CONTROLLING THE COST OF LONG-TERM DIGITAL ACCESSIBILITY

A cost model for long-term digital accessibility

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I. ABSTRACT

For some time now, heritage organisations and other institutions have been in agreement about the need for the long-term preservation and accessibility of valuable digital resources. What is much less clear, however, is how much this would cost. In many cases, not enough consideration is given to the long-term cost of curating digital collections, often because very little is actually known about this aspect. As a result, such management costs are often not included in institutions' ordinary operating expenses. Moreover, many heritage institutions tend to assume that the long-term costs are very high, partly due to the exponential rise in the volume of material, whether digitised or born-digital. In many cases, incidental revenue (i.e. project income) is used to pay for long-term management costs. But is this assumption correct? And how can we control the cost of curating digital collections in the long term? We have designed a cost model for analysing and controlling the cost of long-term digital accessibility.

II. THE COST OF LONG-TERM ACCESSIBILITY: DEVELOPING A COST MODEL FOR LONG-TERM DIGITAL ACCESSIBILITY

The aim of the model is to make it easier to control the fixed and variable costs of the long-term accessibility of digital heritage. In order to do so, it is absolutely vital to have a clear picture of the cost structure and the cost drivers, not only as they stand now, but also with a view to budgeting for future costs. A uniform financial framework and a uniform set of basic principles are needed to facilitate comparison. Institutions, policy-makers and funding-providers can then use this information to reach better informed decisions on investments in and the use of facilities for enabling long-term access.

This project builds on previous Dutch and international schemes for helping institutions obtain a clearer picture of the cost of long-term access to their digital material. One of these was a project entitled Collaboration to Clarify the Costs of Curation (4C), which resulted in the development of the CCEx tool (Curation Costs Exchange),[1] which institutions can use to analyse their own expenditure and compare this with the level of expenditure incurred by other institutions operating in the same field. The 4C project formulated the following vision of the future:[2]

> *"In five years' time (2020) it will be easier to design or procure more cost-effective and efficient digital curation services because the costs, benefits and the business cases for doing so will be more widely understood across the curation lifecycle and by all relevant stakeholders. Cost modelling will be part of the planning and management activities of all digital repositories."*

The developers of the cost model for long-term digital accessibility examined a number of

existing models[3] and sought to create consistency with the CCEx tool. The model is designed to help institutions to:

1. analyse the costs of digital preservation (in part so as to gain better control over them) and their component parts;
2. monitor these costs so as to keep them better in check;
3. compare the costs of long-term accessibility with those incurred by other institutions, so as to learn and gain better control over these costs;
4. take certain strategic decisions, based on points 1, 2 and 3, affecting both the institution itself and specific sectors, as well as all organisations curating digital collections.

The model makes it easier for institutions to make policy decisions, including decisions on collection policy, on the use of staff and other resources, on partnerships with other institutions and on the necessary infrastructure.

III. THE COST MODEL FOR LONG-TERM DIGITAL ACCESSIBILITY: STRUCTURE AND CONTENT

The cost model for long-term digital accessibility is an activity-based cost model focusing on activities that need to be performed as part of a process of long-term preservation and access. Providing long-term access to digital information is an active process involving the following activities:
1. selection/pre-ingest;
2. ingest;
3. processing;
4. documentation;
5. archive;
6. access;
7. user support.

Each process stage also involves a number of overarching activities:
1. metadata;
2. preservation management;
3. infrastructure;
4 ICT.[4]

These are represented separately in the model.

Our decision to work with these specific process stages and overarching activities was based on a study of a number of existing cost models for long-term digital accessibility.[5+6] Among the aspects we examined were the variables and activities included in these models, their aims and their complexity. The cost model for long-term digital accessibility is based on the findings of this study. Additionally, the activities, sub-activities and related definitions are based on the OAIS[7] model, with further refinements added in the wake of discussions in committees set up by the institutions participating in the project (i.e. institutions in the fields of cultural heritage, archives, media and science). The same committees also tested the model.

The cost model for long-term digital accessibility generates information on the cost structures and the cost drivers, and identifies the financial cost of the curation and preservation of, and the maintenance of access to, digital heritage assets. If the model is used over a period of years, it can reveal the impact of these factors on cost (correlations). The correlations can then be used to generate a statistical cost forecast.

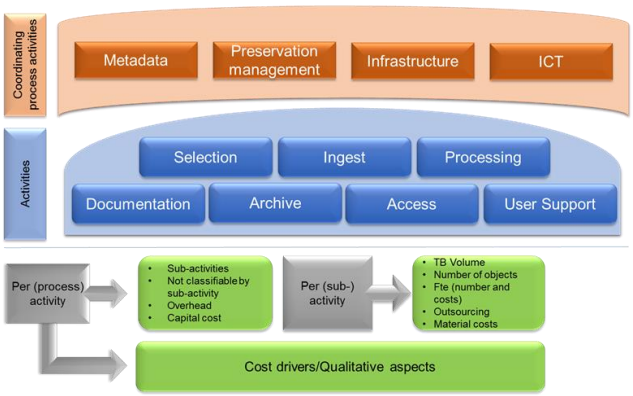


Figure 1: Cost model for long-term digital accessibility

IV. LINK WITH OTHER FIELDS OF RESEARCH COVERED BY THE DIGITAL HERITAGE NETWORK

Link with preservation: policy and curation[8]

Costs are the inevitable consequence of institutions' decisions on their preservation policies. In theory, every institution (with a digital archive) has a policy on how to safeguard the long-term accessibility of its digital collection. In many cases (but not always), this policy (or, as the case may be, the institution's decisions) are based on certain underlying principles. Some organisations decide to do their own digital archiving, using the OAIS model as a framework, including the associated terminology, functions and

information model. Others outsource their digital archives to an external organisation, but insist in doing so that the latter sticks to their own policies. The process of making these choices and deciding on the structure, details and implementation of the archive begins with a thorough analysis of the cost of long-term digital accessibility for the organisation in question.

Not all institutions curating collections currently make use of preservational expertise and are fully aware of digital access as a long-term issue. While certain organisations in the Netherlands possess the relevant expertise and are aware of the basic principles, they soon face the problem of how to record the principles underlying their preservation policy and thus ensure that all members of staff act in accordance with these principles. This is a process of change that takes time and management effort and which requires active support. The organisation runs certain risks by postponing the implementation of preservation or by viewing it as a purely technical issue. These risks do not solely affect the quality of long-term accessibility. The level of cost associated with preservation will also remain unclear as long as the organisation fails to adopt a clearly formulated policy. A lack of clear information on costs will result in the organisation taking strategic decisions without a sound basis.

As a member of a wider network, an organisation that is responsible for curating a collection is virtually always one of the many links in an information chain. The method chosen for preserving the collection requires certain measures that extend beyond the confines of the organisation itself. A number of parties need to know how long-term access to the collection is guaranteed. For example, depositors will be keen to know that their works are in safe hands. Subsidy-providers have certain requirements that need to be met and wish to have a clear picture of the organisation's philosophy and working methods. For their part, the staff of the organisation need to have a sense of direction in their day-to-day work. In short, there can be no long-term accessibility without a coherent preservation policy if *ad-hoc* decisions are to be avoided, if depositors, subsidy-providers, staff and other stakeholders are to have a clear idea of how the organisation is planning to safeguard long-term access to its collection, and if the long-term risks are to be minimised. The cost of long-term digital accessibility is an essential component of this policy.

Link with generic (distributed) facilities[9]

There is a vital link between the cost model for long-term digital accessibility and generic, distributed facilities.[10+11] A facility is said to be generic if it is the result of collaboration among a number of repositories or if it is offered as a service by one repository to one or more other repositories. The persistent identifier for digital heritage assets in a digital archive is a good practical example of the result of a collaborative effort. The registration systems used by virtually all Dutch heritage institutions include a facility for recording persistent identifiers. This is thanks to the fact that the heritage institutions decided to join forces and work together with suppliers. A range of scenarios have been developed for the design of generic facilities by a network of national facilities for public-sector organisations offering long-term access to digital information. Using concrete, achievable scenarios, the organisations and their clients can take well-founded policy decisions, reassign resources, and define national responsibilities more clearly.

Costs play a key role in all this, as the outcome of the scenarios. The explicit assumption here is that closer cooperation produces greater effectiveness and efficiency. Although there may conceivably be certain scale losses as well as gains, the overriding principle is 'work together where possible and go it alone where necessary'. However, costs may also be seen as input for the scenarios, i.e. as the basis for strategic decisions on whether an organisation should perform certain activities itself, subcontract them to external suppliers, or perform them in partnership with third parties. It is absolutely essential to have a clear picture of the cost involved (with the aid of the cost model) in order to take strategic decisions on such matters ('bringing supply and demand together').

This article examines the added value created for by heritage institutions by the use of the cost model for long-term digital accessibility. We believe that the use of the cost model for preservation (policy and curation),

combined with generic facilities, offers even more added value than in the past. This is because the information generated by the model provides a sound basis for strategic decisions on whether a digital repository should perform certain activities itself, subcontract them to external suppliers, or work in partnership with third parties. Moreover, the model clarifies the relationship between policy, generic facilities and costs.

V. RESULTS OF TRIAL WITH COST MODEL: STAGES 1 AND 2

The first stage consisted of the development of the cost model and its trialling by eight institutions.[12] Following the completion of the first stage of the project,[13] the second stage was launched in 2018, when the model was refined with the aid of interviews with representatives of institutions, the experiences gained by the institutions and the findings of the first stage. The roll-out of the model also continued in the second stage, with more institutions[14] using it as a means of measuring and controlling the cost of long-term digital accessibility. The resultant information was analysed and the first step was taken on the road to exploiting the model's full potential by linking cost drivers with costs. As far as the latter point is concerned, the question is: what happens to the level of cost when a button is pressed or a dial is turned (i.e. a policy is adopted or modified)? This type of information can be used as evidence in support of strategic decisions.

This section presents the results achieved to date and discusses the technical aspect of the linkage between costs and cost drivers.

Results

The following figures show the results obtained to date. These are highlights. We (i.e. the Digital Heritage Network) are currently building an analytical tool in PowerBI. Not only does this display more results, it also offers the possibility of comparing institutions and different sectors. However, there is an important qualification that needs to be made here. In making any comparison, account must be taken of the administrative, organisational and strategic context in which the institutions operate, as well as any additional responsibilities and the requirements applying to access to and the storage of collections for professionals, teachers, students and the general public. This aspect is factored into the cost drivers in the model; see figure 1). It is the only way of making a fair comparison based on the right findings.

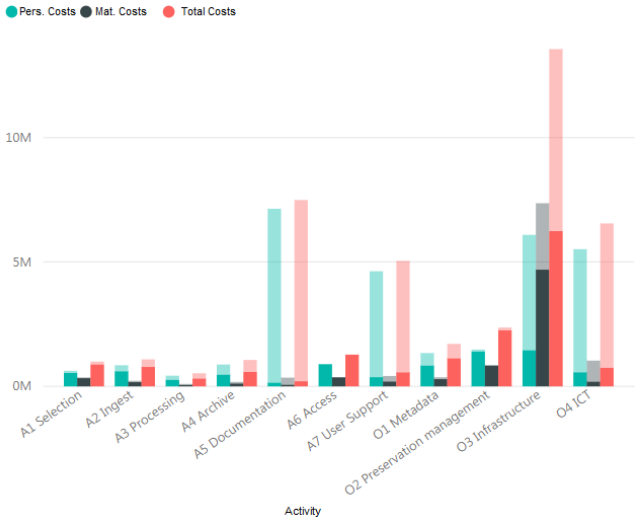


Figure 2: Total costs (staff and material costs) of long-term digital accessibility, by process stage and overarching activity.

Figure 2 shows the total cost of long-term digital accessibility as experienced by 14 institutions, distributed over the process stages (designated with an 'A') and the overarching activities (designated with an 'O'). One institution has been separated from figure 2 (on account of a huge discrepancy in the costs concerned; these are shown as transparent bars in the bar chart). It is clear from figure 2 that the bulk of the cost of long-term digital accessibility lies in the overarching activities, i.e. metadata, preservation management, infrastructure and ICT. As far as the process stages are concerned, most of the cost is incurred at the front end of the process, i.e. selection and ingest, and in access.

Figure 2 also shows that staff costs are higher than material costs throughout the process, apart from in relation to Infrastructure (one of the overarching activities). This reflects the high labour-intensiveness of the activities in question.

Staff costs (rounded off for all institutions) account for 71.7% of the total costs. Material costs account for 27.9%, services sourced from external suppliers for 0.4%, and the cost of temporary staff for 0.1%. Overarching activities

account for 58.04% of the total costs, with the process stages accounting for the remaining 41.96%.

The following picture emerges if the total costs incurred by each institution are broken down by process stage and overarching activity (institution C has been disregarded in order to present a fair picture).

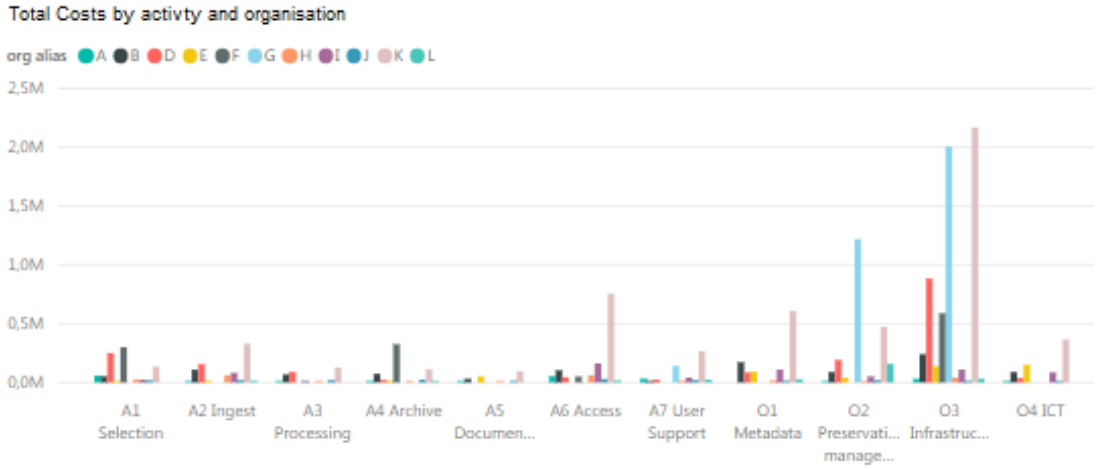
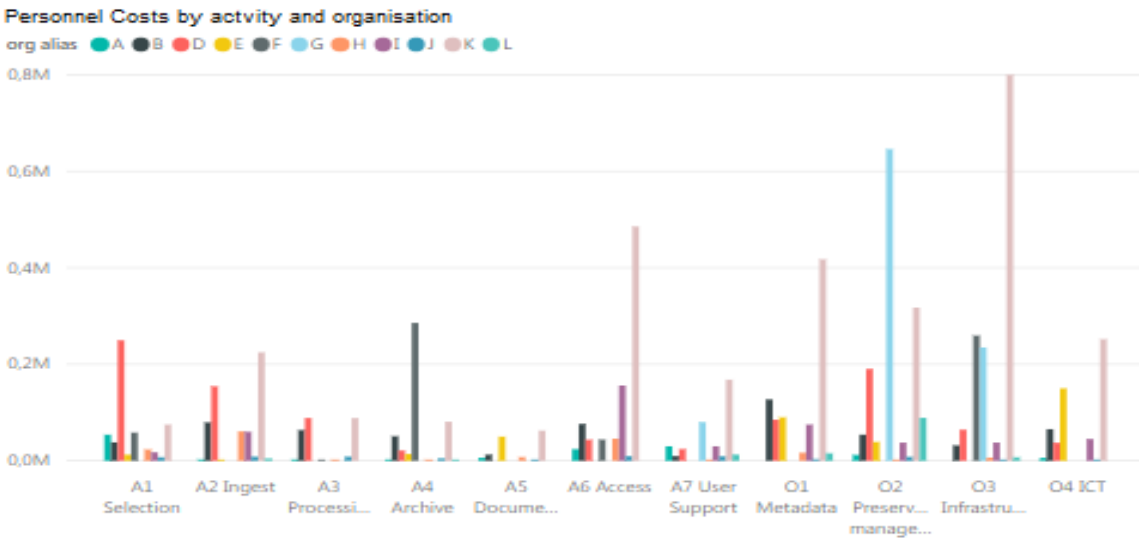


Figure 3: Total costs per institution (excluding institution C), by process stage and overarching activity.

If we look at each institution in more detail (ignoring the outliers), it is clear that the cost curve for most institutions is U-shaped. In other words, the bulk of the costs are incurred at the start of the process (mainly in relation to selection and ingest) and in the overarching activities, i.e. metadata, preservation management, infrastructure and ICT. This is even more apparent where the staff costs are concerned; see figure 4.

Figure 4: Staff costs per institution (excluding institution C), by process stage and overarching activity.



Modelling the cost per activity as a function of presumed cost drivers

We asked the participating organisations about various aspects of their activities related to the archival preservation of digital assets. These include the cost of specific activities and the type of activities concerned. We also identified a number of characteristics relating to the organisation's objectives in terms of preservation, and the role the organisation sees for itself in making the archive available to users. Almost all characteristics were coded as nominal or ordinal variables (i.e. yes/no, tape/hard disk or low/medium/high), known as unordered and ordered factors respectively. We also recorded both the number of objects in the archive and the number of terabytes it contained.

The original goal was to perform a multivariate regression analysis of the cost of each activity, in order to arrive at an estimate of the cost of archival preservation given specific values for each of the factors. However,

this requires a much larger sample than was available, as each combination of factor values ideally has to be present in the sample for this type of analysis to yield meaningful results. Given that activities relating to object metadata alone have six binary factors and three three-valued factors, modelling this activity alone would require data on over 1,700 organisations. We therefore decided that multivariate regression was not an option.

An alternative approach known as 'regression trees' comes from big data analysis. Instead of numerical terms in an equation, as multivariate regression tries to obtain, this type of analysis aims for maximum likelihood estimates of an outcome, given a number of inputs. The advantage of this method is that it can deal with missing values more easily than multivariate regression. A regression tree, in a nutshell, aims to divide a set of cases in two by finding the variable and value that gives the 'best' split. Each resulting subset is then split again, until either a desired precision is reached or the number of items in the set falls below a pre-set limit. The end result is a tree of conditions, where each branch leads to a better estimate of the outcome given all inputs thus far. The condition at each decision point is a pointer to the most important additional factor that needs to be known in order to arrive at a better estimate.

Naturally, regression trees also require a substantial data set. Factor values that are not present in the data set cannot give information on how important they might be to the outcome. For example, it is not possible to work out whether the use of tape drives leads to a higher cost of access, if there are no cases in the data set actually using tape drives.

Having only nine actual cases available for analysis left us with the question of how to ascertain whether our model yields usable results. The normal procedure is to split the data set into a 'training' set and a 'test' set. The former is used to build the regression tree and the second for checking whether the model is not accidentally too specific to the training set, and also how well it performs with 'new' data. This procedure is clearly nonsensical, given the limited number of cases available to us. However, some information can be gleaned from estimating different values from the same data. We have the total cost per activity after all, as well as the number of objects and the size of the archive in terabytes. If we were to model the total cost as a function of all input parameters, the cost per object times the number of objects and the cost per terabyte times the number of terabytes, the resulting estimates for a constructed test case would have to be in the same ballpark if the available information were sufficient to build a usable model.

We were somewhat disappointed when we performed the actual analysis. After training models for the cost of providing access (i.e. total cost, cost per terabyte and cost per object), we found that the estimated total cost for a constructed case was twice as high if modelled as total cost (€31,334) than if modelled by the cost per object (€14,485). The total cost in terms of cost per terabyte (€4,077) was less than a third of that in terms of cost per object. This was a relatively minor discrepancy: in other comparisons, there were differences of two orders of magnitude.

Conclusion

The conclusion must be that the validity of our model has yet to be proven. The question is whether this is a result of a shortage of cases displaying all relevant values of the variables that we measure, or whether we have failed to include certain important factors in our model. A second conclusion must be, for now, to advise extreme caution in comparing cost-per-terabyte and cost-per-object metrics between organisations, or in using these as a basis for estimating the cost in an organisation with different characteristics than those in the 'benchmark' data set.

If we want to explore this model further, and particularly if it is to be used to benchmark organisations or to explore different choices with respect to archival preservation, we would require a significantly larger number of cases covering a wider range of input parameters. It is not realistic to expect all combinations of input parameters to be covered, but each value specific to any activity needs to be represented at least once. We want all combinations present of the four (binary) organisation-wide parameters that we identified. This would mean having organisations with large and small numbers of objects and large and small volumes of total data. Together with the four binary organisation-level parameters, this equates with a minimum of 4x16 = 64 organisations.

Any value of an input parameter that is not present in the data set by then would need to be included as an additional case. It remains to be seen whether it would be feasible to collect data on so many organisations.

VI. EYE'S EXPERIENCE WITH THE COST MODEL

This section looks specifically at the experience gained with the cost model by the Eye film museum in Amsterdam.[15] Not only was Eye closely involved in the development of the model, it also took part in the trial and was one of the first institutions to adopt the model in practice.

Eye's experience was that, although the cost model for long-term digital accessibility generated valuable information, it also raised a number of issues to which solutions needed to be found:

- The organisation's existing processes were not based on activity-based costing (ABC); staff and associated costs were not attributed to activities.
- The financial accounts were not consistent with the ABC model.
- Projects and their related costs needed to be associated with both the direct costs (either recurring or non-recurring) and the funding of activities (i.e. exceptional items such as grants and ordinary income such as visitor earnings).
- The terms and definitions used in the model and those used by Eye needed to be reworded to make them consistent with each other.
- Overhead expenses (including the cost of premises) needed to be attributed to activities.

In its current form, the model does not allow the future cost of access to objects to be calculated.

The following emerges of the percentage distribution of Eye's costs over the activities making up the process of long-term digital accessibility:

- 56.8% of Eye's costs relate to overarching activities;
- 43.2% relate to individual stages in the digital accessibility process.

ICT (8.5%) and infrastructure (23.2%) account for 31.8% of the aggregate cost, with metadata accounting for a further 16.6%. Ingest is the most expensive of the individual process stages, accounting for 10.4%. The whole front end of the process, i.e. pre-ingest, selection and ingest, together accounts for 15.4% of the aggregate cost. The ratio of staff to material costs at Eye is 58.9% to 41.1%. Storage costs (i.e. documentation and archive) absorb only a small proportion (8.3%) of the aggregate cost.

The cost model has given Eye a good idea of how the costs are distributed and has produced useful information for future decisions on the funding of activities. The model also allows Eye to take strategically sound decisions on whether to perform certain activities itself, to subcontract them to external suppliers, or to work in partnership with third parties. This applies to storage, for example.

This application was highlighted during an exploratory study carried out by Eye and LIMA into the possibility of forming a partnership for storage purposes. The cost model for long-term digital accessibility was put to practical use in this study, and the findings enabled LIMA and Eye to reach a clear decision about a possible future partnership. It became evident to both LIMA and Eye that joining forces would be beneficial for organisations curating large volumes of AV material only if their workflows of digital assets were broadly similar. This type of knowledge is extremely valuable as it shows that sharing digital infrastructure is not simply about technology and software, but also depends on harmonisation and coordination. In the case of LIMA and Eye, the two organisations' workflows proved to be too divergent for any efficiency gains to be derived from a partnership.

In other words, the cost model is also suitable for use in a small-scale setting – for example, in a situation in which two organisations are interested in identifying the potential benefits of collaboration. In many cases, the organisations involved will be operating in broadly similar fields of collection.

VII. WHAT NEXT? USING A ROAD MAP AS A COMPASS

We produced a road map for the further development of the cost model. The next stage after the development of the model (stage 1) involves rolling-out the model among

institutions (this is an ongoing process). The Digital Heritage Network needs to have access to a larger pool of data, in order to make greater use of the model's potential for statistical forecasting. This will also remedy the model's shortcoming.

The next step in the road map is to match supply and demand. The model provides users with information on the similarities and differences in cost structures in the various sectors, based on an analysis of each stage in the process. This information can be used as the basis for deciding whether an institution should perform certain activities itself, subcontract them to external suppliers, or join forces with third parties, and also for matching supply with demand. Finally, the information can also be used to challenge institutions and/or suppliers to come up with the right propositions so that they can solve certain issues, irrespective of whether these apply specifically to their own sectors or more widely. The 4C road map[16] refers to this stage as '*Who should do what?'* and *'Market efficiencies'*.

The final stage in the road map paves the way for undertaking social cost-benefit analyses[17] and calculating the social return of long-term digital accessibility in a range of sectors. In other words, what is the added value for society and is it worth investing in this when the decision is taken? Clear information on costs and the underlying cost drivers provides the input for social cost-benefit analyses. This fourth and final stage of the road map represents the 'dot on the horizon', i.e. the distant point that the Digital Heritage Network aspires to reach in the future, working in close collaboration with its affiliated institutions.

Institutions have made clear that they stand to gain a great deal from analysing, controlling and actively managing the cost of long-term digital accessibility. The prototype model is a means of gaining a better understanding of, and hence achieving better control over, the costs. It is designed specifically to link up with the policy decisions taken by the institution in question (i.e. the cost drivers) on long-term digital accessibility. The Digital Heritage Network has launched a large number of activities centring on the formulation of a digital preservation policy (such as the Digital Preservation Policy Framework, based on the EU's SCAPE model and courses). The model also makes it possible to compare institutions with each other and, in doing so, to identify similarities and differences in cost drivers and costs. The resultant dialogue generates input for intensifying cooperation on long-term digital accessibility, both among institutions and within and between different sectors. The ultimate aim is to further improve the way in which the digital heritage is collected, curated and rendered accessible, and hence to open it up to users.

One thing is clear (in addition to the need for further research): the importance of raising our understanding of the cost of digital preservation will only increase in the years to come.

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[1] http://www.curationexchange.org/

[2] 4C, *Investing in Curation; A Shared Path to Sustainability*, pp. 1-26, 20 February 2015/ http://www.4cproject.eu

[3] http://www.4cproject.eu/summary-of-cost-models/

[4] See for definitions: NCDD, *Onderzoek naar de kosten digitale duurzaamheid*, BMC Onderzoek, pp. 1-68, January 2017.

[5] http://www.4cproject.eu/summary-of-cost-models

[6] Kejser, U.B., K.H.E. Johansen, A. Thirifays, A.B. Nielsen, D. Wang, S. Strodl, T. Miksa, J. Davidson, P. McCann, J. Krupp & H. Tjalsma, "Evaluation of Cost Models and Needs & Gaps Analysis", *4C*, pp. 1-99, 30 June 2014.

[7] The Open Archival Information System (OAIS) Reference Model was designed in order to identify the functions required for sustainable curation, and to formulate a common set of terms for this purpose. The model identifies six functions:

- ingest;
- data management;
- archival storage;
- administration;
- preservation planning;
- access.

Lavoie, B., *The Open Archival Information System (OAIS) Reference Model: Introductory Guide*, 2nd edition, DPC Technology Watch Report 14-02, pp. 1-37, October 2014.

[8] Sierman, B., M. Van Gorsel & R. Van Veenendaal, *Preservering: van Beleid naar Beheer*, S@P Jaarboek 19, pp. 55-64, December 2018.

[9] Van der Nat, J., *Generieke Voorzieningen en samenwerking*, S@P Jaarboek 19, pp. 155-162, December 2018.

[10] Van der Nat, J. & M. Ras, *Samen wat kan, individueel wat moet. Samen bouwen aan een netwerk van landelijke voorzieningen. Samenvatting en conclusies van het onderzoek naar een landelijke infrastructuur voor duurzame toegang tot digitale informatie*, *NCDD*, pp. 1-16, April 2015.

[11] Van der Nat, J. & M. Ras, *Samen bouwen aan een netwerk van landelijke voorzieningen: Eindrapport van het onderzoek naar een landelijke infrastructuur voor duurzame toegang tot digitale informatie*, *NCDD,* pp. 1-80, April 2015.

[12] The following institutions adopted and used the cost model during the first stage of the project: Dutch National Archive, Royal Library, EYE Filmmuseum, SURFsara (computing and e-science support centre), DANS (institute for permanent access to digital research resources), Overijssel Historical Centre, Rotterdam Municipal Archives, International Institute of Social History (IISG).

[13] NCDD, *Onderzoek naar de kosten digitale duurzaamheid* , BMC Onderzoek, pp. 1-68, January 2017. See in particular chapter 5, entitled 'Roadmap Dutch Cost Model for Digital Preservation', outlining a road map for the development of the cost model for digital preservation. The road map consists of the following four stages:

- development of a Dutch cost model for digital preservation;
- expanding the user base and corroborating findings;
- bringing together supply and demand;
- groundwork for social cost-benefit analyses.

[14] The following institutions adopted and used the cost model during the second stage of the project: Gemeentemuseum (The Hague), Dutch Museum of Photography, Sound and Vision Museum, Tresoar (Frisian Historical and Literature Centre), National Museum of World Cultures (comprising Africa Museum, National Museum of Ethnology, Museum of the Tropics and World Museum) and Amsterdam Municipal Archives.

[15] www.Eyefilm.nl

[16] 4C, *Investering in Curation; A Shared Path to Sustainability*, pp. 1-26, 20 February 2015.

[17] The 'social return' is the added value held by a project for society as a whole. It is an indication of how much the project costs in relation to its social benefits (i.e. why should an organisation undertake such a project in the first place?). The social return can be used to inform strategic decisions, for example on whether an institution should perform certain activities itself, subcontract them to external suppliers, or join forces with third parties. A social cost-benefit analysis is a method of calculating the social return. It involves undertaking a systematic, coherent analysis of all the various effects caused by a project and comparing these with a scenario in which the project did not take place, i.e. a no-action alternative. Both the costs and the benefits of the project are expressed in euros. The same applies to aspects that are not immediately expressible in monetary terms, such as noise, a pleasant view or a sense of security. If the benefits are found to be greater than the costs, the project may be said to be conducive to social well-being. The weakness of a social cost-benefit analysis lies in its theoretical nature and the limited involvement of stakeholders. Moreover, in practice, such analyses tend to depend heavily on key indicators and theoretical assumptions, thus undermining the impact of their findings. Finally, they are labour-intensive and costly in their full-blown form (see also Ministry of the Interior and Kingdom Relations, *Werken aan maatschappelijk rendement; Een handreiking voor opdrachtgevers van MKBA's in het sociale domein*, pp. 1-73, October 2011).