

# Results, Challenges and Perspectives in Data Management and Artificial Intelligence in Slovenia

Dr. Karmen Kern Pipan

Ministry of Public Administration of Republic Slovenia

Interoperability Academy Winter School

Leuven, December 12th 2019

# SLOVENIA



## Country Profile

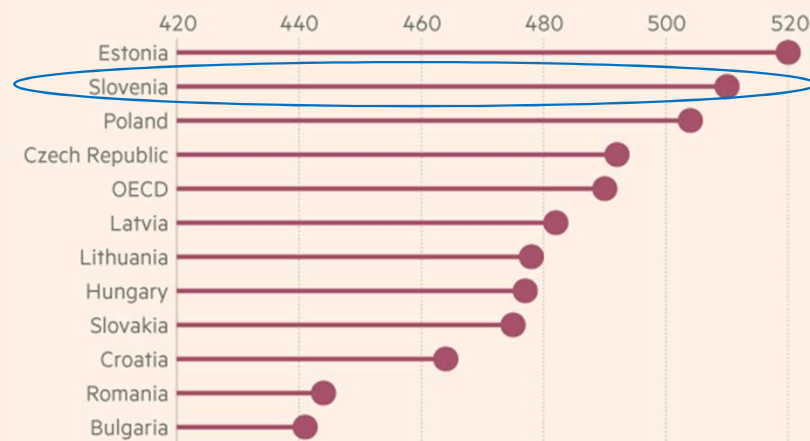
### Basic data

**Population:** 2 066 880 inhabitants (2018)  
**GDP at market prices:** 45 947 million Euros (2018)  
**GDP per inhabitant in PPS (Purchasing Power Standard EU 28=100):** 85% (2017)  
**GDP growth rate:** 4.5% (2018)  
**Inflation rate:** 1.9% (2018)  
**Unemployment rate:** 5.4% (2018)  
**General government gross debt (Percentage of GDP):** 70.1% (2018)  
**General government deficit/surplus (Percentage of GDP):** 0.7% (2018)  
**Area:** 20 273 km<sup>2</sup>  
**Capital city:** Ljubljana  
**Official EU language:** Slovenian  
**Currency:** Euro

Source: Eurostat (last update: 15 March 2019)

### Students performance in maths

PISA score 2015



Source: OECD

### Gross expenditure on research and development

% of GDP, 2016



Source: Thomson Reuters Datastream, Cornell/INSEAD/WIPO

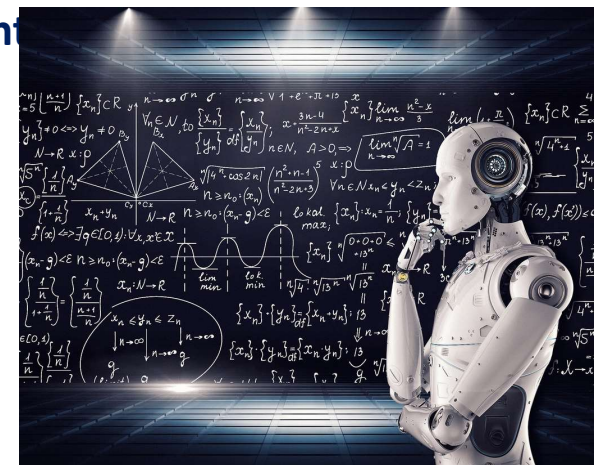
## Slovenia – one of the pioneers of Artificial Intelligence



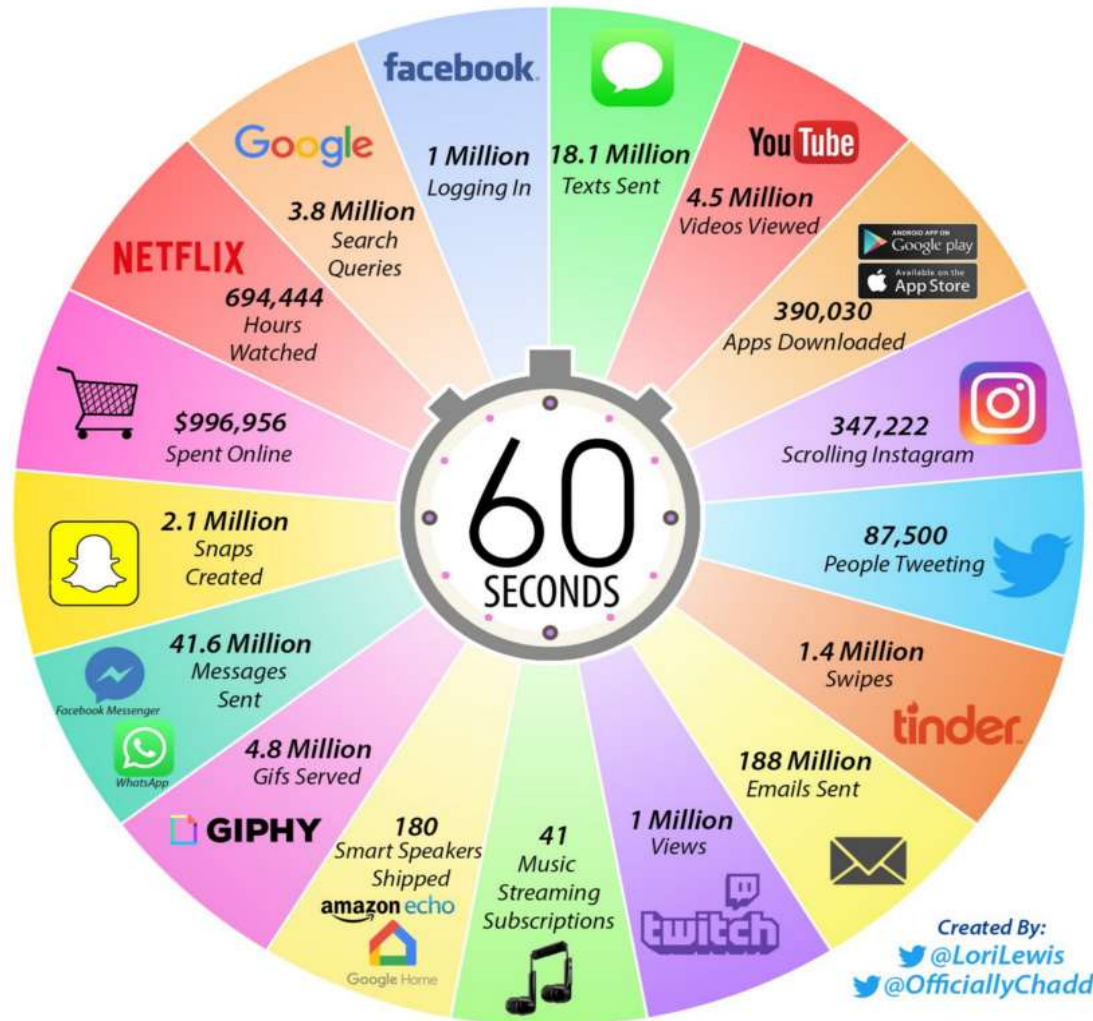
- **1970** - starting research AI at the Jožef Stefan Institute and the University of Ljubljana.
- **1980** - covered numerous domains including **finance, management and healthcare**.
- **1990** - expansion of Slovenian AI research in **'heuristic search' - machine learning** and **qualitative reasoning** showing an increase of research publications in academia.
- **2019 – UNESCO** - International Research Centre for Artificial Intelligence (IRCAI) seated in Slovenia.
- **Strong international collaboration** in AI researching and producing of AI outcomes.
  
- **Notable Slovenian AI achievements:**
  - **'The Event Registry'** - system for **analysing text news sources to track global news spread**, the context of news mentions, to predict the spread of news - invaluable information for publishers and journalists.
  - **'COPCAMS'** – together with 7 EU countries producing a network of cameras able to **identify the most important video streams for transmission** (using in the surveillance industry, monitoring of traffic and advanced manufacturing).

## UNESCO - The International Research Centre for Artificial Intelligence (IRCAI) seated in Slovenia

- On November 25th 2019 in Paris the UNESCO conference general decided - **the first UNESCO-sponsored international centre for AI** will be seated in Ljubljana (established next year).
- **Recognition to Slovenian scientists' achievements** and a result of the good cooperation between the Slovenian government and UNESCO, especially in **open educational resources** where **Slovenia** has gained recognition as a **global leader**.
- It will **advise governments, organisations, legal persons and the public** on systemic and strategic solutions in introducing AI in various fields.
- This puts **Slovenia on the global map** of the most high-profile and **advanced countries**.
- **National Strategy on AI** is in the process of design with several stakeholders.



# 2019 *This Is What Happens In An Internet Minute*



Created By:  
@LoriLewis  
@OfficiallyChadd

Source: <https://www.visualcapitalist.com/what-happens-in-an-internet-minute-in-2019/>



## Main Principles & Goals



- Shifting focus from applications to data management
- Benefits for citizens, businesses and policy makers
- Using emerging technologies to get information from data
- Personal data security (GDPR) versus open data (PSI, Open data directive)
- Data driven decision making



- Especially in government and public services data



- Common Governmental Platform for Data Analytics => Data Warehouse + Business Intelligence + Data Lake for Big Data => Artificial Intelligence

## Data Management Framework

- **EU Legal Basis:** PSI and Open Data Directive, GDPR, eIDAS Regulation, INSPIRE, SDG Regulation, Digital Europe Programme 2027, ISA2 and SEMIC
- **SLO Legal Basis:** Accessibility of Websites and Mobile Applications Act, General Administrative Procedures Act (ZUP), Information Security Act, Public Sector Information Access Act (ZDIJZ), Personal Data Protection Act (ZVOP), National Strategy on Interoperability, Digital Slovenia 2020, Public Sector Development Strategy 2020, ...
- **Data Accessibility**
- **Data Quality**
  - Data Sources procedures quality
  - Data management process quality
  - Fraud prevention (fake news detection), ...
- **Interoperability**
  - Legal
  - Organisational
  - Semantic
  - Technical
- **Specific Tools Development**
- **Specific Skills Building**
- **Building of Data Management Awareness**
- **Preparing Legal Basis for Data Management Framework**



## Starting Points and Challenges of Data Analytics in Public Administration in Slovenia

- **Data bases are unlinked** and located in **different siloses**.
- Estimation: **weekly / monthly reports** by governmental agencies, e.g. for finances, HR (**manually**) takes **0,5 - 2 days**.
- Most **reports are repetitive** -> could be **predefined and automated**, analysts could focus on **predictive analytics**, what if scenarios and data interpretation.
- Daily / weekly various **journalist / parliamentary questions** – it's estimated **0,5 - 2 days** for answering since **data are not collected and managed**.
- We estimate **the savings: 0.3 - 0.5 FTE / year** of the current work per the analyst.



## Goals, Challenges and Perspective

- **Data driven decision making** for more transparency and more efficiency.
- **Benefits for citizens, businesses and policy makers**
- Informational Commissioner and legal frame: **personal data security & GDPR.**
- **For analysts: automatisaton of repetitive tasks**, support to infographics and predictional analytics,
- **Important role of users:** owners / guardians of the data,
- **Continious activity** for governmental administration: **competence center for user support.**

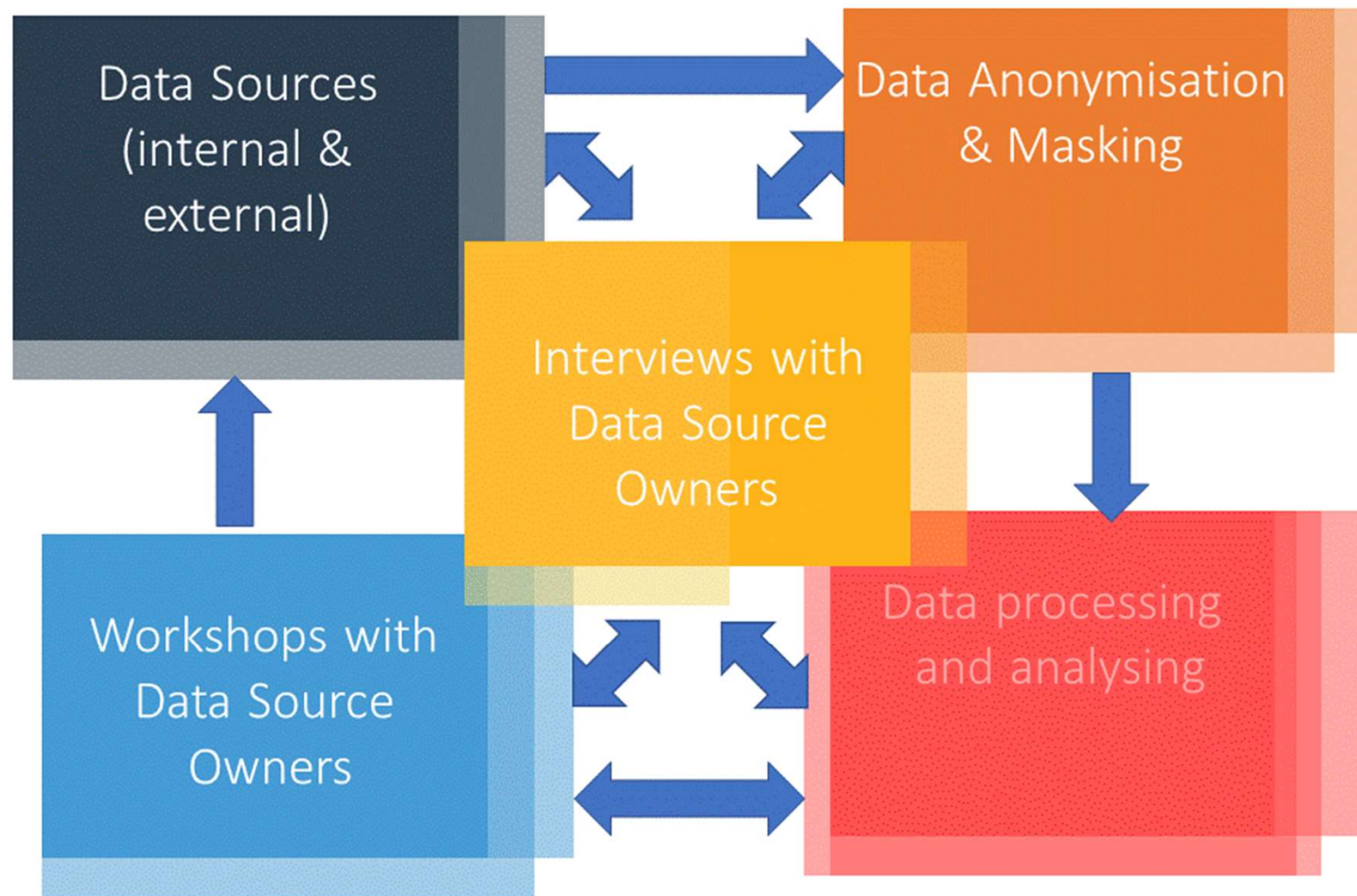


## Big Data Pilot Project in Ministry of Public Administration

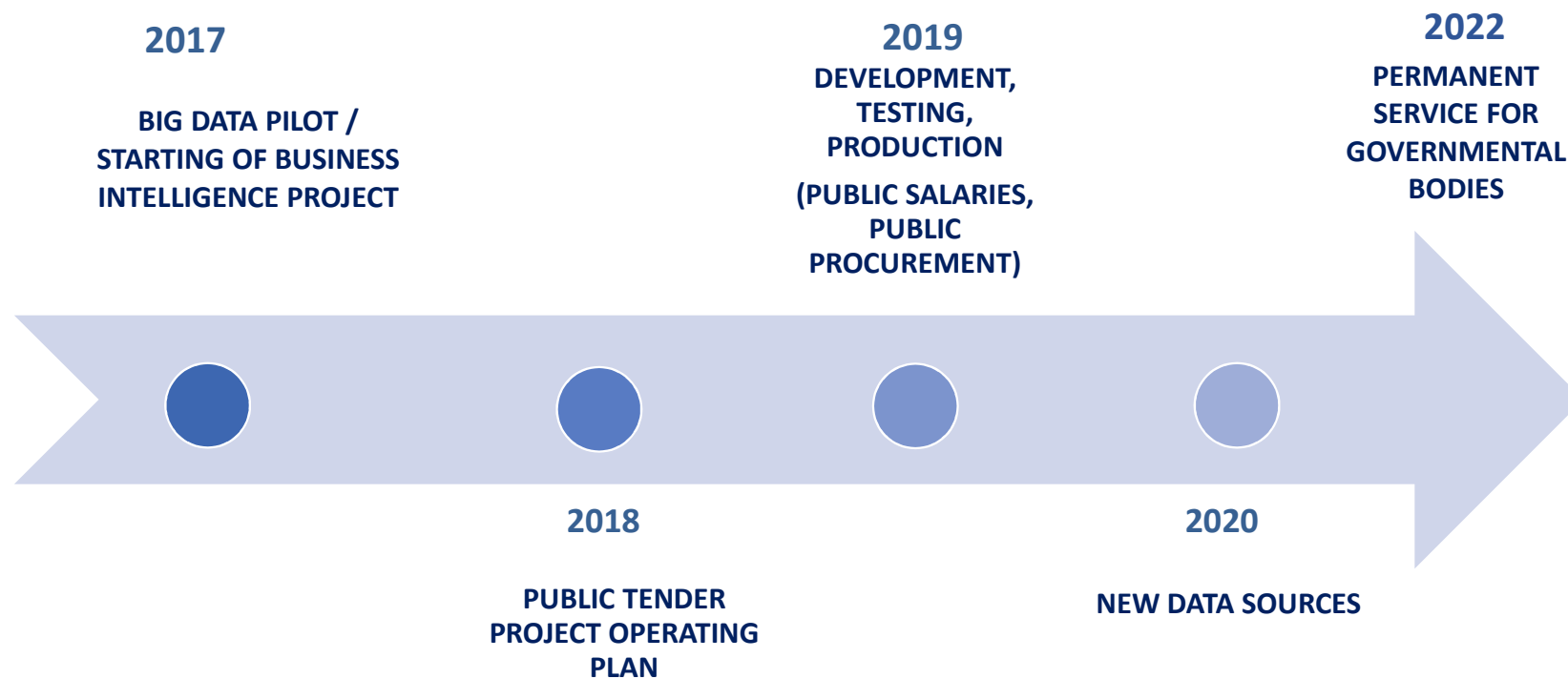
- **Purpose** - to learn what Big Data could enable to improve efficiency in the field of HR and public procurement on our **private cloud**.
- Pilot with partner company **EMC Dell** – 5 experts + 23 MPA team members.
- **Duration** April 2016 to February 2017. MPA data, from January 2015 to August 2016.
- **Data sources**: data on employee's time management, salaries data, HR data and finance data, data on public procurement + open data – postal codes and weather.
- **Media** – personal data. **Informational Commissioner** - Impact Assessment on Privacy.
- Data **substitution** and **anonymisation** (personal data).
- **R Language, Python, R studio**, Hadoop, Apache Spark, Jupiter Notebook.
- **Change management** – Restablishing Trust.
- **Digital skills - training programe for public servants** with University of Ljubljana and University of Maribor by MPA Administration Academy ( 1,5 year over 800 participants).
- **Data Ecosystem - Common Governmental Platform** => Data Warehouse + Business Intelligence + Data Lake for Big Data + Artificial Intelligence.



# Process Big Data Analysis for HR efficiency improvement in Ministry of Public Administration of Republic Slovenia



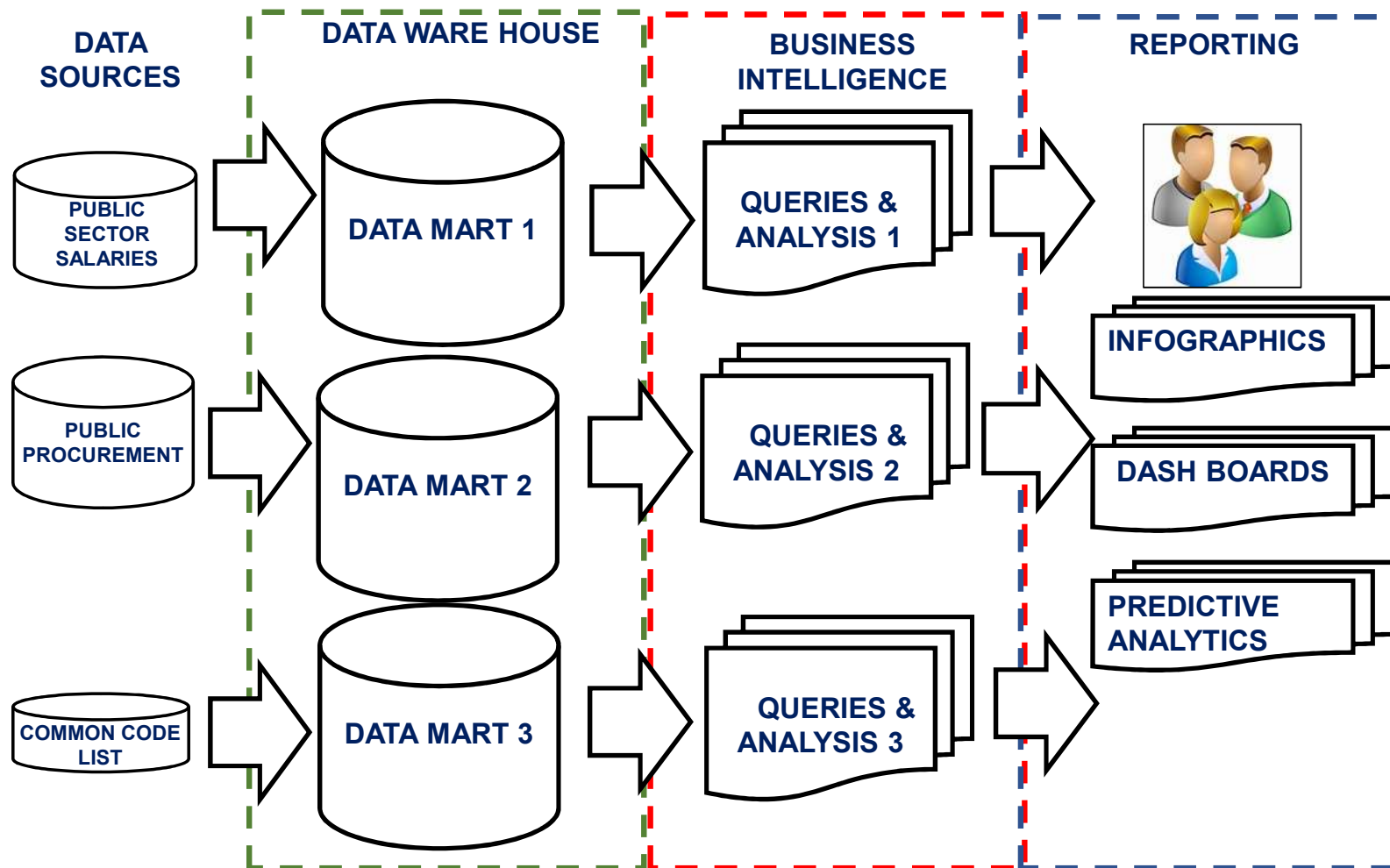
## Business Intelligence Project - Chest / Skrinja



## Business Intelligence Project - Chest / Skrinja



# Business Intelligence Project - Chest / Skrinja



# Benefits of Data Analytics



<p>Quicker <b>finding</b> of data <b>errors</b></p>		<p>Self-service <b>dash boards</b></p>	
	<p>Linkage and visualisation of different data sources</p>		<p>Cleaning of data on the source</p>
<p>New <b>knowledgement</b> within the data</p>		<p>New <b>patterns</b></p>	
	<p>Verified and masked data</p>		<p>Data interpretation – one truth</p>
<p>Important role of <b>advanced users</b></p>		<p>Real time reports &amp; transparency</p>	

## Main Lessons Learned and Further Challenges



- **Change management** challenge.
- Personal data **security** and **anonymisation**.
- **One team -> one goal** (HR, Finance, Legal department, IT).
- **Statistics, interpretation of mid-data** and connection to business analytics.
- **Training programme for public servants** with University of Ljubljana and University of Maribor by MPA **Administration Academy** (more than 870 participants).
- **OECD Observatory for Public Sector Innovation**
- **Common Governmental Platform for Data Analytics** => Data Warehouse + Business Intelligence + Data Lake for Big Data + Artificial Intelligence.
- **Demo Presentation of Business Intelligence:**
- <https://app.powerbi.com/view?r=eyJrljoiNzQ4ZjJkMTEtYWE5Ny00M2NmLTk1MTAtNjMxYjkwMzBmNmU3liwidCI6ImE5YTE5NjMzLWI2NjltNGJINC04ZGEyLTdhZjg4NWQzNjVmZiIsImMiOiJh9>



# Analiza mesečnih poročil bruto plač in drugih prejemkov za leto 2018

Vir: Portal plač javnih uslužbencev

Postavka

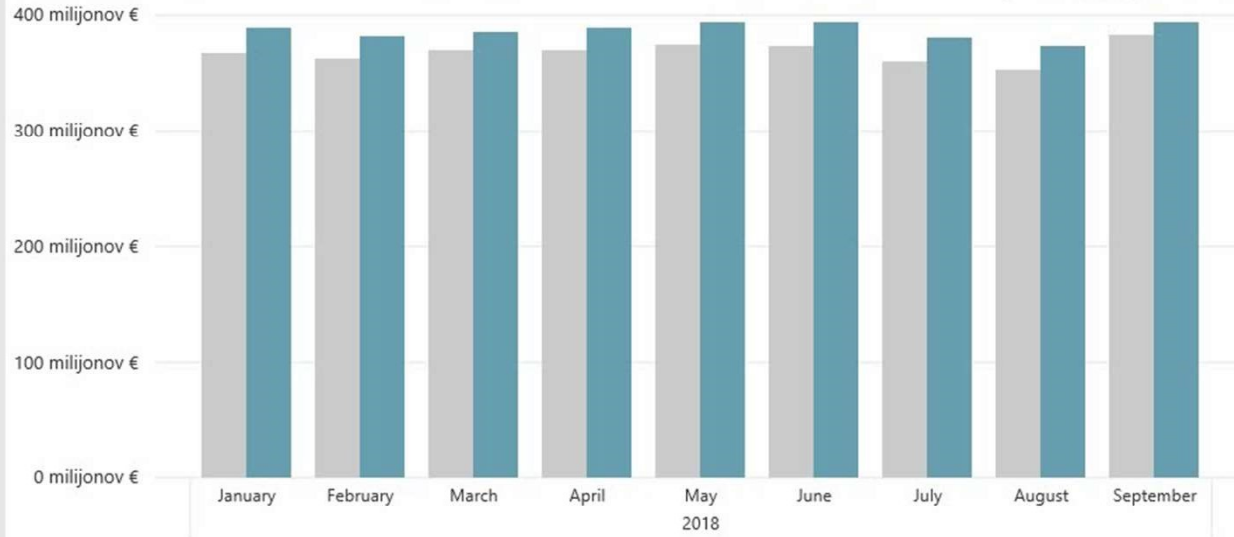
Obdobje

Vsi

1.1.2018

30.9.2018

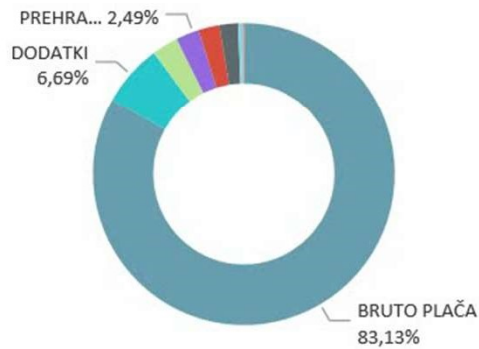
Vsota izplačil v izbranem letu glede na isto obdobje lani



Vsota izplačil v izbranem letu glede na isto obdobje lani po RPU



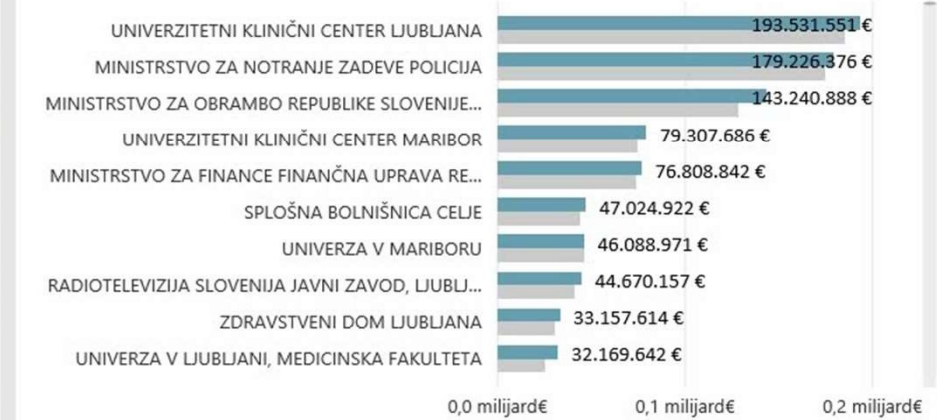
Vsota izplačil glede na postavko



Odklon vsote izplačil glede na odklon št. zaposlenih

Month	Odklon vsote izplačil	Odklon št. zaposlenih	Povečanje izplačil glede na novozaposlenega
January	22.365.674 €	2.584	8.655 €
February	18.803.305 €	2.344	8.022 €
March	16.318.560 €	2.104	7.756 €
April	19.909.476 €	2.277	8.744 €
May	19.028.988 €	1.913	9.947 €
June	20.034.170 €	4.442	4.510 €
July	21.024.697 €	4.282	4.910 €
August	20.834.487 €	4.005	5.202 €
September	11.472.796 €	3.039	3.775 €
October			
November			
December			

Vsota izplačil v izbranem letu glede na isto obdobje lani po PU



## Further Challenges & Opportunities

- **Enabling data sharing among**
  - Applications
  - institutions / companies, intersectorial
  - Governments / countries, cross - border
- **Data quality verification procedures development**
- **Protecting data against**
  - Non-authorized: access, manipulations, use
  - Special focus on sensitive and personal data
- **Preparing strategies for**
  - Data management
  - Interoperability
  - Artificial Intelligence
- **Building awareness, skills and political support**
- **Building organisational / coloboration / resurces structure (e.g. Data Officers ...)**
- **Building Legal basis for Data management framework**

