University-Industry Educational Centre in Advanced Biomedical and Medical Informatics (CeBMI)

Elena Zaitseva

Abstract— University-Industry Educational Centre in Advanced Biomedical and Medical Informatics (CeBMI) is one of project financed by ERASMUS+ - Knowledge Alliance. Biomedical and medical Informatics (BMI) is a complex and interdisciplinary area that needs diverse yet complementary knowledge, expertise and competences in medicine and IT. The principal project outcome is the Centre-BMI with an ICT platform for online BMI education provision and delivery. The Centre will provide a vibrant platform to support productive cooperation between companies, and universities with supplementary and complementary expertise. This will result in a synergy of theoretical and practical approaches to very complex and real problems in real businesses.

Keywords—ERASMUS+, Knowledge Alliance, CeBMI, Educational Centre, Biomedical Informatics, Medical Informatics

I. INTRODUCTION

There is a global consensus about IT relevance for health care, which, e. g., led in 2005 to the World Health Assembly's eHealth Resolution [1] and to the implementation of the WHO's Global Observatory for eHealth [2, 3]. According to WHO reports, IT is an integral part of medicine [3, 4]. At the present time new area of knowledge has been formed named as Medical/Biomedical Informatics (BMI). BMI informatics [5] (also called healthcare informatics, or clinical informatics) is the interdisciplinary study of the design, development, adoption and application of IT-based innovations in healthcare services delivery, management and planning. It deals with the resources, devices, and methods required to optimize the acquisition, storage, retrieval, and use of information in health and bio-medicine. Health informatics tools include computers, clinical guidelines, formal medical terminologies, and information and communication systems, among others. It is an 'emerging field' for decades due to the rapid advances of biomedical and IT sectors. Successful biomedical informatics research has resulted in the development of innovative technology supported techniques, diagnostic and therapeutic methods leading to radical changes and enhancement of healthcare delivery [6 – 8].

The introduction of IT into the health care domain requires a pool of high quality multi-disciplinary experts in the field. Education is considered as the most appropriate tool to greatly improve attitudes and behavior of professionals working in the healthcare and IT sectors. BMI is a multi-disciplinary area that integrates domain knowledge from biomedicine and informatics (which includes IT, data science – big data, data mining and machine learning). However, this area has specifics for medical and technical professionals. This fact results difference in education on BMI for medical and technical specializations [9]. Emerging interdisciplinary domains impose new demands on core competences, posing additional challenges to practitioners involved (e.g. IT and medical training). Given this dynamic situation, IT engineers and physicians need to adapt to existing or future capacity and capability building needs (i.e new form of knowledge, competences, and skills) [10,11]. This calls for continuous improvement in training with learning outcomes that will adapt to changing labor market needs.

E.Zaitseva, University of Zilina, Zilina, Slovakia (e-mail: elena.zaitseva@ fri.uniza.sk).

Curricula, programs and modules for BMI should have different context for medical and engineering specialization and take into account possibility and tendency in industry [9 – 11].

Biomedical and Medical Informatics (BMI) is a very dynamic field undergoing rapid evolution and centrally featured in health reforms across Europe. Emerging technologies in BMI are central to making healthcare more personalized, precise, reliable, safer and cost effective. The increased interest in BMI education and training is leading to transformative trends in creating new educational programs at higher education institutions in Europe offering a BMI degree. New emerging interdisciplinary domains are being added to the curriculum offering additional possibilities and challenges for engineers and system scientists to be involved, but at the same time imposing new demands on core teaching and learning competences.

Therefore, in this project, effective, and innovative curricula will be developed via a collaborative effort of a team of experts (from medical and technical universities, technology providers) with diverse expertise. The different project partners will contribute to the development of different skills, expertise and competences are: technology – by technology providers (i.e. hardware manufacturers (or suppliers) and healthcare software solution providers; higher education partners - solving complex biomedical informatics related problems in the medical field. This consortium will bring about a synergy of medical informatics-related theories and practice which will help provide a holistic training to the learners.

The development and implementation of the Centre-BMI to support educational process and courses appropriately addresses this pressing and real problem. The Centre will provide an invigorating environment for the cooperation of technical, medical universities, and enterprises in BMI that will provide a pool of supplementary expertise, skills, and competences in this area. Both universities and enterprises' contemporaneous participation in the project fosters a new trend of integrated medicine and IT educational provision relevant for the definition of an emerging innovative BMI-related professional profile that is well sought after by enterprises. This Centre will be open to other non-consortium partners that would like to be involved in cooperative activities helping to ensure the project's impact and sustainability.

The project is implemented by consortium of 13 partner (Table 1) which represent the academic staff (universities from IT and medicine), IT companies and hospitals.

TABLE I
PROJECT CONSORTIUM

Organization	Country
Zilinska Univerzita v Ziline (UNIZA)	Slovakia
Leeds Beckett University (LBU)	UK
Peter L. Reichertz Institute for Medical Informatics of the Technical University of Braunschweig (TUB-PLRI)	Germany
Università Campus Bio-Medico di Roma (UCBM)	Italy
Universidad Rey Juan Carlos (URJC)	SPAIN
University of Oulu (UOULU)	Finland
Universitat de Valencia (UV)	Spain
TELESIG Ltd (TELESIG)	Bulgaria
STAPRO SLOVENSKO s.r.o. (Stapro)	Slovakia
Dr. Guido Kaufmann e.K. (DGKeK)	Germany
Amnim d.o.o. (Bioanim)	Slovenia
Ostravska Univerzita (OU)	Czech Republic
Hospital of Zilina (FNsPZ)	Slovakia

II. CeBMI Project Implementation

The project implementation and its principal result can be founded at the project web-site (https://cebmi.fri.uniza.sk/). There are two principal outputs of this project. One of them is opening and accreditation of new specialization for the student at University of Zilina in BMI and the second is development of the portal CeBMI. The specialty on Biomedical Informatics was accredited by the Ministry of Education, Science, Research and Sport of the Slovak Republic at the end of 2019. This year, the first graduation of students with a degree in Biomedical Informatics took place. The CeBMI portal is developed for the collection and distribution of the teaching materials in BMI. This portal is by link (Fig. 1).
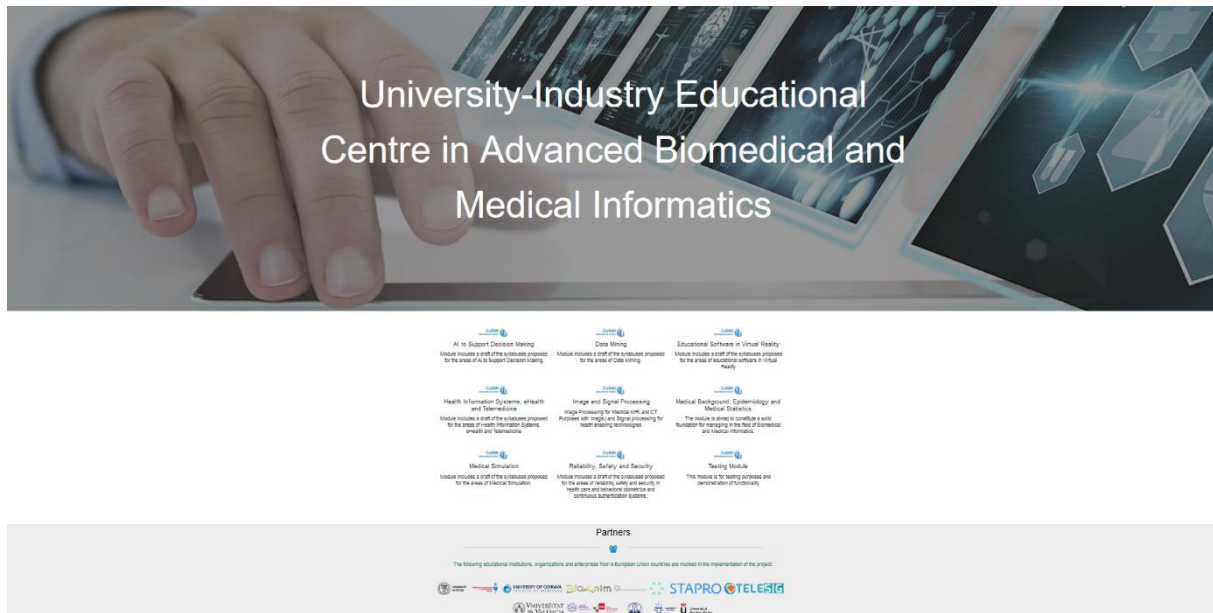

Fig. 1 The CeBMI portal

Currently, the portal has 8 thematic modules, for which training materials will be completed in the near future. The viewing of teaching materials is open access. The users who want to add materials to one of the modules, registration is required. This portal is an open platform and representatives of universities and IT companies outside of the consortium can join this initiative.

Acknowledgment

References

[1] http://www.who.int/healthacademy/media/WHA58–28-en.pdf
[2] https://www.who.int/goe/en/
[3] https://apps.who.int/iris/bitstream/handle/10665/252529/9789241511780-eng.pdf;jsessionid=60D28B0E35C1235B021177A5A432D724?sequence=1
[4] http://apps.who.int/iris/bitstream/10665/204523/1/9789241565219_eng.pdf
[5] E.V. Bernstam, J.W. Smith, T.R. Johnson, "What is biomedical informatics?", *J Biomed Inform*, vol. 43, pp.104 – 110, Feb 2010.
[6] R.Haux, "Health information systems – past, present, future", *Int. J. Medical Informatics*, vol. 75(3–4), pp.268-281, Mar-Apr 2006.

[7] J. Sligo, R. Gauld et al., "A literature review for large-scale health information system project planning, implementation and evaluation", *Int. J. Medical Informatics*, vol. 97, pp. 86-97, Jan. 2017.

[8] G.I. Mihalas, "Evolution of Trends in European Medical Informatics", Acta Inform Med, vol.22, pp.37-43, Feb. 2014.

[9] R. Haux, M. Marschollek et al., "Should Degree Programs in Biomedical and Health Informatics be Dedicated or Integrated?", *Journal of Medical Systems*, vol. 41(7), pp.1 – 7, Jul. 2017.

[10] I. Masic, H. Pandza, "Medical Informatics Education - Past, Today and Future", *European Journal for Biomedical Informatics*, vol. 14(2), pp.40-45, Feb. 2018.

[11] J. Mantas, E. Ammenwerth et al. "Recommendations of the International Medical Informatics Association (IMIA) on Education in Biomedical and Health Informatics Methods", Inf Med, vol. 49(2), pp. 105-120, Feb. 2010