eHealth On the Horizon

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Fig. 1. Europe at night.

Abstract— The Visualizing Electronic Health Record Data (EHRVis) Workshop coincides with the alignment of (at least) three events: (1) the historic 25th annual IEEE VIS Conference–in Europe for the first time, (2) the call for funding bids to Horizon 2020–The EU framework program for research and innovation, and (3) the rapid rise and advancement of research in eHealth with particular emphasis on electronic health records (EHRs). This is a clear sign for the visualization community to synergize by working together to secure funding in eHealth. Here we aim to initialize this effort by discussing a range of collaboration levels and soliciting those that are interested.

Index Terms—eHealth, Horizon 2020, visualization, visual analytics, health analytics

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1 INTRODUCTION AND MOTIVATION

The timeliness of the EHRVis workshop is a clear sign. The workshop event aligns with at least three other major coinciding events.

Historic IEEE VIS: The workshop coincides with the celebratory 25th anniversary of the IEEE VIS conference (in 2014), as well as its location in Europe (Paris), for the first time in the history of the conference acknowledging the growing role of European research on visualization.

Horizon 2020: The EHRVis workshop also coincides with Horizon 2020 Horizon 2020 is the largest EU Research and Innovation program in its history with nearly EUR 80 billion in funding available over 7 years (2014 to 2020). The funds are intended to drive more breakthroughs, discoveries and global-firsts. "Horizon 2020 is the financial instrument for implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness" [2].

Rapid growth in eHealth: Also coincident with the historic IEEE VIS conference and Horizon 2020 is the rapid increase in eHealth Research. For example, Swansea University leads a massive eHealth initiative targeted at the EHRs from the UK's National Health Service (NHS). The SAIL (Secure Anonymised Information Linkage Databank) project, established in 2006, is a major initiative developed by the College of Medicine at Swansea University and is funded by the National Institute of Social Care and Health Research (NISCHR) of the Welsh Government [3]. From the data collection and storage point of view, the SAIL project is a huge success. Several terabytes, of patient-based health care data have been archived and anonymized which provides a very valuable resource for those studying improvements in health care.

However, the SAIL project, like all data gathering projects of this nature, faces major challenges from a knowledge extraction point of view. Our ability to collect and archive data vastly exceeds our ability to extract useful knowledge and insight from it. The SAIL database is vastly large, complex, containing thousands of database tables, and

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stems from hundreds of disparate, uncalibrated sources. And the larger and more complex a dataset is, the more difficult it is to extract knowledge and insight. This is precisely where the power of data visualization comes in.

There are a number of initiatives and projects spanning (at least) North America and Europe. This is evident by the growing number of workshops and publications with a focus on eHealth and EHRs. Some examples include this workshop [1], the annual International Conference on Enriching Health Data for Research and Practice (USAB 2014) [4], the annual Workshop on Visual Analytics in Healthcare [5]. The Journal of the American Medical Informatics Association (JAMIA) publishes a special issue on Visual Analytics (`http://jamia.bmj.com`). The EHRVis workshop web page also lists nine previous related events dating back to 1997 [1].

2 A CALL TO SYNERGIZE

The coincidence of these three events is a clear sign for the visualization community to synergize. Collaborative synergy can take on a number of forms:

- **Sharing Educational Materials:** Several Horizon 2020 training events have taken place throughout Europe. Those who have attended may share their educational materials.

- **Sharing Expertise:** Every visualization researcher brings a different set of knowledge and expertise to the table. We can share our expertise of both previously published eHealth visualization literature and bid writing. Some of us may have gained expertise by registering as a Horizon 2020 reviewer. Expertise through this experience could also be shared.

- **Letters of Support:** Every grant proposal can be improved by a letter of support from either an academic or an industry partner. This is a simple and effective collaboration mechanism.

- **Networking:** Some of us may be aware of or notice a potentially interested stakeholder, beneficiary either from industry or academia, or a potential academic collaborator for whom a helpful introduction or referral could be made.

- **Finding Calls:** Horizon 2020 features a plethora of funding calls. Navigating through the large number can be a time-consuming task. Identifying calls relevant to this workshop's participants is helpful.

- **Internal Reviewing:** We could read and review each others bids before their official submission.

- **Collaboration on Bids:** The ultimate goal of the call to synergize is to collaborate on bid writing. Horizon 2020 requires co-investigators from (a minimum of) three different countries. This is the key requirement that motivates our synergetic effort.

This workshop provides a key platform to initiate such a collaboration. The author is willing to lead a collaborative effort on preparing a bid.

3 HORIZON 2020 CALL ON PERSONALIZING HEALTH CARE

The European Commission has published a call we believe is relevant to the EHRVis audience. It's provided as an appendix. There may be other relevant or closely related calls. Collaborations on non-European proposals are also welcome. Anyone interested who has identified another candidate call can contact the first author.

4 CONCLUSION

The coincidence of the rapid increase in visualization, visual analytics, and eHealth related activity, Horizon 2020, and the very first IEEE VIS Conference in Europe is a clear sign for action. One of the key requirements for Horizon 2020 bids is the collaboration of three or more EU countries. We have described and identified and described a number of ways to synergize within the visualization community Anyone interested in collaborating on a Horizon 2020 bid can contact the first author.

5 APPENDIX: HORIZON 2020 CALL ON PERSONALISING HEALTH AND CARE

The following content is from the Horizon 2020 call on Personalizing Health and Care [2]:

Personalising health and care
H2020-PHC-2015-single-stage
Sub call of: H2020-PHC-2014-2015
Publication date: 11-12-2013
Deadline Date: 21 April 2015 17:00:00 (Brussels local time)
Total Call Budget: EUR 162,000,000
Main Pillar: Societal Challenges
Status: Open OJ reference OJ C 361 of 11 December 2013
Topic: Digital representation of health data to improve disease diagnosis and treatment PHC-30-2015

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http://ec.europa.eu/programmes/horizon2020/
en/area/health
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"Many challenges need to be met to grant everybodys legitimate wish for a long, happy and healthy life. Chronic and infectious diseases, pandemic threats and antimicrobial resistance are on the rise. Also, the side effects of an aging population will need to be addressed - the number of people in the EU aged over 65 will have grown by 70% by 2050.

European research and innovation in health helps to tackle these challenges. It is an investment in our health and, on a larger scale, an investment in a healthy workforce, a healthy economy and lower public health bills.

The return on this investment will be finding new ways to prevent diseases, developing better diagnostics and more effective therapies, as well as taking up new models of care and new technologies promoting health and wellbeing. New technologies could keep older people active and independent for longer and help European health and care systems to remain sustainable.

Finally, European research and innovation in health is about working together across borders, sharing each other's knowledge and resources and improving our health and care system together."

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http://ec.europa.eu/research/participants/
portal/desktop/en/opportunities/h2020/topics/
2273-phc-30-2015.html
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Topic Description: "Specific challenge: Digital personalised models, tools and standards with application for some specific clinical targets are currently available. There is however a need for greater integration of patient information, for example of multi-scale and multi-level physiological models with current and historical patient specific data and population specific data, to generate new clinical information for patient management. Any such integrative digital representation (Digital Patient) must also allow meaningful knowledge extraction and decision support.

Scope: Proposals should focus on new decision support systems (DSS) based on a complex integration of heterogeneous data sources and subject-specific computer models. This should enable an integrated data analysis, and should present a highly visual data representation, using user-friendly interactive exploratory interfaces in order to assure usability and acceptability.

Proposals should enable the use of DSS by healthcare professionals for personalised prediction and decision in prevention, diagnosis or treatment and should take into account data protection and ethical

considerations, as well as those pertaining to the inherent uncertainties and limits of prediction. The models should be already available, multi-level and multi-scale and will be integrated with the individual and population data relevant for the targeted clinical situations, e.g. the required molecular and cellular data, including genomics and epigenomics, in vivo and in vitro imaging data, or data on administration of therapeutics and on nutrition/exposure to environmental factors and will be linked when relevant with computer models of personalised physiology, functional disorders and other diseases. The proposed systems should take advantage of the personal medical data accumulated over time. Proposals should include the standardisation of data formats. The integration of data coming from other new technologies for e.g. key-enabling technologies should be considered. Gender and ethical issues should be duly considered.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Better coherent use of health data available for a subject in conjunction with the existing medical knowledge in clinical decision making
Design of predictive and therapeutic interventions
Better management of complex clinical situations.
Enabling use of the same information by different medical services and the other relevant healthcare professionals.
Better control and inter-service coordination in the management of the patient health. Providing a consistent view of a patient's care needs.

Type of action: Research and innovation actions"

REFERENCES

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