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INTELECTUAL OUTPUT O5 –

Policy Recommendations for the Harmonization of the Entry Requirements and Learning Outcomes in Information Science in Europe

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1. Introduction

This document is an attempt to shape recommendations regarding harmonization of entry requirements and learning outcomes for European higher education programmes in Information Science. Its base is the Erasmus+ project EINFOSE (European Information Science Education: Encouraging Mobility and Learning Outcomes Harmonization)[1], which had eight partners from the EU (Filozofski fakultet, Sveučilište u Osijeku, Croatia; Högskolan i Borås, Sweden; Stiftung Universität Hildesheim, Germany; Universität Graz, Austria; Univerza v Ljubljani, Slovenia; Universitá di Pisa, Italia; Universitat de Barcelona, Spain; and Hacettepe Universitezi, Turkey).

One of the project goals was aimed at trying to look for common grounds upon which Information Science in Europe builds its identity, leading to base for higher education and consequent job-market for Information Science graduates, and use these to shape policy recommendations for harmonization of entry requirements and learning outcomes. The other goal was to strengthen networking between European Information Science departments, Higher Education Institutions (HEIs) and ICT companies as well as the decision-making bodies. The motivation was also to look for the best ways to attract BA students from different and varied academic backgrounds to enroll in Information Science master programmes, the reasons being that today's educational systems and job markets are in need of information specialists in every field and discipline.

The recommendations also stem from the experience, teachers, students and relevant stakeholders' comments and suggestions during transnational project meeting and multiplier events as well as the follow up online discussions. It was expected that the document, based upon agreed learning outcomes at Graduate level, might help in reaching consistent level of recognition and implementation entry requirements not only for the IS programs at graduate level but serve as a model for other academic disciplines

From the project proposal:

> „The commonly accepted entry requirements based upon basic learning outcomes and the introduction of innovative teaching methods could motivate students, improve teaching and strengthen the network of HEIs in the IS field. The agreement upon a basic core content that will prepare students for the enrolment at graduate level would make the recognition process easier. Furthermore, it would also enable students to specialize in certain topics (such as digital humanities, scholarly communication, big data, information economy, sociology of media, etc) at that HEI that has experts on these topics.
>
> European HEIs in IS should strive to improve learning and teaching and build up a strong partnership network to be able to support and take an active part in the implementation of the goals of the 2013 Communication on Opening Up Education. Starting from the idea that "Europe will only resume growth through higher productivity and the supply of highly skilled workers" (http://ec.europa.eu/education/news/rethinking_en.htm) we look at Information Science and Computer Science departments as an important vehicle to prepare new generations of students and as a provider of ICT and Information Literacy related content and guidelines easily available to all students interested in improving their knowledge and mastering new ICT skills. This especially relates to the entry requirements for the enrolment at graduate level programs in IS and high quality OERs and digital communication channels between students/teachers and between teachers from partner HEIs. An open and innovative approach to education embedded in the digital environment should lead towards

[1] http://einfose.ffos.hr/

the reform of IS education at 8 partner universities that intend to map out policy recommendations applicable to other HEIs, based upon experience from all phases of EINFOSE project. New approaches, especially those related to the enhancement of digital integration in learning and teaching, could contribute to the higher quality of offered programs in order to assure the best teaching methods and platforms, thus revealing the relevance of IS education in a changing digital environment.

On a general level, the project will result in growing awareness of the interdisciplinary nature of the IS field and its valuable contribution to the design and delivery of digital knowledge and skills for other graduate programs at HEIs, especially for STEM students, by offering a social and humanistic view upon the changing society as well as for students who need more attention in the process of their inclusion in society by preparing guidelines for librarians and information officers on immigrant information service, information service for disabled students etc.

This document will include all the relevant suggestions for improvement and it should offer a set of recommendations for EUCLID, Eblida, ASIST/EC and other professional and scientific bodies involved in the matters of the IS field as well as to EU respected bodies that work on QF and Recognition of Qualifications. It is expected that partners will propose the ways and modes of harmonization of the entry requirements that will allow students to enter the graduate programs in IS well prepared and to make their mobility activities at the graduate level much easier.

After acceptance of the recommendations the proposal will be sent to the European Higher Education Area (AHEA) which has a task to ensure more comparable, compatible and coherent systems of higher education in Europe."

The following draft recommendations for the harmonization of the entry requirements and learning outcomes in Information Science are thus based on several foundations:

- professional literature;
- findings of an initial (unpublished) analysis of the Masters programme of EINFOSE partners, done in 2016 by Maja Krtalić (team member from Osijek);
- findings of a simple analysis of the Masters programmes of EINFOSE partners, presented in draft form at the Multiplier Event and more thoroughly at FEIS conference in Pisa (Vilar & Žumer, 2018), updated with certain clarifications from the project partners;
- discussions at the Multiplier Event in Ljubljana in April, 2018, titled "Policy recommendations for the harmonization of the entry requirements and learning outcomes in Information Science";
- presentations and discussions at FEIS conference in Pisa 2018;
- formal and informal collegial discussions preceding and following all these events;
- initial comments received from project partners and other academic colleagues;
- discussions and topics presented at the two European Summer Schools in Information Science in 2017 and 2018;
- content of the EINFOSE project proposal.

The text gives an overview of the issues that Information Science was found to be faced with and tries to give some solutions and recommendations. It is divided into five parts:

1. The identity of Information Science
2. Information Science education (contents, criteria and competences)
3. Information Science entry requirements and expected learning goals
4. Information Science job market
5. Overall recommendations

Before going into the discussions on these five areas, we present, in short, the framework, content and goals of the mentioned Multiplier Event in Ljubljana, as it contributed greatly to the work on these recommendations.

1.1. Multiplier Event "Policy Recommendations for the Harmonization of the Entry Requirements and Learning Outcomes in Information Science" (Ljubljana, April 2018)

This Multiplier Event served as an introductory activity within the preparation of these requirements. It was organized with several goals:

- To obtain insights and opinions regarding Information Science study programmes entry requirements, learning outcomes, target job market segments, etc. from EINFOSE partners, employers, teachers, students, experts in the field, as well as Information Science experts from countries other than those participating in EINFOSE project (eg. UK, Hungary, Bosnia and Herzegovina).
- To share preliminary empirical findings regarding the contents of study programmes of EINFOSE partners (entry requirements, learning outcomes);
- To obtain information on some other relevant study programmes (eg. Zadar University, London City University);

At this two-day event seven papers were presented and two round tables were organized, all pertaining to various aspects of education in the field of Information Science in Europe: competences, study programmes content and goals, job-market perceptions etc. Guests in the audience were a mixture of employers, teachers, researchers, students, advisory experts, information professionals of various fields of expertise. The invited speakers (outside EINFOSE) were:

- Andrew Whitworth, University of Manchester;
- Lyn Robinson, City University, London;
- Franjo Pehar and Krešimir Zauder, University of Zadar.

On Day 1 Tatjana Aparac Jelušić spoke about project EINFOSE, Drew Whitworth presented his thoughts on future information competences, Franjo Pehar and Krešimir Zauder provided insight into curricula and employment situation in Croatia while Jan Pisanski presented experience from Ljubljana study programme reaccreditation activities. Day 2 started with Lyn Robinson's presentation on competences and employment situation in UK, then Polona Vilar presented preliminary analysis of IS programmes entry requirements and Alen Doracic spoke about competences and employment situation in Sweden.

Participants at the two round tables were (institution / expertise /area in brackets):

1. Round table on Information Science job market: moderator Polona Vilar; participants: Romana Fekonja (Institute of Education / school libraries advisor); Christian Schlögl (University of Graz / teacher); Franjo Pehar (University of Zadar / teacher); Simona Resman (City Library, Ljubljana, Slovenia / head of development unit); and Miro Pušnik (Central Technical Library Ljubljana / director).
2. Round table on Information Science competences: moderator Jan Pisanski: participants: Lyn Robinson (City University, London / teacher); Dejana Golenko (Law Faculty, Rijeka, Croatia / head librarian); Thomas Mandl (University of Hildesheim / teacher); Davor Šoštarič (Institute of Information Science, Slovenia / former director).

Due to their direct relevance to these recommendations, the relevant contents of the Multiplier Event discussions and presentations are presented at adequate sections of the recommendations.

2. The identity of Information Science

The question of education for Information Science is undoubtedly also a question of the identity of the discipline, its relations and overlaps with Library Science, Computer Science, Digital Humanities, Information Management, Language Processing (and some other areas). These identity issues also have a strong influence on the education in the field. While there is no doubt that it is possible to draw parallels between Information Science (IS), Library Science (LS), Library and Information Science (LIS) etc., there does not seem to exist a consensus on what the differences and similarities are, or where boundaries should be drawn.

The identity of information science should be understood in the context of a merging of three separate traditions: library science, documentation science and information science. Recently some new areas have been influencing the directions in which IS is developing – heritage sciences, domain related information, artificial intelligence, to name just few of them.

Libraries and librarianship are almost as old as writing itself. Practices of ordering and cataloguing texts as well as helping people find appropriate reading materials have been refined within numerous cultures worldwide during thousands of years. Similarly, the formation of departments for educating librarians has a long and complex history. Development of research-based academic professional education has been uneven globally. Some of the important sources to development of library and information science and information science are Belkin (1978), Capurro (1992), Vakkari (1994), Rayward (1996), Buckland and Liu (1998), Saracevic (1999), Rayward (2004), Tuomaala, Järvelin and Vakkari (2014) and Hjørland (2017).

Dewey's (1876) publication of the first advanced classification and subject index is a landmark in the development of library science. The Dewey decimal classification system remains to this day the ordering tool of choice for most academic libraries. Researchers in what is now called library and information science have grappled with problems spanning traditional faculty boundaries between the humanities, social science and technological research.

Dewey can be credited with starting the first formal educational institution in 1887. Curiously, the label established at the time was Library economy. During the following decades, numerous schools of library economy were established. The alternative term of Library Science was introduced by the Chicago Graduate School in 1926. This label quickly gained recognition and at the end of the first half of the 20 century, schools of library economy had by and large shifted to library science.

Deweys classification system was also influential within documentation science which, otherwise, had strong roots in Europe. Belgian lawyers Otley and La Fontaine, with their most notable contributions in the early 20th century, can be seen as founding fathers of this tradition. Although documentation science has remained in some use within Francophone countries, it has otherwise been merged with information science. Crucially, The American Document Institute renamed itself the American Association for Information Science in 1968 (later, Technology was added and acronym has been known as ASIST). This remains the most

influential organization for IS/LIS scholars worldwide, recently changing the name into Association for Information Science and Technology, keeping the same acronym).

Information science itself developed as a tradition in close proximity with advancement of computing. Most notably Bush (1945) emphasized the technological challenges of finding relevant information in the context of escalating information production. Information science first appeared as a formal institutional entity in the mid-1950s (Bawden and Robinson, 2013). Much of this foreshadowed and, indeed, inspired innovations of the Internet and the World Wide Web.

In the 1960s, many existing departments of information science and library science merged into the new entity of Library and Information Science (LIS). New departments established thereafter in different countries started off with that label. At the same time, several older departments, particularly in the United States, retained the label of Information Science. Some Library and Information Science schools have since the 1990s dropped “library”, rebranding themselves simply as information science or information studies or as an information school (or iSchool). There have even been cases, for instance the Royal School of Library and Information Science in Copenhagen, which have gone full circle, re-adopting the library word.

As Information Science developed over time it came to broadly include sophisticated perspectives from psychology, education and sociology (the user) as well as technological, mathematical, philosophical and semantic perspectives for understanding the ordering of documents. Information Science can today be seen as very broad, covering the whole domains of Library Science, Documentation Science, Information Science, Archival Studies and even Museology. Researchers active within schools marked up with different labels such as information science, information studies, information and communication studies and information school work within the same research domain as those situated within Library and Information Science schools. There is also a discussion in the research community about the conception of the field raising the question if there is a Information Science or Information Sciences in the plural (Sonnenwald, 2016).

In her presentation at Ljubljana Multiplier Event, Robinson (2018) has emphasized that Library and Information Science, whether looked at as a single discipline or as two separate fields, is the discipline which takes care of the record of humankind, meaningful, well formed, semantic information, mostly instantiated as documents in some form. It studies the processes of the information communication chain (creation, organisation, dissemination, discovery, management, preservation, analysis, use, understanding), and the interactions between them. According to Bawden and Robinson (2013), Information Science overlaps with numerous other disciplines with interest in studying communication process in which information is the main focus. Its unique character is in the fact that it tackles the entire communication chain with all its aspects and the interactions between these aspects. Differences or similaties between Information Science and other sciences have been often pointed out and discussed in the literature as for instance concering the difference between Information Science and Computer Science. Although much information is available, the study of information is not identical with the study of computers, information technology or

communication technology. While core topic in Computer Science is interaction between humans and computers in the case of Information Science it is the interaction between people between and the whole information ecology (Hjørland 2013).

Information is perhaps the most important concept within information science. Nonetheless, it is a broad and daunting notion. Everything spoken or written as well as the nuances of body language can be labeled with this broad concept. The concept can also be applied even more broadly. All bodily functions, ecological and planetary systems, any movement of anything in the universe can be seen as information.

Information scientists have always struggled with the potential totality of the core concept of their domain (Machlup & Mansfield, 1983). It has therefore been difficult to define information and supply demarcations for Information Science. Many attempts at understanding what information is for the information scientist have ended up with lists of what can be done with it, i.e. producing, storing, indexing, managing, distributing etc.

Given such problems with the concept of information, it is perhaps not surprising that some researchers have turned back to the concept of document. Frohmann (2009) suggested that documents simply are more informing that information, inviting researchers in the field to back away from the boundless complexities of the information-concept, returning, instead, to the more manageable "document". Several researchers have since then found such a conceptual shift useful. Nonetheless, for most of those active within Information Science, information remains the core concept and the open ended character of that concept is seen as a resource, not as a disadvantage. In that sense, "information" has the same position within information science as "social" for the sociologist or "learning" for the educational scholar. Such broad terms allow for the development of numerous traditions that can coexist while upholding separate understandings of the same umbrella concept.

Information scientists have had a century long monopoly on research on indexing, cataloging and information search. However, with the launch of the World Wide Web in 1991 issues regarding information search became of everyday concern for just about everyone. The early search engines such as Yahoo!, GoTo and Altavista built upon established notions of library research (Weinberger, 2007). This involved adoption of the physical notion that each individual document could only be filed away within one subject category. However, with the coming of the digital, individual documents could be situated within numerous subject categories simultaneously and such possibilities created a wealth of opportunities for rethinking metadata, indexing and cataloging.

Brin and Page (1998) revolutionized search forever by actually taking the tools of one area of Information Science (Bibliometrics) and using that for another area (Information Retrieval – IR). The result was the search engine Google which made ranking of relevant documents a matter of popularity, i.e. one in-link is equal one vote. At the time, this meant a search engine that only dealt with subject relevance, ignoring issues of user relevance. However, during the 2000s Google would increasingly concern itself with user profiling and an ambition to personalize services (Fuchs, 2012).

As information search as well as other traditional Information Science areas became linked to the marketing economy, mass media and numerous policy areas, researchers within marketing, political science, media and communication studies, computer science and informatics became interested in research questions that previously only Information Science had been concerned with. This created numerous discussions regarding disciplinary identity (Åström 2007, 2010; Nolin & Åström, 2010; Milojević, et al, 2011; Pilerot, 2012). This has also meant that many departments have profiled themselves in various ways.

Impression of a fragmented Information Science field, competition from other fields and strong convergent movement is given much attention in the research literature and has prompted voices about crisis in Information Science (Bawden 2015, Madsen 2016, Sonnenwald 2016). Convergence issues as a basis for the understanding of the relationship between several IS and other disciplines such as communication, semantics, cognitive sciences etc, as well as the theoretical boundaries of the IS in relation to the disciplinary traditions of librarianship, documentation, archival, and museology studies could shed light on the unifying principles of information disciplines and fields of practice that might provide a new framework for disciplinary theory (Aparac-Jelušić, 2014).

However, Nolin and Åström suggested what is commonly perceived as a weakness, the multidimensional character of the field and the fragmentation, can be translated into a strategic resource, by turning it to a strength (2010). The notion of weak discipline has also been challenged to be a myth driven of the ideal of a unitary discipline with the strong boundries (Madsen 2016).

Many Information Science schools have in recent years merged with other departments/disciplines locally, thereby creating a larger critical mass and a specialized area. This can involve a stronger focus on information management and collaboration with business oriented research or other type of merger with schools focusing on computer science or informatics. However, in those cases key concepts “library” and “information” disappeared as institutional markings.

The diversity of such mergers appears challenging for the identity of the international field of Information Science. Ideally, this would lead to increased quality in teaching and research as developments within various branches within the humanities, social sciences and technological research tend to be quickly picked up and discussed within the dedicated conferences and journals of Information Science. This is a field that together with informatics and computer sciences, is a vital actor in the scholarly investigation of the digital transformation that broadly impact every sector in society.

3. Information Science education (contents, criteria and competences)

It should be stressed that defining the information profession and information competences is a difficult task. Buckland (2004) discussed educational programmes in LIS (and documentation) as being specific due to their interdisciplinarity and orientation towards people, knowledge instead of technology. Information Science programmes are even more specific because, not unlike other fields, they wish to attract graduates from other fields, thus emphasizing the applicative nature of Information Science to specific disciplines. For example, Abell & Oxbrow (2006) argue how important information and its management are in the success of any organization, and how information professionals possess just the right skills to successfully do these jobs. Also Blankson-Hemans and Hibberd (2004) mention the specific skills needed by information professionals in the special or corporate libraries of the private sector. Therefore, it is very important to have in mind the entry requirements for these educational programmes. Gerolimos (2008, p. 536) has identified some specific skills that seem to go beyond "traditional" library skills and are found in many curricula. According to him, a curriculum with a combination of courses from traditional and digital environments should offer students suitable qualifications for professional work in modern hybrid environment of a typical library, all the more if accompanied by generic and social skills, leadership skills and understanding of ethical issues that are gaining importance. In terms of generic skills, Marchionini and Moran (2012) report on new relevant skills: entrepreneurship, risk-taking etc., that accompany the interpersonal and communication skills.

Gerolimos (2008, p. 530) writes that

> "One major change of the past two decades affecting the structure of modern LIS courses is the, so called, "I-School movement". (…) Following this "movement", many traditional library schools have changed their titles from "library" to "information", preferring some more generic terms to name themselves, like "school of information", and their courses have been renamed "information studies".

Marchionini and Moran (2012, p. iii) add on this:

> "Some of these schools were created specifically to address information education, some were created by merging existing departments (e.g., computer science and media studies), some are aggregations of faculty and courses from the entire gamut of academic departments, but most adapted from roots in education for librarianship. Regardless of their origins, i-Schools around the globe are evolving rapidly."

A review of the landscape of the education in Library and Information Science in the first decade of the 21st century (Chu, 2010) identified great changes to the field essentially because of the quick development of digital technologies. As a result, new subjects such as digital libraries, knowledge management, and information architecture had been added to the curricula. Jank et al. (2013) identified several patterns in terms of mergers, collaborations, alliances, and partnerships in Information Science education. Beyond a slow but continual trend of schools being absorbed into other academic departments and programs, there was also a trend in the transition of LIS programs to i-School status. As a result, an international flavor within the i-School movement emerged with an increasing number of members from throughout the world joining the movement.

Although some analyses show that LIS programmes seem to be linked and interrelated (see for example Južnič and Badovinac, 2005), an important issue is internationalization which seems to be going slower than one would want (see for example Gerolimos, 2008; Virkus,

2007, 2008; Kajberg, 2004; Abdullahi and Kajberg, 2004). As Kajberg (2004) writes, internationalization and mobility encouragement has been the focus of many LIS schools, but some steps still need to be taken, as some obstacles hamper this process and the pace of this internationalism European LIS education appears somewhat uneven. An analysis of current situation within Europe (Borrego, 2015) has shown lack of common approach to LIS education and a very low level of activity in domestic or international partnerships. Most undergraduate degrees combine a grounding in general culture with courses in technology, languages and practical training. In many cases there are no clear differences between undergraduate and graduate programmes; the programmes have similar names and no target audiences are specified. In addition to the general postgraduate degrees in librarianship and archive studies, most programmes revolve around digital curation, business information services and data analytics.

However, the effects of the digitization in the society is challenging library and information's professionals and IS/LIS programs since they have to demonstrate special qualifications for the services within terms of differently trained professionals. Doracic (2018) pointed out during his speech in Ljubljana increase of employment of other professions such as for instance computer specialists at the academic libraries in Sweden. The similar trend has been evident in Denmark (Hjørland, 2013). This development raises questions concerning the content of the IS/LIS programs but also as opportunity to develop arias of teaching and research within IS/LIS.

In recent white paper of the IFLA BSLISE Working Group (2018, p. 2), "the following key findings were identified from the data analysis:

1. A formal undergraduate or graduate degree is required in many countries; however, there is no correspondence/equivalence among degrees; for many programs, there is no international or recognized standard against which they can be benchmarked for transferability or reciprocity.
2. Certification is required in many responding countries; these are local certifications that are not internationally recognized, that is, there is no correspondence/ equivalence among certifications; hence, reciprocity becomes an issue, and the local certification practices do not have an international or recognized standard for Quality Assurance (QA).
3. Many countries have formal local structures/systems for QA (i.e., governmental or higher education accrediting body; professional association; professional charter/ council/union, etc.), or regulatory mechanisms; however, other countries may have none.
4. Different LIS professional qualification structures are in place; however, there is insufficient international knowledge about them and they may not always be recognized or understood.
5. Most responses from around the world indicate that certification is not needed for the broader LIS field. In Europe, the situation is mixed.

6. The library field and the broader LIS field may have been, at one time, understood as separate disciplines; however, the evolving nature of librarianship has blurred the boundaries in terms of scopes of practice, skills, and knowledge."

IFLA BSLISE working group thus shaped some key recommendations regarding LIS education (2018, p. 2):

1. Identify core and other competencies for transferability and reciprocity.
2. Develop an international framework for the assessment of quality standards in LIS education.
3. Create a local structure where there is none, building on local strengths.
4. Develop an international resource that identifies local structures.
5. Develop a "system" of qualification/accreditation inclusive of the areas in the broader LIS field.
6. Define and understand what the broader LIS field means and its implications for LIS education and professional development.

In his speech at the Multiplier Event in Ljubljana, Doracic (2018) presented the areas and competences relevant for the library and information field now and in the future (DIK 2011). These are a mix of professional, personal and core competences. Skills relevant for the future seem to revolve around:

- digitization (knowing technology, understand systems, create and manage metadata, know law and license negotiation),
- reading (support and develop reading and writing skills linked to different types of media forms, know reading methodology, language, disability and outreach activities),
- scholary communication (know about science and research data, publishing, information practices, journal and monograph management, bibliometrics, digital preservation and accessibility, law and license negotiation),
- participatory culture (digital technology and media, source criticism, communication, pedagogy, creativity (entrepreneurship), marketing, management, outreach and contact-creating activities),
- pedagogical activities (virtual and physical learning environments, source criticism, law, learning styles, teaching methods, knowledge sharing and outreach activities),
- marketing (internet and social media, law, press, presentation techniques, text writing, visual presentation),
- academic competence (employment flexible adaptations, leadership, meta competence and meta-perspective, ie. ability for learning skills development, management of different perspectives on the business as well as dialogue and opinion skills, ability to create meaning in a variety of values and understanding),
- intercultural and multilanguage skills.

Similarly, a symposium on the future of information professionals at University of North Carolina (Marchionini & Moran, 2012) also identified some crucial future personal competences of people in information professions, regardless of the type of institution they might be working for: communication skills (communication, listening and understanding), agility and flexibility, and, skills not often mentioned, but considered very important: preparedness for risk-taking, entrepreneurship, embracing change as the perpetual driver.

Among the desired competences Marchionini and Moran (2012) propose creative and adaptive thinking, cooperative problem solving, compassion and mutual respect, and devotion to learning and knowledge stewardship. Educational programmes should foster these competences. Besides, they also advocate for common and specific values that should be pursued in the educational programmes, because they are integral part of the identity of the profession as well as the basis for quality services:

1. Common values: excellence, creativity, curiosity, and passion for learning.
2. Values derived from Library Science: Organization of information, Universal access, Collaboration, Intellectual freedom, Self-directed learning, Stewardship.

But, as warned by Marchinini and Moran (2012), some of these values may come into conflict with the for-profit nature of many of the organizations where the graduates will find positions. They argue that these values are so critical to the professional identity that they need to stay a part of the professional preparation of every graduate and that they distinguish information professions from other disciplines. Building on hese values provides another basis upon which to investigate and build educational programs.

Central to the triad *people-information-technology* is the entire information life cycle and the ways that people and technology participate in this cycle. These core values dictate the learning and teaching actions people apply to their information lives because they also determine what policies and systems we develop and apply and what costs and constraints we are willing to bear. Traditional librarianship focused most heavily on stewardship of extant information and today's information programs have broadened this mandate to the full information life cycle that includes generation, management, transmission, use/reuse, and preservation, where the following values are important:

- In partnerships, information professionals place value on accurately-represented and well organized information serves information production teams well.
- Information professionals value universal access thus cerating powerful and adaptable indexes, ontologies, and because they value stewardship, they worry about cost-effective but sustainable data structures.
- Information professionals value universal access and self-directed learning, and advocate open access publishing and easy-to-use access systems.
- Information professionals value collaboration and learning, and are willing to go beyond simply delivering information to helping people apply it.
- Information professionals value access and stewardship, they know that these go hand in hand and that substantial context must be included if information is to be useful in the future.

The project EINFOSE draws attention to the set of competencies IS HEIs must ensure in order to achieve the desired level of harmonisation and internationalisation of their students. Various professional institutions define core competencies in the field of Library and Information Science (e.g. Library and Information Association of New Zealand Aotearoa LIANZA, 2012; American Library Association ALA, 2009; Special Libraries Association SLA, 2016; Australian Library and Information Association ALIA, 2014; Chartered Institute of

Library and Information Professionals CILIP, 2013). Next to those general set of competencies there are also numerous special competencies defined for sub-fields within LIS. Those are, for instance, data management (Confederation of Open Access Repositories COAR, 2012), information, document and records management field (Government of Newfoundland and Labrador, 2009; also, Records and Information Management Core Competencies, 2017)[2].

In addition to those competencies IS HEIs must also take into account the qualifications frameworks that are defined by administration at national and/or international level (e.g. International Standard Classification of Occupations – ISCO; Statistical Classification of Economic Activities in the European Community – NACE; European Qualifications Framework – EQF; European Digital Competence Framework for Citizens – DigComp, etc.).

In the case of the EINFOSE project, the European Qualifications Framework (EQF) is of a particular significance. EQF is a translation device to make national qualifications more readable across Europe. The core of EQF are eight reference levels describing learning outcomes of each educational level. Those learning outcomes are divided into 'Knowledge', 'Skills', and 'Responsibility and Autonomy' (Descriptors, 2018). IS HE educators must design programmes that result with learning outcomes of levels 5th-8th.

Next to EQF, the project also emphasizes the importance of ESCO (European Skills, Competencies and Occupations) – a classification system covering skills, competencies, qualifications and occupations. Its goal is to make the European labour market more effective and enable the worlds of work and education/training to communicate more effectively. ESCO provides the description of occupations (e.g. Information and communications technology professionals), skills/competencies and qualifications and is linked to relevant international classifications and frameworks (e.g. ISCO, EQF). For the area of IS HEIs it is important to pay particular attention to reusability of skills obtained through LIS/IS education. According to ESCO, the skill reusability level refers to a wide range of applications for a certain knowledge, skill or competence (ESCO, 2018). Therefore, besides sector and occupation specific-skills, IS HEIs should give a special attention to the development of both transversal and cross-sectoral knowledge, skills, and competencies.

As it is well documented several competency indexes of information professionals exist – here we give only a few of more recent date:

- CILIP Professional Knowledge and Skills Base
- WebJunction Competency Index for the Library Field
- Competencies For Information Professionals Of The 21st Century
- SLA competencies for Information Professionals

They are mostly comprised of ethical, generic (sometimes called personal or enabling), and professional LIS (sometimes called 'core') competencies, in various constellations, in some

[2] For the exhaustive list of competency, knowledge, and skills profiles please go to Competencies for Information Professionals. Retrieved on September 26th, 2018 https://librarianship.ca/resources/competencies/.

we find separate technological competencies, while in others technological competencies are part of professional group.

CILIP Professional Knowledge and Skills Base (2013)[3]

- Ethics and values
- Generic skills
  - Leadership and advocacy
  - Strategy planning and management
  - Customer focus, service design and marketing
  - IT and communication
- Professional expertise
  - Organizing knowledge and information
  - Knowledge and information management.
  - Using and exploiting knowledge and information.
  - Research skills.
  - Information governance and compliance.
  - Records management and archiving.
  - Collection management and development.
  - Literacies and learning.

WebJunction Competency Index for the Library Field (2014)[4]

- Essential Library Competencies
  - Core Technology Competencies
  - Personal/Interpersonal Competencies
- Library Collection Competencies
  - Acquisition and Processing
  - Cataloging
  - Collection Development and Management
  - Digital Resources Technology
  - E-Resource Management
  - Preservation
- Library Management Competencies
  - Community Relations
  - Facilities
  - Financial Management
  - Laws, Policies and Procedures
  - Marketing and Public Relations
  - Organizational Leadership
  - Personnel Management
  - Project Management
  - Staff Training and Development
  - Strategic Planning

[3] https://www.cilip.org.uk/page/PKSB

[4] https://www.webjunction.org/documents/webjunction/Competency_Index_for_the_Library_Field.html

    - Trustees, Friends and Foundation
- Public Services Competencies
    - Adult and Older Adult Services
    - Children's Services
    - Circulation Services
    - Patron Training
    - Public Access Technology
    - Young Adult Services
- Technology Competencies: Systems and IT
    - All IT
    - Automation Systems
    - Enterprise Computing
    - Hardware
    - Networking and Security
    - Operating Systems
    - Public Access Technology
    - Server Administration
    - Software Applications
    - Technology Planning
    - Web Design and Development

Competencies For Information Professionals Of The 21st Century (2014)[5]

- Values and competencies
    - Core values: contributing to the knowledge base of the profession by sharing best practices and experiences, and continuing to learn about information products, services, and management practices throughout the career; commiting to professional excellence and ethics, and to the values and competencies of the profession
    - In addition: Accountability, Comptency, Confidentiality, Dependability, Ethical behavior, Fairness, Honesty, Integrity, Perseverance, Responsibility, Trustworthiness
- Professional Competencies
    - Creating and Maintaining Collaborative Relationships
    - Managing Information Resources and Information Services
    - Understanding and Applying Information Tools and Technologies
- Personal Competencies
    - Planning, prioritizing and focusing on what is critical, based on the strategic goals of the parent organization.
    - Being entrepreneurial and innovative in applying information services and skills.
    - Being adaptable, flexible, and able to transition into new roles and responsibilities to meet the changing needs of the organization.
    - Seeking out challenges and preparing for, and capitalizes on, new opportunities.
    - Actively listening and problem solving, and communicating effectively.

[5] http://infonista.com/wp-content/uploads/2014/05/Core-Competencies-Revisions-4-30-14-draft.pdf

- Negotiating confidently and persuasively.
- Developing active partnerships and alliances.
- Building an environment of mutual respect and trust; respects and values diversity.
- Developing interpersonal skills to influence and employing a team approach; recognizing the balance of collaborating, leading and supporting.
- Taking calculated risks; showing courage and tenacity when faced with opposition or competition.
- Embracing lifelong learning, demonstrates personal career planning and professional development and networking.
- Balancing work, family and community responsibilities.
- Celebrating achievements for self and others, acting as a mentor to nurture discovery.

SLA competencies for Information Professionals (2016)[6]

Core competencies

- Information and Knowledge Services – elements of this competency include the following:
  - Recognizing and articulating information and knowledge needs;
  - Analyzing information and knowledge flows relevant to the context of community characteristics and organizational goals;
  - Enabling the sharing of knowledge through interpersonal contacts and relationships as well as by using digital or electronic systems and processes;
  - Prioritizing information services to meet the organization's most critical operational or strategic needs;
  - Advocating for the effective use and management of information systems and processes;
  - Teaching, training, and developing information literacy and associated skills for stakeholders;
  - Using information management skills to learn about a domain, discipline or industry;
  - Applying subject domain knowledge to the work environment to support the organizational mission; and
  - Understanding the varied aspects of human information behavior.
- Information and Knowledge Systems and Technology – elements of this competency include the following:
  - Engaging multiple stakeholders to recommend the information architecture needed by the entire organization;
  - Selecting and implementing information and knowledge systems;
  - Selecting and using information management tools, such as library management systems, content management systems, social media platforms, and information retrieval and analysis tools;
  - Identifying systems and tools to meet requirements of specific communities;

[6] https://web.archive.org/web/20170321172834/http://www.sla.org:80/about-sla/competencies/.

- Designing interfaces for an intuitive user experience;
- Coding using appropriate scripting and other tools;
- Curating, publishing, and/or packaging information in usable formats; and
- Continuously evaluating information and knowledge systems and technologies.

– Information and Knowledge Resources – elements of this competency include the following:
  - Establishing a budget for resources and advocating for allocation of funds;
  - Aligning the strategy for managing information resources to support the strategic goals of the parent organization and community needs;
  - Systematically evaluating new or unfamiliar resources by applying analytical frameworks and methods;
  - Delivering authoritative information resources to meet the needs of a particular audience, cover a certain topic, field, or discipline, or serve a particular purpose;
  - Managing and delivering relevant resources of all types, media, and formats, including published and unpublished, internal to the organization as well as external, digital, textual, numeric, and visual;
  - Negotiating appropriate pricing and terms and conditions for the licensing or acquisition of information resources;
  - Continually analyzing the effectiveness of the portfolio of resources under management, making adjustments as needed to ensure relevancy and provide users with optimum decision-support content;
  - Identifying experts and sources of expertise and facilitating knowledge sharing within organizations;
  - Auditing and mapping information and knowledge assets available within the organization in order to advise users about resources relevant to various business activities; and
  - Teaching others to critically evaluate information and information sources.
– Information and Data Retrieval and Analysis – elements of this competency include the following:
  - Interviewing and consulting with community members to identify and clarify information and knowledge needs;
  - Developing sophisticated search and retrieval strategies to discover and retrieve information from varied systems and repositories;
  - Understanding search engines and information retrieval systems, including the unique functionalities provided by different systems, and applying this understanding to information search and retrieval projects;
  - Assessing the veracity or quality of information and its underlying sources in search engines and information retrieval systems;
  - Using appropriate data analysis, text analysis, visualization, and similar tools to analyze information in order to extract insights and meaning;
  - Communicating the results of information retrieval and analysis projects in a way that is usable and actionable by the intended audience; and
  - Teaching all competencies in a variety of formal and informal settings.
– Organization of Data, Information, and Knowledge Assets – elements of this competency include the following:

- Applying standard professional practices for descriptive and subject metadata to information assets;
- Developing custom metadata schemas;
- Developing custom taxonomies and ontologies as local circumstances warrant;
- Developing retention and destruction policies and procedures based on legal requirements and organizational operational needs;
- Training others in effective practices for information organization and management;
- Applying quality control practices to ensure the appropriate application of policies and practices for information organization and management; and
- Coordinating the development and implementation of archival systems and processes that are customized to support organizational needs.

– Information Ethics – elements of this competency include the following:
  - Recognizing ethical issues relative to information handling, including but not limited to privacy and confidentiality, information security, intellectual property and copyright, and intellectual freedom;
  - Modeling ethical information behavior;
  - Teaching, influencing, and coaching others;
  - Contributing to organizational policies, procedures, and other initiatives; and
  - Assessing and auditing the organizational implementation of information ethics.

Enabling competencies

– In addition to these unique core competencies, information professionals also possess other essential competencies that are shared by professionals in other fields. These "enabling" competencies are vital for professional success and career development. It would be possible to produce a very long list of such competencies, but the following is a short list of those that merit the greatest attention:
  - Critical thinking, including qualitative and quantitative reasoning;
  - Initiative, adaptability, flexibility, creativity, innovation, and problem solving;
  - Effective oral and written communication, including influencing skills;
  - Relationship building, networking, and collaboration, including the ability to foster respect, inclusion, and communication among diverse individuals;
  - Marketing;
  - Leadership, management, and project management;
  - Life-long learning;
  - Instructional design and development, teaching, and mentoring; and
  - Business ethics.

3.1 Empirical findings

The analyses by Krtalić (unpublished) and Vilar & Žumer (2018), the former presented in text in Figures 1–8, while the latter is shown in Tables 1 and 2, have shown rather big differences between study programmes of EINFOSE partners:

– Number of study programmes per partner varies from one to three.

- Partners also offer different levels of programmes: undergraduate or graduate; some offer both while some only offer graduate programmes.
- Some partners offer actual Information Science programmes (be it as study programmes or specializations within their study programme), while some actually offer Library and Information Science programmes.
- Programmes, judging from their names, cover various disciplines to various levels of granularity: Information Science, Library Science (and combinations of the two), Language Technologies, Digital Publishing, Information Management, Knowledge Management, Graphics, Interactivity, Virtual Environments, Information Technology, Digital Libraries, Data Science, Business Informatics;
- There are also differences in possible study combinations: some programmes require another discipline to be studied simultaneously (as major or minor) while others are one-major.
- Duration of study varies from one to two years (2–4 semesters), in one case less (1-2 semesters) and is linked to number of ECTS (usually 60–120).
- The core competences of both undergraduate and graduate programmes differ at least to some extent from partner to partner: the differences are already noticeable in numbers of listed competences, some partners focus more in professional competences while others also add interpersonal and generic competences, the 'new' skills, such as entrepreneurship, problem-solving are rarely mentioned (only by two partners).

To a certain extend these differences also reflect different notions of Information Science among project partners: while some explicitly regarded only their programme entitled Information Science and not other master level programmes, others included all study programmes regardless of the title.

Information Science

- independent work in organizations which deal with collecting, organizing, storing and providing information
- promoting and advocating the influence of organizations which deal with collecting, organizing, storing and providing information
- critical use of new findings in theory and practice of the chosen professional field
- independent research and publishing of research results
- creativity and independence in the development-oriented work, and in the research within the chosen field
- awareness of the meaning and roles of information in each individual organization, as well as in the modern society

Figure 1. Expected competences upon completion of the Masters studies in Ljubljana (compiled by M. Krtalić)

Information Science

- search for and retrieval of relevant information on any subject in a variety of information sources
- organization of information in the physical and the digital environment
- preservation of information so that it is long-term available and usable
- development of specific information products and services for different user groups
- transfer of information literacy skills to different user groups
- visual organization and presentatio of information
- evaluation and conveyance of information to different user groups

Information Technology

- application of information and communication technologies - the students acquire a high level of skills for working with information and communication technologies, such as designing and developing applications for different interfaces (GUI, web, mobile).
- organization of data, information and knowledge – due to the interdisciplinary character of the field, students acquire the skills to connect the various theoretical approaches and different organizational models in their application in the realization of specific tasks, learn how to manage knowledge to facilitate the realization of projects, etc.
- civic competences - the students develop a sense of responsibility towards the society, the market, the importance of the right of access to knowledge and information, gain awareness of information richness as a precondition for progress, on the importance of the plurality of opinions and ideas for the development of democratic systems and the like.
- media competences - students develop awareness of the importance of social media and their impact on the daily lives of individuals in the modern information society
- entrepreneurship - through association with the labour market the study programme encourages entrepreneurial spirit, develops awareness of the potential and importance of success in a competitive and innovative work environment, develops independence, responsibility for the tasks and develops teamwork skills.

Upon completion of the programme, the students will be able to:

- solve given problems by using the techniques of procedural or object oriented programming languages
- design information systems, define solutions using appropriate technology
- select and apply the optimal design of a template technological solution as well as the appropriate development methodology
- design or adapt the user interface of network locations/applications
- create or edit network locations based on static HTML and CSS, adjusted to the different widths of the screen display and enrich the content of network locations by JavaScript dynamics
- create network applications
- create mobile applications
- test systems, create test documentation
- administer a relational database (backups, writing queries, procedures, triggers, functions)
- carry out marketing activities through social media
- create user documentation
- prepare documentation for software developers
- implement and manage data/archive systems (repositories, etc.)
- standardize and manage metadata and identifiers in information systems
- implement certain segments of the Semantic Web in information and data/archive systems (e.g., creating linked data)
- design and create knowledge-based systems (knowledge base, etc.).

Publishing

- communication in the native language – the students develop and improve their communication skills in their native language by editing and formatting texts; students develop special, extremely high competencies in written discourse work
- basics of information and communication technologies – the students acquire a high level of skills for working with information and communication technologies, such as preparation and creation of electronic publications, usage of programmes designed to format text and illustrations, search in digital repositories and databases, etc.
- organisation of learning - due to the interdisciplinary nature of the field, students acquire the skills to connect the various theoretical approaches and different organizational models and their application in the realization of specific tasks, learn how to manage knowledge to facilitate the realization of projects, etc.
- civic competencies - the students develop a sense of responsibility towards the society, the importance of dissemination and promotion of cultural and scientific achievements, the importance of the right of access to knowledge and information, they gain awareness of information richness as a precondition for progress, of the importance of the plurality of opinions and ideas for the development of democratic systems, etc.

- entrepreneurship - through association with the labour market the study programme encourages entrepreneurial spirit, develops awareness of the potential and importance of success in a competitive and innovative work environment, develops autonomy and responsibility for the tasks given, and given the nature of the publishing business, in particular, develops the capacity of teamwork
- cultural awareness and expression - the students acquire awareness of the importance of the beauty of both the written and the oral discourse, get familiar with the book as a medium and an integral part of the national cultural heritage, meet different technologies for the transfer of cultural content, develop a critical attitude towards the ideas and opinions expressed.

Upon completion of the programme, the students will be capable of:

- market research and examination of the possibility of action by the publishing house, the analysis of the existing and the creation of new market niches
- selection, contact, engagement and acceptance of authors and copyright manuscripts
- acquisition, editing and dissemination of manuscripts and sequential adjustment of the manuscripts to
- arious publishing products
- contextualizing specific publishing products and the application of appropriate procedures for the design, distribution and marketing
- assessment of the appropriateness of the content for a specific publishing area following the knowledge of the structure of publishing areas and their respective features
- 'merging' of marketing and distribution models with specific authors and authors' manuscripts
- assessment of the quality of the author's works, the cost of production and sales opportunities and making decisions about the viability of investing in certain authors or projects
- assessment of the cultural and scientific value of the work with the help of the reviewers and other experts
- editing and participating in the shaping of the book in order to meet the expectations of the authors in accordance with the specifics of a publishing area
- use of new technologies to reduce production costs, develop new marketing techniques with the aim of using 'digital communication channels'
- promotion of books to targeted customers, intermediaries (e.g., booksellers) and key buyers (e.g., ministries, school boards, etc.)
- creation of short-term and long-term publishing plan and sequential record keeping of editorial procedures and timeliness of these actions

Figure 2. Expected competences upon completion of the Masters studies in Osijek (compiled by M. Krtalić)

Information Management

- Graduates have expert level theoretical and practical professional knowledge and they keep developing it.
- Graduates can identify major obstacles and their possible causes in their professional field.
- Graduates are knowledgeable about scientific research methods and techniques.
- Skills/ cognitive-applied
- Graduates have the ability to interprete, evaluate and use theoretical and practical information in the field of information management analytically.
- Graduates are capable of using wide range of research methods in an advance level.
- Proficiencies
- Graduates, either as an individual or as a team member, are able to identify problems in the field of information management, create solutions and realize these solutions.
- Graduates have the ability to lead learning orientation and to make critical evaluation on knowledge and skills in the field of information management.
- Graduates have the ability to pursue, evaluate and interpret developments in the field of information management nationally and internationally.
- Graduates are capable of communicating research results orally, visually and textually.
- Graduates can communicate effectively, orally and written, in a foreign language
- Graduates are capable of using information and communication technologies in an advanced level.

- Graduates comply with social, scientific and ethical codes at all stages of research they carry out in the field. They use their knowledge and skills to contribute to the society and science.

Figure 3. Expected competences upon completion of the Masters studies in Ankara (compiled by M. Krtalić)

Libraries and Heritage Collections

- Knowledge of the history of the book, libraries and reading, the historical context and the physical characteristics and production techniques of books to ensure that materials are appropriately organized, preserved and described for the benefit of all interested parties.
- Mastery of the analytic and descriptive techniques used for heritage materials, and the acquisition of skills in the use of new technologies and the digitization and use of digital and metadata management systems to enable access to materials.
- Knowledge of the norms, good practices and tools used to organize and describe appropriately the special materials collections in library catalogues, websites and centre publications.
- Knowledge of materials preservation and conservation in special collections in order to ensure the long-term conservation of materials. The master's degree will analyse the custodial responsibility of safeguarding heritage assets, particularly with the aim of appraising and evaluating the physical condition of collections.
- An understanding of the characteristics of reference services to assist and instruct users in the use of heritage resources in a centre, and skills in bibliographic research directed at reference sources and specialized literature.
- Mastery of the techniques used to promote and disseminate special collections. Students will analyse policies addressing project planning and implementation, the expansion of services and good practices applied to special materials collections.
- An understanding of intellectual property rights, authors' rights, management of rights, sponsorship, personal data protection and other legal questions, particularly involving the acquisition, access, dissemination and display of special materials.

Management and Direction of Libraries and Information Services

- the capacity to analyse the working environment of an information unit or service and to identify user requirements, through the strategic gathering and interpretation of data;
- the ability to assess and identify the critical factors that determine the success of an organization;
- to capacity to use planning, direction and leadership techniques for the use and management of resources;
- the capacity to plan resource use on the basis of user requirements, staff structure, collection type, etc.;
- the capacity to plan and manage collaboratively, to ensure that services and products meet the demands and needs of the organization and its users;
- the ability to identify the strengths and weaknesses of an organization, product or service, establish and apply indicators, and devise solutions to improve quality;
- the capacity to use various promotion and communication strategies to involve users and capture greater market share;
- the capacity to draw up policies, guidelines and procedures to ensure the smooth running of the organization;
- the ability to manage and lead an efficient team and to promote personal and professional development.

Several factors are required to devise an appropriate information system: in-depth knowledge of an organization and its environment; a team of professionals with the right skills to provide quality services; the establishment of assessment systems; the acquisition and management of the financial resources needed to set up the system; and the ability to establish a dissemination method to ensure that the services reach the right audience. To respond to new environments and requirements, professionals are needed who can network and lead multidisciplinary teams in collaborative, joint projects involving several organizations.
The main objective of this master's degree is to provide comprehensive, specialized professional training for university graduates from all areas of knowledge, as well as managers of libraries and other information

services. The course also offers specialized training for holders of degrees in information and documentation and diplomas in Library and Information Science who do not have the specialized training or specific qualifications needed for management-level positions.

In the current context, a good library manager is a person who can transform the library into the heart of an organization; has an up-to-date, global approach to the position; knows how to manage processes of change; has negotiation, communication and collaboration skills; and can train, manage and coordinate teams.

Digital Contents Management (starting in 2018/2019 academic year)

- Know the basics and apply the techniques of conceptualization and modelling of websites and digital applications based on the purpose, objectives and goals of an organization, business or project.
- Analyse the environment and the competence to develop user-oriented digital services and products.
- Know and apply the methodological principles of digital marketing, especially for the improvement of audiences and the conversion of websites and digital applications.
- Apply analytics metrics for use and behaviour of website users.
- Use techniques to diagnose the user experience and the usability of websites and digital applications.
- Understand and use software applications required for the creation and development of digital products and services.
- Plan and organize in multidisciplinary teams the processes of diagnosis, design and promotion of websites and digital applications.

Figure 4. Expected competences upon completion of the Masters studies in Barcelona (compiled by M. Krtalić)

The programme provides in-depth knowledge and skills for Information Science and linguistic activities in a multilingual environment.

After the successful completion of the Master's degree program, the graduates will have a broad field of activity. They are, among other things, able

- To analyze problems of information management in multilingual environments and to identify ways to solve them
- To work independently, quickly and purposefully into new contexts, which are relevant in the respective science and working environment
- Key competences such as teamwork, social skills and moderation skills
- To analyze situations characterized by intercultural and multilingualism and to develop independent scientific solutions for communication problems as well as the self-chosen specialization

Figure 5. Expected competences upon completion of the Masters studies in Hildesheim (compiled by M. Krtalić)

In Graz, the Institute of Information Science and Information Systems is one among 15 institutes at the Faculty of Social Sciences and Business Administration. There it offers a specialization on Information Science and Information Systems, which can be selected by business administration students besides another specialization in their master program.

The course objectives of the specialization on Information Science and Information Systems of the Master's degree program on Business Administration include:

- the development of key competences in information science (information skills) and information systems (IT skills) for business administration students;
- the ability to deal with problems of knowledge and information management

Figure 6. Expected competences upon completion of the Masters studies in Graz (compiled by M. Krtalić)

Digital heritage

Knowledge and understanding

- be able to understand and critically analyse information practices and cultural practices in libraries and other knowledge-intensive organisations
- have developed knowledge and skills for work with strategic development of information systems and services in collaboration with other specialists and professionals

Skills and abilities

- be able to plan for and implement the management and organisation of information systems, resources, and services
- and/or cultural activities and services in libraries and other knowledge-intensive organisations on a general level
- be able to plan, implement, and evaluate projects concerning the development of information resources and services and/or services in the cultural sector
- be able to study groups of users of information systems and/or cultural activities in a systematic and scientifically valid manner, with respect to development of resources and services
- be able to apply scientific methods in professional contexts as well as display an insight into the complex role of science in society
- be able to independently perform investigations, evaluations and applied research projects in collaboration with various partner organisations

Values and attitudes

- understand and critically analyse the role of libraries and similar organisations in society diachronically and synchronically
- be able to understand and analyse how the interactions between modern information technology, use, and social and cultural practices influence the organisation of information resources and their accessibility

Figure 7. Expected competences upon completion of the Masters studies in Pisa (compiled by M. Krtalić)

Master's programme: Library and Information Science, Digital Library and Information Services

The students after graduating from the programme will:

- be able to understand and explain the modern library and Information Science research, especially, in the area of digital libraries and information services, and have ability to apply its results for the needs of various target groups
- be able to use different theoretical perspectives in the organisations that require and exploit advanced competence in the area of digital libraries and information services and apply abstract knowledge to specific cases and problems
- have knowledge and skills to develop strategies for digital information services in co-operation with other specialists and implement these strategies
- Be able to assess, evaluate and conduct applied research tasks independently and in co-operation with different other stakeholders
- Be able to plan and conduct independently basic training for the users of digital information services
- Have theoretical and methodological knowledge that provides foundation for research education within the area

Figure 8. Expected competences upon completion of the Masters studies in Borås (compiled by M. Krtalić)

Table 1. Basic information on the study programmes (Vilar & Žumer, 2018)

Partner	**UL**	**UO**	**HU**	**UBA**	**UH**	**IUG**	**UP**	**UBO**
City **Country**	Ljubljana Slovenia	Osijek Croatia	Ankara Turkey	Barcelona Spain	Hildesheim Germany	Graz Austria	Pisa, Italy	Borås Sweden
Number of programmes	1 direction	3	1	3	1	0 (only spec. in BA)	1 4 directions	3
Major/minor course	MA	MA	MA	MA	MA	MI	MA	2MI, 1MA
Discipline(s)	IS	IS, IT, P	IM	LS, IS, CH, LM, DL	IM	Spec. in BA	DH, LT, DP, KM, G, I, VE	LS, IS, DL, C
Duration (semesters)	4	4	4	2	4	1–2	4	4?
ECTS	120	60	120?	60	120	20 ECTS + ev. 20 ECTS Master thesis)	180	60/120
Title	M. of LIS&BS, direction IS	M. in IS, IT, P	M. in IM	/	M. A.	M.A. (in Business Admin.)	/	M. of LIS, DL, IS, M.S. in IM

Note:

Abbreviations for partner institutions:

UL – University of Ljubljana, Faculty of Arts, Department of Library and Information Science and Book Studies; UO – University of Osijek, Faculty of Humanities and Social Sciences, Department of Information Sciences; HU – Hacettepe University, Department of Information Management; UBA – University of Barcelona, Faculty of Library and Information Science, and Documentation; UH – University of Hildesheim, Faculty of Linguistics and Information Science; UG – University of Graz, Institute of Information Science and Information Systems; UP – University of Pisa, Department of Computer Science; UBO – University of Borås, Swedish School of Library and Information Science.

Abbreviations for programme:

IS – Information Science; LS – Library Science; IT – Information Technology; P – Publishing, IM – Information Management; DL – Digital Libraries; CH – Cultural Heritage; LM – Library Management; BA - Business Administration; DH - Digital humanities; LT - Language Technologies, DP - Digital Publishing, KM – Knowledge Management, G - Graphics, I – Interactivity, VE – Virtual Environments, C – Communication; B/A – Basic/Advanced

Table 2. Learning goals (Vilar & Žumer, 2018)

Partner	**UL**	**UO**	**HU**	**UBA**	**UH**	**IUG**	**UP**	**UBO**
City Country	Ljubljana Slovenia	Osijek Croatia	Ankara Turkey	Barcelona Spain	Hildesheim Germany	Graz Austria	Pisa Italy	Borås Sweden
Learning goals	organization of information within profit and non-profit sectors independence theoretical base-knowledge practical use of theory	search & retrieval organization of information information products & services teaching IL presentation of inf. ICT applications communication entrepreneur-ship media competences civic competences cultural awareness & expression	creativity, problem-solving self-confidence leadership capabilities design, implement., operation of information systems research skills theoretical base-knowledge practical use of theory team work LLL communication	management, treatment, dissemination & promotion of cultural assets information systems public and private organizations development of projects and evaluation of products and services related to heritage collections theoretical base-knowledge practical use of theory ICT application digitization organization of information user research rights data protection communication	problem-solving independent quick, purposeful work in new contexts team-work social skills and moderation skills intercultural, multilingual skills	informa-tion and IT skills informa-tion manage-ment know-ledge manage-ment	theoretical base-knowledge knowledge management use of ICT tools building databases and archives with management systems in specific areas of expertise	development, management, evaluation of IS and CS, and in advanced IM in libraries and other knowledge-intensive organisations development and management of digital collections and information services in libraries and other cultural, research, business, and public organisations

3.2 Content of the discussions at Ljubljana Multiplier Event regarding Information Science competences

We can add to the above information also the content of the discussions at the EINFOSE Multiplier Event in Ljubljana, based upon previously done investigations. At the meeting, EINFOSE partners shared the following:

- The partners perceive a gap between declared competences and the actual competences that Information Science graduates have upon completion of their studies.

- The partners have different opinions on which core competences should a bachelor of Information Science have, and the same goes for the masters of Information Science.
- There are also different notions between partners about the competences that are desired by the potential employers of Information Science graduates.
- Experience also shows that there is a gap between the acquired competences of the graduates and the desired competences of the employees.
- However, the partners mostly agreed on two notions: that there has been a shift in competences expected of Information Science graduates in the past few years and that they think it would be very difficult to harmonize competences between European Information Science schools, mostly because they work in so different environments and their job markets are so different.

According to some other presentations at the EINFOSE Multiplier Event, for example the characteristics of study programmes at University of Zadar (Pehar & Zauder, 2018) and London City University (Robinson, 2018), it is fair to assume that similar differences would be revealed if other Information Science programmes were analysed.

It has also been emphasized by many collaborators in the EINFOSE project, as well as found in studies, that too many administrative obstacles have been observed in institutions of higher education that hinder the speed of study programmes development in terms of contents, competences, emphases etc. It is highly desirable that university administration becomes more flexible and steps back from their demand for formality as these two are in direct contrast with each other. University administration should become aware that more formality simply brings less development and is not a guarantee of quality. Too formalized procedures hinder development and even increase the gap between the educational institutions and job market.

Another major drawback is inadequate encouragement of interdisciplinarity. Comments from the project partners indicate that many would like to see more interdisciplinarity both in the studies and in academic careers, which would then reflect in the content of teaching.

4. Information Science entry requirements and expected learning goals

As stated in the objectives of EINFOSE project:

> "Large differences still exist in connection to the enrolment procedures and learning outcomes in the field of IS at graduate level. These differences cause barriers in accepting students from other disciplines at graduate programs at HEIs that offer MA programs in IS and in recognition procedures related to LOs and ECTS at the EU level. IS is an interdisciplinary field with strong social, cultural and ICT features but relatively young academic discipline. It has an important role in today's digital society as it is concerned with the design and usage of systems for information management and delivery of such information services that should improve the equity, diversity, inclusion and the citizens' participation in democracy in general. In most countries except for the USA, IS is a relatively small discipline when the number of offering universities is concerned. As a consequence: many IS departments merged with other departments (such as pedagogical, computer science, communication science, economy and management) which makes the harmonization of learning outcomes and mobility goals more difficult; hardly any university can cover the full range of subjects and only a few topics can be taught in depth. Thus, partnership is needed to foster exchange of best practices and enrich exsisting cooperation. In addition, programs vary considerably in regards to models, although the core competencies and the Qualification Framework (QF) are recognized by professional bodies (such as CILIP, Eblida, ALA, and ASIST).
>
> Common entry requirements will mitigate or even eliminate the differences in enrolment procedures at different HEIs offering programs in IS could contribute to the higher enrolment of students with different background at the graduate level programs.
>
> The agreement upon the basic core content for entry requirements based upon accepted LOs will make the enrolment and recognition process easier. It will also enable students from partner HEIs to specialize in certain new areas (such as digital humanities, scholarly communication, big data, economy of information, sociology of media) at the HEI that has experts who can offer specialized knowledge and skills. With regard to STEM competencies, Information Science could largely contribute in teaching digital competencies (information and media literacy).
>
> The agreed learning outcomes in IS and basic entry requirements together with a diverse specialization areas offer a unique opportunity to deal with harmonization of learning outcomes with a mutual understanding that the proposed Policy Recommendations will be followed at all of the partner institutions after the project end.
>
> EINFOSE project seeks to find out the appropriate ways and modes of the harmonization and recognition of the basic entry requirements that will be accepted by partners and translated into Policy Recommendation for Euclid and other EU bodies. There is also broad support for promoting the European Qualifications Framework and its policy statements and documents as a reference tool to facilitate cooperation and dialogue with non-European countries."

We can thus add to this starting point, which at the time of writing the project proposal, was based mainly on personal and institutional anecdotal experiences, that also the subsequent analyses of EINFOSE partners' study programmes, as well as discussions at Multiplier Event, FEIS symposium etc. revealed rather similar findings.

We can thus no longer speak only about 'anecdotical' or 'experiential' evidence. These findings are presented in the following section and present one of the elements of the overall discussions at the end of this document.

4.1 Empirical findings and content of the discussions at Ljubljana Multiplier Event regarding Information Science entry requirements and expected learning goals

The analyses by Krtalić (unpublished) and Vilar & Žumer (2018), the former summarized in text while the latter shown in Table 3, has also identified differences between study programmes of EINFOSE partners in terms of entry requirements:

- Some institutions allow entry to candidates with finished 1st level programme of LIS or related field without additional obligations while candidates who had finished an unrelated 1st level programme, need to pass additional entry (differential) exams. These exams differ from institution to institution.
- Other institutions give candidates without 1st level LIS education additional obligations upon entering the studies and it is unclear how the ECTS points in the whole masters programme are distributed, compared to the candidate without these additional obligations.
- In some cases, treatment of candidates is the same regardless of their previous education and additional conditions are given to all (such as knowledge of English)

Table 3. Entry requirements and view of EINFOSE Summer School (Vilar & Žumer, 2018)

Partner	**UL**	**UO**	**HU**	**UBA**	**UH**	**IUG**	**UP**	**UBO**
City Country	Ljubljana Slovenia	Osijek Croatia	Ankara Turkey	Barcelona Spain	Hildesheim Germany	Graz Austria	Pisa Italy	Borås Sweden
Entry requirements (ER)	Finished 1st level LIS programme (180 ECTS) Finished any 1st level (or older) programme + 14-18 ECTS diff. exams	Finished 1st level ICS programme (180 ECTS + 3 GPA) Finished any 1st level (or older) programme + difference exams (except publishing)	Written & oral exams + ALES and KPDS or ÜDS or TOEFL Lateral transfer	Finished 1st level LIS programme Finished any 1st level programme + 2 courses (depending on chosen programme)	Finished 1st level IM programme or equivalent Finished any 1st level programme + 8 courses	Finished bachelor programme on Business Administra-tion (180 ECTS)	Finished 1st level similar programme Possible entry assessment (non-selective) Possible additional courses before admission	Finished 1st level LIS, or Social Science programme + proficiency in Eng. (for LIS&DL&IS) Finished any 1st level programme (for LIS pr.) Finished any 1st level programme + 1 year of experience (for IM)
EINFOSE ESSIS as ER	Fully Recognized; Substitutes entry exams	Partially recognized; On level of courses /credits	Partially recognized; On level of entry procedure	Not recognized	Not recognized	Not recognized	Partially recognized; On level of entry procedure	Not recognized

When speaking about the core (L)IS competences, a debate was also raised as to whether achieving learning goals in all areas that are considered core may be too much for a 2-year or even a 3-year study programme (although this exceeds Masters studies duration), that specialization is probably a good response to the needs, and that we should probably think about dividing academic and professional competences, as they are two different sides of the same coin.

Judging from this, we can ask whether the circumstances in which the teaching of Information Science is done are at all comparable. We can assume that particular circumstances, such as the competition of other programmes in the same country or in the vicinity, job market etc. greatly influence the way in which Information Science education is organised.

Expected learning goals are also presented rather differently in the study programme descriptions. This finding in a way reveals that EU guidelines for all higher education institutions as to the learning outcomes are not followed to the same extent. While some institutions are quite scarce and only state the overall goals, others list the expected competence in more detail. The question thus is whether a person studying Information Science would gain comparable competences in any of these institutions, and also, is this at all desirable or even possible. However, undoubtedly, some basic competences in Information Science field have to be achieved, regardless of the approach or 'specialization' offered.

The partners also devised a summer school of Information Science which was organized in 2017 and 2018. The idea was to offer a one-week training in basic Information Science contents to candidates coming from fields other than Library and Information Science, that would serve as an entry requirement – meaning that the students who passed this school woudl be eligible to enter Information Science Masters studies without additional requirements. As evident from Table 3, only one partner fully recognizes it, while three recognize it partly. Another circumstance is that not all students, who attended the summer schools in 2017 and 2018, actually came from outside LIS. Experience from Ljubljana shows that the student who attended the summer school in 2017 and did not have LIS background, was later very successful in Masters study of Information Science, had no difficulties in participating in the studies and passed all exams in the first year of Masters study. Thus it would be advisable that partners, who have separate entry requirements for graduates of other disciplines (the exception here is Borås where BA from any discipline is acceptable), revise their views and decisions regarding consideration of the Summer School as an entry requirement. There is also a possibility, in the future, to recognize the Summer School as a replacement for some introductory or elective course at graduate level.

We see that are speaking about a continuum of development of perceptions of (L)IS area and this concerns the following areas:

- Areas of society and economy where the competences are needed/useful,
- The perceptions of the Information Science as a discipline and consequently Information Science studies (and thus a question, who is interested to study),
- The treatment of the entry requirements by the educational organizations in the context of the study programmes.

It is also evident that different EU countries are on different sides of this continuum. This is not only related to social attitude towards the role of information in the society and in the economy, but also to the overall social attitude towards culture and knowledge which in turn impacts the role, image and influence information institutions. In some countries it is more acceptable to find Information Science graduates working in areas of information organization thus contributing to the success of their organizations while other countries these programmes still mainly educate library staff and are faced with the problem of the job market being static and offering few openings.

As an example regarding identity and image of the field, the Multiplier Event participants discussed the Library Science example: The "L" in LIS gives a very precise context of the discipline, and is in some countries even a regulated profession. Information Science context is much broader, perhaps even too broad, therefore it is more difficult to define. This brings at least two issues:

- The problem of "gatekeeping": Who do we "allow in" the Information Science studies – we shouldn't gatekeep but allow broad approach, perhaps going in two directions (subject specialist – bottom-up approach; and information specialist – top-down approach).
- Also it's a question of consent on how to combine other areas/disciplines with (L)IS degree.

5. Information Science job market

Similar to defining the profession it is also difficult to explicitly define Information Science job market. We could adopt the definition by Robinson (2018) that it is any job concerned with taking care of human records, information, documents and with processes in the information communication chain (creation, organisation, dissemination, discovery, management, preservation, analysis, use, understanding). Thus any organization, private or public that is concerned with any part of this chain, offers opportunities for information jobs. Marcionini and Moran (2012) describe some of the typical work tasks of information professionals:

- partners in generating and collecting information; part of the research, data mining, or design team;
- eliciting, ingesting, organizing, and evaluating information by using distributed databases and by directing data streams, creating powerful and adaptable indexes, ontologies, and taking care of cost-effective but sustainable data structures;
- sharing information openly and freely, supporting universal access and self-directed learning and advocating open access publishing and easy-to-use access systems;
- participating in using and reusing information to solve problems, make decisions, learn, and play; educating the public to find and use information, assess its accuracy and provenance, and joining small or massive teams to aggregate, synthesize, annotate, or summarize; valuing and supporting collaboration and learning, going beyond simply delivering information to helping people apply it;
- serving as stewards of knowledge which is even more important today for the diverse forms and volumes of digital information as well as for ensuring the future usefulness of information.

When speaking about the identity of the field, we should also speak about the identity of the information profession[7], probably better, professions and professionalization. In this context it also concerns the feeling of professional identity and confidence of the graduates which they should mostly acquire during their studies (which include contacts with job market during placement activities). This second part of the question thus concerns the graduates applying for jobs: are they applying for the right jobs, how much are they capable to “read between the lines” when looking at the job-ads content – how much can they interpret their skills, abilities and personal characteristics as being adequate to what is being required in the ads, and how well can they present their characteristics in job applications; this being also connected with requirements for educational programmes to include personal characteristics development. There is of course also the big, but often neglected question of specialization stemming from the complexity of the field. Both educators and employers should probably recognize that being a IS/LIS professional can mean many things and is

[7] Since today nearly all professions could be argued to be at least in part informational, it is important to note that the term 'information profession' here is used in the sense of individuals and organizations providing, as Bates (2015) has argued: "(…) key services and functions, which may or may not be associated with specific information institutions, and which all manage a body of exosomatic information, in physical or digital form, using numerous information technologies, in order to make that exosomatic information available for humanity to use."

always connected with the context and target audience/users. And this should be clearly reflected in both, study programmes and job ads.

Information Science is being strongly affected by technological as well as social changes, which is nicely described by Marcionini and Moran (2012):

> "The information professions are at an inflection point in time. The environment in which all information professionals operate has been revolutionized, primarily due to profound changes in technology. Technology has transformed almost all aspects of our world, and has certainly transformed the careers into which we send our graduates. These technological changes have altered traditional methods of information storage and retrieval that have endured for centuries. Scholarly communication has been transformed and user expectations heightened. Access to information is ubiquitous and information permeates all aspects of our lives. This is no evolutionary change but a disruptive one as we move from a world where information was contained within walls in finite containers such as books and filing cabinets to one where information is virtual and omnipresent. Information schools once prepared professionals to work in a specific type of institution; now they are preparing professionals for careers in a world where the institutions that employ them (if they actually do work within an institution) are of many types and serve many different purposes. Once information was typically dealt with on a local scale; now information professionals work with information that is international in scope, linking institutions and individuals across the globe in real time. These profound changes in the information world demand equally profound changes in the education of the professionals who will spend their careers working in this new world."

5.1 Empirical findings

Vilar & Žumer (2018) found that different schools (EINFOSE partners) not only see their job markets rather differently, but also give very diverse descriptions, both in length and content:

- some give explicit references to the types of institutions (or sectors) where the graduates are expected to work;
- some give emphasis to libraries (sometimes in connection with only certain study programmes);
- some also mention other types of information organizations besides libraries (details are mostly not given);
- some are very general in their descriptions;
- some focus more on the types of jobs (this sometimes closely resembles the descriptions of competences); and
- some do not give explicit references to potential employers.

The same was discovered by Krtalić (Figures 9-11). According to some findings in the USA, it is fair to expect great diversity among information institutions also due to the shift from document-centric to information centric society (Marchionini & Moran, 2012).

Expectations were expressed that information institutions, while certainly not losing their importance, will face many changes, related to technology, consolidation, open access, environmental issues and challenges, scope of the labour market, competition, multitidciplinarity, proactivity, expected competences, changes in education etc.

Ljubljana

Information Science – study qualifies the candidates for organization of information in various environments within profit and non-profit sectors.

Osijek

Study qualifies graduated students for jobs in various institutions, both public and private - in the field of heritage institutions (libraries, museums, archives), but also in other organisations where organization of information is needed (e.g. banks, hospitals). In addition, students find jobs in publishing instutions as well as software developing firms.

Ankara

Undergraduate alumnis who are graduated from the Department of Information Management can get various job opportunities both in private sector and public institutions. There are many working areas for alumnis such as university, research, public, school and special libraries, archives and documentation centers. The job opportunities is not only restricted with libraries, but also contains database design, indexing and abstracting services, softwares companies, news agencies, publishing firms and research & development centers. Through the renewed curricula, our alumnis have a chance to utilize current job opportunities such as information architecture, web designer, usability expert, etc.

Figure 9. Prospective employers/jobs as given by Ljubljana, Osijek, Ankara (compiled by M. Krtalić)

Libraries and Heritage Collections

This master's degree is intended to train specialists who can take charge of the management, treatment, dissemination and promotion of cultural assets in the form of bibliographic materials and documents, develop projects and evaluate products and services related to heritage collections.
The general objectives focus on training professionals who are able to apply new information and communication technologies to older resources, specialized libraries and special collections, and who are flexible in their ability to carry out projects in heritage management, dissemination and promotion, while adapting new norms and procedures and creating shared and consistent standards for the description, safeguarding and dissemination of heritage on a European scale.
Additional objectives include the mastery of processes and techniques employed in the creation, analysis, management and evaluation of information in different media and formats for the utilization of end consumers, including reference services in libraries and online support services. For these cases, students will examine the characteristics of users of these products and services, professional ethics and the national and international legal framework.

Management and Direction of Libraries and Information Services

The aim of this master's degree is to train specialists who can design and manage information systems, manage projects, and manage human and financial resources in all kinds of public and private information units, where they will also be able to implement and manage quality processes to ensure that the organization's objectives are met.
The degree aims to train experts in strategic planning, assessment, service marketing, and quality and resources management (human, material, economic and financial, technological and information resources, infrastructure, etc.). It also provides skills and competences applicable to the organizational development, leadership and executive management of libraries and other public and private information departments and systems (library networks, consortia, archives, newspaper archives, map collections, etc.) across a wide range of specializations and sectors.
On successful completion of the course, students will be able to design and manage information systems and to manage projects, human resources and financial resources in any public or private information unit. In addition, they will be able to implement and manage quality processes to ensure that an organization's objectives are met.

They will be able to work independently and manage service companies that can draw up comprehensive projects for information and document management in companies and organizations.
Information units (libraries, archives and documentation centres) and information systems must meet the needs of their users and clients and should keep up to speed with technological developments. To achieve this, the professionals that manage these units must have the knowledge required to manage human, financial and other resources so that the unit can meet these needs and provide suitable services and circuits for the organization's environment.

Digital Content Management

The Master's Degree in Digital Content Management provides specialized training for professionals in design, management and evaluation of products and services related to the digital content of companies and institutions.
Management of digital content is a work area and skill with a strong projection around the world. This is clearly seen in the increase in the number of consultancies and companies dedicated to designing web architecture, to conduct user experience studies (UX), to manage the presence of brands in social networks (community manager), to improve web positioning in search engines (SEO) or to plan online marketing campaigns. There is also an increase in the demand of work positions dedicated to the administration of public intranets or websites and to document management. This can be noticed in various sectors: medium and large companies, research centres, public administration, libraries, archives, museums, etc. In order to respond to this demand, the Master's Degree in Digital Content Management trains professionals specialized in design, management and evaluation of products and services related to the digital content of companies and institutions.
It is a training offer based on the cross-disciplinary project-based learning (PBL) approach and enables students to analyse the development environment and their competence, to apply the methodological principles of digital marketing, and to plan and organize processes of diagnosis, design and promotion of web sites and applications. At the same time, students are trained in the use of computer applications to create and develop digital products and services, metrics to analyse users' behaviour, and techniques to improve user experience and usability

Figure 10. Prospective employers/jobs as given by Barcelona (compiled by M. Krtalić)

Hildesheim
Experts in Information Management, capable of panning, implementing, evaluating and maintaining information services, Expert in designing and evaluating interactive interfaces. Primarily in companies.
Master degree – Experts for information services in international organisations
Graz
Managers in private companies and public organizations – professionals who need information skills and IT skills when performing their managerial job.
Expert in information and knowledge management – professionals involved in the design of information systems as well as the creation, preservation and dissemination of knowledge within public and private organizations.
Pisa
managing, and evaluating information services and cultural services and in advanced information management within different types of libraries as well as within other types of knowledge-intensive organisations.
Bachelor's degree - The programme is aimed at students who are interested in a qualified education for advanced information work and/or cultural work and the development of information services and/or cultural services in various types of libraries, companies, public bodies, or other types of knowledge-intensive organisations.
Borås
development and management of digital collections and information services in different types of libraries and other cultural, research, business, and public organisations.

Figure 11. Prospective employers/jobs as given by Hildesheim, Graz, Pisa and Borås (compiled by M. Krtalić)

Study entry requirements are closely linked to two sides: expected learning outcomes, and job market requirements. Namely, some changes that have occurred have big impact on the field of Information Science. In some countries the employment market for (L)IS programmes has widened to include work-posts that have to do with information organization in a wide array of organizations: government agencies, commercial firms, web design firms, online retail etc. In some other countries, this is still closely linked only to libraries. Another issue is the influence of the economic crisis which also had a great impact. For example, an analysis of the characteristics and evolution of the job market in Catalonia in the information science sector (Abadal, Borrego & Serra, 2012) showed that the number of public job offers has declined. There has been a sharp drop in vacancies in the kinds of centres that were the main employers in this sector (archives and libraries). This alanysis also showed that nevertheless, there are still a considerable number of offers from private companies, particularly web portals and consultancies. The changes in the kinds of organizations that are hiring have led to variations in job requirements. There has been a decline in the number of job offers for professionals with specific information science qualifications and an increase in the number of vacancies for professionals with a more general background and similar characteristics to other professionals, particularly in the area of communication.

However, it is evident that new information professions and jobs will appear soon and will keep appearing all the time. Among these Marchionini & Moran (2012) list information architect, data analyst, database administrator, web developer, ontologist, usability engineer, social media strategist, data curator, chief information officer, and of course librarian, archivist, museum curator.

Marchionini & Moran further argue that what makes it more difficult to foresee how future information specialists should be educated, are two things: this diversity plus the fact that it is impossible to predict the information environment where the graduates will be working. They present some questions and dilemmas with which the educators of future information professionals are faced (Marchionini & Moran, 2012):

- How do schools recruit the best and brightest students and sustain life-long learning relationships with those students?
- How diverse a faculty should they recruit to represent the spectrum of disciplines that are critical to modern LIS schools?
- How should schools deal with the task of integrating knowledge and practice in a way that will prepare their graduates for the challenges of the rapidly changing information environment of the future?
- How can these schools leverage information technologies to be more effective and efficient?
- How do they build mutually beneficial partnerships with information industries and agencies? With different schools and departments?
- How should the schools (programmes, faculty, student outcomes) be assessed?

According to Fichtelius et al. (2016), competences of graduates, often considered as strong by the employees, are:

- knowing IT and digital services /tools, handling digital and social media,
- good theoretical knowledge about the library and library activities,

- good ability to connect theoretical knowledge to practical activity,
- good theoretical knowledge of how information is organized, structured and made available, information systems, etc.,
- good at doing investigation, project planning etc.,
- having good academic competences.

5.2 Content of the discussions at Ljubljana Multiplier Event regarding Information Science job market

Besides what was already present in the literature, EINFOSE partners and other participants of the Multiplier Event also discussed some other issues: When information jobs are in question, it is important to know which level of study programme is in question: undergraduate or graduate. In this respect we find different employers' requirements in various countries. Considering Information Science job market, permanent dialogue is important among educators and employers, and it must be clear that they are the partners in this dialogue. Very important in establishing and maintaining contacts are also placement and internship, and topics of theses that should be relevant for practice, and bring benefits to information organizations which provide fields for research.

The process of recruitment has changed: it is no longer only required to present certificates of education and CV, applicants need to do tests of personality and competences, also other procedures used by the employers to check their appropriateness for the job. Also, employers use various automatized procedures (algorithms) to define traits of potential recruitees. Not to mention that students' online activities, profiles and identities are more and more frequently considered by potential employers.

There is also an issue of job descriptions in ads. On the one hand this is a question of how effective is the communication between the educators and the employers – are they speaking the same language when it comes to job descriptions. For example, when the organization is looking for a systems librarian – which skills do they actually expect?

Also Doracic (2018) has given an example of varied terminology used for information professions by the Swedish Association for Information Specialists**:** Information Specialist, Business Intelligence Manager, Librarian, Research Consultant, Knowledge Manager, Records Manager, Metadata Development Specialist, Information Officer, Web Editor and Project Manager.

This is, therefore, partly also the question of terminology used for decribing jobs, skills, competences etc. Another part of this question is the frequent problem of job ads which only look for experienced workers. Employers should also recognize that it is not always possible to find a person with the same amount of expertise and experience as the previous employee, and that opportunity should be given to newcomers, as this also opens the doors to organizational development.

Another big role awaits the professional (L)IS organizations in shaping the professional identities, helping in educators-employers communication etc. In some countries where these organizations are larger, more professionally organized, have longer traditions and influence, this has been done with much greater intensity. Also, due to the number of such

organizations, perhaps we could raise the question of how well they communicate to each other.

The discussions at the Multiplier Event round table revealed, and it was also confirmed by Doracic (2018) that the whole professional field expresses difficulties in recruiting with the right competences, regardless of the type of library or other information organization. On the other hand, employers often lack certain other competences, skills and personality traits. While perceived locally, these are influenced by the rapid changes and expectations of the outside world. Investigations identified lack of (Doracic, 2018):

- knowledge about the role and importance of the (public) library in society for democracy, education, availability and digitizing,
- insight in political work and policy decision-making processes – ie. what does it mean to be politically managed organization, to be part of municipality, region, state,
- developing the library as a creative space
- reading promotion
- cultural work
- knowledge about literature and literary history
- cataloging
- knowledge of languages other than mother tongue and English
- pedagogical skills, didactics
- planning library activities in collaboration with school, teacher, pupils, curriculum and practical implementation
- scholarly communication,
- open access/open data/open science
- competencies in support of research data management, including infrastructure, technology and law, visualization of data, data analysis, digital methods)

While some of these are observed mostly in the context of particular types of organizations (school libraries, academic libraries) and are as such more specific, others are more general. According to Doracic (2018), many employers also report inadequate personal characteristics, such as a lack of social skills and express the need for the personal with skills such as novel thinking, curiosity, flexibility, outgoing personality, initiative with drive, ability to create relationships, think outside the box. Without those organisation is not able to respond to users needs, to reach citizens, children and youth etc. The questions that arise from such findings are:

- Do educational programs attract students with the competences and skills needed by profession? This question is again connected to the identity of the field and of the profession.
- What could be done in order to strengthen the development of at least some of these characteristics during studies?

We could conclude with the notion that information sector (at least the library part) is a solid job market, but is extremely diverse and is rapidly changing due to the ongoing digital transformation and increased complexity. With the growing needs of corporate sectors and other information organizations, the complexity will surely increase even more. We observe an increased plea of employers for generic/general and personal competencies.

Specialization is required; in fact, it is the only realistic solution. Information organizations will also need other professions, e.g. computer scientists, information system scientists, communicators, publishers, marketing experts, teachers etc., which emphasizes the need for double degree (L)IS studies which would bring the candidates competences from various disciplines thus addressing the problem of interdisciplinarity.

6. Overall recommendations regarding the harmonization of the entry requirements and learning outcomes

Analyses and discussions have revealed that it may be doubtful (if at all reasonable) to focus on shaping standardized or harmonized learning outcomes in Information Science education, one of the reasons being diverse job markets in various partners' countries, and another the different environments of the Higher Education in these countries. During our discussions and investigations on what kind of information professionals are being shaped in our educational programmes, we did document that in spite of the identified differences, we are still talking about the same or very closely related field. This also means that we should not stop discussing the identity and mission of the Information Science. It also does not mean that we lack harmony, as harmony and diversity are two different things. Diversity is a positive trait and does not hinder harmony.

What seems to be important is to discuss the contribution of Information Science to society, accompanied and supported by ethics, and think thoroughly about how to market these aspects and issues. When speaking about harmonization of learning outcomes, we should be clear which aspects and processes are considered. Different institutions have different emphases within this context. It seems that approach in the Information Science community, that would be at the same time coherent and respectful to differences and different fields, is the answer to many dilemmas posed here. The educators are all doing the same things and seem to agree that it is about flexibility and tolerance which builds broad people. In terms of job market this requires tolerance and even kindness to newcomers – also employers should understand and tolerate beginners and give them time to grow and develop.

As there have been many observations that Information Science is today fragmented and in need of clear goals and a satisfactory theoretical frame, we should further emphasize the need of self-reflection of the discipline and of its constant development within the development of the society. In order to strenghthen the identity of Information Science, perhaps it is time that we stop the debates about the identity per se and focus on the mission of the discipline. As we already discussed, it is about the processes of the information communication chain (creation, selection, organisation, dissemination, discovery, management, preservation, analysis, use, understanding), and the interactions between them.

This basically considers the perceptions of Information Science from the perspective of various stakeholders (policy-makers, decision-makers, employers, educators, (potential) students) on the following:

- the role of Information Science in the society, in the economy; and potential needs to change this role;
- the content of Information Science studies;
- the difficulty of Information Science studies;
- the reasons to study Information Science, etc.

There are several levels of the recommendations that we suggest as a result of work in the EINFOSE project for different groups of agencies:

1. The **partners in the EINFOSE project**, to
   - continue the discussions of the contribution of Information Science to society and involve a wider academic community in these discussions;
   - focus the discussion on the key values and ethics of information profession in promoting the results of the project to the stakeholders on the governmental level;
   - emphasize the adaptability of Information Science graduates to different job tasks and the combination of "soft" social and "hard" technology skills in promoting the results of the project to potential employers;
   - continue the organization of the Summer School, if the proper financing is found, to make it a sustainable activity;
   - invest in applications for the resources needed to market and run the Summer School.

2. The **Information Science departments and schools** in the higher education institutions in European countries and to the **iSchools network**, to
   - organize further discussions of the common learning outcomes of the Information Science programmes on the Master's level, as was the FEIS symposium in Pisa, 2018, which has provided many interesting and fruitful discussions;
   - explore the diversity of the Information Science programmes with regard to existing labour markets, potential student audiences, possible specializations and other criteria;
   - prepare the maps of student and teacher mobility in Europe (and outside) with regard to the identified commonalities and differences;
   - promote the variety of study profiles and potential job profiles of Information Science graduates to the potential employers in different countries.

3. The **EU programme offices in the member countries** to
   - support the initiatives of the information science educators in drawing the maps of mobility between European Information Science departments and schools.

4. The **higher education authorities in European countries**, to
   - support the efforts of the Information Science departments in internationalization of their educational programmes;
   - provide resources for organization of the surveys of the actual employment of the Information Science graduates within European countries and harmonize these efforts on the European level.

5. The potential **employers of the Information Science graduates**, to
   - participate in the discussions about the knowledge and skills of Information Science graduates and their relevance for potential job market;
   - show flexibility and openness to changes and developments of the society, technology etc. which reflect in their fields and in Information Science;
   - provide internships and test positions for Information Science graduates;
   - provide opportunities for beginners in the field.

6. To European Commission (for example, Education, Audiovisual and Culture Executive Agency – EACEA; Employment, Social Affairs and Inclusion; European Research Council Executive Agency; Research Executive Agency
   - to respond to the intiatives of the Information Science educators and provide support to further exploration of harmonization means for the Information Science education in European countries (and elsewhere);
   - to provide continuous funding of the Summer School.

The overall recommendations, which follow, are divided into two fields that are, in our opinion, most important:

1. Recommendations regarding the common competences (learning outcomes) and job profiles;
2. Recommendations regarding the advocacy and promotion of Information Science.

6.1 Recommendations on the common competences (learning outcomes) and job profiles

As it was strengthened in the discussions following the initial presentation of the study findings and in other contributions, partners agreed that harmonization of study programmes, entry requirements and job market expectations is advisable but should be pursued with caution and tolerance due to rather fundamental differences between not only EINFOSE partners but also other HEIs which offer programmes in IS – in terms of ideas and traditions regarding education institutions and systems on the one hand, as well as employment market in various countries on the other. Diversity within the IS/LIS is not only good but necessary for further development of the field.

The partners agree that future changes in the educational programmes, at minimum, should be to think about the changes of the major components of all educational programmes: the students, the faculty, the curriculum and the modes of delivery. The emphasized point, which is worth to be considered carefully, is which parts of the educational programmes are worth keeping, which should be removed, adapted, added. This relates not only to European HEIs that offer educational programmes and conduct research in the wider area of Information Sciences, but worldwide. Having in mind that near future is bringing a hundreds of new jobs and information related profiles, we suggest offer a few issues to be considered for each of these components:

1. Students:
    - Beyond obvious characteristics of successful information professionals such as intelligence, creativity, communication skills, and desire to serve others, Information Science field should endeavor to recruit young people who have different BA backgrounds, and encourage high tolerance for ambiguity, analytical problem solving talent, intuitive or empathetic interaction styles, outgoing personalities, etc.
2. Faculty:
    - There is a growing need to recruit and promote both, generalists and specialists who might bring in their knowledge and expertize to the Information Science department/ school, participate in collaborative teaching and research with colleagues from other departments/schools, locally and internationally;
    - Schools should strive to find the best balance between research and teaching, and continuously shape both evaluations of research success and impact, as well as assessment of teaching effectiveness and excellence.
3. Curriculum:
    - Should be designed in such a way to support core ideas and techniques from Information Science field that must be included in every student's program or individualize curricula to learners;
    - Should show the right balance between information theories and information best practices;
    - Should be as much a comprehensive as the local circumstances allow and supported by cooperative and joint programmes with other HEIs, in Europe and wider;
    - Should be designed in such a way that allows evaluation of student learning outcomes and career impact.

4. Delivery:
    - Based upon new didactic approaches and principles (see: Didactic Framework) that allow the right balance of individualized and group learning, face to face and online learning, coursework and *in situ* learning;
    - Should endeavor to follow the guidelines provided by main information professional organizations.

In this document the partners agreed to shape two lists:

1. A list of basic Information Science competences and values (Figure 12), which are based on indexes of competences of information proffesionals and similar documents prepared by professional bodies (CILIP, EBLIDA, IFLA, ALA/SLA etc.), professional literature, discussions among project partners etc.; and
2. A list of specialized job profiles (Figure 13), which is also based on discussions and literature, as well as contents of actual job ads.

Both are of course incomprehensive and in need of further updating, due to various reasons: constant development of the field, continued debate on this draft document, views of various stakeholders etc.

Generic competences
- Analytical skills
- Systems and IT competences
- Leadership
- Advocacy
- Strategic planning
- Management
- Customer focus
- Service design
- Marketing

Specific/professional competences
- Organization of knowledge and information
- Information and knowledge management
- Using and exploiting knowledge and information
- Understanding and applying physical and digital information tools and techniques
- Research skills
- Library management
- Understanding and managing physical and digital services and resources
- Planning, construction and maintenance of appropriate physical and virtual information spaces
- Analysing users' information needs and behaviour
- Information governance and compliance
- Records management, preservation and archiving
- Collection management and development
- Public service competences
- Literacies
- Teaching and learning competences

Personal competences
- Adaptability
- Agility

- Communication
- Embracing change
- Responsiveness
- Collaboration
- Communication
- Creativity
- Enthusiasm
- Self-motivation
- Perseverance
- Tolerance
- Entrepreneurship
- Risk-taking
- Problem-solving

Values

- Accountability
- Constant professional development
- Competency
- Confidentiality
- Dependability
- Ethical behavior
- Fairness
- Honesty
- Integrity
- Responsibility
- Trustworthiness

Figure 12: A list of basic Information Science competences and values

- Archivist
- Business Intelligence Manager
- Communications Librarian
- Curator
- Data Librarian
- Data Services Librarian
- Digital Archivist υ Content Manager
- Digital curator
- Digital librarian
- Digital Projects Librarian
- Digital strategist
- Digital Technologies Specialist
- Documentalist
- e-resources manager(ERM)
- Implementation and Migration Manager
- Information analysts
- Information manager
- Information Officer
- Information Specialist
- Instruction & Digital Services Specialist
- Knowledge Management Coordinator
- Knowledge manager

- Librarian
- Librarian's specializations: Public, university, special, school librarian; Cataloguer, reference, collection librarian, system librarian, Youth Service Librarian, Cataloging and Metadata Specialist, Serials and Electronic Resources Manager, Access Services Librarian
- Metadata Development Specialist
- Museum Education Coordinator υ GIS and Geospatial Data Coordinator
- Preservation, curation specialist
- Product Information Coordinator
- Project Manager
- Records Manager
- Research Consultant
- Resource Description Librarian
- Scholarly Publishing & Intellectual Access Specialist
- Software Engineer
- STEM Outreach & Instruction Librarian
- User Experience Designer
- Web analyst
- Web Editor

Figure 13: A list of specialized Information Science job profiles, as given in various job ads

Based on this, we recommend that EINFOSE partners and other higher education organizations establish an ongoing systematic monitoring of the job market, maintain contacts with the employers, decision-makers and education institutions, as well as continue with their contacts and exchange of good practices.

Variations found in the study programmes, job markets and other influential circumstances, such as different formal entry procedures, we have to conclude that the approach to harmonization of the entry requirements lies in recognition of common grounds in Information Science within European Union. We also suggest that partners, as much as possible, open their study programmes to students of other disciplines, and to consider the attendance at ESSIS Summer School, especially in case this programme continues in the future, be it within this or any other formal framework.

6.2 Recommendations on the advocacy and promotion of Information Science

Since in our investigation and discussions during the duration of the EINFOSE project, it was found that to define what constitutes an information profession and competences is a difficult task, the real question is how to change (or influence) the educational and employment systems, in fact the entire society.

An important factor in this is promotion, advertising and advocacy of Information Science and its role in the society, which can only be done by the people in Information Science in collaboration with relevant stakeholders and collaborators:

- **To the decision-makers in the context of national policies, legislation, curriculum content,**
- **To existing and potential employers about the benefit of Information Science skills for their 'business' (also using best-practice examples),**
- **To educators on all levels of formal schooling,**
- **To potential students when they contemplate what to study and why (to attract candidates from areas other than humanities and social sciences; also using the case of i-schools as an example),**
- **To the society as a whole about the role of information and knowledge in its development and progress.**

All of these areas require a good plan on how to approach this process, in which phases it should be divided, which stakeholders to be addressed and in which order. Also, educational programmes need to think thoroughly about their structure, contents, and expected learning goals, and also focus on establishing and maintaining contacts with the job market. And, above all, they need to thoroughly think who they want to attract in the first place.

Since we obviously need to influence the public image of Information Science, the main question the Information Science educational community should ask themselves is:

Which things/images/perceptions do we want associated with the image of Information Science in the eye of an average individual, to make it a well-defined profession and give it a positive connotation?

Considering the width of the Information Science, achieving common learning outcomes in all sub-fields of Information Science areas, it may be too much for a 2-year study programme.

We suggest two approaches:

1. **To promote increased learning and knowledge about partner departments and schools to pursue identification of Information Science common grounds which would resonate in learning outcomes.** These could also document the nucleus of the Information Science, the reason being that each 'established' academic and research discipline is able to differ their domain from other disciplines. Information Science should be able to say what is its *differencia specifica* and what are the content, knowledge and skills which students should acquire to be called information professionals. Information Science should also strive to define its 'superior domain' and the sub-disciplines which connect the community within the area of IS/LIS.

2. **To continue with specialization, as well as division between professional and academic competences, which probably is the best possible response to the needs of the society and of the job market.** This would also strengthen the exchange of expertise and influence networking and collaboration between EU HEI institutions.

We recommend to all partner HEIs not to burden the students with the task to find their place in the society and in the job market after graduating from Information Science programmes – it is up to Information Science people (university management, study programmes designers etc.) to do this job of defining where information competences are best used and most useful, and work on persuading the employers that they need people with precisely these competences. However, we should think about how to improve promotion and advocacy skills of people working in HEI Information Science and attract promotion specialists.

The EINFOSE project was a wonderful opportunity for many reasons, among them:

- It provided an opportunity to get a better insight into the wide variety of situations in EU countries, regarding organization of higher education, job market, etc.
- It also enabled us to dedicate time and effort to strategic discussions and contemplations regarding the future of European Information Science education, and the role of information Science in society.

We strongly believe that this project opened a path to even better cooperation between HEI's themselves, as well as with employers, decision-makers, even wider society.

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