Change and Innovation in European Library and Information Science Education

Abstract
This review article examines current trends and developments in higher education and considers how library and information science institutions have responded to these. The contribution of LIS institutions to innovation and change in Europe is examined through institutional case studies in the following institutions: the Institute of Information Science and Information Systems, University of Graz, Austria; the Institute of Information Studies of Tallinn University, Estonia; the Department of Library Science and Information Systems, the Alexander Technological Educational Institute of Thessaloniki, Greece; the Faculty of Communication of Vilnius University, Lithuania; and the Swedish School of Library and Information Science, University of Borås, Sweden. This paper follows up the study conducted in 2003 by Virkus and Wood (2004, 2005), who analyzed trends and developments in higher education and the responses to these by LIS institutions. The findings of the study are used to identify the main challenges for LIS education.

Resumen
El objetivo principal de este artículo es ofrecer una perspectiva de las tendencias y los avances actuales en el ámbito de la enseñanza superior, así como ilustrar algunas de las respuestas que las instituciones de Biblioteconomía y Documentación (ByD) han dado ante estos cambios. Se analiza la contribución que hacen las instituciones de ByD a la innovación y el cambio en Europa, mediante cinco estudios de caso llevados a cabo en las siguientes instituciones: el Instituto de Ciencia de la Información y Sistemas de la Universidad de Graz (Austria); el Instituto de Estudios de Información de la Tallinn University (Estonia); el Departamento de Ciencia de la Información y Sistemas de la Universidad de Borås (Suecia). Este trabajo complementa el estudio de Virkus y Wood (2004, 2005), en el que se analizaban las tendencias y avances registrados en la enseñanza superior y las respuestas que las instituciones de ByD dieron ante estos cambios. Se presentan los retos más importantes a qué ha de hacer frente la enseñanza de ByD sobre la base de los resultados del estudio.

Resum
L’objectiu principal d’aquest article és oferir una perspectiva de les tendències i avanços actuals en l’àmbit de l’ensenyament superior, així com il·lustrar algunes de les respostes que les institucions de Biblioteconomia i Documentació (BID) han donat davant d’aquests canvis. S’analitza la contribució que fan les institucions de BID a la innovació i el canvi a Europa, mitjançant cinc estudis de casos duts a terme a les institucions següents: l’Institute of Information Science and Information Systems de la University of Graz (Àustria); l’Institute of Information Studies de la Tallinn University (Estònia); el Department of Library Science and Information Systems de l’Alexander Technological Educational Institute de Thessaloniki (Grècia); la Faculty of Communication de la Vilnius University (Lituània); i la Swedish School of Library and Information Science de la University of Borås (Suècia). Aquest treball complementa l’estudi de Virkus i Wood (2004, 2005), en el qual s’analitzaven les tendències i avanços registrats en l’ensenyament superior i les respostes que les institucions de BID van donar davant d’aquests canvis. Es presenten els reptes més importants a què ha de fer front l’ensenyament de BID sobre la base dels resultats de l’estudi.
Introduction

We are living today in an environment where change has become the norm for organizations to sustain their success and existence. Although many approaches and methods have been suggested to manage change, the success rate of change initiatives is less than 30 percent (Al-Haddad; Kotnour, 2015, p.234-235). There is also widespread recognition of the importance of innovation to European competitiveness and growth. The Europe 2020 Strategy which aims at achieving smart, sustainable and inclusive growth puts developing an economy based on knowledge and innovation among three mutually reinforcing priorities. The Strategy states that Europe's "average growth rate has been structurally lower than that of our main economic partners" influenced by "lower levels of investment in R&D and innovation, insufficient use of information and communications technologies (ICT), reluctance in some parts of our societies to embrace innovation, barriers to market access and a less dynamic business environment" (European Commission, 2010, p.5).

The Europe 2020 Strategy also acknowledges a need for a fundamental transformation of education and training in order to address the new skills and competencies that will be required if Europe is to remain competitive. Innovation in education and training is a key priority in several flagship initiatives of the Europe 2020 strategy (e.g. the Agenda for New Skills and Jobs, Youth on the Move, the Digital Agenda, and the Innovation Union Agenda). Educational stakeholders also recognise the contribution of ICT to achieving these targets, and the role of ICT as a key enabler of innovation and creativity in education and for learning in general. It is also believed that the full potential of ICT is not being realised in education settings and that only a few innovative projects manage to survive beyond the early adopter stage and become fully embedded in educational practice (Kampylis et al., 2012, p.1).

Higher education (HE) institutions have an important role to play in the Europe 2020 strategy. Yet, it is believed that the potential of European HE institutions to contribute to Europe's prosperity remains underexploited. Too few European HE institutions are recognised as world class in the current, research-oriented global university rankings (European Commission, 2011, p.2). Therefore, the 2013 Communication of European Commission (EC) Opening up Education: Innovative teaching and learning for all through new Technologies and Open Educational Resources sets out a European agenda for stimulating high-quality, innovative ways of learning and teaching through new technologies and digital content building on the recent initiatives Rethinking Education, European Higher Education in the World as well as the EU flagship initiative Digital Agenda (European Commission, 2013, p.2). It is believed that ICTs will broaden access to learning opportunities at different levels and varied educational contexts, will enable teachers to better respond to diversity and heterogeneity in the classroom and enrich teaching, improve learning experiences, support personalised learning, facilitate access through distance learning, and virtual mobility, streamline administration and create new opportunities for research (Redecker et al., 2011, p.81; European Commission, 2011, p.5). Thus, the Europe 2020 Strategy focuses on innovation, new skills and jobs, digitalisation, resource efficiency, and poverty reduction.

This paper presents a follow-up of the study by Virkus and Wood (2004, 2005) which analyzed trends and developments in HE and the responses of library and information science (LIS) institutions to these changes in 2003. The contribution of LIS institutions to innovation in Europe was examined through three case studies: the Manchester Metropolitan University, the Robert Gordon University and the Tallinn Pedagogical University (now Tallinn University). A total of 12 interviews were carried out at three universities in spring 2003 and how these institutions perceived innovation and change was presented.

During the last twelve years the learning environment has changed significantly; there are new societal needs, students' expectations, technological developments, and learning and information practices (LisbonSCOP2013). Education paradigms are shifting to include more online learning, blended and hybrid learning, and collaborative models (Johnson et al., 2014). With the development of open education philosophies that focus on open content, open data, and open educational resources (OER) together with the rise of Massive Open Online Courses (MOOCs) during the last decade, the courses, programs, learning objects, providers and practices have moved increasingly across national boundaries (Virkus; Uukkivi, 2015). Therefore it was decided to replicate that study.

The contribution of LIS institutions to innovation and change in Europe is examined through five institutional case studies: The Institute of Information Science and Information Systems, University of Graz, Austria; Institute of Information Studies of Tallinn University, Estonia; Department of Library Science and Information Systems, Alexander Technological Educational Institute of Thessaloniki, Greece; Faculty of Communication of Vilnius University, Lithuania and the Swedish School of Library and Information Science, University of Borås, Sweden. This paper is divided into four sections. The paper includes an introduction and a brief overview of main changes and innovation in HE that have had an impact on European HE. It then proceeds to discuss contribution of LIS institutions to innovation and change in Europe. The final part presents conclusions.

2 Trends and developments in the higher education environment

There is evidence that demographic trends and the financial and economic crises are having a profound effect on European HE systems (Sursock, 2015, p.34). The weak economic outlook has been accompanied by an increase in youth unemployment in many parts of Europe. This has prompted many governments, the EC and the Organisation for Economic Co-operation and Development (OECD) to emphasise the need for closer links between universities and industry, to stress innovation policies and graduate employability. In response European universities are placing more focus on developing the practical and entrepreneurial skills of their students, and on promoting innovation and a broad range of stakeholder partnerships (Sursock, 2015, pp.23-24). Other key trends in the last decade relate to the developments in ICT and the
A number of publications spoke of technological advances as one of the most important future change drivers in HE. For example, the brief Technologies in Higher Education: Mapping the Terrain published by the UNESCO Institute for Information Technologies in Education (IITE) provides an overview of the major ICT related developments which influenced HE (UNESCO IITE, 2014). The internationally recognized NMC Horizon Report series are designed to help education leaders, policy makers, and faculty understand new and emerging ICTs, and their potential impact on teaching, learning, and research. NMC Horizon Report series and regional NMC Technology Outlooks are part of the NMC Horizon Project, a comprehensive research venture established in 2002 that identifies and describes emerging technologies or practices that are likely to enter mainstream use over a period of the coming five years in education around the globe (Johnson et al., 2013, p.3). Educational leaders worldwide look to the NMC Horizon Project and both its global and regional reports as key strategic technology planning references (Johnson et al., 2015, p.1).

In 2014, the Horizon Report Higher Education Edition identified six emerging technologies that were likely to have an impact on HE in the next five years: a) flipped classroom and learning analytics; b) 3D printing and games and gamification; c) quantified self and virtual assistants (Johnson et al., 2014) and in 2015: a) Bring Your Own Device (BYOD) and flipped classroom; b) makerspaces and wearable technology; c) adaptive learning technologies and the Internet of Things. BYOD and the flipped classroom are expected to be increasingly adopted by institutions in one year’s time or less to make use of mobile and online learning. The time-to-adoption for makerspaces and wearable technology are estimated within two to three years, while adaptive learning technologies and the Internet of Things is expected to be mainstream in universities and colleges within four to five years (see Table 1) (Johnson et al., 2015).

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<thead>
<tr>
<th>Emerging technologies</th>
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<tr>
<td>Time-to-Adoption Horizon: Near-term horizon - One Year or Less</td>
<td>Flipped Classroom</td>
<td>Bring Your Own Device</td>
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<td>Learning Analytics</td>
<td>Flipped Classroom</td>
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<td>Time-to-Adoption: Mid-term horizon: Two to Three Years</td>
<td>3D Printing</td>
<td>Makerspaces</td>
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<td>Games &amp; Gamification</td>
<td>Wearable Technology</td>
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<tr>
<td>Time-to-Adoption Horizon: Far-term horizon - Four to Five Years</td>
<td>Quantified Self</td>
<td>Adaptive Learning Technologies</td>
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<td>Virtual Assistants</td>
<td>The Internet of Things</td>
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Table 1. Emerging technologies that have an impact on HE (Horizon Reports 2014, 2015).

The NMC Horizon Reports also indicate the key trends that are very likely to impact changes in HE across the world over the next five years. These trends are sorted into three time-related categories: fast trends that will realize their impact in the next one to two years, and two categories of slower trends (mid-range and long-range trends) that will realize their impact within three to five or more years. The key trends mentioned in the 2014 Report are: growing importance of social media, integration of online, hybrid, and collaborative learning, rise of data-driven learning and assessment, shift from students as consumers to students as creators, agile approaches to change, and evolution of online learning (Johnson et al., 2014). In the 2015 Report the key trends are as follows: increasing use of blended learning, redesigning learning spaces, growing focus on measuring learning, proliferation of OER, advancing cultures of change and innovation, and increasing cross-institution collaboration. Each of these trends has numerous implications for teaching and learning practices (see Table 2) (Johnson et al., 2015).

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<tr>
<th>Trends</th>
<th>2014</th>
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<tr>
<td>Fast Trends (next one to two years)</td>
<td>Growing Importance of Social Media</td>
<td>Increasing Use of Blended Learning</td>
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<td></td>
<td>Integration of Online, Hybrid, &amp; Collaborative learning</td>
<td>Redesigning Learning Spaces</td>
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<tr>
<td>Mid-range Trends (next three to five years)</td>
<td>Rise of Data-Driven Learning &amp; Assessment</td>
<td>Growing Focus on Measuring Learning</td>
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<td></td>
<td>Shift from Students as Consumers to Students as Creators</td>
<td>Proliferation of OER</td>
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<tr>
<td>Long-Range Trends (next five or more years)</td>
<td>Agile Approaches to Change</td>
<td>Advancing Cultures of Change &amp; Innovation</td>
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<td></td>
<td>Evolution of Online Learning</td>
<td>Increasing Cross-Institution Collaboration</td>
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Table 2. Key trends that have an impact on HE (Horizon Reports 2014, 2015).

The NMC Horizon Reports indicate a number of challenges that are barriers to the mainstream use of technology in HE. The challenges are sorted into three categories: solvable challenges as those that we both understand and know how to solve; difficult challenges that are more or less well-understood but for which solutions remain elusive; and wicked challenges, the most difficult, are categorized as complex to even define, and thus require additional data and insights before solutions will even be possible (see Table 3) (Johnson et al., 2014).
The significant challenges mentioned in the 2014 Report are low digital fluency of faculty and relative lack of rewards for teaching as solvable challenges, competition from new models of education amongst which is the rise of MOOCs and scaling teaching innovations as difficult challenges, and expanding access and keeping education relevant as wicked challenges (Johnson et al., 2014). In the 2015 Report blending formal and informal learning and improving digital literacy (DL) are perceived as solvable challenges, personalizing learning and teaching complex thinking are considered difficult challenges, and competing models of education and rewarding teaching are defined as wicked challenges (see Table 3) (Johnson et al., 2015). For example, improving DL is considered as one of the solvable challenges in 2014 and is already addressed by several institutions. For example, the Open University in the United Kingdom (UK) developed the Digital and Information Literacy Framework to better integrate DL in their curriculum and Cornell University made available online resources for learning key technology skills (Johnson et al., 2015, p.1).

All these emerging technologies, trends and challenges analysed by the Horizon Project are very likely impact technology planning and decision-making over the next years and has been tied to essential questions of relevance, policy, leadership, and practice (Johnson et al., 2014). The Trend 2015 report provided evidence of the changing policy landscape in Europe that is becoming more varied and fragmented and notes that “a number of gaps between policy making and institutional priorities should be addressed” (Sursock 2015, p.35). However, two trends in particular are expected to have a strong impact on policy decisions in the next five years: the proliferation of OER and measuring learning through data-driven practice and assessment. For example, the EC's Institute for Prospective Technological Studies (IPTS) launched the Opening Up Education to assist in the formulation of guidelines in OER adoption and implementation and the Open University in the UK has created policies that support the ethical use of learners' analytics (Johnson et al., 2015, p.6). Thus, traditional educational models are challenged by increasing numbers of online courses, OER and MOOCs that provide possibilities to learn autonomously; it challenges the world of formalized degrees and campus universities (van Rij, 2015, p.33). MOOCs have also focused attention on a range of issues related to learning pedagogies and the use of ICT-based learning (Sursock, 2015, p.33; Rajabi; Virkus, 2013). However, many authors point to the fact that many educators "are not aware enough or even if they are aware are not capable to utilize the new changing learning opportunities" at the primary and secondary education as well as HE (van Rij, 2015, p.14).

Internationalization of HE has been an important priority for many international organisations, governments and HE institutions for many years and is a trend that is expected to continue in HE. It is believed that universities have now developed more strategic approaches (Sursock, 2015, p.26) including curriculum design and delivery, teaching and learning, mobility including virtual mobility, research and administration; it is also translated into staff policies focusing on international recruitment, academic experience gained in another institution and internationalising staff through staff mobility (Sursock, 2015, p.14).

However, these trends, challenges and emerging technologies are all interconnected and influence significantly European HE including LIS institutions.

### 3 Methodology

This paper is based on the presentation given at the III International Seminar on Library and Information Science Education and Research (LIS-ER) in Barcelona, 4-5 June 2015. The main objective of this paper was to give an overview of current trends and developments in higher education and provide some examples of responses of Library and Information Science (LIS) institutions to these changes.

Therefore, convenience sampling technique was used to collect data to illustrate the change and innovation process in the selected LIS institutions. The institutions were selected because of their convenient accessibility and proximity to the researcher. Furthermore, as the aim of the paper was to provide some illustrations and not generalisations, the sample was not intended to be comprehensive and representative of the LIS education in Europe as a whole.

A total of 15 academic staff members were involved in this small scale study in spring 2015. Two academic staff members from each of the five LIS institution - the Institute of Information Science and Information Systems, University of Graz, Institute of Information Studies of Tallinn University, Department of Library Science and Information Systems, Alexander Technological Educational Institute of Thessaloniki, Faculty of Communication of Vilnius University and the Swedish School of Library and Information Science of the University of Borås - answered to the questionnaire with open questions. In addition three interviews were conducted with academic staff members at the Institute of Information Studies of Tallinn University and two interviews with the staff members at the Department of Library Science and Information Systems, Alexander Technological Educational Institute of Thessaloniki.

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<tr>
<th>Challenges</th>
<th>2014</th>
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<tr>
<td>Solvable Challenges</td>
<td>Low Digital Fluency of Faculty</td>
<td>Blending Formal &amp; Informal Learning</td>
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<td>Relative Lack of Rewards for Teaching</td>
<td>Improving Digital Literacy</td>
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<tr>
<td>Difficult Challenges</td>
<td>Competition from New Models of Education</td>
<td>Personalized Learning</td>
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<td>Scaling Teaching Innovations</td>
<td>Teaching Complex Thinking</td>
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<tr>
<td>Wicked Challenges</td>
<td>Expanding Access</td>
<td>Competing Models of Education</td>
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<td>Keeping Education Relevant</td>
<td>Rewards for Teaching</td>
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Table 3. Challenges for the HE in the coming decade (Horizon Reports 2014, 2015).
The study was covering a number of aspects, which sought to determine where the innovations and changes had originated, which people were instrumental in introducing and implementing change, attitudes to the changes, and generally looking at the impact of the changes on both the pedagogy and the departments concerned. The questions about how the academic staff perceives innovation and the most important innovations in the past five years were asked.

4 Contribution of LIS institutions to innovation in Europe

The concept of innovation was central for this study and therefore it was important to examine how study participants perceived and understood this central concept. All research participants agreed that innovation can be defined as the introduction or initiation of something new and original, something that did not exist before. Innovation was perceived as a new idea, product, service, process, approach, instrument, solution, technological novelty or advancement, new methodologies, research directions and results, best practices or technologies. However, several academics connected innovation mainly with the technological novelty. For example, one staff member described innovation as "an implementation of something new (it may be philosophical ideas, methodologies, scientific research results, best practices, new technologies etc) in your everyday life", another notes "Innovation is the introduction of a novelty or a novel aspect (can be a product, a service, or a process) which brings some kind of improvement (in quality, functionality, cost, productivity)" and another says that "innovation would be a new way of doing something or a new instrument for accomplishing some task. Innovation for me always comes with a positive improvement connotation: gives some benefit or pleasure, is easier, and helps to save time or space, or money". The idea of innovation as a process of developing novel ideas that are likely to be useful reflect the idea of Light (1998), the author of the book Sustaining Innovation, that innovation in the public sector must be about facilitating the work of our primary constituents in ways that are new and useful - doing something worthwhile.

All research participants agreed that there is a need to innovate. One staff member notes that innovation and experimentation with new educational methods is a key element in education and another adds that innovative thinking makes humans go forward and achieve things. It was believed that the connotation of an improvement makes it necessary to innovate all the time as there is always room for perfecting something.

The main innovations that have been introduced in the last five years included structural changes at the departmental, institute or university level. For example, one university is undergoing an university-wide restructuring process which changes the classical structure of the university – transfer from 19 disciplinary institutes to five interdisciplinary focus fields (educational innovation, cultural competencies, digital and media culture, healthy and sustainable lifestyle and open society and governance) which will result in reduced staff numbers and curricula. One institution mentioned changes in the departmental restructuring in terms of human resources (e.g. old guard left and due to financial cuts departments had to merge and operate as one). In another institution the department was involved in an innovative re-organization, resulting in it being part of a faculty. One interviewee also mentioned a new body for coordinating and harmonizing teaching the same courses in different programmes which enabled easier planning and saving time of the teaching staff.

Secondly, research participants referred to changes and innovation related to ICT. These included the use of the learning management system (e.g. Moodle), teleconference system, and e-books. In addition, the development of OERs, the integration of social media into learning and teaching, exploring the use of learning analytics and MOOCs, experimenting with BOYD, using cross-country teaching and learning with the help of ICT, transferring the curriculum to the online and blended mode, and the implementation of the new system of booking business travels and accounting were mentioned. For example, one staff member said: "In general the department is making an effort to introduce the new technologies in the program of studies either with the form of new courses that are strongly linked with new technologies or by introducing new educational methods based on new technologies". In one department staff members found that the introduction and use of the learning management system Moodle as an innovation. One institute referred to the idea of supporting the professional development of librarians through MOOCs. The research participants believed that ICT helped to improve the effectiveness and quality of learning and teaching, develop an environment for personalized learning and contribute to the internationalization process. We can see that ICT was an important innovation that affected the investigated institution although the results showed little disparity concerning the ICT tools in place.

The third main area where innovation is common is in the development of new programmes, courses and teaching methods. For example, one department developed a new online programme in digital library management, another introduced a joint master degree programme “Global Studies on Management and Information Science” (GLOMIS), one institution transferred their Digital Library Learning joint master campus programme into two additional modes – an online and a blended learning mode. Several staff members described new courses that are strongly linked with new technologies, and the development and design of curricula in a new way (inter-disciplinary and cross-disciplinary). In one department English language lectures in the German language curriculum and the increased use of case studies in teaching and learning was mentioned as innovation. Thus, in the area of learning and teaching there were many initiatives to improve the quality of teaching and learning and to widen access to education through offering students the alternative learning opportunities. Introducing new ways of teaching and learning and developing new curricula or revising existing curricula in adding new courses were led by the analysis of the needs of potential target groups (students, library and information professionals, employers, professional associations).

The process of internationalisation, forming new partnerships and collaboration were also perceived as innovations. For example, the following activities were mentioned: partnership with new international partners, cooperation with the Greek Librarians Association for organising manifestations with various subjects, cooperation with Organising Committee of Library Reinforcement, initiation of interdisciplinary
research and development projects with other institutes within the university and other universities as well as cross-border exchange and collaboration, development of international joint master programmes, and the creation of contacts with those who already are professionals. These were all part of these developments.

The main triggers that led to the introduction of innovation were connected with the economic crisis and inadequate financial resources. However, it is not surprising, as the financial and economic crises have had a profound effect on many HE institutions (Sursock, 2015). Next to the economic factors were emerging technologies, pressure to change in HE, need to follow the changes in the LIS field and keep educational relevance, competition with other players, the effort to trigger more students in the context of negative demographic trends, an increasing number of international students, a need to expand access and reach to new target groups, to offer possibilities for personalized learning and lifelong learning. It was believed that an analysis of the job market and new programmes could help to attract more students and bring prestige and authority to the LIS institution. One research participant said: "The innovation was literary forced […] due to financial cuts and directives to cut down in staff", another mentioned: "Introduction of innovation was connected with changes in the discipline, with changes in teaching and learning approaches, anticipated changes in student patterns of study and recognition that continuous development for librarians depends upon them". However, one staff member said “The rector's desire for change" and “the university wish to get a quality certification” were the main triggers. One staff member said: "There were several pressures, first of all the rapid development of the digital environment that brought along the need to modernize not only the content of curricula but offered also new approaches in teaching methods and learning process. The changed environment offers new jobs and also requires from the employees new skills. The demographic situation had also to be taken into account" and another added "There is always the danger that our institute is not re-continued one day. If, however, our institute can demonstrate which benefits it delivers to our faculty, this danger is very low".

All staff members interviewed were involved in the change and innovation process although to varying degrees. A limited number of individuals were more influential and contributed more to the innovation process. However, in case of radical innovation in the organization all staff members were involved in the process. The majority of interviewed academics believed that they helped to implement change and only few felt that they were initiators of innovation. For example, one staff member said: "The initial idea was born from a colleague from the German partner university. However, I was strongly involved in the implementation of GLOMIS at our university from the very beginning and, thus, also had a great influence on its formation" and another added "Basically, the whole teaching staff (experimenting) and the department management (initiating and stimulating), programme and study directors (leading)". One staff member said that it will make my job easier and help to diminish the workloads. I believe in therapeutic organizations and will participate in anything that helps to make them true". Innovation and change was mainly introduced to the staff in departmental meetings, seminars and via e-mails. In one institution the participants also mentioned personal invitations. However, several staff member were quite critical how the innovation and change was communicated to the staff. One staff member said that it "was not communicated at all until we asked about it". In one institution the staff member said: "At the university campus it was most probably planned in using university communication channels in the best possible way, but in reality it seems that the information communicated was contradictory and all committees, commissions and working groups and university communication channels (lists, intranet, newsletter etc) stayed distance to academics. There is a huge gap how the innovative structural changes in the university are seen from to the top management and from the academics point of view". In that institution the developments were top-down, and came as actions to be taken and therefore staff did not feel very much involved. One person mentioned that structural changes had been very time-consuming and it had been a negative impact on teaching and research activities. Several staff members highlighted the need for better leadership and management in the change and innovation process.

It was pointed out that academics were generally positive toward the change and innovation process, but participated to varying degrees. One staff member said: "They were all very excited and positive but very few of them actively participated" and another added that innovation and change had been "stage and situation dependent – some unhappy periods along the way for all through the confusion and misunderstandings, but mainly regarding the whole process as necessary and alleviating the work".

It was also asked what type of innovation and change occurred. Al-Haddad and Kotnour (2015, p. 242) believe that when the change type is clearly identified, then the most appropriate methods to promote change can be used. There were different views about the type of innovation and change. Small improvements and extensions to existing processes were seen as incremental. However, radical and architectural innovation was also introduced. The staff member said: "I believe that the structural change as an innovation process has an impact on all the university and staff and therefore we can talk about radical innovation". Sometimes there was a mixture of incremental, radical and architectural change. For example, one staff member said “I would describe them both as radical as well as architectural (involving restructuring of staff responsibilities) as some aspects were completely uncharted territory thus radical where as some others involved restructuring”.

A number of impacts were noted. In terms of competing with other departments all institutions found that the introduction of innovation was a good strategy. In several institutions the result of innovation was an upgraded curricula and courses, and it was felt that the quality of the educational offer increased. The staff was also happy that new programmes were successful and continue to run and that more information science courses are offered in English. One staff member said: "The impact of the change has been encouraging and testifies that we have done the right decisions. At the moment we are still in the phase of implementing the innovations of curricula and the thorough analysis can be done after two-three years when we have had the first graduates from the full programmes". The use of ICT in education was perceived to have a positive impact on teaching and learning. In one institution it was believed that learning objects and OERs helped to make learning more flexible and influenced positively the teaching and learning institution. It was noted: “Staff was strongly encouraged to create online testings and courses. As a result there are 54 online courses today. This means that the most of the courses have their material online that is easily accessible by all students that do not have to be on campus to access the material and communicate with their peers and teachers". E-books were felt good for distance students
and the system of business travel diminished freedom, but gave financial advantages for the staff. The coordination and harmonization of teaching had a big impact on staff time saving.

Ideas for further innovation included collaboration with other LIS departments either from their own country or abroad, having teachers from other department to teach in their departments and provide fresh ideas and methods of teaching. One staff member said: "Since the EU fund is granted only for four years, we plan to find sponsors from the private companies in the future. This would also strengthen the relations of our institute with private enterprises". In one institution the staff member said: "At the moment we have ahead further innovations grounded from the merge of structural units of informatics, information science and mathematics. It gives different possibilities for innovations both in academic and organisational field". One staff member also found that digital science is an opportunity for LIS institutions.

5 Conclusions

In the past five years European LIS institutions are influenced by different types of challenges such as the economic crisis, negative demographic trends in some countries, emerging technologies, internationalisation and globalisation and therefore there is a continuous need to find innovative ways to survive and achieve educational goals. There is pressure on HE institutions to do more with less and the question of how to achieve excellence in teaching and learning with the time of costs and cuts is being asked by many institutions. The five case study institutions of this study try to respond to these challenges and innovate constantly in order to maintain efficiency, effectiveness and economy.

The main innovation was connected with structural changes at the departmental and university level, the course and programme development, ICT developments, internationalisation, and collaboration and partnership. Academics believed that there is a need to constantly innovate. The main triggers that led to the introduction of innovation were connected with the economic crisis and inadequate financial resources, emerging technologies, need to follow the changes in the LIS field and keep education relevant, competition with other players, the effort to trigger more students because of negative demographic trends, an increasing number of international students, a need to expand access and reach to the new target groups, to offer possibilities for personalized learning and lifelong learning.

Compared to the trends, challenges and technology developments of the Horizon Reports in 2014 and 2015 the following challenges were mentioned by the research participants: expanding access and keeping education relevant that were perceived as wicked challenges by the expert panel of the Horizon Report in 2014 and personalized learning that was perceived as a difficult challenge by the expert panel of the Horizon Report in 2015. The following trends were mentioned: growing importance of social media and integration of online, hybrid, and collaborative learning that were fast trends and evolution of online learning that was a long-range trend according to the Horizon Report in 2014 and proliferation of OER as a mid-range trend and increasing cross-institutional collaboration as a long-range trend according to the Horizon Report in 2015. Regarding technology developments only learning analytics and BOYD was mentioned by the research participants.

Although ICT was used in teaching and learning in all LIS institutions, two LIS institutions have paid more attention to ICT, whereas the other three institutions had invested more in the programme and course development. Two institutions have had significant structural changes and three institutions paid more attention to the internationalisation process. All staff members were involved in the change and innovation process, although to varying degrees. The staff generally was positive towards innovation and recognised the need to change. In most cases changes have been incremental, but radical and architectural innovation was also introduced. Sometimes there was a mixture of incremental, radical and architectural change.

The staff attitude towards innovation and change and their involvement in this process was quite similar to the study in 2003 even though the questionnaires had been answered by different staff members and the institutions were not strictly the same. However, compared to the previous study the academic staff in these five case study institutions perceived innovation and change sometimes differently and was more critical and self-critical towards the innovation and change process. Twelve years ago the staff of the explored institutions was more forward-looking and optimistic and several academics referred to the Bologna Process. However, the Bologna was not mentioned in this study. Any sharp differences because of the different national contexts of these case studies were not recognised. It should be said, however, that these conclusions are made on the basis of five case studies and a limited number of research participants and the results may not be representative.

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