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The value of open data and use cases

Alicia León Molina

Generalitat de Catalunya

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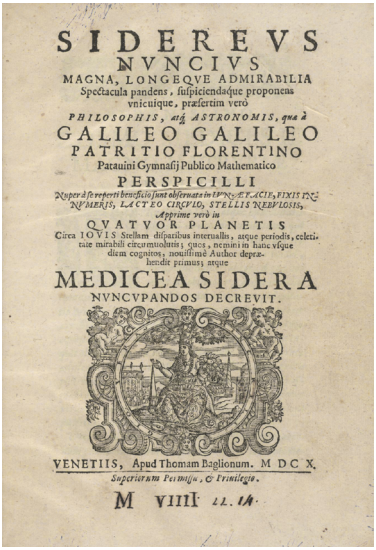
Prologue
The *Sidereus Nuncius* and the value of open data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In March 1610, Galileo published the *Sidereus Nuncius* (the 'Sidereal Messenger') and for the first time showed the world observations of the surface of the Moon and the famous four moons of Jupiter. The two discoveries were the first to empirically contradict the Aristotelian view of the world and the universe around us.

Firstly, the moon showed irregularities; it was clearly a corruptible sphere and, therefore, the objects that flew over the Earth were not as perfect as was thought according to the accepted model established in Ancient Greece. Secondly, the path of Jupiter's 'stars' showed that they revolved around the planet and not the Earth, thus disproving the geocentric model.

But apart from the profound impact these observations had in the progress of modern astronomy and, more generally, the birth of the scientific revolution and modern science, the speed with which Galileo published the observations openly, and the rigour and detail with which he described and visualised the observational data in the *Sidereus Nuncius*, is remarkable. As Gingerich and Van Helden explain, the Moon observations published in the *Sidereus Nuncius* began on 30 November 1609 and ended on 2 March 1610, while the observations of Jupiter were made in January 1610. On 13 March 1610 the *Sidereus Nuncius* was published in New Latin in the Republic of Venice (Italy). As well as

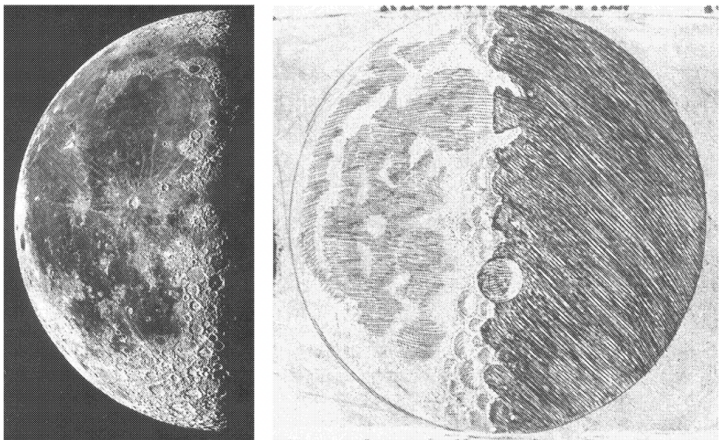


Figure 1: (a) photograph of the Moon in the last quarter from the Lick Observatory, and (b) engraving of the Moon in the last quarter, as it appears in the *Sidereus Nuncius* [source: Gingerich and Van Helden, 2003].[i]

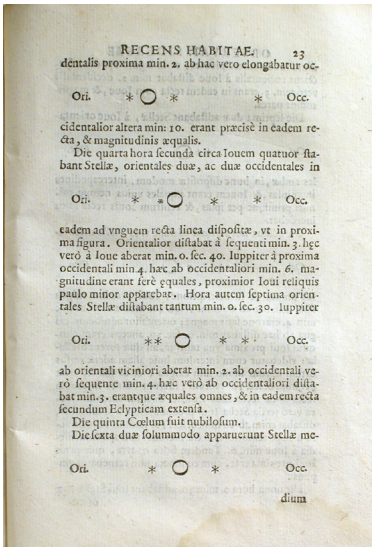
its scientific importance, the publication is a work of art, as can be seen in Figure 1, written in clear, attractive prose (Figure 2).

What is the relevance of the *Sidereus Nuncius* in the context of open data in the 21st century? First and foremost, it was the first modern publication of *open observational data*. The value of the data became apparent within a few months, when the astronomer Johannes Kepler reused it to confirm new observations with a more powerful telescope and they served as the empirical foundations for new models that would provide extraordinary understanding of the universe in which we live.

Open data in the 21st century is data from observations, facts and experiments published openly to make it accessible to the public, which can be reused to help obtain a better understanding of ourselves and the country and world we live in. When we understand ourselves and our surroundings objectively (while also being aware of the difficulties

[i] Gingerich and Van Helden: "From *occhiale* to Printed Page: The Making of Galileo's *Sidereus nuncius*". *Journal for the History of Astronomy*, 2003.

in doing so) we can make better decisions and be better prepared to face challenges. And when this objective, quality information is available to more people, its value is multiplied: there emerge new models to explain the universe (such as the *Sidereus Nuncius* and its impact) or new applications for the public to use, such as the case of the open data on London's public transport, which is just one of the examples in this volume you hold in your hands.



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Ori. * ○ * * Occ.

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Figure 2: Galileo's drawings of Jupiter and its Medicean stars in the *Sidereus Nuncius*. Image courtesy of the History of Science collections, University of Oklahoma Libraries.

Furthermore, the *Sidereus Nuncius* is relevant to open data today because it helps us grasp the importance of explaining data in detail, rigorously and understandably, using attractive images, and of providing quality datasets.

Galileo's unique legacy is one we would like to follow with humility, with examples such as the publication of this book, always sharing data of value to the public and humanity and doing so in the most comprehensible way possible.

Mercè Crosas i Navarro
Secretary for Open Government

About this work

Volume 8 of the Open Government series, which focuses on the value of open data through examples from around the world, was released in early 2022, the ideal moment for its publication.

The COVID-19 experience has transformed our understanding of the value of proposals and activities related to open government. Open data, in particular, and sharing knowledge, in general, have been essential tools during the pandemic, facilitating: 1) rapid, large-scale coordination in many areas of society; 2) the proposal, development and adjustment of data-driven public policy; and 3) more transparent explanations of the course of the pandemic on a daily basis, providing detail not only at the municipal level, but even for specific hospitals and schools. Can you imagine what the situation would have been like without open data? It is probably better not to think about it.

Management of the pandemic has laid the groundwork for a cultural and institutional shift in how we deal with complex, shared challenges from now on: what is needed is a public-private-civic partnership based on openness and data-sharing. Failure to do so would mean action based on non-collaborative logic, which we must now consider a thing of the past.

Whether dealing with the climate emergency, its prevention and the knowledge of its impact, addressing the needs of the labour market in terms of recruitment, wages or training, or optimising mobility in the metropolitan area and throughout Catalonia, we need data. We need open data. We need shared data. We need data that is up to date and broken down as far as possible.

Can you imagine meeting these challenges without having a central role for open data and collaboration? Unfortunately, this does not take much imagination. We certainly still have some way to go. We can set out on this path together on a firm footing and with the shared experiences and trauma of recent months.

The cases included in this publication illustrate the value of open data for a wide variety of challenges: the survival and boosting of small businesses in New York; improving education in Mexico; managing natural disasters in Nepal; combating gender violence in Colombia and Venezuela; and tackling hunger in several African countries, among many others. One of the biggest challenges in producing this volume was selecting the cases, because other equally interesting examples have had to be discarded. These are fascinating stories showing the impact of open data and partnerships between the public and private spheres and organised citizenry to provide data on shared challenges. Fortunately, it is safe to say these are not isolated cases; they are setting a trend, a new form of management that has already had an impact all over the world. In addition to a detailed reading of each case, I recommend a look at the "List of other cases" section at the end of each chapter for further inspiring examples.

The publication of this text contributes to ongoing reflection on the role of government agencies in opening up data. Until now, they have been the main source and publishers for open data, as defined by the International Open Data Charter. At the Secretariat for Open Government, we believe it is now the time to provide an orchestrating role for data of public value in the civic and private sectors, which has much to offer.

Albert Cañigueral i Bagó
Director-General for Open Data, Transparency and Collaboration

The value of open data and use cases

Alicia León Molina

Conceiving the publication

Open data[1] refers to sets of information produced or compiled by public bodies that government agencies make available to the public in a structured form, so they can be simply and conveniently used.

The main aim in making data open is to provide society with government-managed data and make it public, so that any individual or organisation can use and extract value from it. With this service, the administrations increase their transparency since citizens are able to access a true picture of the services provided.

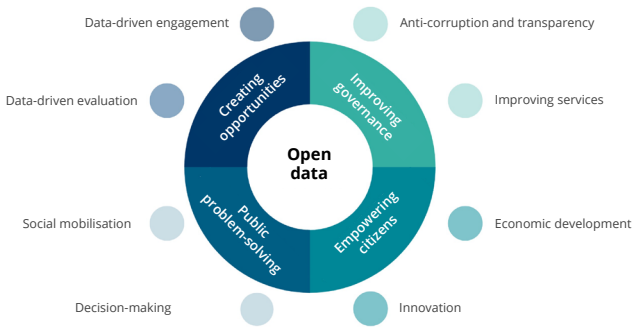
The Open Data Charter defines open data as a **tool that facilitates better governance and provides actions**, but which is not an end in itself.

For open data to be fit for purpose it must be:
1. Open data by default
2. Timely and comprehensive
3. Accessible and usable
4. Comparable and interoperable
5. For improved governance and citizen engagement
6. For inclusive development and innovation

The last two points highlight the concept of **impact**, which refers to the capacity to prove whether change has occurred in the ecosystem thanks to the implementation of a given project, in this case, an open data project.

1 Open Data Charter.

In most cases, impact is reflected in more than one dimension and positive impacts are often observed indirectly. However, from research by the Open Data Impact organisation,[2] the following taxonomy has been defined regarding the impact of open data in the public sector.



As shown in the figure above, new forms of impact from open data, above and beyond the potential the economic benefit, are increasingly being considered. As the report *The Social Impact of Open Data* notes,[3] open data provides numerous benefits to society, such as improving institutional responsiveness and decision-making, reducing levels of corruption, building democratic spaces for citizens, empowering local and disadvantaged voices, and improving the delivery and use of services.

The report also defines the basic possible outcomes from a case of open data:

- Output: the end product, good or service the project produces, such as a new visualisation tool, an infographic, the number of visits to a website, etc.
- Outcome: defined as the medium-term result among specific beneficiaries, the outcome from having achieved specific results, such as: a more informed citizenry, changes to laws on government transparency, etc.

2 Stefaan Verhulst and Andrew Young (2016). "Open data impact when demand and supply meet. Key Findings of the Open Data Impact Case Studies".

3 "The Social Impact of Open Data", Sunlight Foundation.

– Impact: defined as the long-term outcome on society, such as less poverty or greater equality.

To further understand how to generate impact through open data, Open Data Impact lists the following conditions as conducive to success:

– **Partnerships** permit a better match between data supply and demand.
– Developing open data as a **public infrastructure**[4] helps make a broader impact on diverse issues and sectors.
– Well-defined open data **policies** and good **assessment** for open data projects are necessary conditions for success.
– Open data initiatives with a clear **objective** or definition of the **problem** have a greater impact.

What is the current status of open data projects?

The *Economic Impact of Open Data* report, published in 2020 by the European Data Portal, estimates the market value of open data at 184 billion euros.

With regard to current situation of open government in Spain,[5] the country has nearly 300 initiatives and over 660 companies are already reusing the information,[6] producing a turnover of over 1.7 billion euros a year.

Moreover, according to the European Data Portal,[7] Spain has the third highest Open Data Maturity rating (94%), behind France and Denmark, with the highest score for 'impact'.

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4 One of Europe's current challenges is to build a public digital infrastructure that empowers citizens and benefits from the digital economy. Katja Bego (2021). "Public digital infrastructure must be at the core of Europe's tech sovereignty strategy".

5 The "Open Data. Publicación y reutilización de Datos Abiertos como iniciativa de Gobierno Abierto en la Administración" Guide. Comunidad Rural Digital (2019).

6 As in the case of the company Asedie.

7 Open data maturity - Spain 2020. "Informe de madurez de los datos abiertos en Europa". E-Government Portal. Government of Spain.

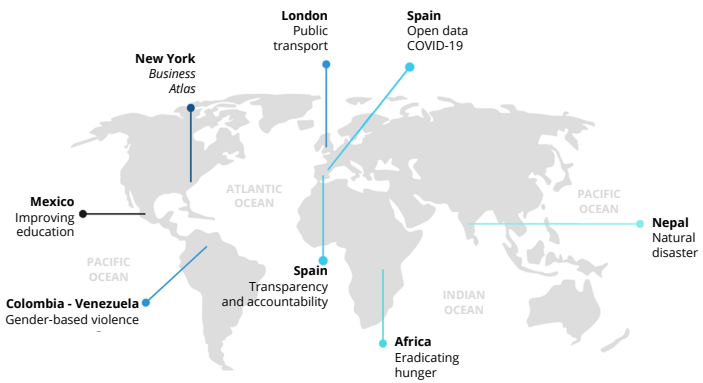
As the data shows, more and more governments and institutions are striving to create accessible open data portals that allow reuse of data by the public and are working to make open and reusable information available to society. However, **are projects being implemented that take into account the impact they generate?**

This volume gathers a number of use cases that have had a positive impact on various areas of society thanks to open data or public information. Such projects provide a particularly broad view of the application and generation of open data, showing how it goes beyond government agencies and how society and organisations benefit from it.

By analysing success stories, we hope to gain insight into applications of open data, provide inspiration and learning for future initiatives, and contribute to generating more success stories.

The cases have been chosen after extensive research, seeking diversity, both in the field of work and the geography where they were applied, while also providing information on their impact. Several actors involved in projects were also consulted in order to broaden the information available and reflect on the lessons learned and their vision for the future.

A map of the cases discussed in the following pages is shown below:



Use cases

Public transport in London

Improving transport and routes with open data

The world is immersed in a process of constant urbanisation, with cities and metropolitan areas positioning themselves as hubs for economic growth. Cities and metropolitan areas are also responsible for approximately 70% of global carbon emissions and consume more than 60% of the world's resources.[8] Goal 11 of the Sustainable Development Goals (SDGs) rightly tackles the challenge of making cities more inclusive, safe, resilient and sustainable.

In this context, public transport becomes an essential service for city life and a driver for economic growth and social inclusion. The service also helps mitigate air pollution and climate change.[9]

This is why the entrepreneurial community, activists and even citizens are increasingly demanding open transport data as an essential part of urban life. Good examples of the application of such data can be found in day-to-day use of public transport, from train or bus information screens to route planning apps; in short, solutions that aim to optimise urban mobility.

As a successful example of this issue, the case of London is analysed here, as it is one of the world's pioneering cities in the real-time publication of open data. The analysis conducted by Deloitte[10] for the London transport authority makes it possible to explore the economic and social impact that open data has had on a variety of issues in the city.

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8 United Nations. Goal 11: make cities and human settlements inclusive, safe, resilient and sustainable.

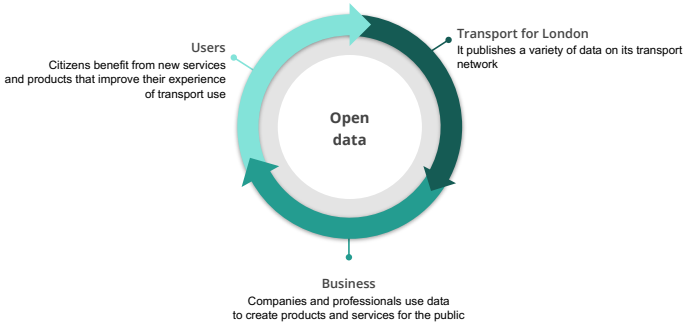
9 United Nations. SDG indicators. Sustainable cities and communities.

10 Deloitte (2017). "Assessing the value of TfL's open data and digital partnerships".

There are more than 31 million journeys a day in London, so facilitating mobility by making as much information as possible available to the public is essential. With this aim and open data in mind, the London transport authority released all possible available datasets, from timetables to service status to disruptions, in an open format and freely available to all.

Subsequently, in conjunction with other organisations, products were created to bring this data to the public: around 600 apps used by 42% of London's citizens.

Furthermore, the increased availability of open data coincided with a rise in demand for public transport in the city, bringing with it new requirements for improvements in public information services.



The **body in charge** of the case in question is Transport for London or TfL, a local government organisation in London, responsible for most aspects of the city's transport network.

Its mission is basically to implement strategies and manage London's transport services. To do this, it is organised into three main directorates and service companies with their own responsibilities for the means of transport:

– **London Underground**, responsible for running the city's underground railway.

- **London Rail**, responsible for liaising with National Rail services in London and regulating the London Overground, DockLands Light Railway and London Trams.
- **Surface Transport**, which manages the citywide red bus network and other surface services.

Open data

The open data used in this project relates to a range of operational and corporate information on London's transport network, including buses, the underground, light rail, commuter rail, trams, roads and rivers. More than 80 data sources were used, 75% of which are available via API.[11]

The sources of available data include information on air quality, general data on journey times, service updates, station locations and facilities available at each station, among others. The available data is listed below by type of transport:

- In relation to the **underground**, data is available on train departures, transfer stations and the status of individual lines and stations. Network statistics are also provided, such as the most common first and last stops and the busiest routes.
- With regard to **buses**, information is available on real-time arrivals, the location of bus stops and the routes of each vehicle.
- For **roads and rail**, data is provided on peak traffic times, real-time traffic and road incidents, traffic cameras and live messages on roadside billboards.
- In addition to the means of transport mentioned above, information is also available on bicycle journeys, walking times between different parts of the city and transport ticket sale points, along with other network statistics.

11 An application programming interface (API) is an interface that specifies how different software components should interact. This defines the contracting of an IT component with which it will make use of its services. Source: Wikipedia.

Impact

To understand the impact that open transport data has had on London, it is presented in terms of three main beneficiaries: passengers and citizens, the city of London and the TfL organisation itself.

TfL passengers and other road users

One of the main beneficiaries of TfL's open data practice are the transport network passengers and road users in general, who can optimise their journeys thanks to the apps that make TfL's open data available to the public. Using real-time information and adjusting routes depending on possible unforeseen events is estimated to save **passenger time** worth between 70 and 90 million pounds/year, i.e. between 80 and 100 million euros.

In calculating these savings, it is assumed that the use of open data by users influences their behaviour. Additionally, it was found that 27% of passengers use apps to plan their journey and 9% use TfL's web services. Estimated financial savings were calculated from this percentage.

In addition, the availability of information on road conditions, accidents and other phenomena has led to **time savings for road users**. This information is used by navigation systems and driving software to optimise journeys and avoid congestion. This saves time and reduces pollutant emissions, as less time is spent driving.

Lastly, over and above the economic benefits, open data is considered to have contributed **social and environmental benefits** to the public. Three impacts are worth noting:

– More **satisfaction with travel**: better information for optimising journeys has improved the user experience.
– **Better information** for planning journeys, making travel easier and making more journeys.
– Improving **lifestyles** by increasing walking and cycling: transport apps help integrate the journey from start to finish, promoting means of transport such as cycling and walking. A 13% increase in walks has been observed since 2007.

London

Opening up transport data also added value and impacted on London in four key areas:

– Increase in gross value added (GVA)
– Job creation
– Generation of new opportunities
– Promoting and facilitating innovation

A large number of London-based companies use TfL data for commercial purposes. The GVA return from open data use is estimated at around £12-15 million per year.

At the same time, this data has directly created some 500 jobs that would not otherwise exist. In addition, around 230 jobs are estimated to have been indirectly created through TfL open data.

A broader vision of the economic benefits to London from TfL open data shows it has brought growth and productivity to the city through:

– Taking advantage of **new opportunities**: London has earned a reputation as a benchmark in the use of open data and the digital economy. A recent study conducted by TechCity found that London's digital economy is worth 30 billion pounds in GVA (35 billion euros) and supports more than 300,000 jobs. Providing open data

in the urban transport sector will be a cornerstone for the development of new forms of transport and transport products.
– Promoting **innovation**: as it releases new data, TfL promotes its use among a large number of developers to innovate and create new services for citizens that address social and economic issues.

Finally, open data is also thought to help **improve the air quality and reduce emissions in the city**. Reuse of open data was found to incentivise a shift from private to public vehicles, walking and cycling, thus helping lower the carbon footprint and reduce particulate pollutant emissions in the city.

For Transport for London (TfL)

Regarding the benefits to TfL, London's transport authority, these consist mainly of **financial savings**, thanks to three key aspects:
– Outsourcing app production.
– Improved problem-solving due to the ready availability of data.
– Partnerships with other organisations that help improve operability.
These three points are explored in more detail below to better understand their positive impact on the organisation's finances.

By releasing the information openly and without charge, TfL has allowed the market to develop innovative apps and services for users. This generates potential cost savings by not having to produce these applications in-house.

Estimating these savings takes into account the potential costs of developing an app (£100,000 - £150,000 per year) and potential maintenance costs (£50,000 - £75,000 per year).

The organisation has also made savings by reducing the workload at its customer service centres, as information is available to the public via the transport information apps, thus freeing TfL from having to take further action.

Finally, the organisation has also **benefited from synergies produced with other organisations working together to reuse and benefit from the same TfL data**. Working with other data providers and organisations brings new sources of data from outside TfL's scope, such as traffic data, which improves the operability of the organisation and its services.

All in all, TfL's launch of open data has generated benefits and financial savings valued at **more than £130 million** (€150 million) for the public, London and TfL itself. This is all thanks to improved customer satisfaction by providing accurate, correct and reliable real-time information on their journey. It also supports the expansion of London's digital economy and new business opportunities arising from open data. Finally, making this data available has been shown to help improve social and environmental outcomes and provide a key tool for innovation.

Relationship to other cases

The following initiatives can be found when analysing other cases of open data in public transport.

In New York City, open data is being used to raise awareness on the state of the bus network in the city, and data-based solutions are being proposed for improvements. The Bus Turnaround Coalition initiative was started by users and the TransitCenter and Riders Alliance organisations. The project is based on analysing how citizens move around the city and what type of transport would be necessary to improve their experience. They then provide recommendations for action to the relevant authorities.

Thanks to this initiative, the Metropolitan Transport Authority (MTA) has carried out a number of actions to improve the bus network, such as improving the app that reports the status of the service and redesigning the bus network to meet citizens' needs.

Finally, there are also several cases in **public transport in Catalonia**. Firstly, there is the Àrea Metropolitana de Barcelona (AMB) open data portal, which contains more than 60 open datasets on mobility in Barcelona and its suburbs.

At the municipal level, the public bicycle service in the city of Barcelona (Bicing) provides an open data section with a variety of information on the service. With this data, the Barcelona citizens can get real-time information on the service via mobile apps. One example is the Smou app, which integrates mobility data from the city.

Lessons learned and vision of the future

Exploring this use case provides a very clear example of impact analysis with open data. One main conclusion may be drawn from the analysis: a good open data publishing strategy can be beneficial for the public, institutions and the organisations involved, and provide both economic benefits and improvements to quality of life.

In the **vision of the future** for this use case, TfL has an opportunity to use its position in open data to explore new commercial partnerships and make more innovative use of the open data to improve the customer experience. Possible future actions include:

- **Releasing more open data** to continue contributing to a data-driven business culture.
- **Commercialising its experience with open data**.
- **Working with developers to identify opportunities in the market** and continue creating new customer experience-focussed services.
- **Using information received by other players** in areas further afield from TfL in order to provide new insights and improve operability.
- **Improving the quality and coverage of existing open data** by cross-matching it with other data.

In the long term, the benefits of publishing this type of data will include shorter waiting and travel times, as citizens are increasing able to optimise their journeys. Secondly, the impact is expected to be greater in the future when integrated real-time data from all mobility and transport options can help create a truly comprehensive urban mobility system, which is more convenient than the use of private cars.

New York City *Business Atlas*

Boosting small business growth through data

As seen in other cases, urban life is increasingly data-driven and data-transformed. Cities such as London and Singapore already use data to plan for the future and day-to-day issues such as city traffic and waste management. This is possible thanks to the large amounts of data generated daily through sensors and mobile phones.

Another key aspect to consider in urban life is ensuring **inclusive economic growth**. Goal 8 of the SDGs focuses on how inclusive and sustained growth can drive progress, generate decent jobs for all and improve living standards.[12] Goal 9 also focuses on inclusive and sustainable industrialisation which, together with innovation and infrastructure, can drive dynamic and competitive economic forces that generate jobs and income.[13]

It is in this context that the *New York Business Atlas*, promoted by the Mayor's Office of Data Analytics (MODA), has emerged with the aim of promoting **small business growth through data analytics**.

Today, large companies can hire data professionals to drive the company's data-based strategy, thus basing decision-making on information. However, many small and medium-sized companies have to use their instincts to make important decisions, such as opening new businesses or expanding an existing one. Thus, the *Business Atlas* could help narrow this **technology gap** between the two types of businesses.

Giving small businesses and enterprise in New York City access to quality open data can help them and add value to their decision-making process.

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12 United Nations. Goal 8: promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

13 United Nations. Goal 9: build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

With the aim of guiding small businesses, information was gathered from different sources, such as public data on public consumption, sales taxes, census demographics and even traffic data from city streets.

Thus, the *Business Atlas* aims to provide both small and large businesses with the same tools to compete on a level playing field.

The organisation behind the project, **MODA**, seeks to harness the data generated in the city to help the city's authorities provide more equitable and efficient services and increase their transparency. Its main functions include creating data-driven solutions for service delivery and citizen engagement, working to implement the city's Open Data Act and facilitating data sharing among city authorities.

The organisation is seen as an example of how governments can go further than just being information providers to the public to become analytical tools for those outside government who wish to learn from the data.

Open data

This project focussed not only on providing information to consumers and end-users, but also to placing end-users at its centre. The *Business Atlas* is designed to be particularly useful to New York's small business community. This is achieved by not only providing open data to companies, but also by carrying out analyses from which to draw conclusions.

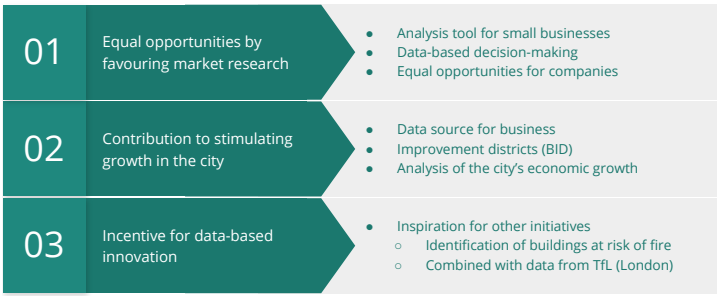
One of the main sources of data for the project is a local start-up company called Placemeter, which uses traffic cameras and sensors to manage urban mobility between neighbourhoods. The resulting information includes this vehicle and foot traffic data, which can be useful for small businesses using *Business Atlas*, as it tells them how many people pass along each road and thus helps them make decisions on locating their business.

In addition, information from the Departments of Consumer Affairs and Finance and demographic data from the census are also used. Data is also shared by the Departments of Health and Mental Hygiene, Environmental Protection, and Housing and Urban Development.

With regard to the data used in the project, it is also worth noting that in many cases MODA's function was to combine and analyse datasets already available and open to the public. In an effort to democratise information and put quality research in the hands of smallholders, a number of analyses and visualisations were generated from the data to make it more accessible and useful for entrepreneurs.

On accessing the portal, a wide range of socio-demographic data is displayed for each of the city's neighbourhoods, as well as economic information relevant to decision-making. In addition, businesses can access free training to learn how to exploit this information.

Impact



The impact of open data can be magnified when government agencies work directly with private companies on specific initiatives. This case shows the effects of private companies, research institutes and government agencies working together to help solve public problems.

The groups favoured by this open data project are, firstly, **entrepreneurs and small business owners and**, secondly, **New York citizens**.

Entrepreneurs and small business owners can make direct use of the data stored in the *Business Atlas*, thus improving their decision-making through free access to market research and data analysis, which would normally be costly. However, the market opportunities provided by the atlas can also be useful in securing funding for new businesses.

In addition, New York citizens can benefit from job creation for the entire city due to the increase in business brought about by small businesses accessing new information and making better decisions. This increase in new business will lead to a better supply response to citizens, thereby more effectively meeting their demands. As a result, residents of traditionally poorly served neighbourhoods in the city benefit from new businesses opening in their area because of a greater understanding of needs and opportunities in the communities.

The impacts arising from the study can be divided as follows:

– **Balancing the competitive environment for market research**
  Giving small businesses a quality data analysis tool allows them not only free access to the data, but also to the analytical process for understanding and applying the information provided by the data. In this way, they can start levelling up to large companies, which, unlike entrepreneurs and small businesses, have access to all these data findings through, for example, analytical departments or consultancies.
  The example of entrepreneurs is very clear, as with the information contained in the *Business Atlas*, they can make a much more convincing case, based on real data, for the sustainability and potential of the business. This makes it much easier for them to obtain the necessary funding, among other things.

– **Adapting the analysis of Business Improvement Districts**
  Business Improvement Districts (BIDs) are organisations formed by private businesses and individuals in a particular area, whose members pay a fee to contribute to the maintenance, development and promotion of their business district.

Data from the *Business Atlas* can be used to help analyse how BIDs are stimulating city growth. Thus, different BIDs can be compared in economic and commercial terms to identify which have been most successful, so they can be replicated in other areas of the city.

– **Influencing innovation through data analytics in New York City**
  As in other cases, this initiative has stimulated and inspired the development of other similar open data projects.
  One example is how the New York Fire Department set up an analysis unit together with MODA to identify buildings with the highest fire risk and thus obtain information to prioritise inspections. In addition, the organisation NYC Buildings worked on a project to manage complaints about illegal buildings.
  Even the city of London found inspiration in the *Business Atlas* in its goal of becoming a smart city. For example, from the data generated by TfL, businesses can obtain precise information on citizens' routes and places with the highest concentration of people.

Relationship to other cases

Related to the use of open data for business is the "Dades x comerç" (Data for commerce) project, promoted by the organisation Iniciativa Barcelona Open Data. This project provides data-driven digital tools to promote local commerce. The project aimed to work with small businesses to bridge the digital divide between small and large businesses by providing access to data-driven digital technology. By helping create mobile apps, it is expected to increase customer knowledge for businesses and provide valuable information for decision-making.

The "Eixos" (Axes) project is a further example of a digital economic observatory that offers data from its own fieldwork with open data from government agencies and private organisations. The initiative aims to offer information to economic agents operating in the area, such as entrepreneurs, chain stores, investors and government bodies, among others.

The portal includes information on businesses, empty premises and company concentration maps by type of business, among other types of information on the local economy.

Lessons learned and vision of the future

This use case is an example of how to use data to support business, not just providing open data, but also, importantly, providing analysis and interpretation tools so that end users can extract value and make informed decisions from the data.

The main challenges highlighted by the organisation are:

– Raising awareness of the tool and ensuring its use. Great importance is given to continuing work on the communication and dissemination of the *Business Atlas* to ensure small businesses are aware of it, know how to explore it and take value from it.
– Ensuring technological adaptation of the tool, so it can be adapted to different types of business and support new data sources.
– Obtaining more granular data to provide more specific information within neighbourhoods.

An overview of the **vision of the future** for the project concludes the analysis of this use case.

The organisation intends to implement new tasks and functionalities, thus creating *Business Atlas 2.0*. These functionalities would include comparing different locations for a particular business, adding public transport information to traffic information, extending currently used data and giving users a new tool to advise on the risk of business failure, thus providing assistance using predictive analytics. This assistance could take the form of new types of funding, among other examples.

The project also aims to initiate and maintain partnerships and relations with agencies, institutions, companies and users.

Eradicating hunger in Africa

Agricultural growth and transformation to eradicate hunger in African countries

The Global Hunger Index shows there has been a considerable reduction in hunger since 1992 in many African countries. Yet despite major progress made with regard to food, according to the 2020 report on world food security and nutrition,[14] the number of people affected by hunger worldwide has been increasing since 2014. It is estimated that 8.9% of the world's population suffers from hunger.

Of the 690 million people suffering from hunger, about 35% are on the African continent, where the numbers of undernourished people are growing faster than in any other region of the world.

This increase is due partly to the COVID-19 pandemic and the plagues of desert locusts in East Africa. These events have worsened the global economic outlook in a way no-one could have predicted, increasing the need for decisive action to reverse the trend.

Given this situation, the case study presented below seeks to make a positive contribution, through open data, to reducing the hunger in the continent.

In 2014, the Malabo Declaration[15] on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods was approved. Its main goal is to eradicate hunger in Africa by 2025 and to reduce poverty in the continent by half, all framed around agricultural development as a means of doing so.

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14 FAO, IFAD, WHO, WFP and UNICEF (2020). Abridged version of "The State of Food Security and Nutrition in the World 2020. Transforming Food Systems to Deliver Affordable Healthy Diets for All". Rome, FAO.

15 Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods.

A number of agricultural goals were adopted in this declaration, to be met by 2025, prioritising agriculture as a strength in the development agenda of Africa.

These goals highlight the importance and intention of using data as a key tool in their achievement. The poor starting point for data analysis and management for decision-making is acknowledged, while there is also a commitment to improve this capacity.

The organisation responsible for this case is the African Union (AU), a continental body made up of the 55 member states of the African continent. The AU was founded in 2002 as the successor to the Organisation of African Unity (OAU).

The AU was created out of a vision of an "integrated, prosperous and peaceful Africa, driven by its citizens and representing a dynamic force in the international arena". The organisation's main goals included:

- Achieving greater unity and solidarity among African countries and their people.
- Defending the sovereignty, territorial integrity and independence of its member states.
- Accelerating the political and socio-economic integration of the continent.

Open data

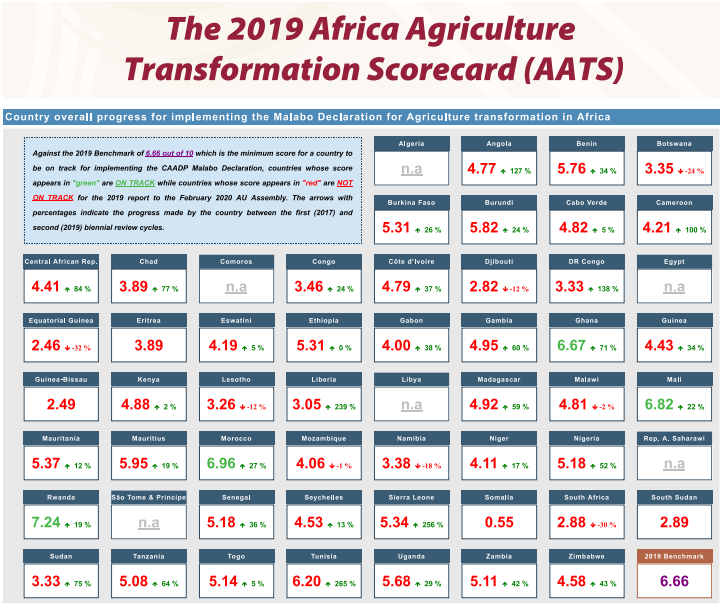
The African Union, together with other agencies, created the Africa Agricultural Transformation Scorecard (AATS). This scorecard uses 43 indicators from the Malabo Declaration to assign a given score to each of the 55 countries.

The indicators are drawn from multiple sources, most of them public, i.e. data collected nationally or by African public bodies.

The AATS brings together indicators from different fields. They can be separated into three levels:

- **The contribution of agriculture to economic growth and inclusive development**: these are socio-economic indicators, such as per capita GDP, unemployment rates, the Gini coefficient[16] and level of malnutrition, among others.
- **Agricultural transformation and sustained inclusive agricultural growth:** these are indicators on activity and trade in agriculture, such as value added in agriculture, intra-African trade values, food price indices, etc.
- **Strengthening systemic capacity to deliver results:** with indicators on the incorporation of new policies focused on meeting the Malabo Declaration goals. The indicators include growth in government spending on agriculture and growth in private sector investment in agriculture, among others.

The 2019 scorecard table is set out below:



Source: The 2019 Africa Agriculture Transformation Scorecard (AATS).

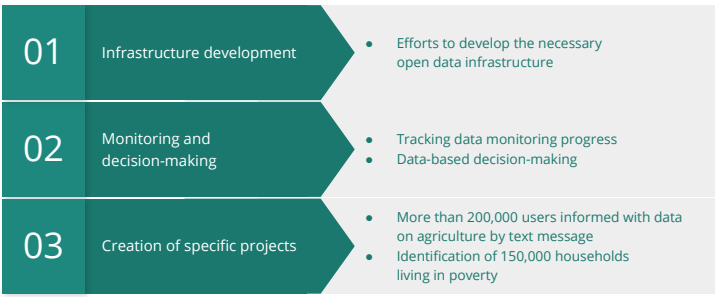
16 The Gini coefficient is a measure of inequality, usually used for income inequality, but can be used to calculate any form of unequal distribution. It is a number between 0 and 1, where 0 corresponds to perfect equality and 1 to perfect inequality. Source: Wikipedia.

The table includes all the countries in the African Union, along with their status with regard to the Malabo development commitments. Thus it shows countries that have not been able to obtain the necessary data, such as Algeria, Cameroon and Egypt. The performance or efforts of countries that do provide data is also shown, but most are below 6.6 (the target proposed in 2019).

In addition, as part of the effort to use data in contributing to alleviating hunger in Africa, a variety of projects have been implemented on the continent:

- **U-Report** in Uganda: used to treat and protect banana plantations from bacteria. U-Report is an innovation-based social monitoring tool focused on users via text messaging. By sending out survey and alert messages, real-time information is collected to gather ideas to share with the community on a range of issues.
- **National Farmers Information Service** (NAFIS) in Kenya: this provides information on prices and other agriculture-related issues.
- **Esoko** and **Farmerline** in Ghana: these two projects were also based on obtaining data for decision-making by text messaging. Using the information messaging service, the initiatives informed local farmers about market prices, weather alerts and farming tips, and connected buyers and sellers in local languages, among other initiatives.

Impact



Three aspects are considered to help understand the impact and benefits of the efforts to date in Africa to achieve the goal in the 2014 Malabo Declaration:

- **Infrastructure development**. The initiative has advanced the development of open data infrastructure in the continent.
- **Monitoring and decision-making**. The open data-driven AATS system has facilitated monitoring of the situation in different countries, while contributing information for decision-making.
- **Creation of specific projects**. Efforts and awareness-raising across the continent have led to the creation of new projects and initiatives to promote agriculture.

Infrastructure development

Africa is one of the lowest-ranking continents with regard to public infrastructure due to its poverty, thus moving towards biennial data collection and reporting is a major breakthrough and impact in itself. It has made it possible to calculate the relevant indicators (which were previously non-existent) and thus assess whether the right policy decisions and progress are being made to achieve the agreed goals.

Monitoring and decision-making

The project has also facilitated comprehensive monitoring of progress in African countries and use of the data for subsequent decision-making.

As mentioned above, the scorecard contains indicators for each of the participating countries. The score includes two types of information: whether the country has been able to carry out data collection successfully and whether countries are implementing good socio-economic policies aligned with the Malabo Declaration goals.

The African Union assigns a target score every two years: countries above this score are understood to be on track to meet the 2025 goals.

In 2017, the target score was 3.9 out of 10, with 20 countries exceeding the threshold. However, eight of the participating countries did not provide data for assessment, thus revealing difficulties in data collection. This year, Rwanda was the country that came closest to achieving the goals (6.1).

The second AATS report was released in 2019, with a target score of 6.6. Although most countries had increased their scores over 2017 and fewer countries failed to submit data, only four countries met the threshold. Analysis of the overall score (4.52) shows signs that the continent is not on track for the 2025 Malabo goals.

Furthermore, the African Union report notes that some states have not used investment plans well enough to meet previous commitments and this has meant final achievement of the goals was not as good as expected. However, the report urges all the data obtained to be used, to see where things have gone wrong and take suitable corrective measures to get back on track, thereby leading to prosperity for these countries.

The Africa Agricultural Transformation Scorecard (AATS) also allows assessment of whether the countries are on track to meet the 2025 goals. The impact of this initiative is difficult to quantify in the short term, but it is clearly a success story. The average score, which was 4.03 in 2017, has increased to 4.52 since then. This suggests an improvement in the agricultural situation compared to 2017, even if the goals have not been met.

It may be concluded that, despite improvements, these have not been enough, leading to calls for decisions and a change of course by the countries that have failed to meet the goal, ensuring they do so by the next review.

The AATS makes it possible to determine whether countries are on track to meet the long-term goals and also assess what exactly is going wrong and, therefore, what actions need to be taken for the future.

Creation of specific projects

Finally, analysing the indicators of success for the above-mentioned projects,[17] in the context of focusing efforts on the use of data for agriculture, shows that:

- The Farmerline service in Ghana has over 200,000 users in West Africa and over 1,000 downloads on the Google Play Store. Thanks to the different ways their services are offered (text messages, voice alerts, app), they have been able to overcome the illiteracy gap and poor Internet connectivity.
- The data generated from the Esoko project has become the mainstay for a number of government intervention programmes, such as the Livelihood Impact Empowerment Against Poverty. The project profiled 150,000 poor households in 50 districts in real time.

Relationship to other cases

There are a number of benefits to using open data, often related to improving decision-making to improve people's lives. However, it should be noted that the use of these techniques in Africa today is very limited, due to poor public infrastructure and poverty. Despite these problems, some countries are trying to use open data to tackle issues, mainly regarding government transparency and accountability.

Government vacancies

There are a number of other smaller-scale projects that have used open data in Africa. *Open data* in Kenya helped citizens receive information on government job vacancies. In this project the government decided to publish vacancies openly throughout the country, to involve citizens more closely in the workings of government.

The initiative changed the way the government interacted with the population, having previously preferred not to share any information publicly.

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17 Jean-Paul Van Belle (2018). "Africa Data Revolution Report 2018 - Status and emerging impact of open data in Africa".

The initiative significantly increased transparency regarding government vacancies.

Ebola outbreak

Another case where open data was used in Africa was to fight Ebola. Clearly, information and transparency are needed to combat such situations. Sierra Leone tried to promote this project to share open data on the outbreak (hospital data, deaths, infected people, etc.). Sharing this data publicly, especially with public bodies in other countries, helped fight Ebola more effectively. The initiative helped control the disease.

Besides Africa, there are also use cases regarding information on food. One such case is the Open Food Network project, which offers an open-source platform to facilitate new ethical supply chains. Using the platform, producers can sell online, wholesalers can manage purchase groups and communities can bring producers together to create a virtual farmers' market to build a resilient local food economy.

Lessons learned and recommendations

This use case provides a very different example of how data can be used to assess whether the best decisions are being made and, if not, redirect the action plan. One main conclusion may be drawn from the analysis: a good strategy for data collection and use can have a major impact in emerging countries. Africa is one of the poorest continents in the world and open data, together with government commitment, can greatly improve the future situation in the continent.

A brief **vision of the future** of this use case shows how Africa has the potential to completely transform its agriculture to fight hunger, thanks to the overview that can be provided by open data. This data will enable governments to transform the decision-making to achieve a clear and common goal: eradicating hunger in Africa. Possible future actions include:

- Improving data collection to make it more efficient and harmonised across all AU countries.
- Increasing the transparency of African governments through open data.
- Improving communication between countries with regard to open data and ensuring the data can be used by each and every member country.
- Improving the quality of the data obtained and the willingness of member countries to use it correctly.
- Transforming other sectors in the African economy and society through better decision-making with open data.
- Substantially increasing trade between different countries using this type of data.

In the long term, such data can have a major impact on the entire African population. Through better political decision-making, harmonisation of goals and communication between countries, Africa will be able to end hunger and significantly improve the agricultural sector. However, there is still much room for improvement, especially in terms of creating a harmonised infrastructure for data collection across countries.

Transparency and accountability in Spain

Public data and information as tools for transparency and accountability

Accountability is the duty of public servants to publicly and regularly report, justify and take responsibility for the use of allocated funds and the results obtained, based on criteria of efficiency, effectiveness, transparency and legality.[18]

According to the latest Corruption Perceptions Index (CPI) for 2020, published by Transparency International, Spain ranks 32nd with 68 points (100 means no perceived corruption). Moreover, since 2012, the score has dropped by 3 points, i.e. perception of corruption in recent years has worsened. Given these figures, it is important to continue building transparent institutions that are accountable to the public.

In this regard, the **Civio**[19] project promotes institutional transparency and easy access to public information through data journalism and technological innovation, as a means of monitoring public authorities and contributing to evidence-based decision-making.

It aims to achieve free access to information generated by institutions, thus making it easy to find out how decisions are made, ensure the public sector is accountable and that citizens can participate in public life.

The organising body is the Civio Ciudadana Foundation, an independent, non-profit organisation. The foundation stresses that its mission is to end opacity in public affairs by informing the public and using innovation to freely access information that matters.

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18 General State Administration - Transparency portal. Accountability.

19 Information provided by Javier de Vega, from Civio's Communications Department.

Civio's main areas of research are:

- **Transparency**. They conduct research and produce articles on transparency and accountability and the right of access to information.
- **Public procurement**. They investigate public contracts in detail, try to identify possible irregularities and provide details on how they work.
- **Power and influence** relations. Investigation and articles on conflicts of interest, revolving doors, appointments, lobbying and high office.
- Access to **health**. They investigate the pharmaceutical market, access to medicinal products and public health policies.
- **Justice**. In the field of justice, they investigate pardons, the independence of the system and access to justice in Spain, and analyse certain significant relevant court decisions.
- Management of **public assets**. Research and articles on the functioning of government bodies, public spending and policies, and their impact on citizens. They also investigate ways of tackling the problem of forest fires.

Their work consists of carrying out investigative journalism and creating innovative tools that make information available to citizens that would otherwise not be made public or would be much more difficult to access. This has led to a number of different projects addressing the areas of investigation described above: "El BOE nuestro de cada día" (The daily Official State Bulletin), "Medicamentalía'" (Drug price research), "El indultómetro" (The pardon-meter), "Quien cobra la obra" (Who gets paid for the work), "¿Dónde van mis impuestos?" (Where do my taxes go?), "Quién manda" (Who's in charge), "España en llamas" (Spain in flames) and "Tú derecho a saber" (Your right to know).

Through these projects, they seek to influence policy in their areas of action: transparency, data openness, prevention of corruption and promotion of good governance. That is why the team meets public representatives and tries to push for real change.

Open data

Data is fundamental to Civio's research. In most of their projects, they collect and process data that is not originally open or accessible.

From PDF documents, information requests or even web scraping, the organisation combines and processes different data sources to obtain the information of interest.

In doing so, Civio goes further than other data reuse projects, given that the information they analyse and use for their projects is not, in many cases, structured and processed information for reuse by institutions.

In addition, in an effort to leverage their work on data, they created their own open data portal, where they share the organisation's own databases for reuse.

Civio has a variety of projects, each focusing on different aspects of transparency and accountability. Consequently, each project uses different data and information processing.

Civio's main projects, what they consist of and the type of information or data used in each case are described below.

"El BOE nuestro de cada día"

This section publishes news and research based on the daily reading of the *Official State Gazette* (BOE), thus the analysed information comes from what has been published in the BOE. Civio views this daily publication as the best primary public sphere source, providing first-hand information on what is happening.

In order to process and publish information in the form of news stories accessible to the general public, the reports have to be read and understood on a daily basis.

“Medicamentalia”

This section provides research into the global gap in access to healthcare. Thus, investigative journalism, data analysis and reporting in the field are combined internationally.

This project currently consists of three areas of research:

- **Drug prices**: research on access to medicinal products around the world. Here they analyse and compare prices of 14 medicinal products in 16 countries, study the counterfeit drug market and present research on compulsory licensing and patents.
  In comparing prices, they use the Health Action International (HAI) database, which collects information on prices, access, differences between medicinal products and information on 14 essential medicinal products from a variety of countries. In addition to working with, processing and reviewing the above data, the Civio team has incorporated information from Italy, Argentina, Spain, Belgium and Germany after accessing public information from each of these countries.
- **Immunisation and vaccine pricing**: research into differences in immunisation levels and vaccine prices.
  To do this, they compiled and cross-referenced various databases, including information on immunisation, diseases and deaths, vaccination schedules, vaccination campaigns and other data on vaccines and their implementation in different countries.
  This led to a number of investigations: vaccine prices, vaccination levels, trust in vaccines (anti-vaxxer movements), health benefits from vaccines, vaccine supply shortages and cancer vaccines.
- **Contraception**: in this case, research was carried out into contraceptive use and barriers to access around the world. The main data sources were World Contraceptive Use and the Demographic and Health Surveys (DHS). A variety of visualisations have been constructed from the data to show the figures for contraceptive use and access to contraceptives. Statements and research on the relationship between contraception and religion were also used to provide a picture beyond the data.

The project also generates content on health and transparency in the sector, such as research into the opacity of pharmaceutical companies in Spain and antibiotic resistance.

“El indultómetro”

This project is based on compiling all pardons granted and published in the BOE since 1996, to provide a tool for accountability and control of the public authorities.

Thanks to the Civio team’s compilation, “El indultómetro” is now the key source in Spain on pardons, as it allows quick and easy access to pardons granted by type of crime and comparisons of annual data and use of this measure between the different governments.

The creation of this tool, and therefore the visibility of data on pardons, coincided with a considerable drop in the number of pardons, from 1.5 per day in 2013 to 1.5 per week.

“Quién cobra la obra”

This project analyses all public works contracts between 2009 and 2015, again based on the information provided by the BOE. It carries out extensive data collection and processing, with the aim of focusing on the total figure for each construction company.

Civio chose the BOE as a source of information, rather than the State contracting portal, because it includes more government bodies and publishes the final contracts once they have been signed.

As explained on their website, the heart of the project and the most complex task is the process of structuring the data, so it can be processed and compared to draw conclusions and provide aggregate figures. In addition, as the information is widely dispersed, it is impossible to obtain complete data on contracting, but they have been

able to provide an approximation by manually compiling information published in the BOE.

“¿Dónde van mis impuestos?”

This project provides detailed, visual information on the general state budgets, where each item can be explored and compared to previous years. It is based on data from the Ministry of Finance and Public Administration.

The project presents trends in expenditure and revenue over time and how it is earmarked. Thus, it focuses on analysing policy objectives and, therefore, derived expenditure, rather than on the area of government it comes from.

“Quién manda”

This initiative analyses power in Spain with the aim of highlighting links between public and private life, to promote the regulation of lobbying and contributing to the publication of the work agendas of public officials.

To do this, Civio builds a repository of links between people in positions of power and/or influence in the country by compiling various data sources (official records, gazettes, the National Securities Market Commission (CNMV), institutional websites, etc.) together with images and articles that make up this information.

“España en llamas”

In this project, a web application was built to view and explore data on forest fires in Spain from 2001 and 2015. The aim was to provide information and key data on the fires.

The data for this initiative comes from the General Forest Fire Statistics (EGIF), which collects forest fire reports filled out for each fire. Obtaining

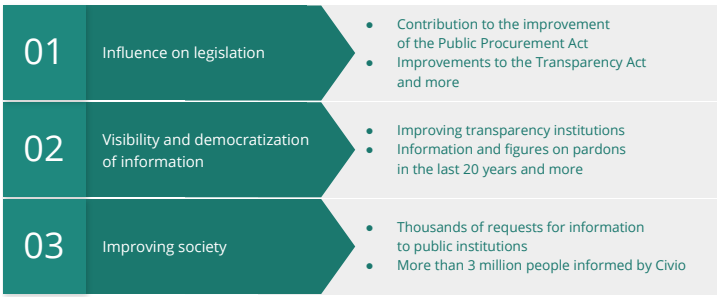
data in this way makes it difficult to get recent information, and usually the most recent data is already two years old.

“Tu derecho a saber”

In this project a website was set up to request information from public institutions before a transparency act had been passed. Together with Access Info Europe, Civio launched the platform in 2012 and passed on more than 1,800 information requests to nearly 900 public bodies and government agencies.

The platform ceased to function with the implementation of new channels of communication between citizens and government authorities. With the implementation of the Transparency Act, institutions no longer answered email queries and everything had to be processed by digital identification over their official portals.

Impact



Since its creation, Civio has made significant progress thanks to its research and work on making public information more accessible. The organisation has produced an impact in the following areas:

– Influencing legislation. Analysing public information has made it possible to influence regulations related to the areas of investigation.
– Visibility and democratisation of information. All Civio projects generate the impact of making public, often previously unpublished information visible and accessible, so that more people are aware of it.

– Improving society. In addition to the above, the organisation and its projects are thought to have helped improve society, bring information closer to the public and ensure good institutional practices.

As the organisation itself states in its web section "Impact and awards", its initiatives have generated the following impacts:

Influence on legislation

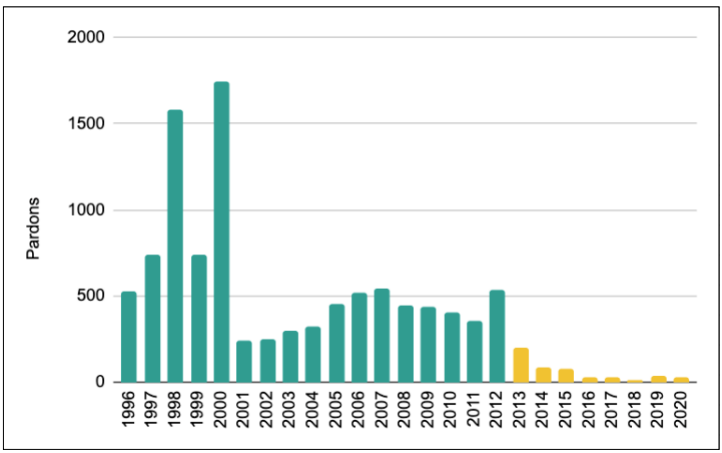
- Contribution to most of the Public Procurement Act, which incorporated measures suggested by Civio to make the whole procurement process transparent and set up a watchdog.
- The petition they launched managed to stop the exemption of the Spanish royal family, political parties, trade unions and employers' organisations from the Transparency Act.
- They helped ensure the Catalan Transparency Act included publication of how institutional advertising is distributed in media outlets.
- The Transparency Council, Madrid City Council and other corporations took up Civio's proposal on access to public officials' work and meeting agendas.

Visibility and democratisation of information

– They have succeeded in getting many public authorities (central government, regional governments, city councils, congresses and political parties) to adopt improvements on the transparency of their operations.
– They have shed light on the pardons granted over the last 20 years.
– They have contributed to more transparent public procurement, thanks to their investigation into more than 8,000 public works contracts, which helped identify the main beneficiaries.
– They disclosed information on the names and salaries of temporary government advisers, seeking to guarantee such information is always public.

- They ensured that key information about senators, such as their links to private companies, was not blocked from appearing in web search engines.
- They reported on more than 6,800 relations between business people and politicians in the first major mapping of power and institutions in Spain.
- They created and analysed the largest database on forest fires in Spain, positioning themselves as the leading source on the subject.
- They showed that 8 out of every 10 euros spent by pharmaceutical companies on doctors are opaque.
- They have enabled over 17 million people to find out how their taxes are spent by providing information on government budget management.

As explained in the previous section, bringing pardon data to light for the first time had a major effect on the figures. Since the creation of "El indultómetro" in 2013, the number of pardons has dropped significantly, from 1.5 pardons per day to 1.5 per week.



Improving society

- They have passed on thousands of requests for information from individuals to public institutions.

- They have helped stop institutional advertising campaigns and have reported specific cases where rules have been breached.
- More than 2,000 people use the tool developed by the organisation, Onodo, to create relational maps.
- They answer hundreds of queries per year from citizens, journalists, government bodies, NGOs and universities to access and better understand public information.
- They facilitate reuse of their information, thereby providing public service journalism.
- Three and a half million people are now informed about public management and decisions thanks to Civio.

In addition, the organisation has received international recognition for their work and achievements through journalism and putting technology at the service of the public. The awards include: 2016 Gabriel García Márquez Award for Journalism Innovation, two Data Journalism Awards, Concha García Campoy Award for Scientific Journalism, 2019 Data Journalism Award, 2018 Best Data Journalism Work Award 2018 (Medicamentalia-Contraception), 2018 second place in the Albert Jovell Award for the best journalism work in the health field (Medicamentalia-Vaccines), among others.

Relationship to other cases

In many of their projects, they refer to a range of previous research work on which it is based, such as the "What should your medicines cost?" project, by Code for South Africa, which provide a benchmark for the Medicamentalia project; the analysis and visualisation of the effect of introducing the measles vaccine in different US states by *The Wall Street Journal*; the analysis of differences in vaccination rates between developing and developed countries by *The Economist*, and the WhatDoTheyKnow.com platform, on which the "Tu derecho a saber" project is based.

In addition, Civio is a member of the following consortia in its search for partnerships that promote investigative journalism and projects on public procurement, transparency and institutional accountability:

- European Data Journalism Network (EdjNet): international journalism consortium covering Europe and pan-European issues using data journalism. They produce research and journalism tools and provide datasets.
- RECORD Consortium:[20] European project analysing public procurement to reduce risks of corruption and inefficiency in the spending of public funds in Spain, Hungary, Poland and Romania.
- Health Investigative Team (HIT): European journalism network investigating health-related issues such as access to medicinal products, corruption and lack of transparency in health systems.
- SceMaps: consortium that provides integrated tools to measure and address the phenomenon of 'state capture' and monitor the fight against corruption.
- Global Investigative Journalism Network (GIJN): international network of non-profit journalism organisations.
- Fandango Consortium: European consortium providing methodologies, data analyses and media cooperation to detect and dismantle rumours and fake news, promoting fact-checked information among European citizens.
- Consortium Openbudgets.eu: European consortium for the creation of methods and tools for fiscal transparency.
- CHEST consortium: European consortium facilitating digital social innovation projects within European Union 7th Framework Programme (FP7).
- Lobbying Transparency: international cooperation network to promote international transparency standards in stakeholder regulation.
- ProAccess Coalition: network of Spanish organisations promoting the recognition of access to information as a fundamental right.
- OGP Subnational Government Pilot Program: pilot programme to involve sub-national governments in open government actions promoted by OGP.

20 <https://tenders.guru/>.

Lessons learned and vision of the future

The reflection on lessons learned and recommendations from this project includes contributions from the team, led by Javier de Vega, head of communication at Civio. Based on the team's contributions and the above analysis, the aim is to provide lessons and reflections from the initiative.

In 2012, many government authorities focused their efforts on creating their own portals to share a variety of open data. In some cases, the initiatives have prioritised quantity over quality, which is why there are a number of **problems**, despite the diversity of portals making data available to the public:

- Data portals that lack maintenance and currently have no datasets.
- Open data that is not up-to-date and therefore difficult to reuse if the intention is to provide an updated view of the information. This is the case of the "España en llamas" project, whose update involves long delays due to a lack of recent official data: in 2021, the most recent data available was up to 2017, as the Ministry claims not to have consolidated the data for later years.
- Lack of data quality. In much of their research, the organisation spends a lot of time processing the data they analyse, as without this process, it could not be analysed nor accurate conclusions drawn. According to the organisation, the data often contains errors, inconsistencies, omissions and mistakes in nomenclature.
- Lack of unified criteria. In addition, given the need to access different data sources from a variety of organisations, there are also differences in the coding or presentation of the information, which further complicates processing and analysis.
- Lack of critical datasets. Critical open data is needed to enable real, robust monitoring of the functioning and performance of government agencies. An example of a lack of information in this respect is public budgets, where most of the time the planning is much more clearly published than the final execution.

Based on these limitations identified by the team over the years, they have passed on to us a number of demands and **recommendations** to continue improving the reuse of public information:

- Focus on citizens and users (citizens, universities, companies), trying to reach the entire population and taking into account their needs at all times.
- Improve data collection and storage processes. Invest time and training in ensuring data quality from the outset, thus facilitating all subsequent stages from publication to reuse.
- Make public information more open and facilitate access and reuse for transparency and accountability. Critical datasets to analyse and test whether a public policy or grant is reaching the people who need it.
- Use technology to ensure all of the above. Civio see new technologies as tools to streamline processes, but consider guaranteeing quality data and a thorough understanding of the laws essential in order to avoid reaching mistaken conclusions. Furthermore, in relation to technology, they propose that algorithms should be revised and these new methodologies should also be made public, to ensure they work properly.

In relation to the impact generated by the data, they think it should be measured by more than its economic benefit. The organisation highlights the value of more indirect impacts, focussing on:

- The number of people accessing a piece of information, a data item that was not originally accessible.
- Shining a light on bad practices through access to public information.
- Influencing public policy and public practices.

In short, they stress the need to continue working to make information truthful and accessible to ensure transparency and accountability, since **what cannot be measured cannot be managed** and, consequently, cannot be audited. A lack quality, accessible data makes the healthy practice of reviewing and criticising public institutional functioning impossible.

At Civio they call for a clearer, more comprehensive vision from government authorities, but also more institutional support, with the common aim of committing to the reuse of data that provides value to society.

Improving education in Mexico

Improving the education system through open data

In 2018, one fifth of children worldwide had no access to school. Furthermore, over half of the world's children and adolescents fail to obtain minimum literacy and numeracy.

Goal 4[21] seeks to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Education is supposed to enable upward socio-economic mobility and provide the key to escaping poverty, so making efforts and guaranteeing accessible, quality education is important.

Despite improvements in recent years and receiving the most funding for education from the Organisation for Economic Co-operation and Development (OECD), education in Mexico is still of poor quality. Less than half of students graduate from secondary school and they perform poorly in international comparisons in maths, science and reading.

Mexican citizens are also complacent regarding education, as past generations come from more precarious situations and families perceive a persistent lack of information on education. For this reason, just finishing secondary education is associated with satisfaction in the country's education system among families.

In addition to all this, there is the problem of corruption, in the form of ghost teachers, inflated payrolls, favourable treatment and the buying and selling of academic qualifications, among other practices.

Thus, the **"Mejora tu escuela"** (Improve your school) initiative was set up to promote improvements in education in Mexico through citizens' participation. The platform can be used to search for and find information on different schools in the country and compare them, and also allows users to rate the schools and leave their opinions.

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21 United Nations. Goal 4: ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

"Mejora tu escuela" is an independent, public and non-profit project created in 2013 by the Mexican Institute for Competitiveness (IMCO), with the support of Omidyar Network. The main objective was to improve education in Mexico through the commitment of all members of the educational community, including families.

The programme provides access to information on the status and performance of public and private schools for all citizens, with special emphasis on reaching parents. The aim of this programme is not only to provide a space for advice, guidance and information for families, but also to offer a tool for participation and reporting, increasing families' involvement and influence on children's education.

In this way, the platform provides the community with a two-way communication channel, with the intention of acting as an agent for positive change, generating data and information for publication on the platform itself. The project website has four sections:

- **"Conoce tu escuela"** (Know your school). This section provides families with information on all schools in Mexico. In addition, each school receives an overall score based on their ratings for different aspects, such as the school's relationship with parents and its honesty and transparency.
- **"Compara tu escuela"** (Compare your school). In this section parents can compare their children's school with others in the same or similar areas, thus helping them to decide which school best suits their needs. The ultimate purpose of this tool is to motivate schools to compete with each other in order to improve.
- **"Califica tu escuela"** (Rate your school). This tool allows members of the education community to rate different aspects of schools and leave comments. Eventually, these ratings will become part of the "Conoce tu escuela" section.
- **"Mejora tu escuela"**. This section contains a number of tools and resources for parents that provide advice and counselling on how to manage and deal with problems that might occur in their schools. Topics include educational inclusion, coexistence and drop-out rates.

Similarly, the platform has a second key element targeting policy, which includes reports whose purpose is generally to expose corruption in education in the country. As a result, the media report on and help publicise such corruption and file complaints.

The body in charge of shaping this project is IMCO, a non-profit public policy and citizen action research centre. Its main objective is to work toward gender equality and other fundamental human rights, promote debate and decision-making in public policy based on evidence and rigorous, technical analysis, with the ultimate goal of making Mexico a more inclusive, just, prosperous and competitive country.

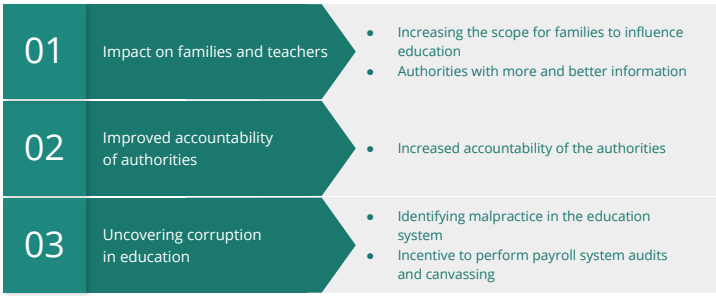
Open data

The project database consists of around 25 datasets, the most relevant being the school census from 2013, the year the initiative started. This database contains information on the number of pupils and schools, their infrastructure and the number of school staff, among other data. The set of tables was made publicly available in 2013 via the Education Information and Management System portal, as part of the national digital strategy plan launched by the Mexican government's Ministry of Public Education.

Data on teacher performance and assessments is also available and included in the datasets on educational competence of schools.

In addition, the database that the "Mejora tu escuela" team builds from families' opinions is also available. This contains information on school supervisors, on whom contact details and other general data are included. There is also a school reconstruction map, which started after the country's catastrophic earthquakes in September 2017, with the aim of maintaining and, ideally, increasing the degree of transparency and accountability.

Impact



An initial idea of the positive impact from "Mejora tu escuela" can be gleaned from the number of visits to the website: between 40,000 and 45,000 visits per day. Moreover, its value is further demonstrated by the fact that dissemination of the platform has been almost wholly by word-of-mouth.

The beneficiaries of the initiative are, firstly, families and, secondly, the country's education authorities. The project' impact areas are accountability and corruption.

Impact on beneficiaries

The platform has provided parents across the country with basic, but important, information that has empowered them to greater influence and ability to act in the field of education. Whereas in the past family members might have felt intimidated by teachers, with the launch of the project, first-hand accounts and stories have been collected that suggest a change in the balance of power between parents and teachers. For example, in one case a mother was able to fight teacher absenteeism at her child's school thanks to the platform.

The government and school staff have also benefited from the initiative. A change in behaviour and attitude can be seen and commitment and effort have been increased. It has become clear that this kind of data was needed not only by families, but also by the authorities, who point

out that they often find more and better information on the platform than in the Ministry of Education's own data sources.

Increased responsibility

The project has increased the involvement of families and the public sphere in education and this, in turn, has led to increased accountability on the part of the authorities.

By making data on schools public, all parties involved have been able to access the information, identifying possible cases of corruption and, in general terms, aspects that were not working properly, thus paving the way for greater accountability.

Corruption reports

Finally, mention should be made of the portal's impact in exposing cases of corruption in the education system. A report on the state of corruption in the Mexican education system was produced from the data published on the web, which provided the following findings:

- There were 1,442 teachers on the payroll who were between 100 and 105 years old, all registered in the same state and with the same date of birth.
- Seventy teachers earned more than the president of the country, 19 of whom worked in schools with very low quality standards.
- Data was also provided on average teacher salaries in Mexico (1,954 dollars) and irregularities: the highest paid teacher earned $46,849, and a school with only one student had six employees with salaries of $6,644 per month.
- Awards for educational programmes that were not being implemented and non-existent schools with teachers on the payroll were identified.
- Prior to the report's release, 10 states initiated audits, while payrolls became the responsibility of federal, rather than state, government.

Free access to information has not only greatly increased institutional transparency with regard to citizens, but has also empowered them to become involved in and contribute to the cause. The impact of "Mejora tu escuela" may be described as increased awareness of citizens' responsibility for education and increased reporting of corruption in education in Mexico.

Relationship to other cases

As seen in the other use cases, education has also boosted the creation of other open data-based projects to support educational improvement. This is the case of the UNESCO-led CapEd project, which aims to connect education laws with data and support states in using them to define national plans to achieve SDG 4.

This project provided a variety of benefits for education development, such as supporting the development of new education plans in Haiti, Madagascar, Democratic Republic of Congo and Senegal. In these countries, national statistics teams were set up to conduct self-assessments on available data sources and data quality to identify development needs based on data analysis.

In addition, the School Cuts project sought to highlight how education cuts in the UK were affecting individual schools. By providing impact data, it gives citizens information on government action in education so they can see how it affects local schools.

Lessons learned and vision of the future

Analysis of the main lessons learned and challenges faced in this project highlights the following points:

- Cancellation of standardised testing. Given the unease caused by reports of corruption in the education system, teacher groups exerted pressure that led to the cancellation of the national standardised testing programme.

- Access to data. Bearing in mind the information on malpractice revealed by the open data, it was not easy to access basic information from the outset. This means the available data cannot be considered 'open data', but rather a combination of open data, data provided by institutions and information gathered from a variety of sources and citizens' participation.
- Data quality. In addition to difficulties in accessing the data, there were also problems with the data quality, given the low quality of data collection.

Finally, in order to continue adding value and contributing to educational improvement through data, the "Mejora tu escuela" project has presented the following **lines for future work**:

- Further developing the "Mejora tu escuela" initiative to link needs to specific actions. For example, one of the main forms of cheating in the country has been identified as teachers giving answers to students during exams. To improve this situation, the project is working on a monitoring mechanism by families, who set aside one day a year to go to classrooms and check exams to ensure these practices do not occur.
- It also aims to provide more detailed information on school budgets and access information on the education costs in the country.
- In addition, it intends to work on a standardised methodology for reporting problems in schools, so that when families face certain situations (such as bullying, abuse and bad practices, among others), they can follow a standard reporting method. This is expected to make it easier to inform the authorities and combat malpractice in schools.
- Finally, it also seeks to ensure information is converted into action, while continuing to take into account the impact of the initiative, from opening up data to improving the education system.

Natural disaster in Nepal

Open data-based earthquake recovery in Nepal

Natural disasters are natural events or phenomena such as earthquakes, floods and landslides that cause loss of life and property.

Earthquakes are one of the worst and most shocking natural disasters. As Nepal is one of the most seismically active countries, it is also among the worst affected by earthquakes. The country suffered 13,600 deaths between 1900 and 2011 due to 6 major earthquakes. More specifically, in April and May 2015 alone, 8,898 people were killed and 22,300 injured in a series of major earthquakes, the largest with a magnitude of almost 8 on the Richter scale.

The effects of these earthquakes on the country are devastating. Nearly half a million homes were destroyed and more than 250,000 damaged. Infrastructures were also affected, including schools, hospitals, transport, power supplies and agricultural land. An estimated 8 million people were affected, i.e. one third of the Nepalese population.

Moreover, the impact of the earthquakes was magnified by the poverty and low levels of development in the country, one of the poorest in Asia.

In 2014, the first companies working for transparent and accessible use of open data for Nepalese civil society began to appear. However, according to the Open Data Barometer (ODB 2015), only 15 out of every 100 of the country's inhabitants have Internet access.

Following two devastating earthquakes in 2015, Nepal faced a long and costly road to relief and recovery. This is why Nepali open data activists chose to look for ways to use open data to identify citizens' most urgent needs, target relief efforts in the most effective way and ensure that aid money reached all those affected.

This led to a number of initiatives based on post-earthquake mapping that were used by relief agencies, alerting rescuers to Nepalis in need

of urgent assistance, providing opportunities for citizens to share their views on recovery with the government, and ensuring fiscal accountability of aid money through transparency portals.

Data-driven disaster preparedness efforts and use of local knowledge, expertise and connections greatly enhanced the success of post-earthquake open data projects. The initiatives analysed in this case study show the potential of open data to inform public data collection efforts, thus helping to save lives and contributing to more effective aid efforts.

In this use case, different actors were involved, each taking on different roles in the value chain through open data. Each of the participating bodies and organisations undertook the tasks of data collection, provision and use.

The organisations involved are described below:

- **Kathmandu Living Labs** (KLL) is a non-profit civil technology company working to create technology to transform city governance.
- **Young Innovations Ltd** is a local technology company that aims to establish open data as one of the priorities of the Nepalese government.
- **Local Interventions Group** is a non-profit organisation that seeks to improve government and cities through the use and analysis of open data in the Global South.
- **Open Nepal** is a local knowledge and learning hub whose aim is to produce, share and use data for the country's development.
- **Code for Nepal** is an American non-profit organisation that aims to empower Nepal through digital literacy in the country, including access to open data and the creation of software apps to serve the public.

Open data

As noted in the previous section, a number of organisations and initiatives emerged to mitigate the effects of earthquakes through open

data. Consequently, each one took different approaches and made use of different sets of open data, as described below.

Kathmandu Living Labs

The initial project consisted of building a map of all schools, hospitals, roads, places of worship and other geographical locations on the ground in the capital.

When the 2015 earthquakes struck, the organisation managed to coordinate the work of more than 8,000 people to build a map of the affected areas. Through Nepali citizens' social media, they were able to identify the most affected areas. The resulting map was used by emergency services, rescue teams and the military to plan actions and allocate resources.

The KLL also used their data to develop QuakeMap, a website where users could report their basic needs in real time to organisations. This meant the public were able to help improving the response by reporting cases of people trapped, identifying damage to infrastructure and requesting assistance for food and water. In addition, once needs and relief were covered, the database was updated to avoid duplicating resources.

Open Nepal and Young Innovations

These two organisations launched the Earthquake Response Transparency Portal initiative by adopting the standards of the International Aid Transparency Initiative (IATI). This portal managed and centralised national and international donations to help alleviate the effects of the earthquake, applying the premises of transparency and ensuring necessary resources were available for priority issues.

The portal also provided information on where and how funds had been used, giving details on the final result of the investment, in order

to guarantee the transparency of the resources and avoid duplicating investment.

The main users of the application were journalists, who consulted it to verify donors' intentions. Other potential beneficiaries of the information were the donors themselves, who could see where their money had actually gone, NGOs looking to research potential donors and areas of interest for other projects, and finally the government, to plan their contributions to reconstruction.

Code for Nepal

In this case, the organisation sought to provide humanitarian assistance to the regions most affected by the earthquake beyond the capital. In doing so, they had already organised and developed a document to list all information on relief agencies, volunteers and victims just 36 hours after the earthquake. They also surveyed survivors to get feedback on what kind of help they had received. All these results were freely published as open data.

Local Interventions Group

This group used open data to guide the emergency response. It helped set up a telephone hotline, identified the needs of people affected to send the most appropriate aid, developed a platform for affected communities and conducted situational awareness surveys among Nepalese citizens.

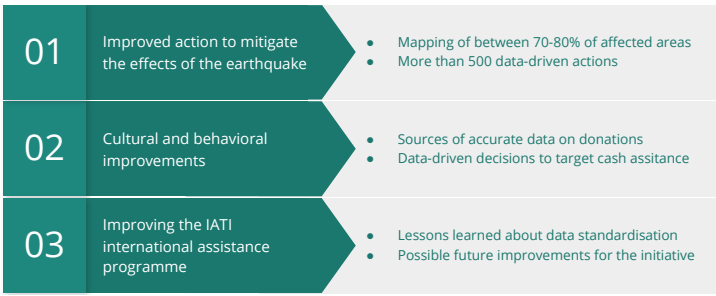
Who's Doing What Where

Finally, in addition to the above projects, several organisations sought to use data to improve efficiency and transparency in the country's recovery efforts.

One of the most notable examples was the Humanitarian Data Exchange (HDX), an open platform created to share data to guide humanitarian aid.

The Nepal - Who's Doing What Where project focused on home recovery data: it collected data from 14 districts on what projects were being implemented, where, when and by whom. Data on the status of the projects is updated as they advance.

Impact



The success and impact indicators for the project fall into two broad categories:

- Metrics and use cases, generated through earthquake mitigation efforts using open data.
- Changes in organisational, political and social culture and behaviour, generated by experience and lessons learned from the projects.

Metrics and use cases

As mentioned above, the KLL produced a map of all buildings, infrastructure and areas of interest in the capital. This meant that, after the earthquake hit, aid was provided to 70-80% of the affected areas. The same map was used by the Red Cross to deliver resources and save lives.

Estimating the value of the portal is complicated, but more than 2,035 situations of need were reported, 978 of which were verified by volunteers and more than 500 of which led to tangible actions.

Changes in culture and behaviour

The earthquake response transparency portal was used by international journalists to find evidence to support their articles. Even the BBC used the portal to track the government's use of funds.

Nepali citizens used the portals to find out where donations were spent.

There were also requests to increase the level of detail in the data by district, although the nature of the data made it difficult to provide this information.

Improving the IATI programme

The transparency portal that emerged in Nepal shed light on some of the limitations of the IATI initiative in terms of emergency reporting, thus contributing to possible future improvements.

The transparency portal developed by Open Nepal and Young Innovations managed to centralise and immediately report data on the crisis and its aftermath. Thus, the IATI team was able to work with data that was already standardised and processed.

Relationship to other cases

Many of the projects arising in response to the aftermath of earthquakes in Nepal were based on previous experience with the 2010 earthquake in Haiti. In that case, the response suffered from poor organisation and lack of transparency for the island's inhabitants. Lessons learned from Haiti helped improve the response in Nepal.

After observing the importance of maps for recovery action in Haiti, in Nepal they were aware of the low quality of official maps, which is why the Kathmandu organisation worked to produce maps of the country and its facilities.

Transparency was also an important consideration after the Haiti experience, where there were major discrepancies in the management of donations, especially in the case of the Red Cross, who detected a missing 500 million dollars.

Also worth mentioning is the Ushahidi project, on which the above-mentioned KLL QuakeMap project was built. This technological organisation develops tools and services that enable people to generate solutions and mobilise citizens. Their software is open source, thereby empowering users to collect, analyse, respond and act quickly based on data.

Finally, another similar case is the experience of Mexico, where, after the 2017 earthquake, a diverse group of citizens came together to form a horizontal cooperation system, with the aim of organising themselves to combat corruption, lack of organisation, inaccurate information and other problems when responding to the natural disaster. This collaboration produced a variety of tools to tackle the situation in the country, including heat maps by concentration of people, algorithms to identify fake news and automatic chats to find missing persons.

Lessons learned and vision of the future

A number of lessons with wider applicability emerge from this use case, as listed below.

Firstly, the following important aspects stand out as they facilitated the smooth development of the initiatives:

– Lessons learned from the Haiti experience helped provide a better environment for action in Nepal.

– The government engaged in a variety of projects, promoting innovation for the public good.
– The involvement of international organisations, who provided tools and knowledge for the Nepal case, and users' contributions to find solutions to data issues.
– Relationships and trust between different actors working on data projects, from data experts to the government.
– The role of volunteers, while both a potential barrier and a positive aspect, is seen as a major benefit, as they can address different issues. In addition, local volunteers provide on-the-ground knowledge based on their own experience, which is vital in such cases.

However, a number of **obstacles** were identified, as listed below:

1. Lack of connectivity and technological literacy: lack of technological skills was one of the main barriers to the project. Many of the users of the different projects did not have Internet access. Apart from connectivity problems, there were also limitations caused by users' lack of experience with this technology. Women, rural communities and ethnic minorities in Nepal were at a particular disadvantage in this area.
2. Creation and use of data: a problem arose with focusing on data creation rather than prioritising its usefulness and reliability.
3. Institutional culture: institutional data culture in government and society always plays a key role in determining whether open data projects are successful. In this case, the problem was the institutions' lack of an open data culture, which led to poor levels of detail in many operations, such as where funds were spent.

In terms of the **vision of the future**, most of the projects mentioned in this report were short- or medium-term projects in response to the Nepal earthquake and were not intended to last beyond the earthquake recovery phase. The projects were therefore temporarily shut down as they are no longer needed. Projects tasked with collecting survivors' experiences are still ongoing, as interviews are still under way. The earthquake response transparency portal is still active and focuses on the reconstruction of the country in the coming years, by

providing a tangible and structured means of managing and organising all the work, while helping identify where all the money has gone in the country, a basic need at the current moment, as citizens' oversight and data use are crucial.

Gender violence in Colombia and Venezuela

Open technology and data to help improve situations of gender-based violence

Gender equality is not only a fundamental human right, but also an essential foundation for building a peaceful, prosperous and sustainable world.[22] There has been significant progress towards equality in recent decades: between 2000 and 2017, 274 laws to promote gender equality were passed in 131 countries, equal gender numbers were reached in schools, on average, and the maternal mortality ratio was reduced by 38%.

Yet despite such positive figures, there is still a long way to go to ensure women's rights: only 1 in 4 positions in national parliaments are held by women; women aged 25-34 are 25 per cent more likely to experience extreme poverty and 190 million women of reproductive age worldwide have no access to contraception despite wanting to avoid pregnancy.

A further issue is gender-based violence, one of the most extreme manifestations of inequality between women and men. Eighteen per cent of women have experienced sexual and/or physical violence at the hands of their partners. Furthermore, only 40 per cent of women who experience violence access support services or seek justice, highlighting barriers to access and lack of trust in the justice system.

The **Gender Data Kit**[23] (GDK) was set up to contribute to the fight for gender equality, providing a set of technologies, feminist methods and resources to support gender-related data projects. All of this is developed as open source.

The first use case arising from this technology is called "**Cosas de Mujeres"** (Woman things). The project introduces a WhatsApp-compatible

22 United Nations. Goal 5: achieve gender equality and empower all women and girls.

23 Information provided by Alex Berryhill, Director of Digital Operations at Gender Data Kit.

platform to connect women to gender-based violence services, while generating action-oriented data.

In the context of the largest migration crisis in recent history, gender-based violence on the Colombia-Venezuela border has become a hidden epidemic.

The issue is exacerbated because the women lack information on where to go to seek help, while people and organisations working in the field lack precise, usable information, preventing an effective response to improve women's situation.

To help in this situation, Ladysmith works to apply the technologies, methods and resources from the Gender Data Kit. Together with grassroots feminist organisations, they work to identify services for women and understand how much access women have to technology.

A WhatsApp platform was created using Gender Data Kit technology to connect Colombian and Venezuelan women with the necessary services, i.e. they could ask for help or make enquiries via a WhatsApp chat. This allowed women in need to obtain help and guidance, while generating data on cases of gender-based violence in the region.

The **Cosas de Mujeres** initiative operates in the following way:

- They connect with local women's networks and grassroots organisations to build trust in the communities. Thus, they are able to connect with women who would otherwise have no access to the Internet and mobile technologies, and thus reach them with their services.
- They connect data to the impact. They analyse the data they collect on their platform and generate useful information to share with humanitarian aid organisations, who can then adapt their actions to women's needs and ultimately generate a positive impact.
- They make the data accessible. As mentioned in the previous point, to improve the situation with regard to gender-based violence, they analyse the data they collect to make the information accessible.

They produce reports and conduct data workshops, among other activities, to ensure the information extracted from the data improves the situation of migrant women suffering gender-based violence.

The project promoter is **Ladysmith**, a feminist research consultancy. The organisation makes women and their experiences the focus of building a more equitable world. Based on the principle of "no research about us, without us", Ladysmith works with international organisations to collect, analyse and make decisions using gender data.

Its main lines of work are: research and data collection, strategic advice and reporting research.

The organisation defines its approach as both technical and structural. They work to collect data to help identify and change beliefs, practices and policies that contribute to gender inequalities. They combine qualitative and quantitative research methods, analytical rigour, familiarity with women's movements, open source data collection technology and public communications expertise to produce gender data with impact.

Open data

In this case, Ladysmith does not rely on re-use of open data, but rather it is the organisation itself that collects data and then makes it and related information accessible, to impact on decision-making in favour of women's rights.

Through the support contacts on WhatsApp from women in situations of violence, data is generated that provides knowledge about their situation. By obtaining data on the number of cases, where they occur and the types of violence, institutions acquire information on which to base subsequent decision-making.

Thus, Ladysmith generates public reports with their data and publishes the information and knowledge it generates. They also provide context

for the problem, present the main findings and problems identified and, bearing in mind their grassroots knowledge and contacts with local organisations, offer recommendations for action based on the above results.

This project gives a different perspective on the practice of publishing information. The organisation states that they are not currently considering publishing the data from the WhatsApp platform, given the sensitivity of the information and the need to anonymise cases and experiences that the women share. However, they have found an appropriate way of extracting valuable knowledge for decision-making, ensuring the above-mentioned goals and focusing on improving women's situations.

Impact

Considering that the initiative is still operational, a comprehensive impact analysis is not yet available. However, initial figures and dataon its success and some of its success stories, where the initiative has contributed directly to women's situation, have been released.

Currently, the initiative's three areas of impact are:

- Scope of the initiative: women who have been reached.
- Uncovering issues: uncovered thanks to the platform and the data it generates. Also from the success stories where actions have been taken for the well-being of women after uncovering an issue.
- Recommendations for action: conclusions drawn from the analysed data.

Scope of the initiative

Between March 2020 and March 2021, the Cosas de Mujeres platform exchanged over than 9,000 messages with women. Many women placed their trust in the team, to solve their needs, clear up doubts or ask for help in difficult situations.

Uncovering issues

The initiative revealed that one of the reasons women do not access the available services to help them in situations of gender-based violence is that they cannot afford to pay for transport to get there. The organisation contacted donors to create a mobile unit to take their services to the women, so they did not need to travel, and guarantee they receive the necessary help.

Moreover, the platform has also revealed figures and cases of violence and related needs.

A total of 446 cases of violence were identified, including physical, psychological, economic and general violence (abuse in hospitals, xenophobia and unspecified mistreatment). Various qualitative findings were also provided to supplement the figures. Some of these are highlighted below:

- Women in Cartagena have no safe place to escape situations of violence and, in many cases, this means they either stay in a violent home or have to choose to live on the streets.
- Women's mistrust of available services was identified, resulting in them avoiding attending state services.
- Women who seek help at night or weekends have more difficulty accessing gender-based violence services, putting their lives at risk.
- The dynamics of semi-virtual services delivery lead to confusion and dangerous delays in cases of gender-based violence.
- Some 27% of women who wrote to Cosas de Mujeres were seeking sexual and reproductive health services, i.e. gynaecological check-ups, STD and HIV testing, contraception and abortions.

– Women describe how little help they receive from the police, who ignore their alerts or are exhausted in the face of recurrent violence.

Recommendations for action

Finally, the seven reports produced so far offer a variety of recommendations for action to the authorities, based on messages received and knowledge generated by the initiative. Each of the reports concludes with recommendations based on the results obtained, including:

– With the arrival of COVID-19, the organisation recommended providing guaranteed phone services and resources to assist women.
– The opening of a shelter for women in situations of violence was recommended, to help them leave these situations.
– Ensuring services for women function at all times, with special emphasis on the most vulnerable moments: evenings and weekends.

Relationship to other cases

There are also a variety of projects on gender violence that aim to tackle gender issues through open data.

The "Desprotegidas, a pesar de todo!" (Unprotected, despite everything!) initiative provides visualisations and information on gender violence in Catalonia based on open data. This project aims to provide a fuller understanding of the situation of women in Catalonia and a variety of information on gender violence.

Further projects, "Dades X Violència X Dones" in Catalonia and the similar "Datos X Violencia X Mujeres" in Spain (Data on violence for women), are web portals with interactive visualisations analysing the impact of gender violence from 2008 to 2020. Data is also provided on sexual violence and the impact of COVID-19 on gender-based violence. In short, the purpose of these portals is to make information available to the public in a simple, visual and accessible way.

Lessons learned and recommendations

This case provides a different view of the concept of open data and information. Although the project does not reuse or generate open data as such, it does consider publication and openness for the information generated from the data, which is what can generate impact.

As recommendations, the organisation highlights the following principles, on which the Gender Data Kit project is based:

1. Let there be no research on us, without us. The organisation focusses on women's research and it is women who analyse their own situations around the world.
2. Use the feminist library. The team searches for feminist scholars to inform its analysis of inequality, poverty, violence and insecurity.
3. The gender gap is also qualitative, which is why the organisation does fieldwork to directly learn from and listen to women's situations. In this way, they believe, trends can be identified and the quality of the statistics assessed.
4. Institutional ethnography. They also highlight the importance of qualitative mapping of policy and programme implementation to highlight gaps in quantitative evaluations.
5. Think intersectionally. Gender is addressed by taking into account other factors for inequality, such as class, geography, race, age, history and sexuality.
6. Open source technology. Digital tools help collect quantitative data to identify gender gaps in a variety of fields. Using open source tools means they can continue to be used over time and any person or organisation can track progress over the long term.
7. Stories are data with soul. The organisation sees the importance of putting gender data into historical, political and economic context. Thus, they report results in a way that compels people to take action.

In addition to the above, the organisation also has several **future lines action** to continue applying Gender Data Kit technology and knowledge. Some of these are highlighted below:

- Investing in more research to track the life cycle of their data and its impact.
- Addressing abuse and disrespect in maternity health services, to help ministries of health improve women's access to dignified treatment.
- Considering women's experiences of climate change, and their proposals to mitigate the situation.
- Collecting stories from peace processes to provide organisations with data on violence in these contexts.
- Strengthening social protection systems by monitoring and evaluating implementation processes from a gender perspective.

COVID-19 in Spain

Promoting research into COVID-19 by opening up data

The world is currently facing an unprecedented global health crisis:[24] COVID-19 is spreading human suffering, destabilising the global economy and drastically changing the lives of millions of people around the world.

In this context, many initiatives and projects have emerged worldwide to alleviate the effects of the pandemic and contribute to a rapid recovery. As on other occasions, we see how data can be used to make more strategic and timely decisions with the right tools and information.[25]

With this goal in mind, Sanitas Data4Good[26] launched the **Open Data Covid** initiative, whereby the organisation opened up private data and made it available to the scientific and academic communities. This data provides secure and pseudonymised information on COVID-19 patients treated at the company's medical centres, guaranteeing the protection of the individuals behind the data at all times.

An open platform available to the general public was created, through which data can be requested by organisations, public and private institutions, companies, associations, individuals and legal bodies. They must, in all cases, justify that their data requests are for research purposes and not for profit.

To ensure this, the requesting process is subject to evaluation by an internal Sanitas data use committee, that approves requests on the basis of two key variables: the intended use of the data and the relevance of the proposed studies to society. The main objective is always

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24 United Nations. Goal 3: ensuring healthy lives and promote well-being for all at all ages.

25 Kai Kaiser and Tiago Carneiro (2020). "How governments can use data to fight the pandemic and the accompanying infodemic".

26 Information provided by the Sanitas Data4Good team.

to ensure that the data can never be used for commercial purposes, neither by Sanitas nor third parties.

Once the request is approved, the person or persons concerned are informed and have access to a single record for a limited time. During this time, users have complete access to the data, databases, graphs and information tables.

Open Data Sanitas created the Sanitas Data4Good initiative to contribute to society through data, with a special focus on the field of health and well-being. The area seeks to contribute to SDGs 3 and 17, improve health indices in society and generate partnerships to meet the challenges.

The team stresses this project as one of the key commitments by the Sanitas Data and Sustainability Area, although the whole organisation has been involved in the background and all areas of the company have participated: hospitals, legal and privacy department and the communication area, among others.

This initiative is in line with the HM Hospitales Covid Data Save Lives dataset. The group opened its data during the first wave of the pandemic and Sanitas identified the importance of helping provide information for COVID-19 research.

Open data

The project collects and publishes data on COVID-19 patients treated at Sanitas medical centres, which includes demographic and clinical information that could be relevant to COVID-19 research.

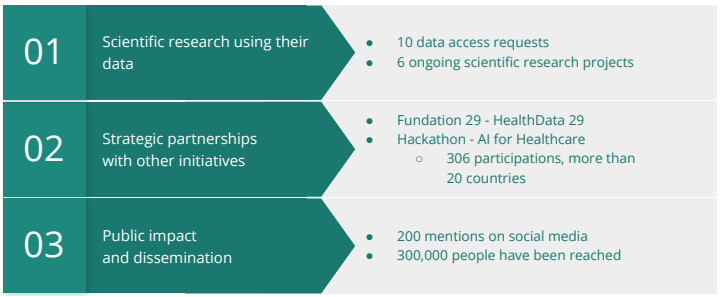
The following tables are available for re-use by the organisation:

– **COVID-19 patients**. This provides information on patients' socio-demographic profiles and the general treatment process, such as hospital admission date, first diagnoses and vital signs on admission.

- **Medication**. Information on drugs given to patients.
- **Information on vital signs on the ward**. Vital signs collected from patients during their stay in hospital.
- **Laboratory information**. Results of tests requested for each patient during admission and in the initial emergency treatment.
- **Patients' ICD-10 codes**. Information on diagnoses, procedures and associated neoplasms during admission to Sanitas hospitals and historical information collected during the first 20 days of admission.

Impact

The impact generated by the initiative is analysed below. It should be noted that this is an on-going project and therefore its impact is still developing. Therefore, only the initial impacts from the project are provided. Over time, it would be worthwhile tracking all the benefits generated by Sanitas Data4Good to health research and, consequently, people's lives.



The launch of the initiative was reported publicly over various channels, with the aim of reaching the worldwide research community so they might make use of the data. This had major repercussions in the public sphere, with more than 50 reports in the general and specialised national media. It has also been widely shared on social media, with nearly **200 mentions, and has reached 300,000 people**.

Sanitas Data4Good has been presented to several medical scientific societies, as well as universities, committees, clinical research-related

foundations and data-related technology centres. In all cases, the team has been very well received, given the importance of this type of project to continue improving scientific knowledge through data use.

Although the team is unaware of any direct inspiration from similar initiatives, they have received proposals for collaboration from a number of organisations, whereby they hope to expand the project in the coming months.

As well as the public repercussion and the scope of the initiative to date, the different **research projects carried out using Open Data Covid are explained below**. Before going into detail, the team highlights two important points to bear in mind: firstly, as mentioned above, this is a new initiative, launched at the end of February 2021, and is therefore still developing; secondly, although data requests are open to any individual or organisation, use of the data must be non-profit and for research purposes.

During the first four months after the launch of the initiative, a dozen requests for access to the dataset were received, six of which were approved, two denied and two are still pending evaluation.

The approved applications worked on the following research:

- **Epidemiological models**. This research exploits data with the aim of estimating infections in a given population, using other accessible values and partial information.
- **Neurological involvement**. This case analyses data from patients with Parkinson's disease and comorbidity with COVID-19.
- **Thromboembolic cases**. This studies the influence of COVID-19 on the incidence of deep vein thrombosis (DVT) and establishes prognostic factors.
- **Treatment optimisation**. Creation of a machine learning model to help answer certain questions arising in the clinical context of hospital management, such as the risk of death or ICU admission, expected length of stay and the effectiveness of different treatments.

- **Response to drug treatments**. Prognostic biomarker models were constructed to identify the response to drug treatments in patients admitted for the SARS-CoV-2 virus. The aim is to assess their effectiveness, adverse effects and the profile of patients who benefit from these treatments.
- **Patient profile**. In this case, the aim is to analyse people infected with COVID-19 and try to find correlations with demographic and/or economic variables.

One of the most advanced research projects is now complete and under review for publication in the *European Respiratory Journal*.

However, most for the research is still in progress or at the stage of publication as a scientific article. Hence, the results and benefits of the research are not yet known. Whatever the case, simply contributing data and information to the research is a major impact in itself, considering its potential and contribution to knowledge on the disease caused by the SARS-CoV-2 virus.

Additionally, the Sanitas Data4Good organisation itself is starting a comparative study of patients from the different waves. They are also working on a dynamic model they are training to predict patients' daily course.

Finally, **partnerships and alliances** with other organisations and measurements of the initiative's impact are also planned. As part of their contribution to SDG 17, the team sees cooperation between organisations as essential to making the most of the data for the benefit of society.

They point out that the data they have opened up contains information from patients treated in the four Sanitas hospitals, which means there is an initial bias, given that their patients have a specific profile and are residents of Madrid or Barcelona. Thus, working with other institutions and organisations is important, in order to broaden the scope and results.

In this regard, Data4Good is very much in line with the European Commission's push to create a European Health Data Space, especially in terms of supporting research on new preventive strategies, treatments, medicines, medical devices and outcomes.

With all this, the organisation has tried to establish contacts with organisations that would enable the initiative to grow. This has led to two collaborations:

- **Foundation 29**. This organisation is the creator of HealthData 29, a platform for sharing datasets for research purposes. Sanitas Data4Good established an agreement to connect the data from the Open Data Covid initiative to its platform to reach a larger number of research projects into rare diseases.
- **Microsoft and Stratiteq**. Sanitas Data4Good, together with these two companies, organised a hackathon on artificial intelligence (AI) applied to the world of healthcare, the AI for Healthcare Hackathon. This hackathon aimed to design and develop AI-based solutions in the field of health and well-being. There were 306 participants, in 37 teams from more than 20 countries.

  The role of the Sanitas team was to propose one of the hackathon challenges and provide data. Specifically, they set the challenge of obtaining predictive models on the course of patients, epidemiological models, information on treatment responses, knowledge of the virus for the creation of a vaccine and socio-demographic data on the impact of the virus on the general population, through a dataset from several hospitals.

  Sanitas Data4Good also participated in the panels to inspire the participants and provided mentoring for some of the teams to help them build solutions and convey the real challenges faced by healthcare workers.

Finally, potential partnerships are also being developed, including one with the Massachusetts Institute of Technology (MIT) and another with the Instituto Tecnológico de Informática (ITI).

Relationship to other cases

As initially mentioned, the initiative is based on a similar, previous experience by HM Hospitales. The **Covid Data Save Lives** initiative provided a database of clinical information for the international medical and scientific community. This database contained anonymised data on patients for COVID-19 treated in their hospitals and collected information on their interactions in the treatment process, diagnosis and ICU stays, among other things.

Through this initiative, HM Hospitales encouraged other institutions to share their information, with the aim of providing the health and scientific community with clinical data to obtain predictive models of clinical courses, epidemiological models and information on response to treatment. In short, knowledge about the behaviour of the virus for the creation of the vaccine, as well as socio-demographic data on the impact of the virus on the population.

The Sanitas Data4Good team has worked closely with HM Hospitales, provided a source of inspiration for its own initiative and worked together on different challenges. This was the case of the hackathon organised by Sanitas with Microsoft, in which both companies made their data available to participants and jointly proposed the challenge of providing more knowledge on COVID-19: “Leveraging Clinical Data to Advance on the Clinical Management of COVID-19 (Hospital Data Set): use of open datasets containing anonymised EHR data from thousands of COVID-19 sufferers to advance our knowledge, prediction, treatment and overall understanding of COVID-19”.

Furthermore, as mentioned in the previous section, Sanitas joined forces with Foundation 29 and contributed its data to the latter’s data repository, with the aim of making data available to the scientific community to advance the study of rare diseases. This organisation does not manage the data, but acts as a repository for data from other organisations, making it available to scientific communities.

Lessons learned and vision of the future

The Open Data Covid initiative provides an excellent example of the value of open data and how useful private data can be if opened up. Sanitas Data4Good is a good benchmark for this practice, as it provides valuable information for medical research with a potentially major impact on society, while guaranteeing secure access to data and anonymity of individuals at all times.

The Sanitas Data4Good group highlights the main **lessons learned** extracted from the initiative below:

- Great potential of using data to improve the health and well-being of society: they see this initiative as the start of more projects using data as a tool for public good.
- The team considers it essential to work with different actors to develop and promote this type of project.
- The amount of data available on health is considered limited in many cases. Therefore the right conditions must be created to ensure data culture permeates society and explain the major potential benefits from improving the availability of data for health research. In addition, it is important to continue to ensure data security and privacy with the relevant legal framework, while allowing and encouraging the use of data for people›s health and well-being.
- Creating clinical databases is a complex and partly manual task, given the large number and heterogeneity of sources that have to be integrated. Investment in processes, systems and technology is necessary (e.g. health data lakes) that already integrate anonymised information and ensure quality. This will help accelerate research initiatives.
- Clinical data generated by organisations or clinics (e.g. a specific medical provider) have many biases, stemming from the type of care, geography and patient profiles, among other things. The real potential comes from integrating diverse clinical databases.
- It is also important for clinical databases in the future to adopt common formats, structures and coding (CIE-10/FHIR), which will help speed up the information integration and, consequently, research.

- Open innovation and open data are great tools to accelerate innovation, but well-defined frameworks are needed to make the most of the initiatives and the ecosystem. For this reason, it would be useful to establish common scenarios aimed at facilitating information sharing and innovation, putting the focus on benefiting people.

Based on what it has learned, the Data4Good team shares a series of **recommendations** from their experience in opening up private data. Although they consider themselves in the process of learning from the initiative, they recommend the following points as basic aspects for launching similar projects:

1. Data privacy from the start. Technical and legal constraints and limitations must first be identified before extracting information and creating databases. This identification is required if information is to be shared while maintaining the privacy of individuals and complying with legal requirements.
2. The need for investment in new information management and exploitation systems and technologies in the field of healthcare.
3. Share the experience with other public and private actors, understanding collaboration as a key to success.
4. Start with small cases to learn from and improve, controlling their complexity from the beginning.

Besides these recommendations, the following **limitations and areas for improvement** were identified by the team:

– Technical and resource constraints. Creating public databases is a costly undertaking, which limits the number of use cases that can be launched in a given period of time.
– Investment in new health information management and exploitation systems and technologies is needed to achieve better results.
– A clear, common framework is needed for such initiatives at national, European and international levels.
– Need for public-private partnerships.
– Need for access to more data and of adequate quality and processing.

Given the above, the next steps in the Open Data Covid initiative are: the COVID-19 initiative platform will remain open and available for research, pointing out that they have recently updated it with new data. At the time of its launch, there were about 1,000 records; now, with the new update, they have doubled the number of cases available in the datasets. They are also working to include X-ray images, at the request of research groups, which can improve the data quality, broadening the possibilities and scope of the initiative.

The Sanitas Data4Good team has shared its **vision of the future** for the initiative and the opening of data in the health field.

Sanitas Data4Good is an open data and social responsibility initiative by the company, whose objective is to provide value to society through data in the areas of health and well-being. With this objective in mind, the idea is to explore further ways of contributing value to society through data, whether through new datasets, open innovation projects, developing precision medicine initiatives or expressing their opinion when disseminating data culture for the public good.

Along these lines, its most immediate project is to open a new dataset to promote other areas of research beyond COVID-19. Sanitas not only has hospitals and medical centres, but also an extensive network of old-age homes and day centres with approximately 6,000 residential places and 45 nursing homes in 11 autonomous communities. For this reason, they would like to promote health research related to the elderly, while a new open health data-based initiative related to older people will be published in the coming months.

Besides this initiative, they will continue to work on partnerships with actors in the data ecosystem to expand the project, seeking common ground with government agencies, scientific societies and universities, and will be open to any opportunities that allow them to bring value to society.

Providing a broader vision of the future regarding the opening of private data in the health sphere, the team considers that the future lies in collaboration between all the actors in the sector, with a common, well-defined framework that focusses on the benefits of patients and society.

They also consider it necessary to modernise and increase the sophistication of health information exploitation and management tools, based on technologies compatible for all the different actors. This would facilitate information integration and ensure privacy and security at all times. Sectors such as artificial intelligence are advancing at a good pace and data must be able to keep up so that health research can progress.

Finally, the Sanitas Data4Good team stresses they would like their initiative to be a source of inspiration to other public and private bodies, as only by all parties coming and working together will truly relevant data that maximises its value for society be obtained.

Thus, they consider the role of government agencies in creating spaces for public-private partnerships to be especially important.

In this case, collaboration has come from the Sanitas Data4Good team, which has provided a large amount of the available information, along with that provided by the website.

We thank the entire team for their time and the information and lessons they have provided us with for this publication.

Iinitiatives in Catalonia

Initiatives in Catalonia using open data to fight COVID-19

As we know, COVID-19 pandemic experienced over the last year has spurred numerous data-driven initiatives and projects around the world. Similarly, at our local level, efforts have been made to enhance the value of open data, while projects have been set up using these data with the same common goal: understanding the course of COVID-19 and contributing to reducing its impact on people's lives.

There are more than 40 databases on COVID-19 in the open data catalogue, with a variety of information on the disease, registered cases, socio-demographic data on the affected population and vaccination follow-up, among others.

In addition, over 30 open data reuse tools have been built to monitor the development of the pandemic in Catalonia and/or visualise its impact:

- With the arrival of the pandemic, the UPC-BarcelonaTech BIO-COM-SC research group began working intensively to help understand and predict its course. Thus, information documents and daily reports are generated to assess the situation and make forecasts in the Catalan, Spanish and European spheres.
- The CiBA's DataLab gender and open data observatory, together with the Barcelona Open Data Initiative, created an open data visualisation portal on the impact of the COVID-19 pandemic on women's lives and another specific one on the impact of COVID-19 on gender-based violence.
- Visualisation portals were also created in the economic field to ascertain temporary lay-off numbers among workers and the economic impact of the pandemic on the Catalan area.
- Initiatives by data analysts were also encouraged, such as the work by Gerard Giménez Adsuar, who has been sharing visualisations and data analyses on different aspects of COVID-19 over his Twitter account and website. His efforts have made the data accessible to the Catalan population, informing everyone on the state of the pandemic.

According to statistics on theuse of datasets in the Generalitat de Catalunya Open Data Portal in relation to COVID-19, there have been 269,125 visits to the COVID-19-related data one and a half years after the start of the pandemic, highlighting the need and significant use being made of it in Catalan society.

All these data and reuse tools have facilitated comprehensive monitoring of the course of COVID-19 in Catalonia to ensure decision are based on data. Analysing the impact of the pandemic on people's lives, from the impact on the economy and unemployment to data on gender violence in times of pandemic has also been important.

In conclusion, above and beyond all the benefits that open data has brought to Catalan society in fighting COVID-19 and its effects on society, these efforts have also thought to have contributed to improving the situation regarding open data. The lessons learned and knowledge gained from these projects and experiences will be of great importance in the future with regard to further use of data to benefit the public in numerous fields. Likewise, government authorities and institutions understand more than ever the need to open up data and make information available to the public, as a means of providing benefits on both sides.

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