

## SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: 15222

STSM title: **CONCEPTUAL INTEGRAL FRAMEWORK FOR MEASURING PERSON-CENTRED CARE IN HEALTH PROMOTION AND PREVENTION PROGRAMS AND SERVICES**

STSM start and end date: 10/12/2019 to 19/12/2019

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### PURPOSE OF THE STSM:

(max.200 words)

Even having theoretically proven potentials, comprehensive measuring systems and evaluation approaches are missing, which should integrate already existing concepts/systems/approaches for measuring provision of person-centred practice among different stakeholders (e.g. PCPI-S **Invalid source specified.**, PERCCI **Invalid source specified.**), evaluation of health and social care services **Invalid source specified.**, optimal health assessment methods (as patented in USA **Invalid source specified.**), adjusted to PCC concepts and settings. Furthermore, along with the digital revolution, information and communication technology applications are currently transforming the delivery of health and social care services, such as **Invalid source specified.:** applications for disease self-management support, support in disease prevention and its challenges followed by traditional prevention methodologies, disease early detection and treatment, etc. Use of ICT support services is aimed to improve the quality of patient care and contain healthcare cost, and it clearly imposes the need for creation of **integral evaluation and measurement system in prevention domain.**

Therefore, specific research objectives will focus on:

- (i) Systematically collect and review different evaluation and measurement approaches related to preventive and promotion healthcare services as well as ICT services and applications; make comprehensive analyses of their potentials for adjustments in/to PCC context;
- (ii) Explore the potentials for creation of integral framework for presentation of **hard and soft requirements** in preventive and promotion healthcare, **semantically enhanced evaluation criteria** (which distinguish and integrate different actors in the process, patients, their relatives, physicians, community, etc.) all by applying **generic approach** (thus enabling creation of instances in specific domains and applications);
- (iii) Exploring the potentials for utilization of **ICT services to support the process of PCC implementation and sustainable utilisation,** ranging from eliciting different kinds of preferences, patients' attitudes and narratives, hidden knowledge identification (mining over patients' behaviour characteristics data, monitoring of app usage, etc.) and integration of all actors in the process.
- (iv) **Testing and evaluation** of proposed framework in real settings, which include use of different stakeholders and measuring the evaluation results in comparison to existing

approaches/methods. Also, identification of recommendations/suggestions as beneficial for PCC implementation and evaluation processes.

### DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

(max.500 words)

In order to build new knowledge about **integral evaluation and measurements in prevention domain**, key activities are put on analyses of well-known approaches and concepts coming from different fields of applications and research communities and their further modifications for PCC context, as follows:

- Analyses of well-known concepts/systems/approaches for evaluation of health and social care services **Invalid source specified.**, optimal health assessment methods (as patented in USA **Invalid source specified.**), and their potentials for applications in PCC domain. The analyses contributed to comprehensive understanding of sets of requirements (hard and soft) in health promotion and prevention programs and services related to PCC concepts;
- Analyses of existing approaches for measuring provision of person-centered practice among different stakeholders (e.g. PCPI-S **Invalid source specified.**, PERCCI **Invalid source specified.**) and analyses and understanding of variety of ICT support services **Invalid source specified.**, their relation to social and health well-being, and relevant evaluation and monitoring systems (if exist). It all together contributed to collect all relevant features, their domain values, accompanying measures and description of relation/dependencies among them.
- On the bases of conducted research and analyses, generic conceptual model is created. Creation of the model is rooted in proven concept of *feature models* **Invalid source specified.**, which is already applied in different medical domains, such as: precision medicine, diabetes research, etc. Since feature models incorporates optimality with several dependencies relations (e.g. inclusion, exclusion, implications, etc.), by defining mapping systems, the generic approach is developed and suggested (which theoretical potentials are proven in **Invalid source specified.**). Finally, by using different algorithms for qualitative and quantitative measurements **Invalid source specified.**, qualifier tags over features are created, and measurements introduced.
- In the process of creating conceptual framework for measuring PCC in health prevention and promotion programs, we exemplified few concrete specific domains of applications (e.g. diabetes among patients of different age, etc.). However, in order to create comprehensive solution, we suggest different testing and evaluation methods, such as: (i) theoretical proofs of consistencies in defining requirements, proofs for correctness and soundness of adapted algorithms; (ii) simulations of potentials for defining different requirements and preferences of different groups of patients, (iii) empirical analyses in real contexts, etc.

[1] M. J. Santana , K. Manalili, R. J. Jolley, S. Zelinsky, H. Quan and M. Lu, "How to practice person-centred care: A conceptual framework," *Health Expectations*, vol. 21, p. 429–440, 2018.

[2] WHO, "WHO global strategy on people- centred and integrated health services," [http://apps.who.int/iris/bitstream/10665/155002/1/WHO\\_HIS\\_SDS\\_2015.6\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/155002/1/WHO_HIS_SDS_2015.6_eng.pdf), 2015.

[3] WHO, "People-centred health care: A policy framework," 2007.

[4] P. C. Bing-Jonsson, P. Slater, B. McCormack and L. Fagerström , "Norwegian translation, cultural adaption and testing of the Person-centred Practice Inventory – Staff (PCPI-S)," *BMC Health Services* , vol. 18, 2018.

[5] M. Wilberforce, D. Challis, L. Davies, M. P. Kelly and C. Roberts, "The preliminary measurement properties of the person-centred community care inventory (PERCCI)," *Quality of Life Research*, vol. 27, no. 10, p. 2745–2756, 2018.

[6] F. Foglietta and F. Toniolo, *New Models of Governance and Health System Integration*, FrancoAngeli, 2013.

[7] H. Zarkoob, E. Martinian, P. Menon, J. Pyle and H. Fakhrai-Rad, "SYSTEMSANDMETHODSFOROPTIMAL HEALTH ASSESSMENTAND OPTIMAL PREVENTIVE PROGRAM DEVELOPMENT IN POPULATION HEALTH MANAGEMENT". USA Patent US2019/0198140 A1, 2019.

[8] M. I. Razzak , M. Imran and G. Xu, "Big data analytics for preventive medicine," *Neural Computing and Applications*, pp. 1-35, 2019.

[9] I. Ognjanović, D. Gašević and S. Dawson, "Using institutional data to predict student course selections in higher education," *THE INTERNET AND HIGHER EDUCATION*, vol. 29, pp. 49-62, 2016.

- [10] I. Ognjanović, D. Gašević and E. Bagheri, "A Stratified Framework for Handling Conditional Preferences: an Extension of the AHP," *Expert Sys.with Applications*, vol. 40, no. 4, pp. 1094-1115, 2013.
- [11] R. Šendelj, I. Ognjanović, E. Ammenwerth and W. Hackl, "Towards Semantically Enabled Development of Service-Oriented Architectures for Integration of Socio-Medical Data," in *The 5th Mediterranean Conference on Embedded Computing (MECO)*, Bar, Montenegro, 2016.
- [12] M. Z. Nezhad, D. Zhu, X. Li, K. Yang and P. Levy, "Safs: A deep feature selection approach for precision medicine," in *2016 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, 2016.

#### **DESCRIPTION OF THE MAIN RESULTS OBTAINED**

During the STSM, several meetings with researchers from Institute of Social Sciences and Applied Informatics and Institute of Biotechnology at Vilnius University and Health informatics and bioinformatics association established at Santaros clinics research valley were organised, all aimed on exchanging key ideas and understanding of open research issues in PCC domain. It resulted with created interdisciplinary research group which agreed about continuation of joint activities even after CA15222.

Prof.dr Dalia Kriksciuniene gave overview of their results in the field of application of computational intelligence algorithms and methods for analysis of marketing systems performance, customer-related performance indicators and provided useful insight how to expand the issue of specification and processing of different preferences in this domain. Also, we explored the potential of semantic structures for presentation of features related to health prevention and promotion in PCC context, different multi modal and multi actors' preferences, their relations and dependencies, all leading to identification of appropriate measurements and metrics.

The results of our research are as follows:

- We introduced feature model for specification of different characteristics, relations and dependencies in health prevention and promotion in PCC context, including patients, their attitudes and health indicators. Our approach in comparison to previous proposals integrates different kinds of features, both quantitative and qualitative, and enables specification of different kinds of preferences, including conditional, un-conditional, as well as shared decision making.
- We introduced integral generic framework by specifying different instances of created model and made analyses of available means and resources for testing and prototyping of the whole approach, ranging from participation of different stakeholders' groups, their requirements specification and formal presentation, as well as available databases about healthcare indicators for testing and training.
- Role of different stakeholders with different interests and background knowledge about the process is analysed and addressed. Special attention is put on understanding of specific cultural context, educational backgrounds, demographic characteristics on potentials and pre-requisites for using different IT solutions. Our approach is focused on creation of a model driven approach for specification of stakeholders' requirements which is rooted in introduced feature structure, different multi modal and multi actors' preferences, relations and dependencies. However, in order to make sound and proven mechanism, more simulation and empirical testing is needed.
- Our preliminary results are drafted in research paper which is planned to be finalised and submitted for 18th International Conference on Informatics, Management and Technology in Healthcare ICIMTH 2020 <https://www.icimth.com>

#### **FUTURE COLLABORATIONS (if applicable)**

One of key benefits for my research and personal development is established cooperation with research team led by Prof.dr Dalia Kriksciuniene as well as initiated cooperation with Health informatics and bioinformatics association established at Santaros clinics research valley. Therefore, future activities will be focused on intensification of our cooperation, close exchange of ideas and joint R&D activities.

During COST 15222 Action, our collaboration will include:

- Prepare and submit paper for 18th International Conference on Informatics, Management and Technology in Healthcare ICIMTH 2020 <https://www.icimth.com> (deadline: 31st March 2020)
- Analyses of critical elements in the framework (e.g. evaluation of developed approach, sensitivity to different kinds of data, legal and ethical issues, etc.) with activities on their further improvements and generalisation of the approach
- Include more young researchers (MSc, PhD students) from both groups in research activities related to suggested framework development, implementation, testing and validation phases;

- Presentation of achieved results, organisation of multi-disciplinary and inter-sectoral discussions with other WG3 and Action members;
- Identification of potential integration with results and achievements of other WGs and Action members;
- Organise some training schools, workshops, invited talks, all aimed on sharing knowledge and experience to our students, and colleagues from both research groups;
- Work on new project proposals for different EU and IPA-Pre Assessment funds, thus providing financial support for our research and innovative actions.