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## **A comparison of production processes for OER**

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### **Abstract**

In most cases the initial production and publication of OER is undertaken by a University and funded through a special project with grants from external bodies. In this phase, OER are developed both from scratch or derived from existing Higher Education courses. After this project phase, the ongoing development and publication of OER continues and the question of the management and upgrading of the OER comes into focus. The costs of producing and upgrading OER are an important factor in devising a sustainable process. Therefore, it is necessary to develop an efficient process for the continuing production, publication and maintenance of OER.

To learn more about influencing factors of production process efficiency we have compared the production processes of two institutions, the Open University UK (OU-UK) and the Open Universiteit Netherlands (OU-NL), both in the initial project phase (OpenLearn for OU-UK and OpenER for OU-NL) and the post initial phase. We aim to identify the differences and commonalities and the influence of these on the efficiency of the production processes.

The main difference between the two Universities is the adoption of state-of-the-art (XML) standard to deliver to different channels at OU-UK. At OU-NL this adoption has just started. Valuable lessons learned in the project phase for the post initial phase are clear specification of requirements for selection of an open course and utilization of technologies already being used for regular materials production. Both institutions firstly drew upon the existing expertise and capabilities for educational resource production being used for regular courses. But rather than strictly follow exactly the same process and possibly compromise the more mission critical development of resources for students both institutions chose to experiment or adapt this process to help provide lessons that might be taken back into regular materials production. Once these lessons and experiences had been gained both open universities sought to reduce the costs of dealing with legacy or de novo educational resources by integrating identification, production and publication within the regular curriculum and course development processes.

### **Keywords**

Production of OER, OpenCourseWare, Open Educational Resources, efficiency, sustainability

### **Introduction**

Ten years after the OCW initiative of MIT, OER is widespread around the world. Several hundred Universities have published OER. This emphasizes the importance OER can have for both institutions publishing them and learners using them. UNESCO (2011) formulates the importance as follows:

“UNESCO believes that universal access to high quality education is key to the building of peace, sustainable social and economic development, and intercultural dialogue. Open

Educational Resources (OER) provide a strategic opportunity to improve the quality of education as well as facilitate policy dialogue, knowledge sharing and capacity building.”

In most cases the initial production and publication of OER is undertaken by a University and funded through a special project with grants from external bodies. In this phase, OER are developed both from scratch or derived from existing Higher Education courses. After this project phase, the ongoing development and publication of OER continues and the question of the management and upgrading of the OER comes into focus. The costs of producing and upgrading OER are an important factor in devising a sustainable process. Therefore, it is necessary to develop an efficient process for the continuing production, publication and maintenance of OER.

In Schuwer *et al* (2010) the major characteristics for such production and publication processes were identified. The characteristics with the highest influence on production costs for OER in the three cases investigated (OpenLearn from Open University United Kingdom [OU-UK], OpenER from Open Universiteit Netherlands [OU-NL] and Delft OpenER from University of Technology Delft) were the parts of the process that were automated, the size of the production team and the type of OER content created.

In this paper we build upon the results of the previous paper and narrow it down to open universities only. This is because compared to regular ‘bricks-and-mortar’ universities, open universities have specific characteristics that have a great influence on the mode of production of OER:

- Open universities mainly produce self study multiple media learning materials rather than support materials for classroom based study.
- Most of the educational content is already digitally available and in many cases already contains interactive elements and rich media.
- Most of the educational content contains third party material which has been cleared (at least) for student use

There remains the question of how to decide which of these elements should be openly available.

We now describe and compare the production processes of two institutions, the OU-UK and the OU-NL, both in the initial project phase (OpenLearn for OU-UK and OpenER for OU-NL) and then after this initial phase. We aim to identify the differences and commonalities and the influence of these on the efficiency of the production processes.

### **Production process for OER**

Producing open and distance learning courses for students (whether or not published in a digital format) is one of the key activities of an open educational institution. In most cases this process has the following characteristics (after Liukkunen, 2006):

- The starting point is a curriculum. From the curriculum, a global specification is an input for considering the individual course development contributing to that curriculum.

- The time needed to deliver the course for student use is the most important steering parameter
- The process as a whole requires a variety of special skills from different people: pedagogical, technical, project management.
- In most cases, a top-down approach is used:
  - Create a global framework for the course (e.g. formulate global learning goals, determine didactics and pedagogical approach, divide content into chapters)
  - Search for sources to (re)use as educational content
  - Actual creation of the course (i.e. refining the global framework by filling in the gaps with the actual content)
- Creation of teaching support materials (hand-outs, presentations to use). In most cases these materials are created by the teacher (not necessarily the same person as the author) using the course materials. In this way the teacher can localize the course materials to his needs and the context in which the materials have to be used or can respond to actual developments not present in the course materials.
- The result of a production process can be such that variations in delivery and use are still possible. In some cases, the production process takes these variations into account (e.g. because this is part of the course specification). In that way, the course can be considered a part-finished product from which a final product can be constructed.

Despite the top-down approach, refinements during the process can lead to adjustments to earlier results (e.g. finding a new course book as a primary source can lead to adjustment of the learning goals in favor of cost-effectiveness).

Producing open educational resources has a lot in common with producing regular courses. There are some differences though:

- Having a curriculum is not always necessary.
- The grain size is not necessarily a course. Smaller parts or extract can also be developed (e.g. a video that is part of a regular course and is published under an open license).
- A lot of sources and resources are used. There are a lot of suppliers, most of them anonymous i.e. they do not supply on order, but their materials are reused with or without them being aware of it.
- Open resources are sometimes hard to find. When found, it is unclear in what way the resource can fit into the course to be produced.
- Post publication quality assurance (QA) procedures differ because the inputs from users (such as rating and review) are from a wider audience than for regular courses and are not formally organized (in contrary to e.g. student surveys at the end of a semester).
- Users of earlier versions of the OER can create derivative work that can be used in the production of a new version. For publishing under an open license, clearance of Intellectual Property (IP) must be carefully carried out. In most cases, for regular courses this IP clearance is more restricted to student use.
- Teachers and institutions may tend to give more attention to pre publication quality assurance when they know their materials will be published as open content ("the whole world will be my audience").

To gather more information about production processes, 61 cases on (OPAL, 2010) were analysed. The following table shows the different processes found in these cases:

<b>Production process</b>	<b>#</b>	<b>Remarks</b>
Derived from existing regular “closed” course materials	31	Sometimes as part of the mainstream process and sometimes using a workflow additional to the mainstream process
Additional “raw” materials from existing “closed” courses, but relatively easy to produce	7	E.g. videocasts or podcasts of classes
Course materials produced especially for an OER repository	7	In most cases additional to the first mentioned scenario.
Other models	2	Including user generated materials
Not described/not applicable	22	Not applicable: mostly because the case was about creating a portal to access existing (open) learning materials or to create communities around existing open learning materials

In some cases, more than one of the above processes was mentioned by the authors/contributors. Therefore, the numbers add up to > 61.

We assume the organizations already have an effective and efficient production process for the production of regular courses. The differences when producing OER lead to adjustments of the production process compared to that of a regular course. It is important to have adjustments to the production process of OER that are as effective and efficient as possible. Probably it is best to stay as close to the regular production process as possible, because the organization is geared to that process and will have less difficulties to adapt to the adjustments.

When an organization starts publishing OER, in most cases these activities are funded by an external body. In this initial phase, the organization has to find out the optimal production process for OER and implement this within the organization. After this initial phase, funding comes from internal sources and the number of OER to be produced rises. Furthermore, management of already published OER is necessary, e.g. to keep them up to date.

To find out how the production processes differ between the initial phase and post initial phase, we will describe the production processes and their differences in both phases for our institutions. Comparing both situations we aim to identify the:

- level at which producing OER in the post-initial phase is integrated into the regular production process;
- causes that influence this level of integration;
- efficiency of the process as a whole.

Costs of the course developers are usually the most important cost factor when producing courses. Therefore, the time it takes to develop a course is a way to measure the efficiency of producing a course.

In the next section, the production processes for OER in both institutions in both phases are described.

## Description of production process

### Open Universiteit (Netherlands): initial project phase

Publishing OER started in 2006 with the OpenER project ([www.opener.ou.nl](http://www.opener.ou.nl)). During this initial project phase, 24 courses were published from seven schools. The majority of courses had an expected study duration of 25 hours. Figure 1 gives a schematic overview of the process (Schuwer and Mulder, 2009).

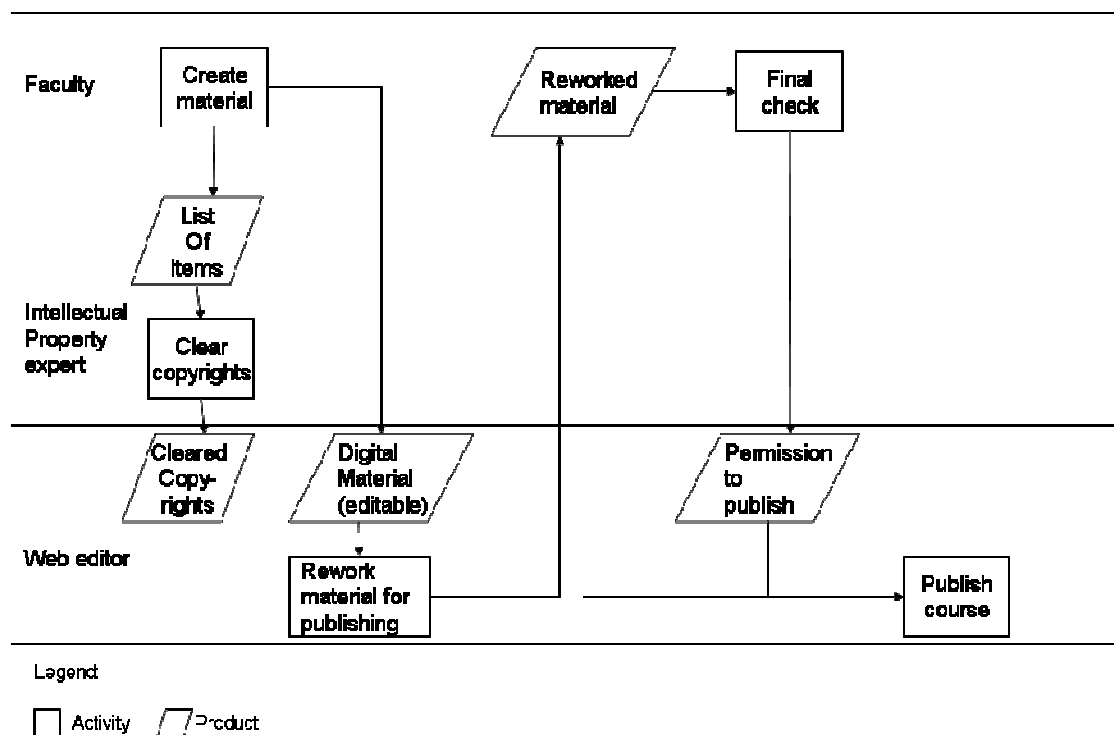


Figure 1 Overview of production process OER at OU-NL

This process was specifically designed for this project. Compared to regular course production at the Open Universiteit the following remarks can be made:

- Activities in the Faculties were mainly performed by one or two authors of the course. In regular courses, a team consisting of several people is involved (several authors, at least one editor);
- Eighteen courses were specifically designed for this project, and only six courses were derived from regular courses. In the latter case, one course added a video to the course;
- The time spent on course production varied between 50 and 250 hours. The mean was around 120 hours. This included the activities of the IP expert, but not the activities of the web editor;

- For the courses derived from a regular course, clearing copyrights was relatively easy because of the presence of an administration of copyrights for all regular courses;
- Publication of the courses was done through the eduCommons platform. Most of the courses were text, delivered in pdf- and rtf-format. For the web based courses different webservers were used that were linked to from the eduCommons platform.

### **Open Universiteit: post-initial phase**

Currently, the Open Universiteit is implementing a business model in which visitors to the OU website are divided into several groups, ranging from anonymous users (who will be offered some free content and functions for e.g. competence assessment), registered users who will be offered personalized services to paying users (through subscription for life long learners or tuition fee for learners aiming at a Bachelor or Master certificate). The website for this implementation is called OpenU (<http://portal.ou.nl/nl/home>). On the OpenU website, the Open Universiteit's Informatics faculty offers 10% of each of its 60 courses from the Bachelor and Master curriculum free of charge under an open license. In addition, the entire course (the internally produced material) can be obtained online by means of a subscription.

The 10% of each course has two functions:

- Preview for potential purchasers
- Awakes interest in website visitors

The requirements of the chosen selection are:

- Self-contained meaningful fragment
- Representative of the entire course
- Easily to maintain
- Enthusiasm inspiring
- Can be studied without additional knowledge.

The examiner of each course provides access to material that satisfies these requirements. To do so, he or she receives a form asking for the necessary information, as shown in Figure x. The website editor is part of the production team and therefore has access to all electronic files. The editor places the material on OpenU. With each new or revised course, it is stipulated at the beginning of the production period which 10% is shown on OpenU. In this way, it takes fewer than five hours per course to produce and publish the extract. Figure 2 shows the form with which the examiner indicates which 10% of the course to place online under an open license.

1: Course title	
2: Course code	
3: Name of examiner	
4: Number of pages of OU material	
5a: Selection for OpenU	- Total number of course material components. - Name of file, if provided.

5b: Associated textbook components	<i>For the textbook-workbook model, give the range of pages for each chapter number</i>
6: Number of pages of selected part OU-material	
7: Description of the extra material necessary for studying the selected portion	
8. Extra material	<i>Name of file provided</i>
9: Description course and selection	<i>Name of file provided</i>
10: Final grading	<i>Name of file provided, if not incorporated in course material</i>
11: Copyright text	<i>at OU, at XXX</i>
12: License software	<i>Open source/with student license</i>
13: Problems with publication	<ul style="list-style-type: none"> <li>- <i>selected part uses textbook and/or software</i></li> <li>- <i>course consists exclusively of study tasks</i></li> <li>- <i>insufficient material without copyright</i></li> <li>- <i>no electronic version of the text</i></li> <li>- ...</li> </ul>

Figure 2 Form for examiner to indicate 10% of the course for open license

In OpenU an experiment is planned in which so called “hot topics” in Informatics are offered for several months per topic (one or two topics a year). In a hot topic, two experts have online discussions (fed by documents). Teachers and students can join in and add to the discussions. All hot topics are openly available. After the hot topic is closed, the results are bundled into an open course of about 25 hours and (when there is sufficient interest) eventually into a regular course.

### **Open University (United Kingdom): initial project phase**

In the 2 year start up phase for OpenLearn (<http://www.open.ac.uk/openlearn>) between 2006-8 over 500 study units (aka courses) were published from all programs and Faculties in the University, representing over 5000 learner study hours in the learner-facing LearningSpace (<http://openlearn.open.ac.uk/>) and over 8000 learner study hours in the educator-facing LabSpace (<http://labspace.open.ac.uk/>). While most study units were extracts derived from existing, longer courses (although still only 38% of all regular courses, a number (12%) were derived from other teaching projects, were created de novo or were taken from discontinued courses (33 in the case of the 8000 hours in LabSpace). In most cases this legacy material was produced and published under an ‘integrity’ model but some were done under remix or a tour guide model (see Lane et al (2009) and McAndrew et al (2009) for fuller details on these models). Whichever model was used, this mostly impacted on the identification and sourcing of the original content and had little effect on the remaining workflow process as set out in Figure 3 (Bradley, 2006). This workflow process itself was also developed specifically for the project albeit a variant of the one used for developing the educational resources used in regular courses from which most study units were derived. This new workflow process was also aided by the use of new technologies that were being introduced into the Open University’s e-production systems.



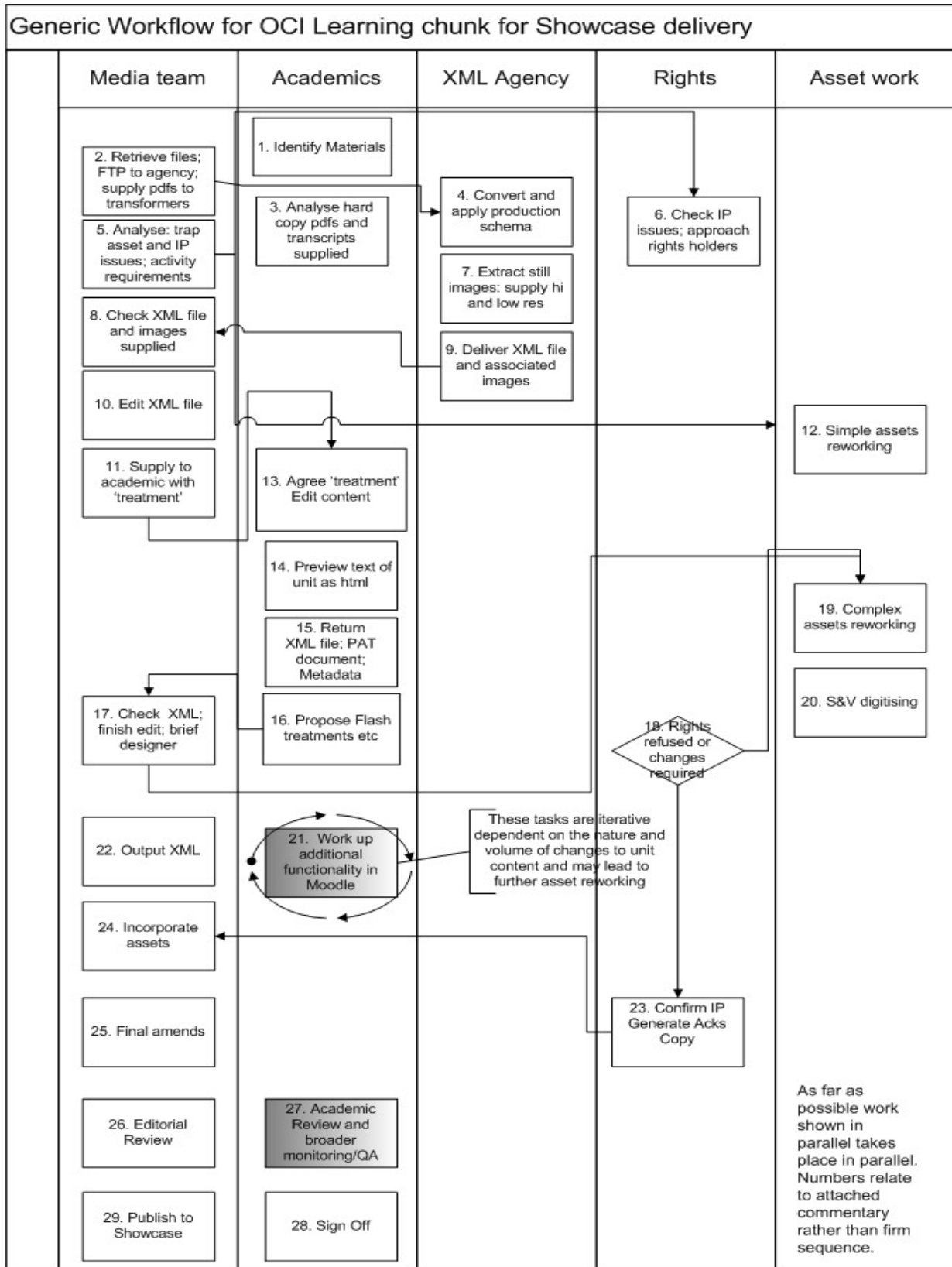


Figure 3 Generic workflow for producing OER at OU-UK

Compared to the regular course production we can note:

- Activities in the Faculties were either performed by one or two authors of the course or a program leader. In regular courses, a team consisting of several people is usually involved;
- Faculties have a proforma and guidance material to help decide what they would offer as a study unit from their courses;
- The time spent on course production varied between 1 and 10 hours per study hour (study units vary in their length from 1 hour to 50 hours with a mean about 10 hours) compared to 10-100 hours per study hour for the de novo production of the parent course, although the mean for both is at the lower end of that range (the range depends on the media mix used and the degree of innovation being deployed);
- For the study units derived from a regular course, clearing copyright was relatively easy because of the presence of a central Rights team that clears material for all regular courses and other teaching projects;
- The academic quality assurance effort focused more on presentational accuracy as the (previously quality assured) educational content itself was not being modified;
- The project was trialing the use of an XML schema being developed for regular course use (OpenLearn was designed so as to enable some technical and pedagogic experimentation to help understand implications for regular course production – see McAndrew et al, 2009);
- Publication of study units was done through a Moodle based platform that was a variant of the Virtual Learning Environment being used for delivery of learning materials to students;
- Most of the materials are available in six different formats for downloading, all derived from the XML schema.

### **Open University: post-initial phase**

Since 2008 there has been continued production and publishing of legacy material and some further technical experimentation, including the provision of further formats for downloading. During the same time there has been:

- extensive upgrading of the e-Production systems for regular courses, in particular the use of the XML schema and document management system that OpenLearn was able to road test;
- a merging of the Moodle systems used for students and for OpenLearn into a single code base with consequent changes to how material is published and presented to users;
- the emergence of new external platforms for delivering legacy AV based OER such as iTunesU and YouTube EDU;
- a small but growing number of user generated (i.e. non OU generated) educational resources produced by individuals, projects and institutions within the LabSpace
- the reworking and open publication of over 5000 hours of content from a now discontinued UK facing website that reflected our work with the BBC (open2.net) which has replaced the former non-Moodle based front pages of OpenLearn;
- the decision to publish 5% of every course in the University on OpenLearn and this to be achieved over a number of years through the pre-specification of study units at the course

planning phase (to enable appropriate Rights clearance) and the production and publication to whichever platform to be achieved through mainstream processes;

- The Library has created a dedicated web site to support course teams in the sourcing and OER from elsewhere for incorporation in regular courses while internal staff development courses are incorporating material on how to create, use and reuse OER;
- an extensive set of grant funded research and/or development projects with multiple partners involving OER that continue to innovate and experiment around how educational resources are produced, published and used.

The result is that the OU-UK will now use exactly the same planning, production and publication processes, technologies and standards for its all educational content with pre-identification of that content to be openly published and through which channels. An example of the power of this approach is the recent creation of e-books of study units from OpenLearn for initial publication through iTunesU and latterly through OpenLearn itself and a technology which will soon be introduced into regular courses.

### Discussion

From these two brief case studies we make the following observations about the commonalities and differences involved in the production processes:

	Differences	Commonalities
Initial project phase	<ul style="list-style-type: none"> <li>- Scale in terms of number and range of units produced and published</li> <li>- Less derivation from existing regular courses at OU-NL</li> <li>- No remix or reuse of other open resources at OU-NL</li> <li>- Greater in-house development of platform at OU-UK</li> <li>- More delivery formats at OU-UK</li> <li>- QA on content and presentation at OU-NL; at OU-UK only on presentation</li> <li>- Time spent on course production</li> <li>- Different platforms for learners and educators at OU-UK</li> </ul>	<ul style="list-style-type: none"> <li>- Publishing courses (within the OpenCourseWare definition) rather than OER assets e.g. video track, word document</li> <li>- Small Faculty input</li> <li>- Dedicated production team</li> <li>- Easy IP clearing through existing staff</li> <li>- Similar production workflow</li> </ul>
Post initial phase	<ul style="list-style-type: none"> <li>- Process at OU-UK is more mature because of the adoption of state-of-the-art (XML) standard to deliver to different channels. At OU-NL this adoption has just started.</li> <li>- Conversion of all regular courses at OU-UK to XML is undertaken. It will take approximately five years to finish this task.</li> </ul>	<ul style="list-style-type: none"> <li>- Clear requirements for the part that is published open</li> <li>- Fixed % of each regular course to be made open</li> <li>- Production of open part is taken care of during regular production</li> <li>- Several possible channels for publication (e.g. iTunesU)</li> <li>- No production 'from scratch for an open course'. (At OU-UK this is allowed only when there is additional or</li> </ul>

	external funding deployed for it)
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Lessons learned in initial project phase for the post-initial phase

OU-NL	- Clear specification of requirements for selection of open course
OU-UK	- Clear specification of requirements for selection of open course - Utilizing but experimenting with technologies already being used for regular materials production - Adopting latest e-production standards to maximize value of the published OER to different users

In both institutions there has been a similar strategic approach to the way that OER production processes have developed. They firstly drew upon the existing expertise and capabilities for educational resource production being used for regular courses. But rather than strictly follow exactly the same process and possibly compromise the more mission critical development of resources for students both institutions chose to experiment or adapt this process to help provide lessons that might be taken back into regular materials production. Once these lessons and experiences had been gained both open universities sought to reduce the costs of dealing with legacy or de novo educational resources by integrating identification, production and publication within the regular curriculum and course development processes. As a rule of thumb, the effort required to openly publish educational content was lower by a factor of ten than that required for publishing the original student facing materials. The mainstreaming of production may reduce the cost and effort of openly publishing as a ‘by-product’ by a further factor of ten.

In the case of the OU-UK there has also been a track record of producing and publishing open access materials (i.e. not openly licensed) as individual OER, rather than OpenCourseWare, to support wider outreach and community engagement activities. This additional body of non-course related materials alongside new capabilities in clearing IP for open licensed publication has enabled the OU-UK to take advantage of new platforms and opportunities at very little extra cost.

In the case of the OU-NL they have been able to move from project based to mainstream OER production and publication at a fraction of the overall cost involved in the much larger scale OU-UK initiative. Low cost routes are possible if clearly aligned with the institutions existing strategies and systems.

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