

How to produce country(service) specific Benefits/ROI/Costs

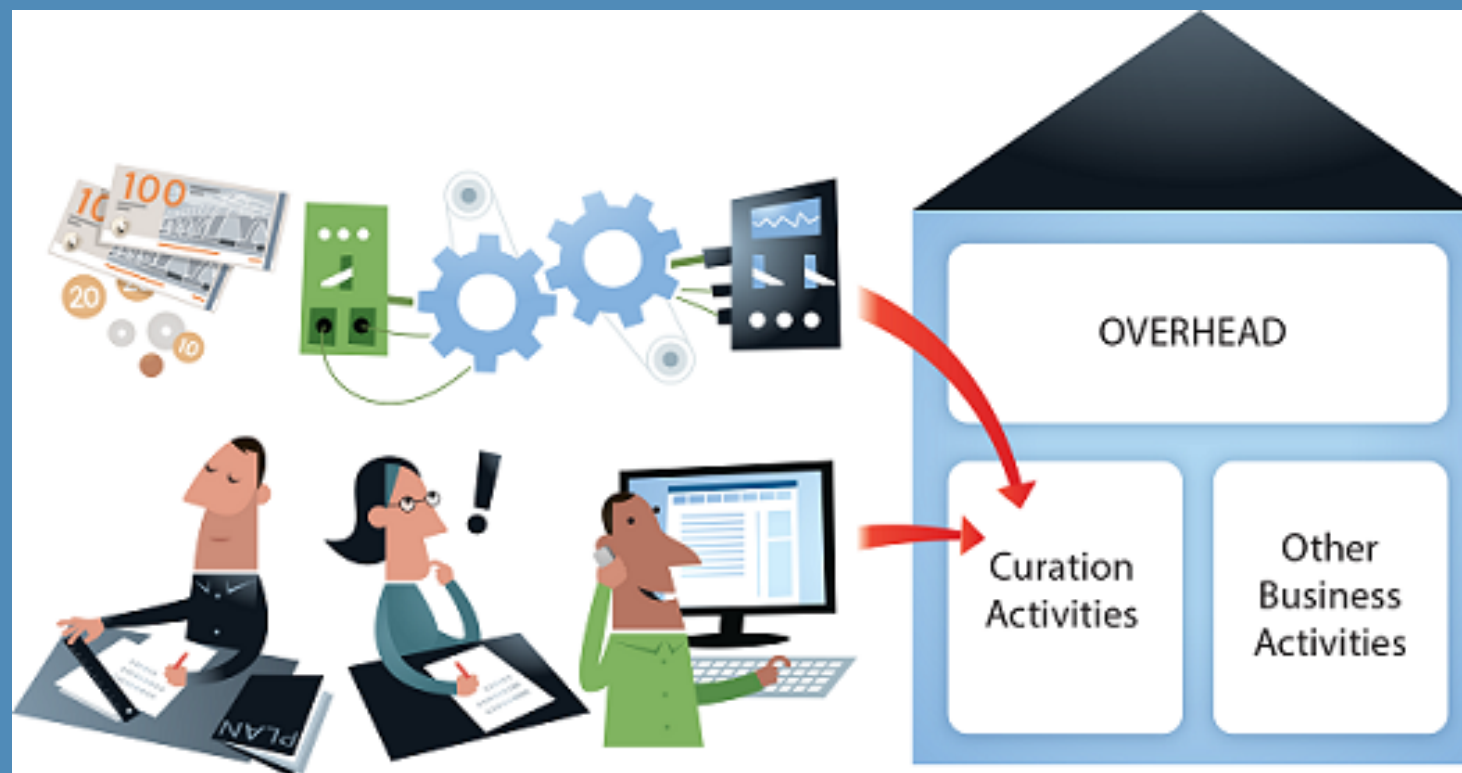
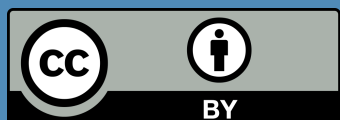


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CESSDA Widening Skopje, November 2019 - Neil Beagrie (Charles Beagrie Ltd)



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Cost-Benefit Advocacy Toolkit

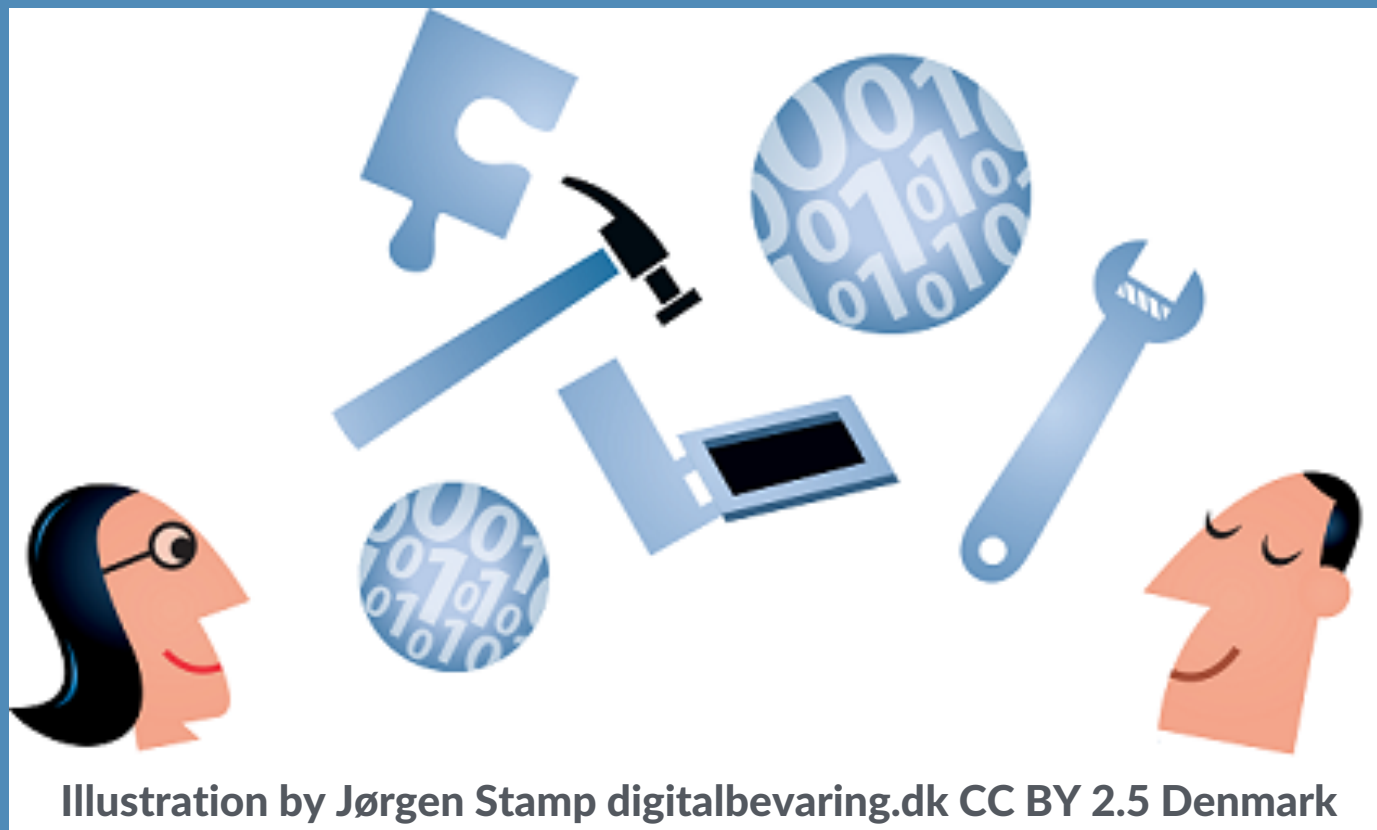


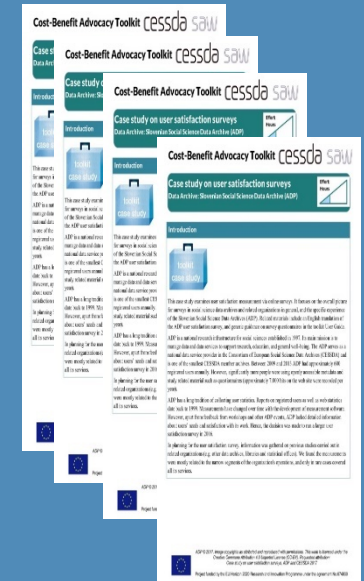
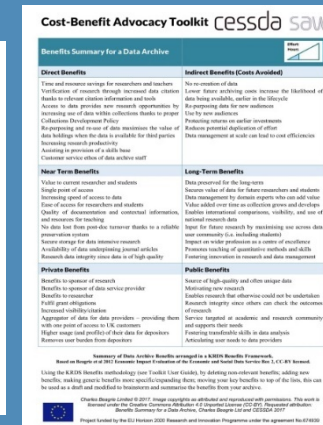
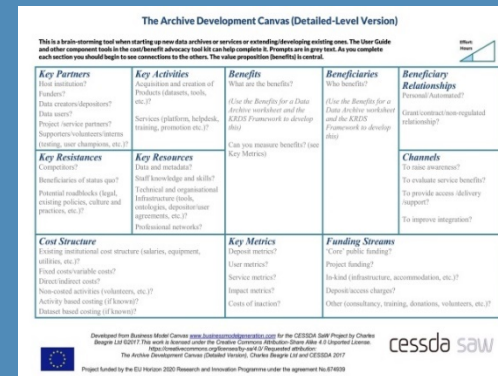
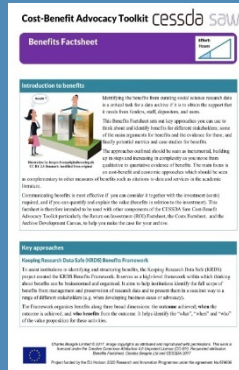
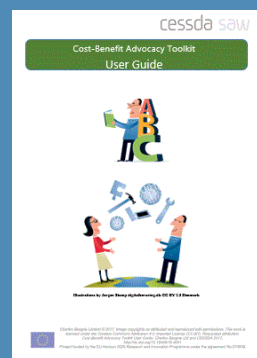
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CESSDA-SaW Cost-Benefit Advocacy Toolkit



User Guide

Factsheets

Archive Development Canvas

Benefits Worksheet

Case Studies

- Developed during CESSDA SAW project (2015-17)
- Workshop support in Guide proposal - hopefully something that will be possible in future



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Toolkit Components

- **Factsheets**
 - ROI, Benefits, Costs
- **Worksheets**
 - Benefits Summary for a Data Archive
 - Archive Development Canvas
- **Case studies**
 - ADP, FSD, LiDA, UKDS
- **Selected External Tools**
 - CCeX, KRDS, CDMA, ESDS Impact, ADP surveys , etc
- **User Guide**



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Design criteria

- Easy for overloaded individuals/ smaller services
- Short documents
- Good Infographics
- Synthesis
- Making existing tools easier to use/tailored to (social science) data services
- Creative Commons CC-BY wherever possible for ease of re-use



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The Factsheets



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ROI Factsheet (1)

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Return on Investment Factsheet



What is Return On Investment (ROI)?



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ROI is a metric used to evaluate the merit of a single investment or to compare the relative merits of a number of different investments. It measures the amount of quantifiable benefits (returns) relative to the investment's cost. To calculate ROI, the quantified benefits (return) is divided by the cost of the investment, and the result is expressed as a percentage or a ratio. A positive ROI means the benefits compare favourably to investment cost.

In business, the ROI metric is used to measure the rates of return and decide whether or not to undertake an investment. In government, ROI is increasingly used to compare and prioritise capital spending proposals within funding programmes. Within research, ROI metrics are often a feature of research infrastructure bids. In the physical and life sciences has been less often used for the humanities and social sciences.

ROI does not inherently account for the amount of time during which the investment is taking place. However one may also incorporate Net Present Value (NPV), a measure that accounts for differences in the value of money over time. For long-term investments, such as research data infrastructures where the benefits accumulate over several decades, the need for Net Present Value adjustment is high.

As a decision tool ROI is simple to understand. However you need to be aware of underlying variables and assumptions that affect the metric and how it was calculated. You can discuss variables such as the length of the calculation time, or if overhead cost should be included, etc. To use ROI as an indicator to prioritise different investment projects is problematic unless the variables are defined and comparable.

The UK Economic and Social Data Service (ESDS) Impact Study and ROI

The ESDS impact study published in 2012 is currently the only example of a fully developed quantified economic impact study and ROI metrics for social science research infrastructures. It found that the quantifiable benefits and returns significantly exceeded the value of the funding invested in the ESDS. The study included two ways of expressing return on investment:

- There was a 5.8 to 1 benefit:cost ratio of net economic value to the service's operational costs;
- A counter-factual macro-economic approach based on returns to R&D at either 1% or 10% estimated the value of the additional return of the data hosted as £28 million to £213 million over 70 years (Net Present Value); suggesting a 2.3-fold to 10-fold return on investment.



Charles Daegre (October 6 2017) images copyright as attributed and reproduced with permission. This report is licensed under the Creative Commons Attribution 4.0 International License (CC-BY). Requested attribution: Return on Investment Factsheet | Charles Daegre | CESSDA | 2017

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ROI Factsheet (2)

| Costs of Inaction: reported metrics for archiving via individual researchers | | | |
|--|---|---|---|
| Absolute loss | Rate of loss of research data sets | 17% per annum | (Vines et al 2014) |
| Partial information loss | Rate of loss of working contact emails | 7% per annum | (Vines et al 2014) |
| | Rate of loss for web-links to data on personal websites | c.5.5% per annum | (Pepe et al 2014) |
| Access | Data requests fulfilled | 25.7% 44% 59% | (Wicherts et al 2006) (Krawczyk and Reuben 2012) (Vines et al 2013) |
| Delay | Elapsed time to fulfill data requests | Up to 6 months Within 1-3 weeks (mean 7.7 days) | (Wicherts et al 2006) (Vines et al 2013) |

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Although these reported metrics are from studies of different disciplines and study dates, they contrast sharply with the excellent preservation record, very high fulfilment rates, and rapid online access rates of public data archives in the social sciences. The public data archives also are appreciating as opposed to

depreciating assets with improving rather than decreasing trends in value over time.



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Benefits Factsheet (1)

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Benefits Factsheet



Introduction to benefits



Identifying the benefits from existing research data is a central task for a data archive if it is to effectively support the research from funders, staff, depositors, and users.

This Benefits Factsheet sets out key approaches you can use to think about and identify how you can deliver different contributions, some of the main arguments for benefits and the evidence for them, and finally practical metrics and case studies for benefits.

The approaches outlined should be seen as instrumental, building up to steps and increasing in complexity as you move from qualitative to quantitative evidence of benefits. The main focus is on cost-benefit and economic approaches which should be seen as complementary to other measures of benefits such as citations to data and services in the academic literature.

Communicating benefits is most effective if you can consider it together with the investment costs required, and if you can quantify and explain the value benefits in addition to the investment. This Factsheet is therefore intended to be used with other components of the CESSDA Saw Cost-Benefit Advocacy Toolkit particularly the Return on Investment (ROI) Framework, the Costs Factsheet, and the Academic Development Canvas, to help you make the case for your archive.

Key approaches

Keeping Research Data Safe (KRDS) Benefits Framework

In recent institutions in identifying and structuring benefits, the Keeping Research Data Safe (KRDS) project created the KRDS Benefits Framework. It serves as a high-level framework within which thinking about benefits can be structured and organised. It aims to help institutions identify the full scope of benefits from the acquisition and preservation of research data and to present them in a consistent way to a range of different stakeholders (e.g. when developing business cases or submissions).

The Framework organises benefits along three broad dimensions: the outcomes achieved, where the outcome is achieved, and who benefits from the outcome. It helps identify the "what", "where" and "who" of the value proposition for these activities.



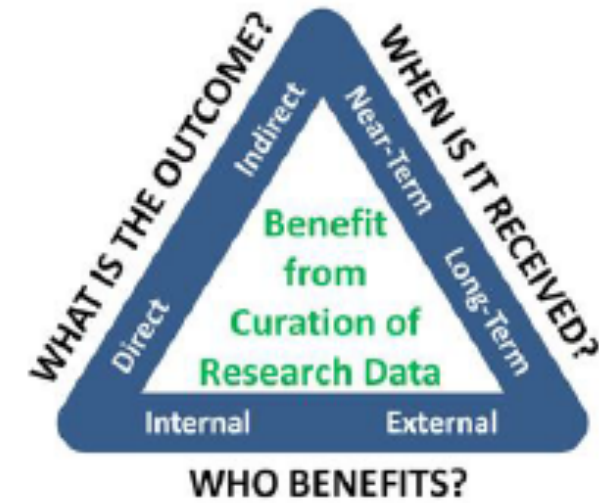
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Benefits Factsheet(2)



The Anatomy of a Benefit
(KRDS User Guide 2011 figure 10).

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| Benefits Summary for a Data Archive | |
|---|--|
| Direct Benefits Time and resource savings for researchers and teachers Verification of research through increased data citation thanks to relevant citation information and tools Access to data provides new research opportunities by increasing use of data within collections thanks to proper Collections Development Policy Re-purposing and re-use of data maximises the value of data holdings when the data is available for third parties Increasing research productivity Assisting in provision of a skills base Customer service ethos of data archive staff | Indirect Benefits (Costs Avoided) No re-creation of data Lower future archiving costs increase the likelihood of data being available, online in the lifecycle Re-purposing data for new audiences Use by new audiences Protecting returns on earlier investments Reduces potential duplication of effort Data management at scale can lead to cost efficiencies |
| Near Term Benefits Value to current researcher and students Single point of access Increasing speed of access to data Ease of access for researchers and students Quality of documentation and contextual information, and resources for teaching No data lost from post-disc turnover thanks to a reliable preservation system Secure storage for data intensive research Availability of data underpinning journal articles Research data integrity since data is of high quality | Long-Term Benefits Data preserved for the long-term Secures value of data for future researchers and students Data management by domain experts who can add value Value added over time as collection grows and develops Enables international comparisons, viability, and use of national research data Input for future research by maximising use across data user community (i.e. including students) Impact on wider profession as a centre of excellence Promotes teaching of quantitative methods and skills Fostering innovation in research and data management |
| Private Benefits Benefits to sponsor of research Benefits to sponsor of data service provider Benefits to researcher Fulfill grant obligations Increased visibility/citation Aggregation of data for data providers – providing them with one point of access to UK customers Higher usage (and profile) of their data for depositors Removes user burden from depositors | Public Benefits Source of high-quality and often unique data Motivating new research Enables research that otherwise could not be undertaken Research integrity since others can check the outcomes of research Services targeted at academic and research community and supports their needs Fostering transferable skills in data analysis Articulating user needs to data providers |

Summary of Data Archive Benefits arranged in a KRDS Benefits Framework. Based on Beagrie et al 2012
Economic Impact Evaluation of the Economic and Social Data Service Box 2, CC-BY licensed.

Using the KRDS Benefits methodology (see Toolkit User Guide), by deleting non-relevant benefits; adding



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Benefits Factsheet (3)

Reported Efficiency Gains from Value and Impact Studies

| | Research | Teaching | Study | Source |
|-----------------------------------|----------|----------|-------|----------------------------|
| Economic & Social Data Service | 46% | 23% | N/A | Beagrie et al 2012 |
| Archaeology Data Service | 44% | 32% | 44% | Beagrie and Houghton 2013a |
| British Atmospheric Data Centre | 28% | 15% | 34% | Beagrie and Houghton 2013b |
| European Bioinformatics Institute | 46% | N/A | N/A | Beagrie and Houghton 2016 |

Reported efficiencies for research, teaching, and learning.

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Costs Factsheet(1)

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Costs Factsheet

Introduction to costs

A basic understanding of budgets and how different factors affect digital preservation and curation costs are critical to establishing and developing any data archive. However, an understanding of the costs of preserving and creating research data sets is not enough to isolate the effective advocacy or to assess economic sustainability.

Cost analysis should be accompanied by an analysis of the anticipated benefits. This costs factsheet should therefore be read and used in conjunction with other components in the Cost-Benefit Advocacy Toolkit, particularly the Benefits Factsheet and the Return on Investment Factsheet.

Effort required and our knowledge base

The costs of data curation and digital preservation have been the focus of a range of research projects in recent years and a collection of tools and a body of knowledge has emerged.

Costs are not a simple topic and in practice can be very complex. Costs in any organisation may be distributed across many departments, activities and budget headings. Establishing costs can therefore involve speaking to many different people and costs can be difficult to untangle. In addition, data curation costs are variable according to a range of economic and service factors that may be included/excluded. Issues such as inflation/deflation, cost of capital, depreciation, and scope and the levels of service provided, all affect costs.

This complexity means that the effort threshold for some costing activities such as detailed activity-based costing is very high and therefore direct use by individual data archives may be limited.

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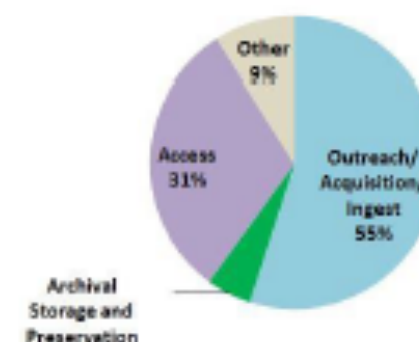
Costs Factsheet(2)

KRDS "Rules of Thumb"

Getting data in takes about half of the lifetime costs, preservation about a sixth, access about a third

KRDS found acquisition and ingest are the biggest costs over the preservation lifetime of research data. The costs of archival storage and preservation activities are consistently a very small proportion of the overall costs and significantly lower than the costs of acquisition/ingest or access activities for all the KRDS case studies.

Percentages varied between different archives but a consistent pattern emerged suggesting this rule of thumb from the Archaeology Data Service cost data as a rough guide to overall lifetime costs (Beagrie et al. 2010, pp. 31-52). It is potentially significant for those building business models and needing to fund archiving from depositor's research grants. Ingest costs may be within the timespan of the research grant and can be a significant part of lifetime costs.



Approximate Activity Data Costs for the Archaeology Data Service
(after Beagrie et al. 2010). CC-BY licensed

Preservation costs decline over time

KRDS found a trend of relatively high preservation costs in the early years reducing substantially over time for data collections. An example is the preservation costs projected for the Archaeology Data Service (ADS) based on their experience of the first 10 years of operating the data service. (Beagrie et al. 2008, pp.4-6). This long-term decline in costs reflects a number of factors: partly the effect of Kryder's Law on technical storage costs but mainly the growth in collections over time and the effect of economies of scale. Again it is potentially significant for those building business models, particularly if considering one-time fixed payment deposit fees or endowment for a dataset.

Fixed Costs are significant for most data archives

KRDS (Beagrie et al 2010, pp. 31-52) found that data archive costs are dominated by fixed costs that do not vary with the size of the collections. For most social science data archives, fixed costs such as core staffing and technical set-up will be significant.

Fixed costs are eventually not fixed but you have to scale up quite a way before that applies. Activities characterised by significant fixed costs can reduce the per-unit cost of long-term preservation by leveraging economies of scale. These factors may have implications for cost-benefit of small collections (as relative costs can be higher) and for collection policies (economies of scale, lower costs and higher impact may come from collecting in adjacent areas such as population health data or the humanities, or via international data collaborations such as CESSDA).

Staff are the most significant proportion of archive costs

KRDS consistently found that staff are the major cost component overall, sometimes as high as 90% of the total costs (Beagrie et al 2010, pp. 31-52). This finding was also made in another recent costs study (NCDD 2017). Equipment costs are a relatively small proportion of total costs. There is a minimum base-level of staff and skills required for any service. It is important to note that staff are the most significant component of fixed costs (see above) and economies of scale will be largely driven by staff costs and data volumes.



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Bringing it all together: The Archive Development Canvas



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The Business Model Canvas

Designed for:

Designed by:

On: Day Month Year

Iteration: No.

Key Partners



Who are our Key Partners?
Who are our key suppliers?
Which Key Resources are we acquiring from partners?
Which Key Activities do partners perform?

Key Partners:
Distribution and assembly
Collection of VMI and inventory
Acquisition of particular resources and activities

Key Activities



What Key Activities do our Value Propositions require?
Our Distribution Channels?
Customer Relationships?
Revenue streams?

Key Activities:
Production
Distribution
Logistics/Supply
Marketing/Sales

Value Propositions



What value do we deliver to the customer?
Which one of our customer's problems are we helping to solve?
What bundles of products and services are we offering to each Customer Segment?
Which customer needs are we satisfying?

Value Propositions:
Performance
Reliability
Customization
"Doing the Job Done"
Design
Brand/Status
Price
Core Reliability
Risk Reduction
Accessibility
Convenience/Usability

Customer Relationships



What type of relationship does each of our Customer Segments expect us to establish and maintain with them?
Which ones have we established?
How are they integrated with the rest of our business model?
How costly are they?

Customer Relationships:
Personal assistance
Individual Personal Assistance
Self Service
Assessment/Advice
Community
Co-creation

Customer Segments



For whom are we creating value?
Who are our most important customers?

Customer Segments:
Mass Market
Niche Market
Segmented
Diversified
Multi-sided Platform

Key Resources



What Key Resources do our Value Propositions require?
Our Distribution Channels?
Customer Relationships?
Revenue Streams?

Key Resources:
Physical
Intellectual (brand names, copyrights, design)
Human
Financial

Channels



Through which Channels do our Customer Segments want to be reached?
How are we reaching them now?
How are our Channels integrated?
Which ones work best?
Which ones are most cost-efficient?
How are we integrating them with customer routines?

Channels:
1. Awareness
2. Acquisition
3. Evaluation
4. Purchase
5. Delivery
6. After sales
7. Support

Cost Structure



What are the most important costs inherent in our business model?
Which Key Resources are most expensive?
Which Key Activities are most expensive?

Cost Structure:
Cost Drivers (Business model innovation, low price value proposition, maximum automation, extensive outsourcing)
Value Drivers (Economies of scale, premium value proposition)

Cost Structure:
Fixed Costs (salaries, rent, utilities)
Variable Costs
Revenue of scale
Revenue of scope

Revenue Streams



For what value are our customers really willing to pay?
For what do they currently pay?
How are they currently paying?
How would they prefer to pay?
How much does each Revenue Stream contribute to overall revenues?

Revenue Streams:
Transaction
Subscription
Licensing
Advertising
Sales
Leasing
Rental
Royalty
Commission
Referral
Freemium
Usage-based
Performance-based
Subscription
Licensing
Advertising
Sales
Leasing
Rental
Royalty
Commission
Referral
Freemium
Usage-based
Performance-based



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The Archive Development Canvas (detailed)

The Archive Development Canvas (Detailed-Level Version) Draft 2017-02-14

This is a brain-storming tool when starting up new data archives or services or extending/developing existing ones. The User Guide and other component tools in the cost/benefit advocacy tool kit can help complete it. Prompts are in grey text. As you complete each section you should begin to see connections to the others. The value proposition (benefits) is central.

| | | | | |
|---|--|---|--|---|
| Key Partners Host institution? Funders? Data creators/depositors? Data users? Project /service partners? Supporters/volunteers (user testing, user champions, etc.)? | Key Activities Products (datasets, tools, etc.)? Services (platform, helpdesk, training, promotion etc.)? | Benefits What are the benefits? <i>(Use the Benefits for a Data Archive worksheet and the KRDS Framework to develop this)</i> Can you measure benefits? (see Key Metrics) | Beneficiaries Who benefits? <i>(Use the Benefits for a Data Archive worksheet and the KRDS Framework to develop this)</i> | Beneficiary Relationships Personal/Automated? Grant/contract/non-regulated relationship? |
| Key Resistances Competitors? Beneficiaries of status quo? Potential roadblocks (legal, existing policies, culture and practices, etc.)? | Key Resources Data and metadata? Staff knowledge and skills? Technical and organisational Infrastructure (tools, ontologies, depositor/user agreements, etc.)? Professional networks? | | | Channels To raise awareness? To evaluate service benefits? To provide access /delivery /support? To improve integration? |
| Cost Structure Existing institutional cost structure (salaries, equipment, utilities, etc.)? Fixed costs/variable costs? Direct/indirect costs? Non-costed activities (volunteers, etc.)? Activity based costing (if known)? Dataset based costing (if known)? | | Key Metrics Deposit metrics? User metrics? Service metrics? Impact metrics? Costs of inaction? | Funding Streams ‘Core’ public funding? Project funding? In-kind (infrastructure, accommodation, etc.)? Deposit/access charges? Other (consultancy, training, donations, volunteers, etc.)? | |

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The Archive Development Canvas (mapped)

The Cost-Benefit Advocacy Toolkit Components mapped on to the Archive Development Canvas

| <i>Key Partners</i> | <i>Key Activities</i> | <i>Benefits</i> | <i>Beneficiaries</i> | <i>Beneficiary Relationships</i> |
|---|--|--|---|----------------------------------|
| | | <div>Archive Development Canvas (Detailed Level)</div> <div>User Guide</div> <div>ROI Factsheet</div> <div>Benefits Factsheet</div> | <div>User Guide</div> <div>Slovenia (ADP) Case Study</div> <div>ADP User Satisfaction Survey</div> <div>ESDS Impact Study (User and Depositor Impact Surveys)</div> | |
| <i>Key Resistances</i> | <i>Key Resources</i> | | | <i>Channels</i> |
| | <div>Benefits Factsheet</div> | <div>KRDS/UKDS Benefits Summary for a Data Archive</div> <div>UK (UKDS) Case Study</div> <div>Lithuania (LiDA) Case Study</div> <div>Finland (FSD) Case Study</div> <div>ESDS Impact Study</div> | | |
| <i>Cost Structure</i> | | <i>Key Metrics</i> | <i>Funding Streams</i> | |
| <div>User Guide</div> <div>KRDS Cost Model</div> <div>4C Cost Comparison Tool</div> | <div>Costs Factsheet</div> <div>Finland (FSD) Case Study</div> | <div>User Guide</div> | | |

Key

CESSDA SaW

External Resource

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The Toolkit is available to download from:
<http://dx.doi.org/10.18448/16.0013>

Questions?

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