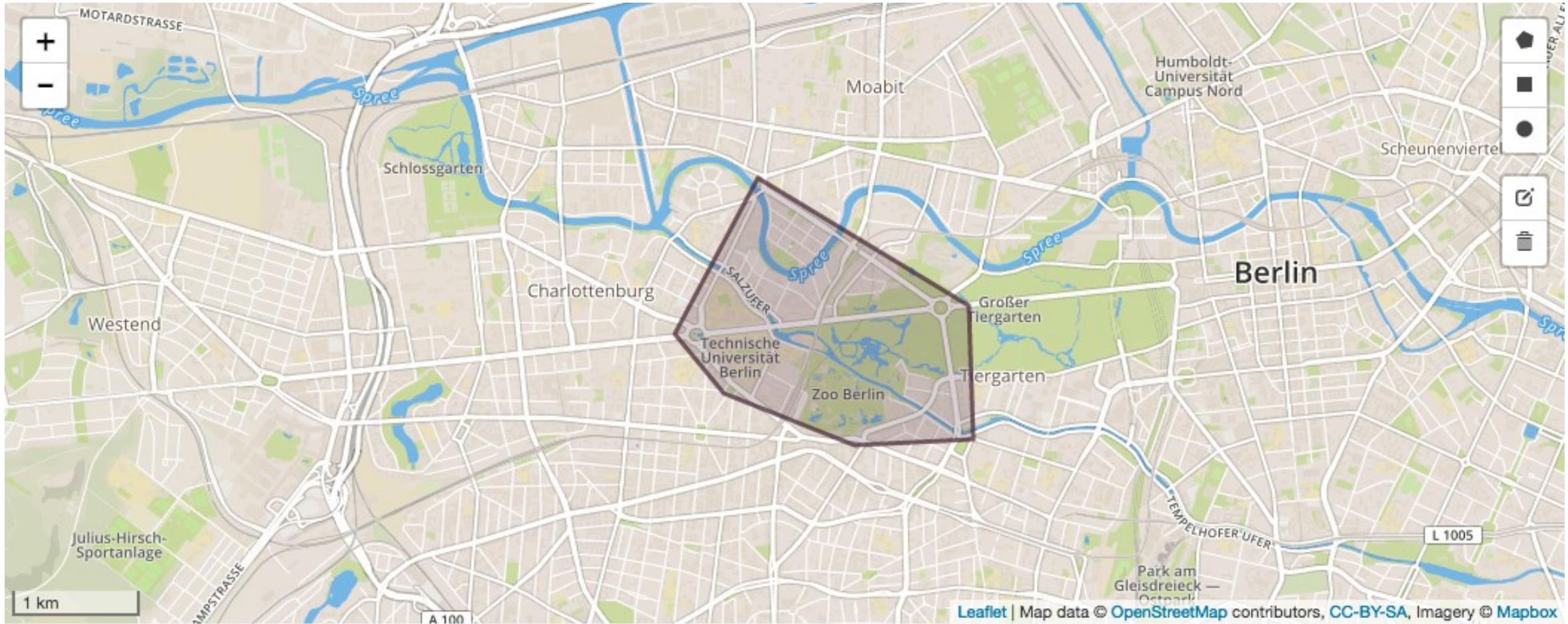
- Virtual boundaries around real world areas
- Embedded in the PARADISE project
- Used in mobile device scenarios
- Project has privacy aspects
- Extending project prototype
- Stand alone geofencing service



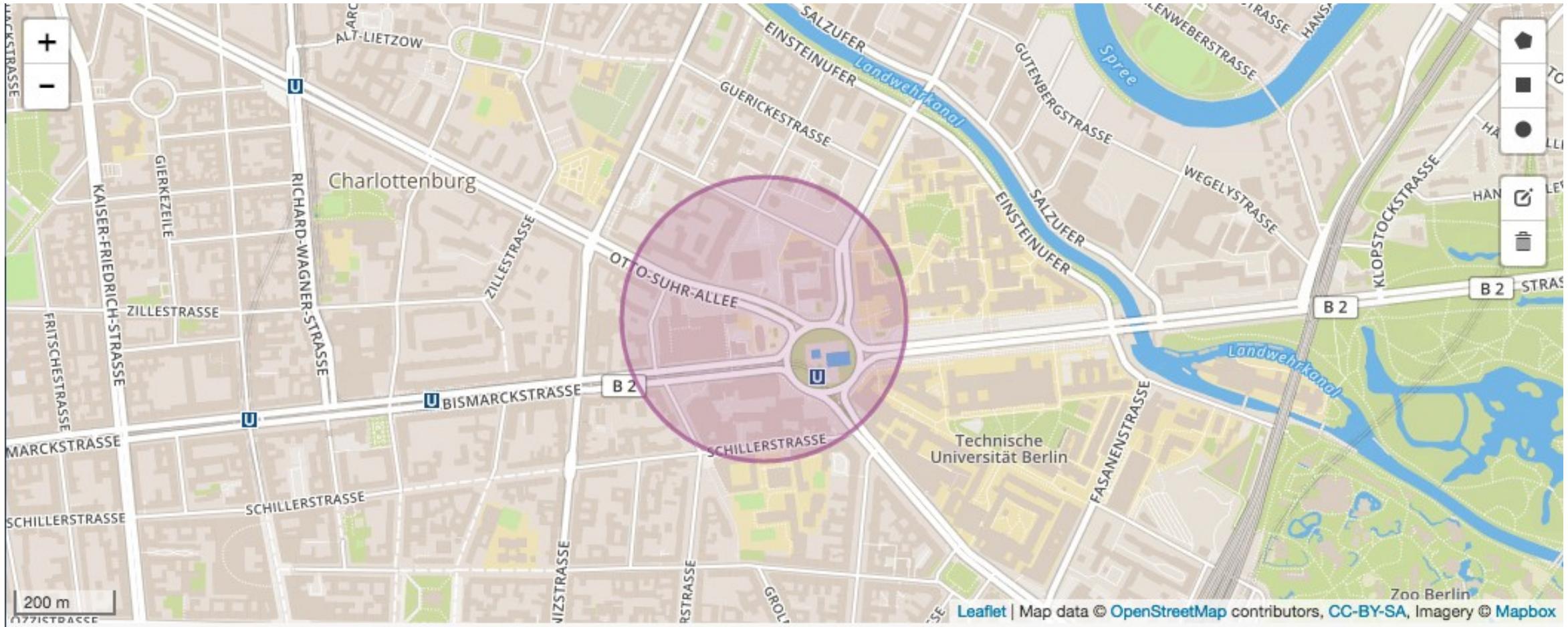
Examples



Examples



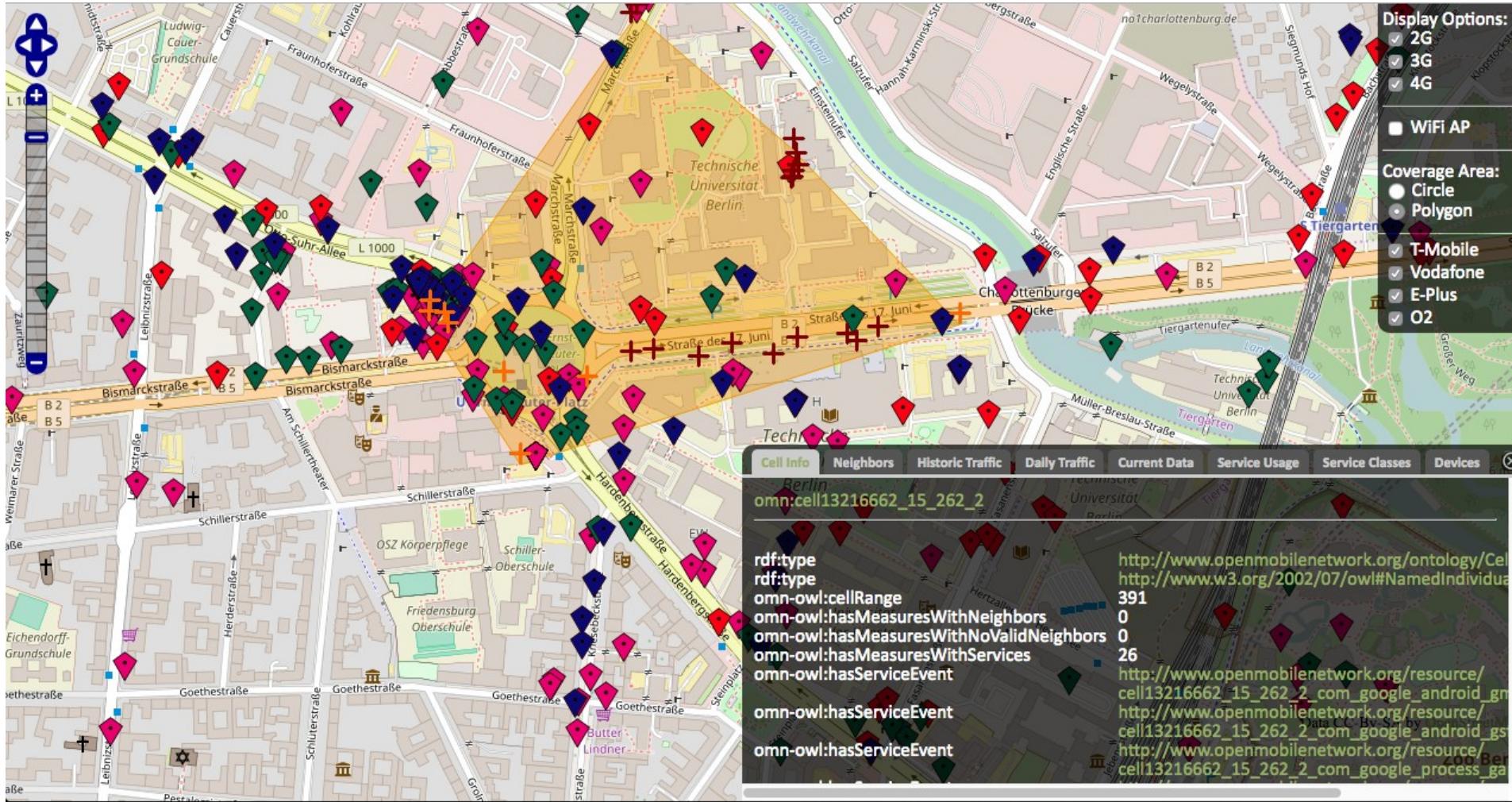
Examples



Semantic Meaning

- Currently used:
 - Nominatim (OpenStreetMap service)
 - German post code areas, 1, 2, 3, 5 length
- Addresses (points □ circles)
- Cell-ID areas, e.g., <http://openmobilenetwork.org/>
- WLAN-areas
- Areas, such as the TU Berlin campus (similar to address)
- ... and many more (come up with your own ideas)

OpenMobileNetwork



Nominatim (OpenStreetMap)

Nominatim

Data last updated:
2017/04/19 08:53 GMT

Charlottenburg

Search apply viewbox [reverse search](#)

About & Help ▾

Charlottenburg, Charlottenburg-Wilmersdorf, Berlin, Germany (Suburb) [details](#)

Charlottenberg, Diez, Rhein-Lahn-Kreis, Rhineland-Palatinate, Germany (City)

Charlottenburg, Landkreis Göttingen, Lower Saxony, Germany, Europe (Hamlet)

Charlottenburg, Eskilstuna, Landskapet Södermanland, Södermanlands län, Svealand, Sweden (Hamlet)

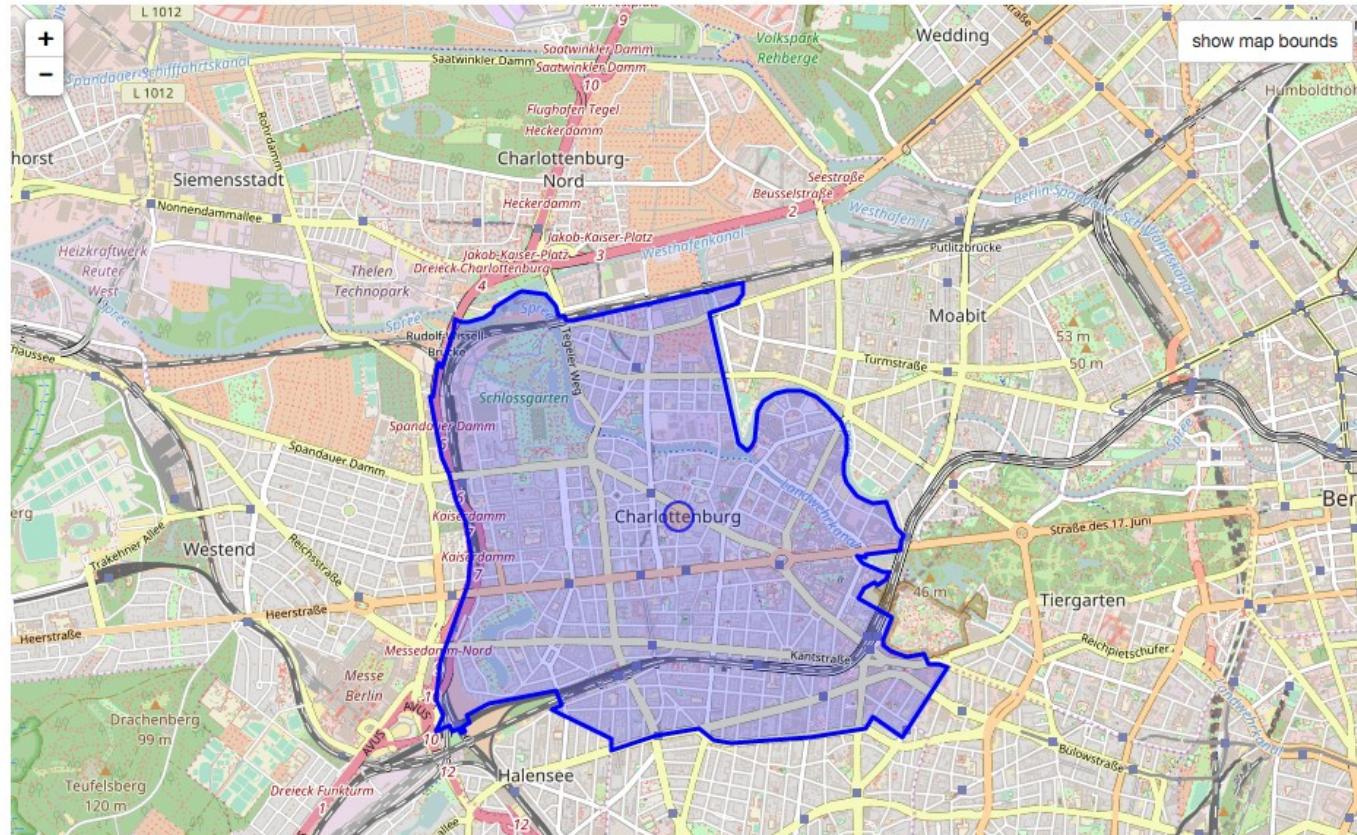
Charlottenburg, Mahaica-Berbice Region, Guyana (Village)

Charlottenberg, Eda, Värmlands län, Svealand, Sweden (Town)

Charlottenburg, Ahlem-Badenstedt-Davenstedt, Hanover, Region Hannover, Lower Saxony, Germany (Locality)

Charlottenberg, Motala, Landskapet Östergötland, Östergötlands län, Götaland, Sweden (Peak)

Charlottenberg, Verwaltungsgemeinschaft Öhringen, Hohenlohekreis, Regierungsbezirk



ToDos

- Define other meanings (not just post code areas)
- Import new areas into the DB
- Search field, fined all hospitals in Germany and draw a geofence around them
- Export functionality, to geojson or other formats (multipolygon)
- Work on user interface
- Using semantic web technologies, RDF, Linked Data, etc.
- Stand alone geofence application (eden)
- Have fun working in the (PARADISE) project context

Technologies to be used



PostgreSQL



#5: PRIVACY DASHBOARD

Philip Raschke

General Data Protection Regulation



CHAPTER II

Principles

Article 5

Principles relating to processing of personal data

1. Personal data shall be:
 - (a) processed lawfully, fairly and in a transparent manner in relation to the data subject ('lawfulness, fairness and transparency');

General Data Protection Regulation



Section 3

Rectification and erasure

Article 16

Right to rectification

The data subject shall have the right to obtain from the controller without undue delay the rectification of inaccurate personal data concerning him or her. Taking into account the purposes of the processing, the data subject shall have the right to have incomplete personal data completed, including by means of providing a supplementary statement.

General Data Protection Regulation



Section 3

Rectification and erasure

Article 17

Right to erasure ('right to be forgotten')

1. The data subject shall have the right to obtain from the controller the erasure of personal data concerning him or her without undue delay and the controller shall have the obligation to erase personal data without undue delay where one of the following grounds applies:

Dashboard



Dashboard

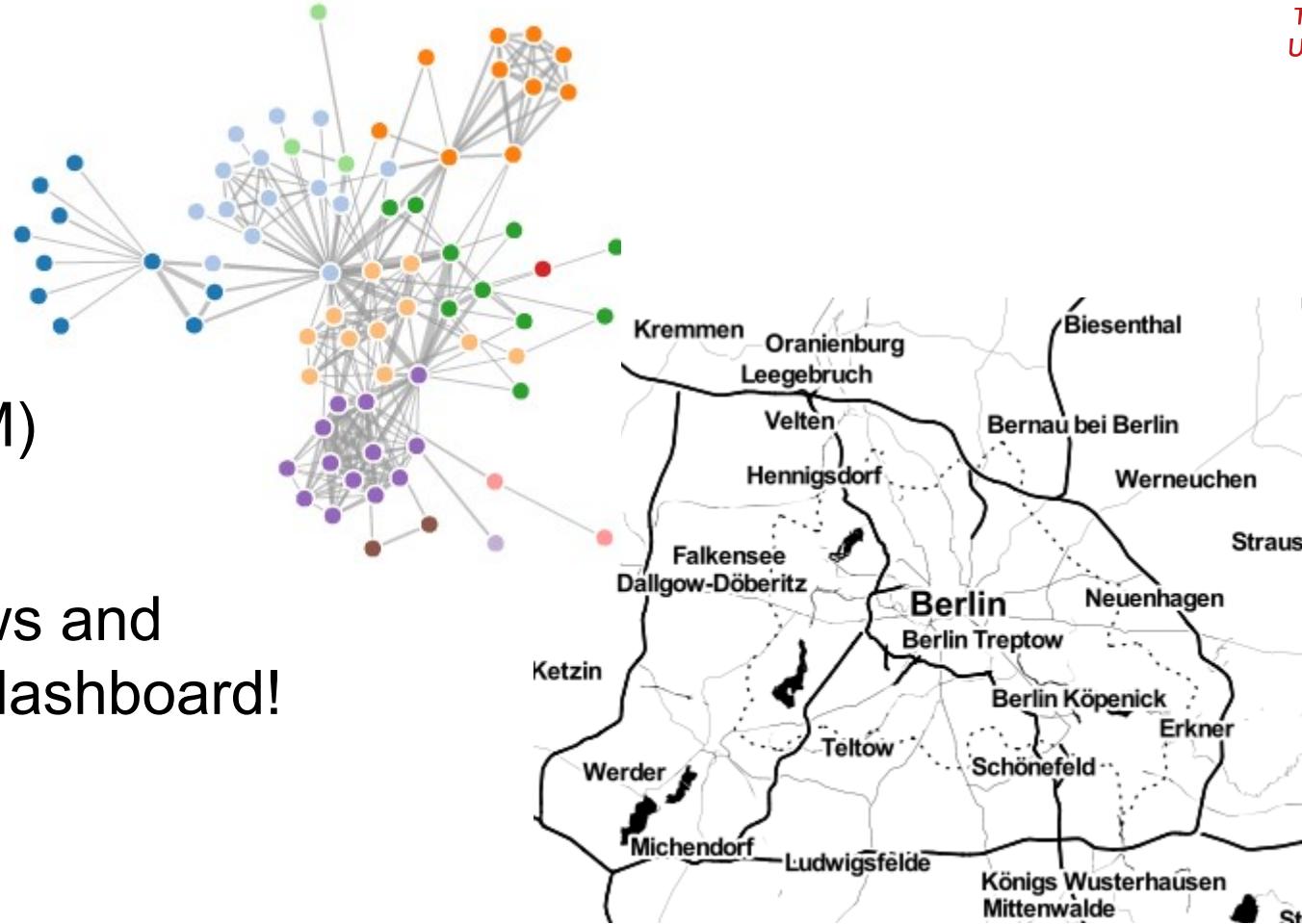


#6: MODELLING AND VISUALIZING MACROSCOPIC MOVEMENTS

Friedhelm Victor | Bianca Lüders

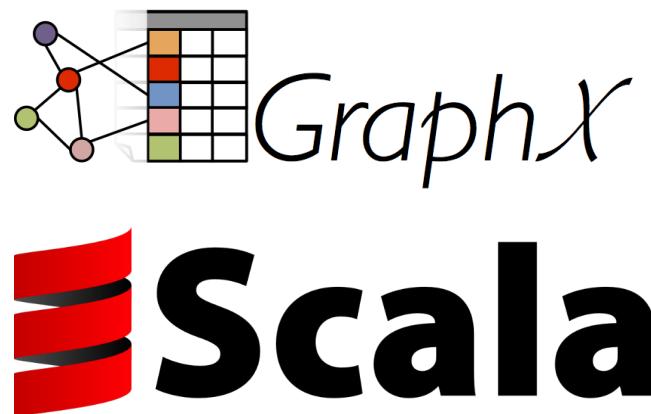
Components

- Movement data about individuals
- OpenStreetMap (OSM)
- Graph modelling
- Extract commuter flows and create an interactive dashboard!



Ideally, you should

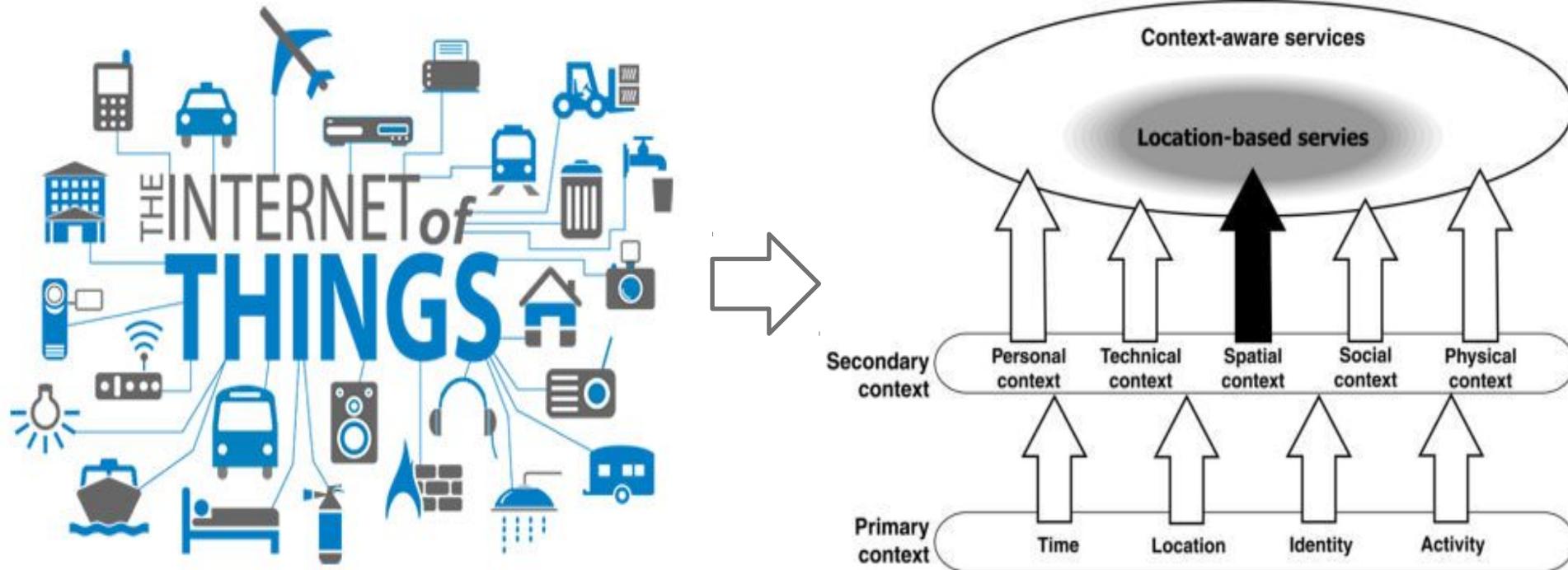
- Have knowledge about
JavaScript, Scala, Databases
- Work in a team of 3-4 students
- It helps to have worked with OSM, Graphs



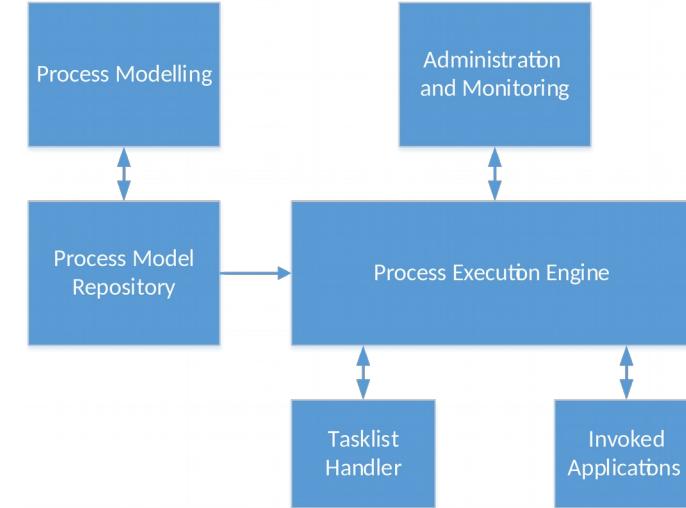
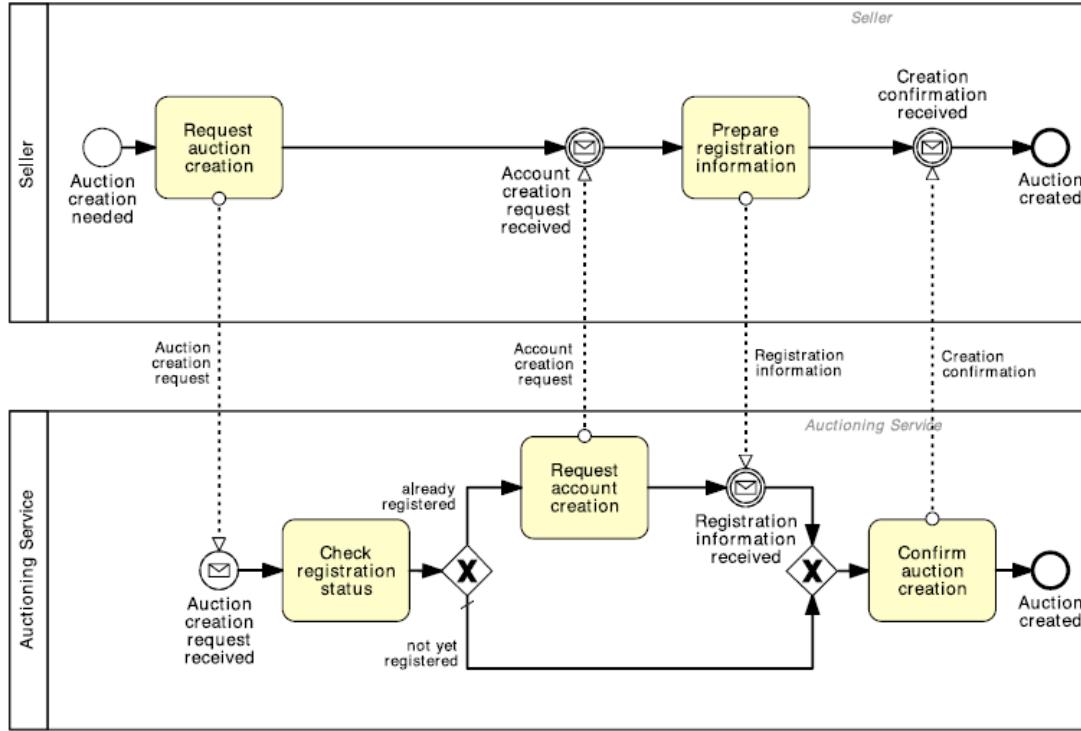
#7: MODELLING CONTEXT DATA WITH BPMN

Kai Grunert | Sandro Rodriguez Garzon

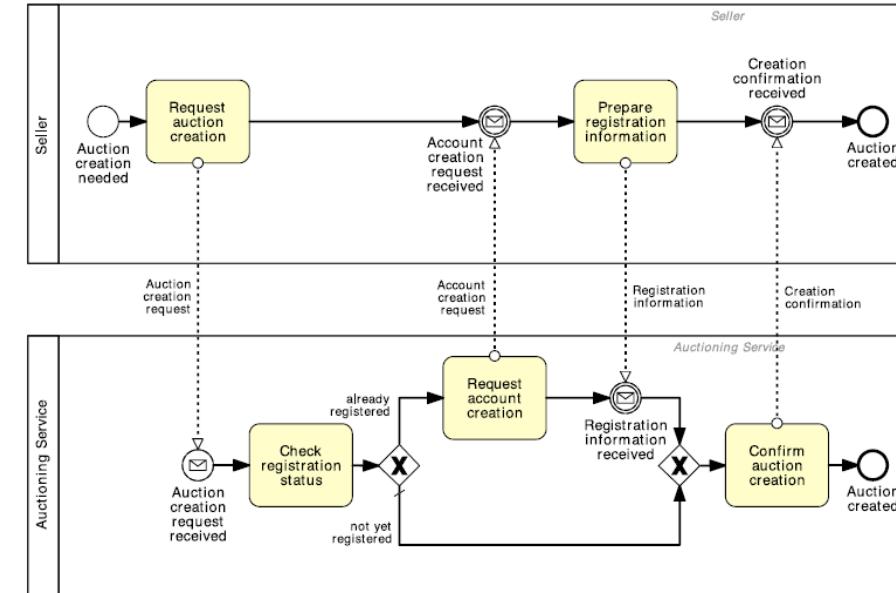
IoT data enables the recognition of contexts



With BPMN you can model and execute business processes



Project: How can you model context data in BPMN?



What is the Goal and what qualification do you need?

Goals:

- Examine different ways to model context data in BPMN
- Implement and execute the models (different sensors connected to an execution engine)
- Compare the approaches



Qualifications:

- (Java) programming skills
- BPMN knowledge is appreciated but not required
- Interested in connecting theoretical with practical work

THAT'S IT...

5 Minutes Break...

- Think about at least two topics you might consider
- If you don't like any of the topics or don't have the required skills you don't have to participate and can leave now
- 5 Minutes Break

Topic selection

Groups

#		1	2	3	4	5
1	WG Recommender System	Muhammad Habib	Aqa Mustafa	Kevin Marcel	Etjen	
2	BCIDM: Blockchain	Filippo	Ijaz	Ricardo	Stefan	
3	Syslog Analysis	Hayatullah Ibrahim	Said	Tong Li	Roug Liu	Jin Hu
4	Semantic Geofencing	Jessica	Ersin	Ozberk	Max	
5	Privacy Dashboard	Than Tuanh	Sonali	Rima	Mark	
6	Macroscopic Movements	Mutasin	Ananya	Piotr	Gabriel	
7	Context Data BMPN	Andrea Marie	Amer	Vaibhav	Simon	
	Max. # participants	28				

ToDos

- Please get in touch with your supervisors now
- Schedule a first meeting within the next days
- Get familiar with your topic and the state-of-the-art
- Schedule regular meetings with your group members
- Time is ticking ...