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**Alliance for Permanent Access to the Records of Science
Network**

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**D42.1 REPORT ON EXISTING
INITIATIVES AND CURRICULA
REGARDING DIGITAL LONG TERM
PRESERVATION**

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ABSTRACT

This Deliverable provides an overview on Digital Preservation curricula and course in academia/Higher Education and Continuing Professional Education. The survey conducted compares the current provision in formal qualifications opportunities within and beyond the library and information sciences.

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Summary Report on existing initiatives and curricula regarding digital long term preservation: Here we collect together information about the other ongoing activities together with a critique of their coverage both in terms of course content and geographical take-up.

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EXECUTIVE SUMMARY

This Deliverable provides an overview on Digital Preservation curricula and courses in academia/Higher Education and Continuing Professional Education. The survey conducted compares the current provision in formal qualifications opportunities within and beyond the library and information sciences. The outcome of the survey analysis will guide APARSEN in the subsequent design of formal qualifications, complementing and hence broadening the coverage of Digital Preservation in formal qualifications in a targeted way. Moreover, the structured survey data will be made publicly available, allowing students and professionals to spot qualification and training opportunities meeting their competence profile and subject field, hence leveraging the required skills and competence profiles within and beyond the library and information science community.

The information about education activities including advanced training activities in Europe was gathered by a desktop research. The study distinguishes Higher Education (single courses) (HE), (Higher Education) curricula (CURR) and Continuing Professional Education (single courses) (CPE). All offers were analysed in relation to country, language and the Target Groups, defined as undergraduates, graduates and practitioners. The contents of the trainings and the curricula were analysed on the basis of the APARSEN topic areas Access, Trust, Sustainability, and Usability. D42.1 marks the baseline for the setup a registry for taking into account the current (European) landscape in view of formal qualifications in the Digital Preservation field and a comparison of the dissemination of the topics and sub-themes defined by APARSEN to the teaching content in practice today which was used for identifying deficiencies in topical coverage in the field of formal qualification and which can be alleviated by APARSEN.

Finally, the study derives eight recommendations to improve the provision of formal qualifications in Digital Preservation. Their purpose is to encourage discussions inside and outside of the APARSEN network of excellence and to lead the way to future activities to be coordinated by the VCoE. By this means, a dialogue with relevant stakeholders on the entry of knowledge transfer about the theory and practice of Digital Preservation in the relevant High School curricula should be initiated.

The enquiry period for assessing formal qualification offerings was from September 2012 to June 2013. While the endeavour was to provide a reliable and comprehensive survey in Europe, adequate representation of all available offerings cannot be guaranteed. Furthermore, the landscape of formal qualification in Digital Preservation is evolving, with new curricula and courses being offered, existing ones being revised, and some offering might even be discontinued for various reasons. To cope with the dynamic nature of the growing formal qualification market, APARSEN will establish and maintain a process for eliciting and accommodating formal qualification contributions as part of the VCoE. Hence D42.1 represents a snapshot depicting the perceived state of affairs within a limited observation window. From this baseline, the desk-based survey will evolve into an online survey, driven by the Digital Preservation Community within and beyond the project.

1 INTRODUCTION

“Researchers in digital preservation will have a similar standing in almost every university as any other mainstream academic areas of research such as Physics or Humanities, with large numbers of graduates in digital preservation supplying a large demand in commerce, culture and society. The assumption we make is that there is a restructured landscape and a sufficient societal demand for digital preservation.” [APARSEN Description of Work, B3.1.5 Long-term impact, page 105]

Under the above assumption, WP42 *Formal qualifications* investigates broadening the scope of Digital Preservation by leveraging the required skills and competence profiles within and beyond the library and information science community. To reach this goal, WP42 pursues a dual approach [cf. APARSEN Description of Work (as revised in late 2012/early 2013), WT3, WP42 Formal qualifications, page 57]:

- i) To establish a dialogue with relevant stakeholders about the inclusion of Digital Preservation theory and practice in relevant Higher Education curricula.
- ii) To define curricula and a portfolio of courses and e-learning material.

For *i*) APARSEN will initiate collaboration with universities and graduate information schools to foster coordination and support of curriculum development within relevant disciplines. These efforts will be aligned with other (current and future) related initiatives in Europe and internationally.

APARSEN will support *ii*) by providing sustainable services and products for Continuing Professional Education, i.e. the mediation and provision of course material through an e-learning platform which contains written material, video material, expert lectures, and publications on Digital Preservation. Initial contributions are foreseen by APA and its members, but external material will be considered as well, licenses permitting. APARSEN will identify deficiencies in the coverage of the current provisioning with respect to its research agenda and target communities. Courses and curricula for closing these deficiencies will be defined in collaboration with the respective RTD work packages (especially WP13, WP14, WP21, WP22, WP23, WP24, WP25, WP26, WP27, WP31, WP32, WP33, WP35 and WP36). These definitions will be made available through the APARSEN Virtual Centre of Excellence (VCoE).

1.1 PURPOSE AND SCOPE

„Here [D42.1] we collect together information about the other ongoing activities together with a critique of their coverage both in terms of course content and geographical take-up.” [APARSEN Description of Work, WT3, WP42 Formal qualifications, page 57]

The purpose of D42.1 is to provide an overview on Digital Preservation curricula and course in academia/Higher Education and Continuing Professional Education. The identified resources are assessed w.r.t. their coverage of the APARSEN topic areas expressed in the Joint Programme of Activities in the Description of Work, i.e. **Trust**, **Sustainability**, **Usability** and **Access** [APARSEN Description of Work, B1.3, Joint Programme of Activities, page 116] for the elicitation of shortcomings in the current provision, which might be alleviated by APARSEN. The outcome will guide APARSEN in the subsequent design of formal qualifications, complementing and hence broadening the coverage of Digital Preservation in a targeted way. Moreover, the structured survey data will be made publicly available, allowing students and professionals to spot qualification and training opportunities meeting their competence profile and subject field, hence leveraging the required skills and competence profiles within and beyond the library and information science community. Hence, the analyses performed within this Deliverable represents a necessary prerequisite for enabling the *informed* (i.e. aligned with existing propositions) design of formal qualifications by contextualizing the APARSEN topic areas with existing initiatives and curricula regarding digital long term preservation.

The initial scope was set upon European initiatives and activities, including resources in English and non-English languages. The collection of evidence turned out to be more difficult than expected, as much of the information about courses and curricula was sparse, idiosyncratically structured and terminology was inconsistently used. Furthermore, the number of offerings which could finally be

considered as eligible for the survey was much lower than initially expected. The data set on initiatives and activities will be continuously supplemented and made accessible online. Specifically, outreach to non-European stakeholders will be managed in coordination with other APARSEN Stream 4 activities; with appropriate models of cooperation if necessary.

Digital Preservation has evolved from its multi-disciplinary roots into an independent, autonomous discipline. However, it is not yet fully established in Higher Education in Europe. While few promising offerings exist in some countries, accredited formal qualifications are sparse. Their descriptions are often inhomogeneous, the contents and coverage of courses and curricula are difficult to assess. Similarly, the skill profiles required by the job markets in diverse sectors are not clearly defined. Hence, if provided, learning objectives and professional often remained vague, and/or bound to the library/archival sector. This rendered the systematic survey which was conducted within WP42 difficult.

1.2 OBJECTIVES

„EU NoE should also help [t]o set up the next generation of researchers through educational programs, and disseminate the research results through training” [APARSEN Description of Work, B1.2, Long term integration, page 10]

WP42 focuses on the *design* of formal qualifications, to ease the targeted access to qualification opportunities and learning materials:

- Definition of curricula for Higher Education and Continuing Professional Education.
- Assessment of the current provisioning and identification of admissible resources.
- Creation of a register of formal qualification opportunities, which will be accessible from the APARSEN website.

Hence the major initial assumption for WP42 is that curricula/courses are not produced, but only defined. Some of the initial contents might be produced through and provided by WP43 *Training courses* and the corresponding RTD work packages, though. To this end, D42.1 assesses the current landscape of formal qualifications for Digital Preservation in Europe, giving insights into the current coverage at the same time identifying shortcomings of current offers. The derived recommendations are to stimulate discussions about the alleviation of the identified shortcomings within and beyond APARSEN.

1.3 METHODOLOGY AND ALIGNMENT

In the same way interested students would perform a search, a set of links to resources about existing initiatives and curricula have been collected through desk-based research and documented in the APARSEN wiki. The specific focus was laid upon Higher Education institutions and professional associations, as only those are authorized for issuing accredited formal qualifications. As the initial focus is set upon European resources, admissible candidates have been identified for further analysis by the WP42 partners. Together with WP43, a reporting form (cf. *Section 2.3*) for capturing detailed information about these resources was developed and used for data collection.

Selection criteria were based on relevance assessments of the captured detailed information (e.g., titles, basic descriptions, keywords, learning objectives) and applied iteratively, resulting in a refined set of resources. The focus was set on topical coverage and establishing a methodology for analysis. The mapping targets being defined by the DoW, Common Vision and survey data. Critical mass was reached through leading offerings, however the resource collection analysed within this Deliverable is not representative and inevitably biased by language and geographical background of the APARSEN consortium. In some cases the available information was insufficient for detailed analyses; this is documented accordingly.

The gathered course information was classified into *Higher Education* and *Continuing Professional Education* and further segmented according to its type (*curriculum*, *course*).

To be able to show the different thematic orientations between single courses and curricula, the following categories were considered: Higher Education (single courses) (hereinafter referred to as

HE), (Higher Education) curricula (*CURR*) and Continuing Professional Education (single courses) (*CPE*). As only a single occurrence of a curriculum for CPE could be found, no separate category has been introduced. It has been merged with *CURR*.

The analysis of existing initiatives and curricula was performed in two phases: Geographical take-up and language were elicited within the first analysis phase, whereas the coverage of curricula/course content, which took significantly more effort, was conducted in the second analysis phase.

The referential frame for the first phase is composed of country, language and Target Group. The countries and languages started from the countries/languages represented in the APARSEN consortium. Focusing on Europe (cf. Section 1.1), they were complemented by prevalent countries/languages established in Europe. Furthermore, three Target Groups were identified: *graduates*, because these students are allowed to attend master programs and master courses; *practitioners*, because they are in the focus of continuing education, and *undergraduates*, because some Continuing Professional Education provider explicitly address, beside practitioners, students with no or little practical experiences with unspecified degree requirements.

In the second phase the content was mapped to the themes underlying the APARSEN topic areas Trust, Sustainability, Usability and Access [APARSEN Description of Work, B1.3.1.2, Topics, page 17] (cf. *Chapter 3*). The calibration of content mappings was performed collaboratively, i.e. mappings were inspected by different partners and adapted/refined, if necessary. Geographical take-up/language and content coverage were then visualized for supporting inspection and detailed analyses.

A critique of the identified shortcomings of courses in general, but also in terms of coverage and their implications was then derived. Recommendations about the concentration of further APARSEN activities for alleviating those shortcomings were then proposed.

WP42 *Formal qualifications* is closely aligned with WP43 *Training courses* and detailed information about specific resources was captured within a joint, harmonized reporting form. While WP43 mainly considers stand-alone, independent training events/tutorials (vocational, online), the focus of WP42 is on Higher Education, more specifically courses, curricula and professional frameworks/programmes academia and Continuing Professional Development which may lead to/are embedded in formal (academic) qualifications such as a masters degree and/or accreditation through ECTS or other recognized certification schemes. However, the development of the underlying IT infrastructure (cf. Tasks 4350, [APARSEN Description of Work, WT3, WP43 Training Courses, page 59]) comprising a content management system and an e-learning environment will be shared between WP42 and WP43 and made available through the APARSEN VCoE.

The RTD work packages of the project contribute to APARSEN topics and themes enclosed [APARSEN Description of Work, B1.3.1.3, Work packages, page 18]. Hence, any identified deficiencies in topical coverage might be related to ongoing RTD efforts (or recent research results, such as from CASPAR, PLANETS or SHAMAN) within and beyond APARSEN. The opportunities, but also the risks (e.g., investments not yielding desired impact) in closing those deficiencies in topical coverage will then be discussed with the respective stakeholders from the APARSEN RTD work packages. As the resources of WP42 are strictly limited, no teaching material will be created within the work package itself. Therefore, the focus is laid upon the design/concepts of curricula/courses for auspicious communities (such as Information System Science, Computer Science in the academic sector, and/or professional organisations such as those SME IT users/providers which are represented by the competence network eBusiness-Lotse Ruhr¹) with promising impact. Within the APARSEN VCoE, however, appropriate teaching material might be contributed by other work packages or external parties.

In general, the APARSEN website will be the central access point for the dissemination of WP42 results, which are embedded within and aligned with other spreading excellence activities. Specific WP42 contributions to the APARSEN VCoE will be:

¹ <http://www.ebusiness-lotse-ruhr.de/>

- Provision of DP curricula designed for selected academic disciplines and Continuing Professional Education in selected sectors
- Design/concepts of courses for selected APARSEN RTD topics
- Online register of formal qualification opportunities

In this context, D42.1 represents the initial step for providing an overview of the current (European) landscape regarding formal qualifications in Digital Preservation and a critique of its coverage according to APARSEN topic areas.

1.4 STRUCTURE

This Deliverable is structured into six chapters. *Chapter 2* describes the eligibility criteria for data collection of information about existing curricula and courses. The mapping framework for matching the contents of curricula/courses to APARSEN topics is described in *Chapter 3*, and applied for the actual analyses in *Chapter 4*. *Chapter 5* describes requirements and supporting IT infrastructure which will be embedded within APARSEN. *Chapter 6* discusses the main insights from the analyses and provides recommendations for further activities.

2 ELIGIBILITY CRITERIA AND DATA COLLECTION

WP42 addresses the development of formal qualifications (and the constitution of their corresponding curricula, cf. [APARSEN D43.1, Chapter 2, Education and Training in Digital Preservation, page 19]) in Digital Preservation for academic and professional communities.

2.1 HIGHER EDUCATION

The DigitalPreservationEurope project defined *Higher Education* as “[...] – formal studies awarded by academic degree that are provided by universities and/or other higher education schools.” [DigitalPreservationEurope, D2.1 (2006), Section II Education and Training in Digital Preservation: The European Context, page 20]

The European Higher Education area is defined by the Bologna Process, which was established for harmonizing standards for academic degrees and quality assurance throughout Europe [Bergen Conference of European Ministers Responsible for Higher Education (2005a)].

According to the Eurydice thematic report *The European Higher Education Area in 2012: Bologna Process Implementation Report*, “Higher education institutions can be academically or professionally oriented[...].” “[...]old differences between academically and professionally oriented institutions still exist formally, but – partly due to the Bologna Process – actual differences are diminishing or have ceased to exist altogether” [Eurydice (2012), Section 1.2. Higher education institutions, page 22]

The Bologna Declaration adopted a framework of qualifications comprising three cycles of Higher Education qualifications, which usually correspond to bachelors, masters and doctoral degree respectively [Bergen Conference of European Ministers Responsible for Higher Education (2005b)].

2.2 ELIGIBILITY CRITERIA

Desk-based research carried out online covering the Higher Education sector yielded an initial set of resources as admissible candidates for further inspection. As the European framework for Higher Education is defined by the Bologna process, different systems outside Europe are not directly comparable. Hence, it was decided to set the focus of analysis for D42.1 on European initiatives (such as nestor qualification or DPE/WePreserve training, which was primarily considered to be eligible due to its availability of online material on specific subjects) and programmes. Non-European efforts will be covered in detail later in the project and the corresponding findings will be documented online (cf. *Section 5*).

WP42 considers curricula and professional frameworks/programmes, but also specific DP-related courses leading to formal qualifications. The informal (due to lack of selectivity) criteria, which were chosen to assess the eligibility of resources being classified as formal qualifications, are for our survey the following:

- Curriculum/professional framework/programme or course embedded therein
- Recurring/continuous
- Formal qualification/certificate

However, those criteria could not be applied thoroughly, mostly because of insufficient information available. In such cases executive decisions about whether or not to admit a particular resource were taken by the analysis team.

Furthermore, academic curricula and courses were restricted to master degree offerings (second cycle in Bergen Conference of European Ministers Responsible for Higher Education (2005b)). PhD programmes (third cycle Bergen Conference of European Ministers Responsible for Higher Education (2005b)) are often very specialized towards a certain topic/objective, hence are likely not to be implemented on a generic level. Bachelor degree offerings, on the other hand, are necessarily less-involved at theoretical level, thus not covering the APARSEN topic areas in sufficient detail.

The resulting list of eligible Higher Education courses and curricula was then cross-checked with the analysis of current provision of training courses conducted within D43.1 [APARSEN D43.1, Chapter

3, Analysis of current Provision in Digital Preservation, pp28ff, also Appendix B, pages 92ff] with marginal overlap as some academic offerings were classified as "training initiatives". On the other hand, training initiatives such as *The Digital Preservation Training Programme* (DPTP) or *Digital Preservation Europe Video Training* were considered as Continuing Professional Education resources and hence eligible for D42.1 as well.

As indicated above, the set of existing initiatives determined to be eligible for further analysis is not representative. It appears that Digital Preservation is not yet accepted as an independent field in Higher Education. This might be due to its cross-disciplinary nature and/or the heterogeneity of professional skill requirements within diverse sectors. This heterogeneity is also evident from the terminology and structure of the descriptions of courses and curricula, which renders assessments and comparisons w.r.t. to given interest profiles of the few more comprehensive offerings difficult. Given the structure of the consortium, there is a natural bias towards those countries/languages of the APARSEN partners. Reported omissions will be included in the dynamic online register at a later stage, as well as additional non-European qualifications described above.

2.3 DATA COLLECTION

Detailed information about eligible Digital Preservation courses was captured within a reporting form which was jointly developed by WP42 and WP43. The following course information attributes were to be analyzed, with asterisk "*" indicating mandatory fields:

- Title of Training/Degree Course*
- Organiser (University/ Institution/ Project/ Initiative)*
- Country*
- Language of Delivery*
- Date
- URL*
- Basic Course Description*
- Format*
- Credits/Qualification Earned
- Sector (Libraries, Archives, Engineering, Higher Education, etc.)
- Target Audience (practitioners, researchers, developers, etc.)
- Requirements (prior knowledge or experience)
- Key topics covered (keywords)*
- Reference standards/guidelines
- Learning objectives
- Additional Remarks

A wiki table was created for collecting existing initiatives and curricula/courses, where APARSEN partners contributed links/short descriptions of resources deemed as relevant for further analysis. This table was then consolidated, and WP42 partners were asked to register their preferences w.r.t. the resources they were willing to collect data about. More detailed information was then captured by each WP42 partner using the form above. The filled-out reporting templates were then quality-checked, with missing information provided where needed. The reporting forms were then transformed into Microsoft Excel spreadsheets, and further categorized according to their format (curriculum, course) and sector (academia, Continuing Professional Education). The filled out reporting forms are found in Annex I, which is accompanying this document.

2.4 RESULTING DATA SET

The resulting data set to be further analysed for this Deliverable was derived from the reporting forms described above.

2.4.1 Challenges

Several iterations of consolidation of the information captured in the reporting forms were necessary to complete/correct/complement data e.g. missing information in the areas of basic course description, credits, sector, key topics and learning objectives, and could be just added in a deeper analysis.

The data provided were of very different quality and quantity. Some data were difficult to extract, as the required information was buried in referenced documents or related web pages. In many cases, the freely accessible(!) information was insufficient for supporting further analyses², some offerings were no longer available online³, or have been cancelled⁴. It was decided to keep usable data sets for this Deliverable, as some of these opportunities might only be temporarily discontinued.

Again other data sets turned out to be inadmissible on closer research, because their content was not focused on Digital Preservation. This applied, for example, on this course: He20 „Advanced preservation“, which is a course on „[...] conservation programming and the collection needs of library and archival material. [...] include the management of risk, a holistic approach to moulds and pests [...]“. The topic sounds like it is in the range of Digital Preservation, but obviously it has a biophysical or chemical background.

2.4.2 Outcome

The Higher Education sector includes mainly different courses and modules in several digital information and Digital Preservation topics which are scheduled especially for graduates and Master students. The range of curricula includes Master programs for instance in the field of Records Management, Digital Preservation, Library or Information Science or other Master degrees in related disciplines. Aim of these degree courses is always a Master degree in the particular subject.

In the field of Continuing Professional Education there are courses collected which provide the theoretical basis and the practical know-how for using Digital Preservation in the professional practice. The main target audiences are practitioners, managers and employees in the field of archiving or data preservation.

After consolidation there were 77 Digital Preservation qualification offers remaining. 39 of them from the Higher Education sector, 19 Curricula and 19 Continuing Professional Education offerings, like workshops, trainings, online tutorials or single courses.

For the statistical analysis of the survey data, 14 countries (Austria, Finland, France, Germany, Greece, Israel, Ireland, Italy, Netherlands, Russian Federation, Spain, Sweden, Switzerland, United Kingdom (Scotland included)), 10 languages (Dutch, English, Finnish, French, German, Greek, Italian, Portuguese, Russian, Spanish) and three Target Groups (undergraduates, graduates, practitioners) were identified as a referential frame. The named countries and languages are forming the superset of countries and languages represented by the APARSEN consortium members. For the detailed analysis please see Chapter 4.

3 MAPPING FRAMEWORK

The analysis of the contents of curricula and courses in Digital Preservation needs to be based on common assessment dimensions which can be applied across communities. These assessment dimensions for the identification of commonalities and differences are derived from and aligned with the integration and research activities which are being conducted within APARSEN. Hence the structuring necessarily correlates with the (non-orthogonal!) APARSEN topic areas expressed in the Joint Programme of Activities in the Description of Work [APARSEN Description of Work, B1.3, Joint Programme of Activities, page 116] and its corresponding RTD work packages. Additional

² e.g. <https://moodle.hu-berlin.de/course/search.php?search=nestor>, <http://www.donau-uni.ac.at/de/studium/digitalessammlungsmanagement/09024/index.php>

³ e.g. <http://www.unibw.de/inf2/Lehre/FT09/lza>

⁴ e.g. <http://www.ltu.se/edu/program/FMDBA?!=en&lasar=2012>

themes (not explicitly expressed in the DoW) which were perceived as relevant during the course of the analyses were added as refinements to the respective topic areas and are explained below. Part of the introductory statements of this chapter and its topic areas are cited from *Section 5.1* of APARSEN D13.1, pages 89-90. When available, the descriptions of the themes were taken/derived from the APARSEN project glossary⁵ and the RTD work package descriptions/Deliverables.

3.1 TRUST

Trust refers to the authenticity of digital data and the environments in which it is preserved. This encompasses the certification of repositories as well as the reputation of both – data and people.

Relevant themes for Trust include, but are not limited to

- Authenticity – *“The degree to which a person (or system) regards an object as what it is purported to be. Authenticity is judged on the basis of evidence.”* [APARSEN project glossary]
- Provenance – *“Provenance means the origin, or the source of something, or the history of the ownership or location of an object.”* [APARSEN project glossary]
- Data quality – *“Data quality related information is of critical importance for the correct long-term data applicability and interoperability.”* [APARSEN Description of Work, WP26 description, page 38] *“The quality of a data set is affected by many factors. The individual relevance of these factors depends strongly on research discipline and data type.”* [APARSEN D26.1 draft, Section 2.4, page 22]
- Audit and certification – *“Section 1.5 of the OAIS Reference Model [...] included an item standard(s) for accreditation of archives, reflecting the long-standing demand for a standard against which Repositories of digital information may be audited and on which an international accreditation and certification process may be based.”* [Digital Repository Audit and Certification Wiki]
- Appraisal, selection criteria – *“The process of evaluation to determine whether records are needed by a public office or local authority and how long they should be kept. Appraisal involves deciding which records of an organisation are retained permanently as public archives, and which records are destroyed once the organisation's business and accountability requirements have been met. This is based on analysing the organisation's business activities, while weighing up community expectations about permanent retention of those records.”* [APARSEN project glossary]

3.2 SUSTAINABILITY

Sustainability is concerned with economic, legal, and social issues in addition to the construction of business cases and cost/benefit analyses for Digital Preservation. Brokerage services deal with the handover of digital holdings at the technical and organizational level.

Relevant themes for Sustainability include, but are not limited to

- Brokerage services⁶ – *“Research and develop ways in which repositories can come to agreement about handing on their data holdings in case a repository can no longer preserve its holdings and needs to hand them on. [...] research and develop ways in which organisations can share information about the availability of hardware and software.”* [APARSEN Description of Work, WP34 description, page 48]
- Business cases – *“Economically-sustainable digital preservation requires i) Recognition of the benefits of digital preservation on the part of key decision-makers, ii) Incentives for the decision-makers to act in the public interest, iii) A process for selecting digital materials for*

⁵ <http://www.alliancepermanentaccess.org/index.php/knowledge-base/dpglossary/>

⁶ This work package was deleted in the revision of the DoW.

long-term preservation, iv) Mechanisms to secure an ongoing, efficient allocation of resources to digital preservation activities, and v) Appropriate governance of digital preservation activities.” [APARSEN Description of Work, WP36 description, page 52]

- Cost/benefit analysis – “Create models for the cost of preservation of digital objects.” [APARSEN Description of Work, WP32 description, page 44]
- Storage solutions – “Storage is a central component in any preservation solution, and requires special functionalities in order to adequately address the need of a preservation system.” [APARSEN Description of Work, WP23 description, page 29]
- Transfer of custody – “Custodianship should always be regarded as a temporary trust and techniques are needed to allow a smooth handing over of holdings from one link in the chain of preservation to the next.” [SCIDIP-ES Design Summary2-1, internal document, page 2]
- Risk Management/Threats – “Digital preservation strategies, as well as the processes and tools that implement those strategies, are designed to secure the long-term future of digital materials. A successful digital preservation strategy must account for and mitigate the impact of various threats to the accessibility and usability of digital materials over time. Digital preservation strategies must address the threats relevant to the specific repository context in which they are expected to operate; this in turn requires an understanding of the full range of potential threats so repository staff can evaluate the likelihood and impact of each in the context of local circumstances, and take appropriate steps to address those threats representing significant risk.” [Vermaaten, S., et al (2012), Section 1]
- Processes – “[...] preservation processes are taken to refer to any processes that take place within the confines of the long-term archive technology that are deemed by stakeholders to be of importance to the effective operation of the archive. This covers processes that would be mapped onto the OAI functional entities of Ingest, Data Management, Archival Storage, Preservation Planning and Access.” [SHAMAN D3.2, Chapter 3, page 29]

3.3 USABILITY

Maintaining usability corresponds to ensuring intelligibility and to enabling interoperability of digital data between organizations and across domains by providing appropriate representation information. This can be supported by setting up a structured repository of common tools and software together with additional required documentation.

Relevant themes for Usability include, but are not limited to

- File formats – “Specific, pre-established structure for the organisation of a file or bitstream.” “Emulation [is a] [...] means of overcoming technological obsolescence of hardware and software by developing techniques for imitating obsolete systems on future generations of computers.” “Migration [is a] [...] means of overcoming technological obsolescence by transferring digital resources from one hardware/software generation to the next.” [APARSEN Glossary]
- Context, semantics – “The context of a digital object to be preserved over time comprises the representation of all known properties associated with it and of all operations that have been carried out on it. This implies the information needed to decode the data stream and to restore the original content, information about its creation environment, including the actors and resources involved, and information about the organizational and technical processes associated with the production, preservation, access and reuse of the digital object.” [Brocks, H., et al (2010), pages 197-226]
- Intelligibility – “There is a need for services that help archivists in checking whether the archived digital artefacts remain intelligible and functional, in identifying hazards and obsolescence risks and investigating the consequences of probable losses. [...] a number of services have been defined for checking whether a module is intelligible by a community, or for computing the intelligibility gap of a module.” [APARSEN Description of Work, WP25 description, page 35]

- Interoperability – *“The ability of independent systems to exchange meaningful information and initiate actions from each other, in order to operate together to mutual benefit. In particular, it envisages the ability for loosely-coupled independent systems to be able to collaborate and communicate.”* [APARSEN project glossary]
- Common tools – *“[The APARSEN software repository] will contain the software or pointer to the software together with descriptions, categorisations and annotations which will allow users to find appropriate tools for their requirements. Of particular importance is information about the strengths and areas of applicability of each tool.”* [APARSEN Description of Work, WP16 description, page 22]
- Preservation planning – *“The OAIS functional entity which provides the services and functions for monitoring the environment of the OAIS and which provides recommendations and preservation plans to ensure that the information stored in the OAIS remains accessible to, and understandable by, the Designated Community over the Long Term, even if the original computing environment becomes obsolete.”* [APARSEN project glossary]
- Infrastructure – A data preservation infrastructure addresses the long term data preservation and use of the knowledge encoded in domain-specific data. Such an infrastructure offers generic, sustainable services and toolkits to support efficient preservation planning and management along with usability and access needs. [adapted from Crompton, S., et al (2013)]

3.4 ACCESS

Access deals with persistent identifiers for data sets and links those to the identification of publications and other entities such as researchers. This is linked to digital rights and access management as well as issues related to the governance of data.

Relevant themes for Access include, but are not limited to

- Persistent identifiers – *“A persistent identifier is a language-independent label, sign or token that identifies an object from another object that cannot be changed over time.”* [APARSEN project glossary]
- Policies and governance – *“Data management is increasingly becoming policy-driven. There are issues like curation/privacy/liability/etc that will need serious consideration and are likely to drive policy, and hence interoperability must consider the propagation of policy. Data policies and governance should also have an in-built vision on how to support structured communities. Also policies defining how to manage data explosion: different policies need to be implemented at different scale (no extra copies after certain stage). The selection of materials for preservation should also be a political decision. The policies should also cover data as a liability, not only an asset. Specific cases will be considered with reference to the policies development.”* [APARSEN Description of Work, WP35 description, page 50]
- IPR, Access rights – *“Access Rights: The access available to system users attached to specific roles in the system.”* [APARSEN project glossary] *“Create techniques for preserving the usefulness of Digital Rights associated with digital objects.”* [APARSEN Description of Work, WP31 description, page 42]
- Finding aids, metadata – *“The descriptive media, published and unpublished, manual or electronic, created by archives or an archival programme, to establish physical or administrative and intellectual control over records and other holdings.”* *“Information which describes significant aspects of a resource. Most discussion to date has tended to emphasise metadata for the purposes of resource discovery. The emphasis in this handbook is on what metadata are required successfully to manage and preserve digital materials over time and which will assist in ensuring essential contextual, historical, and technical information are preserved along with the digital object.”* [APARSEN project glossary]

Note: Scalability was considered too unspecific for analysis. Hence, it is not represented as a separate theme within the mapping framework; many aspects thereof are already covered by other more specific themes such as Storage Solutions, Processes or Infrastructure.

3.5 SUMMARY

The themes depicted in *Sections 3.1, 3.2, 3.3, and 3.4* were used for assessing the coverage of APARSEN topics by existing courses and curricula, i.e. the available information gathered through desk-based research was mapped onto these concepts. Correspondingly, content coverage is measured quantitatively based on the representations created by these mappings which depict whether or not a resource is associated with one or more of the specific APARSEN themes. The mappings themselves, however, are subjective and qualitative as the exact key terms were not necessarily contained within the inspected documents.

4 ANALYSIS

For conducting the analysis, all data collected in the reporting forms (cf. Section 2.3) were compiled in a Microsoft Excel spreadsheet. The analysis of the data took place in two steps. In the first step the collected, compiled and completed education offers regarding HE, CURR and CPE (cf. Section 1.3) were analysed in relation to country, language and target audience, to get a geographical overview and an overview regarding the quantity in the different Target Groups (cf. Section 4.1).

The second step considered the content of the offered courses and analyzed the mapping to the four assessment dimensions Trust, Access, Usability and Sustainability, as described in Section 3. This is reported in Section 4.2.

The analysis of the course texts respectively the subsequent content mapping resulted in a high degree of complexity. The mapping was carried out in several iterations. Due to the number of subcategories (5 in Trust, 5 in Access, 7 in Usability, 7 in Sustainability), the mapping was divided among the team members and processed separately in Microsoft Excel. Subsequently, the results were discussed in the team and consolidated.

Clear content coverage was not always provided because of the use of not assignable terms, generic terms (like OAIS or records management) or limited explanations of standards. This was the reason why it took several iterations until a consensus could be found to assign certain terms to certain categories. Sometimes decisions had to be made to exclude generic terms as their meaning from the course description were not clearly identifiable. Content was also not mapped if it was considered as not relevant. Subcategories were added when they were considered as useful. Additional challenges for the evaluation of courses were the different languages.

Content in languages except German and English have been covered to the best of knowledge.

There was insufficient information for qualified mappings/analyses of (some) offerings, e.g., one higher education course from Greece and one higher education course and a master program from France. In these cases, their existence was acknowledge in the depiction of geographical/language coverage, but not within the mapping analysis.

In general, the mappings of constituting courses were not used to characterize the curriculum they are part of. However, the description of “Master in Library and Information Science (MALIS)” itself did not yield sufficient information for analysis. After some discussions it was decided to make an exception in this case, thus considering the mapped contents of the only relevant course “Modul: Informationstechnologien 2” as extensions to MALIS’s description.

4.1 STATISTICAL ANALYSIS

Comparing Section 2.4, 77 offerings were considered regarding 14 countries (Austria, Finland, France, Germany, Greece, Israel, Ireland, Italy, Netherlands, Russian Federation, Spain, Sweden, Switzerland, United Kingdom (Scotland included)), 10 languages (Dutch, English, Finnish, French, German, Greek, Italian, Portuguese, Russian, Spanish) and 3 Target Groups (undergraduates, graduates, practitioners).

Mappings to multiple categories were possible, thus result partially into mapping rates (number of related / relevant offers) per category (Country, Language, Target Group) higher than 77.

It should be noted that three large curricula were found that were comprised of a lot of individual courses in the analysis and thus are responsible for the higher frequency of courses in English and German language and -country (England, Germany). These are: Master's program Conservation of New Media and Digital Information of Stuttgart State Academy of Art and Design, Germany in German and English, dedicated advanced training courses for professionals of Archivschule Marburg, Germany in German and Digital Preservation Training Programme of University of London Computer Centre, UK in English.

4.1.1 Country

The survey examined in total 19 CURR, 39 HE courses and 19 CPE offers like workshops, trainings, online tutorials or single courses in 9 countries (**Fehler! Verweisquelle konnte nicht gefunden werden.**). There was insufficient information about the offerings in the remaining 5 countries for

making qualified assessments. Most of the offered courses were held only in one country. Only one curriculum, the Master degree course (MA in Digital Information and Asset Management) of the King's College in London, is organised as a binational study together with the Humboldt University of Berlin (*Humboldt Universität zu Berlin*). This curriculum is accordingly offered in both countries in Germany and in the United Kingdom.

In order to ease comparison and assessment of the geographical coverage of DP qualification opportunities, all country-related charts always display all countries of the analysis reference frame (cf. Section 1.3).

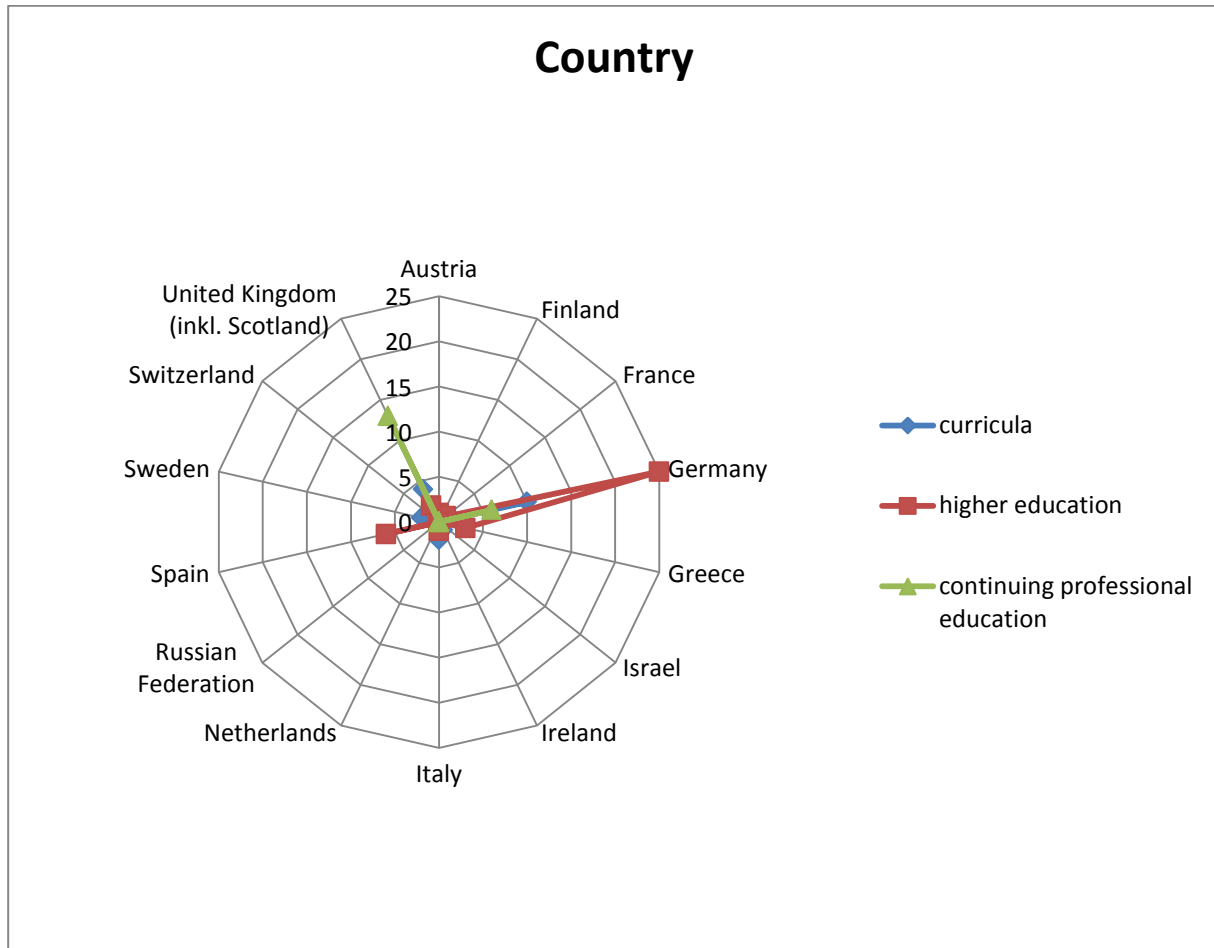


Chart 1: Coverage of all offers by country

Referring to the existing CURR range (Chart 2), the following results became obvious: Germany offers the most opportunities (10) followed by the United Kingdom (4), Italy and Sweden both offering two CURR and Ireland just as France with one offer.

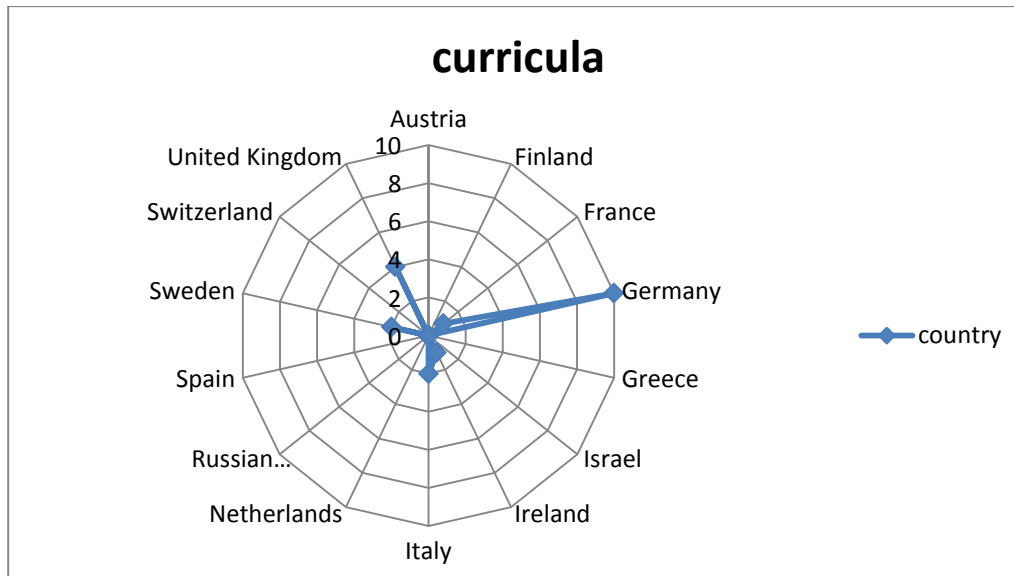


Chart 2: Coverage of curricula offers by country

The analysis of the offered HE range (Chart 3) indicates that most of the courses are supplied in Germany (25) followed by Spain (6), Greece (3) and the United Kingdom (2). In Italy, France and Austria one course is offered each.

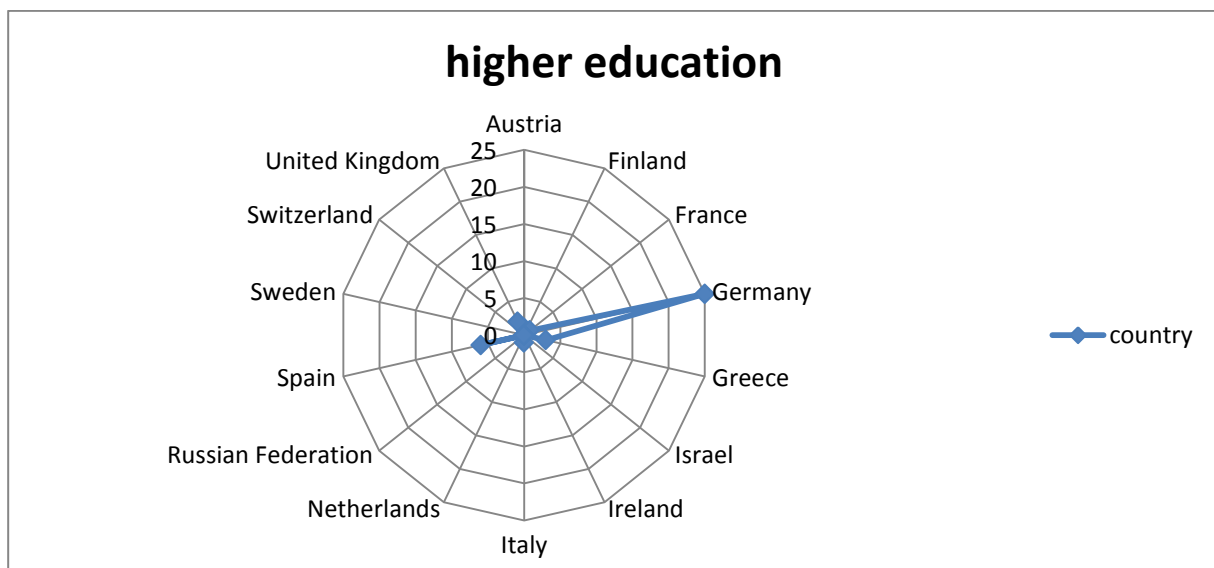


Chart 3: Coverage of Higher Education offers by country

Concerning the CPE (Chart 4), the majority of courses, trainings and workshops exist in the United Kingdom (12 + 1 in Scotland). Germany offers six educational opportunities.

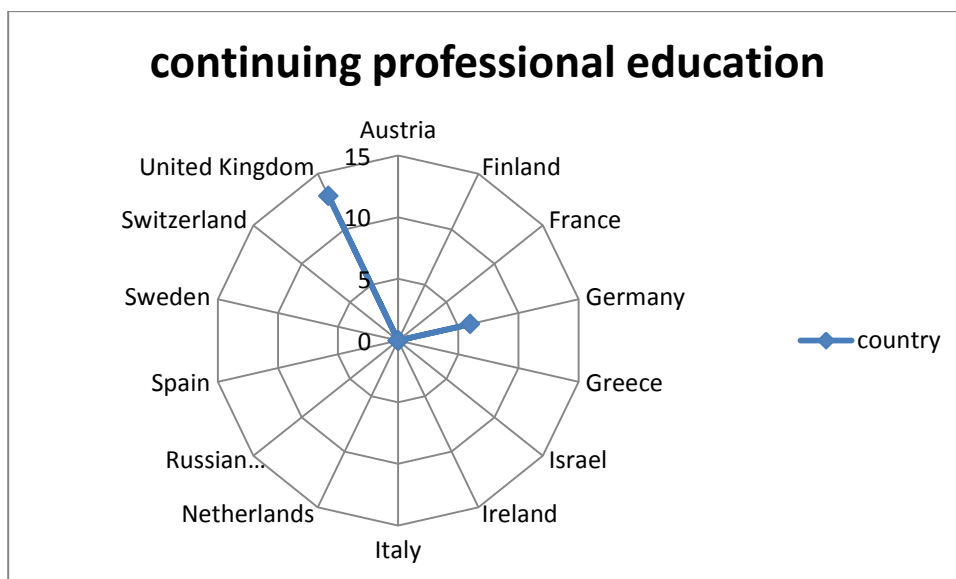


Chart 4: Coverage of Continuing Professional Education offers by country

In total, 77 offerings (CURR, HE, and CPE) with sufficiently detailed information were found. These offerings originate from 9 countries, which are United Kingdom (including Scotland), Germany, Greece, Italy, Ireland, Austria, Spain, France and Sweden.

4.1.1.1 Key Findings

There are many educational and academic offers in the United Kingdom and Germany. Countries like Italy, Ireland, Greece, Austria, Spain, France or Sweden also supply some educational and academic offers. The majority of the courses are held in only one country. Binational degrees constitute an exception. Despite our best efforts, no eligible formal qualification offerings in the field of Digital Preservation for many European countries could be found. The dominant number of offerings from the UK and Germany in CURR, HE, and CPE shows that there is great potential for establishing similar opportunities in other countries, including the development of bi-/multi-national curricula.

4.1.2 Language

Distribution and relevance of the languages used for the several education offers in total differ significantly (Chart 5). Most of the CURR, HE and CPE are offered in English and German. On the one hand this results from the amount of CURR, HE and CPE offered for instance in Germany alone. And on the other hand the impact of the English language on the international communication and scientific terminology compared to other languages is explicable.

For constant reference, all language-related charts always display all languages of the analysis reference frame.

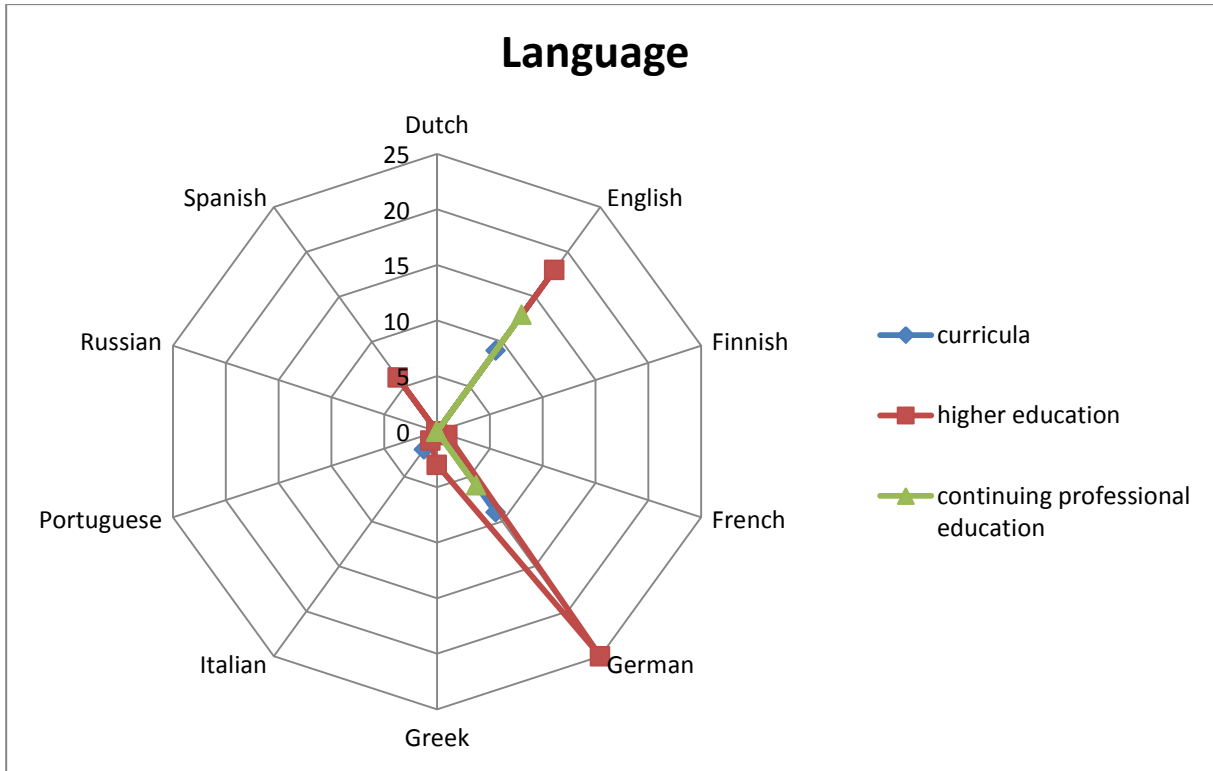


Chart 5: Coverage of all offers by language

Referring to the nineteen CURR most of them are offered in German and in English (18). Only two CURR are in Italian, and one in French (Chart 6).

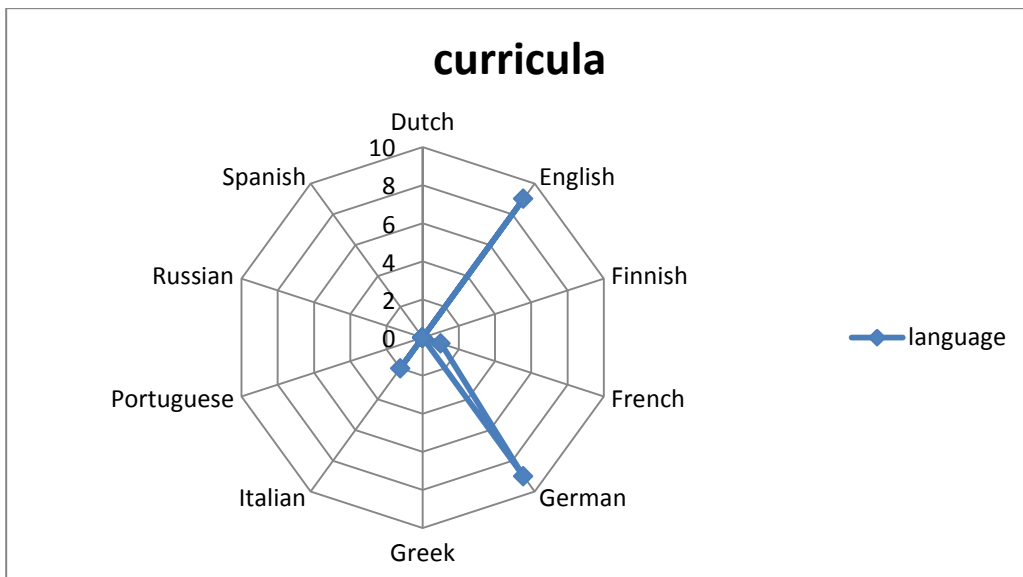


Chart 6: Coverage of curricula offers by language

Concerning the HE scope Chart 7 shows: twenty five German courses, eighteen courses in English, six courses in Spanish, three in Greek, one in French and one in Italian.

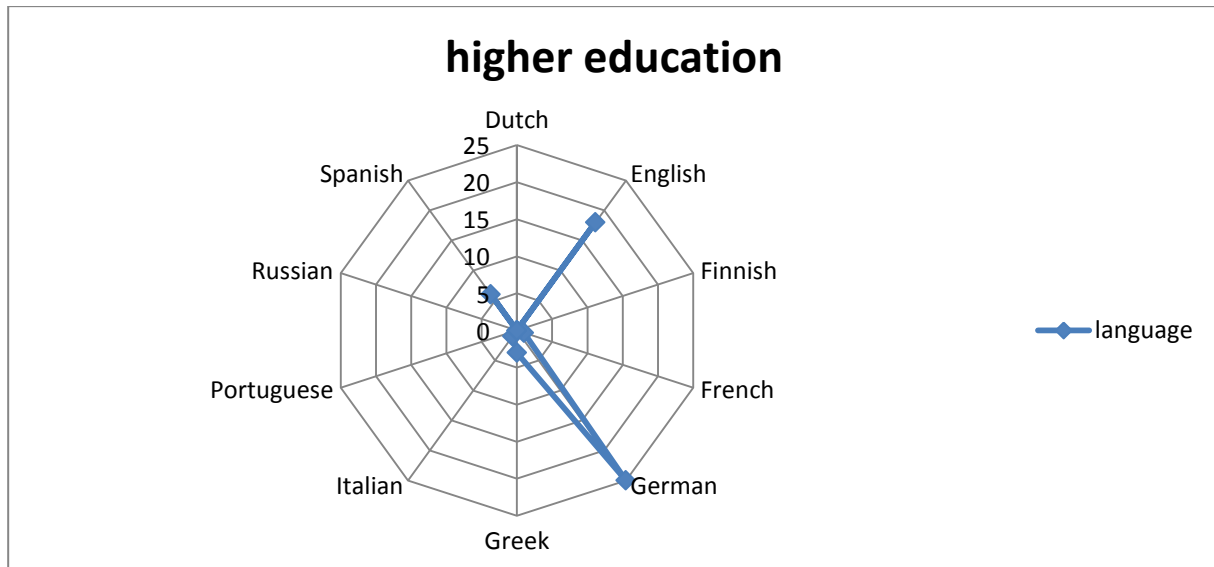


Chart 7: Coverage of Higher Education offers by language

The evaluation of CPE shows the following outcomes (Chart 8): Most of the offered courses, trainings, and workshops were held in English (13), followed by German (6).

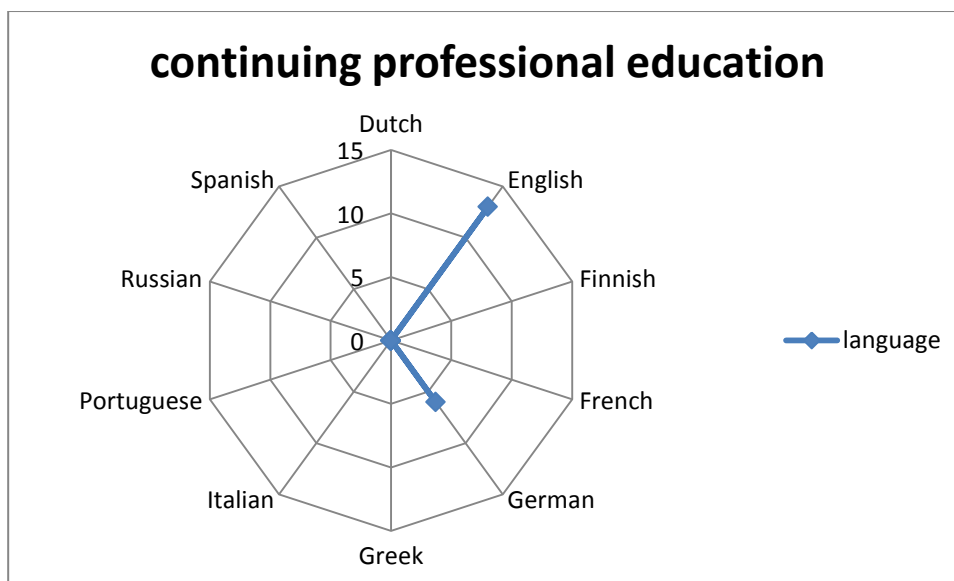


Chart 8: Coverage of Continuing Professional Education offers by language

These results show accordance to the analysis of the amount and allocation of the countries in which CURR, HE, and CPE are offered. It can be determined that the majority of the courses are held in the language used as native language in the particular country, for instance, courses in Germany are mostly held in German. Because no courses were identified in The Netherlands or Finland, these languages are also not represented in the spider chart. But there are some other exceptions of this characteristic. So some Swedish and German Master programmes are not held in the native language (respectively Swedish and German) but in English. The reason behind this result could be that English is often used as a business language in the particular countries. Another explanation is the relevance of using English for the future exercise of profession or the participation of students and course participants from other or different countries.

Some of the CURR, HE and CPE courses are designed as bilingual offer. There are fourteen bilingual resources in total. One example: The Master's degree course (MA in Digital Information and Asset Management) of the King's College in London is a bilingual study; the curriculum is accordingly considered for German and English. The same applies to the Master's program Conservation of New Media and Digital Information of the Stuttgart State Academy of Art and Design. One difference referring both courses: the Master's degree course of the King's college is a binational study and the Master's programme of the Stuttgart State Academy of Art and Design is only held in Germany.

4.1.2.1 Key findings

English and German are the most common languages for CURR, HE and CPE offers. One reason for the comparably huge number of English and German studies and training courses lies in an obvious correlation with the total amount of CURR, HE and CPE in the United Kingdom and Germany (see Charts 1 to 4). Most of all evaluated studies and courses were held in the UK and in Germany and hence in the natives languages of these countries. Another reason for the high usage of English is that this language is very common in the international communication and scientific terminology. Deduced from this issue there is also a high potential for CURR, HE and CPE in other common and global important languages like Spanish and Portuguese. Another conclusion is that there is also a big potential for bilingual offers, for instance, English-German, English-Spanish or English-French and bilingual CURR because of the relevance of using English for the future (international) exercise of profession of students and participants.

4.1.3 Target Audience

The survey considered three Target Groups: undergraduates, graduates, and practitioners. The focus in Academia was on the master's programs, but some of the CPE courses investigated are offered as suitable for everyone, or even specifically designed for students with no prior learning (without the degree). Here, the term undergraduate denotes any kind of formal degree requirement (both academic and professional) for enrolment in Continuing Professional Education offerings. (Cf. Chart 9).

This study takes into account that CURR for practitioners are explicitly required or desired in Higher Education. Only masters programs were considered, for which practitioners must have proof of bachelor's degree.

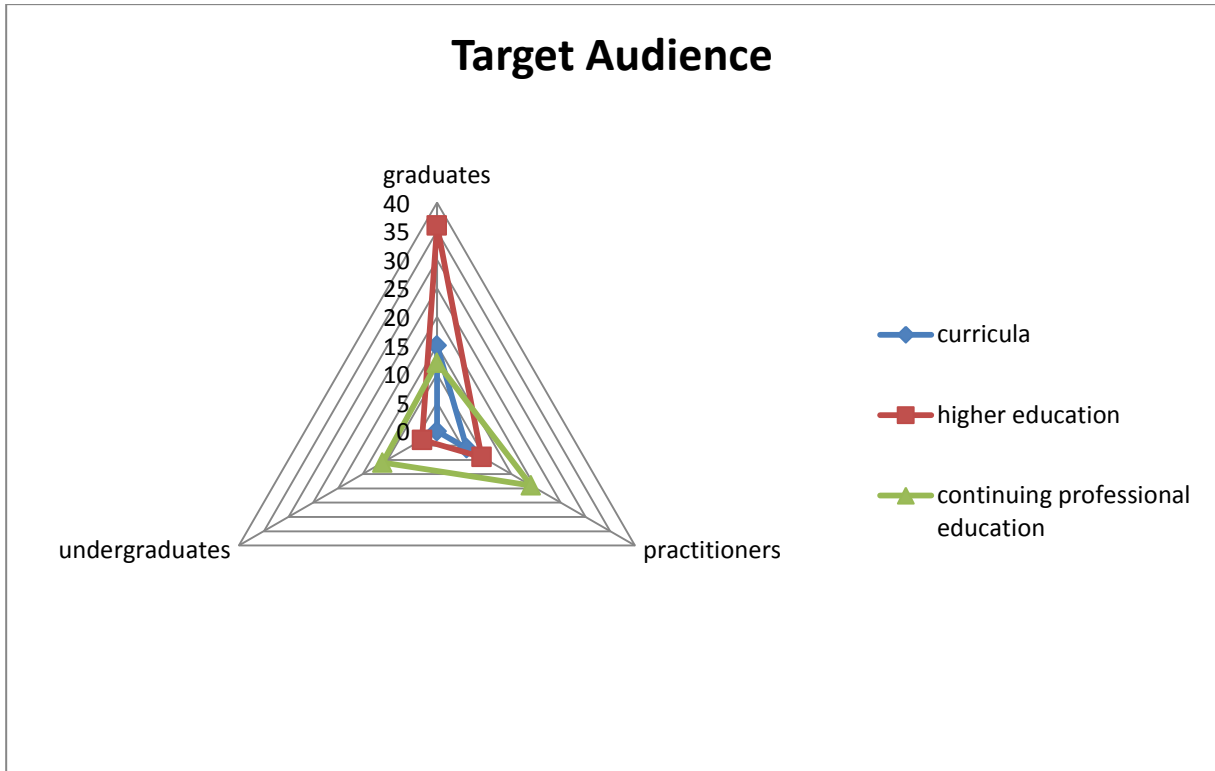


Chart 9: Comparison of overall offer to all target audiences

Referring the CURR (Chart 10) most of them (15) are offered for graduates. Six CURR require practical experience. The Master of Records Management of the *Archivschule Marburg* requires two years of work experience, for example.

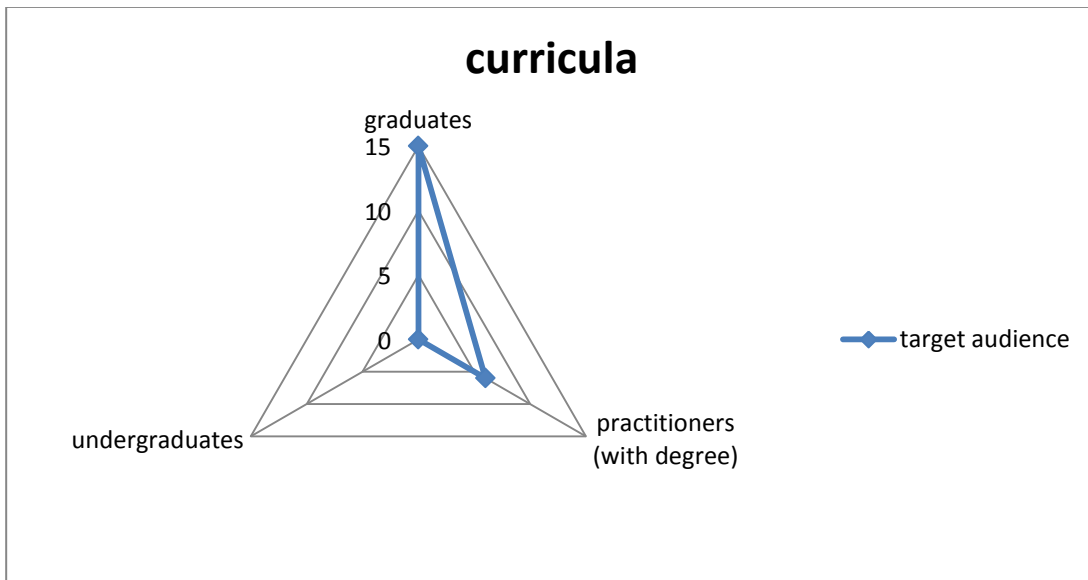


Chart 10: Coverage of curricula offers by target audience

Concerning the HE scope (Chart 11) the following spread arises: Most of the offered courses are available for graduates (36). Nine offerings put the focus on graduates with practical experience and three courses are open to undergraduates as well.

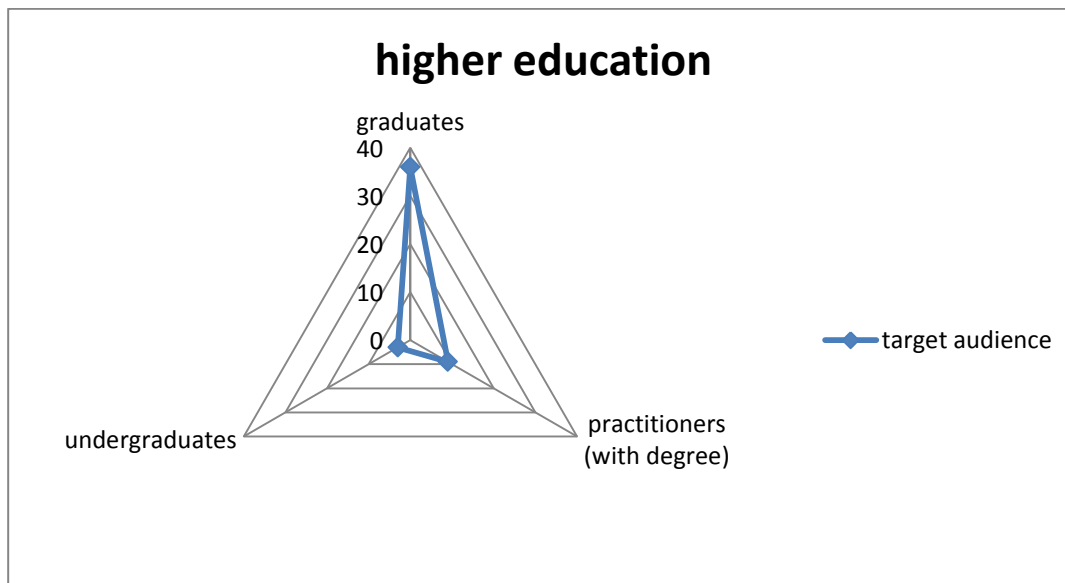


Chart 11: Coverage of Higher Education offers by target audience

The evaluation of the CPE shows the following outcomes (Chart 12): There is an almost an equal number of offerings for undergraduates (11) and graduates (12). There is nearly double the number of offerings for practitioners (19). The equal distribution between undergraduates and graduates is based on the fact that the University of London Computer Centre offers the Digital Preservation Training Program, which is created for nearly every audience out of the range of Digital Preservation. The sample is not representative at this point.

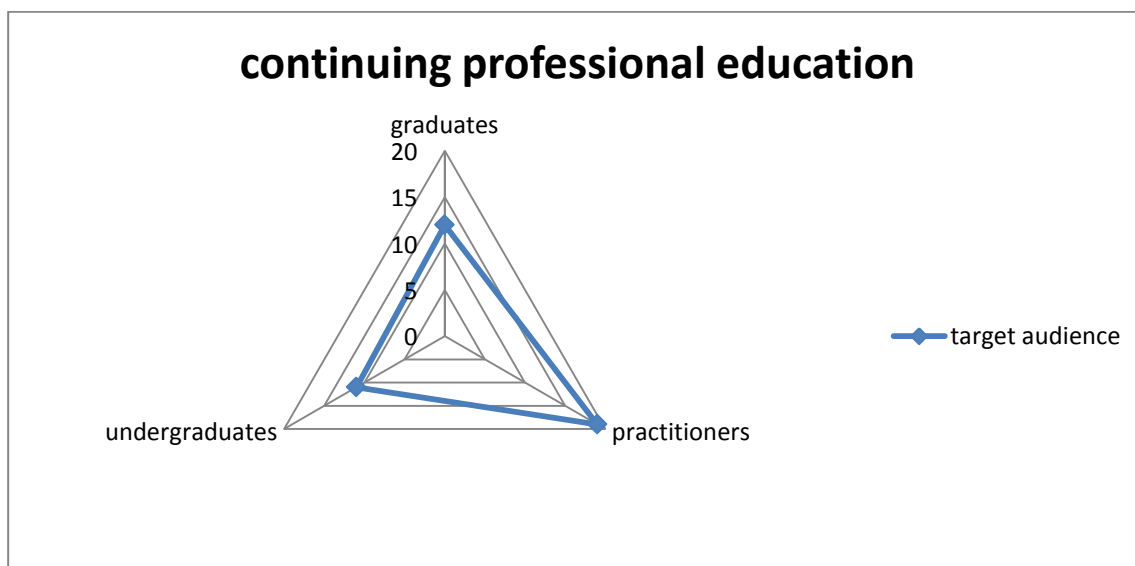


Chart 12: Coverage of Continuing Professional Education offers by target audience

4.1.3.1 Key Findings

These results show that the majority of the current academic offer refers to a target audience of students with bachelor degree in this case, and not on professionals with or without degree. The potential for educational institutions to establish more CPE trainings, workshops or courses for DP practitioners has to be discussed with the respective stakeholders. As indicated earlier, only a single curriculum specifically designed for CPE could be found. Users of DP training have no opportunities to take continuous training programs to get an approved degree or certificate. Thus, no comparison can be made between CPE workshops, seminars or training courses.

4.2 MAPPING ANALYSIS

Furthermore, the offerings considered in the survey were analyzed in terms of their coverage of the APARSEN topics Trust, Access, Usability and Sustainability (cf. Section 3). First of all, the subject matters indicated in the course offer description were mapped along these topics and their subordinate themes.

Because the quantity of offerings varied, we opted for relative shares rather than absolute numbers (Chart 13). In addition, we only analysed the offerings with sufficiently detailed content (cf. Section 2). So we considered 19 of 19 offerings in the range of CPE, 18 of 19 CURR and 37 of 39 in HE.

Within the four main topics, the distribution differs between 54% (Trust in HE) and 95% (Usability in HE), which means specifically that all four main topics are mentioned in minimum half of the considered training opportunities (54%) and maximally in nearly every offering (95%). The analysis reveals which terms represent the main topics in which scope.

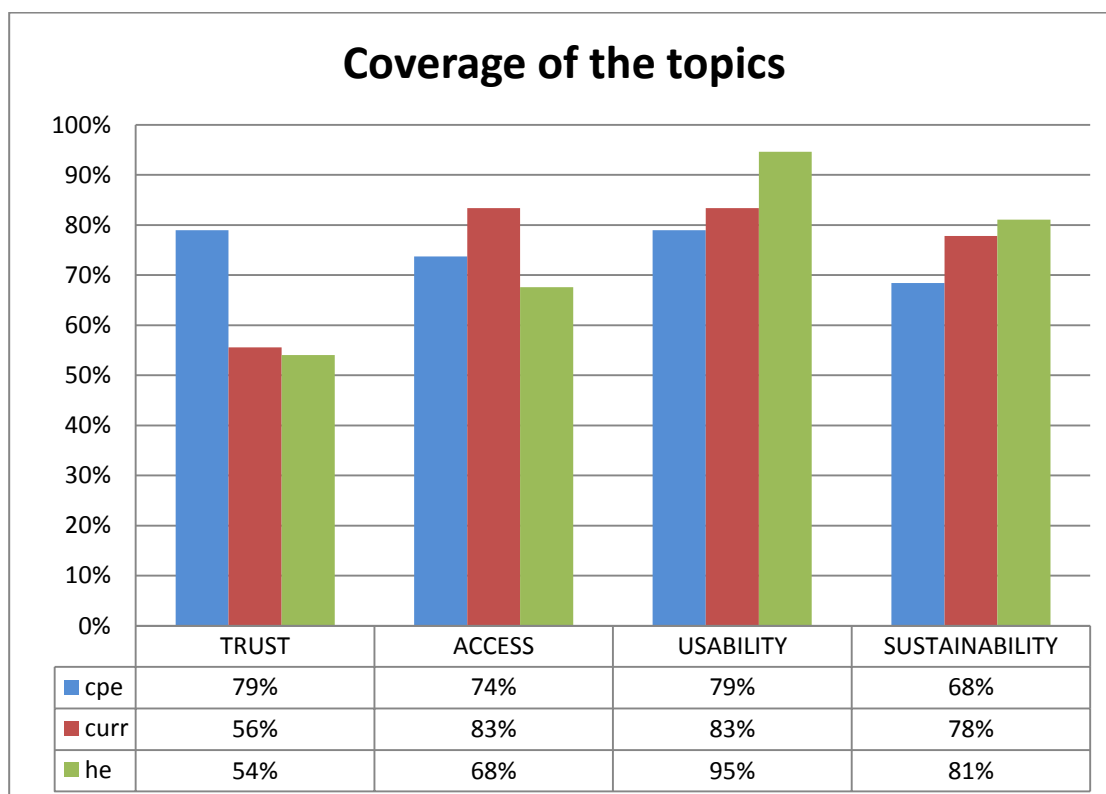


Chart 13: Coverage of the main APARSEN topic areas by all offerings in total

4.2.1 Trust

The key issue Trust is mainly represented by the themes “Provenance”, “Audit and certification” and “Appraisal, selection criteria”. The coverage of the terms in the area Trust is very different. Data Quality reaches max. 11%, Authenticity, and Audit and Certification are only represented in one category a bit more, Appraisal, Selection criteria in at least two categories. Only Provenance reaches more than 20% in all three categories (Chart 14).

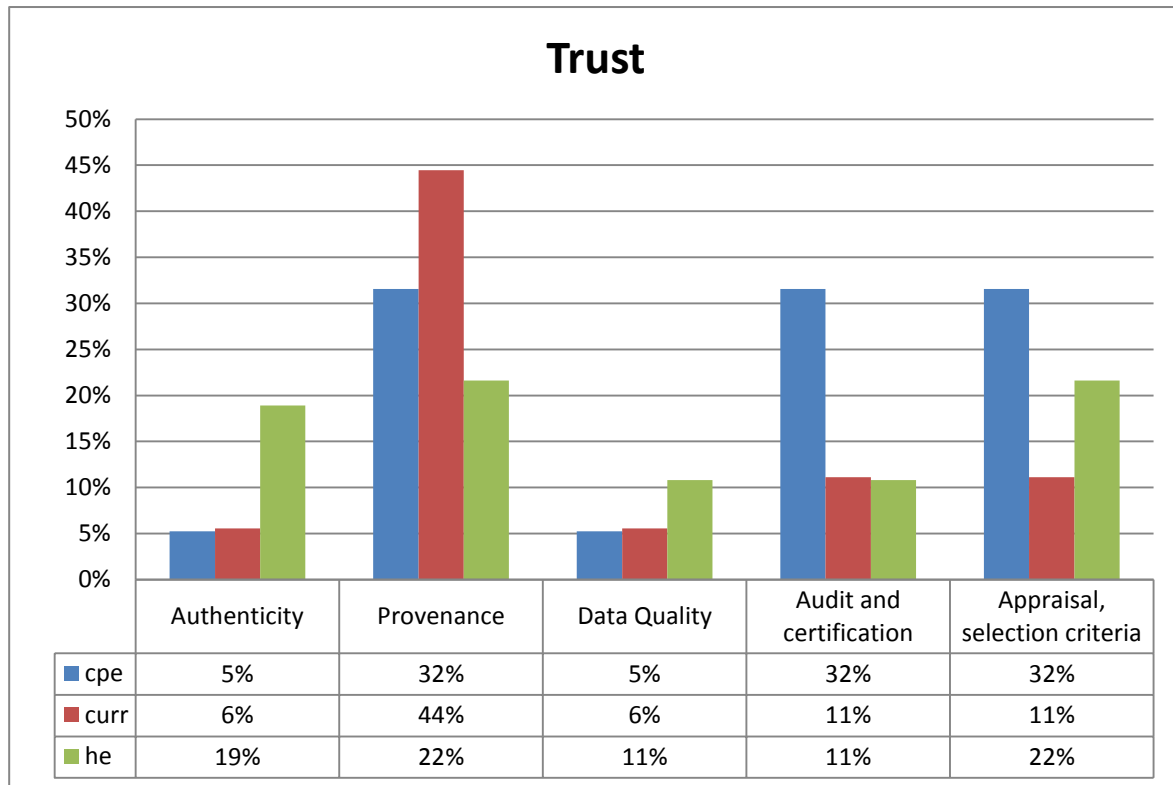


Chart 14: Distribution in the area Trust

4.2.1.1 Authenticity

Authenticity is represented merely in HE courses with 19%. As a theme for CPE, it is with 5% not very well represented, and in the descriptions of our present CURR, it is also under-represented. It has to be investigated, whether Authenticity is a too specific concept, hence it is only found in detailed course descriptions and not at curriculum level.

4.2.1.2 Provenance

The concept of provenance and related terms appear with almost 44% the strongest in CURR. In the field of CPE and HE it is with 32% and 22% the most common term in the category of Trust. Because of the strong significance for the area CURR and the overall high presence, a strong correlation between the conceptual context of provenance and the Trust topic can be observed.

4.2.1.3 Data Quality

The term Data Quality has a rather minor topical coverage in our dataset. It occurs most often in HE courses (CPE 5%, CURR 6% and HE 11%). Thus, it does not appear to represent a characterizing aspect of the core Trust topic.

4.2.1.4 Audit and certification

This theme has its highest coverage in CPE with 32%, so it seems to be especially relevant for professionals dealing with issues related to the Trust topic. Audit and certification was covered either as a direct term or indirectly, e.g., through "trusted repositories".

4.2.1.5 Appraisal, selection criteria

This term is as much represented in the area CPE as "Audit and certification" is (32%), but it also exists in the area HE with 22%. Selection and elimination processes dominate the term in our dataset. The theme seems to be much more relevant for individual courses than for the depiction of the overall CURR. It is one of the three terms which were most often observed to correlate with the Trust topic.

4.2.2 Access

Access is characterized by the three terms "Policies and governance", "IRP, access rights" and "Finding aids, metadata". "Persistent identifiers" is mentioned only marginally, "Security" does not even occur once (Chart 15).

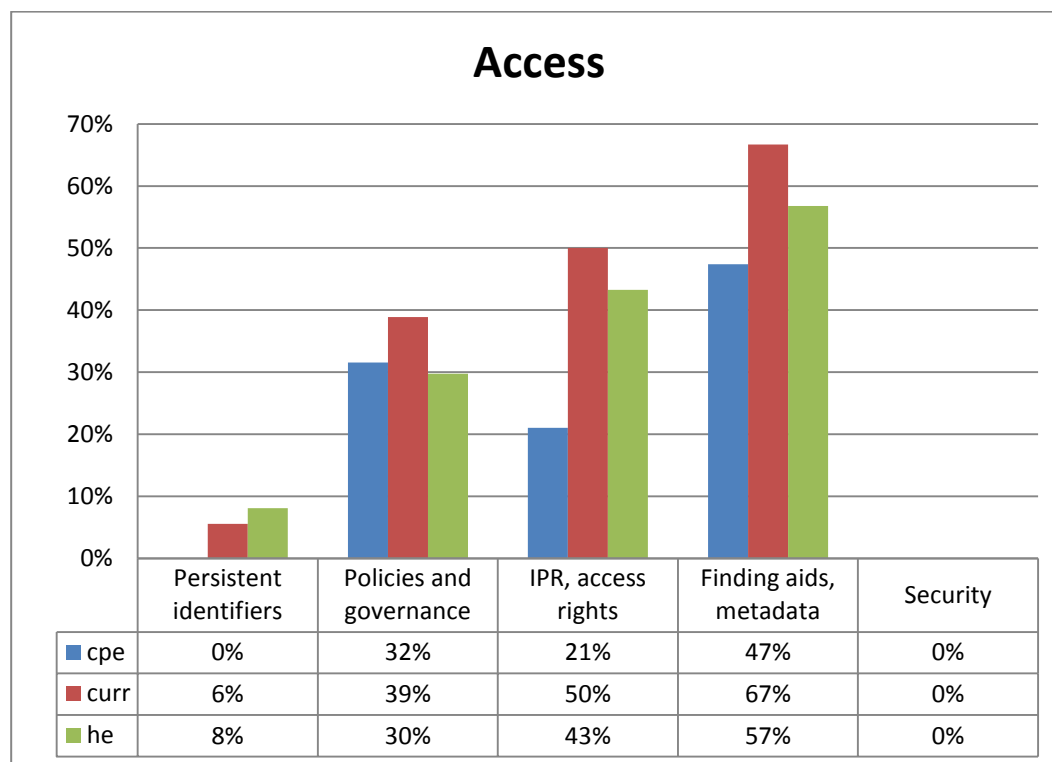


Chart 15: Distribution in the area Access

4.2.2.1 Persistent identifiers

The term is marginally represented with 6% in CURR and 8% in HE courses. One possible interpretation of the low topical coverage might be related to the fact that issues related to the establishment/maintenance of persistent identifiers are of organizational nature rather than technical/RTD issues. This and alternative interpretations will be discussed with WP22 Identifiers and citability.

4.2.2.2 Policies and governance

This theme is equally represented in all three areas with round 30% - 40% and covered by various terms, such as: preservation policies, principles and guidelines, legislation, corporate accountability. This leads to the assessment that this theme appears to be relevant for CURR, HE, and CPE. This is also supported by its occurrence at course-level in various offerings with different backgrounds.

4.2.2.3 IPR, access rights

Here we have a high coverage of 50% and 43% in the areas of CURR and HE. CPE on the other hand is covered with 21% less intensively. This theme is determined by various terms also, such as: digital rights management, data protection, freedom of information, archive rules, information law, copyright law, practice for access, access models and licensing. Again, we assume a relatively general and important issue that is used in different topics and courses. However, it is represented in the range of Academia stronger than in CPE.

4.2.2.4 Finding aids, metadata

This theme is with an average of 56% the most commonly mapped terminology within our analysis. This is due to the term "metadata" because it is related to archiving and Digital Preservation in many different subjects. In two of three CURR contents are described using metadata. The theme is part of the knowledge base of the overall subject.

4.2.3 Usability

Usability is the main topic with the most used subsumed terms. Except for one, all these themes were reflected in the three categories of DP courses with mostly high percentage (Chart 16).

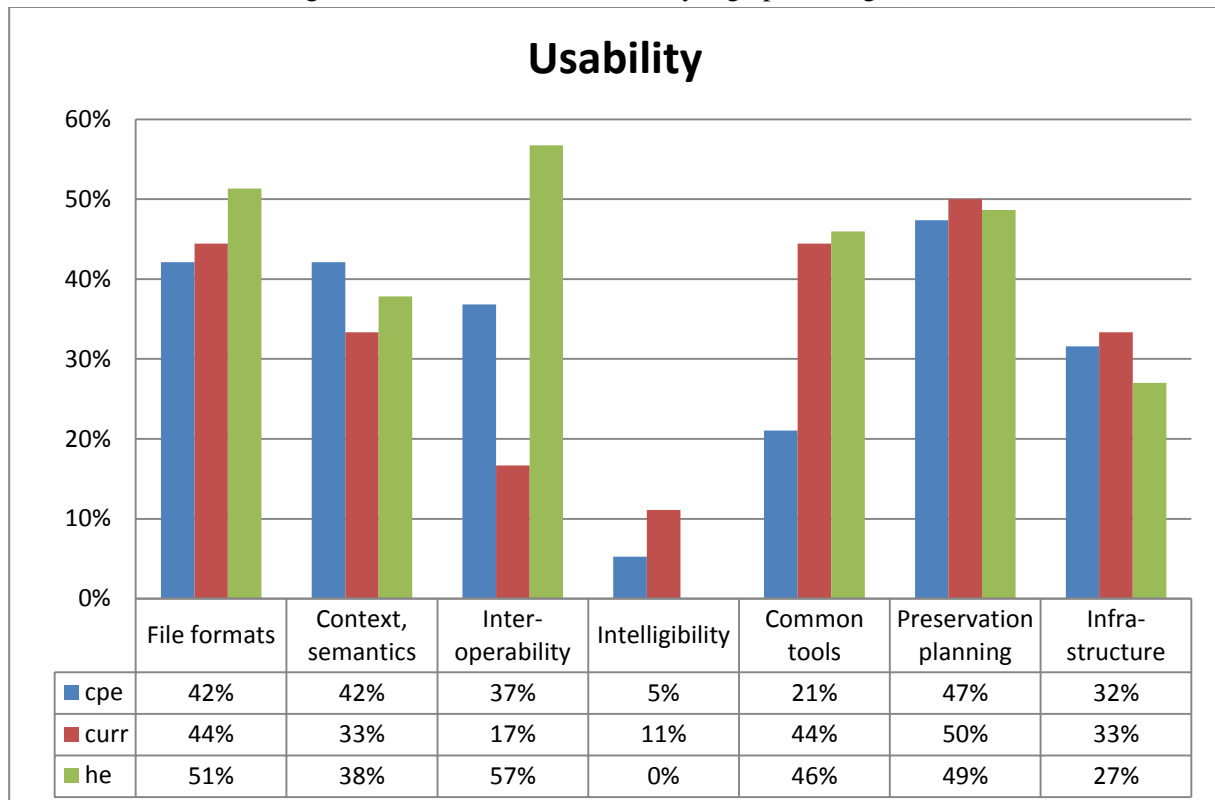


Chart 16: Distribution in the area Usability

4.2.3.1 File formats

There is a nearly uniform distribution of file formats across CURR, HE, and CPE. This indicates that the theme is generally perceived as relevant for all kind of education offers. In every category (CPE, CURR and HE) file formats have been reached a percentage of more than 40% (CPE 42%, CURR 44% and HE 51%). That could be meaning that file formats are an important issue for the whole category usability. Terms like migration, integration, standards and particularly metadata are the most mentioned items in the different courses; probably because of their general importance for preservation. This could explain the similar distribution over all three groups of courses.

4.2.3.2 Context, semantics

Context and semantics are most important for the sector CPE. In this sector we can assess an appearance of 42%. In the area of CURR and HE following distributions have been shown: CURR 33% and HE 38%. Generally, context and semantics are observed to be strongly correlated with the Usability topic, hence it can be attributed to be of high relevance. Metadata and semantics occur mostly in this thematic field.

4.2.3.3 Interoperability

For the theme interoperability there are three different characteristics to notice. On the one hand we can see that this issue is not very relevant for the area of CURR (appearance only 17%). On the other hand we have a percentage of 57% in the area of HE; and at least a percentage of 37% in the field of CPE. The correlation of interoperability with CURR is low, whereas correlation is high for individual courses. However, many of those individual courses are part of different CURR. The OAIS (information) model and standards in general are most often observed as course subjects.

4.2.3.4 Intelligibility

The theme intelligibility it not strongly represented in the different categories (percentage of 5% in the field of CPE courses, 11% in the CURR and none in HE. Possible interpretations of the rare occurrence of intelligibility have to be discussed with WP25, e.g., coverage through the related theme of context and semantics which are repeatedly found.

4.2.3.5 Common tools

We have a nearly equal percentage referring the theme common tools in the categories CURR (44%) and HE (46%). In both categories these issues are represented through a few of different terminologies, which all handle with varying techniques and software tools. Examples for some course and curricula topics mentioned are: tools for managing records and information, software options and developing new tools and products. In the field of CPE this theme has just a percentage 21%.

4.2.3.6 Preservation planning

Preservation planning is very common in all three categories (CURR 50%, CPE 47% and HE 49%). This might be due to fact that this theme is characterized by diverse terms and concepts, such preservation analysis workflow, Digital Preservation preparation and requirements, significant properties, strategy, managing Digital Preservation, preservation strategies etc. Because of that we have a very high percentage in all three groups of courses. The theme preservation planning is hence also very relevant for the APARSEN topic usability.

4.2.3.7 Infrastructure

Referring the theme infrastructure we have a relative similar distribution overall all three categories (CPE 32%, CURR 33% and HE 27%). Hence infrastructure appears to be relevant across all types of offerings and the Usability topic in general. Terms like technical and organizational requirements, platforms, IT components and infrastructure itself are some mentioned items in the different courses; probably because of their relevance for planning, designing and configuration of preservation concepts. This could also explain the relative equal distribution of percentage of this theme in the different courses.

4.2.4 Sustainability

Sustainability includes seven themes, wherein "Business cases" and "Processes" stand out. The theme of "Brokerage services" occurs not at all (Chart 17).

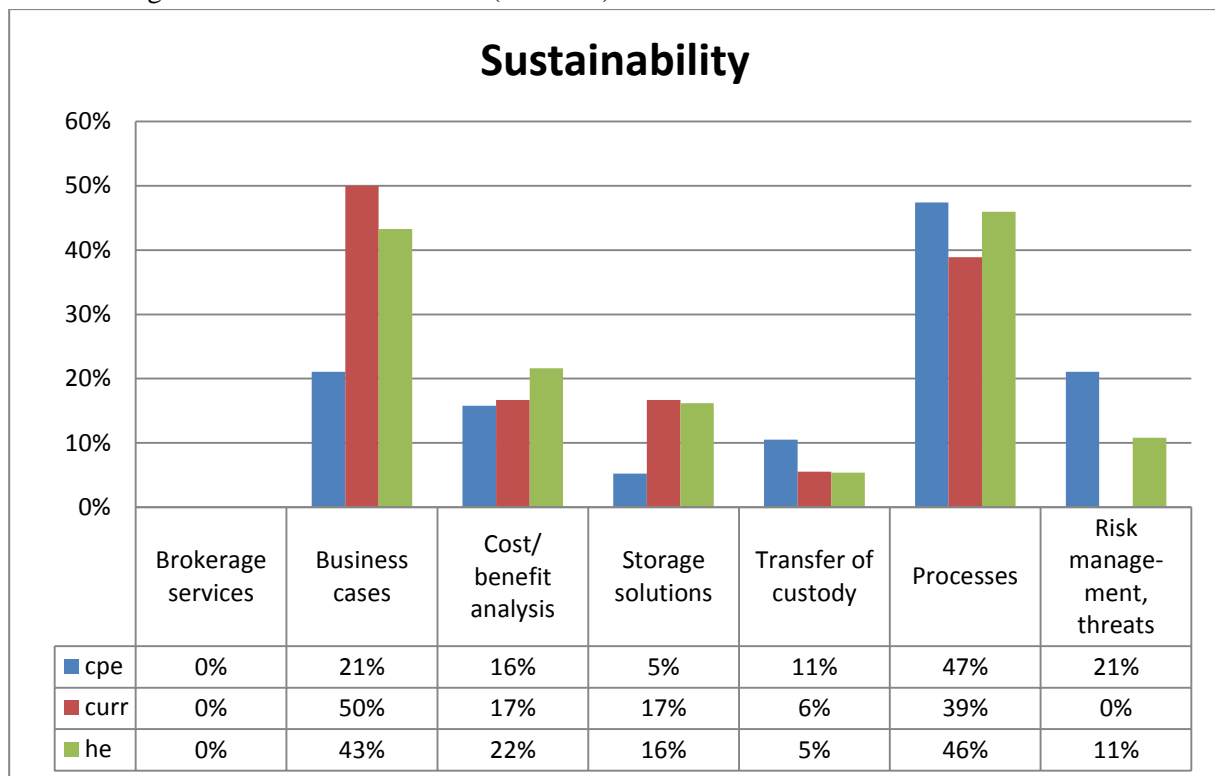


Chart 17: Distribution in the area Sustainability

4.2.4.1 Business cases

The theme "Business cases" is more represented in academia than in CPE (CPE 21%, CURR 50% and HE 42%). This suggests that this theme provides a good characterization of the Sustainability topic in general. For example, the theme is reflected in business models, problems and action fields, legal and cost aspects, supply sources, marketing. The low topical coverage in CPE needs to be further investigated with WP 36, as it might indicate a deficiency in current offerings.

4.2.4.2 Cost/benefit analysis

The term cost / benefit analysis appears almost equally in all three segments (CPE 16%, CURR 17% and HE 22%). Cost Analysis is the keyword. This theme, with a rather economic background, has a constant presence, but isn't of the main concern.

4.2.4.3 Storage solutions

This term has in CPE much less importance than in the academic field (CPE 5%, CURR 17% and HE 16%). So this is another indicator of the needed expansion of DP courses for people in employment and professionals.

4.2.4.4 Transfer of custody

The term is used less, in the division CPE with 11%, in CURR with 6% and in the considered individual academic courses with 5%. The term is mainly represented by aspects of rights management, which finds itself in the field of Access in “Policies and governance”, or “IPR, access rights”. The content is thus certainly relevant, but is labelled differently and is defining the area of access more than the area of sustainability.

4.2.4.5 Processes

The Processes theme seems to provide a good characterization of the Sustainability topic, as it is observed in an average of 44% of all offerings. It appeared in all three segments equally often, in CPE with 47%, with 39% in CURR and in HE with 46%. This might be due to the fact that the term Processes itself is quite broad, with its specific meaning diverging across sectors and domains. Specific occurrences of the Processes theme encountered were, for example: acquisition processes, workflow, process analysis and process modelling. The percentage difference of the division CURR to the other sectors speaks for the differential use of the multiple cross-term "process" in different areas of specialization and thus individual courses in the academic as well as in continuing education sector. Due to the extensive spectrum several “side issues” arise, that can be assigned to a limited extent, such as "migration, emulation, technology preservation" and "storing, encoding and transmitting data".

4.2.4.6 Risk management, threats

This theme is with 21% in the category of CPE and 11% in HE and 0% in CURR stronger in training than in the academic field, but overall quite thinly represented. As a main heading in a degree program, it is not used within our data set; however, there are special courses, especially in focusing on practical orientation and application to handle the risk management entirely.

4.2.5 Summary

Taking the APARSEN core topics as normative basis for what should be offered, the elicitation and detailed/comprehensive discussion of the actual reasons and implications of observed deficiencies in topical coverage in the data analyzed was beyond the scope of this deliverable. Possible interpretations (e.g., "deemed to be not mature enough/irrelevant", "terminology mismatch", "conveyed need for offerings" ...) will be discussed in detailed with the respective WP stakeholders and reflected in the design of the APARSEN curriculum.

Trust is influenced by three terms in the area of CPE (Provenance, audit and certification & Appraisal, selection criteria) and has reached the highest coverage in the area CPE with 79%. Trust is determined in the field of HE by two terms (Authenticity, Provenance & Appraisal, selection criteria) and is represented in the field of CURR only by Provenance.

Policies and governance, IPR, access rights, and finding aids, metadata define the topic **Access**. Access delivers with Usability the largest contribution in the field of curriculum.

Usability provides with six out of seven terms the largest input, the most frequent topic or in all three segments (CPE, CURR, HE).

Sustainability is represented mainly by Business cases and Processes. After Usability Sustainability provides the next largest contribution to HE courses.

The APARSEN core topics are covered in over 50% of the analysed offerings across CURR, HE, and CPE. However, the observed occurrence of constituting sub-themes varied. For instance, there was little evidence of the themes Persistent Identifiers, Security, Intelligibility and Brokerage Services, Transfer of Custody, and Data Quality. As another example, topical coverage of Authenticity, IPR, Access rights, Interoperability, Common tools, Business cases, and Storage solutions was in general found to be higher in HE than CPE.

Overall, topical coverage appeared to be relatively consistent across areas (CURR, HE, and CPE), countries, and languages. This supports adequateness of the methodology established and gives some indication as to the validity (i.e. critical mass reached through leading offerings) of the findings w.r.t. topical coverage.

5 IMPLICATIONS

5.1 PUBLIC RESOURCES REPOSITORY

Together with work package WP43 *Training courses*, WP42 *Formal qualifications* aims to broaden the scope of Digital Preservation by leveraging the required skills and competence profiles within and beyond the library and information science community. Digital Preservation can be considered a base competence in the information society. Because of the ever escalating scale of relevant disciplines and practical domains, the study's scope had to be narrowed down (cf. Section 4 Analysis). For the same reason, the development of curricula and training material in a significant cross-section of disciplines beyond library and information science as well as their integration in extant educational programs in Higher Education and Continuing Professional Education is currently an unrealistic goal to accomplish. In order to facilitate access to qualification resources in Digital Preservation for students, researchers and practitioners alike, APARSEN will maintain and make the structured survey data publicly available, allowing these target groups to spot qualification and training opportunities meeting their competence profile and subject field.

That register of Digital Preservation curricula and courses in academia/Higher Education and Continuing Professional Education will become part of the APARSEN Online Training Portal (OTP) (cf. Task 4350, [APARSEN DoW, WT3, WP43 Training Courses, page 85]), comprising a set of online services dedicated to leveraging skills and competence profiles in the field of Digital Preservation.

In general, the Online Training Portal (OTP) is dedicated to be of help to anyone interested in gaining initial skills or improving his competence in Digital Preservation. Specifically, the portal will be designed to support students and trainers with three main services:

- Register of Digital Preservation curricula and courses in academia/Higher Education (HE) and Continuing Professional Education (CPE)
- Repository of training material in Digital Preservation
- Online learning with courses in Digital Preservation

5.1.1 Register of Digital Preservation curricula and courses in academia/Higher Education (HE) and Continuing Professional Education (CPE) on Digital Preservation

This service allows students and professionals to spot qualification and training opportunities meeting their competence profile and subject field, hence leveraging the required skills and competence profiles within and beyond the library and information science community.

The service makes available a catalogue of opportunities to gain qualifications in or to be trained in Digital Preservation. Opportunities may range from stand-alone, discrete training events/tutorials to courses, curricula and professional frameworks/programmes. The focus is set on Higher Education, vocational education, academia and Continuing Professional Development which may lead to or which are embedded in formal (academic) qualifications or recognized certification. The register lists events, programmes and providers. Each entry is described by an essential set of attributes allowing users to identify opportunities meeting their interests and training and qualification needs, respectively. Mainly, the register refers to/ links to original information provided by the organizer.

The Online Training Portal will to some extent act as a Content Management System (CMS) which by and large “allows publishing, editing and modifying content as well as maintenance. Such systems of content management provide procedures to manage workflow in a collaborative environment. These procedures can be manual steps or an automated cascade.” [http://en.wikipedia.org/wiki/Content_management_system]

With launch of the online service, the register will comprise the resources identified in the course of this survey and reported in this Deliverable D42.1 (cf. Annex I). The survey contributes an initial data set (cf. Section 2.3 and 2.4) which covers a subset of the service’s potential scope. The survey’s eligibility criteria (cf. Section 2.2) define the boundaries of the initial service coverage, informing the target audience what resources they can expect to find in the register and what not. The attributes country, language and target audience recorded for each entry support users in finding opportunities they can geographically attend, understand the matter and meet the admission criteria. APARSEN will plan for maintenance procedures to continually supplement and update the curricula and courses register (cf. Section 5.3).

5.1.2 Repository of training material in Digital Preservation

This service supplies teachers and trainers with material suitable for creating courses on digital long-term preservation within and beyond the library and information science community. Furthermore, its material is expected to enable students and professionals to study single topics by self-directed learning on a basic level.

The repository offers digital resources suitable for teaching topics in Digital Preservation. It contains single, discrete documents and media like, but not limited to, basic information texts, scientific articles, presentation recordings, case studies, guidelines, and best practice reports. The content should be a good mix of theoretical concepts and examples from various application domains. It may address different target audiences, ranging from Higher Education and academia to vocational training and Continuing Professional Development. The repository stores local copies of the resources, if possible. In cases where this is not possible, the service refers to/ links to the original distributor. All content is indexed by an essential set of attributes which enables developers, authors, instructional designers, and subject matter experts to select suitable raw resources for the individual course production, fitting the specific application domain context, the specific target audiences and the specific learning objectives.

APARSEN WP42 *Formal qualifications* in collaboration with WP41 *External workshops, symposia and events* will populate the repository with training material including that collected from third-parties. Potential contributors are Higher Education infrastructure in Europe, public research and development projects and training initiatives, who generously share their material. Moreover, the repository will host training material developed by WP43 *Training courses* belonging to the Advanced Practitioner Training Course (Task 4320), the Topic Specific Training Courses (Task 4330) and the Executive Briefings (Task 4340).

5.1.3 Online learning with courses in Digital Preservation

Such service could be dedicated to offering students and professionals the opportunity to improve their knowledge in Digital Preservation by attending online courses. Acting as a training and qualification provider presupposes the setup and continuous operation of an organisation. Although APARSEN was not intended to run online courses, for the sake of completeness, this Deliverable describes a coherent suite of three services adding up to the Online Training Portal. This also includes online learning with

courses in Digital Preservation, which is optional in the scope of APARSEN. The technology chosen for implementing the OTP is prepared to act as a Learning Management System and run online courses. Whether the VCoE will step into the business of (certified) online training and qualification is a decision to be taken in line with business plan development in WP11 *Common vision*. In APARSEN, the OTP is set-up to the stage of a Content Management System in which online course elements and online course structures can be authored and stored. Universities, colleges and training and qualification providers can take building blocks from this repository to build up and enhance their own offer.

The service would deliver online courses in Digital Preservation and keep track of the student's individual progress. Courses encompass a unit of teaching on a subject in or related to Digital Preservation. Students attending courses should belong to the intended audience of the course and qualify by their previous knowledge. Attendance of the course is intended to build competences, described by the course's learning objectives. The course structure organizes the learning process, subdividing the course into modules and activities. Activities range from reading and studying documents and multimedia training material and exercises up to taking quizzes and examinations. Depending on the student's performance, the course may branch into alternative onward activity paths inside the course. The service concentrates on distant, self-directed learning in which the students themselves set their individual pace of learning and their individual times of learning. Besides that, computer-based activities in online courses may be integrated with practical or workshop-based situations, following the blended learning approach.

In order to run online courses, the Online Training Portal covers features of Learning Management Systems (LMS), supporting "the administration, documentation, tracking, reporting and delivery of education courses or training programs." LMSs range from systems for managing training and educational records, to software for distributing online or blended/hybrid college courses over the Internet with features for online collaboration. Colleges and universities use LMSs to deliver online courses and augment on-campus courses. Corporate training departments use LMSs to deliver online training, as well as automate record-keeping and employee registration. Student self-service (e.g., self-registration on instructor-led training), training workflow (e.g., user notification, manager approval, wait-list management), the provision of on-line learning (e.g., computer-based training, read & understand), on-line assessment, management of continuous professional education (CPE), collaborative learning (e.g., application sharing, discussion threads), and training resource management (e.g., instructors, facilities, equipment), are all important dimensions of Learning Management Systems." [http://en.wikipedia.org/wiki/Learning_management_system] The LMS of the Online Training Portal is integrated with its CMS in that it can make use of repository training material inside online courses. However, it is not a learning material development environment in the sense of Learning Content Management Systems (LCMS), which supports creating, editing, reusing and repurposing learning content. [http://en.wikipedia.org/wiki/Learning_Content_Management_System]

Depending on their design, the programme will comprise or add to training courses or parts thereof developed by WP43 *Training courses*, namely the Advanced Practitioner Training Course (Task 4320), the Topic Specific Training Courses (Task 4330) and the Executive Briefings (Task 4340).

5.1.4 Integration and common services of the Online Training Portal (OTP)

A comprehensive suite of shared information and communication services accompanies the register, the repository and the online learning in the Online Training Portal. One or more **Taxonomies** provide a structure for the content. Its categories reflect concepts researchers and practitioners in Digital Preservation are used to in their daily business. Independent schemes complement one another. The APARSEN topics Trust, Sustainability, Usability and Access with their respective sub-themes form one essential scheme in that taxonomy. Relevant schemes in Digital Preservation identified so far include preservation services, organisation role in Digital Preservation, and application domain. The competence profile scheme and the target audience scheme are prevalent in qualification and training. Hierarchical classification inside each scheme allows for specialization into subcategories. Training

opportunities, training material and online courses are grouped into categories that fit. Content can be assigned to multiple categories, adding up to a panorama classification that satisfies manifold interests and uses cases. Altogether, the portal can be considered to speak the language of the students and the instructors. **Faceted browsing** aids users in exploring the Online Training Portal and in locating content of their interest. It lets students and instructors apply multiple filters to narrow down the presented offer to categories of relevance to them. The filtering can be combined with querying terms in the content full-text. Users can convey their individual explicit **interest profile** in terms of a combination of categories. Thereafter, the portal will offer to rerun on demand searches on the content according to that profile. Besides, the portal automatically deduces implicit interest profiles from user behaviour. Users would be presented with individual **recommendations** assessed to match his/her interests but which the user has not accessed so far. The underlying user tracking is further exploited for **most-viewed-charts**. The portal advises users of **similar content** determined by means of full-text analysis. Various tools encourage users to contribute and help building an active community. **5-star rating** allows users to express their appraisal of training material and courses based on their individual subjective or objective assessment criteria. With **commenting**, users can publicly express their thoughts on single items of content. In case of controversial opinions, subsequent comments can mushroom into a chat conversation. **Sharing** and **tell-a-friend** support users in spreading the word, informing their acquaintances about interesting content on the Online Training Portal through social networks and by email messages. **Tagging** enables users to classify content along their individual terms not predetermined by taxonomy.

The online services will be designed and set-up by WP42 (Task 4240) and WP43 (Task 4350) in close collaboration, integrated with the APA/APARSEN/prospective VCoE web site established by WP44 (Task 4430) and WP52 (Task 5220).

5.2 COLLECTION OF RESOURCES

The goal of D42.1 is to identify and to collect information about existing initiatives and curricula related to formal qualifications. However, constraints apply on the process of collecting resources. Specifically, the intellectual property rights associated with the analyzed resources remain with their respective owners/institutions. Access criteria to specific curricula/courses vary accordingly.

Building on the analysis described in *Chapter 4*, Task 4220 will elaborate on the specification of courses and curricula for Digital Preservation in selected disciplines. And the identified resources will be further analyzed as part of Task 4230 for proving its relevance and consistency regarding format, content and coverage within the APARSEN context. As the information available online is limited/restricted, this will be done by getting into direct contact with relevant stakeholders in a constructive dialogue (Task 4240). The VCoE vision (WP11 Common Vision) will provide a clearly defined coherent approach which provides coverage and quality control and also acts as an incentive for collaboration with APARSEN; a corresponding sustainability/business plan is required for persuading owners to surrender their content. If negotiations are not successful or specific course material is simply not available in the required form a decision will have to be taken w.r.t. development/preparation within APARSEN and its constituting work packages.

Online resources such as the nestor e-Tutorials⁷ and (project-specific) training videos⁸ and (project-specific) training videos⁹ were created within a specific context with specific target audiences and learning objectives. Hence, their general applicability as supporting material for formal qualifications will be assessed after the APARSEN curricula/courses have been developed.

⁷ <https://moodle.hu-berlin.de/course/search.php?search=nestor>, http://nestor.sub.uni-goettingen.de/education/nestor_e-Tutorials.pdf

⁸ e.g., cf. http://nestor.sub.uni-goettingen.de/education/nestor_e-Tutorials.pdf

⁹ e.g., cf. <http://www.alliancepermanentaccess.org/index.php/training/training-materials/>

5.3 RESOURCE REGISTER MAINTENANCE

In order to continually provide a service of value, the register of qualification and training offers must feature accurate and up-to-date data. This requires permanent maintenance. A Virtual Centre of Excellence (VCoE) will support the sustainable maintenance processes. Four approaches come into mind: Central maintenance, maintenance by network, maintenance by community, and maintenance by provider.

- **Central maintenance:** The VCoE invests own resources for cleansing and updating the register data. This may include subcontracting.
- **Maintenance by network:** As a network of stakeholders in Digital Preservation the VCoE delegates the maintenance task to its members.
- **Maintenance by community:** Any volunteer may contribute to updating and inserting register data.
- **Maintenance by provider:** Institutions and companies running academia/ Higher Education curricula and offering Continuing Professional Education programmes insert and update their respective offer.

All approaches have advantages and drawbacks with respect to costs, control, coverage, and quality. Generally speaking, the costs borne by the VCoE and the control over regular and timely execution of the process can be assumed to decrease from the first to the third approach as listed above. The inner two approaches presumably achieve best geographical, language, topic, and application domain coverage. Quality accomplishments in terms of objectivity may vary, as stakeholders involved in the maintenance process may be biased. All approaches except central maintenance elicit and accommodate contributions from outside the project.

The VCoE will establish editorial or review processes in order to ensure data quality and to generate trust. In case the maintenance is delegated to VCoE member organisations or qualification and training providers, the VCoE may introduce electronic data exchange interfaces for automatic synchronization with extant databases.

With the data collated during the survey work, the VCoE is in possession of training and qualification provider contacts, which allows for directly addressing these organisations. As a result of the further research, networking and spreading excellence work in the project, APARSEN is connected to a varied spectrum of stakeholders active in Digital Preservation. In order to get to a good coverage on the qualification and training offers all over Europe, maintenance procedures should try to activate the entire community for the task.

Regarding all these considerations, sustainable procedures for continuing maintenance of the register of qualification and training offers have been designed. In essence, they follow the maintenance by network approach for submission of contributions from outside the project and apply a review in order to assure data quality. Regular calls in public or direct communication are supposed to activate the community.

Submission and review procedure: The VCoE seeks and accepts reports about training and qualification offers from the general public. Online forms on the Online Training Portal or, alternatively, on the VCoE web site allow for submission of new entries proposed to become enlisted in the register. Submission is open all the time. New proposals will be brought before appointed editors for review. Editors check the data for validity and may turn down proposals. Furthermore, editors are free to correct and, if appropriate, enhance data provided before a new entry is accepted into the register.

Network activation procedure: The VCoE will request contributions from its affiliated multiplier organisations. Regular updates covering the scope of the member organisation could be included in the VCoE membership terms and conditions.

Community activation procedure: In its regular public communication the VCoE will advertise its register of Digital Preservation curricula and courses in academia/Higher Education and Continuing Professional Education on Digital Preservation. Subscribers will be informed about the opportunity to contribute to the register through public submission forms.

Provider activation procedure: The VCoE will directly address known providers of training and qualification offers and suggest they make use of the register as a means of advertising their services. Preferably, these calls will be timed with the beginning of semesters, trimesters and other terms of universities, colleges and other educational schedules.

The maintenance procedures outlined above are at the draft rough-cut planning stage and are likely to undergo redesign before actual implementation. This is because of the interdependency with the VCoE business model development conducted in WP11 *Common Vision*. The concerted planning will determine relevant partners, target audiences and customers of the VCoE as well as its services offer. The design of the register maintenance procedures will be tailored towards resources available and adapted towards supporting the centre's business.

6 CONCLUSIONS

WP42 *Formal qualifications* aims at broadening the scope of Digital Preservation by leveraging the required skills and competence profiles within and beyond the library and information science community. However the relevant subject fields and application domains beyond library and information science which could profit from theory and practice of Digital Preservation or which could contribute to the conservation of digital assets, respectively, are difficult to define precisely. In principle it encompasses any discipline that creates, edits, brokers, transmits, or stores digital objects which includes much of the information society. Of course this Deliverable cannot in practice claim to provide comprehensive coverage of Digital Preservation curricula and course in academia/ Higher Education and Continuing Professional Education. The scope of the data captured so far is limited to education and training offers, most of which have been aimed at library and information science. Through reflection on single course units in Higher Education and on discrete courses in Continuing Professional Education, this Deliverable captures the offer open to students, researchers and practitioners in other disciplines.

6.1 MAIN INSIGHTS

Preservation viewed as a branch of library and information science looks back on a long tradition, compared to which digital long-term preservation is a rather young and specific discipline. Determining curricula and course in academia/Higher Education and Continuing Professional Education in Digital Preservation particular often is compromised by scarce information about the offer publicly available. As access to the associated course material often is restricted to enrolled participants, it does render the assessment of curricula and courses prior enrolment difficult at best.

Even where they exist, obtainable curricula, programmes and course descriptions are often short and mostly informal. The terminology used is non-uniform across individual offerings. Few generic keywords outline the subject matter at a high level of abstraction, rarely accompanied by more specific information about the breadth/extent in which the concepts behind those keywords are covered. Apart from language barriers, subjects overlap, and the meaning of single terms and statements in the descriptions depend on the respective course/curricula context. The few curricula which were deemed as admissible are inhomogeneous; every curriculum has its own focus areas and different modules which are defined by the organizational context they are offered within. In general, target audiences were not always clearly defined.

In order to attain an overview by topic as presented in the analysis (cf. Section 4), mappings onto the APARSEN topics Trust, Sustainability, Usability and Access and their respective sub-themes were conducted iteratively for calibration. However, many mappings remained necessarily subjective, thus they are biased by interpretations of the sparse information available.

Also administrative information on the offer frequently lacks structure. The audience addressed, the learning objectives and the prerequisites for attending the course are not always evident. It is notable that the survey on curricula, programmes and course descriptions did not reveal a commonly accepted pattern of competence profiles or position profiles in digital long-term preservation, respectively.

Because few offerings from other European countries exist, geographic take-up is dominated by UK and Germany. (cf. Section **Fehler! Verweisquelle konnte nicht gefunden werden.**). As the survey has been conducted within the APARSEN consortium, offerings outside the APARSEN representation might have been missed, e.g., for language reasons. Likewise, the most common languages offered are English and German.

Regarding course/curricula content, the coverage of the APARSEN topics is mixed. While, for instance, finding aids and metadata are deemed as relevant for many offerings, those themes are related to **Access** and thus not solely restricted to Digital Preservation. Regarding **Usability**, its constituent themes are most frequently found/mapped. Except for intelligibility, which might be due to the fact that the term itself is not commonly accepted and clearly specified within the DP community. Hence, it might be implicitly covered by other Usability themes such as context and semantics. **Trust** is mainly driven by provenance, audit and certification, and appraisal and selection criteria. While

processes and business cases have good coverage in **Sustainability**, the actual delimitation of these themes was difficult to assess. Brokerage services, on the other hand, were not covered explicitly in any of the analyzed resources. Either the corresponding issues are associated with other topics, or they are not deemed as relevant/mature enough for inclusion in formal qualifications.

6.2 RECOMMENDATIONS

The following recommendations regarding formal qualifications in Digital Preservation were derived from the insights above and in previous Sections. Their purpose is to stimulate discussions within and beyond the APARSEN project and to help pave the way for future activities which are coordinated through the APARSEN VCoE.

- Harmonization of terminology – There should be a shared, standardized vocabulary for the description of curricula and courses. Building on the APARSEN glossary, the core topics and themes, but also sectors and target audiences, should be harmonized, thus facilitating the assessment of contents and coverage.
- Structured descriptions of opportunities – The joint WP42/43 reporting form could be used as baseline template for structured capture of information about DP curricula and courses. This holds especially true for credits/qualifications earned, requirements, and learning objectives.
- Specification of competence profiles – From the analyses it appears that Digital Preservation as a discipline is lacking and generally accepted competence/job profiles for formal qualifications. Hence it is necessary to clearly define the market impact within specific sectors of the qualifications obtained.

The implementation of the above recommendations might be informed by ongoing activities in related disciplines, such as the course and qualification descriptions within the *Linked Universities* initiative¹⁰.

- Design of curricula beyond library/information science communities – While Digital Preservation is established within library/information science communities there was little evidence about DP subjects being taught in other, related scientific and professional disciplines. To further broaden the scope of formal qualifications in Digital Preservation, as prescribed by the DoW, curricula for other disciplines should be developed.
- Establishment of cooperative dialogue between stakeholders – To overcome fragmentation and harmonize the description of offerings an open dialogue with stakeholders from within (and outside) the EC needs to be established. Besides contacting the providers of the courses/curricula analyzed, synergies with related initiatives such as the International Curation Education (ICE) Forum¹¹, or the PrePARE Project¹² should be exploited.
- Setup of registry for formal qualification opportunities – Specific descriptions of curricula and courses should be freely available and accessible online. The APARSEN VCoE should be the one-stop shop for information about existing courses and curricula. This would require the delivery of required information (see above) by the providers of formal qualification opportunities.

The above dialogue and its consecutive actions might be coordinated via the APARSEN VCoE, but also supported events organized through WP41 External workshops, symposia and events. Such a dialogue would comprise discussions about admissible online material which might be made available by/brokered through the APARSEN VCoE.

¹⁰ <http://linkeduniversities.org/lu/index.php/vocabularies/>

¹¹ <http://www.jisc.ac.uk/whatwedo/programmes/preservation/iceforum>

¹² <http://www.lib.cam.ac.uk/preservation/prepare/index.html>

- Expand course offerings – There is potential in all four APARSEN topics to expand offerings which are supported by APARSEN RTD work packages. Such offerings, however, need to be embedded into existing/newly defined curricula in a meaningful way, which comprises the adequate coverage of topics and themes, but also the provision of corresponding formal qualifications and/or certificates. Besides contacting the providers of the courses/curricula analyzed, synergies with related initiatives such as the International Curation Education (ICE) Forum, the development of the ANADP II¹³ catalogue of education of training opportunities, or the PrePARE Project should be exploited.
- Re-examine descriptions of APARSEN RTD issues – While many of the RTD issues addressed by APARSEN are addressed within (some of) the available courses and curricula, little evidence about the coverage of some issues could be found. The reasons for the lack of coverage need to be investigated by the respective RTD work packages. This would require the delivery and maintenance of required information (see above) by the providers of formal qualification opportunities. New offerings such as the planned "Digital Archives" master's degree of the National Superior School for Information Sciences¹⁴ and Librarianship or the new "Masters in Digital Curation" at Aberystwyth University¹⁵ which fell outside the enquiry period for this deliverable will then be represented online.

6.3 DISCUSSION

The problems related to the sparseness of information available, inconsistent structures and terminology encountered in the preparation of this Deliverable are likely to also affect interested parties who wish to obtain an overview of relevant offerings matching their diverse interests/preferences and profiles. Hence, a target-oriented assessment of formal qualification opportunities matching given backgrounds/goals is difficult at best.

The dataset which was analyzed is not comprehensive, but depicts a snapshot of the current European landscape in formal qualifications in Digital Preservation as perceived by APARSEN. The derived insights correspond to observations rather than formally derived and statistically quantifiable claims, as the resulting set of admissible, usable data was unexpectedly small. But even within this dataset, the heterogeneity and non-uniformity of the curricula and course descriptions posed significant challenges, rendering the mappings, their calibrations and consecutive analyses extremely complicated and time-consuming.

The observed imbalance in the current provisioning w.r.t. geographical take-up and supported languages might have been caused by the bias imposed through the APARSEN consortium structure, i.e. formal qualification opportunities in countries/languages not represented in the project were not ascertained yet. As a resource register is to be set up as part of the APARSEN VCoE (cf. Section 5), missed opportunities can be added later and made available online. Likewise, the information collected so far can be harmonized, extended and updated according to pre-defined procedures which are described in Section 5.3.

Even though its focus appears to be on (accredited) training rather than formal qualifications, the recommended areas for alignment depicted in the essay "Education Alignment" in the Educopia report "Aligning National Approaches to Digital Preservation" [Davidson, J., et al (2012), pages 269-308] are largely consistent with the main insights and recommendations of this Deliverable. This was to be expected, as WP42 Formal qualifications and WP43 Training courses are complementing each other, exhibiting a significant degree of synergies throughout the course of APARSEN. Higher Education

¹³ <http://www.educopia.org/events/ANADPII>

¹⁴ http://netpreserve.org/sites/default/files/resources/MastersDegreeBnF_IIPCGA.pdf

¹⁵ <http://www.aber.ac.uk/en/postgrad/postgraduate-courses/taughtcourses/infostudies/digital-curation-masters/>

issues have also been partially addressed in the DPE Deliverable Outline of training principles and objectives [DigitalPreservationEurope (2007), Section II pages 20-26], however the discussion was restricted to brief descriptions of the Bologna and Copenhagen processes.

6.4 NEXT STEPS

- Setup of resource register and corresponding management functions/procedures
- Consolidation of the APARSEN glossary
- Establishment of a cooperative dialogue with stakeholders, starting with request to check/correct the data about their offerings
- Broadening the scope to non-European initiatives
- Design of curricula for selected disciplines
- Reflection on course content with relevant RTD work packages

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