Beyond DIGISER - An analysis of public sector digitalization in European cities and its correlates

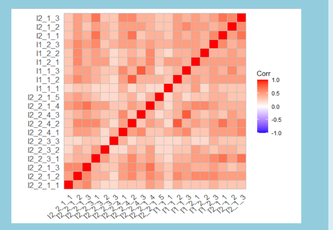
Data Bees

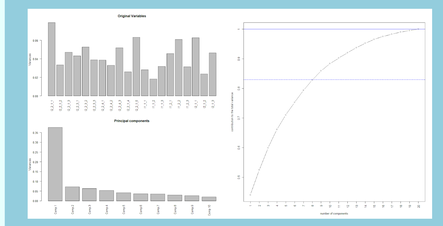
Maite Siebel
Michele Carlo La Greca
William Rom
Hatice Deniz Temurtas
Melis Yilmaz

The aim of **DIGISER** is **analyzing the transformation of the public sector** and its service provision **through digital innovation**. It can be reached by exploring the diversity of the European territory in terms of socio-economic, cultural and environmental endowments in different cities, through a **set of composite indicators provide a synthetic assessment of the performance** of the cities.
The aim of this research project is to give **tools and knowledge** to the stakeholders and policy makers for **making informed decisions on best-possible actions to boost digital transformation**.

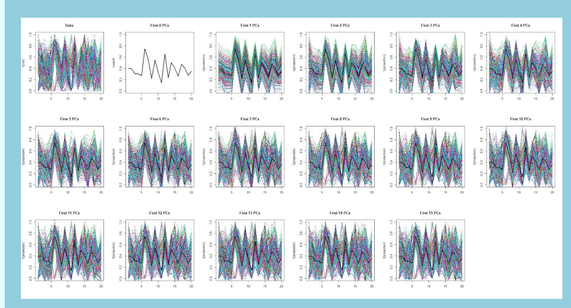
Principal Components Analysis

Before starting the PCA analysis, correlation between variables are checked.
Proneness to experiment and Innovative Technologies: When city's degree of adoption of innovative Technologies is high, this city ready to experiment new organizational settings and methods within the public authority
Advanced methods and principles and Skills: The level of consistency of methods and principles used to increase the digitalization level is high when there is availability of skills of management of digital innovation

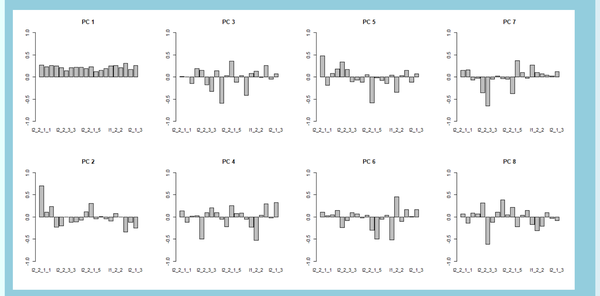




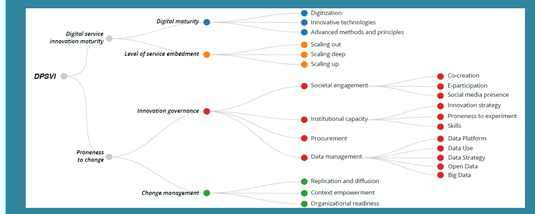
The Principal Component Analysis implemented last hierarchical layer which includes 20 variables. After PCA, as it can seen from screeplot, the first 8 Principal Component explains 83% of the total variability.



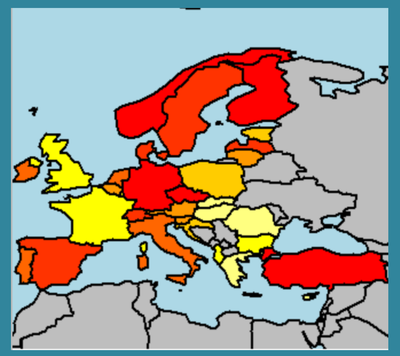
PC2 is related with how features and data management of data platform is good for a city, how the city deal with the big data, non-effectiveness of the strategies that ensure impacts of innovation.
PC3 is related with lower level of consistency of methods and principles used to increase the digitalization level, lack of availability of skills as digital innovation management and how the city deal with the big data
PC4 related with lack of influence replicated/exported innovations and e-participation
PC5 is related with how features and data management of data platform is good for a city, how a city can't deal with the big data
PC6 is related with how innovation of services is pervasive, how much effect at societal level unlike negative influence replicated/exported innovations, the lower degree of digitization of pre-existing internal procedures
PC7/PC8 are related with in negative way that how much pervasive is the communication via social media by the municipality



Introduction – Digitization across Europe

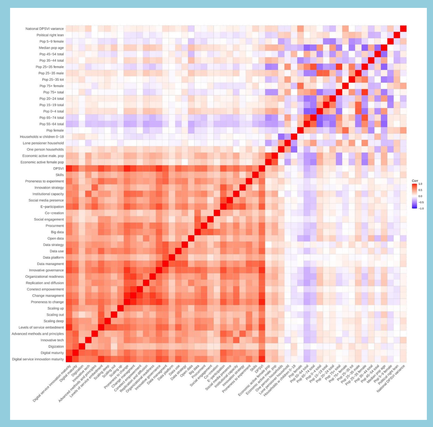


DIGISER data consists in a dataset of **255 respondent cities, and 31 indicators**, that resume the digitization of each city. They have been collected through surveys by DATSU and Design Department @ Polimi. Starting from left, the indicators (value between 0 and 1)aggregate until the last index, **DPSVI**, is reached.
It describes the digitization degree of a city.



The above map shows **how the digitization is spread in the European countries**. From **yellow** (low digitization) to **red** (high digitization

Socioeconomic influence



Using additional **data coming from EU commission Eurostat datasets**, we can analyze correlation between socioeconomic indicators.

Some variables with **positive affect on digitalization**: The **amount of one person households and the ratio of young people**. An economically active population, with a **bigger importance on the women being economically active**.

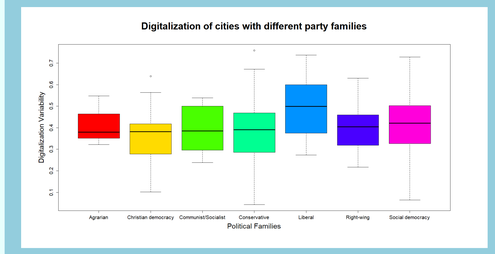
Some variables with a **negative affect** on digitalization: **Large degree of people over the age of 65**. More surprisingly: A **large ratio of females ages 25-35 and 5-9**.

Political Influence

The analysis continues with the study of a possible Political influence in the digitization.

Based on the political orientation of the max vote share party of a country in the last elections, **each country has also a feature for its political orientation**.

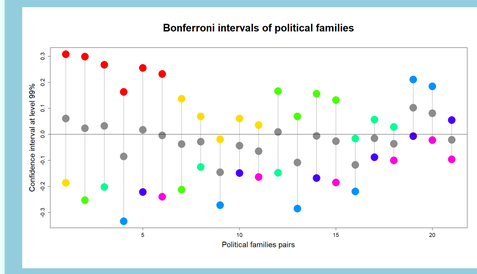
ANOVA may be a good analysis to check if the **political orientation of the cities have an impact on the digitization** of them.
We will focus on the **DPSVI index**, that express the final degree of digitization of a city.



Exploring the variability of the 7 population, each with a different party family, we can see that **cities with different political orientations have different digitization variability**, as well as the mean.

After having run the ANOVA and having checked the assumption of normality and homoscedasticity of the data, we got that the **political orientation influences the variability of the digitization** (test at 95%).

We performed 21 tests simultaneously, one for each couple of political families.
We use **Bonferroni approach** to understand **which political families are responsible for this effect**.

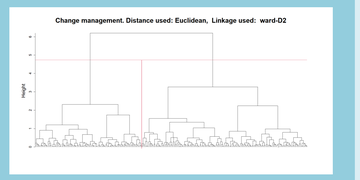


We obtained 21 intervals. Christian Democracy and Liberal orientation pair influences the digitization, as well as Conservative orientation and again Christian Democracy.

Cluster Analysis

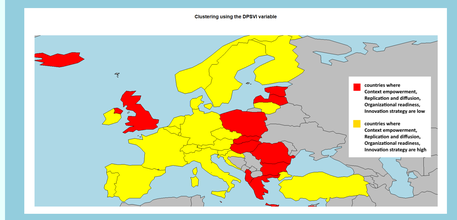
The cluster analysis considers 4 aspect of the digitalization that may be related with the political situation, since they are indices of the **Change management**, that is the capacity of public administrations to put in play a set of actions, norms, policies, and tools to proactively support innovation in digital service development.
A clustering analysis has been made, dividing all the cities in **2 clusters**, according to:

- Context empowerment
- Replication and diffusion
- Organizational readiness
- Innovation strategy



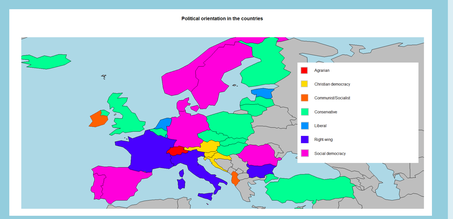
Based on the clustering, the **countries belong to 2 different groups**:

- **'Red' are countries where the indices are lower** with respect to the other countries, so they are countries where there is not an important action coming from the authorities to help the digital era growing and spread in a good way
- **'Yellow' are countries where the indices are higher** with respect to the other countries, so they are countries the action of the authorities is focused in the general improvement and diffusion of the digitization in the country

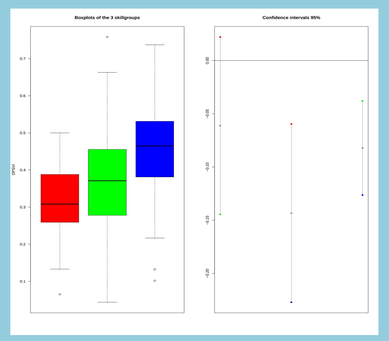


Given the political orientation of the countries, **we can compare the clusters with the political families of each of them**, looking at some insight

We can see that **many conservative countries are also those that are in the cluster 1 (red).** We can thus interpret this result with the tendency of conservative countries to don't focus and improve the digitalization under the point of view of the bureaucracy.



Individual digital skills influence



The research focused on the analysis of an additional dataset, containing the percentage of individuals with basic or above basic overall digital skills for each country.

By exploring them, we have observed three clusters of skills. To see if the skill of the population reflects the degree of digitalization in public sector we have performed an ANOVA and got result which made us conclude that there is a statistical difference between the groups.

Conclusions

The research might benefit stakeholders in making informed decisions on best-possible actions to boost digital transformation of local public services in the European Union.

By looking at the PCA, it is possible to identify for each city the aspect of digitization that outstands the most with respect to the others, in order to allow the policy makers to focus on them or make other decisions.

Using Eurostat socioeconomics data, political data, and the distribution of individual digital skills the research found an interesting influence of them with respect to the digitization.
Therefore, stakeholders can have the knowledge of the fact that politics and economics may be important when choosing a strategy for the Digitization, as well as the individual knowledge of digital skills.