Sustainability of (Open) Data Portal Infrastructures

Funding Portals: A Business Case Approach to Funding Model Longevity

This study has been prepared by the University of Southampton as part of the European Data Portal. The European Data Portal is an initiative of the European Commission, implemented with the support of a consortium led by Capgemini Invent, including Intrasoft International, Fraunhofer Fokus, con.terra, Sogeti, 52North, Time.Lex, the Lisbon Council, and the University of Southampton. The Publications Office of the European Union is responsible for contract management of the European Data Portal.

For more information about this paper, please contact:

European Commission
Directorate General for Communications Networks, Content and Technology
Unit G.1 Data Policy and Innovation
Daniele Rizzi – Policy Officer
Email: daniele.rizzi@ec.europa.eu

European Data Portal
Gianfranco Cecconi, European Data Portal Lead
Email: gianfranco.cecconi@capgemini.com

Esther Huyer
Email: esther.huyer@capgemini.com

Written and reviewed by:
Johanna Walker
Email: j.c.walker@soton.ac.uk

Elena Simperl
Email: elena.simperl@kcl.ac.uk

Sarah Hewitt
Email: s.hewitt@soton.ac.uk

Last update: 02.03.2020
www: https://europeandataportal.eu/
@: info@europeandataportal.eu

Luxembourg: Publications Office of the European Union, 2020

Publications Office of the European Union

OA-02-20-163-EN-N ISBN: 978-92-78-42146-5 doi: 10.2830/012098

Note: this document is part of a series of research reports developed on the topic of "Sustainability of (open) data portal infrastructures", all of which are available on the European Data Portal at https://www.europeandataportal.eu/en/impact-studies/studies .

The series is made of the following reports:

1. A Summary Overview
2. Measuring Use and Impact of Portals
3. Developing Microeconomic Indicators Through Open Data Reuse
4. Automated Assessment of Indicators and Metrics
5. Assessment of Funding Options for Open Data Portal Infrastructures
6. Open data Portal Assessment Using User-Oriented Metrics
7. Leveraging Distributed Version Control Systems to Create Alternative Portals

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1. Introduction

1.1 Aims

This task seeks to devise a toolkit that explores the various funding models (private/public/hybrid/self) that may be possible for portals and the various activities that might be required in order to provide value for these funding streams. This is in part based on previous work, and built upon to create an actionable guide for portal owners.

1.2 Previous Work

The report Digital Infrastructure Sustainability Solutions Framework (Connecting Europe Facility 2014-2020 Long-Term Sustainability of Digital Service Infrastructures) informed our thinking on public, private, hybrid and self-funded models of financing.

The report Recommendations for Open Data Portals: From Set up to Sustainability provided key insights, summarised the following;

"*All public sector Open Data portals need financing, both for the infrastructure of the portal and maintenance, as well as any outreach, training and support for publishers and re-users of data that is within the scope of the portal's operations*."

Securing finance for the design and early development of a portal was generally less of a problem for portal owners. Long-term funding to cover items such as maintenance and improvements (including bug fixing) was reported as more difficult for the portal owners interviewed for the report. A known budget, covering short, medium and long-term goals and strategies gives all parties confidence in the sustainability of the project. The report further recommends that the funding strategy is open, and that the priorities align with those of the funders.

In countries where Open Data is considered to be "*an essential public service, and provided for in law"* funding is usually 100% from public funds. For other countries, the funding is more likely to be mixed i.e. public and private funding. One potential revenue source might be the data itself, although the ODI 'strongly advises against' portals charging for data, as a key point of an open data portal is that data should be freely available to all. Where portal owners can consider charging is for value-added services such as training courses for users and/or publishers, or data analytics services. However, care should be taken that these activities do not adversely affect data users downstream.

However, as with any funding model, regardless of the source of funding, it is important to "*perform, commission or identify research into the impact of your portal's current or potential activities".* Monitoring and measuring the impact of publishing open data is closely bound up with other aspects such as governance, but also links back to the idea of getting publishers and users together to address specific challenges. Much useful knowledge might be gathered from such activities, and should be recorded for use in on-going applications for funding.

The follow-on report, *Ensuring the Economic Sustainability of Open Data Portals (2018)* provided key recommendations for open data financing, including:

- Exploring freemium models
- Investing in promotion of re-use

- Sharing cost-burden and innovation strategies with other portals
- Facilitating monitoring of use

1.3 Report Approach

This report is structured as follows: firstly, we present key issues of funding and costs of portals that set the background to the report.

Next, we demonstrate how business cases can assist portals in a. identifying the purpose, and therefore the impact, of their portal, and b. in identifying the appropriate funding strategy. We provide examples of business cases for portals enabling direct budget savings, citizen participation and service innovation in the public sector.

Having established these drivers for portals, we then present 4 funding models, derived from previous work, and show how these can be matched effectively to appropriate business cases, as not all funding strategies are appropriate to all portal business cases. Finally, we show how portals can use these tools to develop a funding strategy, and present our Sustainable Funding Method. As part of this we include a budget template and identify the 6 key questions for sustainable financing.

2. Funding and Costs

From the previous reports, we identified 20 dimensions of open data portal financing. This allowed us to critically analyse exactly what the recommendations were reflecting, and to derive a broad list of cost activities for investigation.

Strategy	Short, medium and long term goals	Prioritisation				
Build	Design and User Experience	Development	Infrastructure			
Operations	Portal operations (inc user engagement)	Maintenance and improvements	Data provision	Outreach, training and support for publishers	Known staffing budget	Data analytics
Support Use	Outreach, training and support for users	Incentivising use	Value-added services			
Measurement	Monitoring of use and impact	Measurement of use and impact (research)	Recording and management of activities, measurements and monitoring			
Income	(Freemium) Revenue					

Figure 1: Open Data Portal Cost Activities

2.1 How much do portals cost?

Both the simple and more complicated answer to this question is, 'How long is a piece of string?' In most situations, such as with the Austrian national portal, data.gov.at, the cost of some key activities (in this case, the preparation of data for publication) was not tracked, so the true cost is not known.[1] Secondly, some costs may be specific to certain portals. When the Helsinki Region Infoshare portal was built, they had to create an open data license as Finland did not have one[2]. Portals may also incur hidden costs. In California, this included spending more than $756,000 over three years to enable internal interaction with the open data portal, inventorying of the Department of Insurance's data and the redaction of information that was not appropriate for publication.[3] Our research identified the following as costs that portal owners had not considered when launching: the cost of changing business processes to accommodate the portal and data; the implementation cost of open source components and the implementation of a data management strategy and plan. Finally, in each case, the cost of hosting and accessing data will vary immensely depending on the size of the datasets, the format, the type and frequency of access and, of course, aspects of the contract negotiated with any relevant technology provider. It may not be possible to have a firm idea of what these may be before embarking on building the portal.

2.2 Where does funding come from?

In the vast majority of cases, activities are funded by government departments. Nationally this has largely been from transparency budgets or municipal IT departments. Most digital service infrastructures currently lack a strategy to becoming financially sustainable. Barbero et al. (2018) find that few are financially sustainable, and some - including Public Open Data - have no basis for *becoming* financially sustainable either.

The 2018 Open Data Maturity report found that similarly, the cost of actually running portals is subsumed into wider open data strategy funding, and no national governments were identifying the cost of sustaining an open data portal as its own activity.[4] Further, no alternative funding models had been explored.

As member states are required to publish certain data, and it is therefore understandable as a regulatory cost, this somewhat explains this cross-state hesitation to explore funding from other angles. However, this 'compliance' approach obscures the possibility of understanding the funding of open data from a more sustainable point of view, which can be developed using a business case.

3. Business Case Development

A business case is a justification for investment in a project or process based on the expected commercial benefit. Having a business case not only ensures that intended impact (and how it will be

[1] https://www.w3.org/2013/share-psi/workshop/krems/report

[2] https://joinup.ec.europa.eu/collection/open-government/document/helsinki-region-infoshare-service-opens-city-data-helsinki-region-infoshare-hri

[3] https://www.governing.com/columns/tech-talk/gov-open-data-cost-problems.html

[4] https://www.europeandataportal.eu/sites/default/files/edp_landscaping_insight_report_n4_2018.pdf

measured) is written into the portal strategy from the beginning, but it also promotes accountability, and moves portals away from the "it's just funded from our IT budget" approach.

Below we present three different business cases for opening up data: making savings to the budget; encouraging citizen participation and innovating products and services. We give an example of each.

3.1 Direct budget savings

Helsinki Region Infoshare

According to the City of Helsinki[5], opening up city purchasing data has resulted in budget savings of 1-2 percent. This 'total transparency' has engaged new audiences with the city administration and encouraged civil servants to ensure their procurement is fully fair and obtains the best value. Additionally, releasing and using open data via open APIs has saved time and staff effort. Consequently, the annual cost of providing the service is relatively low for the benefits, especially when secondary benefits such as increasing trust or providing or enabling better services for citizens are factored in.

While the initial pilot stage, which lasted 2 and a half years, cost around 1 million euros, the annual cost is 60.000 euros, split across the 4 partners.

Initial Funding: SITRA, the Finnish Innovation Fund; Finnish Ministry of Finance municipality cooperation grant

Current Funding: Cities of Helsinki, Vantaa, Espoo and Kauniainenc

Publishers: Multiple departments across the cities

3.2 Citizen Participation

Data Mill North

Data Mill North[6] began life as Leeds Data Mill, which tried to bridge the gap between decreasing resources and increasing demand for public services. The aim was to enable citizens and organisations to become digital social entrepreneurs who were aware of the relationships between the city's services and businesses. This required open data from multiple sources to be combined in one site.

This led to a naturally collaborative approach. The site grew larger and extended to include nearby Bradford. As the pooled data grew, so did the idea of pooling other resources including funding. Eventually, the site was extended to include data from the entire north of England.

[5] https://hri.fi › en_gb

[6] datamillnorth.org

Initial Funding; Cabinet Office Release of Data Fund

Current Funding: Repository partners

Publishers: 63 data owners and publishers across the north of England

3.3 Innovation in Products and Services

SCIFI

The Smart Cities Open Data Reuse (SCORE) and the Smart Cities Innovation Framework Implementation (SCIFI)[7] projects used public-private innovation processes to create new services with open data. Data in SCIFI is published on the project hub (FIWARE) to enable cities without existing portals to participate in the innovation.

These business cases identified the following information:

a brief description of the problem;

KPIs that would be used to assess if the problem was solved;

the root causes of the problem;

who was affected;

what was the scale of the problem;

who the 'problem owner' was;

who the political sponsor was;

the stakeholders;

who had been consulted about this;

the link to the relevant part of the policy plan;

the resources that could be committed.

In any business case, there is a need to define a 'do nothing' scenario, to assess the comparative value of not investing. In these business cases, the leads were challenged to find other existing technical solutions, ie, to see if the problem could be solved without actually opening data.

Initial Funding: Interreg 2Seas programme, internal IT budgets, private companies

Current Funding: N/A (still in initial phases)

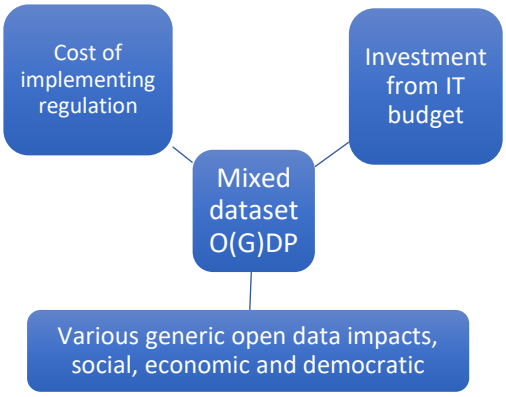
Publishers: Gemeente Delft, Stad Mechelen, Stad Bruges, Ville de Saint Quentin

[7] www.smartcityinnovation.eu

4. Four Financing Models

The choice of business case will influence the practical decisions about which kind of financing model is most appropriate. In this section, we review four financing models and ask how they might work in practice.

4.1 Internal (public) financing



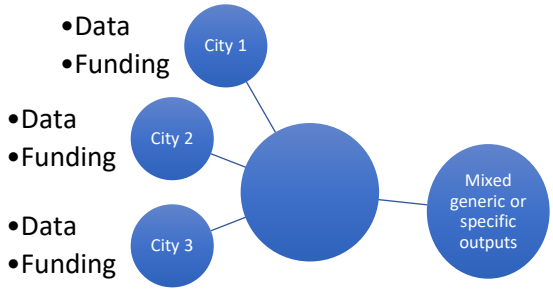
Open Data Portals are not always well planned. The planning that does happen often goes into technical infrastructure and staff; while initial set-up costs may be budgeted, the financing the platform in the long term is not considered in much depth.

Our workshop found that open data portals are financed out of internal IT budgets, rather than being assigned a budget of their own; there was also no evidence of planning for current and future funding needs. This may be due to the fact that many open data portals in municipalities are required by law, and therefore seen as a necessity that is budgeted, e.g. by the responsible council, to meet external requirements, but with no intention to develop a business plan. If the open data portal is in the hands of an area that does not traditionally deal with revenues (such as an IT department), this is not particularly unusual.

Internal financing of a portal, either cross-subsidised or as a regulatory cost, is therefore the status quo. It is sustainable to the extent that it is a regulatory cost and will therefore be included in budgets going forward. However, this leaves less space for development and innovation.

Internal financing should not be seen as the easy or fall back option, but should be approached with the same care and planning as external finance acquisition.

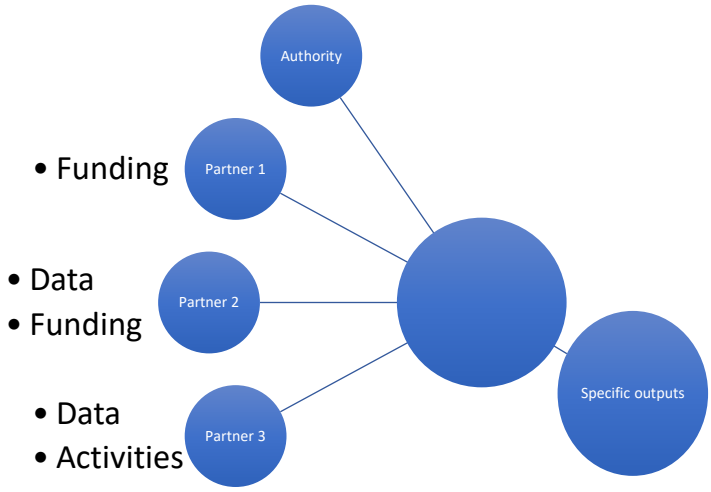
4.2 Co-funding (sharing governance and technology costs with other cities/regionally)



This is a funding format that works particularly well for cities. As can be seen from the examples in the business cases above, a number of portals at a sub national level are using this approach. Many smaller and mid-size cities in northern Europe already combine IT costs so this approach is well aligned. The secondary benefits are not simply that the finances are shared, but that data is pooled and therefore easier to locate and breaks down traditional local authority boundaries. This sharing supports the drive towards Smart Regions.

Co funding also means a clear decision making process and there may be some additional costs of agreements/contracts or a way to reduce these will have to be agreed. There must be consensus on what will be shared. If cities have very different motives to share data this may mean that tracking of benefits becomes more complicated. In this approach, it is vital to consider data standardisation.

4.3 External financing (private partnerships, public and private data)



Combining government and privately held data has long been the Holy Grail of open data publishing. However, while the dominant portals have been open government data (OGD), there have been excellent (and often regulatory) reasons that such portals do not give the appearance of being influenced by corporate finance. Equally, there have been few compelling reasons for commercial organisations to investigate this directly.

However, the growth of smart city services is likely to change this. Where data about public activities is being collected by private companies, this is sharing the cost of collecting or generating the data. Further, it may generate legitimacy for (appropriate) data to be shared in a public sector controlled open data portal. In Flanders, 9 cities are working with innovation company IMEC to develop a smart region which includes mixing public and private data based on linked data.

Collaborative open data projects are not uncommon in regions of North America. The Manitoba collaborative data project the Social Planning Council of Winnipeg, the University of Manitoba, the University of Winnipeg, the International Institute of Sustainable Development), and the Winnipeg Regional Health Authority. The Western Pennsylvania Regional Data Center is a partnership between Allegheny County, the City of Pittsburgh and the University of Pittsburgh.

Case Study: MaRS Discovery District

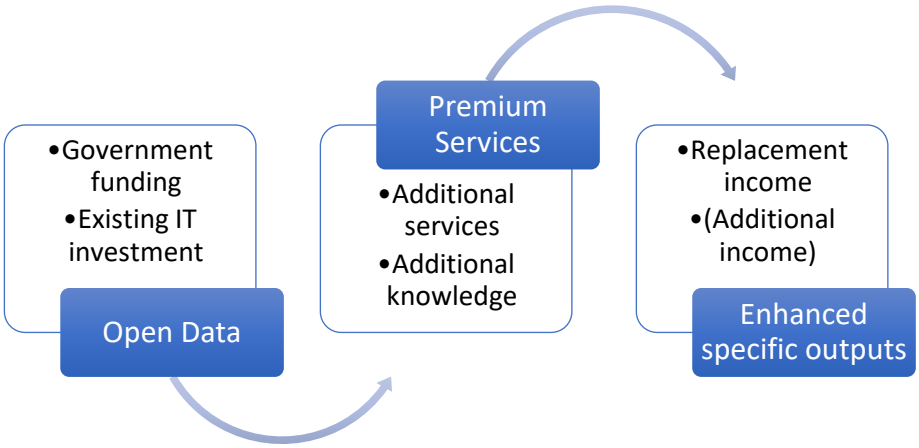
The Open Data Portal of Ontario was built as part of a public-private partnership that established the not-for-profit corporation MaRS Discovery District. MaRS is a Regional Innovation Centre that assists entrepreneurs in founding successful global businesses from Canada's science, technology and social innovation. MaRS-supported startup GDP contribution since 2008 is 11.7bn Canadian dollars.

Case Study: St Quentin and the Smart Cities Innovation Framework Implementation

St Quentin is a mid-sized city in northern France. As part of the Interreg 2Seas project Smart Cities Innovation Framework Implementation (SCIFI) it is working with the small to medium enterprise (SME) Element.io to develop a watering optimization system for St Quentin's parks and sports green spaces. Part of the aim of SCIFI is to encourage cities to open their data for these kind of innovative products and services that will benefit citizens.

The Element.io solution uses 6 different datasets. Two of these, including weather data, are open datasets published by external bodies. One, a calendar of bookings of the spaces, is used in the solution but is not published anywhere nor considered suitable for opening in the long term as it is considered to pose a security risk. The last three are all sensor data, which is being collected and published on data portal that is internal to SCIFI. Of these, one set is important only to Element.io, but the other sets of data can be considered for full opening later.

4.4 Self-financing



A key recommendation from the previous report was that in order to generate revenue to support financial sustainability, open data portals could charge for either data, services, or tool using a freemium model. This could, for example, be based on data quality, with higher quality datasets - which cost more to produce and maintain - being charged for while lower quality sets could be either free or available at lower costs.

Distinguishing which data could or should be charged requires a good measure of their quality and use; this approach will only be successful if the data quality is sufficient, and there are users who can both use the data and afford to pay for it. This may not be the case for a single municipality; payments may be combined with co-funding models, e.g. with several municipalities setting up a portal together and offering higher quality datasets for a price. Fundamentally, for many data publishers, especially those that do not have high value datasets, or only a few high value datasets, this is simply not practical. The risks of provision include having to hire highly skilled employees to deliver the enhanced datasets, while most likely experiencing inconsistency of demand.

Where data sets need substantial enhancement or improvement to increase their value, portal owners need to be sure that they, not the market, are best place to add that value. This is largely outside of the business of most governments, and therefore the provision of enhanced, curated data is often fulfilled by private operators, such as Open Corporates in the UK or Spazio Dati in Italy.

What can possibly be charged for, and sounds more plausible in the context of the vast amount of sensor data that is anticipated in the near future, is the provision of streamed Internet of Things data. Ensuring close to 100% levels of data availability is costly and can reasonably be charged for.

However, in some cases it is possible to identify a third self-financing model, in situations where the provision of data has increased services to end users and customers so effectively that it has increased revenue directly. Deloitte estimate (conservatively) that the increase in revenue to Transport for London generated by 80 open data streams offered through one unified API is £20million.[8]

[8] https://tfl.gov.uk/info-for/media/press-releases/2017/october/tfl-s-free-open-data-boosts-london-s-economy

An interesting question arises when the data is being provided by revenue generating agencies. National Mapping and Cadastral Agencies are usually mandated to generate sufficient income to cover their costs. While many are compensated by central government to provide open data, it is possible to use small scale open data as a 'taster' to promote sales of large scale data.[9]

Case Study: Finnish Meteorological Institute.

Meteorological data is some of the most well-established and proven open data. In the US, where meteorological data has been available for free for many years, growth in the market for weather forecasting services grew by 17% per annum between 1999 and 2006. In Europe, the comparable figure was just 5% p.a[10] The Finnish Meteorological Institute has made all its basic weather data open for free, and has successfully implemented a premium service on top. This includes the FMI searching for and supplying datasets; tailoring datasets; and advice and consultancy around the datasets.

From the literature, it is plausible that the chances of successfully offering a freemium service are increased for single focus portals (weather, geographic, transport data, as shown above) which operate in an area that has traditionally been a revenue generator rather than solely a cost centre.

Case Study: Bath:Hacked

"We have no formal funding and live mostly on miracles. We guarantee to respond well to any/all offers of event sponsorship," says the Bath:Hacked website. Bath:Hacked began as a group who created their own mapping data, in response to government control of official mapping data. Since then they have grown to address a number of problems including air pollution: each issue creates its own set of activities and attracts its own funding.

Bath:Hacked has an extra challenge financially - as a group that does not actually own data, there are potentially extensive costs of generating and collecting these. It has responded with numerous strategies, including: sub-setting national datasets to produce locally useful versions; reaching out to local businesses to attract privately-held data, and engaging with citizens who have been cataloguing and curating local information.

[9] http://www.eurosdr.net/sites/default/files/images/inline/20170918-eurosdr_workshop-nmcas_and_open_data_survey_2017_fwd.pdf

[10] https://www.w3.org/2013/share-psi/workshop/krems/report

5. Sustainable Portal Funding Method

Create the business case -> devise funding strategy -> plan launch and ongoing budgets

5.1 Funding Strategy

The first step to creating and maintaining a sustainable portal is to develop the business case. Next, we have devised a series of questions that should be answered in order to ensure that all funding requirements, and elements of the portal that impact on this, have been considered. Completion of this will establish the funding strategy.

1	What is your overall budget? How is it managed? By whom?
2	What are your priorities? How will you ensure your priorities (training, support for publishers, user engagement) align with those of your funding source(s)?
3	How will you identify, monitor and measure the impact of your portal's current or potential activities, to develop and support a business case for future funding?
4	What short-, medium- and long-term funding needs are you anticipating? What have you planned for? What do you need to plan for?
5	How will you be open about your funding strategy, so that people publishing and accessing data from the portal can identify future needs, use cases and potential funding shortfalls?
6	Can users help finance open data? Could this be through some form of (measurable) cost reduction?
7	Who will fund ongoing costs?
8	How will you monitor and measure impact?
9	How will you record your progress? Who will be the audience for this? How might this impact funding?
10	What does 'data quality' mean? How will you get and retain good quality data?
11	How will you fund the maintenance of your portal? How will you deal with requests for data and/or other services?
12	How will identify the community you are serving? How will you engage your community? How will this be funded? How will you measure impact?
13	Can you charge for data? What kind of services do you think this might imply?
14	If you can't charge for data, how can you monitor data use?
15	Are there any financing costs that weren't thought of at the outset?

We asked these questions of a group of portal owners/publishers to understand:

- Whether the questions made sense;
- What kind of answers they would evoke;
- What kind of further questions they would emerge;
- Where the largest funding gaps between best practice and existing practice exist.

These portals were all from early open data maturity cities in Northwestern Europe, however, they are already engaged in shared innovation activities with open data. Participants self-selected the questions they found most valuable to answer.

The questions that obtained the most responses were number 9 (how will you monitor and measure impact?) and number 11 (what does 'data quality' mean?). Certainly, these are two of the more challenging questions to define, and to accurately cost, and therefore will repay serious consideration.

The question testing also suggested that publishers found the questions around charging for data challenging. As the content of many portals is based on the PSI Directive 2003/98/EC, and open data can only be charged at marginal cost, some portal owners were nervous of being seen to be charging for data, or funding the portal in a way that suggested it was not simply a regulatory cost.

The answers indicated that often promotional costs are not often seen as part and parcel of the total cost, but as an 'as and when' opportunity when funding comes along. The question therefore becomes one of how to address that in the financing strategy. Who will have ownership, as this will likely vary? How can promotion be made more consistent?

Lastly, the questions revealed that the publishers believed the process of preparing data for publication would become increasingly cheaper as it was absorbed into the normal business processes. When considering this, publishers should remember that there may be changes or improvements in the way they wish to deliver the data that may affect this.

5.2 Budget Template

As noted above, there is such great variety in the costs of launching and maintaining an open data portal, which will be changed by not only the choice of business case, funding strategy and technical capability of the portal owner, but also by the data itself, particularly where big data is involved, that it is not instructive to give a 'one size fits all' definitive cost (in fact, it may be problematic if it results in causing poor decisions). However, it is possible to use the 20 cost activities to ensure the correct items are captured in the budget.

Activity	Cost	Details
Build	Development	This is generally seen as the largest cost, however, with a wide variety of catalogues and platforms available, the cost of development is reducing. A major decision is whether to develop (and then maintain and improve) in house or to contract out

	Infrastructure (incl. hosting)	This has a number of dependencies: is the portal a catalogue or will it host, totally or partially, the data sets? How will publishers and users access the datasets and how frequently? Answers to these and other technical questions will impact on the cost of the infrastructure, which might be minimal if only a few datasets are hosted, but extensive in the case of a large national portal
	Design and user experience	Again, this can vary extensively depending on whether the portal owner chooses to innovate or simply reuse an existing format
Strategy	Short, medium- and long-term goals	Setting aside budget to cover time for the setting of short, medium- and long-term goals, which often require the input of a number of stakeholders
	Prioritisation	Identifying time and resources for the development of business cases and associated funding plans
Operations	Portal operations (incl. user engagement)	Portal operations include all the day to day activities that might include content management and social media, reaching out to users regarding updated data sets and liaising with data publishers
	Data provision	Identifying, locating, cleaning/redacting and preparing data for publication. This is a large part of ongoing budget spend. Specialist support with aspects such as metadata may be required, which should be reflected in the staffing.
	Staffing	This is likely to change with changing priorities and value-added services. This is the area portals frequently underestimate, both in ongoing requirements and hidden costs

	Outreach, training and support for publishers	The percentage of the budget that should be allocated to this will vary with the nature of the portal. For a portal focused on a data intensive area such as national mapping agencies, publishers are likely to already be highly skilled. For a national portal publishing data from multiple departments, this may require considerable investment
	Data analytics	If an external platform provider is being used this cost may be rolled up with the design and hosting
	Maintenance and improvements	For subsequent years. This element of the budget should not be reduced too much as it will limit the ability to respond to user need
Encouraging Use	Outreach, training and support for users	This is an important element to ensure take up. As above, it is often left to separate budgets, but for a consistent approach, should be included in the main budget
	Incentivising use	While this may not be necessary in every budget, it is particularly important where portals are 'eating their own dog food', i.e. publishing data openly as an effective way to share it between departments or sub-departments
	Value-added services	Value-added services may include co-locating tools, improving documentation or enhancing metadata. They may also include more complex services that can be charged for
Measurement	Monitoring of use and impact	Ongoing assessment and monitoring should be implemented where possible
	Measurement of use and impact (research)	A small percentage of the budget should be reserved for an annual survey or other mechanism to understand how the site is being used and what impact this is having on the larger ecosystem

	Recording and management of activities, measurements and monitoring	Depending on the funding stream, this can potentially be a relatively onerous cost area. If reporting back to a central grant making body or project overseer is required it is important to apply sufficient resources to this task. Even where this is not required, ensuring that activities and impact are documented properly is an important part of sustainability
Income	Revenue	Provision of freemium services/sponsorship (if applicable)

5.3 Budget Focus Over Time

Naturally, each activity will require more or less focus over a period of time, assuming that the portal is in a pre-launch stage for a year to 18 months, and that the portal reaches a balance that could be considered maturity around the 5th year. Here, the budget focus at pre-launch is on the build but also on strategy – getting all the stakeholders on board and creating a resilient plan for the future. In the early stage, this moves to operations, which then become cheaper in maturity as projects become crystallised as business as usual. In maturity, the focus is on the encouragement of use and ways to create income, while the strategy may need some reviewing in the light of progress. Measurement should not be a huge cost, but an early stage investment in surveys may be valuable.

Stage/Activity	Pre-launch	Early stage	Maturity
Build			
Operations			
Strategy			
Encouraging use			
Measurement			
Income			

5.4 Six Key Sustainability Questions for Funding

The list of questions above can be used by anyone seeking to understand the full costs of opening their data. However, by rigorously interrogating the questions below, portal owners who are some way along their open data journey will be enabled to develop a picture of the existing funding gap and where to focus future sustainability efforts.

The key questions to identify this are:

- What is the source(s) of funding to date?

- Which of the 20 cost activities does it cover?
- With what measurements is it associated (publication of data sets, building of platform, use of datasets and so on)?
- Which of the 20 cost activities that are not covered should be prioritised?
- When will the funding run out?
- Is there a plan for the next funding round?

6. Recommendations

The following 5 recommendations comprise useful activities for the vast majority of portal owners and budget holders.

- Take a broad and deep view of the full cost of the portal including all 20 cost activities, and ensure that the full budget is surfaced, to avoid hidden costs;

- Consider focusing freemium services only on specific data areas, where both customers and staff are familiar with purchasing and supplying services;

- Portals cover a range of activities, and sustainable funding may come from a variety of different sources to cover this. While the hosting may remain an internal cost, portals require data and promotion, and commercial agreements could include covering the cost of these;

- Think about future alignment of the open data portal beyond being an IT or transparency concern. How might it be rolled up with another aligned service to add value? If the aim is to create business innovation via open data, which business support activities might the open data portal become part of?

- A clear business case for the development and continued support of a portal will not only make it more sustainable but will also establish where to look for impact.