SHORT TERM SCIENTIFIC MISSION (STSM)
SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA15222
STSM title: Monitoring and Analyzing Internet behavior in person centered care
STSM start and end date: 22/02/2020 to 03/03/2020
Grantee name: Alexia Sampri
Host: Prof Konstantinos P. Tsagarakis, Democritus University of Thrace
Working Group: 4

PURPOSE OF THE STSM:

With the Internet's use constantly expanding, the vast amount of information can be employed in order to better assess issues in health care systems. The most popular tools that allows us to interact with Internet data are Twitter and Google Trends. Google Trends has been widely used in the past to examine interest in various health-related topics and has shown great potential in forecastings, predictions, and nowcastings. By performing data analysis using Google data, healthcare organizations can make assessments on various population health issues faster and easier, understand what patients are searching for online, the query geographical distributions, and the respective volumes. The purpose of this STSM was the evaluation of an online search tool for identification of trends and preferences of people on medical concepts. Moreover, I also aimed to expand my knowledge by evaluating selected examples of approaches and use online search tools to select appropriate quality metrics in health promotion and person cantered care. This STSM was of reference on how Big Data Analytics can assist with the better monitoring of health and medicine related issues, as well as address the issues of reducing costs and increasing economic benefits.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

During my STSM at the Democritus University of Thrace, I spent the time with Prof. Konstantinos P. Tsagarakis, leader of the Business and Environmental Technology Economics (BETECO) Lab, with experience in big data analysis, web search data analysis, and data mining in healthcare. My work was focused on understanding big data mining methods in health. I was engaged to analyze and evaluate data generated by the Google search engine. The work set out to provide a solid basis on which can be built in order to achieve the large-scale data analysis and future implementation of innovative, integrated care systems that lead to behavior monitoring and cost reductions, but equally as important to maintain or even improved quality of care. Our work was to select appropriate quality metrics in health promotion and Person-Centered care.

Google trends is a flexible, free tool that can shed light on our keyword research. It gives relative search volume data that are helping us discover people's web interests, compare between alternatives, and check the volume between semantically different words. Data retrieved by Google Trends are normalized over the selected period and are downloaded online in '*.csv' format. In addition, we provide the visualization of the data and examine if any consistencies exist amongst the online interest over the selected period of time.

The choice of the terms is crucial for the accuracy of the results when retrieving and analyzing the online data. In the beginning an overall search of all available terms variations in online interest was provided in

order to identify the option/keyword/term that would increase the validity of further analysis on the subject of person centred care. So, we used the Google Trends' hits' data from January 2004 to December 2019 to analyze the change in the online interest of the terms: "Person centred care", "Person–centred care", "Person centered care", and "Person–centered care". We obtained google searched data worldwide and in the United Kingdom. The next step forwards was to examine online interest only in the English term "Person centred care". After that, we also examined the online interest for the translated term in the CA 15222 participant countries. The translated terms, of the term "Person centred care", were obtained from a list of translations that Prof. Tsagarakis provided, compiled by translations from the rest of CA 15222 members.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

The data analysis showed no enough Google searches neither for the English term "Person centred care" nor for its translation in the official languages of the following Cost Action 15222 participant countries: Bosnia and Herzegovina, Croatia, Czech Republic, Denmark, Finland, Greece, Israel, Italy, Latvia, Lithuania, Montenegro, North Macedonia, Poland, Portugal, Serbia, Slovakia, Slovenia, Switzerland, and Ukraine. On the contrary there were enough google searches in the Netherlands, Norway, Spain, and Sweden, but only for the respective translated terms.

Figure 1 consists of the changes in the online interest in "Person centred care (Search Terms)" from January 2004 to December 2019 in the UK. We see that until February 2011 the online interest of the term is in general stable with some spikes, but it has been constantly increasing after that until the end of 2019.

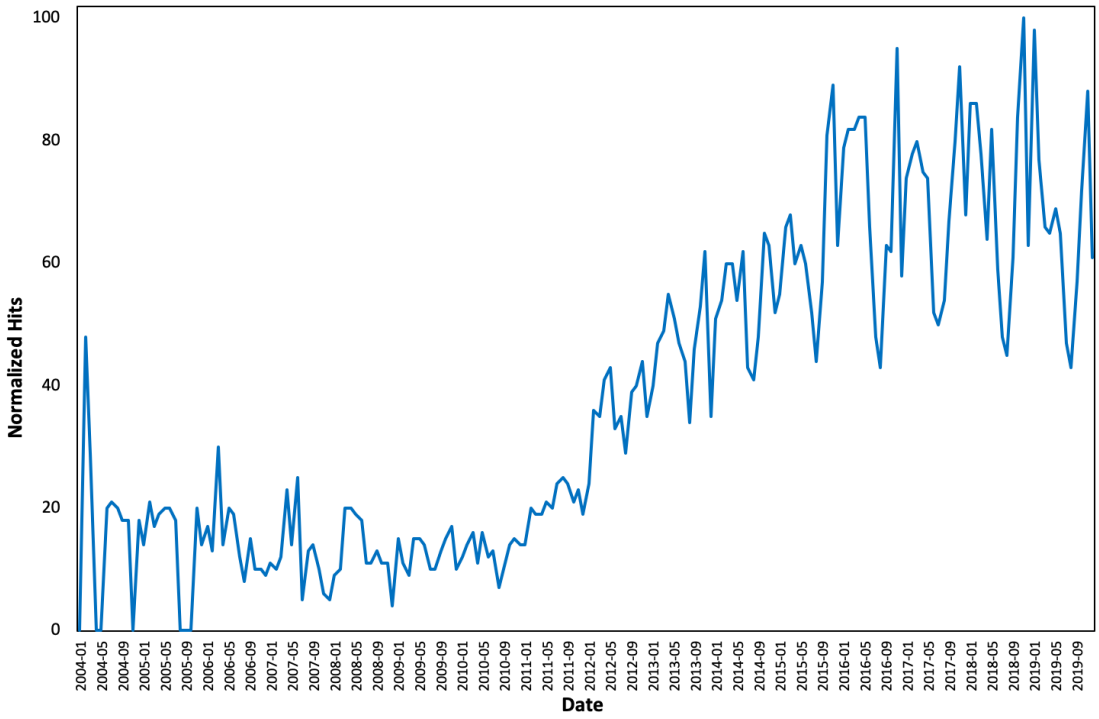

Figure 1. *Normalized Google Trends Data for the searched term "Person centred care" in the United Kingdom from January 2004 to December 2019*

In Figure 2, we see the changes of the online interest in terms: "Personenzentrierter Ansatz", "Persoonsgerichte zorg", "Personsentrert omsorg", and "Personsentrert omsorg" from January 2004 to December 2019 in Germany, the Netherlands, Norway and Spain respectively. We observe that, despite Germany, the online interest has some spikes but in general is very low until 2010. From 2010 and afterwards there is a constant increase in the google searches of the term in the Netherlands, Norway and Spain.

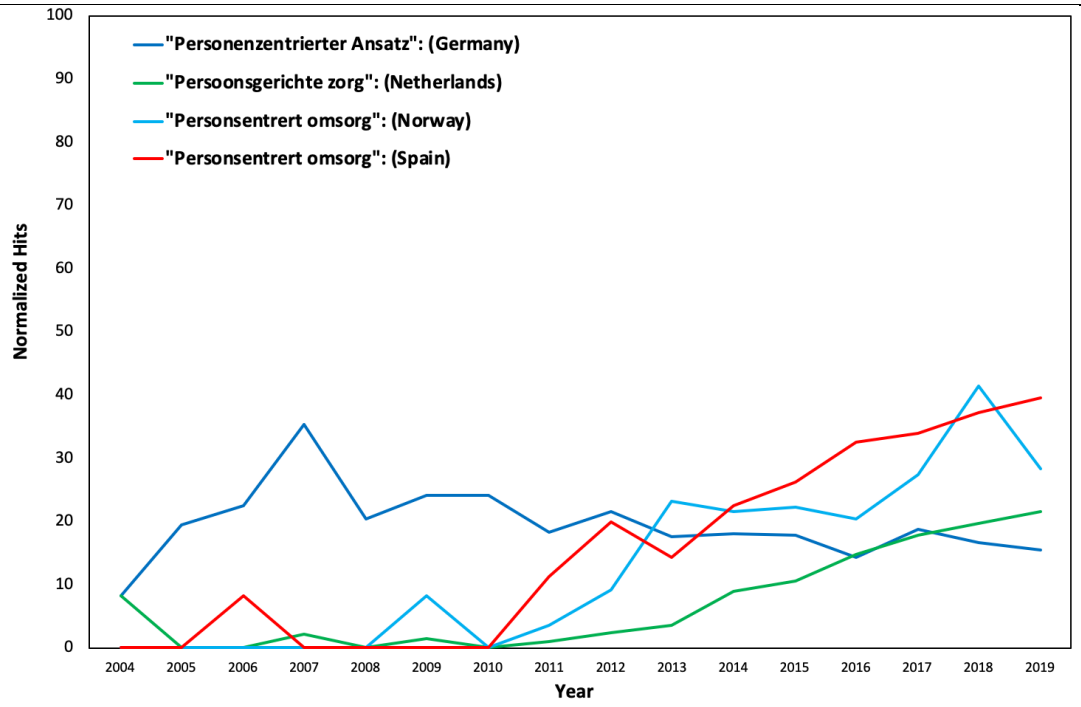

Figure 2. *Normalized Google Trends Data for the respective translated terms for "Person centred care" in Germany, the Netherlands, Norway, and Spain from January 2004 to December 2019*

In figure 3 we compare two Swedish translations of the term “Personcentrerad vÃ¥rd” and “Personcentrerad omvÃ¥rdnad” in Sweden from January 2004 to December 2019. We observe that both terms have some spikes until 2010 while from that year there is a constant online interest in Google searching.

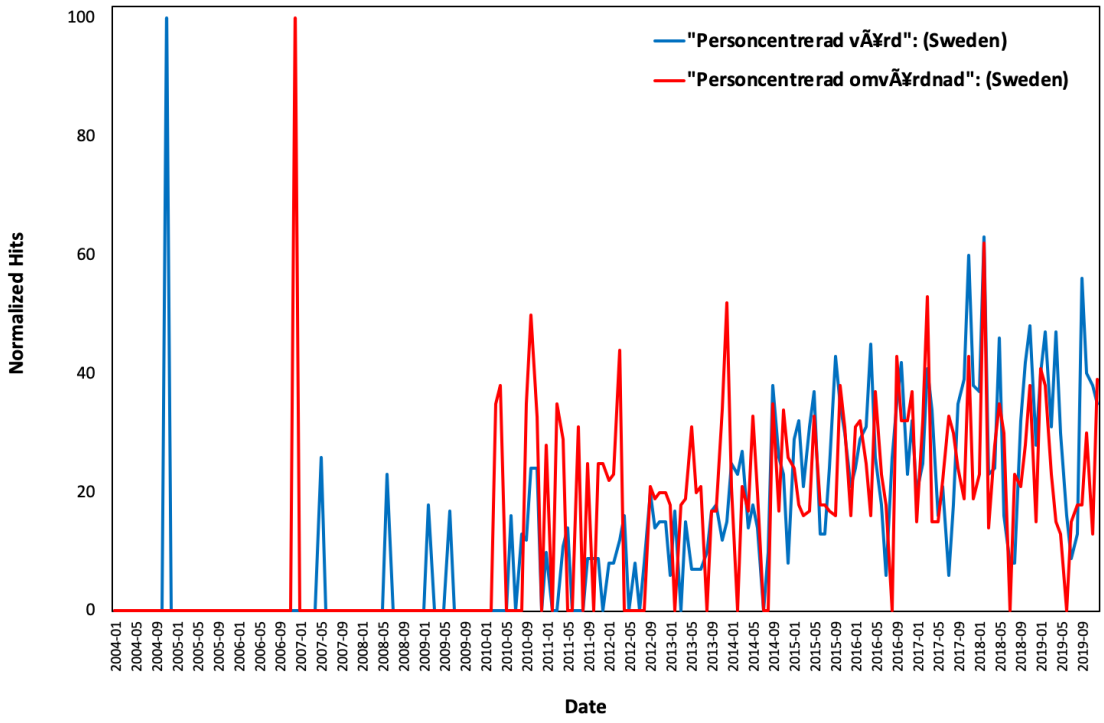

Figure 3. *Normalized Google Trends Data for the term "Person centred care" translation in Swedish, in Sweden from January 2004 to December 2019*

In conclusion, language and search behavior change over time. Policy makers need to make sure their quality metrics in health promotion and person centred care reflect these changes. Google Trends confirmed that “Person-centered care” and “Person-centred care” were declining as search terms. “Person centred care” was rising mostly in Europe and Australia while “Person centered care” in the United States and Canada.

Another interesting result is that searchers change terms and adapt their searches fast. We also need to use terms that have been already been used and are well known to the target country. We find that sometimes the official term does not really mean that people use it and know about it. They may use a synonym that we should include in the analysis. Adding an interface that allows for the display of all terms along with their relative contributions to the final results, and the linguistic, geographic, and terminological contextualization of each would go a long way towards addressing these issues.

FUTURE COLLABORATIONS (if applicable)

The design of the data analysis study in WG4 was held among two partner countries: Greece and the United Kingdom. Through this collaboration, we are now preparing an article to be soon submitted the Journal “Big Data and Cognitive Computing”. In addition, the contacts obtained through this STSM will be applied for joint projects, bilateral exchange visits, and individual consultations. I have already established connections between my institute Health eResearch centre, which is part of the University of Manchester, and BETECO with the aim of developing and upgrading Big Data mining methods.