REPORT OF THE VICE PRESIDENT FOR WORKING GROUPS AND SPECIAL INTEREST GROUPS (WG/SIGs)

Tze-Yun Leong

This report Part III is a compilation of the WG/SIG reports and is included as a separate document.

Part III: Full individual SIG and WG Reports

1 Special Interest Group: Nursing Informatics


Website of the WG:  http://www.imia-medinfo.org/ni/

Chair (2012 - 2016)
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Vice Chairs (2012 - 2016)
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Lucy Westbrooke – Membership
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1. **Background** – Brief description of the WG/SIG mission, vision, and objective

**Objectives**

- Explore the scope of Nursing Informatics and its implications for health policy and information handling activities associated with evidence based nursing practice, nursing management, nursing research, nursing education, standards and patient (or client) decision making and the various relationships with other health informatics entities.
- Identify priorities or gaps and make recommendations for future developments in nursing informatics.
- Support the development of nursing informatics in member countries and promote nursing informatics worldwide.
- Promote linkages and collaborative activities with national and international nursing and health informatics groups and nursing and health care organizations globally.
- Provide, promote and support informatics meetings, conferences, and electronic communication forums to enable opportunities for the sharing of ideas, developments and knowledge.
- Participate in IMIA working groups and special interest groups to present a nursing perspective.
- Develop recommendations, guidelines, tools and courses relating to nursing informatics.
- Encourage the publication and dissemination of research and development materials in the field of nursing informatics.
- Support and work with patients, families, communities and societies to adopt and manage informatics approaches to healthcare.

2. **Achievement** - Events and projects conducted and publications completed

- Joanne Foster participated as author of a chapter in “Introduction to Nursing Informatics” edited by Kathryn Hannah, Pamela Hussey, Margaret A Kennedy & Marion Ball (2015) published by Springer.
3. **Participation** - Engagement and participation in IMIA and health informatics events and activities

- Hyeoun-Ae Park attended the 4th Translational Bioinformatics Conference held from October 25 to 26, 2014 in Qingdao, China
- Hyeoun-Ae Park attended APAMI 2015 held from November 1 to 2, 2014 in New Delhi, India
- Hyeoun-Ae Park attended 2015 IMIA GA held on Oct 31, 2014 in New Delhi, India
- Hyeoun-Ae Park attended AMIA 2015 Joint Summits on Translational Science held from March 23 to 27, 2015 in San Francisco, USA
- Hyeoun-Ae Park attended ACENDIO 2015 held from April 16 to 18, 2015 in Bern, Switzerland
- Hyeoun-Ae Park gave a keynote address on ‘Past, Present and Future of Health Informatics’ on April 27, 2015 at 50th Anniversary of Health Informatics at University of Minnesota, Minneapolis, MN, USA
- Hyeoun-Ae Park gave a one hour talk on ‘Use of Clinical Data from EHR for Nursing Research’ at Nursing Research Seminar Series, School of Nursing, University of Minnesota, Minneapolis, MN, USA, April 30,
- Hyeoun-Ae Park attended MIE 2015 held from May 27 to 29, 2015 in Madrid, Spain
- Kaija Saranto gave a keynote address on “Patient Safety” at MIE 2014 held from August 30 to September 2, 2014 in Istanbul, Turkey,
- Kaij Saranto was a member of the panel on “eHealth” at ACENDIO 2015 held from April 16 to 18, 2015 in Bern, Switzerland.
- Lucy Westbrooke presented “TeleDOT” poster and presentation to HINZ2014 conference, Auckland New Zealand
- Lucy Westbrooke and Michelle Honey presented “International and National Connections in e-Health for Nurses” poster and presentation to HINZ2014 conference, Auckland New Zealand
- Smart Phones, Smart Tablets, Smart Nurses.
- Heimar Marin, an honorary member of IMIA-NI gave Virginia Henderson Lecture on May 22, 2015 at ICN 2015 in Seoul, Korea. She talked about how ICT can be used to help nursing care

4. **Outreach** - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

- Hyeoun-Ae Park made one hour presentation on nursing informatics to a group of international students who visited to College of Nursing, University of Illinois in Chicago as part of exchange program.
- Hyeoun-Ae Park and Leann Currie (University of British Columbia, Vancouver, Canada) delivered keynote speeches on nursing informatics for nurses in India on November 2 during APAMI 2014 held at India Habitat Centre Amaltas Hall, New Delhi, India, from November 1 to 2, 2014
- Hyeoun-Ae Park went to the AIIMS (All India Institute Of Medical Science) in New Delhi to have an informal meeting with nurses at the hospital and introduced the activities of the IMIA-NI SIG.
• Hyeoun-Ae Park had a one hour session with the graduate students in health informatics program at University of Minnesota, Minneapolis, Minnesota, USA on April 28, 2015 and introduced activities of IMIA and IMIA-NI
• Kaija Saranto had two presentations on nursing informatics for health professionals and information system developers at INDEHELA (Informatics Development for Health in Africa) Access workshop hosted by Faculty Informatics & Design, Cape Peninsula University of Technology, Cape Town, South-Africa from November 3 to 7, 2014.
• Susan K Newbold discusses IMIA and upcoming NI and MedInfo conferences during the Nursing Informatics Boot Camp. There were 16 events around the US and one in Doha, Qatar.
• Susan K Newbold is the owner of a LinkedIn group open to all nurses. It is called IMIA Nursing Informatics Special Interest Group

5. Collaboration - Working with other IMIA WG/SIGs or external organisations or institutions
• Hyeoun-Ae Park attended EFMI/IMIA WG meeting held on May 27, 2015 during MIE 2015 conference in Madrid, Spain.
• Hyeoun-Ae Park attended EFMI NI WG meeting held on May 28, 2015 during MIE 2015 conference in Madrid, Spain.


Website of the WG: (and other relevant sites)  http://francophonesig.imia.info
https://imia.limsi.fr/jfim2014/

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1. **Background** – Brief description of the WG/SIG mission, vision, and objective

The focus of this SIG is to provide a collaborative environment for those Francophone members of IMIA whose ability to interact in English is limited, or when French language-specific issues may have a significant impact on medical informatics issues and would benefit from more synergies within the Francophone community.

This is substantiated by the organization of regular Francophone Medical Informatics conferences, through the JFIM series, and by fostering the development of natural language processing of French-language medical texts.

2. **Achievement** - Events and projects conducted and publications completed

The main achievements of the SIG in the present period concerned the Journées Francophones d’Informatique Médicale (JFIM conference). SIG members also promoted French language processing through a panel and a shared task.

The proceedings of the JFIM 2014 conference (held in June 2014) were published as an open access proceedings in the on-line CEUR workshop proceedings, which provide good visibility and an ISSN. They are available at [http://ceur-ws.org/Vol-1379/](http://ceur-ws.org/Vol-1379/) both as a full volume (http://ceur-ws.org/Vol-1379/JFIM2014-complete.pdf) and as individual papers carrying page numbers.

We prepared the next JFIM (2016) by issuing a call for proposals to the Francophone member Societies. Three candidates were willing to propose to organize the 2016 edition of JFIM, and eventually the Swiss made a strong bid which was accepted by the chairs of the SIG. The plan is to hold JFIM 2016 as a follow-up of NI 2016 (Nursing Informatics) in Geneva, on June 29-30, 2016. Co-locating with NI 2016 will have the advantage that a number of colleagues, including from the South, should be there. This is also an opportunity to try and attract nursing informaticians to the SIG. For example in France nurses are rarely connected to the medical informatics community as usually represented at JFIM and in the French Medical Informatics Society AIM. We considered that a co-located conference would be a facilitator for such connections.

We started a discussion on the future governance of the SIG, to set up a process to find suitable candidates for incoming chairs. In the meantime, the current Chair and Co-Chair continue for a second mandate.

SIG members held a panel at the AMIA 2014 Fall Symposium on Clinical Language Processing in languages other than English. This gave a large part to French, but included it in a larger vision which promotes the processing of all national (and regional) languages which are useful in a clinical context. A follow-up journal paper is planned.

SIG members organized a shared task to promote the natural language processing of French-language medical texts. This took place in the framework of the international CLEF initiative
which organizes shared tasks in Natural Language Processing every year. The task consisted in detecting concepts and their UMLS codes in French documents: titles of MEDLINE-indexed articles and drug leaflets from the European Medicines Agency (see https://sites.google.com/site/clefehealth2015/task-1/task-1b). This enticed 7 teams from six different countries to participate and propose systems which tackled this task, thereby establishing for the first time the state-of-the-art for concept coding from French medical texts.

3. **Participation** - Engagement and participation in IMIA and health informatics events and activities

We held a business meeting at AMIA 2014 on Nov 18, 2014 where we discussed possible venues for JFIM 2016.

We shall be holding a business meeting at MEDINFO 2015 too.

4. **Outreach** - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

The SIG was represented at the AMIA 2014 Fall Symposium and will be represented at MEDINFO 2015.

See the point above about NI 2016 for JFIM 2016 and nursing informaticians.

5. **Collaboration** - Working with other IMIA WG/SIGs or external organisations or institutions

See the point above about Nursing Informatics and JFIM 2016.

See also the point above about CLEF eHealth and the CLEF organization.

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**1 Working Group: Biomedical Pattern Recognition**

**Biomedical Pattern Recognition (WG7) (Updated April 2013)**
**Website of the WG:** [http://www.imia-medinfo.org/new2/node/136](http://www.imia-medinfo.org/new2/node/136)
**Chair (2010-2013)**
Dr. Luca Mainardi,
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**Objectives**
To promote applications in medicine and biology focusing on methods of pattern recognition and interpretation.
Recent Activities
- July 2012. The 7th Biomedical Signal and Interpretation (BSI2012) Workshop has been held in Como, Italy next July 2-4th 2012. The workshop is an initiative by the IMIA, IFMBE and IEEE-EMBS. IMIA WG7 has been deeply involved in the organization of the event: the WG7 chair is the Programme Chair of BSI2102 and a few members of the WG7 were involved in the Scientific Committee. The workshop aims at exploring the fields of biosignal interpretation including model based signal analysis, data interpretation and integration, medical decision making extending the existing signal processing methods and technologies for the effective utilization of biosignals in a clinical environment as well as for a deeper understanding of biological functions from the whole organism, system, to cellular, protein and gene scales. The workshop had a hundred of attendees coming from worldwide.
- July 2012. Two satellite symposia were organized in relation to BSI2012. The first one is on “Signal Processing in Dialysis Treatment” and the second on “PSYCHE: a Personalised monitoring SYstems for Care in mental HEalth”. These symposia addressed current challenges of signal processing and biomedical pattern recognition methods in nowadays clinical practice.

Future Activities
- The WG7 are planning to have a special issue (to be published on Methods of Information in Medicine) based on the selection of top 20-25 papers among those presented at the 7th International Workshop on Biosignal Interpretation (BSI). In line with the mission of the Workshop and the WG7, the selected papers deal with the most recent advances in medical informatics and biosignal processing methods that can be applied to biological and physiological systems so that interpretation of the results can lead to better detection, diagnosis and treatment of various diseases.
- December 2012-January 2013: The remaining contributes presented at the BSI2012 workshop will be published on special issues of the International Journal of Bioelectromagnetis (IJBEM). Two volumes have been already published (volume 14, 2012 and volume 15, 2013), others are in press.

Copy of email sent by Prof Wetter. He will expand his report at General Assembly

Chair (2011-2014)
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Textbook: Springer had promised that it would be ready for MedInfo but it is not. This is how it looks today: http://www.springer.com/us/book/9783319195896

Web portal to register Consumer Health Informatics projects; it is meant to facilitate communication among protagonists mainly in developing countries. However, the software that we used to build it prototype proved as dysfunctional for some essential requirements. I can show a beta - better to say gamma - version at the conference but I hesitate to distribute the URL because it is too ... well ... gamma.
I have a new staff member as of Jan 2016 who will provide a better one.

MeSH keyword Consumer Health Informatics: After the failure in 2011 where Consumer Health Information was rather established as of Jan
2012 I made a new and better substantiated application where I characterize the differences between the two. Hope they accept it this time.

3 Working Group: Critical Care

No report submitted for 2014 or 2015 therefore consider WG defunct

4 Working Group: Data Mining and Big Data Analytics


Website of the WG:  http://www.imia-medinfo.org/new2/node/144

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Vice-Chair (2014 - 2017)
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6. Background – Brief description of the WG/SIG mission, vision, and objective

This working group is the successor of the working group on Intelligent Data Analysis and Data Mining, that existed from 2001 to 2013. The working group's main activities are the organization of workshops, panel discussions, tutorials and business meetings at international conferences such as Medinfo, the AMIA Annual Symposium, Medical Informatics Europe and the Artificial Intelligence in Medicine Conference. The workshops and panel discussions are intended to provide a forum to meet and exchange knowledge and experiences for working group members and all others who are interested. The tutorials intend to introduce people with little knowledge and experience with data mining and big data analytics to the basic concepts, theories and software tools available in the field. Finally, the working group is involved in the publications of thematic special issues and methodological reviews in
international scientific journals such as Methods of Information in Medicine and Journal of Biomedical Informatics.

The objectives of the working group are:
- To increase the awareness and acceptance of intelligent data analysis and data mining methods in medical community.
- To foster scientific discussion and disseminate new knowledge on AI-based methods for data analysis and data mining techniques applied to medicine. To promote the development of standardized platforms and solutions.
- To provide a forum for presentation of successful intelligent data analysis and data mining implementations in medicine, and for discussion of best practices in introduction of these techniques in medical and health-care information and decision support systems.

7. Achievement - Events and projects conducted and publications completed

The working group published a review paper in the IMIA Yearbook of Medical Informatics 2014, entitled "Technical Challenges for Big Data in Biomedicine and Health: Data Sources, Infrastructure, and Analytics" and written by Niels Peek (Manchester, UK), John H. Holmes (Philadelphia, USA), and Jimeng Sun (Atlanta, USA).

8. Participation - Engagement and participation in IMIA and health informatics events and activities

The working group will organise a tutorial and a panel at the MedInfo 2015 conference in Sao Paolo, Brazil, August 2015.
- The tutorial is entitled "Evaluation of Prediction Models in Medicine" and will be given by A. Abu-Hanna (Amsterdam, The Netherlands) and N. Peek (Manchester, UK).
- The panel is entitled "From Small to Big to Rich Data: Dealing with new sources of data in Biomedicine". The panellists are Niels Peek (Manchester, UK), John H. Holmes (Philadelphia, USA), Fernando Martin-Sanchez (Melbourne, Australia), Luccia Sacchi (Pavia, Italy), and Riccardo Bellazzi (Pavia, Italy).

9. Outreach - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

The working group chair moderates a LinkedIn group called "Data Mining and Big Data Analytics in Biomedicine" which has 38 members.

10. Collaboration - Working with other IMIA WG/SIGs or external organisations or institutions

The working group has a long-standing collaboration with the Knowledge Discovery and Data Mining Group from the American Medical Informatics Association (AMIA).
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Vice-Chair (2013-2015)
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11. Background – Brief description of the WG/SIG mission, vision, and objective
Objectives:
- To disseminate and exchange information on Health and Medical Informatics (HMI) programs and courses.
- To promote the IMIA HMI database on programs and courses on HMI education.
- To produce international recommendations on HMI programmes and courses.
- To support HMI courses and exchange of students and teachers.
- To advance the knowledge of:
  (1) how informatics is taught in the education of health care professionals around the world,
  (2) how in particular health and medical informatics is taught to students of computer science/informatics,
  (3) how it is taught within dedicated curricula in health and medical informatics.

12. Achievement - Events and projects conducted and publications completed

Paper in press

13. Participation - Engagement and participation in IMIA and health informatics events and activities
- eHealth in Asia: From Strategy to Implementation, The Third Asia eHealth Information Network (AeHIN) General Meeting, 04 – 05 December 2014, Manila, Philippines.
- Meeting on eHealth technical support & discussions on Mobile Technology for Community Health (MoTeCH) project, 31 March - 01 April 2014, World Health Organization (WHO) Regional Office for South-East Asia (SEARO), New Delhi, India.
- Joint Inter-Ministerial Policy Dialogue on eHealth Standardization and Second WHO Forum on eHealth Standardization and Interoperability, 10-11 February 2014, Geneva, Switzerland.

The following activities will be conducted at Medinfo 2015
**Workshop “Courses on Health IT Evaluation: Development of Recommendations”**

Abstract: To guarantee that health IT evaluation studies are conducted in accordance with robust standards, well-trained health informatics experts are needed. In this workshop that is jointly organized by the EFMI, IMIA and AMIA Working Groups on Health IT Evaluation and the IMIA Working Group on Education in Health Informatics, we will work on recommendations for content of health IT evaluation courses. In particular, participants will first get an overview on first recommendations developed during an earlier joint workshop at MIE 2014 and MIE2015 and will then work in smaller groups to refine these recommendations.

**Panel: Current Status and Challenges in Biomedical and Health Informatics Education and Capacity Building in Latin America**

Abstract: Information and Communication Technologies can play a critical role in improving healthcare, however capacity building and education in Biomedical and Health Informatics (BMHI) still face several challenges in the Latin America region. We invite our panelists to describe existing education programs in the region as well as illustrate challenges and ideas that may promote and foster education.

**Panel: Health Informatics Education: Online Learning, Professional Networks and MOOCs**

The explosion of information technology has had a significant impact on society in general and healthcare in particular. While Health Informatics has grown rapidly as a discipline in response to rapid changes, global and national commitments are needed for the current health care systems to adopt and use integrated health information systems. An essential element of these commitments is the development of multidisciplinary human resources capable of accompanying these changes. Objective: To describe from multiple countries and perspectives different approaches taken to educate health care workers and other professionals involved in health care organizations in the fundamental issues and methodologies in biomedical informatics

14. **Outreach** - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

15. **Collaboration** - Working with other IMIA WG/SIGs or external organizations or institutions

The Working Group Chairs would explore the possibility to partner with the other IMIA Working Groups like Health Informatics Standards and Health Informatics for Development to evaluate in a survey if there is any training on eHealth Standards and based on the results work on a minimum curriculum on eHealth Standards based on competencies

In response to the call from Dr. Tze-Yun Leong, VP for WG/SIG for collaboration opportunities with the International Federation of Information Process (IFIP) and the European Federation of Medical Informatics (EFMI), our WG has expressed its interest in collaborating with Technical Committee (TC 3: Education) from IFIP and EDU – Education Working Group of EFMI. The WG looks forward to explore the activities of mutual interest and avenues to work together.

The WG is keen to initiate discussion with other IMIA WGs like Health Informatics Standards, Telehealth and Health Informatics for Development to collaborate and partner on events of mutual synergy related to training, capacity building and knowledge sharing.
The vice-chair of the WG has been invited to play an advisory role towards establishing an online Health Informatics programme by an University in India. An update would be provided once the proposal is finalised.

The WG is keen to partner with institutions working on competency framework for key health informatics functions and roles.

The vice-chair of the WG is engaged in a discussion with the National Release Centre (NRC) for SNOMED CT in India to support the efforts on capacity building for SNOMED CT implementation in India.

6 Working Group: Health Geographical Information Systems

7 Working Group: Health Informatics for Development


Website of the WG: (and other relevant sites) http://www.imia-medinfo.org/new2/node/140

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16. Background – Brief description of the WG/SIG mission, vision, and objective
   Objectives
   • Define the sub-domain of “health informatics for development” as it pertains to its parent “biomedical and health informatics” and as it relates to specific issues in low-to-medium income countries (LMICs)
   • Characterize the unique issues in health informatics experienced by LMICs such as those found in the social, political, and economic contexts
   • Identify best practice and lessons learned in health informatics that LMICs can adopt in order to build cost-effective health information systems
   • Connect developed and developing country health informatics experts for possible partnerships and collaborations
   • Redefine standards and interoperability in the context of the needs of LMICs
   • Identify innovations such as mobile health that make it possible for LMICs to design and implement health information systems at a cost they can afford
17. **Achievement** - Events and projects conducted and publications completed

*Why patient centered care coordination is important in developing countries?* C. Otero, D. Luna, A. Marcelo, M. Househ, H. Mandirola, W. Curioso, P. Pazos, C. Villalba

*Health Informatics in Developing Countries: Going beyond Pilot Practices to Sustainable Implementations: A Review of the Current Challenges.* Daniel Luna, Alfredo Almerares, John Charles Mayan, Fernán González Bernaldo de Quirós, Carlos Otero.

*Challenges and potential solutions for big data implementations in developing countries.* D Luna, J C Mayan, M J García, A A Almerares, H Mowafa

*Health Informatics in Developing Countries: Systematic Review of Reviews.* Contribution of the IMIA Working Group Health Informatics for Development. D Luna, C Otero, A Marcelo


*Challenges and hurdles to implement eHealth in developing countries.* MEDINFO 2015. HF Mandirola Brieux, JH Bhuiyan Masud, sk meher, S Indarte, D Luna, C Otero, P Otero, F Gómez Bernaldo de Quirós, F Portilla

Works in progress

*Share knowledge, spread the discipline. The challenge of health informatics in developing countries.* C Otero, D Luna, A Marcelo, A Margolis, W Curioso, F González Bernaldo de Quirós.

18. **Participation** - Engagement and participation in IMIA and health informatics events and activities

People of our working group had participated in many conferences in the field like INFOLAC 2014 in Montevideo, Uruguay; APAPMI 2014 in New Delhi; MIE 2014 in Istanbul, Turkey; MIE 2015 in Madrid, Spain, as well many other small conferences in the regions.

The developments in Asia are focused on platform approaches to capacity-building on eHealth. The Asia Pacific Association of Medical Informatics (APAMI) remains to be the official regional organization for IMIA in Asia. Recently, APAMI has been active seeking for solutions to assist Nepal immediately after the earthquake.

The Asia eHealth Information Network (www.aehin.org), created by the World Health Organization to support countries in the design and implementation of their national eHealth strategies, has begun to establish capability at several levels of the health hierarchy. For health and ICT leaders and planners, AeHIN supported the training of thirty participants from nine countries on IT Governance (COBIT5). Thereafter, twenty-seven participants from 6 countries underwent enterprise architecture training, ten of who became TOGAF 9.1 certified. As a follow-up, twenty participants took the
online ArchMate training and of which 5 received certification. The next steps of AeHIN are to consolidate these trainees as a cadre of certified professionals. Together they will form the regional enterprise architecture council for health to oversee the design and implementation of a regional interoperability lab in Asia as a common resource for its member countries.

With the upcoming post-2015 development agenda, Asian countries are now studying how they can establish information systems that can faithfully collect data that can provide better data for decision making along the lines of the sustainable development goals (SDGs). While doing this, there is increased attention being placed on an a shared regional architecture that will allow countries to share consistent SDG data while also enabling them also to extend the architecture to be responsive to their local needs (eg, localization). A regional conference on how to effectively create this regional interoperability framework will be held in Bali this October 2015.

In Latin America, following our central conference, INFLOAC 2014, the conference for IMIA Lac, that was performed in Montevideo, Uruguay, members of the working group beginning to work in our big challenge for 2015: MEDINFO 2015, the first mundial conference in Latin-America. We work together to help smalls groups to developed their own papers, and also help in the process to spread our working group. We also collaborate in review process and generate workshops and tutorials for this conference.

At the same time, we beginning to work in a new project to help us spread the discipline, that we think to present at MEDINFO 2015. Also our social media strategy will be presented in this conference.

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8 Working Group: Health Informatics for Patient Safety


Website of the WG: http://www.imia-medinfo.org/new2/node/345

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Vice-Chair (2014 - 2017)
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Associate Professor
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University of Victoria
19. **Background** – Brief description of the WG/SIG mission, vision, and objective

The working group focuses on the following areas where health information systems are concerned:

1. Identifying and documenting how health information systems and their associated devices can best be designed, implemented and applied to improve patient safety (e.g. developing usable, integrated workflow solutions that are safe),
2. Identifying and documenting software safety issues involving health information systems (e.g. physician order entry, electronic documentation, decision support tools) and their associated devices,
3. Discussing, developing and promoting methodologies that improve patient safety using health information systems and their associated devices,
4. Discussing, developing and promoting methodologies that prevent the occurrence of safety issues involving health information systems and their associated devices,
5. Educating health informatics professionals, health professionals, health care administrators and policy makers about: (a) how health information systems and medical devices can improve patient safety, and (b) the solutions that can be employed to prevent the occurrence of technology-induced errors involving software and medical devices,
6. Collecting, analyzing and disseminating research results about health information systems and medical devices that improve safety as well as those that have been found to inadvertently decrease safety.

20. **Achievement** - Events and projects conducted and publications completed


21. **Participation** - Engagement and participation in IMIA and health informatics events and activities

1. Collaborated on an IMIA pre-conference workshop
2. Publication of an IMIA Yearbook paper

22. **Outreach** - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

1. Met with WG leaders from EFMI at the MIE 2015 conference in Madrid
2. Planned meeting with WG members at MedInfo 2015
23. **Collaboration** - Working with other IMIA WG/SIGs or external organisations or institutions

1. Collaboration with the IMIA WG’s Human Factors for Patient Safety and People and Organizational Issues Group for the CSHI 2015 conference prior to MedInfo 2015: 
   [http://cshi2015.org/call-submissions](http://cshi2015.org/call-submissions) and publication of conference proceedings from the conference

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**9 Working Group: Health Information Systems**

**Health Information Systems**

*Report for the Year July 2014 – June 2015*

**Website of the WG:** (and other relevant sites) N/A

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**24. Background** – Brief description of the WG/SIG mission, vision, and objective

- Promote systematic development and research in the field of health information systems;
- Promote research and efforts on efficiency and cost-effectiveness of health information systems for the healthcare, health delivery and access to health;
- Promote research and development in the domain of sustainability in health information systems;
- Promote evaluation, identify and assess problems and success factors of health information systems.

**25. Achievement** - Events and projects conducted and publications completed

Co-organization of a workshop with the German Working Group for EHR Data Reuse for Clinical Research (chair Ulli Prokosch), and the European i2b2/Shrine AUG (details below).

Organization of a “eHealth-Enabled Clinical Data Reuse Workshop” at the Medinfo 2015 conference.

Preparation of a review paper about the secondary uses of EHR information for ‘big data’ applications (mentioned below).
26. **Participation** - Engagement and participation in IMIA and health informatics events and activities

“eHealth-Enabled Clinical Data Reuse Workshop” planned at the Medinfo 2015 conference. Will feature presentations by 5 experts (Drs. Lovis, Prokosh, Lehmann, Hripcsak, and Meystre), 2 selected submissions from the community (submissions received after call for submissions currently being reviewed), and a roundtable discussion.

27. **Outreach** - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

Spring-summer 2014: International outreach campaign inviting all IMIA member countries to designate “liaison” members to the Health Information Systems WG. Twelve countries officially designated such a “liaison” member.

2015-current: Preparation of a review paper about the secondary uses of EHR information for ‘big data’ applications.

LinkedIn page for WG members communication regularly used.

28. **Collaboration** - Working with other IMIA WG/SIGs or external organisations or institutions

September 2014: Organization of a successful “Research Databases” workshop with the German Working Group for EHR Data Reuse for Clinical Research (chair Ulli Prokosch), and the second European i2b2/Shrine AUG meeting in Göttingen, Germany.

10 **Working Group: Health Record Banking**


Website of the WG:  [http://www.imia-medinfo.org/new2/node/474](http://www.imia-medinfo.org/new2/node/474)

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29. **Background** – Brief description of the WG/SIG mission, vision, and objective

**Mission and vision:**

Studying sustainability models of health records (patient/individual-centric, longitudinal, cross-institutional and interoperable), with an emphasis on the health record banking model, which is focused on the following key principles:
1. independent/trusted organizations that curate and manage the records on behalf of patients and make it available to all authorized parties
2. the records of each patient are logically aggregated in one place (but not all patient records are in the same place thanks to multiple & independent banks)
3. Greater control for patients over their own records with no need for globally unique patient’s id

Objectives of the WG:
1. Promote legislation change that will give rise to HRB establishment
2. Promote international collaboration on HRB, especially between existing HRB experiences in Europe and the US
3. Foster HRB initiatives around the globe
4. Work with the HRB Alliance (http://www.healthbanking.org)

5. Achievement - Events and projects conducted and publications completed

1. Organized an HRB workshop at the EFMI MIE 2014 in Istanbul
2. Organized an HRB workshop at the EFMI MIE 2015 in Madrid
3. Organize an HRB session at the WCIT conference in Mexico

6. Participation - Engagement and participation in IMIA and health informatics events and activities

Will organize an HRB workshop in MedInfo 2015 in Sao Paulo.

7. Outreach - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

Established an open LinkedIn group for the IMIA HRB WG at: https://www.linkedin.com/grp/home?gid=7300138
We currently have 141 members.

8. Collaboration - Working with other IMIA WG/SIGs or external organisations or institutions

In MedInfo 2015, Amnon will participate in a panel discussion titled “Toward precision medicine: extending the biomedical informatics community tent”, along with Guillermo Lopez Campos, Jessica Tenenbaum, and Lewis Frey, who represent other WGs of IMIA that deal with related topics, in attempt to sort out the various perspectives and foster collaboration.

11 Working Group: History in Biomedical and Health Informatics


Website of the WG: www.infohistory.rutgers.edu

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Vice-Chairs (2014 - 2017)
30. Background – Brief description of the WG/SIG mission, vision, and objective

The Biomedical and Health Informatics History Working Group of IMIA was approved at the IMIA GA held in New Delhi in conjunction with APAMI 2014 last August. Its work is to sponsor meetings, investigations, studies and generate materials and publications on the history of biomedical and health informatics. The IMIA History Working Group extends the activities of the History Task Force on the 50th Anniversary of Medical Informatics, providing coordinating mechanisms for activities of different regional and national groups engaged in related historical studies of the field. The Working Group will work on gathering, archiving, and indexing historical documents and materials from IMIA and related professional society, institutional, and individual sources, develop and maintain a web-site and a media-wiki for these purposes, and sponsor the publication of an eBook on the History of International Biomedical and Health Informatics that summarizes and disseminates the results.

31. Achievement - Events and projects conducted and publications completed

Building on the work of the earlier IMIA History Taskforce we move forward in sponsoring and encouraging the gathering of IMIA-related archival materials, with a prototype media repository at Rutgers University that can help those contributing to the 50th Anniversary IMIA History book or writing their own recollections and histories. The materials support the writing and chronicling of the development and evolution of IMIA, its contributors, its sponsored events and publications, educational and other professional activities.

Achievements related to the IMIA History WG since its establishment this past year involve:

a) Writing and submitting a grant proposal to the National Library of Medicine, NIH, USA to support the writing, archival and editorial work of producing the contributed volume on the International History of Biomedical and Heath Informatics. This will be the first book of its kind as an international community-based writing effort that covers the development and evolution of an informatics professional field over the entire world since its beginnings approximately 50 years ago.

b) Organization and chairing of the ACMI History Sessions by Kulikowski and McCray during AMIA 2014 in Washington, DC. These sessions included major leaders in Biomedical and Health Informatics (BMHI) and identified themes and topics of BMHI
and traced how they have developed and evolved over the history of the field, as well as including individual reminiscences of pioneers in the field.

c) Publication of an edited volume *Contributions to the History of Medical Informatics* (Masic and Mihalas, Eds.) based in part on materials generated for the Workshop of the Prague-STC EFMI Meeting in 2013 sponsored by the IMIA History Taskforce, with strong participation of many of its members. Chapters of the book include short contributions from members, a number of reprinted chapters, and several overview chapters by Masic.

d) Participation in the EFMI –IMIA joint WG meeting at Medical Informatics Europe (MIE-2015) in Madrid this past May, where Kulikowski and Mihalas participated in a discussion with the other WG chairs and participants, on the ways in which the historical development of themes and topics in BMHI need to be chronicled and written for the 50th Anniversary IMIA History.

e) Invitations to contributors to BMHI internationally to provide short chapters for the 50th Anniversary IMIA History on how they personally became involved and contributed to BMHI in its different specialities and threads of research, practice, and education. These will help supplement previously published materials on the History of BMHI in the *IMIA Yearbook*, the journals of the Association, and other sources.

f) Submission and acceptance of a Workshop for Medinfo 2015 in Sao Paulo to focus on the History of International BMHI and recruitment of a wider range of contributors while sharing ideas about how the book can be developed further.

### 32. Participation - Engagement and participation in IMIA and health informatics events and activities

Expanding on the above, the most recent activities involving the IMIA History WG have included the EFMI –IMIA joint WG meeting at Medical Informatics Europe MIE-2015 in Madrid this past May, where Kulikowski and Mihalas participated in a discussion with the other WG chairs and participants, focusing on the importance of coordinating the work of the national, regional and international activities for writing the chapters needed for the 50th Anniversary IMIA History Volume in time for Medinfo 2017 in Beijing. Coordination with other working groups involved in medical, nursing, social, ethical, and scientific aspects of the field was also discussed in order that contributors provide not only their personal statements of how they have contributed to the field of Biomedical and Health Informatics (BMHI), but also obtain sufficient synthetic short chapters on the evolution of the field in individual countries and regions centered around the main themes and topics reflecting the threads of strength and focus of the BMHI work in different countries and regions. These discussions built on earlier ones at workshops held at Medinfo 2010 in Cape Town, at IMIA-LAC in Guadalajara in 2011, at almost all AMIA Annual Meetings and ACMI Meetings since 2011, MIE 2011 in Oslo, at APAMI in Beijing in 2012, in Prague at the Workshop in conjunction with the EFMI-STC, at the Medinfo 2013 Congress held in Copenhagen, at MIE 2014 in Istanbul, and at APAMI 2014 in New Delhi, where the History WG was formally approved.

### 33. Outreach - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

Each of the above meetings helped in the recruitment of new prospective members to the WG, and we expect to consolidate the membership formally during the Medinfo WG meeting in Sao Paulo.
Members of the WG based on the interest they have evidenced as participants in the Workshops on IMIA History at Medinfo 2010, 2013, and the other IMIA-related venues like MIE, APAMI, AMIA and other meetings listed above, include:

- **Africa (HELINA):** Lyn Hanmer (South Africa), Ghislain Kouematchoua Tchuitcheu
- **Asia-Pacific (APAMI):** Enrico Coeira (Australia), Sashi B. Goggia (India), Evelyn Hovenga (Australia), Inga Hunter (New Zealand), Jack Li (Taiwan), Jia Lin Liu (China), K.C. Lun (Singapore), Michio Kimura (Japan), Hyeoun-Ae Park (Korea), Hiroshi Takeda (Japan), Ken Toyoda (Japan)
- **Europe (EFMI):** Jos Aarts (The Netherlands), Klaus-Peter Addlassnig (Austria), Barry Barber (UK), Riccardo Belazzi (Italy), Ronald Cornet (The Netherlands), Patrice Degoulet (France), Tomas M. Deserno (Germany), Gjuro Djezelic (Croatia), Rolf Engelbrecht (Germany), Francis Roger France (Belgium), Guenther Gell (Austria), Antoine Geissbuhler (Switzerland), Kemal Gurclen (Turkey), Anna Hafberg (Iceland), Arie Hasman (The Netherlands), Reinhold Haux (Germany), Mira Hercegojna-Szekeres (Croatia), Jacob Hofdijk (The Netherlands), Peter Hurlen (Norway), Sabine Koch (Sweden), John Mantas (Greece), Izet Masic (BH), George Mihalas (Romania), Victo Maojo (Spain), Oleg Mayorov (Ukraine), Anne Moen (Norway), Hans Peterson (Sweden), Francesco Pincirolli (Italy), Alan Rector (UK), Bernard Richards (UK), Otto Rienhoff (Germany), Nils Rossing (Denmark), Michael Shiffrin (Russia), Diarmuid UaConnail (Ireland), Jan van Bemmel (The Netherlands), Jana Zvarova (Czech Republic)
- **North America (AMIA and COACH):** Constantin Aliferis (US), Marion Ball (US), Elizabeth Borycki (Canada), Larry Fagan (US), Andrew Grant (Canada), Robert Greenes (US), W. Ed Hammond (US), Betsy Humphreys (US), Christoph Lehman (US), Donald A.B. Lindberg (US), Alexa McCray (US), Judy Ozbolt (US), Denis Protti (Canada), Virginia Saba (US), Charles Safran (US), Ted Shortliffe (US), Peter Szolovits (US)
- **Latin America (IMIA-LAC):** Lincoln Assis de Moura (Brasil), Heimar Marin (Brasil), Alvaro Margolis (Uruguay), Amado Espinosa (Mexico), Valerio Yacubsohn (Argentina)

34. **Collaboration** - Working with other IMIA WG/SIGs or external organisations or institutions

The IMIA History WG will participate with other WGs of IMIA such as: a) SIG Nursing Informatics: because Nursing Informatics has pioneered work on the history of their field, it makes much sense to draw on their experiences and coordinate with their activities.; b) Organizational and Social Issues WG: This would be another WG with natural connections to our proposed WG, given that the history of biomedical and health informatics has strong social and organizational aspects; c) Health and Medical Informatics Education WG: Understanding the evolution of our field is an important component of the education of informaticians, so coordination of activities with this WG could prove very valuable.
The IMIA WG will also work with other affiliated organizations in fields such as in Nursing and Public Health to recruit members who are interested in contributing to the ongoing archiving, compilation, and writing of both personal accounts as well as more systematic overviews of the evolution and development of themes and topics in particular regions and countries.

In addition we are collaborating with the IEEE History Center, with its Director, Michael Geselowitz, joining the external editorial review committee for the 50th Anniversary IMIA History of BMHI since he has considerable experience in the archiving and compiling, editing, and publications in the history of technology.

We are also planning to contact the WHO and HON and others who have been active in technological aspects of healthcare and the development of informatics methods and systems and may be interested in sponsoring historical work related to biomedical and health informatics.


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Focus

Consideration of human factors can make the difference between systems that function well in the clinical environment and systems that function poorly. The Physician-Patient relationship has now become the Physician-Computer-Patient relationship. Human factors engineering is the field of study which deals with cognitive aspects of the human computer interaction. This working group discusses methods for studying the computer-human interaction in health. New and adapted research and methods are needed to evaluate the complex systems facing both clinicians and patients today. Furthermore, this working group engages in discussions regarding optimal interface designs for health
informatics software to make the computer a welcome partner with both the clinician and the patient for the empowered longitudinal care of the individual.

Objectives / Goals

- To promote methods and techniques devoted to the study of human factors in the field of Biomedical Informatics.
- To coordinate studies and actions in this particular domain and to develop standardization initiatives for usability studies and user-centered design in the healthcare domain. This international group of experts supports state of the art methods, models, innovations and results.
- To disseminate rigorous scientific principles for performing formal usability evaluations to improve the efficiency, acceptability and safety of health informatics applications.
- To support emerging teams in this field all around the world: an IMIA Working group offers the opportunity for newcomers to benefit of the support of experts in this domain.

Recent Activities


Workshop at ITCH 2015:

Panel at ITCH 2015:
Marie-Catherine Beuscart-Zéphir, Régis Beuscart. Romaric Marcilly, Sanne Jensen, Christian Nøhr, Andre Kushniruk: How can Usability Engineering be more widely applied?

Met with WG leaders from EFMI at the MIE 2015 conference in Madrid

Planned meeting with WG members at MedInfo 2015

Collaborated with other WGs for a PreMedINFO conference

Upcoming Activities

Context Sensitive Health Informatics 2015
As a continuation of the MEDINFO 2013 pre-conference: Context Sensitive Health Informatics: Human and Sociotechnical Approaches that were held August 17 and 18 2013 (the conference website: http://cshi2013.org/), we have organized a PreMEDINFO conference to be held in Curitiba, Brazil August 15 and 16 2015.
The conference is organized in collaboration with the WG on Organizational and Social Issues, the WG on Health Informatics for Patient Safety, and the WG Technology Assessment & Quality Development in Health Informatics.

Paper at Context Sensitive Health Informatics 2015
EHR Big Data Deep Phenotyping
Contribution of the IMIA Genomic Medicine Working Group
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3 Vice-Chair IMIA Genomic Medicine WG, Health and Biomedical Informatics Centre, The University of Melbourne, Parkville, Victoria, Australia

Summary
Objectives: Given the quickening speed of discovery of variant disease drivers from combined patient genotype and phenotype data, the objective is to provide methodology using big data technology to support the definition of deep phenotypes in medical records.

Methods: As the vast stores of genomic information increase with next generation sequencing, the importance of deep phenotyping increases. The growth of genomic data and adoption of Electronic Health Records (EHR) in medicine provides a unique opportunity to integrate phenotype and genotype data into medical records.

The method by which collections of clinical findings and other health related data are leveraged to form meaningful phenotypes is an active area of research. Longitudinal data stored in EHRs provide a wealth of information that can be used to construct phenotypes of patients. We focus on a practical problem around data integration for deep phenotype identification within EHR data. The use of big data approaches are described that enable scalable markup of EHR events that can be used for semantic and temporal similarity analysis to support the identification of phenotype and genotype relationships.

Conclusions: Stead and colleagues’ 2005 concept of using light standards to increase the productivity of software systems by riding on the wave of hardware/processing power is described as a harbinger for designing future healthcare systems. The big data solution, using flexible markup, provides a route to improved utilization of processing power for organizing patient records in genotype and phenotype research.

Keywords
Deep phenotype, ontology, big data, genome, electronic health record
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Introduction
Enormous volumes of electronic data are collected on patients across the world at an ever-increasing rate. Traditional clinical workflows are already overwhelmed.
with the problem of too much data and too little time [1]. The idea of finding relevant knowledge for the patient at hand from the millions of clinical experiences accumulated in Electronic Health Records (EHR) is a daunting task—how do we search for such knowledge and how do we know the associations observed are valid? Starren and colleagues argue that including next generation sequencing within EHRs will further overwhelm workflows in clinical practice [2] and poses a host of challenges [3]. How can informaticists create the next generation of information systems that address both the present and future challenges of data scope and diversity? Stead et al. [4], in a seminal paper, describe the problem of building large health information systems as a tension between investment in software-based and hardware/processor-power-based solutions. While most developers and informaticists believe that a solution lies in better software capable of handling the new complexities of medical care, the upshot of the Stead and colleagues article is that investment in more complex software systems may not be the best approach to solving the growing complexity of clinical data. They argue that software development improves linearly, with about five percent gains yearly in efficiency and capabilities to address complexities. In contrast, hardware processing power has improved exponentially (Moore’s Law), doubling every 18 months. Simpler software systems that rely on hardware processing power to address complexity have an inherent advantage. To shift healthcare to a model that relies more on processing power than on software complexity, Stead et al. propose the use of an internet like approach to health information system development using light prescriptive standards (e.g., URL, HTTP and HTML) that support flexible markup coupled with massive indexing of simple data stores. Heralding the rise of “big data” architectures, they propose combining “light” methods with reference standards based on ontologies and vocabularies for flexible markup of EHR data. The tagging of clinical information at different levels of specificity is modeled on the standards approaches that enabled the rapid expansion of the Internet. Reference standards can evolve over time, which is important in domains where knowledge is rapidly evolving such as genomic data in medicine. To date, the approach remains theoretical, but the success of big data architectures in other industries suggests that it is both feasible and advantageous.

**Background**

Although extant EHR systems could be overwhelmed by genomic scale data, combining data with omics resources and associating deep phenotypes with patient records will advance knowledge discovery of genetic disorders [5] and support the practice of personalized medicine [6]. To reach this goal without overwhelming EHRs there are a number of challenges that must be overcome: phenotyping in the EHR, omics data representation and big data analytics in medicine. Researchers are actively addressing these challenges and accelerating advancement.

**Phenotyping in the EHR**

Phenotype is specified through the expressed characteristics of an organism that result from variation in its genotype interacting with an environment [7]. Deep phenotyping [6] extends phenotyping into clinical data with the variation of clinical concepts collected over patient-clinician encounters used to define phenotypic cohorts of patients. From the perspective of clinical records, a phenotype is a collection of clinical traits and measurements that describe fundamental attributes of a patient. The phenotype can be a single trait such as race or a collection of events that compose a cohort of patients that are of interest for a particular question being investigated. The use of constellations of events to define phenotype provides a way of specifying the criteria for a cohort of patients. The use of groups of events allows the definition of a phenotype to go beyond diagnosis coded with International Classification of Disease, version 9 codes (ICD9) and potentially assesses the accuracy of assigned codes [8]. A prerequisite to achieving precision medicine is the systematic study of phenotype
abnormalities through deep phenotyping that identifies human deviations in morphology, physiology and behaviour [6]. Through controlled experiments with precise phenotype definitions, phenotypes have been developed extensively in animal models [9]. In clinical settings, on the other hand, the data are noisy and collected for the purpose of delivering medical treatment at the point of care rather than phenotyping. Consequently, data stored in EHRs do not have the same consistency and precision of data collected for experiments. Hripcsak and Albers discuss the challenges to phenotyping in the EHR such as incompleteness, inaccuracy, complexity and bias [8]. They propose studying the complexities of the EHR as a means of improving phenotype collection and improving EHR processes to support phenotype development. They also touch upon expanding the way in which phenotypes can be defined in terms of time series data analysis. They describe the process of phenotyping in the HER as an iterative approach in which experts curate a set of cohort patients expressing a phenotype in order to create a training data set. Features are then extracted from the EHR, rules are constructed, and sensitivity along with specificity are measured until they reach an acceptable validated level for the training data. The rules are then applied to the full data set. The consistency of vocabularies and ontologies used to describe EHR data can be explored to determine the impact they have on the rules generated and complexity of extracting phenotype from medical data. Prescriptive phenotype definition is not the only approach to the problem; it is also possible to define a phenotype by example based on medical events. The field is currently advancing techniques in ontology construction for developing phenotype and similarity measures to search and match phenotypes [10, 11]. Ontologies and vocabularies are central to phenotype definition within EHR data. The Unified Medical Language System (UMLS) [12] provides a repository of vocabularies with which to consistently markup medical records. Expanding potential applications of the repository, conceptual similarity has been used to relate it to other knowledge sources [13]. The UMLS contains vocabularies such as the Logical Observations Identifiers, Names, Codes (LOINC) used to encode lab tests [14], RxNorm [15] for normalized medication names, ICD9 [16] for diagnostic codes and Systematized Nomenclature of Medicine--Clinical Terms (SNOMED CT) with high concept coverage and explicit semantic relationships [17], which combined, become very relevant for the specification of phenotype.

Ontologies

Using a reference standard to harmonize phenotype research, the Human Phenotype Ontology project created a common terminology and ontological representation that can be used for consistently categorizing phenotypes in human disease [18]. It connects with the Online Mendelian Inheritance in Man (OMIM) resource and extends it through the use of a controlled vocabulary for consistent labeling [19]. Doelken et al. [10] describe the Human Phenotype Ontology project and its continuous build architecture. They also describe software that facilitates consistency management with resources such as OMIM. The use of ontological information enables the patient history or event streams to be organized with hierarchical data structures that allow flexible annotation and searching of the data. An organizational mechanism based on directed acyclic graph (DAG) representations can be used to encode the ontology. The use of DAGs is widespread in genomics (e.g., the Gene Ontology and Sequence Ontology). A strategy for managing the dynamic domain of genotype and phenotype data is to combine highly indexed flexible ontological markup of data files with ontology distance measures of events in the patient population. Software systems store events from patients as clinical encounters with clinical content (much of it is free text) and metadata on context of collection. By marking up observations from each clinical encounter using a flexible and extensible format, a stream of events can be associated with each patient. The primary interest is to draw similar cohorts from streams of clinical events in the EHR.

Semantic and Temporal Similarity

There are multiple approaches to calculating similarity measures between patient cases such as path length between terms in an ontology or similarity of temporal sequences that occur in the patient’s record. A distance measure can be computed between terms by searching for the shortest path connecting them. Köhler et al. [20] examine clinical diagnostics using semantic similarity searches on clinical feature that describe phenotypes. The tool uses the Human Phenotype Ontology to augment the searches. They validated the tool with simulated data and describe
how the approach can be applied to assist in diagnostic workflow. Girdea et al. [11] present PhenoTips a web-based tool for documenting phenotype information that is used within clinical encounters. The open source software uses the Human Phenotype Ontology and connects with OMIM. PhenoTips has been deployed and used to collect anonymized patient phenotype information for three research projects in hospitals across Canada. The tool is specifically designed to fit within clinical workflows and has incorporated feedback from clinicians using the system. Inherent in the concept of similarity are representations of patient-history. While the genome of a patient may be stable, the interpretation of the variants, the effects of disease and environment evolve over time. The evolution of a patient’s health events related to a disease may follow the same or a similar trajectory to other patients. Leveraging the concept of similar trajectories, an approach to predicting an index patient’s health events could use temporal alignment of the health records from comparator patients [21]. Systems such as Lifelines2, discussed in the visualization literature, apply techniques to identify and align patients. Specifically, these systems use an index case to find matching cases, those with exact matches of ordered events to the index case. The ordered events from the matched cases are aligned to the index case and used to predict future events for the index case [22]. When multiple cases are aligned to an index case, the range of outcomes from the matched cases provides a prediction guide for the index case. The approach of finding patients that match an index patient assumes that the underlying illness and the course of prior events are similar [22]. This is a reasonable assumption, if one assumes that the clinical phenotype of a patient is given by both underlying medical conditions and the aligning medical events. Expanding this conceptual definition of phenotype, Wongsuphasawat [23] extends Lifelines2 to include differentiation between and filtering out of unimportant events, inclusion of demographic features, and modeling of the trajectory those patients took to reach the alignment point [24]. This further expands the conceptual definition of phenotype. Phenotype is not only the disease but also its response over time to native homeostatic mechanisms and to treatment. Even if there is similarity in the underlying conditions (e.g., a myocardial infarction), the health events ordered across time (e.g., a myocardial infarction, followed by congestive heart failure and low blood pressure) may also serve an important role in defining phenotype. If a patient has had several prior heart attacks or had a heart transplant prior to the heart attack, knowledge of the path that patients followed prior to the aligning event may be critical in developing a phenotype that could be used for treatment planning. When using EHRs and as the number of events considered increases, the probability of finding cases with an exact match in the sequence becomes reduced. Lee and colleagues [25, 26] have explored relaxing the requirements for exact match by weighting the differences in comparisons of sequence events using dynamic programming methods, however, this approach faces challenges with exponential complexity in the number of patterns. Adding difficulty, similar events in a sequence must be considered as well. For example, a patient who has asthma that follows treatment with the beta blocker metoprolol is similar to one who has asthma that follows treatment with a beta blocker propranolol, but not necessary to one who has asthma that follows treatment with aspirin. Approaches to address this complexity may require application of tools such as Ayers et al.’s [27] Sequential Pattern Mining Using Bitmaps (SPAM) algorithm [28] or artificial intelligence methods for temporal abstraction, such as those applied in Shahar’s and colleagues Knave II application [29]. Nonetheless, deep phenotyping has to include the course a patient has followed to reach a particular point in time, as this ultimately reflects concepts of disease progression, complications of illness, and response (or non response) to treatment. Extending analysis approaches with time series information from the EHR enables the recognition of trending patterns that enhance phenotypic description. By constructing deep phenotypes from clinical notes and other medical findings, a more precise description of a patient’s health and treatment options can be developed and similarities between patients can be identified, especially in relationship to genomic data and molecular drivers of the phenotypes.
Omics Data Representation

In the last two decades medicine has witnessed a revolution in the development and use of different molecular biology and “-omics” technologies and methodologies. Traditionally used as powerful tools towards a better understating of the mechanisms associated with disease, they are transitioning to critical tools for achieving improved healthcare by means of precision medicine. In the last five years this trend has been reinforced by the developments and evolution of sequencing methods that have substantially reduced the costs of accessing these technologies, and thus, facilitate their adoption for clinical applications [30]. These new methodologies have brought with them an explosion in the volumes of data generated and pose a challenge for their management and interpretation.

Almost simultaneously, there has been a movement towards the widespread use and adoption of EHRs in the clinical setting. Consequently, EHR developers have to incorporate new forms and data types generated in the genomics and molecular fields, manage them effectively and present the assay results in a meaningful way to users. The speed in the advances and changes in genomics represents additional challenges for EHRs in terms of variability and quantity of data generated. This increasing complexity caused by the evolution of genomic technologies is exemplified in the changes associated with differences in the management of laboratory results. Initially laboratories were focused on a single gene analysis or gene panels. This was followed by the management of millions of variants identified in genotyping experiments based on genome wide association studies (GWAS) and more recently the management of whole exome sequencing (WES) and whole genome sequencing (WGS). In 2003, when the Human Genome Project was finished, it meant the successful accomplishment of a multibillion dollar international project that required several years to complete, now new advanced next generation sequencing techniques have reduced the costs and data turnaround in a manner that have made gathering individual genomes for clinical purposes a reality. The investment in WES technology combined with patient data has resulted in over 100 Mendelian disease variants being identified in the past three years [5]. The big volumes of data generated with the latest genomic approaches add an important challenge for biomedical informatics and EHRs not just because of their size itself but also because of the processing, analysis requirements and methodologies that must be applied in order to present the data in a useful and meaningful manner for clinical users. These processes need to generate key metadata to be included with the genomic data to aid in their interpretation. The metadata should include aspects such as the laboratory techniques, bioinformatics, tools, databases and pipelines used to generate those data.

Masys et al. [3] described some of the challenges associated with the inclusion of genomic data in EHRs. They identified seven challenges: Separation of raw data and interpreted data; Annotation of data generation and processing; Requirement of lossless compression methods to reduce data footprint; Presentation of the clinically actionable data; Use of human and machine readable formats to facilitate the design and implementation of decision support methods; Anticipation changes in genomic variation; and finally Design of systems supporting clinical care and research. Although the term “omics” covers a multitude of different approaches (e.g., proteomics, transcriptomics, metabolomics, microbiomics), most of the current efforts to incorporate these data in the EHRs have been focused on the integration of genomics information. Even this has been generally limited to the inclusion of a single genome per individual whereas it is possible to find different genomes within an individual in different situations such as transplant recipients, chimerism or cancer. Therefore the possibilities of having to integrate multiple genomes into the EHRs are real and should be considered in the design of future systems. Additionally in the last couple of decades the landscape of gene expression analysis has been dominated by microarray technology but the reduction in the cost of sequencing technologies is leading towards the replacement of microarrays by RNA-Seq (RNA sequencing) analysis bringing an additional source of large volumes of sequencing data that should be managed. The complexity of integrating genomic data into EHRs and the clinical workflow become a rationale for intermediate solutions, specifically, the development of ancillary systems that incrementally evolve increasing functionality [2]. Ancillary technologies provide a route to gradually incorporate big data infrastructure into EHR systems. To achieve a successful integration of genomic data into the EHRs it is necessary to adapt and develop available standards to ensure efficient data and information exchange between the laboratories where
the data are generated, the EHR and their users and in some cases as well with the possible ancillary repositories where the genomic data are stored [2]. Standards for genomic variants such as the genome variation format (GVF) [31] can be used to store data along with some existing terminologies and ontologies, such as LOINC, SNOMED-CT, that have been adapted for these new data. The approach of combining consistent markup with efficient genomic storage is a key aspect to ensure the successful use of genomic data in the EHRs. Despite the many hurdles, there are numerous examples where genomic data have been successfully included in the EHRs for both research and clinical purposes such as those from the electronic Medical Records and Genomics (eMERGE) consortium [32]. Newton et al. [33] provide a comprehensive description of phenotyping processes in the eMERGE network. They touch upon the complexity of the task and methodologies for achieving it through the use of machine learning and data reduction methods. Another major challenge from a technology perspective is integrating the different types of omics data with phenotype identification. Ontologies can be used to both integrate data from diverse sources through unified semantics and to provide relationships for computational analysis such as semantic similarity. Similarity metrics can be calculated through ontologies and other algorithms to model the degree of content similarity to identify phenotypes. This explosion of data requires adoption of new technology such as big data approaches for managing and analyzing it.

Big Data Analytics in Medicine

The term, big data, describes a collection of data that pose challenges to traditional data processing approaches (e.g., relational databases). The challenges are derived from the following characterization: volume (denoting size), variety (indicating heterogeneity), veracity (representing accuracy) and velocity (designating processing speed). Combinations of these four characteristics can result in a big data problem that cannot be scaled using traditional databases and analysis systems. Medical data over time combined with genomic data becomes a big data problem due primarily to volume and variety and becomes a velocity problem with the use of real-time data. New methods for big data parallel processing have been developed using a functional program paradigm. With these new big data approaches, the algorithms are brought to where the data are instead of shipping the data to different cores in a computing environment. The methods are based on Google’s file system [34] and BigTable [35], a sparse, distributed, persistent multidimensional sorted map that increases performance by taking a large number of records and parallelizing their processing over many machines. An ecosystem of open source tools (e.g., Hadoop, MapReduce, Spark, HBase, Accumulo, Mahout, CouchDB and MongoDB) have been implemented and applied to big data problems such as Facebook’s real-time messaging environment [36]. The use of NoSQL database solutions combined with parallelized MapReduce jobs applied to medical data has the potential to change the way deep phenotypes are constructed. The discovery of deep phenotypes can be expanded and scaled through the use of big data methodologies to include patterns of time series of events from the EHR.

Another strength of the big data Hadoop system is the ability to commoditize the use of hardware for scaling data storage and computation. New nodes can be added to scale with storage needs. Because the knowledge around genomic variant and omics data will change significantly over time, computationally powerful and dynamic systems are needed that can re-analyze data as new knowledge is created. A value added component of big data systems is the ability to store and process variant information and utilize it when its relevance is identified. Given the growth of genomic data in clinical systems, such as the
VA’s Million Veterans Project, the ability to incrementally scale the storage and analysis platform is highly desirable.

**Discussion**

Data integration is a key component to building huge data systems filled with biological, genomic, clinical, phenotype and other health related data. Data integration involves combining or linking data from multiple sources to enable data sharing, expanded data sets, secondary analysis/reuse of data and broadening multidisciplinary collaborations. In Seoane et al. [37] review of data integration in genomic medicine, they observed that data integration approaches of cross-linking, data warehouses and federation are suitable for particular applications, but are not general solutions. The problem is a plethora of small heterogeneous data sets that resist integration through the complexity of variety. The cases of EHR data, omics data and deep phenotyping involve the big data variety problem. Hadoop data stores offer a new approach to reduce and manage the complexity of high variety data. Although difficult, the variety problem in big data can be addressed through the use of BigTable paradigm because the data can be stored in a raw format and transformed at the time it is needed with as much precision as the raw format encodes. Rather than the data warehouse paradigm that needs to harmonize to a canonical representation, the new big data methods for integration have the ability to store data without normalizing it in a relational data model. The reference standard approach supports the management of the flexible markup of patient records along with using ontologies to organize and search those records [4]. The phenotype and genotype of the patient can then be maintained through the denormalized markup language developed for knowledge discovery in EHR data. The NoSQL solution does not preclude the development of standardized representations; it just does not make heavy standardization and normalization a prerequisite to integrating high variety data into the system. Using deep phenotype information at the point of care introduces the need for real-time analysis to meet the requirements of point of care services. To present potential deep phenotypes to the clinician that incorporates time series data from the EHR, the analysis system needs to have parallelizable components that can break the task into independent chunks. This enables parallel algorithms to speed processing time and to deliver results with acceptable response times. Given the existence of scalable big data stores and analysis capabilities, deep phenotyping analysis can be applied to time series and trending information in medical records. Clinical data are loaded into the Hadoop cluster and analyzed along with other data within the cluster. Having all the data within the Hadoop cluster allows phenotype and genotype data to be linked and analyzed on a common platform. The analysis approach involves writing the appropriate MapReduce program to assess similarity of patients in deep phenotypic cohorts. The Mahout MapReduce code base has been developed for machine learning using Hadoop. It implements learning algorithms such as nearest neighbor and handles running the mappers and reducers across a cluster and outputs the resulting classification model. Mahout provides a solution within the Hadoop framework to parallelize analysis and increase performances to potentially address speed requirements at point of care.

**Conclusions**

The scientific advances in the types of data available and the diversity of algorithms for phenotyping analysis of clinical data put software development further behind. Traditional relational data warehouses are well suited for facts aggregation over dimensions that can be preconfigured for fast query answering. This is useful for identifying patterns indexed by dimension tables, but is difficult to apply to time series information, which is core to understanding or predicting a patient’s health trajectory. A patient’s health information over time is critical for deep phenotyping. Specifically, it is necessary to understand a patient’s response to treatment where clinical measurement trends with the delivery of a therapeutic intervention. New approaches are needed to deal with the scale...
of clinical data and the rapidly expanding diversity of algorithms. These approaches, heralded in Stead et al. [4], focus on simple data models augmented by extensive, flexible indexing driven by raw computing power. Many of the discussed challenges are tightly intertwined and are critical for achieving precision medicine. Omics is an extremely dynamic field and our knowledge about the effects associated with the different variants is continuously evolving and being updated. Analysis and interpretation of omics data are supported by the existing knowledge and predictions available at the moment of the analysis. Interpretation of some variants may change over time and it is necessary to keep open the possibility of reinterpreting the data using the advances in knowledge and interpretation of the human variants as well as applying improved analytical tools and pipelines. Advances require gaining access to new and extended datasets that inform knowledge discovery on health and diseases across different populations. For this reason it is important that omics data are accessible for research purposes under the appropriate ethical approval. The relevance of this sharing process for research comes because in many aspects and despite the noise and difficulties to mine and extract information from the EHRs, they represent the best data annotation source, that when combined with omics data, can advance the practice of precision medicine. By treating EHR data as clinical event streams, a number of new big data methods can be developed and adapted from the technology sector. The content of these streams can be processed in combination with strategies for conceptual markup of events and matching of event streams, to rapidly retrieve and identify phenotypes. Specifically, big data solutions can use tagged data coupled with ontologies to identify phenotypes. The growth of clinically relevant deep phenotyping in this genomic medicine era depends on the application of flexible and evolving approaches to nosology, that is in turn, enabled by a move to new, computational-intensive big data architectures.

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References

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14 Working Group: IMIA WG 6 Language and Meaning in Biomedicine (LaMB)


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Background – Brief description of the WG/SIG mission, vision, and objective

This group is a forum for state of the art dialogue and collaboration on theory and practice of the representation of meaning in healthcare and biomedical research, encompassing natural language technologies, terminologies, ontologies as well as knowledge representation.

Past activities (still under the name “Medical Concept Representation”):
• Joint panels on Terminology and Natural Language Processing at MEDINFO 2004.
• Meeting in Rome, Italy, proceedings in a special issue of the Journal of Biomedical Informatics on "Biomedical Ontologies" (Volume 39, Issue 3, pp. 249-378 (June 2006)). An overview of the domain in 2006 is here:
  http://bib.oxfordjournals.org/content/7/3/256.full

Recent activities (2011-2014):

Reported in the WG’s LinkedIn group (https://www.linkedin.com/grp/home?gid=3680642) and its wordpress site (https://imiawg6lamb.wordpress.com/2014/12/10/welcome-to-the-imia-wg-6-language-and-meaning-in-biomedicine/)
The LinkedIn group was formed as one of the decided steps to reach out to the professional/scientific community with an interest in the topics addressed by this working group, to provide a platform neutral, high level forum to discuss emerging professional issues, to promote relevant events and publications, to connect interested individuals to influential people in the domain. The LaMB WG wordpress site has background materials and reports / plans for business meetings. The site hosts all information we would like to share with interested partners. We also hope to get input from the research & professional community.
Achievement - Events and projects conducted and publications completed

Over 80 members registered in the LinkedIn group. Regular business meetings held at major conferences. Two publications focusing on the WG topics:

From Concept Representations to Ontologies: A Paradigm Shift in Health Informatics?
Medical concept representation: the years beyond 2000.

Participation - Engagement and participation in IMIA and health informatics events and activities

The WG submission for a workshop on the MEDINFO 2015, titled “Biomedical Semantics in the Big Data Era (Id=871)” has been accepted by the MEDINFO2015 SPC.

Outreach - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

See the description of our LinkedIn site as our primary tool for outreach.

Collaboration - Working with other IMIA WG/SIGs or external organizations or institutions

Participation in an IMIA / EFMI meeting at Medical Informatics Europe (Madrid, May 2015), where Stefan Schulz summarized the history and the mission of this working groups. Interest was expressed to co-operate with EFMI working groups, which, however, were only partially represented.

15 Working Group: OPEN SOURCE

Website of the WG: http://www.imia-medinfo.org/new2/node/147
http://www.medfloss.org/node/479

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35. **Background** – Brief description of the WG/SIG mission, vision, and objective

IMIA OS WG has been formed in 2002 with the objective to focus on educational, promotional and 'evangelistic' activities to raise awareness of open source software in health care. The primary objectives of the IMIA OS WG are to:

- disseminate knowledge about the benefits and prospects of FLOSS in health care among IMIA members and outside of IMIA,
- provide a neutral collaboration platform for all stakeholders in health care in respect to FLOSS,
- to foster collaborations between FLOSS-HC projects and
- to lower the perceived barriers to the adoption of FLOSS in health care

36. **Achievement** - Events and projects conducted and publications completed

Continuing development of the MedFLOSS database

**Participation** - Engagement and participation in IMIA and health informatics events and activities

- Tutorial at MIE2014, Istanbul, Turkey
- Open Source Village at Med-e-Tel 2015, April 22-24, Luxembourg
- Workshop at MIE2015, Madrid, Spain
- Medical Open Source Software Seminar the 9th Japan, Oct 11, 2015, Kyoto, Japan.
- Tutorial at the General meeting of Asean eHealth Information Network, Dec 4-5, Manilla, Philippines.

37. **Outreach** - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

We are involving Asian region communities, which have emerging FLOSS community in their countries. They are trying to utilize FLOSS for universal health coverage.

38. **Collaboration** - Working with other IMIA WG/SIGs or external organisations or institutions

- Close collaboration with EFMI LIFOSS WG and GNU Solidario
- Collaboration with AeHIN
- First contacts with OSEHRA

Website of the WG: website/blog for the WG are in development

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1. Background – The purpose of the Organizational and Social Issues working group is to promote Organizational and Social Issues and the role they play in medical informatics. Given the increased implementation of health information technology and the focus on approaches such as Big Data it is more important than ever to ensure that organizational and social contexts are considered and studied as part of the design and evaluation of informatics based solutions.

2. Achievement – In 2014 the SOI WG published a WG paper in the IMIA yearbook. In 2015 Craig Kuziemsky represented the WG at a panel presentation at ITCH 2015 in Victoria. The WG collaborated with the Patient Safety and Human Factors WGs on a paper for the Context Sensitive Health Informatics Pre-Medinfo conference in Curitiba, Brazil. Craig Kuziemsky also contributed to an IMIA Yearbook paper led by Elizabeth Borycki (Patient Safety Working Group).

3. Participation - Craig Kuziemsky and Rebecca Randell attended the joint IMIA WG meeting at MIE2015 in Madrid. Both will be attending Medinfo 2015 in Sao Paulo and will be hosting a WG meeting at Medinfo

4. Outreach – The WG meeting at Medinfo will be extended to other people interested in joining the group. Craig and Rebecca will both be attending AMIA 2015 in San Francisco. At MIE 2015 they developed a plan for submission of a WG paper for the 2016 IMIA Yearbook and for submissions to AMIA 2016 and possibly to other conferences such as CSCW and CHI. They will also be targeting a WG submission to Medinfo 2017.
5. **Collaboration** – We have begun collaboration with other working groups. In 2015 the OSI WG has collaborated with the Patient Safety, Human factors WGs and Primary Care WGs. We anticipate these collaborations will continue in 2016.

**17 Working Group: Primary Health Care Informatics Working Group**

**Report for the Year July 2014 – June 2015**

Website of the WG:  [http://www.imia-medinfo.org/new2/node/149](http://www.imia-medinfo.org/new2/node/149)

Other websites:  [http://clininf.eu/about/imiaphciwg.html](http://clininf.eu/about/imiaphciwg.html)

**Chair (2014 - 2016)**
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6. **Background** – The PHCI WG mission, vision, and objective

**Goal:**
To establish and sustain a “community of practice” to promote and develop primary health care informatics as a specialism within health informatics.

**Vision:**
Patients and citizens will achieve better health status through the implementation of informatics in primary care. This improvement may be through improving their direct care as well as through enabling population level data to better inform public health as well as more efficiently and effectively answer ethically approved research questions.

**Objectives:**
To promote the

a) development and evaluation of methods to model and implement research studies based on routinely collected computerised medical record (CMR) data;

b) development of ontological approaches to case finding, interventions and outcome measures in routinely collected CMR data and repositories of data from multiple CMRs (i.e. working with real world evidence);

c) use of IT at the point of care – in the primary care clinical consultation; and

d) development of models for the assessment and management of multi-morbidity and polypharmacy.

7. **Achievement** - Events and projects conducted and publications completed

a) **Workshops:**
   - Planned workshop at Medinfo2015;
   - Contribute to the IMIA Yearbook

b) **Publications (Yearbook):**

c) **Publications (Journals):**
8. **Participation** - Engagement and participation in IMIA and health informatics events and activities

- Mazza D, Pearce C, Huang N, Liaw S, Britt H. Workshop: Using *Routinely Collected General Practice Data to Inform Practice and Policy: What do we have now, where do we need to go and how are we going to get there?* Primary Health Care Conference; 2014 August 2014; Canberra: PHC Research Information Service.
- Craig Kuziemsky and SdeL attending Medical Informatics Europe (MIE) in Madrid, May 2015. Craig represented the PCIWG at the IMIA-EFMI liaison meeting for WGs, as SdeL has a timetable clash with an FP7 project workshop.
- We conducted a Delphi study on the theme “Does informatics enable or inhibit the delivery of patient-centred, coordinated, and quality-assured care”. The objective of the study was to achieve consensus about the role of informatics in patient-centred care. The three-round consensus building exercise involved panel of general practitioners and informatics academics who were members of the working group. The results of the study will be published in the Yearbook of Medical Informatics 2015 edition.


9. **Outreach** - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media


10. **Collaboration** - Working with other IMIA WG/SIGs or external organizations or institutions. We have no such plans directly in place.

- We have multiple informal contacts with the North American Primary Care Research Group (NAPCRG) and with the World Organisation of National Colleges and Academies of family practice (WONCA).
- We are open to collaborate with any of the PHCI national or regional informatics working groups. Our strongest collaboration is with EFMI.
The British Computer Society (BCS) funded SdeL’s travel to IMIA-MEDINFO, in Brazil, partially to enable him to hold a PCIWG meeting.

Simon de Lusignan – Chair

Siaw-Teng Liaw – Co-Chair


Year 2014
As a part of the annual conference organised by Medical Informatics Europe (MIE 2014, Istanbul Aug 31-Sep 3) EFMI Working Group “Security, Safety and Ethics” and the IMIA Working Group “Security in Health Information Systems” organised jointly a unique event i.e. a Joint Workshop for the first time. The title of this WS was “Impact of New Health Models on Information Privacy and Policy-Driven Management of Personal Health Information”. Topics discussed covered features of the new health and healthcare environment, their impacts to security, privacy and service implementation, Ethics and Laws, Strategy for trustworthy health information exchange, strategies and policies to health data protection and architectural solutions. Peter Croll (the chair of SiHiS) attended the IMIA General assembly in New Delhi (31th Oct 2014). During this meeting he presented initial ideas for a project “Business Proposal for the Global Protection of Personal Health Data”.

Year 2015
The work Group prepared a Work Shop proposal for MEDINFO “The Global Protection of Personal Health Data”. Proposal was accepted by the Scientific Committee and it will be organized on Friday 21st Aug in Sao Paulo. After the WS, a business meeting will be arranged. Key tasks in this meeting are formulation the WG strategy for coming 2-3 years and selection of chairs.

19 Working Group: Smart Homes and Ambient Assisted Living


Website of the WG: (and other relevant sites) n/a

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Vice-Chair (2012 - 2015)
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Phone:
Fax:
11. Background – Brief description of the WG/SIG mission, vision, and objective

12. Goals and Objectives

The aim of this working group is the study and promotion of research and development in the area of smart homes and ambient assisted living applications. A "smart home" is a residential setting equipped with a set of advanced electronics, sensors and automated devices specifically designed for care delivery, remote monitoring, early detection of problems or emergency cases and promotion of residential safety and quality of life. Information and Communication Technologies (ICTs) are utilized to allow individuals to live independently in their preferred environment. Thus, systems are patient-centered rather than institution-centered as they are designed to address the needs of individuals, their families and caregivers rather than these of health care facilities. Furthermore, such technologies can allow for the detection of emergencies and provide the means to increase social interaction and minimize isolation for residents (by increasing access to information, entertainment resources and communication with peers).

13. Achievement - Events and projects conducted and publications completed

The P 4 all Subproject. Information meeting

IMIA yearbook: Big Data, Smart Homes and Ambient Assisted Living
V. Vimarlund; S. Wass, 2013

Participation - Engagement and participation in IMIA and health informatics events and activities

Participation in MIE 2015, Madrid and working meeting with all other WG representatives.

14. Outreach - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

Presentation of the WG at conferences. I will participate in several conferences during Sept. Dec 2015 and inform colleagues about the WG.

15. Collaboration - Working with other IMIA WG/SIGs or external organizations or institutions

We have discussed collaboration with the WG evaluations:

Will submit a proposal to host a workshop to next MIE

20 Working Group: Social Media
Revision date: 26 June 2015
Board of the working group 2014-2016

Chairman: Luis Fernandez-Luque, Norut, Tromso, Norway (luis.luque@norut.no)
Vice-chairman: Dr. Chris Paton, University of Oxford (chris.paton@ndm.ox.ac.uk)
Secretary: Dr. Margaret Hansen, School of Nursing & Health Professions, University of San Francisco, San Francisco, CA, USA (mhansen@usfca.edu)

Former leadership of the 1st term (2010-2013)

Chairman: Dr. Chris Paton,
Vice-chairman: Francisco Grajales III
Secretary: Luis Fernandez-Luque

Background
Over the last decade, social media tools and services are transforming health and medicine. The need for a more coordinated work in the area of health social media ignited the creation of a Web 2.0 Exploratory Taskforce at IMIA under the leadership of Dr. Peter Murray (IMIA-CEO) in 2007. The aim of the task force was to “bring together interested individuals from within and outside IMIA to explore the nature and potential of Web 2.0 applications, aiming at developing background materials and proposing specific lines of action for the IMIA Board and General Assembly”. The task force rapidly attracted the attention due to the active networking at several conferences and finally in 2012 the IMIA Social Media Working Group was accepted by the General Assembly of IMIA under the leadership of Chris Paton. In 2013, the leadership of the working group was renovated with the approval of the General Assembly in Medinfo 2013.

The Social Media Working Group (SMWG) aims to be IMIA’s vehicle for stakeholder engagement in Social Media. Its membership will be international, inclusive, and multidisciplinary. The IMIA SMWG engages members from the international informatics community, across sectors, to identify, explore, collaborate, and disseminate research on the use of social media for health. Of particular interest are the drivers of change, barriers, facilitators, and policies necessary for the application of the various social media categories in the health domain, including 1) health care delivery, 2) health care professional education; 3) public health; 4) clinical and disaster medicine; and 5) research.

As described in this report the first term of the SMWG was to be consolidated as an active working group. During the last four years the SMWG have been actively involved producing research papers, workshops and panels in nearly all the leading conferences of medical informatics. Furthermore, it won the award of the best working group in IMIA in 2012 and 2013.

Memberships
The IMIA SMWG has establish a protocol for the inclusion of new members. The prospective members will fill a web form available at the IMIA SMWG website and then the Secretary will invite them to the mailing list which is the official communication channel of the group. The new members are encouraged to introduce themselves to the rest of the group in the mailing list.

During the year 2014 only 3 new members joined the group from Taiwan, South Africa and Sweden. In total since the creation of the group over 60 members have joined. These new members have joined via former members and events organized as part of IMIA events (e.g. MEDINFO, MIE).
There is a global representation in the group with members from 17 different countries and from all the IMIA represented continents. The most active members are in North America, Australia and Europe. The former objective of getting new members from Asia has been achieved with a new members from Taiwan.

Participation and outreach
With regards of active participation within the group the best metric is the usage of the mailing lists, since 2007 there have been more than 140 threads. In the last 12 months (from July 2015) above 300 emails have been exchanged between working group members to organize different activities. Around 30 emails related to general discussions in the mailing list, and close to three hundred to organize different activities. For example, over 47 emails have been exchanges in 2014 to organize a panels in Medical Informatics Europe 2015, and similar number for Medinfo 2015. Nearly 100 emails have been exchanged to organize participation of the working group in the IMIA Yearbook (e.g. IMIA Yearbook collaboration).
Since its creation of the working group, there have been at least 10 scientific publications (available in a group created in Mendeley) due the collaboration in the IMIA SMWG including 4 publications in the IMIA Yearbook and several other official IMIA Journals (below a sample of the yearbook contributions). The following publications are results of our working group activity, in bold we highlight publications result of the activity in the last 12 months we have published (in press) two IMIA Yearbook contribution and 2 panels/workshops (one in MIE and other in MEDINFO).

We would like also to highlight that a member from Norway (Elia Gabarron) is doing a research stay in Australia to work with another member (Dr. Annie Lau). That collaboration started in our working group.

IMIA Collaboration

One of the objectives for the last year was to strengthen our collaboration with IMIA. To achieve that we collaborated in the following activities the previous 12 months:

- 3 people from our group attended the MIE 2015 “EFMI & IMIA meeting” between different working groups. We plan to seek collaboration with other groups. A similar meeting is planned in MEDINFO 2015. In those meetings we are aiming at setting up a plan for collaborating organizing an event in 2016 (this has been therefore delayed from previous goal).

- Reinforced collaboration with IMIA Yearbook: we became co-editors of the consumer health section. Including revision of best paper selection, co-authoring synopsys and writing a survey. We have fulfill all the objectives from previous report.

- Reinforced collaboration with MEDINFO 2015: we assisted the LOC in the definition of a strategy for social media communication. In addition, we helped the SPC and arranged that one member of our group attended the consensus meeting in Madrid. This level of participation was not planned by the time of the previously report.

- Panels, workshops and group meetings have been organized in MIE, MEDINFO. We have organized 2 panels and arranged participation in 2 WG meetings. Our objective for activities in IMIA events have been fulfilled.

Plans for the Future (2016)

IMIA Yearbook collaboration: we foreseen to continue collaborating.

- Survey paper, selection of best papers, synopsys paper.

IMIA Official events participations:

- 4 workshops/panels/side events to be arranged in 2016 within IMIA Oficial conferences.

R&D Collaboration: members of the IMIA SMWG have been granted several grants for conducting Health Social Media Research as part of collaborative European Projects under the programme H2020. These projects are planned to start at the end of 2015 and it is foreseen that collaboration will be open to all members of the working group.

Co-organization of a wider event with collaboration of other working groups: meetings with other we plan to arrange coordinate events with other working groups in MIE 2015 and Medinfo 2015. Have been closed, but the goal of organizing a join event has been postponed to 2016.

21 Working Group: Standards in Health Care Informatics

Website of the WG: we don’t have a website yet but are planning to have one using already existing initiatives in the area of eHealth Standards. See below (and other relevant sites)

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16. Background – Brief description of the WG/SIG mission, vision, and objective

Support countries in the adoption, adaptation and/or development of HI standards, promoting the capacity building and the creation of local forums in standards and Interoperability. The main focus of the group is to define and develop a curriculum on eHealth standards in total coordination with IMIA Education and HI for Development WGs.

This focus was decided on the meeting at MEDINFO 2013 where WHO was present and reinforced that this should be the focus of the WG.

17. Achievement - Events and projects conducted and publications completed

Dr. Heather Grain from Australia is preparing a draft document on competencies on eHealth Standards to be used as a guidance on the definition of the eHealth Standards curriculum.

Co-Chair Jun Nakya published a paper at the IMIA 2014 Yearbook describing the Workshop on Standards held at MEDINFO 2013 in Copenhagen

Oct 2014 - To have a face to face meeting of the WG at the INFOLAC Conference in Montevideo, Uruguay on October 2014.

18. Participation - Engagement and participation in IMIA and health informatics events and activities

Participation to the WHO FIC Meeting (Dec 2014) as for Omics standards

MEDINFO 2015 – Toward having the website up and running with training material, either locally or linked to existing resources will be designed
19. **Outreach** - Recruitment and engagement of new members and target communities, publicity and representation at major events and/or on social media

Collaborating with WHO ICD11 development team as for clinical Omics sub information model development and publication of its achievement at WHO FIC meeting (Dec 2014).

2015 - To establish a web site where all the information on training for eHealth Standards will be available. Initial idea going forward is to coordinate with Sherbrooke University WHO CC that has already started the development of the HIS-KR (Health Informatics Standards Knowledge Resource -http://www.hiwiki.org/hiskr). A project to fund the extension of this website to the needs of the IMIA WG shall be written and submitted to WHO and other stakeholders.

20. **Collaboration** - Working with other IMIA WG/SIGs or external organisations or institutions

Collaborating with WHO ICD11 development team, ISO TC215 WG2, HL7 CG SIG as for clinical Omics sub information model standard.

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**22 Working Group Technology Assessment & Quality Development**

**Report for the Year July 2014 – June 2015**

Website (shared with/ hosted by the EFMI WG Evaluation) on http://iig.umin.at/efmi/

**Co-Chairs (2014 - )**

- **Associate Professor Andrew Georgiou**  
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**Immediate past Chair (2011 - 2013)**

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**Working group members:**

- **Elske Ammenwerth** Director of the Institute for Health Information Systems, University for Health Sciences, Medical Informatics and Technology, Hall in Tyrol, Austria.

- **Nicolette de Keizer** Associate Professor, Department of Medical Informatics, Academic Medical Center, Amsterdam, The Netherlands

- **Andrew Georgiou** Associate Professor, Centre for Health Systems & Safety Research, Australian Institute of Health Innovation, Macquarie University Australia

- **Hannele Hyppönen** Research Manager, National Institute for Health and Welfare, Finland
Farah Magrabi Associate Professor, Centre for Health Informatics, Australian Institute of Health Innovation, Macquarie University Australia

Pirkko Nykänen Professor University of Tampere, School of Information Sciences Center for Information and Systems, University of Tampere

Michael Rigby Emeritus Professor of Health Information Strategy, Stoke-on-Trent, United Kingdom

Philip Scott Senior Lecturer in Information Systems School of Computing, University of Portsmouth

Jan Talmon Consultant, Maastricht University, The Netherlands

Synopsis of Working Group report

This report from the IMIA WG on Technology Assessment and Quality Development describes the WG’s record of international collaboration in the areas of education, performance management, evidence-based health informatics and safety and quality. These activities reinforce important developments in the WG’s networks and participation including with: IMIA working groups (e.g., European Federation of Medical Informatics Working Groups) and regional members of IMIA (e.g., Asia Pacific Association of Medical Informatics and the American Medical Informatics Association). The WG established important outreach connections with the Cochrane Executive and its Informatics and Knowledge Management department to discuss the development of evidence-based health informatics. During 2014-2015 the WG made important representations to further its contribution to the IMIA-WHO collaboration plan on evaluation. Key areas of success outlined in this report include: i) the preparation of a submission to the IMIA Yearbook on patient portals as a means of information and communications technology support to patient-centric care coordination; and ii) the undertaking of a book venture with IOS Press on Evidence-Based Health Informatics (edited by Ammenwerth E and Rigby M) as part of a major international collaboration involving leading evidence-based health informatics researchers, practitioners and IMIA, EFMI and AMIA working groups.

1. Background

The strategic mission of the working group is:

- To promote the necessity of a systematic evaluation of health information systems during their whole life cycle as a precondition for the better support of patient care.
- To promote theory and practice of evaluation of health information systems, taking into account approaches from a variety of scientific fields.
- To develop and promote methods and tools to support the systematic evaluation of the effects of health information systems on structure, process and outcome of patient care, and to give feedback to system builders how to alter their systems to improve effectiveness and to avoid negative effects.

We are convinced that the evaluation of health information systems demands a combined, multi-disciplinary (or even trans-disciplinary) as well as multi-method approach. Therefore, the aims of the Working Group (WG) are:

- to foster discussion between experts from informatics, medical informatics, economics, health care, health services research, clinical epidemiology, biometry,
psychology, sociology, ethnography, organizational development, operations research and other evaluation fields, on an international level, and to encourage exchange on methodological issues between researchers from different traditions;

- to offer an opportunity to share knowledge with the aim of obtaining profitable cross-fertilization among different fields of expertise and especially between quantitative and qualitative research;

- to promote a combined research agenda to develop frameworks and toolkits for information systems evaluation, offering guidelines for an adequate combination of evaluation methods and tools;

- to discuss and clarify the networking needs for long-term evaluation research in medical informatics, and to promote combined research proposals at an international level.

2. Achievement

The IMIA WG undertook a significant working consultation and collaboration to submit the following contribution to the IMIA Yearbook:


Working group members were involved in the following workshops for **MIE 2014 (Istanbul, Turkey)**:


- **Ammenwerth E** and Georgiou A. Health IT evaluation in Health Informatics curricula – international overview and recommendations. Medical Informatics Europe 2014 (Istanbul, 31 August – 3 September 2014)


- **Scott PJ**, Brown AW, Friedman CP, Wyatt CP, **Georgiou A**, Eisenstein EL. Improving the science of health informatics by using validated instruments and outcome measures. Medical Informatics Europe 2014 (Istanbul, 31 August – 3 September 2014)

Working group members were involved in the following workshops and panels for **MIE 2015 (Madrid, Spain)**:


Working group members were involved in the submission of the following workshops and panels for **Medinfo 2015 (Sao Paulo, Brazil)**:
Scott P, de Keizer N, Georgiou A, Hyppönen H, Craven C, Rigby M. Why evidence-based health informatics should have theoretical foundations: Exploring the implications for policy and evaluation Medinfo 2015, Sao Paolo (Workshop) Accepted 16 March 2015


de Keizer N, Ammenwerth E, Craven C, Magrabi F, Otero P, Scott P. Courses on Health IT Evaluation: Development of Recommendations Medinfo 2015, Sao Paolo (Workshop) Accepted 16 March 2015

Magrabi F, Sittig D, Nøhr C, Luna D. Health information technology: Addressing human factors to improve patient safety Medinfo 2015, Sao Paolo (Panel) Accepted 16 March 2015

3. Participation

- WG member A/Prof Georgiou is contributing to the Royal College of Pathologists of Australia, **Pathology Information, Terminology and Units Standardisation (PITUS)** program, which will make a major international contribution to the improvements in the recording, decision support, communication and analysis of pathology laboratory reports.

- Members of the Working Group have (in association with several IMIA WGs) contributed to the organization of the **Context Sensitive Health Informatics** satellite conference at Medinfo 2015 in Brazil.

- The working group continues its close collaboration with the **EFMI Working Group on Evaluation**, through joint publications, webinars, workshops and tutorials at international conferences. The working group also started to discuss closer collaboration with the **AMIA Working Group on Evaluation**.

- The working group is working on **explanation papers for STARE-HI and GEP-HI** that will give further explanations and justifications as well as examples.

- The **web-based health IT Evaluation Inventory** has continued to be updated and expanded. It now comprises around 1,700 abstracts of evaluation papers in health informatics. It allows researchers from all over the world to submit papers for inclusions. The Evaluation Inventory database is available for free at [http://evaldb.umit.at](http://evaldb.umit.at).

4. Outreach

- During 2014-2015 the WG continued to expand its network and the scope of its work. In the course of this year the WG has established strong connections with the **Australian College of Health Informatics**, the **Indian Association of Medical Informatics** and **Asia Pacific Association of Medical Informatics**.

- During 2014-2015 the WG made important representations and initiated discussions with key World Health Organization representatives with the aim of contributing to the joint **IMIA-WHO collaboration plan on evaluation**.

- The Working Group has established connections with the **Cochrane Collaboration** through Chris Mavergames, Head of Informatics and Knowledge Management on the Cochrane Central Executive. This collaboration is aiming to build common ground in pursuance of evidence-based health informatics.

5. Collaboration
The IMIA WG has embarked on a major international collaboration to coordinate the production of a book on Evidence-Based Health Informatics to be edited by Ammenwerth E and Rigby M. The book will be published by IOS Press as part of the Studies in Health Technologies and Informatics series. The book intends to promote the idea of evidence-based health informatics to a broader audience and promote health informatics as a scientific discipline. The book is based on a major international collaboration involving IMIA, EFMI and AMIA Working Groups and draws together contributions from key leaders, researchers and practitioners in the health informatics field.

The IMIA WG and EFMI WG held a joint Business Meeting on 2 September 2014 during MIE 2014 which also included representatives from Taiwan, the UK and Australia. The Business meeting discussed joint collaboration on workshops for Medinfo 2015, the development of indicators for eHealth and a contribution to IMIA Yearbook in 2015.

The working group continues its close collaboration with the EFMI Working Group on Evaluation, through joint publications, webinars, workshops and tutorials at international conferences. The working group also started to discuss closer collaboration with the AMIA Working Group on Evaluation.

The working group has maintained a strong level of collaboration with the AMIA Working Group, as evidenced by collaborative efforts and presentations. Magrabi F. Clinical safety of England’s national program for IT, AMIA webinar 9 April 2015.

Working Group meetings (minutes of teleconference and business meetings)
18 July 2014 (Teleconference)
2 September 2014 (EFMI/IMIA Business Meeting held in Istanbul, Turkey)
1 October 2014 (Teleconference)
30 October 2014 (Teleconference)
1 December 2014 (Teleconference)
11 March 2015 (Teleconference)
11 June 2015 (Teleconference)

23 Working Group

24 Working Group

Website: http://www.wearable-sensors.org

Chair (2010 - 2016)
Michael Marschollek, Prof. Dr. med. Dr.-Ing.
Peter L. Reichertz Institute for Medical Informatics
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Objectives

The WG aims to promote medical informatics research in the area of wearable sensor technology in healthcare by providing a joint comprehensive platform for information exchange and scientific collaboration. The group aims to attract experts from different areas of expertise, such as medical informatics, biomedical engineering, nursing and medicine.

The following areas of research are addressed by the WG:

- **sensor application** and research areas in healthcare: diagnostics and therapeutics, in terms of primary, secondary and tertiary prevention
- **methods for sensor data analysis**, with a special focus on the analysis of multimodal data
- **integration of sensor data** resp. extracted information with health information systems and decision support systems to achieve individualization of diagnostics
- **acceptance** of wearable sensor technologies for healthcare, both by potential users/relatives and healthcare professionals.
Recent Activities

- unanimous election of Dr. Stephen Redmond as new co-chair of the WG (10/2014)
- the WG’s paper in the IMIA Yearbook of Medical Informatics 2014 was published:
- Michael Marschollek gave an invited talk “Sensors in medical applications and clinical studies – experiences and challenges” (March 20, 2015) at the University of Westminster, London, UK.
- WG chairs have established contact with the IEEE EMBS Wearable Biomedical Sensors and Systems Technical Committee
- WG chair took part in the EFMI IMIA WGs meeting to discuss potential collaboration, 27 May 2015 in Madrid
- active promotion of the WG and its activities on all above-mentioned events
- updates of the WG’s website (domain: wearable-sensors.org) and postings to the mailing list
- Current WG members: 22
- Current mailing list subscribers: 116 (June 16th, 2014)

Future Activities

- intended: paper for next IMIA YB
- in discussion: joint workshop with IEEE Wearables group at MIE2016 (Munich) or EMBC 2016 (Orlando)