



SoftNet/Centric Panel 2020

Systems for Citizen-oriented Services



Panel:

Systems for Citizen-oriented Services

(citizen responsibility, democracy and social networks, service adoption, special services,)

SoftNet

2020

Chair

- Stephan Böhm, RheinMain University of Applied Sciences, Germany

Panellists

- Valentin Plenk, Institute of Information Systems at Hof University, Germany
- Chia Hung Kao, National Taitung University, Taiwan
- Yasushi Kambayashi, Nippon Institute of Technology
- Maxim Mozgovoy, The University of Aizu, Japan
- Krishna Kavi, University of North Texas, USA



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Topics for discussion: (Chair: Stephan Böhm)

- Valentin Plenk → Data protection as a barrier to innovation in Germany / Impact on research activities and digital competitiveness / Strategies for privacy-oriented design
- Chia Hung Kao → Impact of AI on smart devices and crowd sensing / Data privacy and protection vs. ease of use and convenience / future trends for „smart citizens“
- Yasushi Kambayashi → Service provision in disaster situation / Impact of upcoming mobile and wireless communication standards / Challenges for app design
- Maxim Mozgovoy → Relevancy of digital education / Online courses in the COVID-19 situation / Automation potential in the classroom beyond computer education
- Krishna Kavi → How to overcome digital divide / COVID-19 as a chance to push digitization / Impact of physical isolation and social media filter bubbles



Panel:

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(citizen responsibility, democracy and social networks, service adoption, special services,)

**SoftNet
2020**

Prof. Dr. Stephan Böhm

Panel Chair and CENTRIC 2020 Steering Committee Member

Panel Topic and Statement:

User-centered Design of Mobile Apps for Citizen-oriented Services

“There are enough visions. There is a lack of implementation! Mobile apps still offer great and largely untapped efficiency potential in citizen-oriented G2C services.”



- Dr. Böhm is a Professor of Telecommunications and Mobile Media at the Faculty of Media Management at the RheinMain University.
- Co-founder of the Center for Advanced E-Business Studies (CAEBUS) in Wiesbaden.
- Teaches media technology and media management topics in bachelor and master programs.

Research Interests:

- Innovation Management and Marketing,
- Technology Acceptance for Mobile Applications and Services,
- Up-front User Research for Mobile Applications,
- Mobile Prototyping,
- Mobile HCI



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Are these services fair to all citizens? Issues and Challenges

Krishna Kavi, University of North Texas (krishna.kavi@unt.edu)

- Digital divide → not everyone has access to technologies
- Language Barrier → may not understand the language of services provided
- Data collection and data mining → data drives services but which data?
- Information sharing and the role of Social networks
 - social networks causes cliques and discourages discourse

COVID-19 is likely to change how governmental services and public discourse will work

Need to assure the participation by all citizens





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Panellist Position

Computer-Assisted Assessment in Online Programming Courses

Maxim Mozgovoy, The University of Aizu, Japan mozgovoy@u-aizu.ac.jp

- Online programming courses still require much manual work during assessment
- Some assessment activities (code reviews) need teacher attention
- Some activities (testing, plagiarism detection) can be automated
- No comprehensive solutions ready for integration with CMS (such as Moodle) exist

→ Such systems are necessary

→ We started an initiative to create one





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Panellist Position

Multi-agent Systems for Evacuation Support Systems

Yasushi Kambayashi, Nippon Institute of Technology yasushi@nit.ac.jp

- Living with natural disasters
- Importance of evacuation routes
- Dynamics of disaster situations
- Instability of communication
- Popularization of smartphones

→ Difficulties for preplanned evacuation routes

→ Cooperation with intermittent communication

→ Ad-hoc communication network with mobile agents on smartphones





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Panellist Position

Crowd Sensing and Cloud Computing for Better Living

Chia Hung Kao, Department of Applied Mathematics, National Taitung University, chkao@nttu.edu.tw

- Smart Device and Crowd Sensing
- Cloud Computing
- Data Science and Analytics
- Visualization and User Interface





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Panellist Position

Data Protection Regulation – Do we need more research or less regulation?

Valentin Plenk, Vice President Research and Development, Hof University, Germany
valentin.plenk@hof-university.de

- The Institute of Informations Systems (iisys) runs some Citizen-oriented research projects
 - MobiDig - Digital Mobeility (in rural areas)
 - MiRA/CLUE – Citizen Science for migrane and other chronic headaches
- All projects are data driven
 - Data collection
 - Data analysis
- A lot of additional effort (and actually also valid research) goes into
 - Finding relevant Data Protection Regulation
 - Designing regulation compliant systems (from scratch / data minimization)



USER-CENTERED DESIGN OF MOBILE APPS FOR CITIZEN- ORIENTED SERVICES

Panel Discussion SoftNet 2020
Systems for Citizen-oriented Services

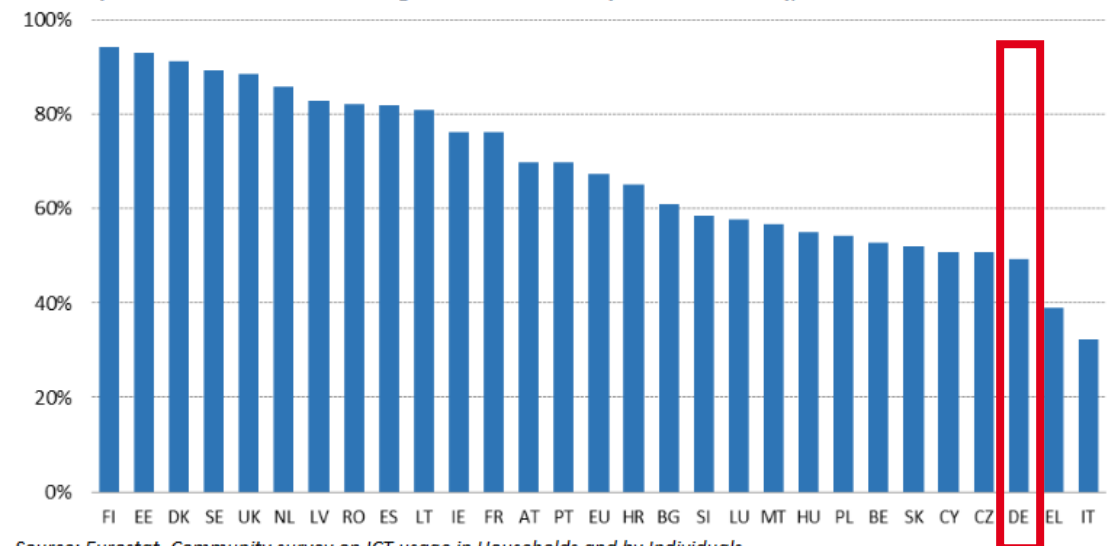
Prof. Dr. Stephan Böhm
October 18-22, 2020

SITUATION OF DIGITAL PUBLIC SERVICES IN THE EU

The use and availability of digital public services still varies widely across the EU – Germany is lagging behind.

- In Germany, the digitization of the public administration often lags behind the wishes of citizens.
- Digital services are often not well known enough, too little thought on the citizens' part or too cumbersome.
- Many laws still require a physical presence or paper forms.
- In addition, many citizens have data protection concerns when using digital public services (“German Angst”).
- In Germany there is also a tendency to over-engineer – too many functions and special features are considered from start.

Figure 3 e-Government users submitting filled forms to public authorities over the Internet in the last 12 months (% of all internet users needing to submit forms to public authorities), 2019



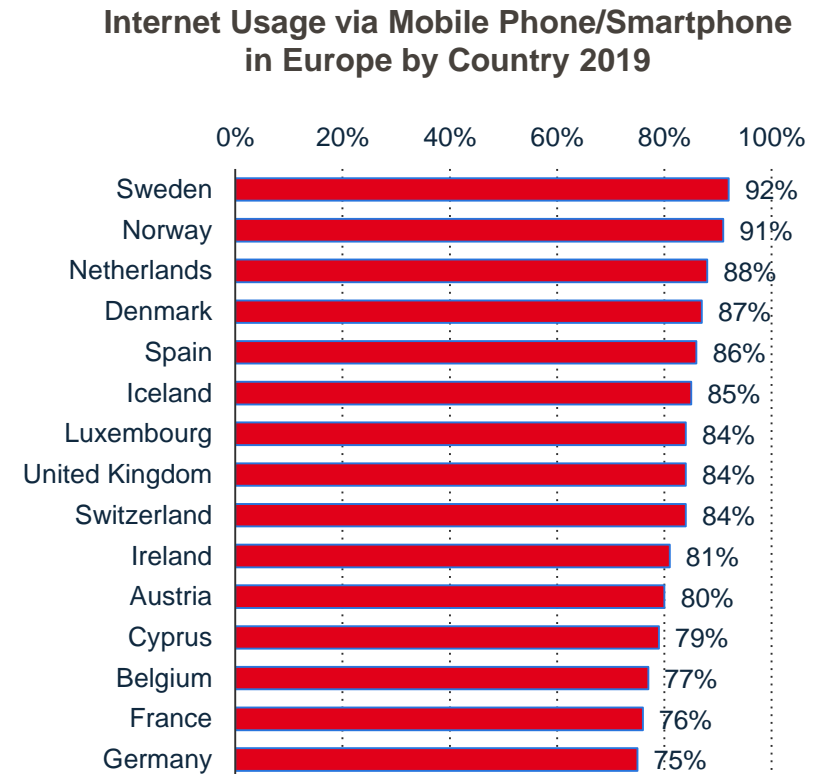
Source: Eurostat, Community survey on ICT usage in Households and by Individuals.

Sources: <https://ec.europa.eu/digital-single-market/en/digital-public-services-scoreboard>, <https://www.bitkom.org/Presse/Presseinformation/Staat-40-Verwaltung-hinkt-Buergerwuenschen-hinterher.html>

MOBILE DEVICES – A UBIQUITOUS INTERFACES TO CITIZENS

Mobile devices are widely available in the population and provide a universal and ubiquitous interface to citizens.

- In Europe, mobile devices with Internet access are widespread.
- In contrast to many “household PCs”, the devices are typically used by individuals.
- The devices are characterized by simple and intuitively understandable user interfaces.
- Users can capture and enter data or interact in many different ways (e.g., barcodes, document scanning, voice input).
- Smartphones offer an interface to the citizen which (especially in Germany) is not really exploited yet.



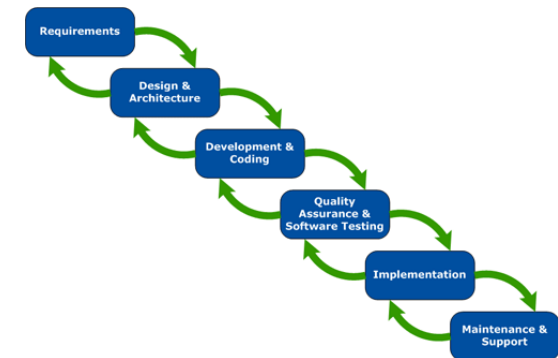
Source: Europe, 16-74 years, Eurostat

USER CENTERED-DESIGN OF MOBILE APPS

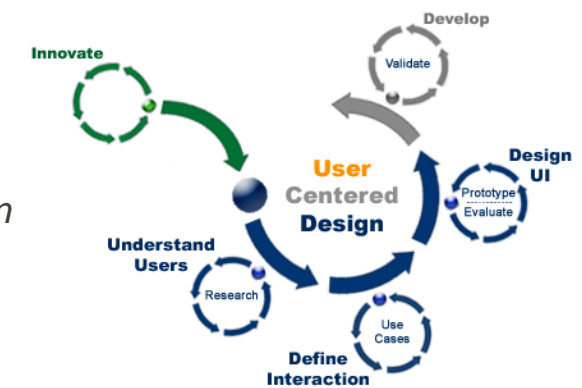
It is important that the app development follows an user-centered approach, i.e. is taking the earliest possible involvement of end-users.

- Traditional software development (Waterfall) is often too slow to develop for the dynamic mobile app markets.
- Iterative user-centered design approaches can better capture relevant user requirements and prevent fails.
- Prototypes play an important role in communicating the concepts.
- It is important to assume a minimum viable product (MVP) and allow for early failure (fail fast, fail often).
- However, citizens services projects are often driven more by political goals than by pragmatic solutions for citizens.

Past:
Waterfall Model
(i.e. Royce 1970)



Today:
User-Centered Design
(i.e. ISO 9241, SAP)



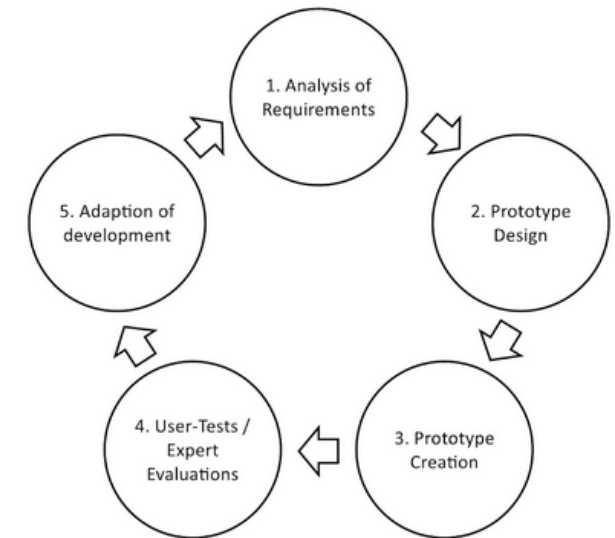
Source of pictures: <http://projectcommunityonline.com/wp-content/uploads/2012/06/developmentprocess1.gif>,
http://www.sapdesignguild.org/editions/edition10/ucd_overview.asp

ADVANTAGES OF MOBILE APP PROTOTYPING

It is important that the app development follows an user-centered approach, i.e., is taking the earliest possible involvement of end-users.

- Prototyping can start with a high level of abstraction and then steadily improve and increase fidelity based on user feedback.
- Allows early integration of future users to identify user requirements/ensure user-oriented product development.
- No coding or functional implementation required – thus avoiding high costs for source code changes.
- Helps to illustrate and discuss different approaches or design variants.
- Minimizes the risk of undesirable developments through early communication of the chosen approach.
- Avoids misunderstandings and helps to create a common understanding of the concept within the team.

Phases of the Usability Engineering Lifecycle (Bähr 2017)



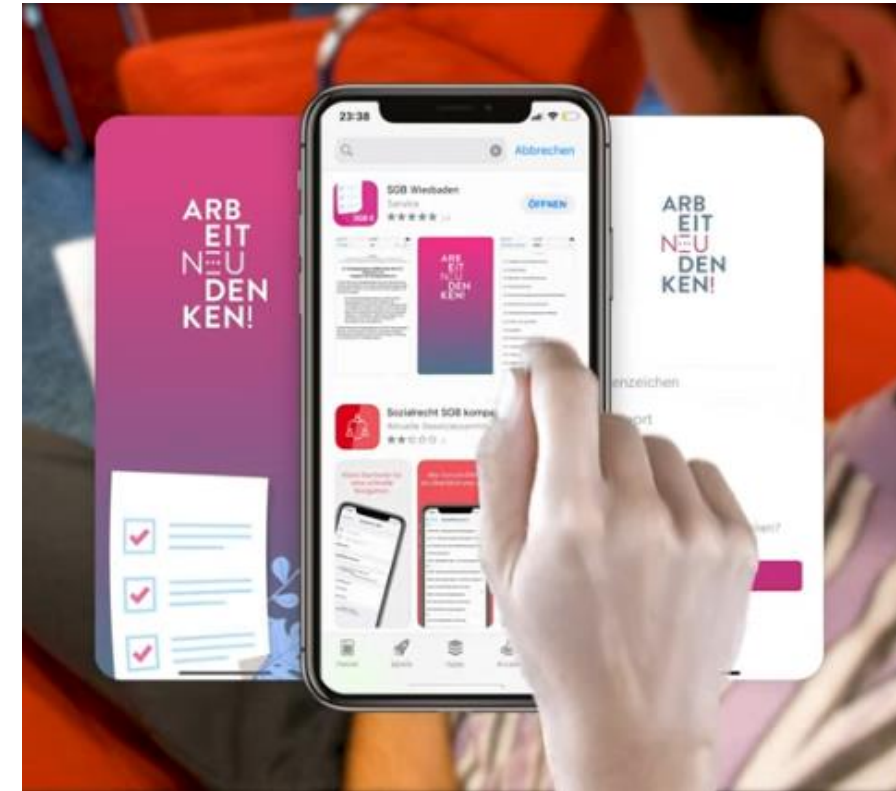
Source: Bähr (2017): Prototyping of User Interfaces for Mobile Applications

CASE STUDY OF A CITIZEN SERVICE APP

At the RheinMain University of Applied Sciences, an app for people on social assistance was developed in cooperation with the city of Wiesbaden.

- Development of the concept of a social assistant app for citizens of the city of Wiesbaden in Germany.
- The proposed app, i.e., relieves applicants of the time-consuming task of filling out application forms and digitizes the submission of receipts.
- Identification of an initial requirements set was done by interviews with potential users and responsible personnel in the city administration.
- Prioritization of requirements for the initial app prototype by using a Kano¹⁾ based survey.
- Realization of the concept as a semester project at the university with media management students.

1) Kano, N., Seraku, N., Takahashi, F., & Tsuji, S. (1984). Attractive Quality vs. Must be Quality. Journal of the Japanese Society for Quality Control, 14(2), 39–48.



Source: Semester Project Media Management
<https://www.youtube.com/watch?v=mz7b9KQFbT4>

USE OF HIGH AND LOW FIDELITY PROTOTYPES

Starting with initial sketches, low-fidelity prototypes were first developed and then refined on the basis of expert feedback.

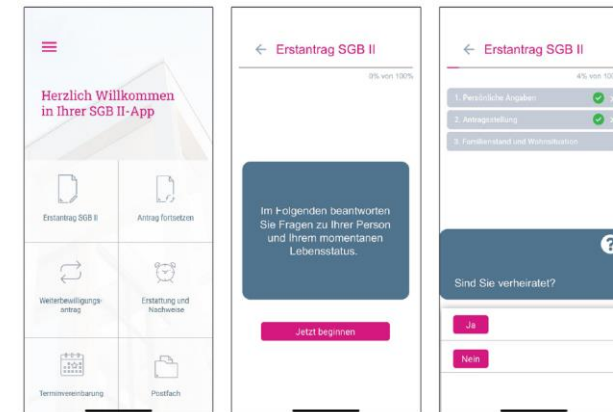
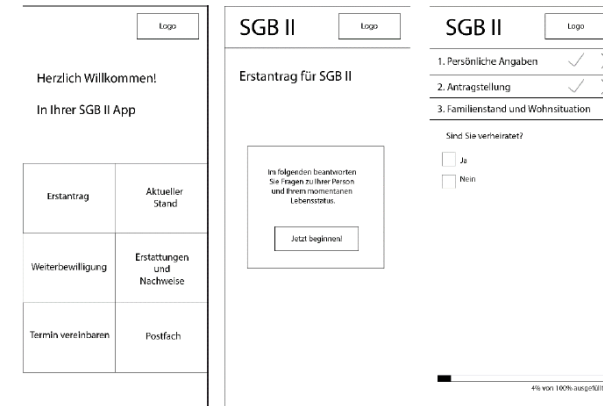
Low-fidelity prototyping:

- (1) High abstraction from screen design
- (2) No colors, images, fonts, etc.
- (3) Use of wireframes/placeholders
- (4) Paper-based, software-based, hybrid approaches

High-fidelity prototyping:

- (1) Design very close to the "end product"
- (2) Use of colors, images, fonts, etc.
- (3) Creation of image- or code-based prototypes
- (4) software-based

Source: Ginsburg (2010): Designing the iPhone User Experience. Boston: Addison-Wesley.

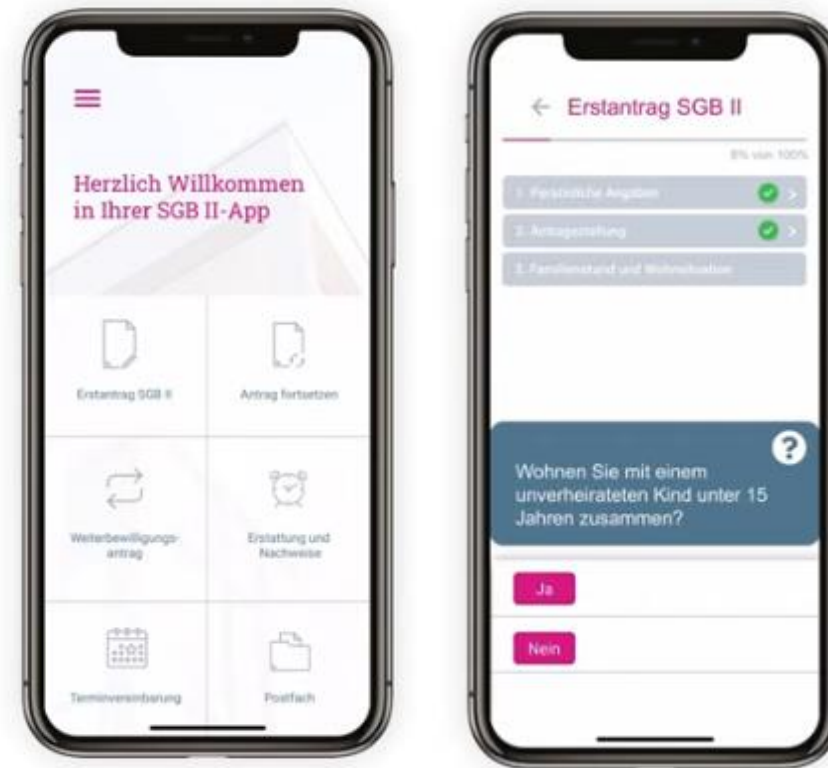


Source: Semester Project Media Management

PROJECT RESULTS – A VIDEO DEMONSTRATING THE PROTOTYPE

The functions and the use of the prototype were illustrated in a demo video, which represents the project result and the concept of the app.

- The functions and the screens of the app were realized as an interactive prototype (based on proto.io).
- A demo video was produced to illustrate the use of all essential functions.
- So far, only a small group of potential users was included in this pre-study.
- In addition, a prototype for a backend application (in the municipality) has been developed.
- The status of the app represents a first stage of development only and should now be tested and improved based on a larger group of (test) users.



Source: Semester Project Media Management

CONCLUSIONS & IMPLICATIONS

User-centered design approaches can be implemented in public administration and lead to innovative approaches in a relatively short time.

- A prototype-based approach has proven to be able to capture essential user requirements in the environment of citizen services.
- Demo videos can be used to demonstrate the intended usage based on a prototype and make the proposed solutions/concept accessible to a wider audience.
- Complementary methods – such as the Kano approach to prioritize initial user requirements – has proven to be helpful in the user-centered design process.
- However, the realization of such concepts still depends on the sustained support by executive sponsors/politicians in the organization and implementation strength of the administrations.

Local Newspaper Article on the Project



Source: Wiesbadener Kurier, 20.07.2020

Systems for Citizen-oriented Services Are they Fair To All Citizens?

My Personal Views

Krishna Kavi

The University of North Texas

Denton, Texas, USA

Systems for Citizen-oriented Services

Traditional view of Citizen-oriented services refers to services from governmental or public service agencies

- Smart Cities
- mobility as a service
- e-voting
- information sharing

Citizens want “more transparent, accessible, and responsive services”

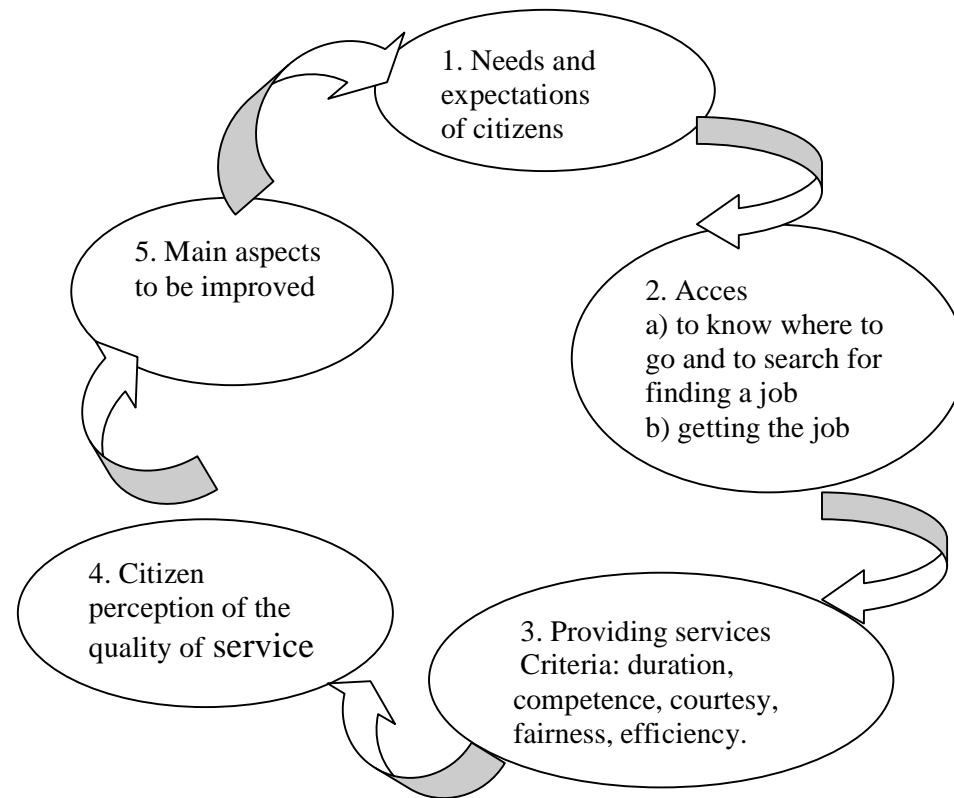
Governmental agencies have responded with

- Information services to collect classified information and requesting ordered (websites)
- Communications services for interaction between individuals or groups of people (e-mail, discussion forums)
- Services transactions to acquire goods or services online or for presentation of data(government forms).

But many surveys found that most citizens are not satisfied

Systems for Citizen-oriented Services

Many agencies are trying to improve their services



In some cases, outsourcing the services

But without proper accountability

And not assuring fair and equitable treatment of the citizenry

I want to go beyond government services when considering citizen-oriented services

I want to include social networks as providing services

Systems for Citizen-oriented Services

Issues and Challenges making services Fair and Equitable

1. Digital divide

Access to internet/wireless

Access to technology (smart phone, laptops...)

Language and understanding how to use technology

2. Collecting data that is inclusive

Current systems rely on data (or surveys) based on participation by a small population

May not represent diverse populations, cultural differences, etc

May not be reflective of all citizens

Systems for Citizen-oriented Services

Issues and Challenges making services Fair and Equitable

3. Influence of Social networks

Fundamental reliance of cliques based on common/shared beliefs

And social networks capitalize on such cliques for their financial benefits

Does not encourage diverse views, dialog and discourse

In some cases social networks have helped promote democracy

But they also led to violence, spreading “fake news”, conspiracies

”deep-fakes” ...

Systems for Citizen-oriented Services

Issues and Challenges making services Fair and Equitable

4. Data collection and management

“Without the active involvement or ‘empowerment’ of citizens, measures or solutions proposed or put forward by authorities serve little purpose.”

Data monopoly versus open data

Manner in which data is collected, used and managed

Controlled by very few tech companies and limited regulations

Data-driven research, but what data drives the research?

Systems for Citizen-oriented Services

Possible ideas

Citizen-oriented services must monitor participation

Monitor social groups and networks

Detect "fake news"

Detect strong cliques for the purpose of monitoring and educating

Explore changing equilibrium regularly, lest settling in suboptimal response

"perturb" groups to introduce other thoughts

From smart islands to a smart regions

View "education" as a service

Internet and technology as an essential benefit (or even as a human right)

Systems for Citizen-oriented Services

Silver Lining --> Post-COVAD19 world

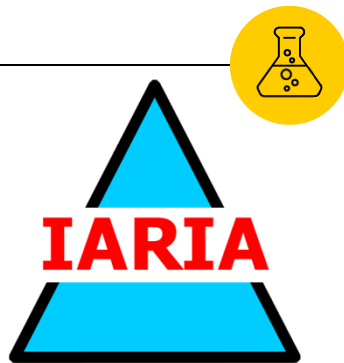
More reliance on technology for everyday needs is becoming a norm

But need to wait and see the impact on different demographic groups

based on gender, race, culture, education and economic levels

May potential lead a way to solutions

Computer-Assisted Assessment in Online Programming Courses



Maxim Mozgovoy

The University of Aizu
mozgovoy@u-aizu.ac.jp





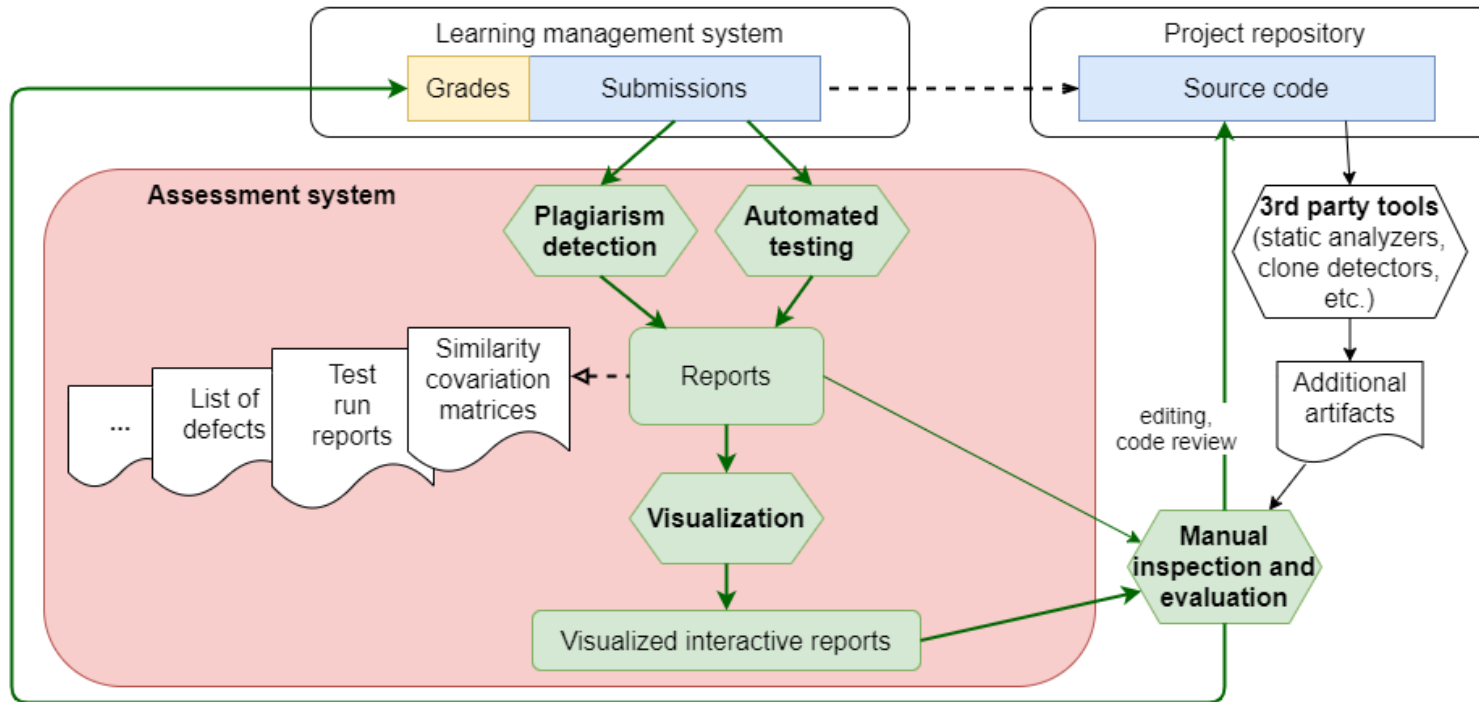
Objectives

Create a submission assessment system
to assist grading process in online programming courses

- Focus on automated testing and code similarity detection.
- Support template code snippets.
- Implement up-to-date detection & visualization methods.
- Integrate with course management systems (such as Moodle)



Assessment Workflow





Challenges

- Integration with Moodle
- State-of-the art algorithms
- Design based on practical use cases
- Support of different programming languages
- Support of code templates
- Extended visualization and analysis
(based on clusters)



Current reporting capabilities

Most current systems provide quite basic reporting capabilities

They help teachers, but more advanced reports can be created

(e.g., based on clusters)

Sample *JPlag* report

| | | | | | |
|---------------|----|--|------------------------------------|------------------------------------|------------------------------------|
| 04_doener.txt | -> | 04_d?ner.txt (100.0%) | | | |
| 30d.txt | -> | 30.txt (99.8%) | 30a.txt (96.7%) | 30b.txt (87.5%) | 30c.txt (80.0%) |
| 29d.txt | -> | 29.txt (99.7%) | 29a.txt (95.0%) | 29b.txt (82.9%) | 29c.txt (75.2%) |
| 30.txt | -> | 30a.txt (96.7%) | 30b.txt (87.5%) | 30c.txt (80.0%) | |
| 29.txt | -> | 29a.txt (95.0%) | 29b.txt (82.9%) | 29c.txt (75.2%) | |
| 19_blogs.txt | -> | 19_blogs-ohne-lit.txt (91.7%) | | | |
| 30a.txt | -> | 30b.txt (86.4%) | 30c.txt (77.1%) | | |
| 25e.txt | -> | 25.txt (86.0%) | | | |
| 29b.txt | -> | 29a.txt (78.8%) | | | |



Conclusion

- ⦿ Automatic assessment systems are available, but present times demand extended capabilities.
- ⦿ Different modules (test runners, similarity detectors) have to be integrated within a single system.
- ⦿ Multi-language support, identification of practical use cases and visualization are still challenging.
- ⦿ Most previous work is focused on technology. It's time to study real user demands and address them.

Multi-agent Systems for Evacuation Support Systems



Nippon Institute of Technology

Yasushi Kambayashi

Background

Wireless communication using a smartphone may be difficult when a large-scale disaster occurs.

- Due to traffic congestion and damage of base stations.

Evacuees require information.

- Detour route to avoid dangerous point such as fire.



Requirements for Evacuation Systems

1. Constructing network without communication base station.
2. Discovering dangerous point, and sharing between evacuees while evacuation.
3. Calculating safe evacuation route, and presenting to evacuee.

Related Technology

Mobile Ad Hoc Network (MANET)

It can be built even if communication base station is broken.

Software Agent

Autonomous without human interventions.

Interacts with other agents to achieve goal.



Requirements for Evacuation Systems

■ Features

1. The system needs to build MANET by wireless communication between evacuee's smartphones.
2. The evacuees needs to share position information of dangerous points by using agents.
3. The system needs to calculate and presents dynamically the evacuation route that avoids dangerous points.

Agent System

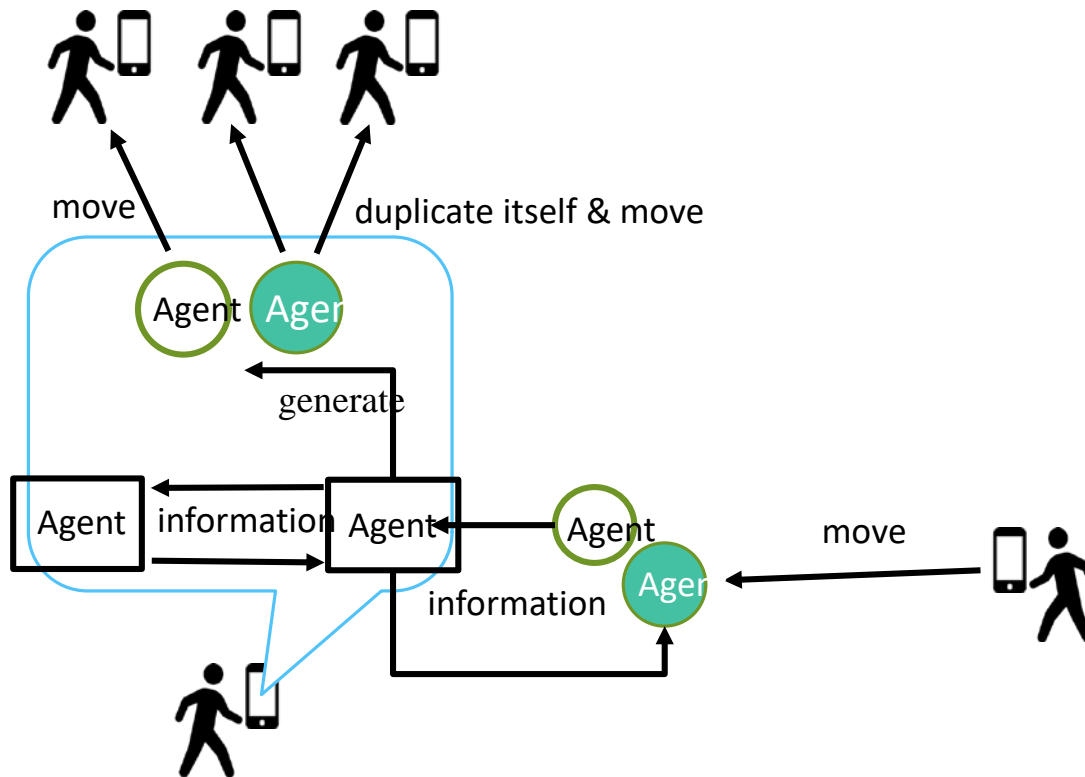
Static Agent

- Information Agent
- Node Management Agent

Mobile Agent

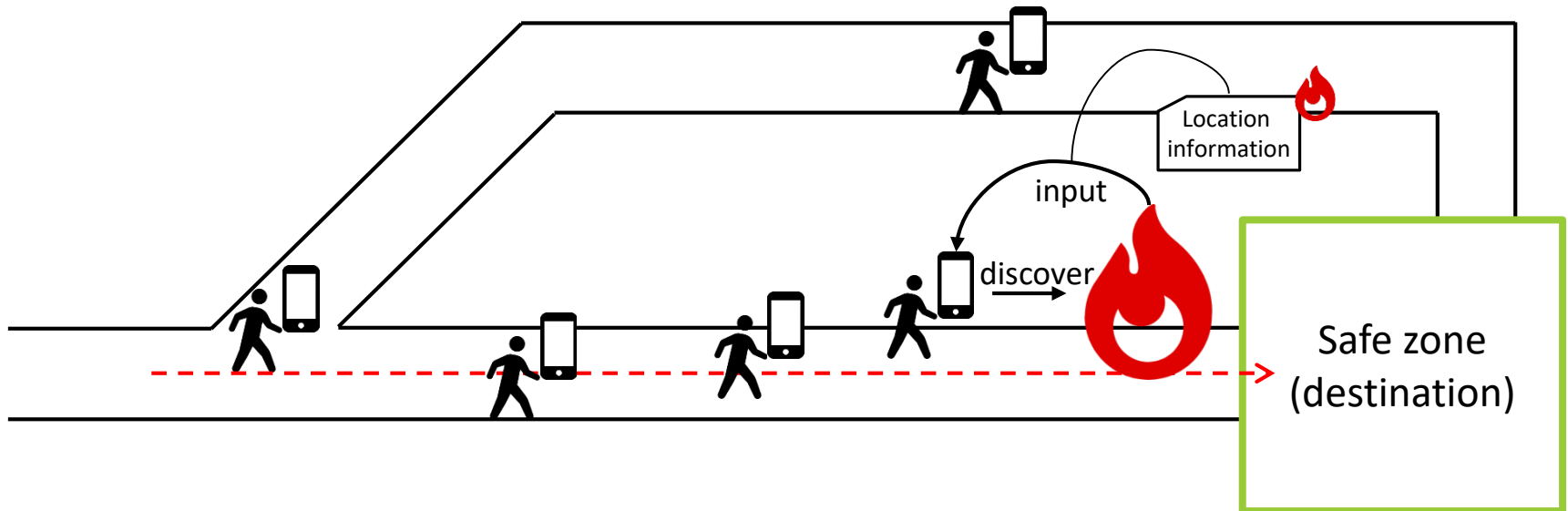
- Information Diffusion Agent
- Information Collecting Agent

Agent System



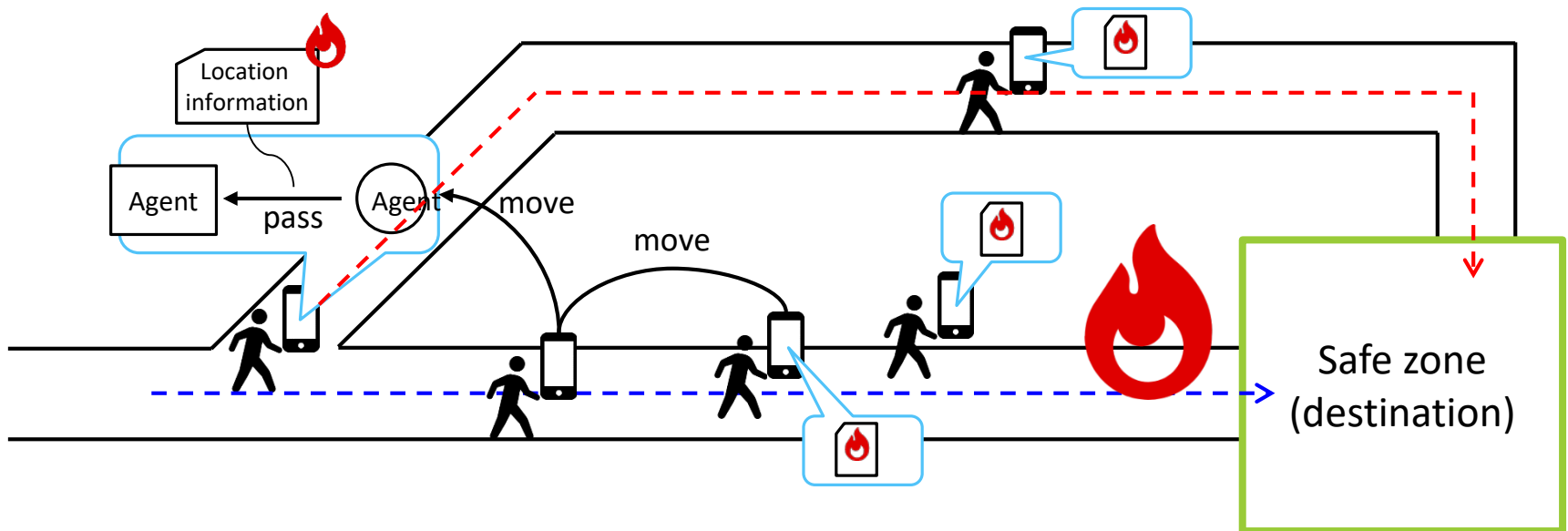
Agent System

Someone discovers a dangerous point, inputs the position information of it into the system.



Agent System

Then the position information is passed to the other evacuees.



Summary

Good Evacuation Support Systems

Evacuees should be able to safely evacuate by choosing best evacuation routes.

Evacuees should be able to choose high altitude routes when they are hit by tsunamis and flood tides.



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Panellist Position

Crowd Sensing and Cloud Computing for Better Living

Chia Hung Kao, Department of Applied Mathematics, National Taitung University, chkao@nttu.edu.tw

- Smart Device and Crowd Sensing
- Cloud Computing
- Data Science and Analytics
- Visualization and User Interface





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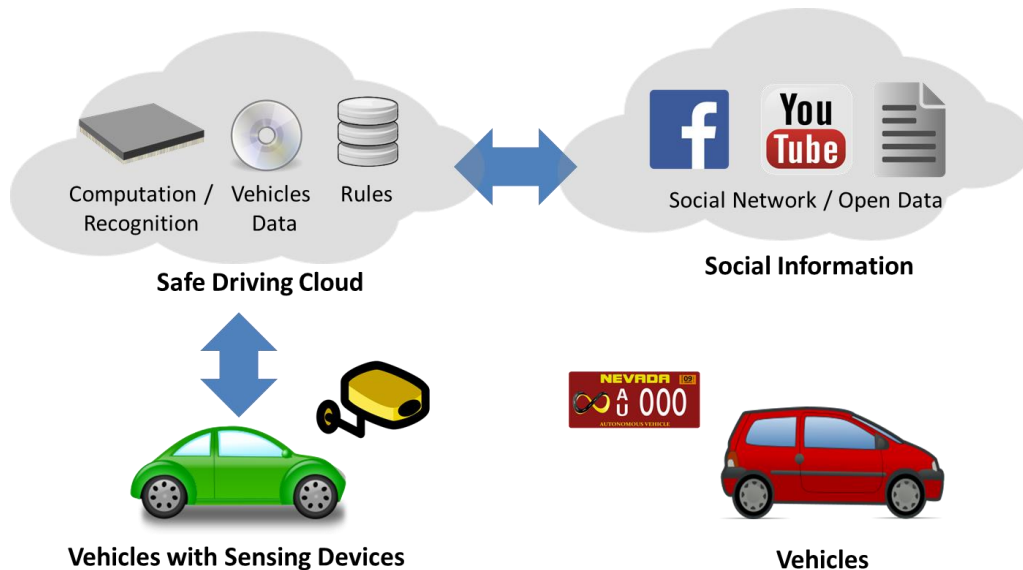
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A cloud assisted safe driving framework is to achieve safe driving in advance efficiently

- Leverage smart phones or dash cams in vehicles to acquire particular information of the front vehicles
- The information of the front vehicles will be acquired, recognized, and analyzed based on historical data preserved in the cloud
- The information and comments on social networks based on the recognized information will be collected and analyzed
- Based on available information and historical data, a reputation for the recognized vehicle will be calculated
- Corresponding suggestion based on the reputation is given to the drivers to perform defensive driving if necessary





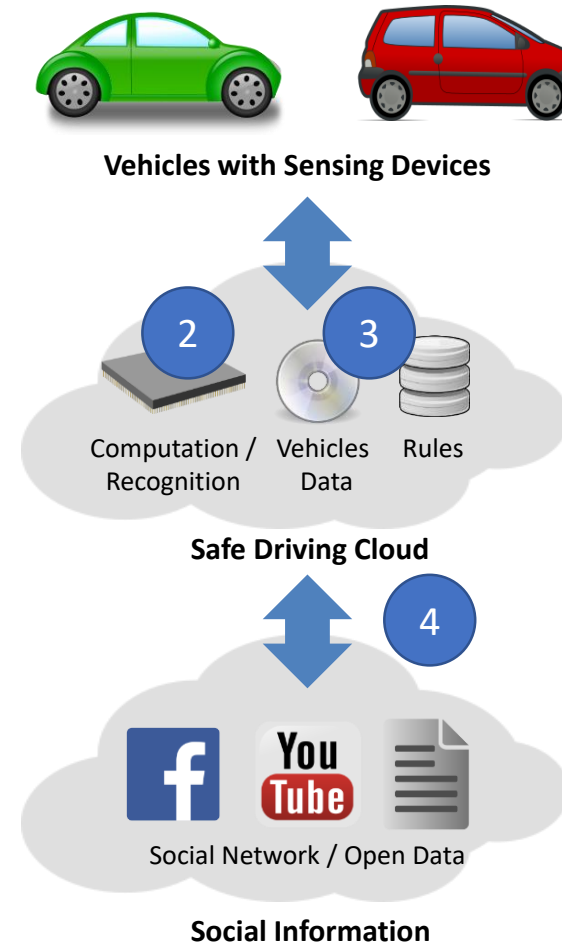
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1. for each received sensing data do
2. Recognize information V_i transmitted by vehicle V
3. Search historical reputation R_h based on V_i
4. Search social information S_i based on V_i
5. if (both R_h and S_i exist)
6. Calculate latest social reputation R_s based on S_i
7. Calculate refined reputation R_r by R_h and R_s
8. else if (only R_h exists)
9. Calculate refined reputation R_r by R_h
10. else if (only S_i exists)
11. Calculate latest social reputation R_s
12. Calculate refined reputation R_r by R_s
13. else
14. Create refined reputation R_r by default value
15. end if
16. Generate notification based on refined reputation R_r
17. Transmit notification to vehicle V
18. Update refined reputation R_r based on V_i
19. end for





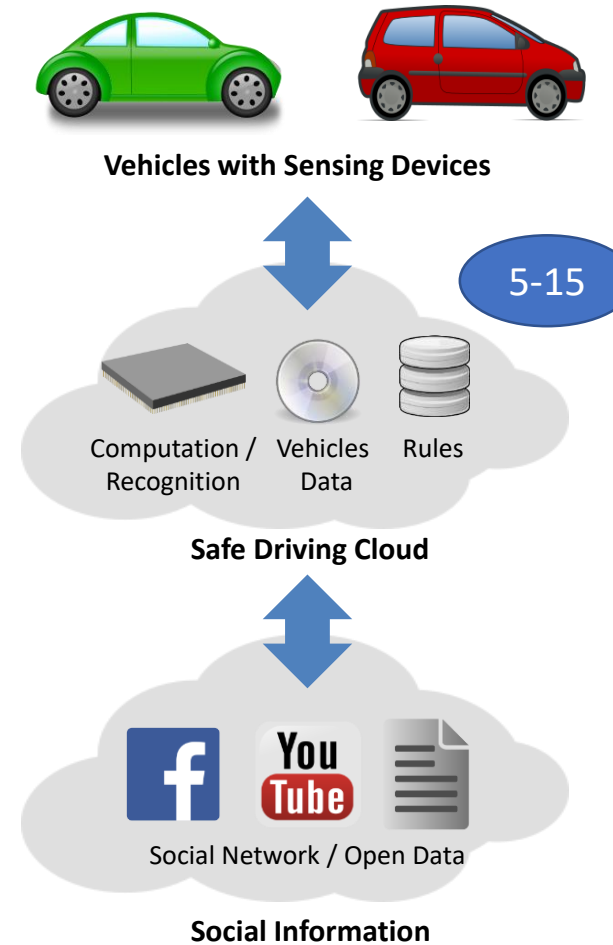
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11. Calculate latest social reputation R_s
12. Calculate refined reputation R_r by R_s
13. else
14. Create refined reputation R_r by default value
15. end if
16. Generate notification based on refined reputation R_r
17. Transmit notification to vehicle V
18. Update refined reputation R_r based on V_i
19. end for





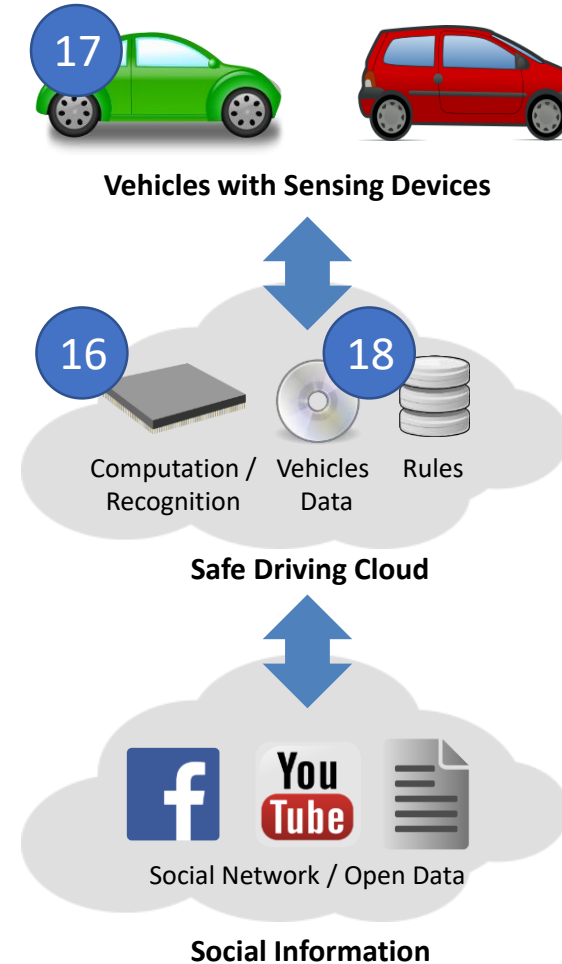
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9. Calculate refined reputation R_r by R_h
10. else if (only S_i exists)
11. Calculate latest social reputation R_s
12. Calculate refined reputation R_r by R_s
13. else
14. Create refined reputation R_r by default value
15. end if
16. **Generate notification based on refined reputation R_r**
17. **Transmit notification to vehicle V**
18. **Update refined reputation R_r based on V_i**
19. end for





Panel:

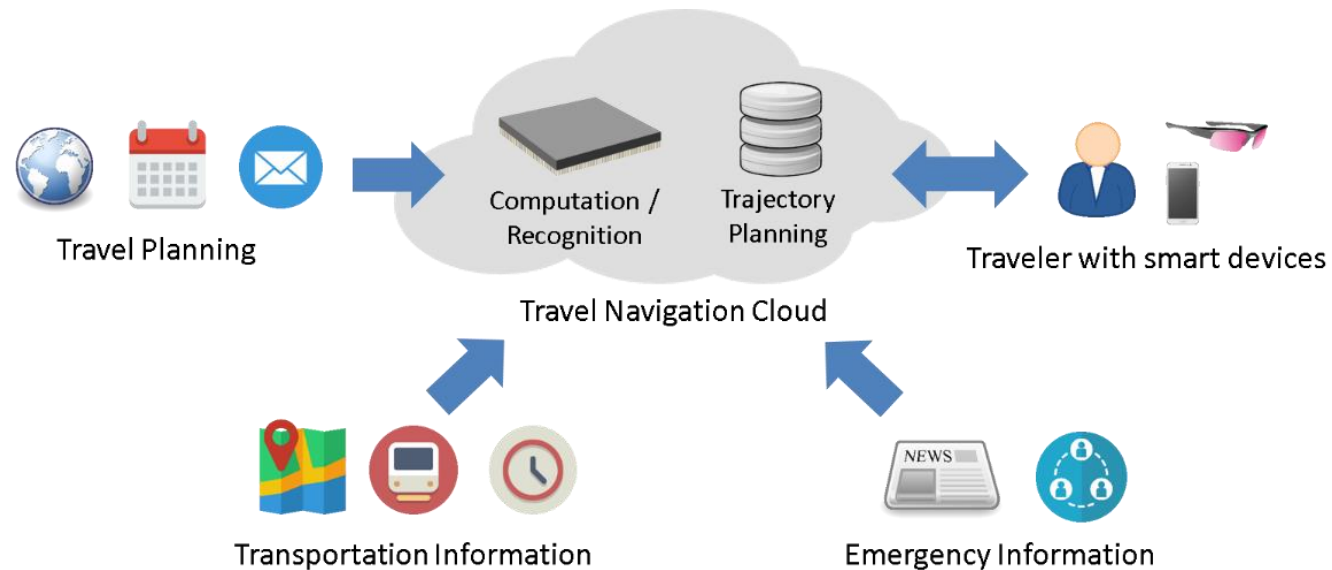
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A smart navigation service is to provide timely and personalized navigation for travelers

- Derive a comprehensive travel plan based on travel information from different services
- Collect travel context of travelers and identify the purpose based on derived travel plan
- Collect information about transportation or emergency events continuously
- Provide personalized navigation information for travelers proactively





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| | | |
|-------------------------|------------------------|-----------------------|
| 13 | 14 | 15 |
| 20 Tokyo sightseeing | 21 Travel to Nagoya | 22 Travel to Kyoto |

The upcoming 3 travel events

2020-08-20 Shizuoka (S 2020-08-20/JJ Shizuoka/NNP)
2020-08-21 Nagoya (S 2020-08-21/JJ Nagoya/NNP)
2020-08-22 Kyoto (S 2020-08-22/JJ Kyoto/NNP)

Travel navigation

Train 717
Departure Time: 10:27
Arrival Time: 11:52



1. A traveler arranges a list of cities (i.e., Tokyo, Nagoya, and Kyoto) on a journey and puts the information in the online calendar
2. On a specific day during the trip, the traveler arrives at the train station of the city (i.e., Tokyo)
3. Through the travel context acquired by the smart device and the travel plan (destination city) retrieved from the online calendar, the travel navigation cloud identifies the current travel status and the purpose of the traveler (i.e., travel to Nagoya)
4. Based on the identified purpose of the traveler and the transportation information retrieved from the government open data, train number, departure time, and arrival time of appropriate train can be identified and provided by the smart navigation service



Panel:

Systems for Citizen-oriented Services

(citizen responsibility, democracy and social networks, service adoption, special services,)

SoftNet
2020



Chia Hung Kao (chkao@nttu.edu.tw)

Department of Applied Mathematics, National Taitung University

MobiDig - MOBILITÄT DIGITAL HOCHFRANKEN

- The objective
 - The aim of the project is to make mobility in rural areas more economical, attractive and environmentally friendly.
 - The efficient use of mobility resources is essential for this, which in turn requires precise knowledge of the actual needs. Therefore, one focus of this project is to investigate how accurate and reliable forecasts can be made by using digital data resources. Thus, the project also has the potential to strengthen Germany's position as a digital location through new solutions for data use and to serve as an example for other applications of digitisation.
- The implementation
 - The project focuses on an integrated database (Data Lake), which uses data from various data sources to create the basis for mobility supply and demand forecasts (Predictive Analytics). In order to meet the special requirements of peripheral regions in Germany, modern sharing concepts and innovative concepts for autonomously driven and demand-controlled regular transport will be investigated and tested on selected public transport routes in the Hochfranken model region by means of a test operation. The test operation is based on the data from the projects Data Lake and the mobility and demand forecasts based on this data.
- <https://www.mobidig.cloud>



MiRA/CluRa - Kopfschmerzradar

- The main idea is that people with cluster headaches or migraines often have an idea of what might be causing their attacks.
- However, it is often difficult to verify these assumptions, because there are many different trigger patterns and - especially in cluster headaches - there are no studies of seizure triggers because of the rarity of the condition.
- This is where the project comes in: For one year, seizure data will be collected from a large number of sufferers and examined for the correlations expressed in advance.
- <https://www.kopfschmerz-radar.de>



Kopfschmerz
Radar

 **iisys**
Institut für
Informationssysteme
der Hochschule Hof

Data Protection Regulation

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Do we need more research or less regulation?

- Research faces less regulation than applications
- Applied research has to take regulation into account to be practically applicable
- This necessitates and justifies research efforts (accompanying research)
- Less regulation on the other hand, would make citizens mistrustful of new services (especially services offered by public institutions)