

# Analytical Report n1



Analytical Report 1: Digital Transformation and Open Data

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<sup>i</sup> At the time this report was first issued the consortium consisted of: Capgemini Invent, Intrasoft International, Fraunhofer Fokus, con.terra, Sogeti, the Open Data Institute, Time.Lex, and the University of Southampton.

## Executive Summary

In this report, the relation between Open Data and Digital Transformation is studied. Nowadays, a substantial amount of online information has initially been collected by the public sector and published as Open Data. Open Data refers to information that can be freely used, modified, and shared by anyone for any purpose. The re-use of Open Data has a high potential, especially in the creation and delivery of new products and services.

Given its potential, Open Data offers an excellent opportunity in assisting organisations in achieving Digital Transformation. Digital Transformation is the increasing adoption of digital tools and technologies by any organisation to fundamentally alter both its internal and external processes and functions. Aim is to radically improve performance or reach of organisations. Digital Transformation consists of three key areas every organisation needs to focus on: customer experience, operational process and business model. Each key area consists of three building blocks for Digital Transformation.

In order to study the relation between Open Data and Digital Transformation, more than 600 use cases from the private sector were gathered, from all over the world. The Digital Transformation model (DT model) was used as the main model to describe organisations' relationship to Open Data, focusing on:

- The way Open Data is re-used by organisations;
- Which pillar of the DT model the use of Open Data relates to;
- The different markets and industries in which Open Data is re-used.

The results of the study show that Open Data is used the most in three of the nine buildings blocks of the DT model: performance management, new digital business and customer touch points. However, the results show that Open Data is used across all building blocks of the DT model.

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### *Open Data is used across all sectors*

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Regarding the re-use of Open Data, the IT sector is the largest sector to re-use Open Data. Furthermore, the public sector is also a large re-user of Open Data. However, research shows that Open Data is re-used throughout all industry sectors.

The most re-used data domains have been structured into three main categories: low-frequency re-use (< 5%), mid-frequency re-use (5-10%) and high-frequency re-use (> 10%). The high frequency domains overlap with the high priority domains identified by the European Commission.<sup>1</sup> Again here research shows that all Open Data domains are re-used.

Within this report, the type of Open Data re-user was also studied. The different types of re-users are derived from the Data Value Chain. The results show that enrichers represent almost half of the re-users (49.7%), whilst enablers were hardly found (2.7%). Enrichers are organisations using Open Data to gain new or better insights they can use to deliver in services or products to their customers – whether existing or often completely new services which could not exist without Open Data. Enablers provide platforms and technologies that other businesses and individuals use. The

aggregators of Open Data, organisations that collect and aggregate the data, represent 29.3% of the re-users. Developers are individuals or companies that analyse the data and create services and products. They account for 18.3% of the re-users.

Besides evidence of the relation between Open Data and Digital Transformation, barriers hindering the re-use of Open Data were identified during this research as well. The main barriers consist of:

- 🌐 Lack of awareness;
- 🌐 Lack of knowledge;
- 🌐 No clear governance;
- 🌐 Data quality;
- 🌐 Internal IT;
- 🌐 Licensing.

Finally, based on the findings described in the report, several recommendations are formulated. These recommendations are divided into two categories: recommendations for governments and recommendations for private sector organisations:

#### **Governments:**

- 🌐 Catalyse the growth of the economy through Digital Transformation by publishing Open Data;
- 🌐 Aim at publishing by applying the 'Open by default' principle;
- 🌐 Publish data under an appropriate Open Licence;
- 🌐 Actively search for interaction with re-users.

#### **Private sector:**

- 🌐 Start with Performance Management, Customer Touch Points or New Digital Business as a Digital Transformation step when using Open Data;
- 🌐 Start using Open Data as a resource today;
- 🌐 Re-use Open Data from any sector, not solely your own;
- 🌐 Choose an integral strategy for your Digital Transformation;
- 🌐 Start small.



## 1. Introduction

*“I believe that we must make much better use of the great opportunities offered by digital technologies, which know no borders.”*

- Jean-Claude Juncker<sup>2</sup>

Technology has become a dominant driver of change in today’s society and the internet is a prime example of one of the most radical technological changes since the invention of electricity. As Luciano Floridi from the Oxford Internet Institute says “We increasingly live in a proxy digital world. We cannot unplug our society anymore”.<sup>3</sup> This technological revolution offers an ocean of opportunity for businesses to develop new services and new products. With the sense of immediacy acquired via the internet and access to vast amounts of information, the game is changing.

The Internet has had an impact on society.<sup>4</sup> Information that was previously difficult to access is now available online. A substantial amount of information available online is Public Sector Information, published as Open Data.

Public Sector Information (PSI) is information collected by the public sector. The definition according to the OECD is that PSI is generated, created, collected, processed, preserved, maintained, disseminated, or funded by or for the Government or public institution.<sup>5</sup> Open Data must be

**Open Data**  
Information that can be freely used, modified, and shared by anyone for any purpose.

available under an open licence and provided in a convenient and modifiable form that is machine readable.<sup>6</sup> The European Union has issued legislation to govern the re-use of Open Data in EU Member States.<sup>7</sup> The expected impact of such legislation is to drive economic benefits and further transparency.

Other examples around Open and Big Data are vividly illustrating how predictive analytics can be seen as the new gold rush.<sup>8</sup> The benefits of Open Data lie in the creation and delivery of new products and services. Between 2016 and 2020, the market size of Open Data is expected to increase by 36.9%, to a value of 75.7 bn EUR in 2020<sup>9</sup>. In addition, Open Data can be used to help transform companies from within as they embrace the digital world and operate what is called a Digital Transformation.

How do organisations deal with such changes? How can Open Data be leveraged to support digital transformation? This report will characterise Digital Transformation and focus specifically on how Open Data can contribute to the Digital Transformation of organisations.

## 2. Digital Transformation – what is it?

Over the past decades, digital technologies have progressively been embraced by organisations: driven by advancement in technology, changing consumer behaviour, increasing globalisation of the workforce, and a desire to be more productive and innovative. This digital wave has not only fuelled a number of fundamental changes in the way organisations produce, sell, and serve, but also changed the way employees work, communicate, and collaborate. The digital wave has therefore created a leadership and transformation challenge for many organisations, large or small. The use of

technology to radically improve performance or reach of organisations is called Digital Transformation.<sup>10</sup>

### 2.1. The Digital Transformation model

Together with the Massachusetts Institute of Technology (MIT), Capgemini Consulting has conducted elaborate research into the topic of “Digital Transformation”.<sup>11</sup> Simply stated, Digital Transformation is the increasing adoption of digital tools and technologies by an organisation to fundamentally alter both its internal and external processes and functions.



To determine the requirements for a successful digital transformed business, MIT and Capgemini Consulting conducted a three year research. Large traditional organisations were studied to gain insights into the key areas that lead to successful Digital Transformation. This resulted into the development of the Digital Transformation model (DT model), as shown in Figure 1.



Figure 1 – Building blocks of the Digital Transformation model

The DT model has three key areas – or core pillars – every organisation needs to focus on to be successful in the Digital Era: customer experience, operational process, and business model. Each area consists of three building blocks, describing digital capabilities that are required to achieve Digital Transformation. These building blocks impact an organisations’ Digital Transformation and will be further discussed in the next section.

#### 2.1.1. Customer experience

To optimise marketing, sales and service interactions, organisations must appreciate what their customers value, and understand where, how, and why they interact with an organisation. Focusing on customer experience helps in achieving these goals. First of all, **customer understanding** makes organisations focus on the satisfiers and ‘dissatisfiers’ of customers. Insights are gained by analysing customers’ behaviour on social media and direct feedback received by the organisation. Then, these insights, combined with other information like location data, enables organisations to adapt their marketing on a customer specific base. This will increase **top line growth**. Finally, by providing **customer touch points** – digital channels for customers – the customers can contact an organisation directly. An example of such a touch point is the creation of an application customers can download to communicate with the organisation directly.

#### 2.1.2. Operational process

The second key pillar focuses on an organisations’ operational process. Organisations should change from manual processes to automated processes. This **process digitization** creates the opportunity to

add new features to existing processes. For example, new partners can be more easily added if the process is automated. The operational process is also impacted by worker enablement. **Worker enablement** offers employees the opportunity to work everywhere anytime. They can share real-time information and collaborate using an online platform. Another way to optimise the operational process is the introduction of **performance management**. Historical data can be combined with information from other sources. Applying performance management stimulates transparency and provides better insight into processes, thus enabling better decision making.

### 2.1.3. Business model

The last pillar of the DT model is the business model. Organisations can create **digitally-modified businesses** by adding a digital component to their traditional business, for example by offering products both on- and offline. Yet, the availability of digital devices can also stimulate innovation leading to **new digital businesses**. New products are introduced that complement the traditional ones, for example applications that are linked to the use of the traditional product. Another impact on business models is the scale on which digital technologies can be applied, the **digital globalisation**. Organisations are not only able to reach a larger amount of customers, they can also tailor their services on specific communities all around the world as well.

## 2.2. Applying Digital Transformation

Digital Transformation consists of three pillars, as discussed in the previous chapter. The theoretic model was explained. However, more interesting to know is in which way organisations have actually achieved Digital Transformation. Have all organisations achieved Digital Transformation?

Within the Digital Transformation model, four different groups of organisations can be distinguished based on their digital maturity: Beginners, Conservatives, Fashionistas and Digital Masters. **Beginners** are those organisations that have not really started implementing the building blocks of Digital Transformation. These organisations are either not (yet) aware or convinced of the value that digital technology can provide for their business. The **Fashionistas** are well aware of the new technologies available. However, they have not conceived a clear vision on their Digital Transformation. They tend to simply add new technological features to their products and services thus following the trend to digital, but not maximising its full potential. The **Conservatives**, on the other hand, are transforming their businesses based on a strong management vision. Yet this vision does not necessarily focus on a full-fledged Digital Transformation. These organisations are cautious with introducing new innovations. Only the **Digital Masters** truly understand how Digital Transformation can add business value. They combine a strong shared leadership vision but also invest in innovation.

Becoming a Digital Master requires addressing and integrating all pillars of the DT model. In doing so, substantial profitability can be achieved. Research has shown that the Digital Masters are 26% more profitable than their competitors. Figure 2 shows how the profitability of the different organisational groups differs.

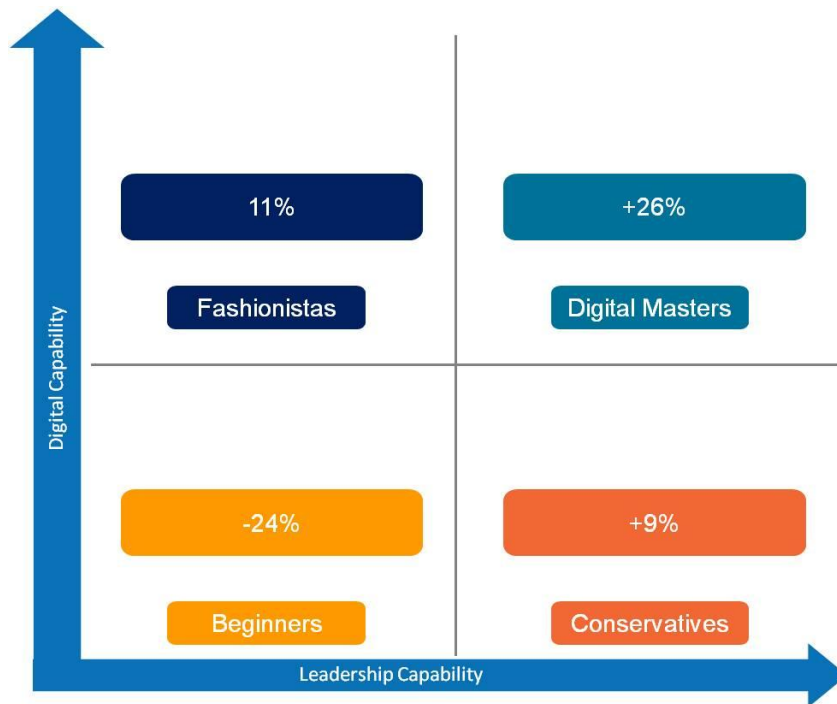


Figure 2 – Profitability per maturity group

The difference in profitability emphasises the need for organisations to start focusing on Digital Transformation and integrating this in their company’s strategy. Organisations need to move away from being Beginners before the gap with the Digital Masters becomes too big to overcome. One way to start the Digital Transformation is by implementing the re-use of Open Data.

### 3. Bringing Open Data and Digital Transformation together

Several benefits of Open Data can be identified. At the political level, Open Data can increase transparency and accountability, civic participation, political awareness and access to information. From a societal point of view, benefits can take the form of increased social inclusion and empowerment, civic participation, access to information and support to personal decision-making capabilities. The re-use of Open Data equally brings economic benefits. Open Data can translate into new job potential, new goods and services created and sold, and growth of the knowledge economy. The market size for Open Data is expected to accumulate to 325 bn EUR in the period 2016-2020. The forecasted number of direct Open Data jobs in 2016 is 75,000 jobs. From 2016 to 2020, almost 25,000 extra direct Open Data jobs are expected to be created. The forecasted public sector cost savings for the EU28+ in 2020 are 1.7 bn EUR.

#### 3.1. Methodology

Given its potential, Open Data has the ability to assist organisations in achieving Digital Transformation. The relationship between Open Data and Digital Transformation is studied by analysing more than 600 use cases from the private sector in over 25 different countries from all over the world. The use cases were gathered primarily via desk research. This included looking at national Open Data portals that publish use cases worldwide with a specific focus on European portals. In addition, dedicated use case websites such as opendata500<sup>12</sup>, work by the Sunlight Foundation<sup>13</sup> the Open Data Institute<sup>14</sup> and other examples described on websites and news articles were assessed. The Digital Transformation model was used as the main model to describe organisations’ relationship to Open Data. The analysis of the use case analysis focused on:

- The way Open Data is re-used by organisations;
- Which pillar of the DT model the use of Open Data relates to;
- The different markets and industries in which Open Data is re-used.



### 3.2. Industry sectors

Open Data can be re-used by organisations operating in different industry sectors. Fourteen sectors have been identified, including one overarching category of ‘other’ sectors to ensure that no single use case would be excluded from categorisation. The sectors can be found in Table 1.

Sector	Description
<b>Culture &amp; Tourism</b>	Travel, museums, sports
<b>Education &amp; Research</b>	School data, science
<b>Energy &amp; Utilities</b>	Gas, water, oil, electricity
<b>Finance &amp; Insurance</b>	Money related
<b>Health</b>	Human wellbeing
<b>Manufacturing</b>	Production of products
<b>Media &amp; Entertainment</b>	Television, radio, shows
<b>Public</b>	Government related
<b>Real Estate/Housing</b>	Real Estate & Housing
<b>Retail</b>	Selling of products
<b>Telecommunication</b>	Cell phones, infrastructure
<b>Transportation</b>	Cars, public transport, infrastructure
<b>IT</b>	ICT, IT, Data science
<b>Other</b>	Services, customer products/services and others

Table 1 – Fourteen sectors used for categorising the origin of the organisation

### 3.3. Data domains

Not all Open Data sets have been considered as having the same potential for re-use. In 2013, the G8 identified a series of Top Data Domains.<sup>15</sup> These domains are widely recognized as having the highest potential value in the Open Data field. In this research, these domains are used as a representative set to classify the use cases. The domains can be found in Table 2.

Data Domain	Description
<b>Organisations</b>	Organisation/business register
<b>Crime and justice</b>	Crime statistics, safety
<b>Earth observation</b>	Meteorological/weather, agriculture, forestry, fishing, and hunting
<b>Education</b>	List of schools: performance of schools, digital skills
<b>Energy and environment</b>	Pollution levels, energy consumption
<b>Finance and contracts</b>	Transaction spend, contracts let, call for tender, future tenders, local budget, national budget (planned and spent)
<b>Geospatial</b>	Topography, postcodes, national maps, local maps
<b>Global development</b>	Aid, food security, extractives, land
<b>Government accountability and Democracy</b>	Government contact points, election results, legislation and statutes, salaries (pay scales), hospitality/gifts
<b>Health</b>	Prescription data, performance data
<b>Science and Research</b>	Genome data, research and educational activity, experiment results
<b>Statistics</b>	National Statistics, Census, infrastructure, wealth, skills
<b>Social mobility and welfare</b>	Housing, health insurance and unemployment benefits

Table 2 – The G8 Data Domains (Data.gov.uk, 2015) with a short description

### 3.4. Data re-users

In addition to the sectors and data domains, the type of Open Data re-user is important to consider. Organisations have different goals when re-using Open Data. Looking at the type of re-use provides insight into the activity of the current players in the Open Data field.

The organisations can be divided into four different types of re-users: Aggregators, Developers, Enrichers and Enablers. These different types of re-users are derived from the Data Value Chain, as shown in Figure 3. The re-use types are further explained in Figure 4. The Data Value Chain also mentions Suppliers. The Suppliers are not discussed any further, as the report focuses on data re-use.

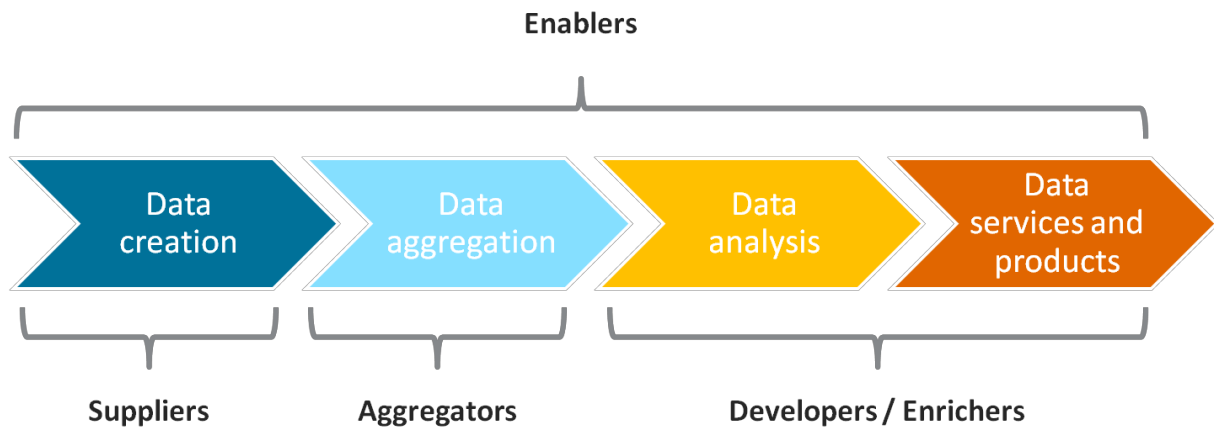


Figure 3 – Data Value Chain <sup>16</sup>

Figure 4 below summarises the main activities conducted across the four different re-use types.

<b>Aggregator</b>	Organisations that collect and aggregate Open Data and other proprietary data.
<b>Developer</b>	Organisations that design, build and sell web, tablet or smart phone based apps.
<b>Enricher</b>	Larger organisations that use Open Data to enhance their existing products and services.
<b>Enabler</b>	Organisations that facilitate the supply or use of Open Data.

Figure 4 – Open Data types of re-users

An example of an Aggregator is the Dutch website Zorg op de Kaart.<sup>17</sup> This website is aimed at increasing transparency in the Dutch healthcare sector. It provides an overview of information of financial status of health institutions, the quality of care, the effect of living at home and demographic information.

Many examples of Developers exist. Where Can I live<sup>18</sup> is a tool for people in London to find a home close to their work. Publicspending.net<sup>19</sup> is a website that keeps track of where public money goes worldwide. The city of Zaragoza (Spain) has an app for citizens to find the (public) service they need, out of the 500 - 600 services in tax, building construction, traffic, education, healthcare, etc the city of Zaragoza has to offer.<sup>20</sup>

Enrichers use Open Data to enhance their existing offerings. An example is the Biblioteca Nacional de España (National Library of Spain).<sup>21</sup> They enriched their catalogue with pictures, biographical information and other data elements through external sources. A French example is Infoterra<sup>22</sup> that uses satellite images to monitor growing crops allowing the production of digital maps that serve as a pattern for the appropriate fertilizer rate to be applied as required to a section of a field.

Enablers facilitate the supply or use of Open Data. Several Open Data portals exist on European, national, regional and local level. The European Data Portal is an Enabler as well.

## 4. The contribution of Open Data to Digital Transformation

The information derived from the use cases was analysed to derive insights into how Open Data contributes to Digital Transformation.

### 4.1. Use of Open Data within the Digital Transformation model

Open Data is used within the three key pillars of the Digital Transformation model, as shown in Figure 5. The figure shows a spread of Open Data usage across all nine building blocks of the DT model. The three areas of the DT model in which Open Data is used most are performance management, new digital business, and customer touch points. How Open Data affects these building blocks is discussed below.

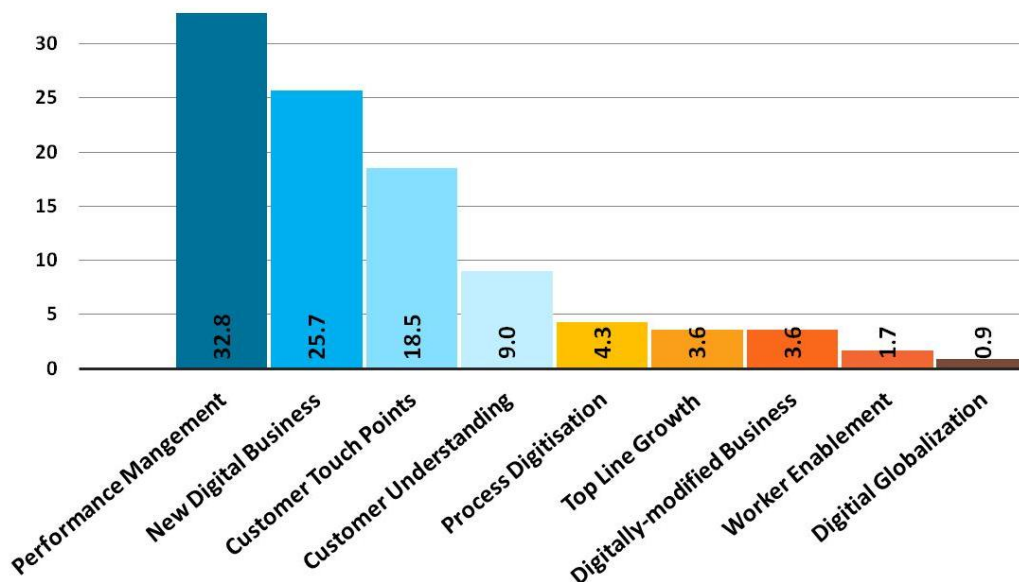


Figure 5 – In which areas of the DT model is Open Data used most?

#### 4.1.1. Customer experience

With regard to customer experience, an increasing trend is noticed in using Open Data to understand customers. There are various organisations which have announced new measures designed to understand customer choices and thereby potentially improve their services. Open Data has opened

up opportunities like never before. Time and demographics significantly impact the outcome of campaigns organised by organisations. Thanks to the availability of Open Data, there is an opportunity to build more effective marketing campaigns by geographic targeting and further customer segmentation. Open Data has helped marketers harness more insight, improve customer engagement and drive loyalty, thereby increasing demand and sales.

This research showed that new customer touch points enabled by the use of digital tools have improved customer experience. The strong relation between this building block of the DT model and the re-use of Open Data seems to be the result of increasing self-service and the development of digital touch points. An example of such a new customer touch point is the Vamos a la Playa application.<sup>23</sup> The application is a solution for visitors of French beaches and bathing areas. The application offers its users the possibility to discover the bathing areas upfront, including their accessibility and facilities on site. Furthermore, the beach-goer can report his or her impressions. The application holds information on the weather, activities, water quality, attendance, access, and on-site localised alerts e.g. alerts about jellyfish, pollution, and overcrowded sites. Another example is Greeniant.<sup>24</sup> This Dutch company creates consumer apps for energy consumption registration based on smart meter information.

For organisations ranging from small to big corporations, Open Data can help make smarter decisions. The way Open Data influences customer experience is presented in Figure 6.

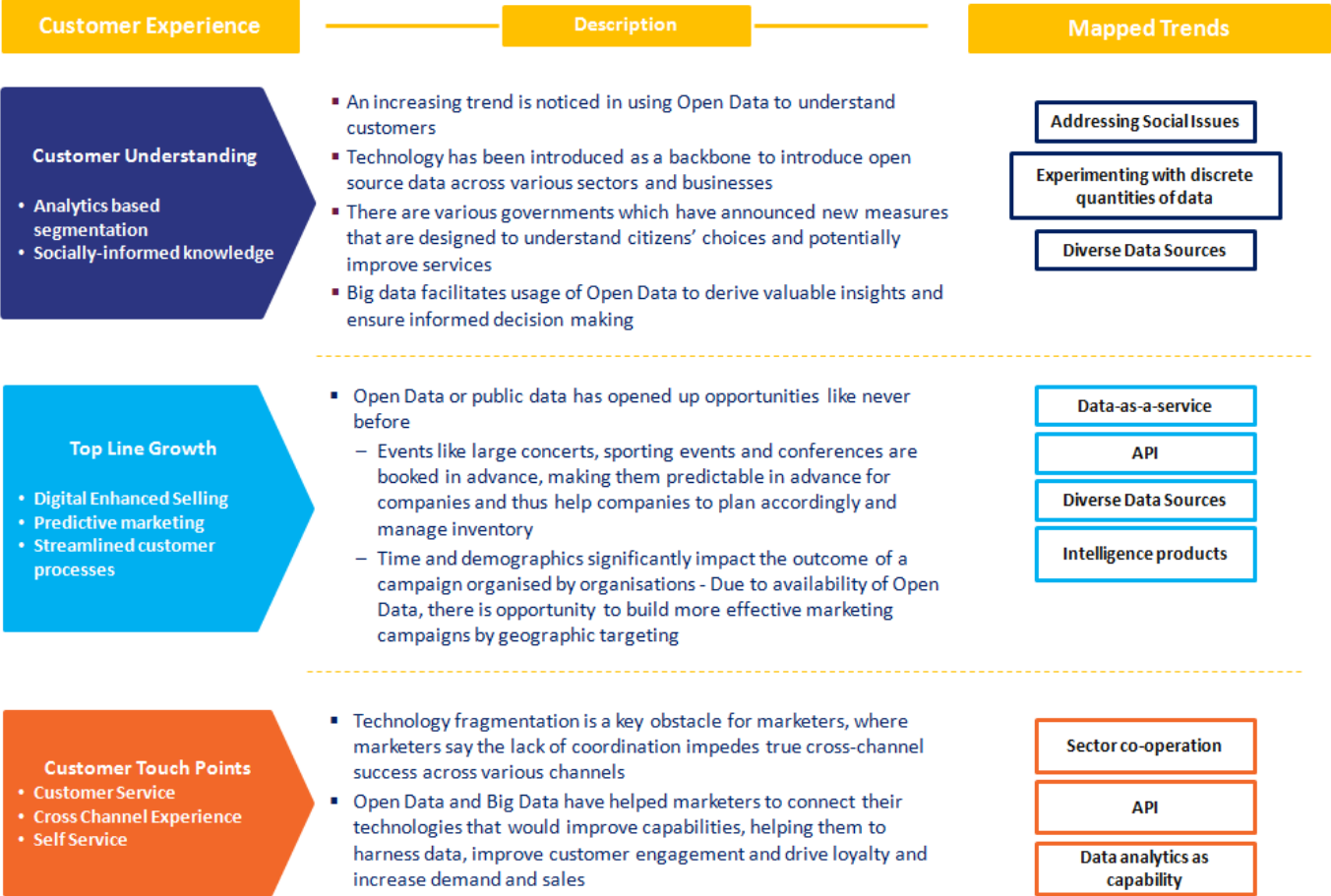


Figure 6 – Open Data re-use trends mapped against Customer Experience

#### 4.1.2. Operational process

Thanks to Open Data, organisations can improve their decision-making and track their performance using digital tools. Digitising processes and incorporating data mining enables companies to detect problems earlier, such as issues in the supply chain. Opening up data will drive more collective business behaviours and help organisations to optimise supply-chains by making all elements of service or product provision more open and efficient. Also, the increasing availability of Open Data from governments will give rise to more collective worker behaviour as expected links and opportunities emerge between different datasets. Across different industries, businesses can combine existing data with Open Data covering a wide array of sectors to enable more accurate segmentation and profiling of lifestyles and life events for better service delivery.

Performance management is the DT building block where most Open Data seems to be applied. This is caused by the relation between performance management with operational transparency and data-driven decision making. When data is made available internally, transparency increases. In addition, Open Data can be seen as a catalyser for performance management as attracting external data works as an enabler for increased data-driven decision-making. Using external data, a wider view can be applied to the analysis, creating better insight and thus enhancing the quality of the analysis. An example is Energy Points, a US company, which provides source energy intelligence software that enables organisations to analyse, manage, and strategically de-risk their energy supply chains. The platform uses geospatial data and sophisticated algorithms to quantify source energy. By doing so, they measure energy use from its source to the site of consumption, while accounting for resource scarcity and environmental impact.<sup>25</sup> The Belgian Customs Authority uses European Anti-Fraud data to check administration of passing goods.

#### 4.1.3. Business model

Open Data fuels innovations, better services, transparency and democracy. Open Data has helped transition businesses and will continue to drive innovation like smart solutions and smarter cities. Those smarter cities may lead to broader social innovations and sustainability, protecting the urban environment. Open innovation ecosystems will in turn facilitate collaborative behaviour even at the fundamental level by solving societal challenges. The premise of Open Data is to publicly post all government data that is not subject to privacy laws. For digital entrepreneurs, this means there is a wealth of free material available to build applications, websites and other digital products. The openness of government data may advance partnerships and cooperation, as well as research and development activities, thus presenting opportunities to create new jobs and new economic growth. Furthermore, Open Data can help policy-makers within organisations to better understand countries' economic situation. Open Data covers parameters such as Gross Domestic Product and Gross National Income which helps in financial inclusion. Also, in partnerships between public and private organisations Open Data can help deliver services to citizens, especially in troubled areas.

Open Data is strengthening statistical analyses, emphasising interpretations, visualisation and conceptualisation of reports creating interactive accesses and offering APIs. Some key trends are presented in Figure 7.

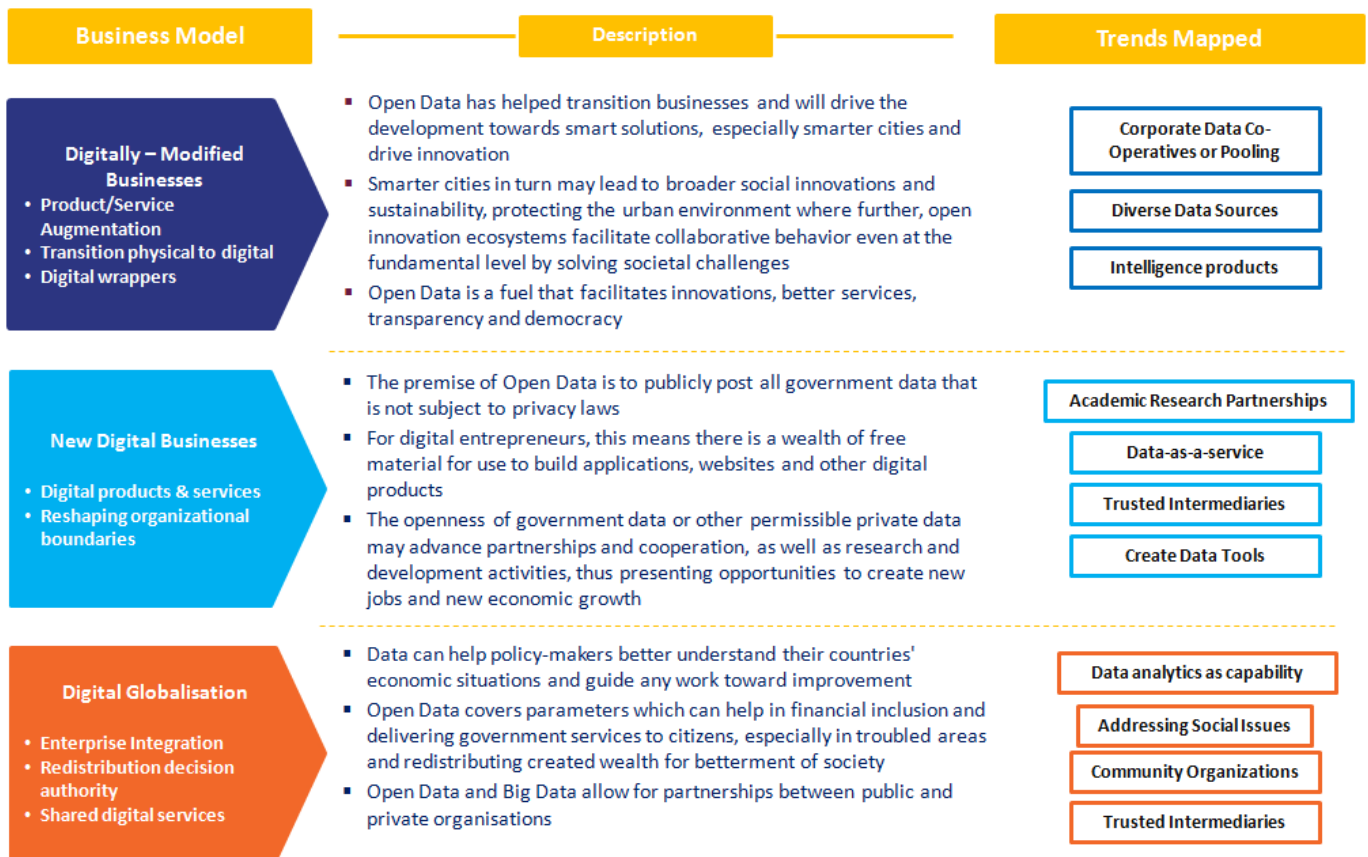


Figure 7 – Open Data reuse trends mapped against business model

Within this study, many recently founded organisations have used Open Data as main enabler to drive new business. For example, Zabala Innovation Consulting in Spain provides information on public grants on R&D to their customers and performs different impact studies for the public administration for evaluating innovation policies.<sup>26</sup> They are a substantial re-user of Spanish Open Data. Furthermore, many new digital products and services that formerly did not exist are often created with Open Data. Neelie Kroes clearly illustrated how a new business stream affects the economy: “Five years ago I could not have spoken about an ‘app economy’. Because it did not exist; today I can talk about one million apps; two million jobs; worth almost twenty billion euro – in the EU alone.”<sup>27</sup> Many of such applications re-use Open Data: geospatial data, traffic data, weather data, and more. An example of a new application that was developed using Open Data is the Dutch Buenradar.<sup>28</sup> The application shows meteorology information combined with radar images to show where it rains. The application creates revenue by placing advertisements.

#### 4.1.4. Value creation within the Digital Transformation model

Companies offering Digital Transformation services by re-using Open Data have equally developed revenue generating models such as licensing, advertising fees, subscription & lead generation, as can be seen in Figure 8.

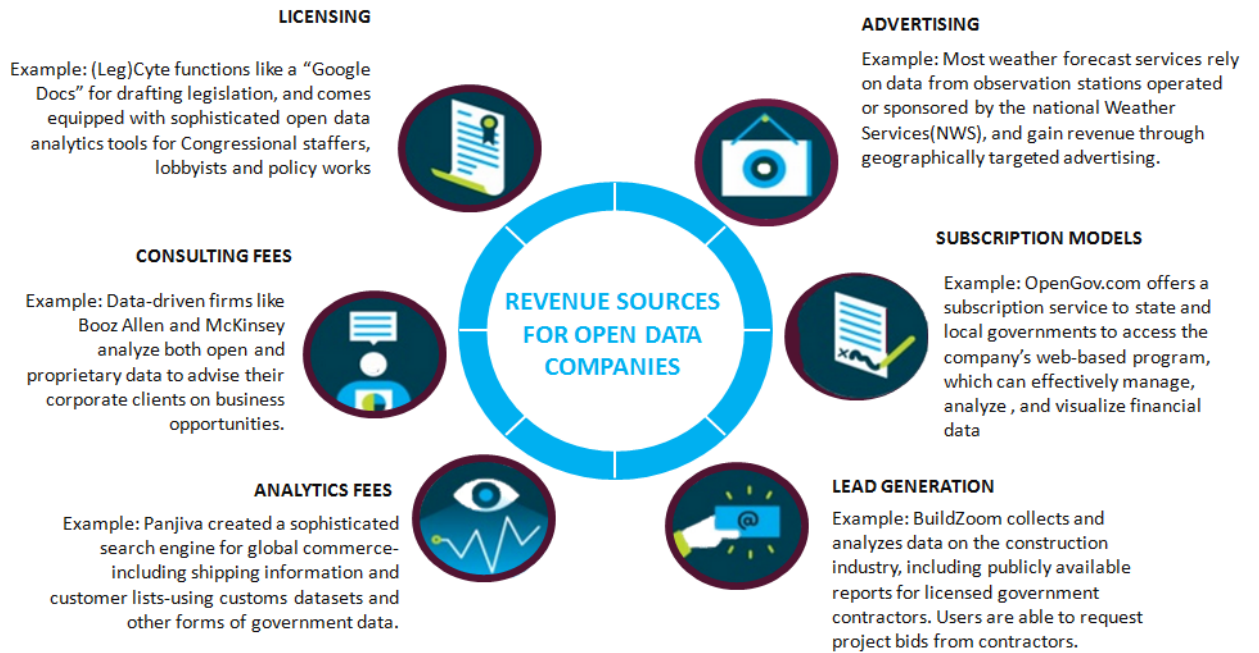


Figure 8 – Digital Technology offerings by using data solutions<sup>29</sup>

## 4.2. Open Data re-use within sectors and data domains

While performing the analysis of the use cases, for every organisation the sectors and data domains were mapped.

### 4.2.1. Open Data re-use within industry sectors

When looking at industry sectors, significant discrepancies were found when comparing sectors and Open Data re-use, as can be seen in Figure 9. The IT sector is the largest sector to re-use Open Data. The public sector is also a large re-user of Open Data. This was expected, as the public sector creates the data as part of their daily operation. Besides sectors using data from their own domain (e.g. Finance & Insurance using financial data), Open Data is re-used throughout all industry sectors nonetheless.

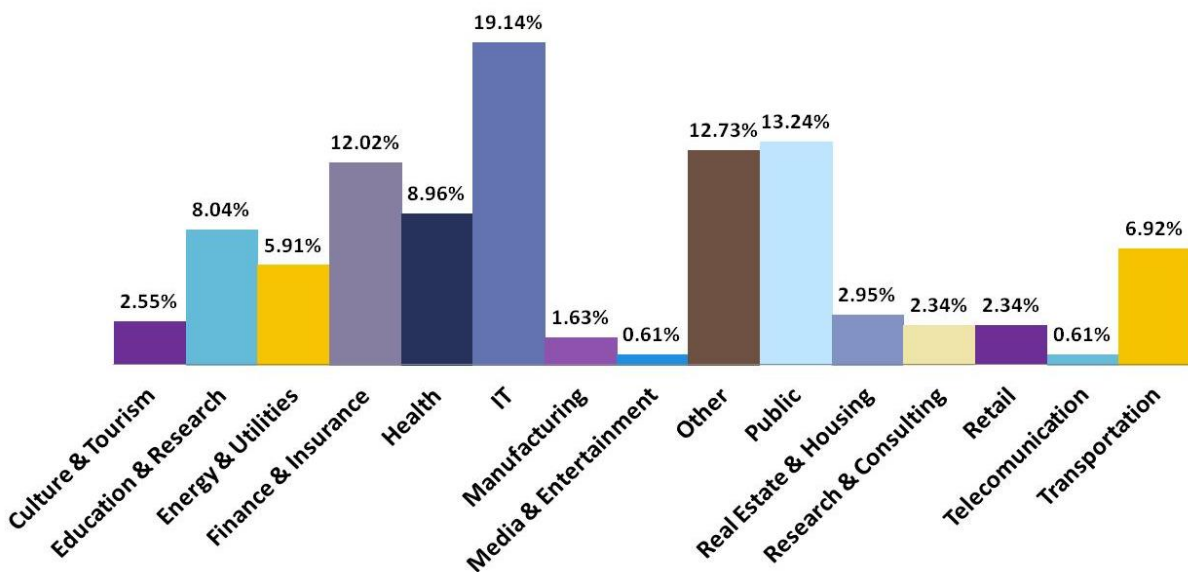


Figure 9 – Open Data re-use per industry sector

#### 4.2.2. Open Data re-use within data domains

When looking at the data domains from where the Open Data was taken, clear differences appear. The data domains can be differentiated in three main categories: low-frequency re-use (< 5%), mid-frequency re-use (5-10%) and high-frequency re-use (> 10%). Figure 10 below shows an overview of the categorisation.

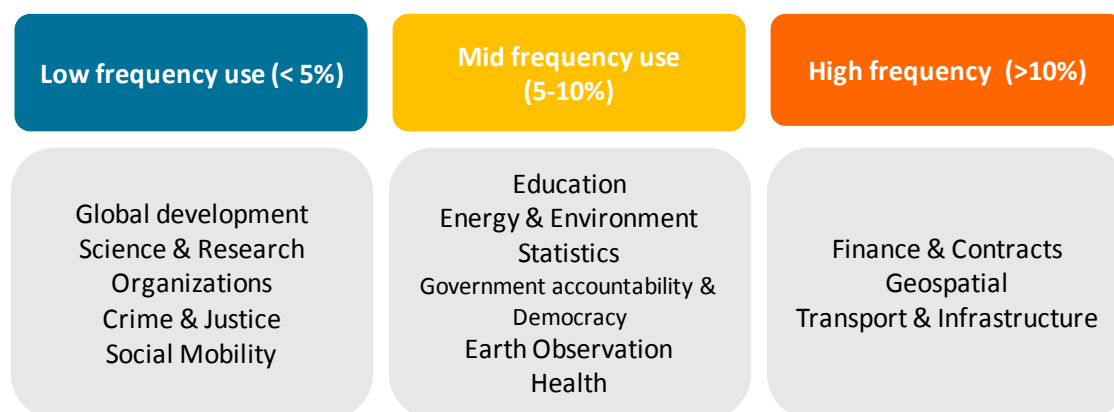


Figure 10 – Low-, mid- and high-frequency use of data domains (Capgemini Research for European Commission)

The high frequency domains are perfectly in line with the high priority domains identified by the European Commission: geospatial data, earth observation and environmental data, transport data, statistical data and selected company data are high priority data domains.<sup>30</sup> The full description of these domains is presented in Table 3.

Data Domain	Description
<b>Geospatial data</b>	Postcodes, national and local maps (cadastral, topographic, marine, administrative boundaries, etc.)
<b>Earth observation and Environment</b>	Space and in situ data (monitoring of weather, land and water quality, energy consumption, emission levels, etc.)
<b>Transport Data</b>	Public transport timetables (all modes of transport) at national, regional and local levels, road works, traffic information, etc.
<b>Statistics</b>	National, regional and local statistical data with main demographic and economic indicators (GDP, age, health, unemployment, income, education, etc)
<b>Companies</b>	Company and business registers (lists of registered companies, ownership and management data, registration identifiers, balance sheets, etc.)

Table 3 – Description of high priority data domains

Interestingly, health and government accountability, as well as energy and education are also fast growing areas for Open Data re-use.



#### 4.1. Types of re-users

When looking at the type of re-users of Open Data in relation to Digital Transformation, further differences also appear.

As Figure 11 shows, Enrichers represent almost half of the re-users, whilst Enablers were hardly found.

For **Enrichers**, as the largest segment of Open Data re-users, many examples of Open Data re-use were found in the use cases. Enrichers are widely spread amongst the pillars of the Digital Transformation model.

Yet, there is one outstanding building block in which these re-users are mainly found: performance management. Applying Open Data for data-driven decision making and operational transparency is a clear advantage for companies on their path to Digital Transformation.

Besides the Enrichers, the main re-users were Aggregators and Developers. As **Aggregators** gather data to gather meaningful insights, it is no surprise that most Aggregators were active in the new digital business building block of the DT model. Since the re-use of Open Data is a relative new business area, new types of organisations arose with business models built around applying analytical skills to Open Data.

The **Developers** were mostly found in customer touch points as well as in new digital business. These two types of Developers were either data suppliers that have developed digital services and app-based products to enhance customer experience, or new businesses that developed new products and services that are based on Open Data.

Due to the fact that examples of **Enablers** were hardly found, no statistical analysis of which Digital Transformation building blocks were affected by this type of Open Data re-users could be undertaken.

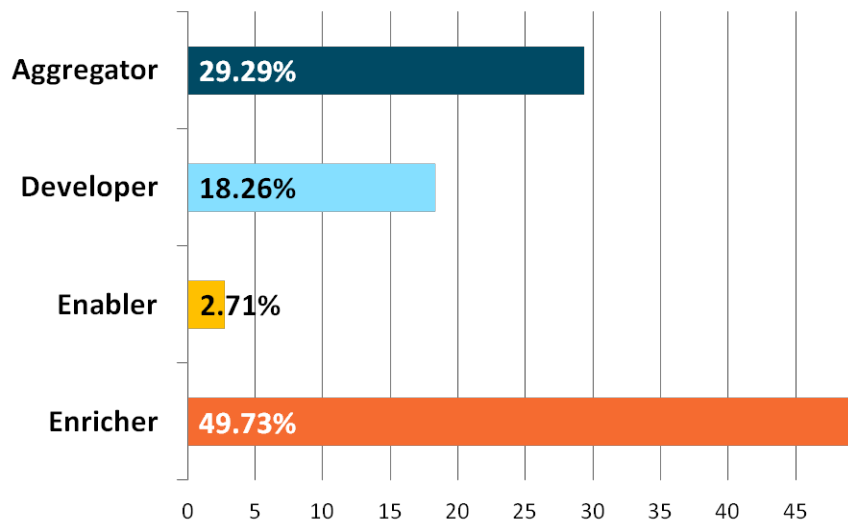


Figure 11 – The spread of types of re-users

## 4.1. Barriers to using Open Data

Besides evidence of the relation between Open Data and Digital Transformation, a few barriers still hinder the re-use Open Data as driver of Digital Transformation. These barriers were further studied to provide a potential solution.

### 4.1.1. Lack of awareness

Often, organisations do not yet know of the potential value of Open Data, or even its existence. This barrier can be twofold; on the one hand interesting Open Data for an organisation might not be published. On the other hand, the organisation may not be convinced of the potential value Open Data might bring to their business. And even though the amount of available Open Data sets is limited, it will continue to increase and thus the potential value might grow as well. Therefore, it is important for the public sector to actively promote Open Data as a free resource. Furthermore, governments should actively promote the potential benefits that Open Data might bring for the economy and provide case studies that illustrate this potential.

### 4.1.2. Lack of knowledge

For many organisations, the lack of knowledge around Open Data is an important reason to ignore the potential of Open Data. The most heard argument is the potential costs needed to attract or develop the capabilities necessary to re-use Open Data. If organisations have no capabilities to analyse data, they should take a step back and consider whether they actually want to retrieve value from data. An alternative could be outsourcing the analysis of the data to another organisation that will then provide insights. In this case the organisation will not have to attract the capabilities themselves. Furthermore, public bodies can invest in communicating how to re-use Open Data. The lack of knowledge is mostly a “feeling”, rather than a real problem.



Figure 12 – Barriers to using Open Data

### 4.1.3. No clear governance

To increase the chance of success for an Open Data project within an organisation, there needs to be a responsible owner. The owner will ensure a good execution that is in line with the organisation’s vision and requirements. The number of Chief Data Officers in organisations is growing, which illustrates the increase of the importance of data, including Open Data. If there is no clear owner who will drive the initiative, Open Data will not reach its full potential.

### 4.1.4. Data quality

A combination of Open Data with internal data can only be achieved if that data is of decent quality. Unfortunately, the quality of datasets differs which influences the effort that is required to obtain valuable insights. Data needs to be uniform if it is to be easily combined. Therefore, it is of high importance that data is published in a structured way. The publisher of the data is responsible for ensuring the data quality.

#### 4.1.5. Internal IT

If the data of an organisation is not available in a structured manner, adding external data will not provide any additional benefit. The internal data will prove to be of no value. So internal IT should be able to provide reliable data. Else, there is no use in attracting external data to correlate internal data with.

#### 4.1.6. Licensing

With regard to the publication of Open Data, there is lot to gain. A great barrier with regard to the re-use of Open Data is the lack of a proper licence. If the licence of an Open Data set is not accurate, the data is no longer open.

## 5. Recommendations

This report has set the first step in exploring the relationship between the re-use of Open Data and the Digital Transformation of organisations. Several recommendations can be made based on the findings described in this report. These recommendations are divided into two categories: recommendations for governments and recommendations for private sector organisations.

### 5.1. Government recommendations

**Catalyse the growth of the economy through Digital Transformation by publishing Open Data**

Open Data drives Digital Transformation, and through Digital Transformation a level of Digital Mastery can be achieved. Organisations can incorporate Open Data in their business to gain competitive advantage and grow towards being a Digital Master, resulting in an increase of revenue. However, public organisations lack insight into the potential benefits of Open Data. Among the many benefits Open Data provides, this report discusses a new angle with regard to digital mastery. Do no longer hesitate whether to publish Open Data or not: Open Data drives Digital Transformation and can increase revenue.

**Aim at publishing by applying the 'Open by default' principle**

There is an on-going discussion within the public sector whether to assess data internally before publishing it. The aim is to publish the most valuable data first. Furthermore, public bodies point out that one dataset is (expected to be) far more popular than the other, and the fact that not all data has to be published. As a key recommendation, do not filter out data that seems to be irrelevant to the public administration itself. As revealed in this study, data from all data domains is re-used, both within a specific sector as well as cross-sector. This implies that there is no particular discrepancy between useful and useless datasets. Make sure that the data is of good enough quality: that it is accurate, accessible and timely, the licence for re-use is clear, and that the source is given and is of a right format.

### Publish your data under an appropriate Open Licence

Open Data is of no use for a re-user if it is not published under an appropriate licence. Legally speaking, the potential re-user is not allowed to re-use the data and therefore, the Open Data set is actually not open. Hence, publishing organisations should be aware of their licensing activities and make sure that the data they publish always has a proper licence attached. Use one of the Creative Commons open licences or apply a national licence, for example the Open Government Licence as available in the United Kingdom.

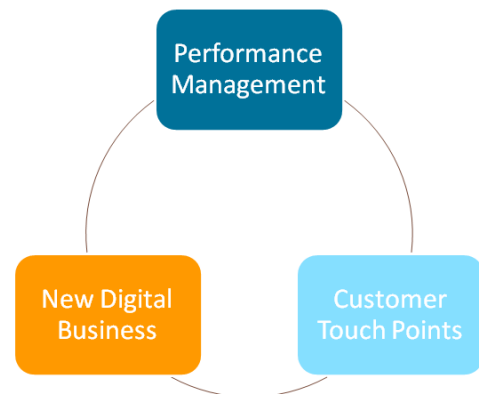
### Actively search for interaction with re-users

Although numerous organisations re-use Open Data, there is still a lot to gain. In order to achieve the economic benefits of Open Data, active participation between re-users and the public domain is required. Therefore, actively search for interaction with re-users e.g. by organising Hackathons and setting up regular feedback sessions between re-users and Open Data providers.

## 5.2. Recommendations for private sector organisations

### Start with Performance Management, Customer Touch Points or New Digital Business as a Digital Transformation step when using Open Data

In practice, organisations seem to mostly incorporate Open Data in their business to enhance either Customer Touch Points, Performance Management or New Digital Businesses. Organisations are recommended to look into the opportunities of these Digital Transformation Model areas first. Seek for solutions in the customer facing areas for instance, by using Open Data in check-out systems, or in making data-driven decisions.



### Start using Open Data as a resource today

This study has shown that, from the 25+ countries and over 600 use cases, organisations use Open Data for any purpose. Be part of the trend and explore what your organisation has to gain. Every sector is transforming and more digitalisation is applied on a daily base. Open Data is a large opportunity to start with.

### Re-use Open Data from any sector, not solely your own

As found in this study, data is used within and across sectors. Organisations might have the tendency to look at specific data from their own domains only. Valuable data might come from other sectors as well. Perform a thorough analysis of a variety of sector specific data domains.

### Choose an integral strategy for your Digital Transformation

Exploring the opportunities of Open Data will likely create incremental growth. Applying Digital Transformation as an integral strategy for your organisation creates huge opportunities to create disruption. Open Data provides a large opportunity to drive Digital Transformation, but the chances of success are higher with an integral strategy.

## Start small

Re-users should keep their view broad, start quickly, and have a strategy. Step one is to realise that a small start is a good start. Start re-using Open Data before picking up a Big Data challenge for instance. Many organisations encounter difficulties analysing data or managing data. A recommendation would be to start small and try to identify quick wins. Incorporate these steps in the strategy. Do you already use external data sources? Great! That is already a start. Not sure which data would be useful for your business? Start with the G8 data types. Try to find a quick achievement, e.g. a data-driven decision is easily made. Think big, but start small.



## Endnotes

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