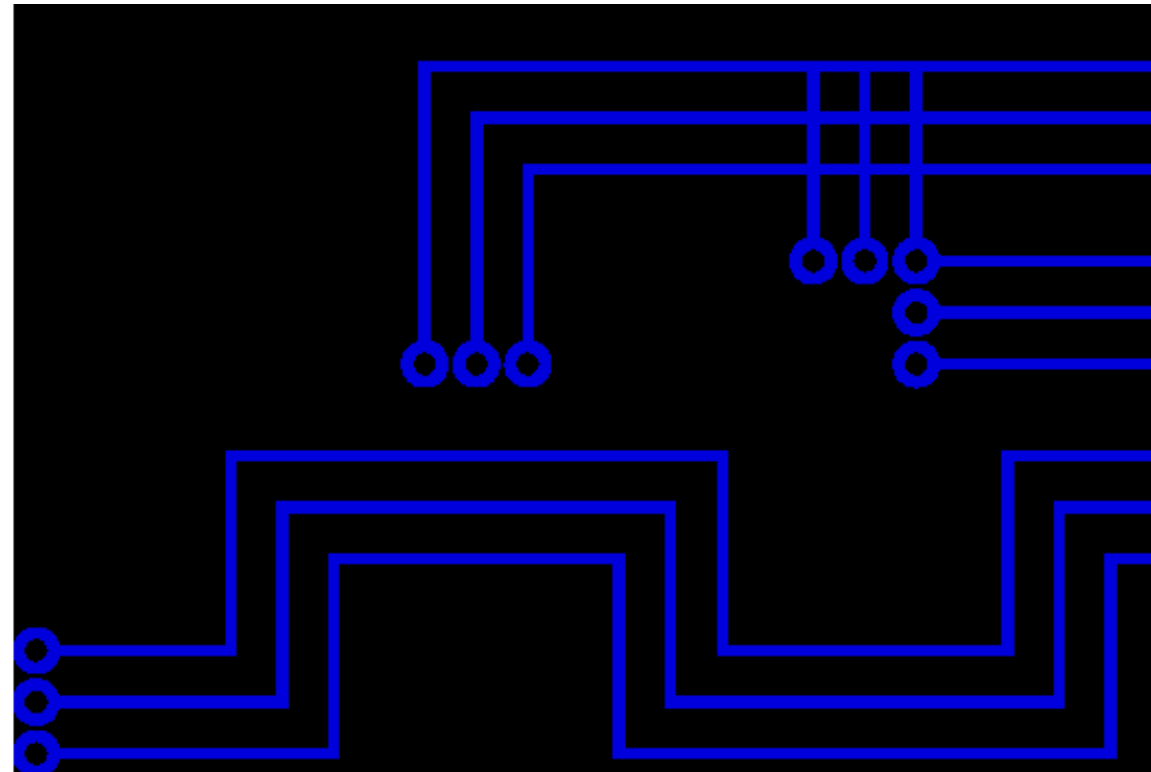# Smart Service

**Leonard Walletzký**

**PA181 Services - Systems, Modelling and Execution**

# Smart Service and Smart City

"A Smart City is a city well performing built on the 'smart' combination of endowments and activities of self-decisive, independent and aware citizens." Giffinger et al. 2007

"Smart city is defined by IBM as the use of information and communication technology to sense, analyze and integrate the key information of core systems in running cities." IBM

"Smart City is the product of Digital City combined with the Internet of Things." Su et al. 2011

"Concept of a Smart City where citizens, objects, utilities, etc., connect in a seamless manner using ubiquitous technologies, so as to significantly enhance the living experience in 21st century urban environments." Northstream
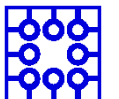
...

# Smart Service

## Personalization

- User-centered
- Ubiquitous services
- Dynamic UX

## Prediction

- Machine Learning
- Data mining, Big Data
- AI

## Based on

- Open data
- Other available data sources
- Multicontextual view

# How can the data help in multicontextual view?

Can data be Smart? Or Wise?

We have a plenty of data in the cities, but are we using them properly?

What is the role of multidisciplinarity in the data management?

How do we know we are using right data in the right time?

# First we need to explore data management of the cities

The cities are not taking care of their data

They do not know what to collect, where to collect and how to collect

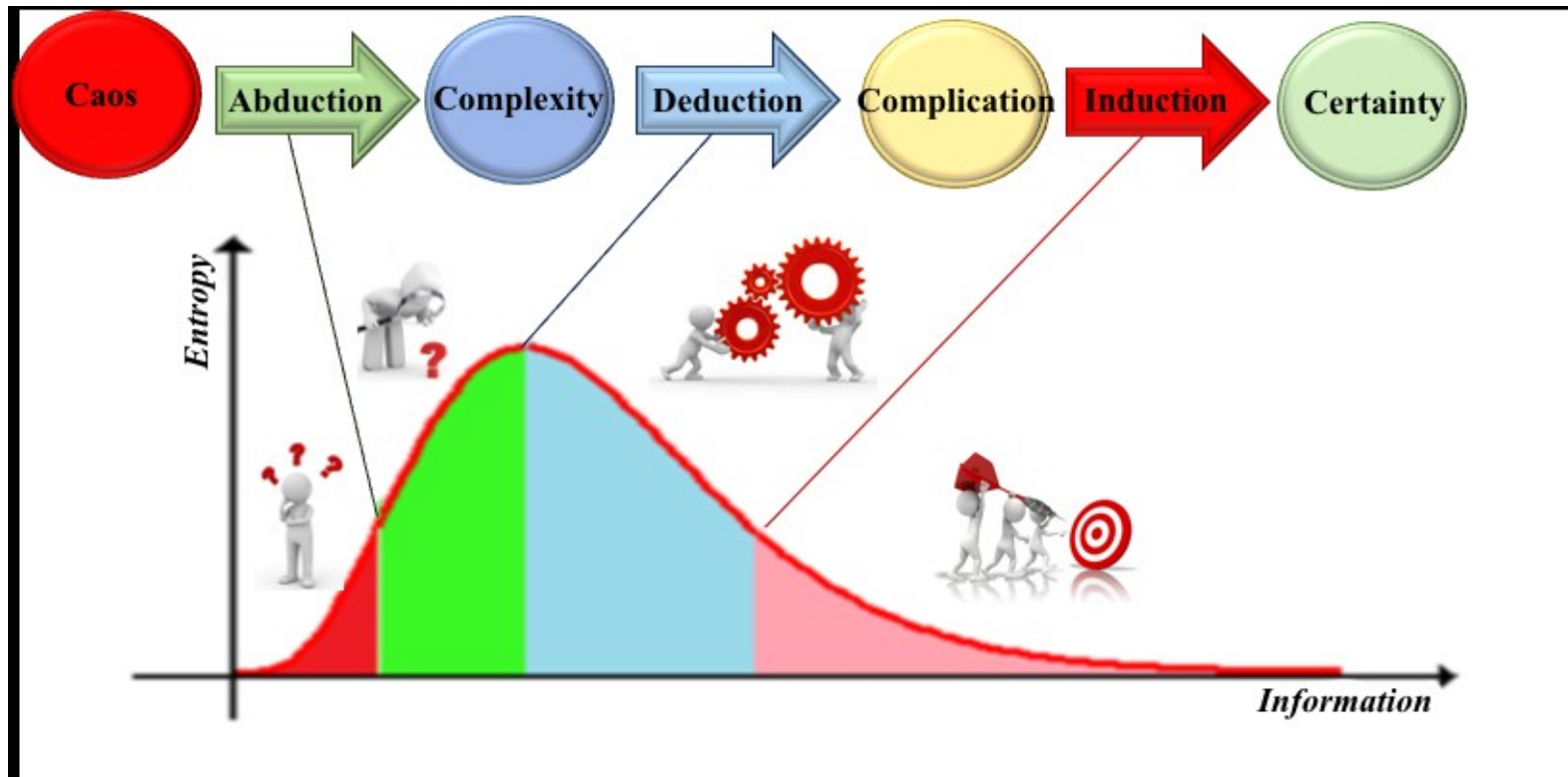What are key aspects of data management?

# Main insights

shift focus from the objective and quantitative management of data to the subjective and qualitative understanding of problems

process through which decision makers find solutions to new problems

more information are useful to solve new problems, only in the case in which the decision maker has the capability to correctly manage and interpret them

Without this, incoming units of information do not help to solve the problem and increase the variety generating entropy and chaos.

Carayannis, Elias & Giudice, Manlio & Saviano, Marialuisa & Caputo, Francesco. (2018). Beyond Big Data: From smart to wise knowledge management.

# 4C model



decision in condition of chaos/complexity is made on the basis of what the decision maker 'feels' to do: essentially, he/she decides guided by his/her emotions and strong beliefs not by the information collected and

# What can we learn?

The interpretation for data usage

There is a difference to use a data to make a decision (problem solving)

- Only if we have relevant information schemas

Or make a decision and find the data that support it (decision making)

- Decision maker is using the emotions to find solution, after that we can find data to support or verify its effectiveness

# Interpretation schemas

- *Information units* represent the 'structural' composition of knowledge in terms of the total amount of data held by the system.

- *Interpretation schemes* represent the system's organization of information variety.

- *Categorical values* represent the system's values and strong beliefs that affect the personality and identity of the system over the time.

# taxonomy of knowledge management approaches

| Information variety dimensions KM approaches | Information Units | Interpretation Schemes | Categorical Values |
|---|---|---|---|
| Data Processing (Bigness) | ⬭ | ⬭ | ⬭ |
| Problem solving (Smartness) | ⬭ | ⬭ | ⬭ |
| Decision making (Wisdom) | ⬭ | ⬭ | ⬭ |

# Conclusions

Data collected as for example Open Data are basic, essential part for the city development

Without skills of decision makers to interpret them to solve the problem or use them to support their decisions the data are purposeless

However, to understand the data complexity and their usage, we must increase the data collected and the entropy

Only by this pressure (4C) it is possible to increase the probability of the finding the right solution

**Examples of data portals**

☐ Brno - https://data.brno.cz/en/

☐ Prague – http://opendata.praha.eu/

☐ European Data portal -
https://www.europeandataportal.eu/en

☐ Rome - https://dati.comune.roma.it/

☐ Naples -
http://www.comune.napoli.it/opendata
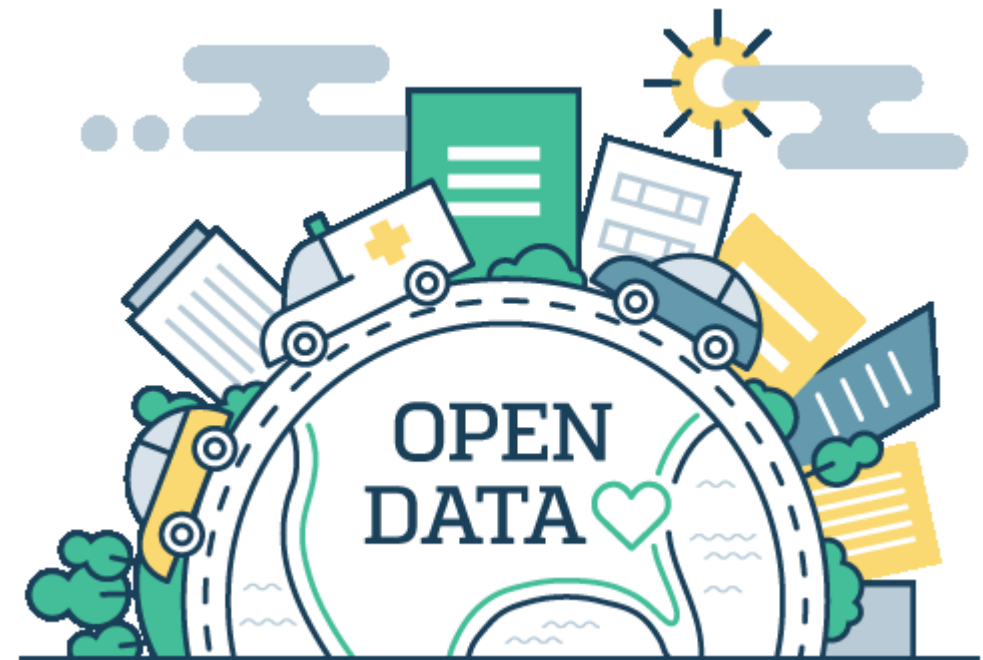
# Important project info

❑The project consists of two parts: **demo and report**

❑ If the project is done by a group of students, in your project report, please **write down who did what**.

❑ The demo should be **developed and deployed on IBM Bluemix platform (IBM Cloud)**

❑ The demo should be **functioning,** and we can try the demo.

# Structure of the project report

**You don't need 100% follow this structure, feel free to add something that suit your project**

**Project title**

**Scenario**

- the problem you would like to solve
- What data / datasets you need for solution

**Modelling** – model the Scenario

- business model (Canvas or Lean Canvas)
- Smart Service Canvas (mentioning all important contexts)

**Service used from IBM Cloud**

- introduction for each service

**Application with Link and snapshots, and also despription of your application**

**Report Summary and who did what!**

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# Example project 1

## Bike rental service

## 1. Bluemix

IBM Bluemix is great cloud solution for creating applications. This platform offers two cloud computing models: platform as a service (PaaS) and infrastructure as a service (IaaS).

The main focus of IaaS is to provide virtualized resources such as storage, power or networking for the organizations without its own computing capacity. These resources can be accessed and managed via internet.

On the other hand PaaS is used by the developers to support the whole lifecycle of software. The whole platform provides mechanisms for building, deploying, running and managing applications on the cloud. It also provides large variety of services which can be directly used inside of your application.

# 2. Scenario

Imagine living in the Brno, city with the great bicycle infrastructure, beautiful scenery and a lot of interesting places which you could visit by bicycle. Nevermind if you don't have your own bicycle, our service Bike-Rental is ready to serve you. We provide set of bicycles which are situated in different parts of the city. You can visit our web page to see which bicycles are available and which one is the nearest to you. Once you pick the right one for you, all you need to do is reserve it via our simple reservation form and you are ready to set of to the trip. The reservation is important step because it makes the selected bicycle unavailable for the others so you don't need to worry about someone taking your chosen bicycle in front of your eyes. Our service also provides you information about the weather for the next day, so it can help to better plan your trip.

Whenever you are done with biking there's not much work to do. Just revisit our page, fill the bike return form and that's it! The system recognizes that bicycle is available for another user and displays it again on the map. How simple is that? The best part is that you don't need to go

# 3. Application

The application is available on the following address: https://nimbusxy.mybluemix.net/
It consists of one homepage and two subpages. The whole design is trying to be as simple as possible, so it's easy and straightforward for usage.

There are multiple main elements on the homepage (from top to the bottom): forecast, map, reservation and return form button and feedback collector. Map is displaying bicycles which are currently available for rental. To rent one of them user needs to click on 'Reserve your bike' button. He is redirected to the reservation form where he needs to put first name, last name, e-mail address and selected bicycle. After successful submitting of the form the homepage is displayed with information message. To free some of the bikes user needs to click on 'Return bike' button and fill the form with rented bicycle. After submitting he's also redirected to the homepage and returned bicycle is displayed on the map.

The homepage also contains feedback section which serves as a feedback collector from two channels: Twitter and e-mail. These feeds provide us information how we could improve our

# 4. Used Services

## Device simulation

Source of all information about bike is GPS sensor embedded in bike construction. Beside location information, latitude and longitude, sensor provides timestamp of measurement and bike velocity. If some damage of bike occurs, device can alert by emitting of damage signal. Signal is caused by pressing of special button directly on bike.

For simulation of such device we used function node from Node Red modeller. Function node contains script which is periodically invoked. Script returns Json that contains all mentioned data. Data are stored in MongoDB and sent to IBM Watson IoT Platform.

In IBM Watson IoT Platform we can visualize IoT device activity. For evidence of bike damages, we utilized possibility to create rule based on property value. When device emits damage signal, alert is automatically visualized in Rule-Centric Analytics board and notifies person in charge.

## Wheater

Another feature that our application offers is a weather forecast. Now it only supports forecast for next day, but this service is quite good scalable and we can extend it in future. Despite of fact that there are countless online services, that offer weather data and forecast, we had chosen the one from BlueMix - mainly because of its integration with Node-Red.

## Social Feeds

We are catching twitter posts with #bikeme hashtag so we can display what our users thinks about our services. Moreover, we had also created an email bikeme@mihalech.com, where our

# 5. Our team

- Integration with MongoDB and Mysql
- Twitter, email and weather functionality

- IOT - GPS sensor device simulation in Node Red
- IBM Watson IoT Platform - device integration, cloud rule creation (damage notification)

- Google Maps integration
- Front-End for reservation and return page

# Example project 2

Table of contents

## Application scenario

Get feedback - Emoting app is designed for getting feedback from the audience. It can be used in public presentations, or even in airport or retail shops to see if our customers are content with the service. So, by simply asking a questions we can get feedback about their experience.

This application uses:
1. IBM Bluemix OpenWhisk to host the backend
2. Cloudant to persist the data
3. GitHub Pages to host the frontend

We used OpenWhisk as a backend as a service. It offers a solution to deploy an app with no server to maintain and also helped us to :
- Create a new question
- Retrieve the question to collect feedback
- Record the answers
- View the results.

# Applications and services

**OpenWhisk** -  a cloud-first distributed event-based programming service. It is  serverless, open source cloud platform that executes functions in response to events at any scale.

**Cloudant NoSQL DB**  - is primarily delivered as a cloud-based service. Cloudant is an open source non-relational, distributed database service of the same name that requires zero-configuration.
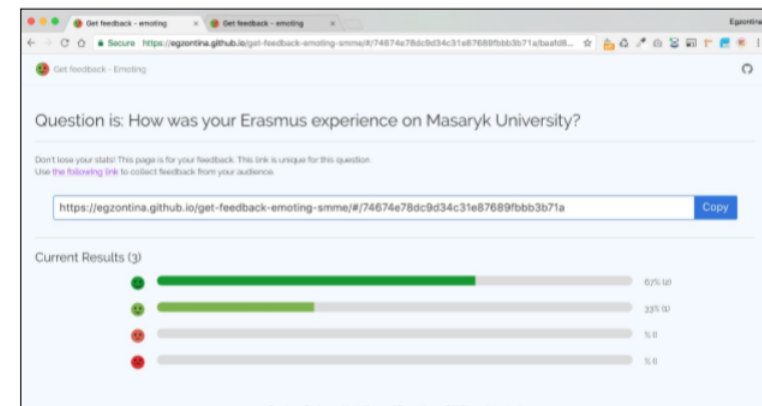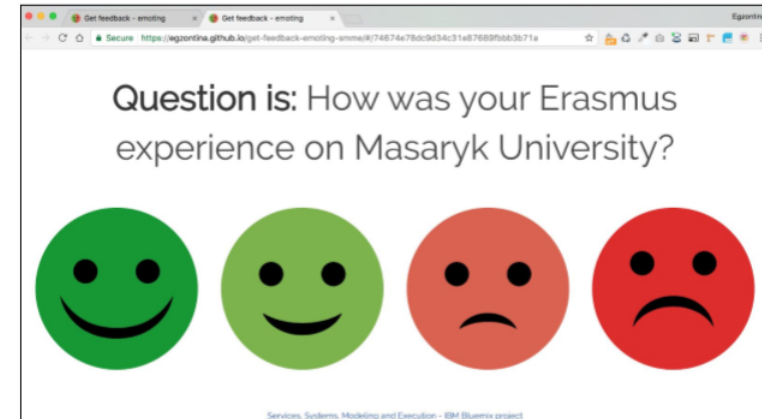
**GitHub Pages**   - We used the GitHub Pages to host and publish our static website.  The dite par is stored under the *docs* folder in the master branch of the project, the static assets are served by GitHub Pages.
The GitHub repo can be found here.

## Snapshots

☐ You could also include application
Snapshots to the report





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# IBM Presentations

The dates will be announced this week:

One date for earlier closing (state exam) –
please, notify me if you belong to this group
– end of May / beginning of June

The second date for others – second half of
June