

A practical guide to implementing the DCC testbed methodology

The DCC testbed methodology

The Digital Curation Centre is committed to advancing knowledge in digital preservation. As digital preservation is a young discipline many of its methods are untested. The testbed methodology developed by DCC researchers will allow practitioners to validate preservation approaches, thereby ensuring digital assets remain usable well into the future.

The DCC methodology builds on existing work. It complements the Dutch, DELOS and Planets testbed methodologies by extending evaluation to consider use cases. Curation activities cannot be evaluated independent of context. To truly understand the usefulness of different preservation approaches we must consider more than simply the technical verisimilitude. Performing validation against user needs to ensure required functionality is not lost as opposed to simply comparing the bits, will provide a more accurate evaluation of the success of different approaches.

Background context

Research into preservation testbeds has been conducted by several groups, including a Dutch research team led by the National Archives of the Netherlands, the DELOS network of excellence and the European Planets project. An overview of each approach is provided below. Additional details are available in the DCC testbed methodology.¹

The Dutch testbed was the result of a three year research project established by the Dutch government. As this approach is driven by an archival perspective, emphasis is placed on ensuring appropriate documentation. Twelve stages are suggested for evaluating preservation approaches. The initial five stages consider the feasibility of the proposed test, while the remainder are concerned with developing and running the experiment, then evaluating results.

The DELOS testbed activities maintained the same twelve stages proposed by the Dutch research team but emphasised metrics and comparability to ensure experiments could be repeated. The Dutch testbed used nine descriptive elements for describing work at each of the twelve stages. In contrast the DELOS framework puts forward objective trees to ensure a deeper, more explicit definition of requirements.

The Planets project has developed a testbed environment to allow researchers to assess preservation actions using the existing methodologies. The testbed itself is mostly concerned with checking the technical performance of individual tools on selected digital objects rather than undertaking a more in-depth evaluation. It is based on a shorter six stage methodology that encompasses the main points of the Dutch and

¹ Kim, Yunhyong et al, *DCC Methodology for Designing and Evaluating Curation and Preservation Experiments*, v1.0, (2008), available at: www.dcc.ac.uk/docs/publications/TestBedMethodV1.1.pdf

DELOS work.² The Plato tool, currently being developed by Planets, allows testbed results to be evaluated according to predefined organisational objectives.

Implementing the DCC testbed methodology

As explained in the introduction, the DCC testbed methodology draws on earlier work as the basis of its approach while adding a use case dimension for validation. The Planets testbed environment will be used to run experiments. As such, we have adopted the six main stages of the Planets approach and extended them to consider a use case perspective. The methodology is detailed in Figure 1 and the explanatory text below then worked through by means of a practical example.

Stages of experimentation

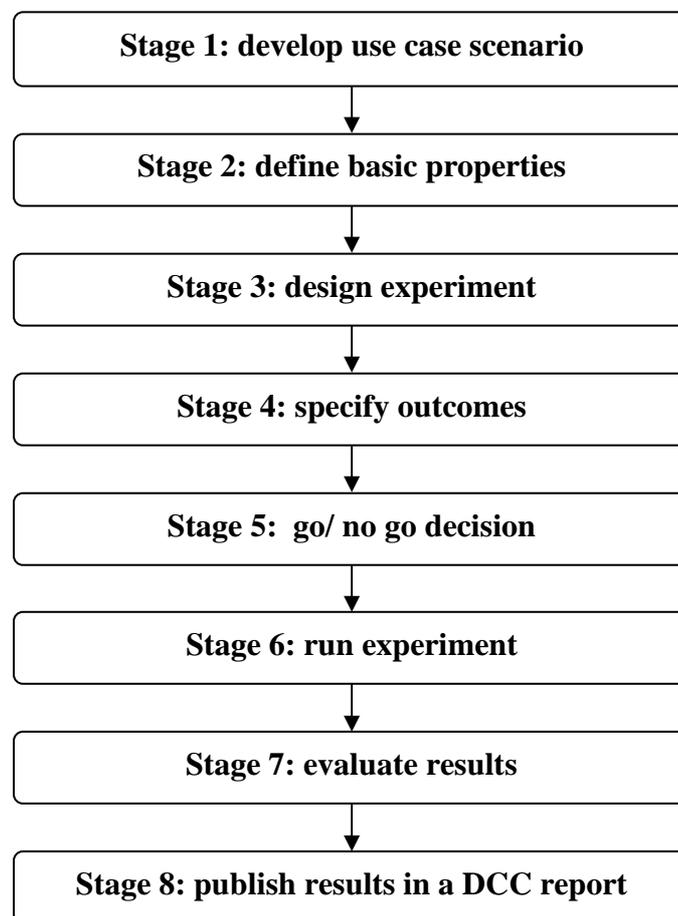


Figure 1: The eight stage DCC testbed methodology

² A diagram of the PLANETS testbed experiment process is available at: <http://testbed.Planets-project.eu/testbed/reader/about.faces>

Stage 1: develop use case scenario

The use case will be used to validate the success of the preservation action in stage 7. As such it will need to identify how the resource is currently used to ensure user requirements, e.g. the ability to perform full text searches, are still met. A use case will minimally consist of:

1. what digital resource is being used (what)
2. for what purpose is it being used (why)
3. in what way is it being used (how)
4. by whom (e.g. researcher, student) is it being used (who)
5. within which designated community is it being used (where)
6. when (e.g. daily, regularly, one time) is it being used (when)

Stage 2: define basic properties

The premise of this stage is to provide an overview of the proposed experiment. Basic details should be recorded, such as an experiment name, description, purpose and focus. The scope of the experiment should be set by noting any key considerations or research questions and recording parameters defined by the use case. An experiment for the text mining community, for example, may restrict the test to focus on textual records and discount any image formats. Links to relevant research or contextual literature can also be recorded at this stage.

Stage 3: design experiment

The experiment design provides the framework for the experiment and method for running it. A decision will be made as to what type of experiment to run (e.g. characterisation / format identification, migration etc), and the number and type of digital objects being input for testing. The emphasis at this stage will be on establishing the practical issues involved in running the experiment. Contextual details are set in related stages: stage 2 addresses the scope and purpose of the experiment, while stage 4 defines the expected outcome and criteria for evaluation.

Stage 4: specify outcomes

This stage will determine the success criteria for the experiment. These could be based on the use case, organisational objectives, collective knowledge of the curation community, or other such factors. The criteria noted will act as a key input during evaluation. A number of quality levels and characteristics are already provided within the Planets testbed for various types of digital object, enabling the experimenter to specify exactly which aspects are most crucial to maintain in a given context. For example the bit depth and appropriate resolution may be paramount for an image migration from png to jpeg. Metrics to evaluate these criteria will be developed.

Stage 5: go/ no go decision

In this stage the Planets testbed will automatically consider the experiment design and parameters to determine if it is feasible to proceed. The result should be recorded along with an explanation or record of changes required if the experiment could not go ahead or was postponed.

Stage 6: run experiment

The Planets testbed will run the experiment according to the inputs and parameters identified in stages 2 & 3. The experiment will test one or more aspects of applying a preservation approach to a defined set of objects. Running the experiment will produce preserved digital objects and an assessment of how they differ technically from the input. This can then be evaluated in the next stage.

Stage 7: evaluate results

The results of the experiment will be evaluated to determine how successfully the requirements were met. Validation is achieved by comparing the data submitted with the preserved object – the output after the preservation action was performed.

There will be two main stages to the evaluation:

1. a technical assessment of how well the preservation action was performed based on criteria recorded within the Planets testbed environment;
2. a qualitative assessment achieved by implementing the use case.

In this secondary evaluation checks will be made to ensure the preserved object can continue to perform its function as stated by the use case. In the case of an online journal, for example, the required functions may be indexing and full text searches to ensure retrieval. As such, significant character corruption would render the document void. Both forms of evaluation will be done with help of metrics developed in stage 4 when expected outcomes were specified.

Stage 8: publish the results in a DCC report

By publishing results with the DCC we allow others to re-run our experiments and learn from our experiences. Building up a body of knowledge in this way is crucial to advancing knowledge in the field of digital preservation. A template will be made available along with example reports.³

³ These will be created in the course of our two experiments