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Mapping Skills and Competencies; Providing Access to Knowledge, Tools and Platforms; and Strengthening, Disseminating and Exploiting Success Outcomes for a Skilled Transatlantic eHealth Workforce

Case Study: eHealth and mHealth development in Slovenia: Smart Specialisation and Smart Cities Initiative

University of Maribor, Faculty of Health Sciences, Center for International Cooperation

TITLE eHealth and mHealth Development in Slovenia: Smart Specialisation and Smart Cities Initiative

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ORGANIZATION

This case study is focused on how eHealth and mobile health (mHealth) development in Slovenia is currently mobilizing within three related projects tied to the Smart Specialization and Smart Cities Initiative. The European Commission (EC) and the European Regional Development Fund (ERDF), which began in 2015, fund this initiative. Together, with other partners, we are working to ensure that e/mHealth is infused into all three of the important projects showcased in the study.

BACKGROUND

The National eHealth project systematically started in 2008 with the goal to digitalize health care in the form of electronic solutions to provide greater security and quality for the provision of health services. In 2011, the Ministry of Health (MoH) established the eHealth sector, which accelerated the planning, implementation, pilot projects and introduction of solutions into the health system. Since 2015, the National Institute of Public Health [1] has managed the eHealth initiative.

Recently, eHealth and health informatics (HI) development is, among other initiatives, targeted under the European Commission's Smart Specialisation strategies, especially the Smart Cities Projects. Smart Specialization is a platform for concentrating development investments in areas where Slovenia has the critical mass of knowledge, capacities and competences, and where there is innovation potential for placing Slovenia within global markets and thus enhancing its recognisability. Smart Specialisation is a strategy aiming to a) strengthen the competitiveness of the economy by enhancing its innovation capacity, b) diversify existing industries and service activities and c) boost growth of new and fast growing industries and enterprises.

Within this platform, there are two projects focused on eHealth: EkoSmart [2] and Smart Cities and Communities [3]. Both the University of Maribor and the Community Health Center Dr. Adolf Drolc Maribor are playing leading roles.

EkoSmart is a project devoted to the development of a smart city ecosystem focusing on three key domains: health, active living and mobility. eHealth and mHealth are the two main pillars on which the smart city ecosystem is built. Various e/mHealth applications are being developed, such as mobile support

for chronic diseases, smart dentistry applications, eHealth support for clinical pathways, active aging and wellbeing, etc.

The Smart Cities and Communities project's key objectives are related to e/mHealth being used to improve health services and the health of the population in smart cities and communities, introducing the concept of *precision health*. Precision health is a step forward from personalized medicine, since it defines activities as well as performance criteria, such as time, space, optimality, finance, performance and public health. The goal is to deliver health in precisely the right moment and right place, with the right diagnosis and right treatment using optimized resources. In the field of precision healthcare, the project-related partners are developing products in the following priority areas:

- Smart devices, sensory and tele-health
- Smart Curative
- Digital Health
- Smart System for Integrated Health and Health Care

Due to the fast development of information, communication and e/mHealth technologies, the project is also focusing on e/mHealth education, especially in the field of application development and use, deployment of new technologies and solutions to the treatment systems and new computer-based data analysis.

STATUS/CURRENT DEVELOPMENTS

In scope of the two Smart Cities and Communities projects, the Community Health Center Dr. Adolf Drolc Maribor began activities focused on e/mHealth:

- The development of a new interactive website
- Optimization of waiting times in paediatric emergency units using mHealth services
- Development of an intelligent platform for health co-production. The intelligent platform, based on state of the art artificial intelligence (AI) algorithms, will support precision, personalized, targeted and tailored health co-production services incorporating on up to date technology, including smart sensors, smart phones, serious games, quantitative self and healthy life style management
- Smart Dentistry focusing on the development of smart toothbrush and bionic teeth

Based on the development of the activities outlined above, the Community Health Centre workforce will have to acquire new eHealth competences and skills.

On the other hand, research on eHealth competencies showed that eHealth education has to be extended to patients as well, who frequently lack eHealth literacy skills to successfully employ eHealth services offered by either governmental agencies or health care institutions [4]. Some applications developed in the EkoSmart project are dedicate to consumer education, which aims to increase eHealth literacy.

ACTIVITIES/MEASURES

The first official attempt to define the Nursing Informatics (NI) education in Slovenia started in the second half of 1996. At that time, the current Faculty of Health Sciences at the University of Maribor received European Union (EU) funding under the scope of the Nursing Informatics and Computer Aided Education (NICE) project, aimed at developing an NI curricula [5]. The curriculum was later implemented as a one-

year specialisation program delivered at the Faculty of Health Sciences. Following the Bologna Declaration [6] in 2007, a new informatics curriculum with increased number of credits for NI based subjects were accredited, based on past experiences with NI education. The Bologna Declaration is the main guiding document adopted by the Ministries of Education (MOE) of 29 European countries at their meeting in Bologna in 1999. It proposed a European Higher Education Area in which students and graduates could move freely between countries, using prior qualifications in one country as acceptable entry requirements for further study in another. Other Slovenian nursing colleges and faculties then adopted similar programs. Since 2007, when the new curriculum was created, little else has been done to evolve NI education in educational institutions.

It is also important to note that, except for some basic information and communication technology (ICT) skills, when it comes to lifelong learning needs for the health care workforce, eHealth competencies and skills are almost non-existent in Slovenia.

CHANGES

As mentioned earlier, educating the healthcare workforce is a very important part of both projects described above. Consequently, a related project, called the Competence Centre for Smart Cities and Communities, started at the beginning of 2017 [7]. In its first phase of project execution, the competencies and skills needed for successful development and employment of innovative services provided by Smart Cities and Communities were identified. In the second phase, the consortium partners began to create education that focused on how to identify competencies and skills needed for the nursing workforce. While eHealth is an important Smart Cities pillar, competencies regarding eHealth were also offered in educational workshops. In the current and final phase, the eHealth competences offered are more general, and inclusive of: agile software development and use of the Internet of Things (IoT), internet services, use of biomedical technology, telemedicine, etc. IoT is considered a part of the internet of the future and will comprise billions of intelligent communicating 'things' like servers, mobile devices, people, sensors, physical entities and virtual components.

RESULTS

Expected results of the above projects are:

- Increase the number of competent e/mHealth developers
- Increase in health professionals competency to employ e/mHealth applications and services
- Increase in competency of health professionals to communicate with e/mHealth developers and to actively participate in the requirements phase of new applications and service development
- Increase in the eHealth literacy of health care consumers

OUTLOOK/LESSONS LEARNT

The ultimate goals of our intensive involvement in the above projects are to integrate e/mHealth and HI into the Smart Cities and Community ecosystems in a holistic way. We would like to ensure that the voice of health professionals and consumers will be heard and considered when creating new e/mHealth applications development. On the other hand, we would like to ensure that health professionals and health care consumers will have enough competencies and skills to use the e/mHealth services as efficiently and

effectively as possible. This way, we would like to achieve the "precision health" state in which all involved in care will get precisely what they need and want using optimal resources.

References

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[4] Kokol P, Blažun H, Saranto K. Health Informatics Competences for eHealth: What Can We Learn from a Bibliometric Analysis? *Stud Health Technol Inform*. 2015;216:1014. doi:10.3233/978-1-61499-564-7-1014

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Case Study Checklists

Checklist of eHealth topics (competencies)

Role of "Peopleware": human factors, awareness, satisfaction and acceptance of health IT, usability measurements, evaluation of health IT, communication, leadership, change management, ethics and IT and similar topics
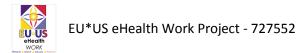
Peopleware is a very important part of our approach. The education is focused on eHealth services providers, professional users and consumers.

Role of inter-professional approaches: inter-professional versus mono-professional training and learning activities. What subjects lend themselves to inter-professional vs. mono-professional classes, learning environments and similar topics

N/A

Role of healthcare data sciences: data and information acquisition including documentation, data quality, data, information and knowledge management, data analysis and statistics, clinical decision making instruments, reporting and similar topics

Slovenian health care providers still do not use a common eHealth encounter, thus communication between different systems is almost impossible. This is surprising, as Slovenia was the second country in the world to introduce EHRs in the late 1990's. Unfortunately, we still use the same record and technology. The Smart Cities Projects are aiming to solve this problem in order to enable the exchange of data, big data analysis and heath care digitalisation.

Fusion of medical technology & informatics: software as a device, smart devices, automatic data acquisition via devices, risk and safety management

Smart devices and automatic data acquisition/analysis are the main topics of the Smart Cities Projects.

Role of process and workflow management: clinical and administrative processes, information continuity and information logistics, management of processes, workflow management systems and similar topics

N/A

Role of ethics, legal and data protection issues: ethics and IT, legal requirements, data protection and information self-determination, data safety and similar topics

The Smart Cities Projects are mainly concerned with technology and peopleware, however data protection and safety are also topics of research.

Role of learning and teaching: learning techniques ("learn how to learn"), learning and teaching styles (online, blended, face-to-face), learning management, information management for learning and teaching and similar topics

Online learning is the main approach, in addition to blended learning. Workshops are mainly organized within the Competence Centre's project scope.

Role of management related topics in health informatics and IT: principles of management, strategic management, stakeholder and change management, leadership, financial management, risk management, quality and safety management, resource planning and management and similar topics

N/A

Role of technology: information and communication systems, telemedicine, telematics, assistive technologies, mHealth, life-cycle-management including systems development/engineering

These are the core of the research and development activities in the Smart Cities Project.

Role of consumers and populations: consumer health informatics, public health informatics

Consumer education to improve their eHealth literacy is an important part of activities performed in all Smart Cities Projects.

Role of Research: information management in research, data analytics

All the development activities are based on research; each consortium partner is required to have a registered research unit.

Role of interoperability: systems integration, IT standards, terminologies and classifications

A common platform through which each project output/product would be able to communicate with each other or real world is currently under development.

Checklist of eHealth topics (gaps and deficiencies)

Teaching the teachers: Are there any activities in your organisation to teach health IT/eHealth to teachers in healthcare?

N/A

Supporting participatory design and acceptance testing/research: Are there any educational activities to teach or practice participatory design? Are there any activities including research in user acceptance testing and satisfaction measurement?

Participatory design is preferred in all development activities. User acceptance testing is required.

Integrating eHealth/health informatics into traditional curricula: Are there any activities to include eHealth/health informatics into traditional curricula of physicians, nurses and other health professionals with direct patient care?

N/A

Motivating clinicians and managers: Are there any incentives and opportunities for clinicians and healthcare managers to acquire and update digital eHealth/health informatics skills and knowledge?

"Motivational" and educational workshops are organized in the scope of the Smart Cities Projects for interested professionals; however, the attendance of health professionals is low at the moment. On the other side, the attendance of IT professionals working in health organisations is high.

Engaging women: Are there any activities to attract female students in eHealth/health informatics or employ female health IT staff?

All EC funded projects are required to follow the equal participation and non-discriminant policy.

Adjusting job descriptions and enable continuing education: Are there any activities to adjust job descriptions, e.g., for clinicians, that include health informatics competencies (also proper use of health IT/eHealth systems) and are there activities to support staff updating and upgrading their health IT related skills and knowledge? This topic is mainly related to provider organisation and IT vendors.

N/A

Updating teaching and learning material: Are there any activities to ensure that the material is up-to-date and of high quality?

In the scope of the Competence Centre project there is continued monitoring of quality of both educational materials and processes.

Availability of courses including electronic courses: Are there any additional activities to improve the availability of courses such as implementation of new courses, new course formats that recognise previous experiences/training in particular for continuing education?

See above

Informal caregivers: Are there any educational activities to teach health IT usage to informal caregivers, e.g. for assistive technologies?

N/A

Shortage of health informatics specialists: Are there any programmes to attract health informatics specialists?

N/A

eHealth Budget: Does your organization, area or region have a dedicated budget set aside for eHealth/health informatics training, education or workforce development initiatives?

The part of the Smart Cities Projects budget is allocated to e/mHealth related activities

eHealth Specialty Areas: Does your organization address any of these speciality settings/areas of training or outreach for eHealth education or workforce development: ambulatory care, social medicine, geriatric/ageing medicine, rehabilitation?

 All Smart Cities Projects address eHealth education and workforce development in general.