MODELO DE PORTADA

TRABAJO FIN DE MÁSTER

MÁSTER UNIVERSITARIO EN ALTA DIRECCIÓN

CURSO ACADÉMICO: 2019/2020

Socio - economic impact at CERN: Social networks and onsite CERN visitors

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Fecha: 15/01/2020

This work and the contained results are part of a project that has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 777563.

The work has been carried out in the scope of the Future Circular Collider study at CERN. It is the result of research performed from December 2017 to December 2019 in the ATS/DO group.

The work has been supposed by the CERN administrative student training programme. The document is openly published and can be accessed free of charge from Zenodo (DOI 10.5281/zenodo.3626444) and CERN's Document Server (cds.cern.ch).

Acknowledgements

A special thank goes to Johannes Gutleber, my supervisor at CERN and who gave me the opportunity to conduct this Research and also to Camilo Prado Román my supervisor at University Rey Juan Carlos, for his support.

I would also like to thank Massimo Florio and Jessica Catalano from University of Milano, and Silvia Vignetti and Francesco Giffoni from CSIL, to helping and teaching me to carry out socio – economic impact researches.

Finally, I also thank many people for the helpful discussion, which have indirectly contribute to this report, especially from CERN: Kate Kahle, Renilde Vanded, Rolf Landua, Ray Lewis, Anna Godinho, Panagiotis Charitos, Arnaud Marsollier, Julie Haffner, Melissa Marie Jaquemod, Carsten Fishel, Steven Goldfarb, Sotirios Boutas, Luis Alfonso Lomba Falcon, Yesika Enriquez, François Briard.

INDEX

INDEX OF TABLES AND FIGURES

1. INTRODUCCIÓN

La Organización Europea para la Investigación Nuclear, también conocida por el acrónimo CERN, se encuentra entre Suiza, más específicamente Ginebra y Francia.

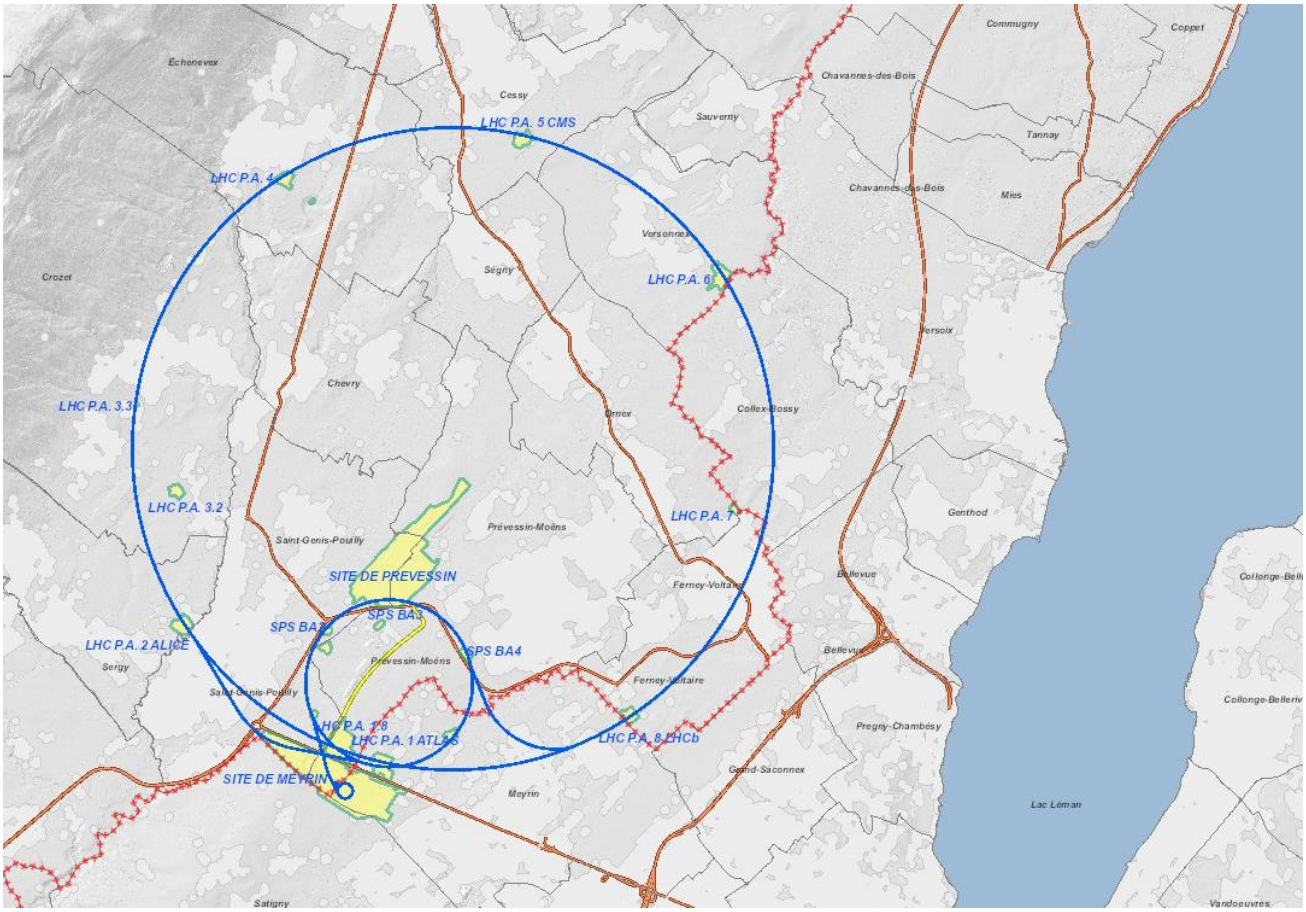

Figura: Ubicación del CERN, sus sitios y las principales instalaciones de aceleración de partículas.

La organización fue fundada en 1954 por 12 países europeos y actualmente está compuesta por 23 Estados miembros: Austria, Bélgica, Bulgaria, República Checa, Dinamarca, Finlandia, Francia, Alemania, Grecia, Hungría, Israel, Italia, Países Bajos, Noruega, Polonia, Portugal, Rumania, Serbia, Eslovaquia, España, Suecia, Suiza y Reino Unido.

El CERN también tiene los siguientes Estados Miembros Asociados: Croacia, India, Lituania, Pakistán, Turquía y Ucrania y Estados Miembros Asociados en la etapa previa a convertirse en países miembros: Chipre y Eslovenia.

También hay varios estados y organizaciones internacionales con estatus de Observador, incluidos Japón, la Federación de Rusia, los Estados Unidos de América, la Unión Europea, JINR (Join Institute for Nuclear Research) y la UNESCO.

La misión del CERN es el estudio de las leyes fundamentales sobre los mecanismos que rigen la naturaleza, especialmente el origen y el funcionamiento del Universo. Muchos proyectos se desarrollan para este propósito en la organización, pero el más grande es el Gran Colisionador de Hadrones, conocido por su acrónimo LHC. Su misión es recrear las condiciones que ocurrieron nanosegundos después del BIG BANG.

Se han realizado varios descubrimientos importantes gracias a las instalaciones de vanguardia que posee el CERN, tales como:

- La World Wide Web fue desarrollada por Tim Berners-Lee en el CERN en 1989. La Web fue diseñada originalmente para ser un sistema para que los físicos de todo el mundo compartan información de forma remota. Los protocolos y software de comunicación subyacentes se pusieron a disposición del público en 1993 de forma gratuita, para que cualquiera pudiera ejecutarlo con un servidor y un navegador básico y continuar con el desarrollo de la infraestructura.
- El bosón de Higgs fue la última pieza del Modelo Estándar de física de partículas. La teoría subyacente fue desarrollada por Robert Brout, Peter Higgs y François Englert en la década de 1960, pero tardó 48 años en ser confirmada experimentalmente con el LHC y sus instalaciones experimentales internacionales (CMS y ATLAS). Este logro fue recompensado con el Premio Nobel de Física 2013.
- La red informática mundial LHC GRID es una integración global de almacenamiento de datos y centros de procesamiento. Los experimentos del LHC (ALICE, ATLAS, CMS y LHCb) producen aproximadamente 15 petabytes de datos en bruto cada año. Estos datos se almacenan, analizan y distribuyen a 170 centros en 42 países de todo el mundo gracias al GRID. Los desarrollos técnicos en torno a esta infraestructura informática han dado como resultado el desarrollo de numerosas herramientas de software, protocolos, almacenamiento de datos y arquitecturas de procesamiento, han generado estructuras organizativas y de cooperación en el procesamiento de información académica y la conservación de datos. La iniciativa continúa siendo una fuerza impulsora en el avance de la informática a escala global.

- La terapia con hadrones es una tecnología adicional que los físicos ofrecen a los oncólogos para tratar los tumores de manera menos invasiva. Varios aceleradores de partículas basados en tecnologías CERN persiguen el tratamiento de tumores reduciendo eficientemente el daño del tejido circundante y reduciendo en menos efectos secundarios (por ejemplo, CNAO en Italia, MedAustron en Austria).

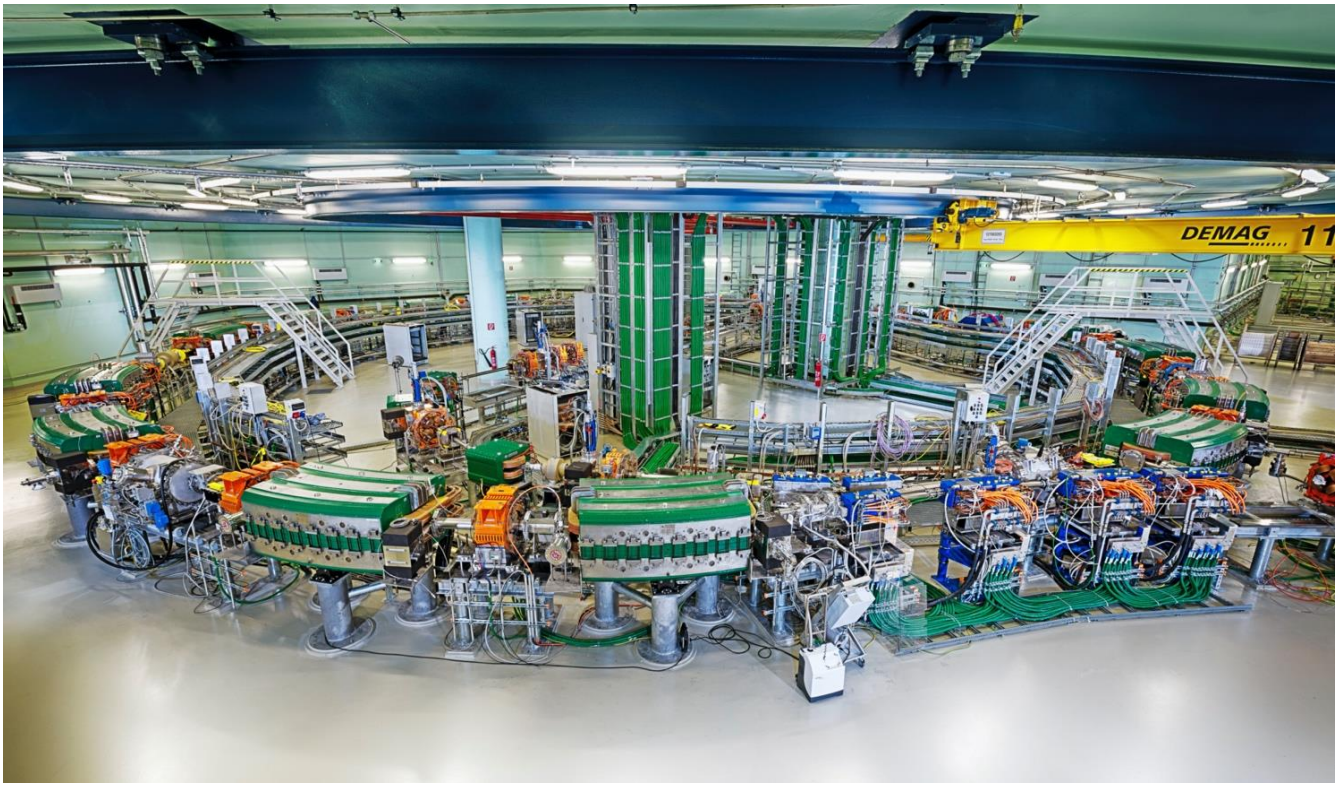

Figura: El acelerador de partículas MedAustron para la terapia del cáncer, se basa directamente en la tecnología del CERN. Ha sido diseñado y construido como un esfuerzo de colaboración en el CERN.

Otros hallazgos que también deben mencionarse son los bosones W y Z, la creación de antimateria, la violación de la simetría de paridad de carga y neutrinos ligeros y muchos otros.

Los resultados de estas actividades han influido directamente en la sociedad y la han mejorado. Hoy en día, es imposible imaginar la vida sin la WWW o las innovaciones tecnológicas en el tratamiento del cáncer, pero ¿cuál es el impacto socioeconómico del CERN?

Este trabajo arroja luz sobre esta pregunta, al explorar un subconjunto de generación de valor económico que está directamente relacionado con el programa de investigación del CERN, con aceleradores de partículas. Se refiere en particular a la estimación de la magnitud de diferentes dominios sociales y culturales. Por un lado, se analizan áreas sociales en Internet como las siguientes:

- Videos en la plataforma de YouTube, que hablan sobre LHC.
- Contribuciones que se han escrito en redes sociales como Twitter y Facebook sobre el programa de investigación del CERN.
- El número de visitantes a los sitios web del CERN.

Por otro lado, el impacto económico producido por **los visitantes del CERN** in situ, se examinará metódicamente y en detalle, diferenciando entre viajes de grupo y privados. El objetivo es obtener una estimación del valor económico generado a través del gasto de los visitantes del CERN producidos entre junio de 2018 y mayo de 2019.

2. INTRODUCTION

The European Organization for Nuclear Research, also known by the acronym CERN, is located between Switzerland, more specifically Geneva and France (see Figure 1).

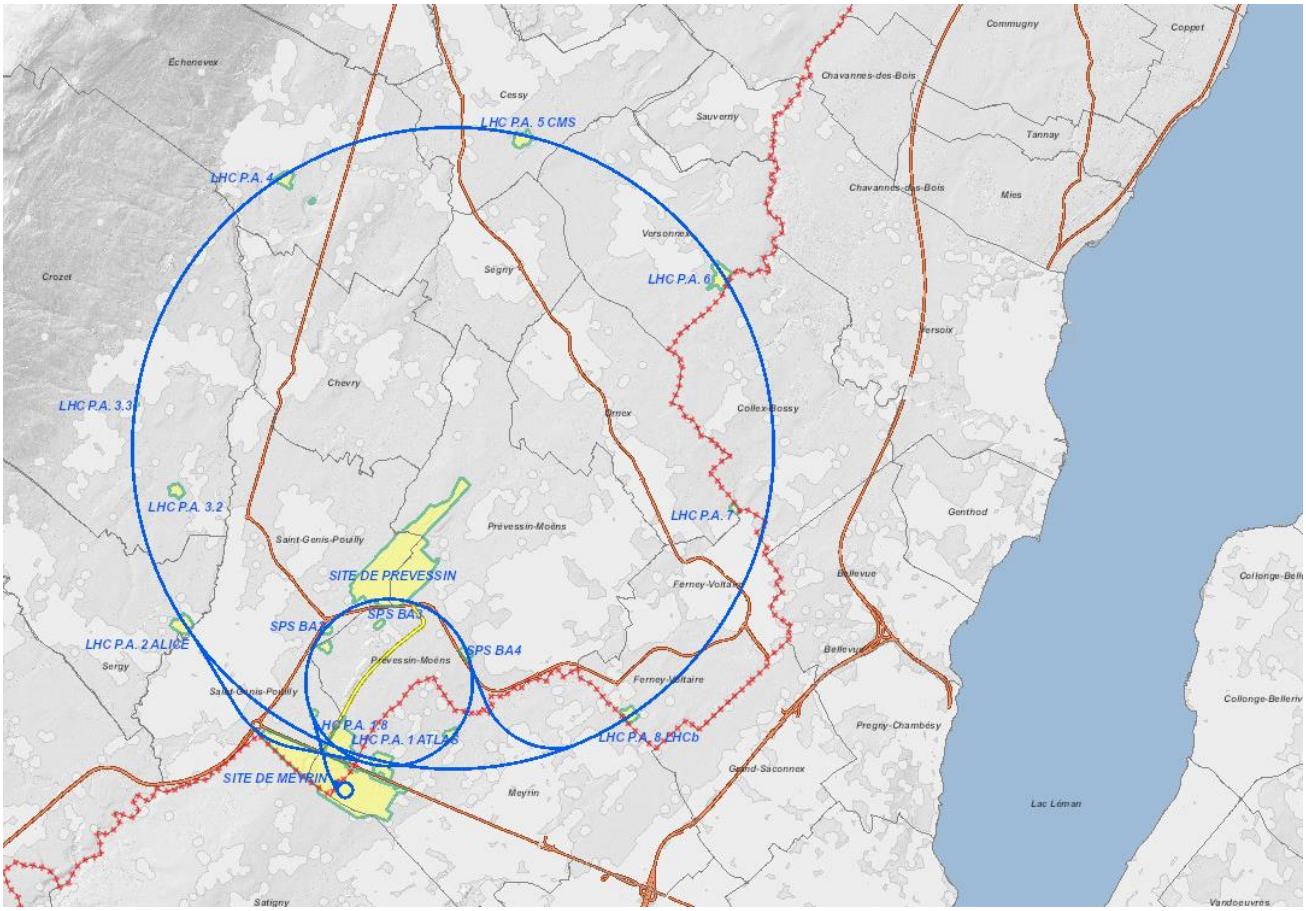

Figure 1: Location of CERN, its sites and main particle accelerator facilities.

The organization was founded in 1954 by 12 European countries and currently it is composed of 23 Member States[1]: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CERN also has the following Associate Member States: Croatia, India, Lithuania, Pakistan, Turkey and Ukraine and Associate member States in the pre-stage to Membership: Cyprus and Slovenia.

[1] https://home.cern/about/who-we-are/our-governance/member-states

There are also several states and international organizations with Observer status, including Japan, the Russian Federation, the United States of America, the European Union, JINR (Joint Institute for Nuclear Research) and UNESCO.

CERN's mission is the study of the fundamental laws on mechanism that govern nature, especially the origin and functioning of the Universe. Many projects are developed for this purpose in the organization, but the largest is the Large Hadron Collider, known by its acronym LHC. Its mission is to recreate the conditions that occurred nanoseconds after the BIG BANG.

Several important discoveries and developments have been made thanks to the CERN's scientific research activities, such as for instance:

- The World Wide Web was developed by Tim Berners-Lee at CERN in 1989. The Web was originally designed to be a system for physicists around the world to share information remotely. The underlying communication protocols and software were made available to the public in 1993 free of charge, so that anyone could run it with a server and a basic browser and continue the development of the infrastructure.
- The Higgs boson was the last missing piece of the Standard Model of particle physics. The underlying theory was developed by Robert Brout, Peter Higgs and François Englert in the 19960ies, but it took 48 years to experimentally confirm it with the LHC and its international experiment facilities (CMS and ATLAS). This achievement was rewarded with the Nobel Prize in Physics 2013.
- The Worldwide LHC computing GRID is a global integration of data storage and processing centers. The LHC experiments (ALICE, ATLAS, CMS and LHCb) produce approximately 15 petabytes of raw data each year. This data is stored, analysed and distributed to 170 centers in 42 countries around the world thanks to the GRID. Technical developments around this computing infrastructure have resulted in the development of numerous software tools, protocols, data storage and processing architectures; have spawned organization structures and cooperation in academic information processing and data curation. The initiative continues to be a driving force in advancing computing at a global scale.
- Hadron therapy is an additional technology offered by the physicists to the oncologists, to treat tumours less invasively. Several particle accelerators based on CERN technologies

pursuit treating tumours efficiently reducing the damage of surrounding tissue and reducing in fewer side effects (e.g. CNAO[2] in Italy, MedAustron[3] in Austria).

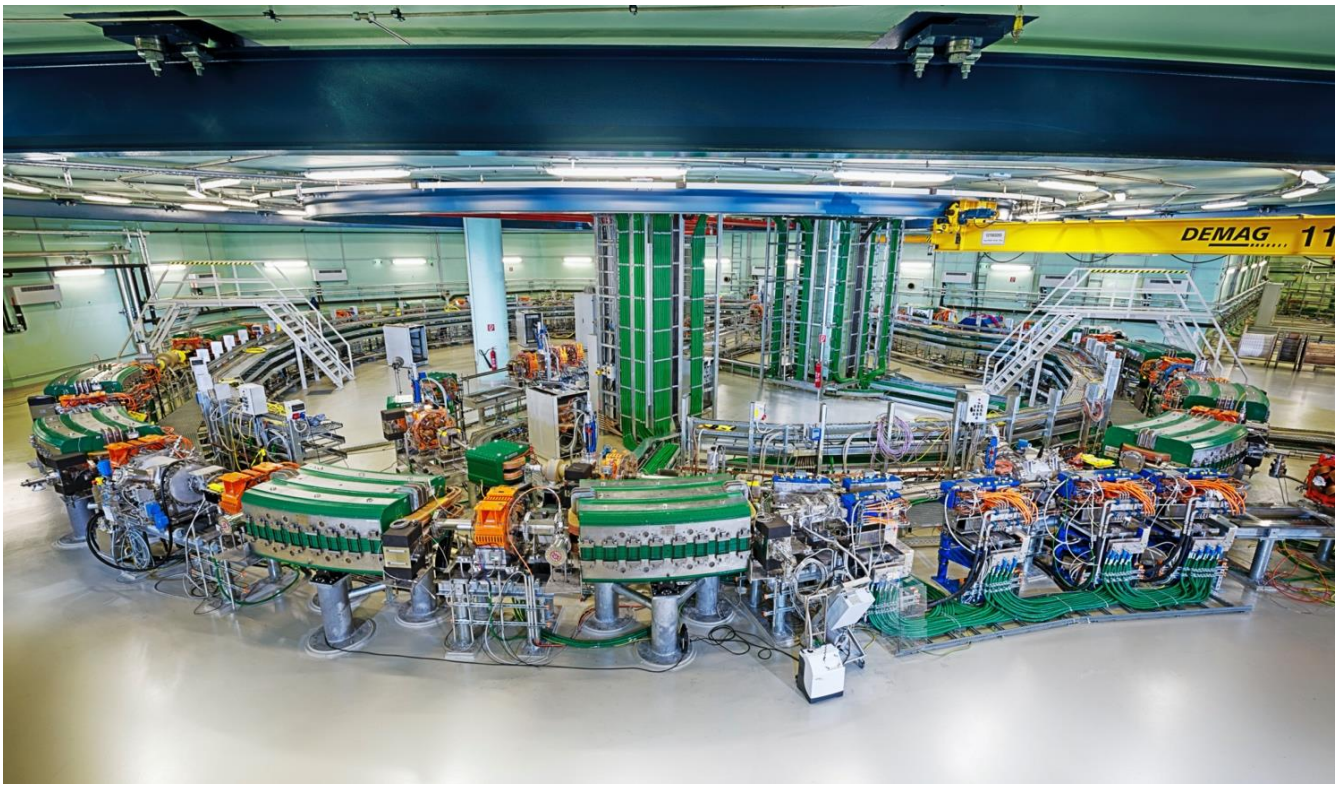

Figure 2: The MedAustron particle accelerator for cancer therapy is directly based on CERN technology. It has been designed and built as a collaborative effort at CERN.

Other findings, which should also be mentioned, are the W and Z bosons, creation of antimatter, violation of charge parity symmetry and light neutrinos and many others.

The results of these activities have directly influenced society and improved it. Nowadays, it is impossible to imagine life without the WWW, without high-resolution medical imaging that is built on top of high-field superconducting magnet technologies conceived for research particle accelerators or technological innovations in the treatment of cancer.

What is the measurable economic value of the socio - economic impact of CERN's activities?

This master thesis sheds light on this question by exploring one subset of economic value generation that is directly linked to CERN's research programme with particle accelerators. It concerns in particular the estimation of the magnitude of different social and

[2] https://fondazionecnao.it
[3] https://www.medaustron.at/

cultural domains. On one hand, **social areas on the Internet** such as the following are be analysed:

- Videos on the YouTube platform, which talk about LHC.
- Contributions that have been written on social media such as Twitter and Facebook about CERN's research programme.
- The number of visitors to CERN's websites.

On the other hand, the economic impact on **onsite CERN visitors** are be examined methodically and in detail, differentiating between group and private trips. The goal is to obtain an estimate for the economic value generated through spending of CERN visitors produced between June 2018 until May 2019.

The results of this master thesis will be used as baseline input parameters and as baseline scenarios for a socio-economic impact assessments of CERN's future project scenarios, in particular for a new, 100 km long circular particle collider infrastructure[4].

[4] https://fcc-cdr.web.cern.ch/

3. SOCIAL IMPACT

Social impact can be defined as the consequence or outcome of a particular action in society. One of the developments with lasting societal impact that CERN has made and that has certainly changed people's lives, was the World Wide Web (WWW)[5]. In recent years, the use of the Internet and in particular WWW-based applications has grown exponentially. Currently, it is used by 56% of the world's population according Global Digital's study in July 2019[6] and 46% are active social media users. Many people use this medium to read newspapers, learn about a topic that interests them, or to communicate with their social circle. These activities produce high benefits in society. Ultimately, however, it is few companies (the big five FAAMG: Facebook, Amazon, Apple, Microsoft, Google) that are not related to CERN and fundamental physics research that are able to capitalize this technology free-of-charge, which was entirely funded by taxpayers' money for the purpose of a fundamental science research programme.

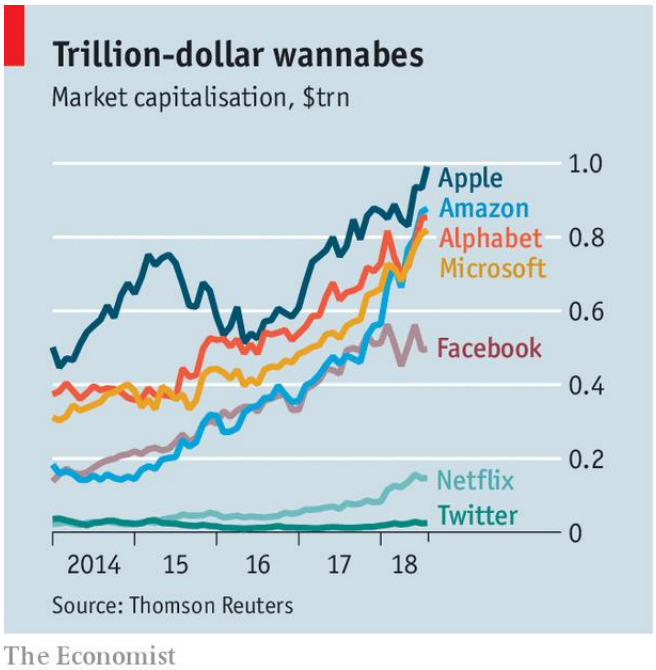

Figure 3: Market capitalisation of FAAMG, courtesy of The Economist, 2nd August 2018.

[5] http://cds.cern.ch/record/369245?ln=de
[6] https://datareportal.com/reports/digital-2019-internet-trends-in-q3

A recent study carried out by the University of Milano (Italy) resulted in a first estimation of such benefits in the framework of a Cost-Benefit Analysis of the Large Hadron Collider[7]. The group of study subjects included: (a) onsite CERN visitors; (b) visitors to CERN travelling exhibitions; (c) people reached by media reports of LHC-related news; (d) visitors to CERN and Collaborations websites; (e) users of LHC-related social media (YouTube; Twitter; Facebook; Google+); (f) participants in two volunteer computing programs. This study was, however, based on models from different impact domains (e.g. models for the impact generation of natural reserves) and on existing statistical information (e.g. overall statistics about CERN visitors). In addition, the data from WWW and social-media were taken at a rather early stage of the social-media technologies, before they were fully integrated and before they reached a high global adoption rate. Videos were not included in the study.

Based on these previous studies, we carried out further research to better estimate and understand the economic impacts produced by outreach activities and cultural goods. The channels analysed in greater depth for this master thesis project were:

- YouTube
- Social media such as Facebook, Instagram, Twitter and LinkedIn
- Specific, research-programme related Websites

By assigning a monetary value to the time people spend on these different channels informing themselves about CERN and its research activities, it has been possible to estimate this benefit category in greater detail. Each section below details the different methodologies chosen for benefit assessment. Some **common methodologies** are:

a) For each of the channels, a **collection of historical data available** on the number of virtual visitors **and the time spent** by these visitors **on the different platforms** has been made.
b) The **time invested** by the visitors in economic terms, is **expressed by considering the social margin value of the time dedicated to leisure activities** [8]. The values provided for the member states of CERN have been used to quantify the time values. A weighted average social value of time is calculated, weighing the value of time for the population of each country. The value that we chose to use for our studies is **0.13 € per minute and person**. See Annex 8.1 page 37, for details on the calculation.

[7] Florio, M., Forte S., and Sirtori E. Forecasting the socio-economic impact of the Large Hadron Collider: *A cost–benefit analysis to 2025 and beyond*. Technological Forecasting and Social Change 112: 38-53, 2016.

c) The timeline used to calculate the benefits generated by the different media channels spans from the first year the platform was launched until 2025. This means that some of the data are based on actually available statistics information and a forecast until 2025 is made based on a trend evolution estimate. The approach involved the adoption of different time horizons corresponding to the various channels considered. The year 2025 was chosen in accordance with the assumption made by the document "Social benefits and costs of large-scale research infrastructures" [3].

d) We **extrapolate data for future years** from the historical data obtained, **as well as for past years where there was a lack of systematic monitoring**. Details are be provided in the following sections.

e) The monetary value corresponding to the socio-economic impact is calculated in a representative way to obtain the benefit generated by these types of activities.

f) The overall quantitative estimate of socio-economic impacts is based on a combination of historical and future data (as described in point c above). We decided to use 2017 as the base year, because this is the most recent year for which actual acquired statistical data is available for our studies. Therefore, we capitalize on past values and discount future values taking 2017 as the reference year[8]. To this end, we use the 3% social discount factor suggested by the "Guide for the cost-benefit analysis of the investment project" of the European Commission [7].

g) The benefits obtained have been reported in Swiss francs, using the following conversion factor: 1 € = 1.14 CHF

h) **Methodology used to calculate the benefits in this study:**

- Calculate the benefit for each year with the formula assigned for each type of social impact.
- Discount the estimated benefit for each year with the capitalisation formula, taking as the base year 2017.
- Sum up the discounted benefits of each year to obtain the cumulative impact in economic terms.

[8] Capitalisation formula: Benefit $\times$ $(1 + 0.03)^{year}$; Discounting formula: Benefit/$(1 + 0.03)^{year}$

3.1 YOUTUBE

Launched in February 2005, YouTube is a platform, used for publishing videos, on the web that lets users upload, view, rate, share, and comment on videos and subscribe to different channels created by users. The content available ranges from video clips, television program clips, music videos, short films and documentaries, audio recordings, movie previews, live streams and other content such as blogs or original videos. In 2018, this platform had around 1.9 billion registered users[9]. The actual number of users is actually much higher, since it is not possible to count anonymous users.

There is a wide variety of videos related to CERN. However, only videos about the LHC's research program, its four main experiments (ALICE, ATLAS, CMS, LHCb) and directly about the organisation's facilities have been considered in our study project. We performed **a detailed analysis of all the videos available on the platform** that correspond to the outlined criteria, selecting only those that after a second individual check could be causally related to the object of our analysis. Applying those strict rules, we identified a total of 616 videos between 2007 and 2017 with approximately 39.5 million total views. For each video, the number of views provided by the platform statistics and the duration of the video were considered for further analysis. Annual data are provided in Annex 8.3, page 38. A significant increase of viewers' interest is observed between 2008 and 2012, which can be explained by the start of the LHC operation and the discovery of the Higgs Boson, since both events are considered world-class. The video that recorded the highest views was uploaded in August 2008 (see Figure 4). It is a rap video recorded at CERN facilities by a group of CERN workers, directed by Katherine McAlpine[10]. The video aims to explain what a particle accelerator is in an entertaining way. It has had more than 8 million visits.

[9] The state of the Internet in q4 2018 report, https://wearesocial.com/blog/2018/10/the-state-of-the-internet-in-q4-2018

[10] Large Hadron Rap: https://www.youtube.com/watch?v=j50ZssEojtM

Figure 4: The most viewed, CERN/LHC related video on YouTube[11].

The number of views indicated by YouTube is unique. Multiple views are only accounted once. This does not mean that people have really watched the entire video. To take into account the common scenario of partial views, a progressive reduction factor was applied for each video based on its total duration. The reduction factors adopted in our analysis were taken from [5]. It is presented in Table 1.

[11] Video link (https://www.youtube.com/watch?v=j50ZssEojtM).

Table 1: Progressive reduction factor for partial views of YouTube videos.

Video Length	Reduction Factor
< 1 MIN	60%
1-2 MIN	50%
2-3 MIN	45%
3-4 MIN	35%
4-5 MIN	35%
5-10 MIN	35%
10-20 MIN	28%
20-30 MIN	19%
30-45 MIN	15%
45-60 MIN	10%
60+ MIN	9%

The discounted benefits of YouTube have been estimated from 2007 onwards, when the first video about CERN was uploaded to the platform, up to 2025 (last year of analysis based on an extrapolation from the available, historic data). Data in the timeframe 2018 to 2025 have been calculated by applying an average annual growth rate of views and minutes of 0.5%[12] (see Annex 8.4 page 39).

The annual benefit *B* of CERN video visits in euro was calculated as follows:

$$B_{Euro} = N_{views\ reduced} \times Duration_{video} \times Social\ Value\ of\ time\ (1\ \text{minute})$$

Further applying a social discount rate of 3% yearly, the **total conservative estimate of the benefit** obtained **between 2007 and 2025** for YouTube videos, **amounts to CHF 1.9 billion** (base year 2017). This corresponds to an average of 95 MCHF per year (Figure 5). The initially growing number of videos is no longer visible in the outlook until 2025 due to the application of the social discount factor.

[12] This rate was calculated by considering the R-squared value on chart number of videos per year (data between the years 2007-2017)

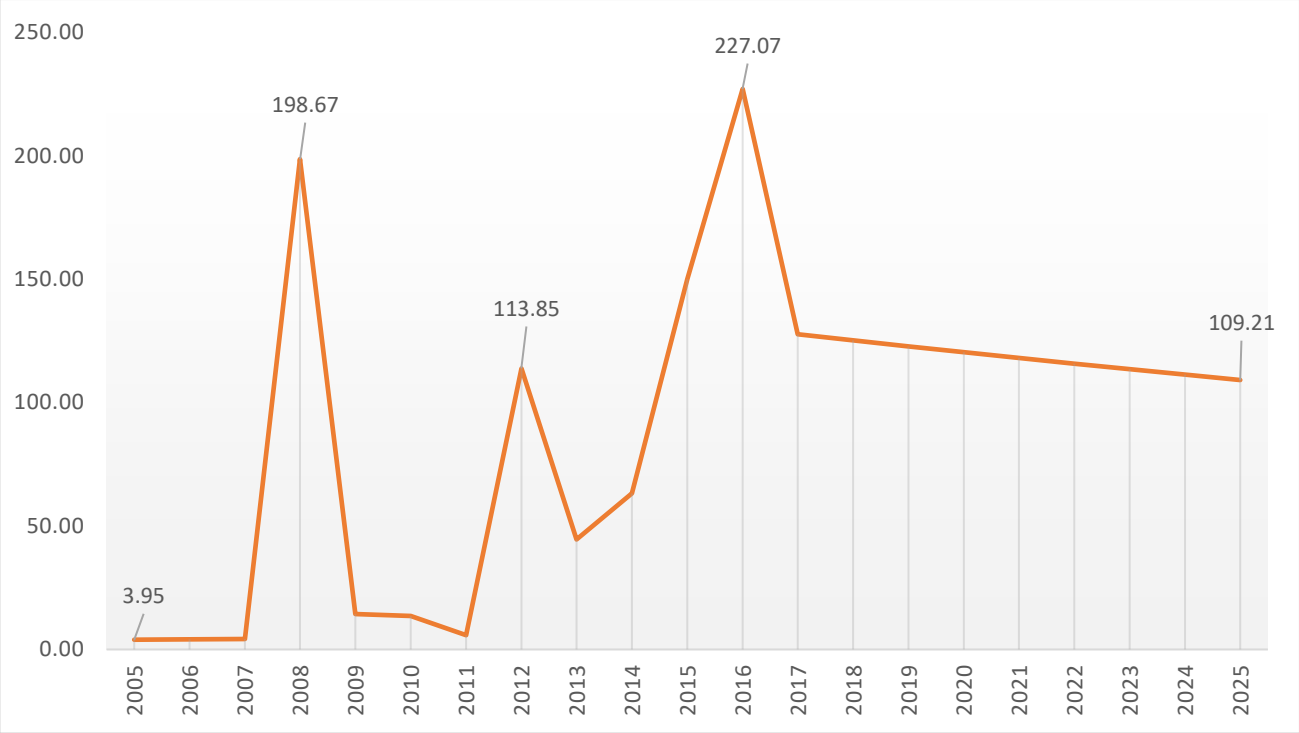

Figure 5: Cumulative discounted benefit of YouTube videos in MCHF.

3.2 SOCIAL MEDIA

Social networks, such as Facebook, Twitter and Instagram, have become widely used communication channels in society. This fact also confirms that the dissemination activities of CERN have increased in recent years thanks to the global adoption of these communication technologies. Any discovery or new information that is generated by the organisation becomes a topic of global interest in a few minutes due to dissemination through social networks.

The initial analysis of this type of information was carried out using historical data on the number of mentions through Facebook, Twitter, LinkedIn and Instagram from 2014 to 2017. The data were provided by the media and the press relations office of CERN (see Figure 6).

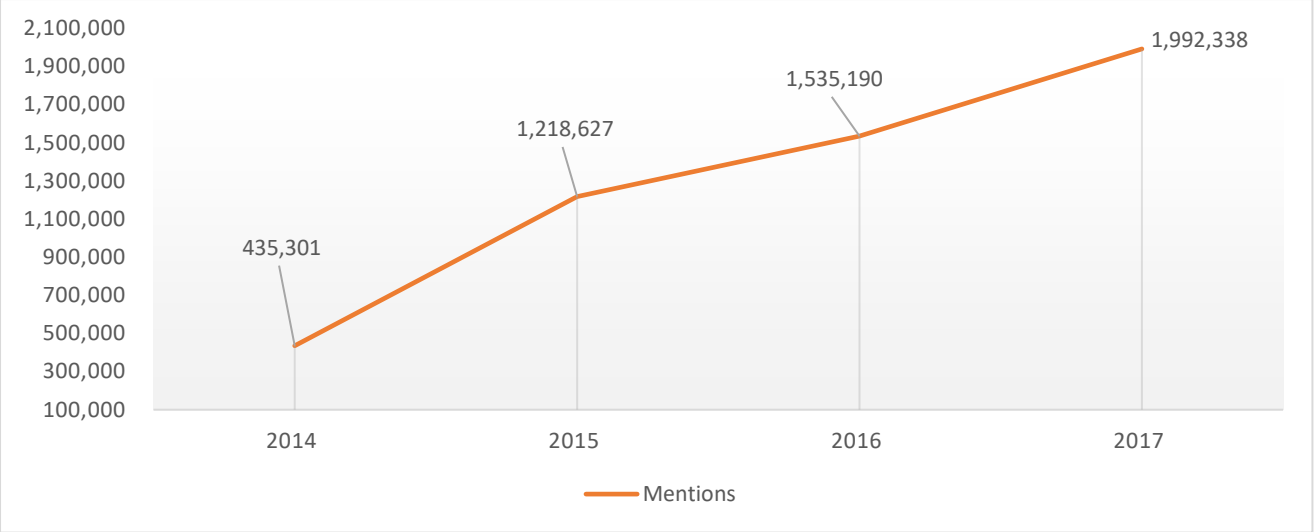

Figure 6: Number of mentions through social media.

Mentions are defined as comments provided by "users" of social networks, citing CERN or LHC. In compliance with our approach, data from the first year of launch of the social network has been taken into account.

Since these channels were launched in different years, 2008 is taken as the year in which the analysis begins. Data before 2014 and after 2018 were estimated assuming an average annual growth rate equal to the one recorded between 2015 and 2017, equivalent to 18% (2014 is excluded since in that year the social network experienced a significant increase). For the calculation, we assume that each visitor spent approximately 0.5 minutes to write a mention.

The annual benefit *B* of the "users" of social networks was calculated as follows:

$$B_{Euro} = N_{mentions} \times Writing_{mention} \times Social\ value\ of\ time(1\ minute)$$

The total estimated discounted benefit amounts to CHF 2.7 million (base year 2017) over the timeline 2008 to 2025. It is not possible to obtain data for the time frame before 2014. Therefore, it is worth pointing out that the estimated values in the time frame from 2008 to 2013 are most likely heavily underestimated. The results are shown in the figure 7.

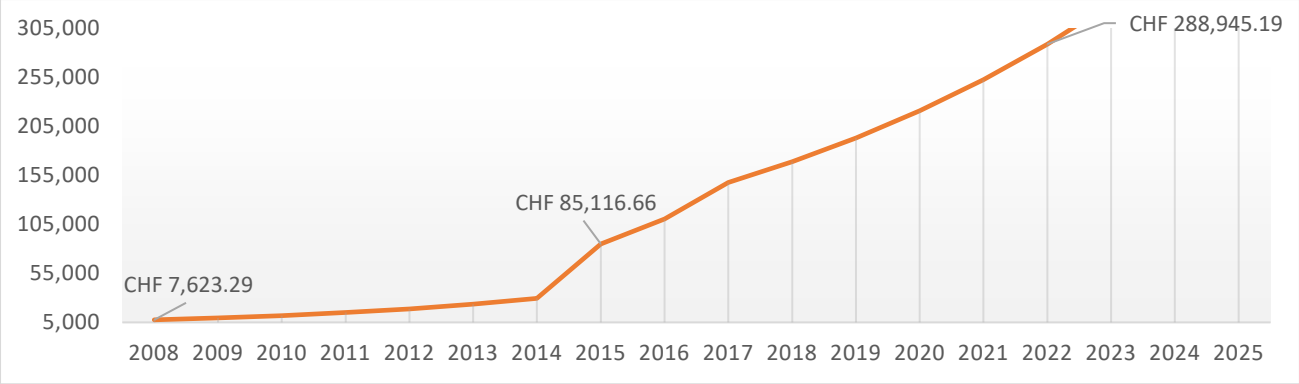

Figure 7: Benefit in CHF in Social Networks.

Social networks and YouTube are strongly related, since videos available on YouTube are often disseminated through social networks. This analysis has not included this data, due to the lack of systematic monitoring of this information. For an adequate analysis, the data for social networks, including the videos seen by anonymous visitors, would have to be adjusted and the effective time dedicated to the consumption of such tickets would have to be corrected to higher values. Therefore, estimates of current benefits should be considered highly conservative.

3.3 WEBSITES

Inasmuch as the World Wide Web was one of the greatest developments made by CERN and considering that today society could not conceive life without it, it has been considered appropriate to analyse the benefits generated by the websites of CERN as well as other collaborating entities.

CERN web pages are used for an infinite number of reasons, from a simple source of information to job search. For this purpose, the following have been evaluated:

- CERN main site
- Main sites of LHC experiments: ATLAS, ALICE, CMS and LHCb
- IPPOG[13] and CIEMAT[14]

Data on the number of visits to the web pages and the average time of the visit were obtained from historical web statistics, see Table 2. For each web page, we consider a different start year (for example, according to the launch of the experiment). To be prudent, it is assumed that the number of visits and the average time spent on each visit remains constant from 2018 onwards.

[13] IPPOG is a networking of scientists, communication specialists and science educators with 32 members and 4 candidates representatives: 26 countries (Australia, Austria, Belgium, Brazil, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom and United States of America), 5 experiments (Alice collaboration, Atlas collaboration, Belle II collaboration, CMS collaboration and LHCb collaboration), CERN and 4 candidates representatives (Bulgaria, Israel, South Africa and Germany's largest accelerator centre named DESY)

[14] CIEMAT is the Centre for Energy, Environmental and Technological Research is Spain. It is a public research organization collaborate with CERN in several projects.

Table 2: Web visitor statistics at CERN.

	2013	2014	2015	2016	2017
ALICE	n/a	n/a	40,470	144,943	156,430
ATLAS	n/a	n/a	2,296	393,125	559,324
CERN	4,667,659	6,366,057	8,633,143	6,142,340	6,592,573
LHCb	75,424	88,959	131,108	90,237	169,572
CMS	207,975	322,744	322,736	324,688	207,975
IPPOG	36,462	38,631	28,311	27,617	56,186
CIEMAT	513,327	484,887	475,449	518,292	445,423

The annual benefit of "visitors" was calculated as follows:

$$B_{Euro} = N_{visits} \times Time_{visit} \times Social\ value\ of\ time\ (1\ \text{minute})$$

The total estimated discounted benefit of the outreach activities through websites amounts to CHF 427 million (base year 2017) during the period 2000 to 2025. Since websites were launched at different times ranging from 2000 to 2008, the average yearly benefit is about 22.5 MCHF. Details are provided in the table 3.

Table 3: Discounted benefit of Web Sites (CHF) between the years 2000 and 2025

Experiment	Total Benefit in CHF (discounted)
ALICE	173,401
ATLAS	3,828,166
CERN	422,046,607
CMS	898,102
LHCb	97,230
TOTAL BENEFIT	**427,043,508**

4. ECONOMIC IMPACT OF ONSITE VISITORS

CERN is open to the public throughout the year free of charge. The organisation has created two permanent exhibitions (Microcosm and Universe of Particles, in the Globe of Science and Innovation, see Figure) to show the visitor the activities that are carried out within the facility and in the monumental high energy physics experiments and to take the visitor on a voyage deep into the world of particles and back in time to the Big Bang. At certain times of the year, the experiment at facilities are open to the public and guided tours are available.

Figure 8: The Globe of Science and Innovation (left) and the Microcosm exhibition (right) at CERN.

Using the Travel Cost Method[15], this study estimates the economic impact in the area from this type of visitor.

A prior study conducted by University of Milan (Italy) [1], showed the great economic impact produced by onsite visitors. Benefits for on-site visitors were estimated using the revealed preference method (2) based on the Marginal Social Value (MSV) of the time spent traveling to visit the LHC. Historical data for this initial study concerning onsite visitors (from 2004 to 2013) were provided by the CERN Education, Communication and Outreach Group and by each of the LHC experiment collaborations (ALICE, ATLAS, CMS, LHCb). Forecasts up to 2025 were obtained by extrapolating the figures with a constant yearly value, based on the trend observed in the previous years. An overlap of 80% between visitors to LHC experiment facilities and the permanent CERN exhibitions (Microcosm and Universe of Particles, in the Globe of Science and Innovation) was assumed. Therefore, only 80% of the total number visitors to CERN were attributed to the LHC/LHC programme. For the benefit estimation, the travel cost method was applied. Visitors were divided into three areas of origin

[15] George R. Parsons; A Primer on Nonmarket Valuation pp 269-329. The Travel Cost Method.

with increasing distance from CERN. An average travel cost was calculated for each zone, using the cost benchmarks of seven cities of origin and by assuming a combination of transport mode and duration of stay[16] .The economic value of the time that travellers spent was taken from HEATCO guidelines[17] for each CERN member state and for some non-member states. Based on the distribution of visitors by country and the mode of transportation, an overall distribution of visitors based on a probability density function was derived [4]. The results are shown in the table 4.

Table 4: Total benefits onsite CERN visitors, previous study

Total Benefits Onsite CERN visitors	
Benefit of visitors to CERN and experiments	1,178,936 €
Discounted benefit of visitors to CERN and experiments (base year 2013)	1,051,103 €

[16] The three zones and the share of visitors for each zone were based on data provided by the CERN Communication Group (personal communication October 2013); additional costs were estimated, including for accommodation and meals (data extracted from the CERN website).

[17] http://heatco.ier.uni-stuttgart.de/

4.1 Analysis methodology

The study presented in this document differs from the initial study in that is relies on actual observations of visitor spending with respect to travel, accommodation and onsite expenses. These data were obtained via a visitor survey that has been conducted over one year, from June 2018 to the end of May 2019. Results were obtained by analysing the responses of 900 form-based inquiries (see form in Annex 8.5 page 40). The forms were provided to the visitors who indicated their actual CERN visit related expenses before and during the travel. The survey was anonymous, only showing age group and country of origin of travel. If the response was for a group, the average values per person in that group were provided.

Several variables have been taken into account in this study:

- The calendar year of the study was divided into two parts. One part was from June 1 to September 31, 2018 and the second part was from October 1, 2018 to May 31, 2019. In this way, it was possible to analyse the expenditures with respect to seasons and holiday periods.
- Two different scenarios were analysed:
    - Scenario 1: Visitors come to CERN, because it is the purpose of the trip.
    - Scenario 2: Visitors come to CERN as a consequence of travelling to the area.
- Onsite visitors have been divided into two categories: group and individual trips.
- Group visitors are those who have registered to have a guided tour. These people are identified and associated with scenario 1.
- Individual visitors are those who have not registered to attend a guided tour. These people are unidentified and are associated with scenario 2.
- The total annual number of individual visitors in scenario 1 is known and was provided by the CERN visitors department. Consequently, for this scenario, an extrapolation of the results to the total cumulative benefit generated by the cohort of all registered visitors in one year was performed.

- The total annual number of individuals in scenario 2 is not known. Each survey was analysed as a single visitor and no extrapolation to the annual cohort of individual, unregistered visitors was performed. Consequently, for this scenario, only a largely underestimated result based on the responses of the available filled in survey forms is presented in this study.
- Average values for the different individual expenditures of visitors (e.g. tram tickets, hotels, souvenirs) were calculated based on the supplied information.

4.2 Scenario 1 - Groups

In this scenario, it is assumed that people who register to attend a guided tour at CERN travel to the area for this purpose. In this case, the total economic expenditure by visitors is accounted. The methodology used to obtain the benefit of the economic impact in the region is carried out for each country of origin, obtaining the number of visitors per country from the database of CERN's visitors department. This database contains the numbers of all visitors with their country of origin. However, the typical average expenditures of visitors during their trip is only known for a subset of countries, since the survey covered only visitors from a fraction of countries. The total expenditures of visitors from the missing countries were obtained by extrapolating the average per person expenditure of visitors from adjacent countries, which had provided data and multiplying this figure with the known number of visitors from that country. The extrapolation was performed according to the parameters used in the previous study conducted by University of Milan.

There are two tables in Annex 8.6 on page 41 – 45, showing the number of visitors during the two seasons of the year and their country of origin. The calculation of the benefit of the economic impact produced has been calculated as follows:

The survey responses were transferred to a spreadsheet, in order to facilitate the calculation of the benefit. First, the averages of the individual expenses indicated in the survey responses were calculated. In the case of daily food and transport, the actual prices of a meal or the tram ticket were taken into account. Daily transport costs in many responses were indicated to be zero, because the hotels give a free transport card for visitors. Then the following formula was applied to obtain the expenditure *E* per survey response, based on the average values for each category:

$$E_{Euro} = \left(Days \times Food_{daily}\right) + \left(Days \times Transport_{daily}\right) + Acoomodation + Tickets + Visit_{museum,exhibition,etc} + Souvenirs$$

In order to obtain the total benefit by country, the average of the responses by country was calculated. In this way an expense was obtained for each country, accounting for the several responses which were obtained for each country. Finally, these values were extrapolated to countries for which there was no data. The results are shown in figure 9.

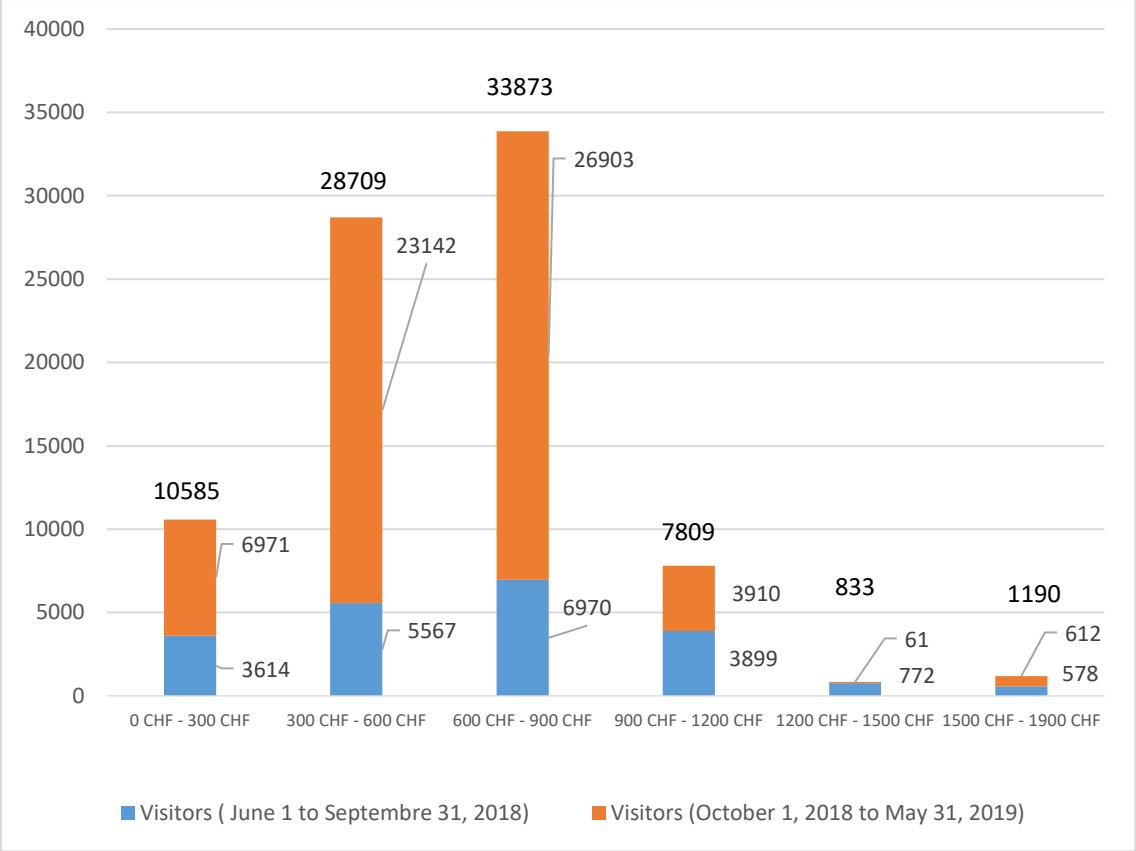

Figure 9: Spending categories of visitors indicating the differences between summer and winter.

Table 5: Total spending by onsite CERN visitors, scenario 1

Total spending by onsite CERN visitors	
June 1 to September 31, 2018	15,088,976.52 CHF
October 1, 2018 to May 31, 2019	38,132,244.42 CHF
Total	**53,221,220.94 CHF**

These results suggest that spending is higher during the winter, because the number of visitors is greater in the winter season, since a large fraction of the visitor groups come from high schools.

4.3 Scenario 2 - Individuals

Calculation of the potential benefit in this case, was almost the same as in scenario 1, the only difference being that the expenses have not been fully accounted for the analysis. These visitors are assumed to come to CERN as a consequence of having travelled to the area for other reasons. In this category, a reduction factor of 50% has been applied to the expenditure of individual visitors.

The factor of 50% has been chosen, since, in discussions with the guides of CERN who receive these visitors, it was determined that people who did not know that CERN was in the area account for 5 out of 10 individuals. The estimated results of the potential benefit are shown in Table 6.

Table 6: Total spending onsite CERN visitors, scenario 2

	TOTAL SPENDING	REDUCTION FACTOR APPLIED	TOTAL SPENDING WITH REDUCTION FACTOR APPLIED
June 1 to September 31, 2018	240,087.90 CHF	50%	120,940.50 CHF
October 1, 2018 to May 31, 2019	234,856.10 CHF	50%	117,428.05 CHF
Total	**476,737.10 CHF**	**50%**	**237,472.00 CHF**

The total estimated spending by onsite CERN visitors during a year is 53,4 MCHF. These results are very conservative, because not all CERN visitors have responded to the survey.

5. CONCLUSIONES

Muchas personas ni siquiera saben que, sin el CERN, la World Wide Web nunca podría haber existido, o que debido a la terapia de hadrones que se ha promovido en la organización, ahora hay formas menos agresivas para tratar el cáncer con una mayor tasa de éxito. Por lo tanto, vale la pena estudiar y documentar la devolución de la contribución de los contribuyentes a esta infraestructura de investigación.

En este trabajo, se analizó, cuantificó y pronosticó un subconjunto de impactos socioeconómicos relacionados con las redes sociales y los visitantes en el sitio hasta 2025. Los beneficios calculados en este estudio son solo un pequeño ejemplo de los beneficios reales de poseer una infraestructura de investigación de este calibre.

Tabla: Beneficio total descontado del Impacto socio – económico producido

	Beneficio descontado
YouTube	1,907,771,970.07 CHF
Redes Sociales	2,724,419.03 CHF
Páginas Web	427,043,508.99 CHF
Visitantes Escenario 1	53,459,589.49 CHF
Visitantes Escenario 2	237,472.00 CHF
Beneficio total	**2,391,236,959.58 CHF**

Esta investigación tiene tres conclusiones importantes:

1 - El impacto social directo producido a través del uso de las redes sociales parece bajo en comparación con el producido a nivel mundial. Esto puede estar relacionado con el hecho de que hasta ahora, el estudio no cubrió los impactos adicionales generados a través de las respuestas, los comentarios realizados en otras plataformas, como blogs o sitios web, y la vinculación de la información. Por lo tanto, los resultados obtenidos deben interpretarse como un impacto muy conservador. Se recomienda extender el análisis de impacto de esta área, para incluir estos efectos.

2 - Realizando un análisis estadístico de los resultados del gasto producido por los visitantes en el sitio, se ha determinado que estos datos siguen una "distribución kernel", que puede usarse en futuros estudios para obtener una extrapolación de los datos, y estimar los futuros impactos económicos en esta área.

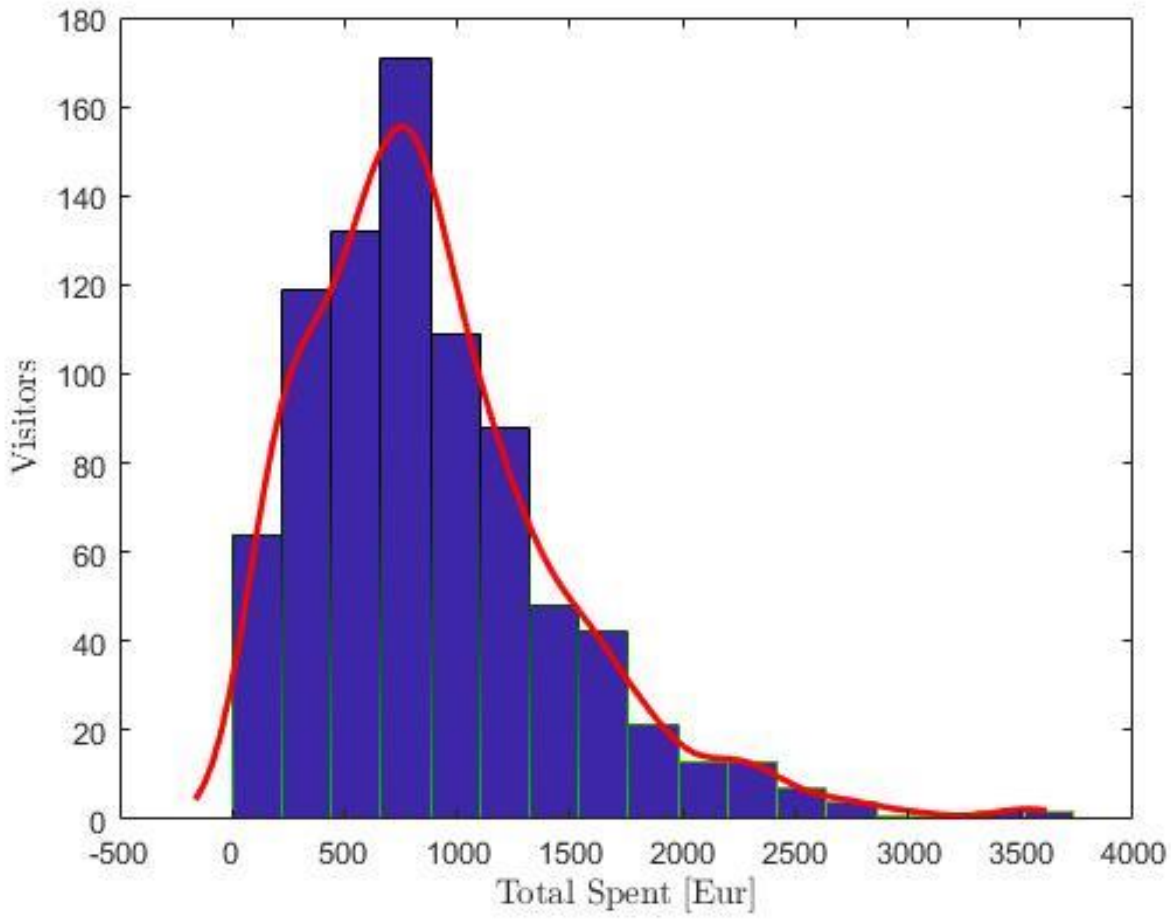

Figura: Distribución kernel sobre el gasto de los visitantes del CERN in situ.

3 - La última conclusión del estudio se refiere a la calidad de la base de datos de visitantes disponibles en la organización. El CERN tiene un registro completo de todas las visitas concertadas, pero no de los visitantes individuales que no se han registrado en una visita oficial antes de llegar al CERN. Esto hace que sea difícil obtener el impacto económico real producido por el gasto de los visitantes. Esta situación debe corregirse mediante la introducción de un registro simple para cada visitante individual en el CERN, de modo que se pueda realizar una contabilidad exhaustiva de todas las personas que visitan el CERN para fines de análisis estadístico.

6. CONCLUSIONS

Many people do not even know that without CERN, the World Wide Web may never have existed, or that due to the hadron therapy that has been promoted here, there are now less aggressive ways to treat cancer with a higher success rate. Therefore, it is worth studying and documenting the return of taxpayers' contribution to this research infrastructure.

In this work, a subset of socio-economic impacts concerning social media and onsite visitors have been analysed, quantified and forecast until 2025. The benefits calculated in this study are only a small example of the actual benefits of owning a research infrastructure of this calibre.

Table 7: Total discounted benefit Impact Pathways

Impact Pathway	Discounted Benefit
YouTube	1,907,771,970.07 CHF
Social Media	2,724,419.03 CHF
Web Sites	427,043,508.99 CHF
Visitors Scenario 1	53,459,589.49 CHF
Visitors Scenario 2	237,472.00 CHF
Total Benefit	**2,391,236,959.58 CHF**

This research has led to three important conclusions:

1 – The direct social impact produced through social-media use seems low compared to the echo produced at global level. This can be linked to the fact that so far, analysis did not cover the additional impacts generated through replies, comments made on other platforms such as blogs or websites and cross-linking of information. Therefore, the obtained results must be interpreted as a very conservative impact. It is strongly recommended to extend the impact analysis of this impact pathway to include the effects of cross-linking.

2 - Performing a statistical analysis of the results of the spending produced by the onsite visitors, it has been determined that these data follow a “kernel distribution” (Figure 10), that can be used in future studies to obtain an extrapolation of the data to estimate the future economic impacts in this area.

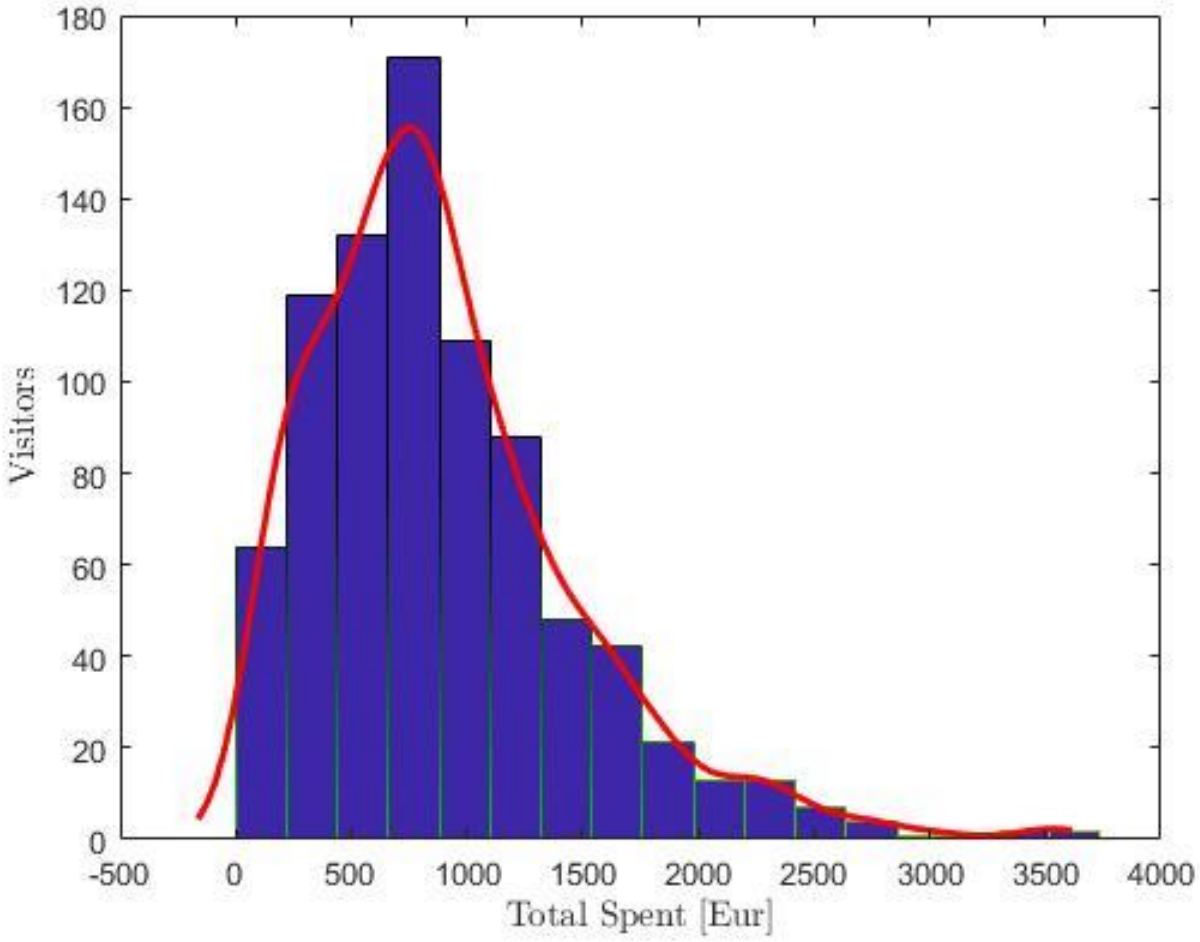

Figure 10: Kernel distribution onsite CERN visitors spending

3 – The last conclusion of the study concerns the completeness and quality of available onsite visitor data. CERN has a complete record of all concerted visits, but not of individual visitors who have not registered an official visit before coming to CERN. This has makes it difficult to obtain the actual economic impact produced by visitor spending. This situation should be corrected by introducing a simple registration for each individual visitor at CERN so that a comprehensive accounting of all persons visiting CERN can be done for statistical analysis purposes.

7. REFERENCES

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8. ANNEX

1. Value of time in monetary terms

The following table shows the methodology used to obtain the value of time per minute employed in the study.

Countries	(€ per minute, 2017 prices)	Total population	€/min * Total population
Austria	0.15	7,545,591.00	1,131,838.65
Belgium	0.14	9,437,231.00	1,321,212.34
Bulgaria	0.05	6,053,846.00	302,692.30
Czech Rep	0.09	8,964,444.00	806,799.96
Denmark	0.15	4,814,237.00	722,135.55
Finland	0.14	4,613,065.00	645,829.10
France	0.13	54,755,982.00	7,118,277.66
Germany	0.14	71,539,066.00	10,015,469.24
Greece	0.1	9,226,998.00	922,699.80
Hungary	0.07	8,381,214.00	586,684.98
Italy	0.12	52,379,345.00	6,285,521.40
Netherlands	0.16	14,329,793.00	2,292,766.88
Norway	0.22	4,344,522.00	955,794.84
Poland	0.07	32,324,445.00	2,262,711.15
Portugal	0.09	8,892,550.00	800,329.50
Slovakia	0.08	4,604,978.00	368,398.24
Spain	0.12	39,742,475.00	4,769,097.00
Sweden	0.15	8,298,087.00	1,244,713.05
Switzerland	0.17	7,194,840.00	1,223,122.80
UK	0.13	54,409,373.00	7,073,218.49
Total	**2.47**	**411,852,082**	**50,849,312.93**

Value of time €/min = 50,849,312.93 / 411,852,082 = 0.1234 ~ 0.13

Values of time are derived from [7] until 2010. These values were updated to 2017, using the increase in the CPI (Consumer Prices Index) between 2010 to 2017.

It should be noted that countries such as the United States, Brazil, Russia, Japan, and India, which have the largest number of YouTube users, are not included in this calculation, because YouTube does not provide the views made by countries. The election was done taking into account only the member countries of CERN to make it as equanimous as possible.

2. Video redaction factor

Several studies have found that video viewing is proportionally related to its duration. The following table shows the reduction factor applied.

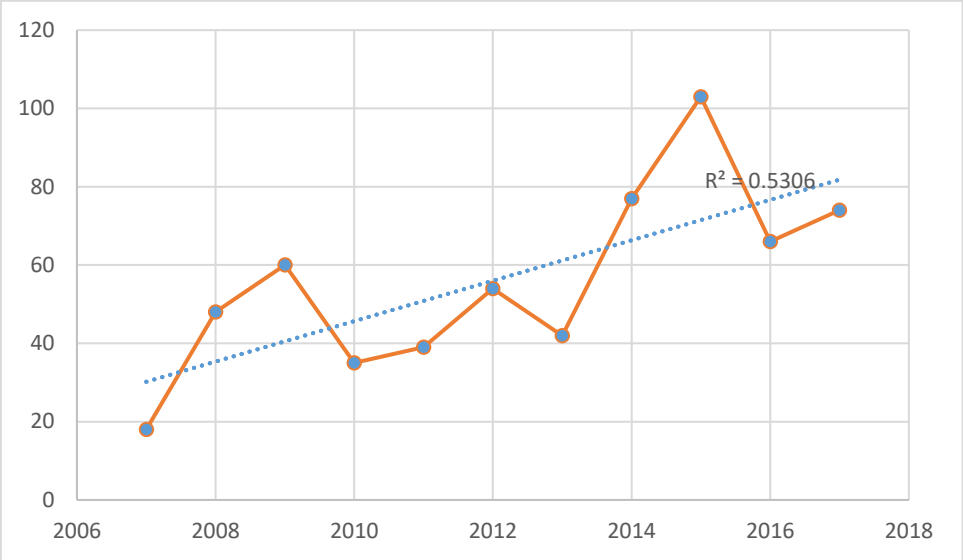
Video duration	Reduction factor
< 1 MIN	60%
1-2 MIN	50%
2-3 MIN	45%
3-4 MIN	35%
4-5 MIN	35%
5-10 MIN	35%
10-20 MIN	28%
20-30 MIN	19%
30-45 MIN	15%
45-60 MIN	10%
60+ MIN	9%

3. LHC and CERN YouTube videos and their viewers.

Year	Number of videos	Number of viewers	Duration of videos per year (min)
2007	18	1,173,467.00	84.06
2008	48	12,551,069.00	396.38
2009	60	1,065,962.43	328.06
2010	35	2,426,585.00	154.55
2011	39	327,446.00	450.37
2012	54	8,441,822.00	593.12
2013	42	1,355,750.00	705.65
2014	77	1,992,482.00	914.93
2015	103	3,773,252.00	862.77
2016	66	4,603,369.23	992.32
2017	74	1,770,141.00	1,657.75
Total	**616**	**39,481,345.66**	**7,139.96**

Source: Data gathered directly from YouTube platform accessed in June 2018

4. **The R- squared value on chart number of videos per year (data between the years 2007 – 2017)**



5. Survey on CERN visitors' travel costs for a Cost Benefit Analysis study of Research Infrastructures

Thank you for filling in this survey, which will help CERN estimate the socio-economic impact of its activities, including on those who visit our exhibitions and take our guided tours. **This survey is anonymous. The information provided will be processed by CERN personnel only. In case you answer for a group, give the average values per person.** Once filled in, please drop your questionnaire in the box at the Guided Tours reception.

Your age:				
☐ < 18	☐ 18 - 25	☐ 26 - 35	☐ 36 - 65	☐ > 65

Country of travel origin:	

How many days does your visit in the region last?			
☐ 1 day	☐ 1 – 3 days	☐ 4 – 7 days	☐ > 7 days

How did you travel to CERN?			
☐ Bus	☐ Train / tram	☐ Plane	☐ Car / taxi

How far did you travel to get to CERN?			
☐ less than 50 km	☐ 50 – 500 km	☐ 501 – 1500 km	☐ > 1500 km

How much did you spend on accommodation?				
☐ 0 €	☐ up to 100 €	☐ up to 200 €	☐ up to 500 €	☐ > 500 €

How much did you spend on the travel (tickets, fuel, toll, etc.)?			
☐ up to 50 €	☐ up to 100 €	☐ up to 500 €	☐ > 500 €

How much do you spend daily on transport in the region?			
☐ 0 €	☐ up to 10 €	☐ up to 20 €	☐ > 20 €

How much do you spend daily on drinks and food in the region?			
☐ 0 €	☐ up to 70 €	☐ up to 150 €	☐ > 150 €

How much do you spend on visiting other sites (museum, exhibition…)?				
☐ 0 €	☐ up to 50 €	☐ up to 100 €	☐ up to 200 €	☐ > 200 €

How much do you spend on souvenirs?				
☐ 0 €	☐ up to 50 €	☐ up to 100 €	☐ up to 200 €	☐ > 200 €

Where do you mostly spend the money (including transport, accommodation, and food)?		
☐ France	☐ Switzerland	☐ I do not know

6. Survey Results by Country

5.1 SCENARIO 1

Group - June 1 to September 31, 2018

Country	Average spending per visitor	Visitors	Total Spending
Arab Emirates	732.70 CHF	22	16,119.40 CHF
Argentina	1,122.50 CHF	13	14,592.50 CHF
Australia	716.70 CHF	137	98,187.90 CHF
Austria	1,200.02 CHF	213	255,604.26 CHF
Belgium	616.25 CHF	77	47,451.25 CHF
Brazil	1,122.50 CHF	108	121,230.00 CHF
Bulgaria	1,882.00 CHF	245	461,090.00 CHF
Canada	897.00 CHF	18	16,146.00 CHF
China	856.55 CHF	184	157,605.20 CHF
Cyprus	597.00 CHF	70	41,790.00 CHF
Czech Republic	547.70 CHF	568	311,093.60 CHF
Denmark	488.52 CHF	130	63,507.60 CHF
USA	1,425.00 CHF	260	370,500.00 CHF
Finland	1,150.00 CHF	85	97,750.00 CHF
France	413.80 CHF	2108	872,290.40 CHF
Georgia	597.00 CHF	2	1,194.00 CHF
Germany	459.60 CHF	2009	923,336.40 CHF
Greece	1,172.13 CHF	1018	1,193,228.34 CHF
Haiti	1,122.50 CHF	6	6,735.00 CHF
Hong Kong	724.40 CHF	97	70,266.80 CHF
Hungary	1,882.00 CHF	97	182,554.00 CHF
India	732.70 CHF	164	120,162.80 CHF
Ireland	878.50 CHF	18	15,813.00 CHF
Israel	597.00 CHF	143	85,371.00 CHF
Italy	942.50 CHF	2127	2,004,697.50 CHF
Japan	724.40 CHF	69	49,983.60 CHF
Korea	737.50 CHF	136	100,300.00 CHF
Kosovo	1,882.00 CHF	6	11,292.00 CHF

Latvia	1,162.50 CHF	7	8,137.50 CHF
Lithuania	1,162.50 CHF	57	66,262.50 CHF
Macedonia	1,882.00 CHF	3	5,646.00 CHF
Malta	942.50 CHF	9	8,482.50 CHF
Mexico	1,122.50 CHF	41	46,022.50 CHF
Nepal	732.70 CHF	15	10,990.50 CHF
Netherlands	753.00 CHF	296	222,888.00 CHF
New Zealand	716.70 CHF	12	8,600.40 CHF
Norway	1,150.00 CHF	182	209,300.00 CHF
Pakistan	732.70 CHF	52	38,100.40 CHF
Poland	754.20 CHF	874	659,170.80 CHF
Portugal	265.00 CHF	321	85,065.00 CHF
Romania	1,882.00 CHF	18	33,876.00 CHF
Russia	754.20 CHF	10	7,542.00 CHF
Senegal	732.70 CHF	1	732.70 CHF
Serbia	1,882.00 CHF	13	24,466.00 CHF
Singapore	716.70 CHF	51	36,551.70 CHF
Slovakia	1,292.60 CHF	149	192,597.40 CHF
Slovakia	1,882.00 CHF	196	368,872.00 CHF
Slovenia	1,200.02 CHF	150	180,003.00 CHF
South Africa	732.70 CHF	20	14,654.00 CHF
Spain	724.84 CHF	888	643,657.92 CHF
Surinam	1,122.50 CHF	2	2,245.00 CHF
Sweden	1,150.00 CHF	244	280,600.00 CHF
Switzerland	165.50 CHF	3293	544,991.50 CHF
Taiwan	856.55 CHF	9	7,708.95 CHF
Turkey	597.00 CHF	537	320,589.00 CHF
United Kingdom	878.50 CHF	3784	3,324,244.00 CHF
Ukraine	754.20 CHF	33	24,888.60 CHF
Zambia	732.70 CHF	3	2,198.10 CHF
TOTAL			**15,088,976.52 CHF**

Group October 1, 2018 to May 31, 2019

Country	Average spending per visitor	Visitors	Total spending
Arab Emirates	984	74	72,816.00 CHF
Argentina	729	7	5,103.00 CHF
Armenia	984	7	6,888.00 CHF
Aruba	729	12	8,748.00 CHF
Australia	1353	61	82,533.00 CHF
Austria	1098.2	951	1,044,388.20 CHF
Azerbaijan	984	25	24,600.00 CHF
Belgium	393.5	743	292,370.50 CHF
Bolivia	729	6	4,374.00 CHF
Bosnia	585	73	42,705.00 CHF
Brazil	729	169	123,201.00 CHF
Bulgaria	432	272	117,504.00 CHF
Cameroon	984	2	1,968.00 CHF
Canada	1764	209	368,676.00 CHF
Chile	729	41	29,889.00 CHF
Colombia	729	26	18,954.00 CHF
Croatia	585	282	164,970.00 CHF
Cyprus	984	2	1,968.00 CHF
Czech Republic	681.6	830	565,728.00 CHF
Denmark	792.7	670	531,109.00 CHF
USA	729	940	685,260.00 CHF
Egypt	984	16	15,744.00 CHF
Estonia	1015.5	8	8,124.00 CHF
Finland	1015.5	530	538,215.00 CHF
France	197.4	6971	1,376,075.40 CHF
Georgia	984	70	68,880.00 CHF
Germany	681.6	3564	2,429,222.40 CHF

Greece	728.13	5773	4,203,494.49 CHF
Guatemala	729	4	2,916.00 CHF
Hong-Kong	1523	21	31,983.00 CHF
Hungary	552	185	102,120.00 CHF
India	646.1	255	164,755.50 CHF
Indonesia	1523	24	36,552.00 CHF
Ireland	556	65	36,140.00 CHF
Israel	984	425	418,200.00 CHF
Italy	491.85	12322	6,060,575.70 CHF
Japan	1523	117	178,191.00 CHF
Kazakhstan	1641	128	104,370.00 CHF
Kenya	984	2	1,968.00 CHF
Korea	1523	191	290,893.00 CHF
Kuwait	984	19	18,696.00 CHF
Latvia	1015.5	61	61,945.50 CHF
Lebanon	984	13	12,792.00 CHF
Lithuania	1015.5	99	100,534.50 CHF
Luxemburg	393.5	65	25,577.50 CHF
Macedonia	728.13	57	41,503.41 CHF
Malaysia	646.1	32	20,675.20 CHF
Malta	491.85	39	19,182.15 CHF
Mexico	729	40	29,160.00 CHF
Monaco	491.85	16	7,869.60 CHF
Morocco	984	22	21,648.00 CHF
Nepal	646.1	12	7,753.20 CHF
Netherlands	718.5	1667	1,197,739.50 CHF
Norway	792.7	1014	803,797.80 CHF
Oman	984	2	1,968.00 CHF
Pakistan	984	20	19,680.00 CHF

Palestinian	984	7	6,888.00 CHF
Paraguay	729	5	3,645.00 CHF
Poland	681.6	1462	996,499.20 CHF
Portugal	888.5	1362	1,210,137.00 CHF
Qatar	984	2	1,968.00 CHF
Reunion	984	6	5,904.00 CHF
Romania	432	54	23,328.00 CHF
Russia	821.35	261	214,372.35 CHF
San Marino	491.85	32	15,739.20 CHF
Saudi Arabia	984	2	1,968.00 CHF
Senegal	984	2	1,968.00 CHF
Serbia	432	8	3,456.00 CHF
Singapore	1523	48	73,104.00 CHF
Slovakia	585	998	583,830.00 CHF
Slovenia	585	354	207,090.00 CHF
South Africa	984	57	56,088.00 CHF
Spain	799.3	1904	1,521,867.20 CHF
Sri Lanka	646.1	2	1,292.20 CHF
Swaziland	984	41	40,344.00 CHF
Sweden	982.5	537	527,602.50 CHF
Switzerland	599.1	7592	4,548,367.20 CHF
Taiwan	1523	2	3,046.00 CHF
Tunisia	984	27	26,568.00 CHF
Turkey	984	819	805,896.00 CHF
United Kingdom	681.41	6722	4,580,438.02 CHF
Ukraine	432	42	18,144.00 CHF
TOTAL			**38,132,244.42 CHF**

5.2 SCENARIO 2

Individual - June 1 to September 31, 2018

Country	Total spending
Algeria	3,437.60 CHF
Argentina	1,472.00 CHF
Australia	10,529.10 CHF
Austria	9,213.00 CHF
Belgium	145.00 CHF
Brazil	653.00 CHF
Canada	21,833.00 CHF
Chile	1,315.50 CHF
China	2,315.50 CHF
Costa Rica	1,220.00 CHF
Czech Republic	948.00 CHF
Denmark	1,967.90 CHF
USA	55,572.00 CHF
Finland	1,500.00 CHF
France	6,980.30 CHF
Germany	9,347.10 CHF
Greece	3,992.60 CHF
Hungary	2,158.80 CHF
India	3,786.50 CHF
Indonesia	982.50 CHF
Iran	1,448.00 CHF
Ireland	2,721.00 CHF
Israel	3,859.50 CHF
Italy	7,284.00 CHF
Japan	2,879.00 CHF
Kazakhstan	1,455.00 CHF
Korea	1,012.10 CHF
Latvia	927.00 CHF
Mexico	1,012.50 CHF
Netherlands	2,581.50 CHF
New Zealand	2,726.00 CHF
Norway	1,758.00 CHF
Poland	3,584.50 CHF
Portugal	1,790.00 CHF
Republic of Korea	1,125.00 CHF

Republic of Mauritius	702.00 CHF
Romania	1,613.10 CHF
Singapore	1,924.40 CHF
Slovakia	782.50 CHF
Slovenia	345.50 CHF
South Africa	5,724.50 CHF
Spain	10,003.10 CHF
Sri Lanka	960.00 CHF
Sweden	1,862.00 CHF
Switzerland	4,757.90 CHF
Turkey	4,432.20 CHF
Ukraine	1,445.00 CHF
United Arab Emirates	3,592.00 CHF
United Kingdom	25,064.20 CHF
TOTAL	**240,087.90 CHF**

Individual October 1, 2018 to May 31, 2019

Country	Total spending
Argentina	1,315.50 CHF
Australia	11,561.50 CHF
Austria	2,958.00 CHF
Belgium	3,549.00 CHF
Brazil	2,076.90 CHF
Bulgaria	2,390.00 CHF
Canada	16,182.10 CHF
China	1,207.10 CHF
Colombia	870.00 CHF
Costa Rica	882.00 CHF
Czech Republic	815.00 CHF
Denmark	1,967.90 CHF
USA	60,283.00 CHF
Finland	4,143.50 CHF
France	8,455.30 CHF
Germany	18,264.6 CHF
Greece	8,146.60 CHF
Hungary	2,039.90 CHF
India	3,809.6 CHF
Ireland	259.00 CHF
Italy	7,009.00 CHF
Japan	1,319.00 CHF
Lithuania	574.40 CHF
Mexico	2,183.00 CHF
Netherlands	2,746.50 CHF
New Zealand	1,144.40 CHF
Norway	5,069.00 CHF
Pakistan	1,837.60 CHF
Philippines	2,840.00 CHF
Poland	1,397.50 CHF
Republic of Belarus	1,022.00 CHF
Republic of Korea	2,727.00 CHF
Romania	877.10 CHF
Russia	838.8 CHF
Singapore	2,835.00 CHF
Slovakia	782.50 CHF

Slovenia	655.00 CHF
Spain	10,794.30 CHF
Sweden	842.20 CHF
Switzerland	5,863.40 CHF
Turkey	615.00 CHF
Ukraine	3,152.50 CHF
United Kingdom	28,485.80 CHF
TOTAL	**234,856.10 CHF**