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MEDINFO 2023 — The Future Is Accessible

Proceedings of the 19th World Congress on Medical and Health Informatics

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Preface

After many years of constrained travel, social movement, and large gatherings of people, the Editorial Committee for MedInfo 2023 welcome you to the resumption of our in-person biennial conference in the beautiful harbour city of Sydney, Australia. MedInfo conferences require considerable effort by numerous people, many of whom are volunteers, and our gratitude is extended to all those involved in the organisation of this 19th World Congress on Medical and Health Informatics. Our community will come together again to showcase our latest research and perspectives, reacquaint with trusted colleagues, and form new professional friendships. MedInfo conferences not only energise those attending but provide a common platform to commence or continue discussions focusing on applied approaches to data, information, knowledge, and wisdom in health and wellness.

The last few years have indeed demonstrated the theme of the conference – The future is accessible. The pandemic highlighted the value of global partnerships, the proficiency of converting laborious manual/analogue processes to an online/digital format for various health transactions, and the flurry of inventive approaches to improving the patient-centric journey and healthcare provider efficiency. It also emphasised the difference in the healthcare system when all its component parts collaborate and work together to deliver patient- and citizen-centric quality care. Finally, it accentuated the growing empowerment of citizens when they feel included in their health and wellness ventures and have access to their data.

During this time, enormous pressure was placed on the discipline of biomedical and health informatics to innovate quickly whilst the healthcare system adapted to the new landscape. Telehealth and remote monitoring were elevated from optional and nice-to-have to essential tools for many countries attempting to support the health outcomes of their citizens residing in urban, rural, and remote locations. Those with chronic disease enjoyed the saved opportunity costs derived from healthcare consultations via teleconferencing methods. Many healthcare providers and citizens like this new connected health landscape and fear the system will revert to its former offerings rather than embrace the future.

Unfortunately, not all countries had the existing infrastructure and could not pivot so quickly, which displayed the negative consequences of the digital divide. Preparing for a digital healthcare ecosystem required multifactorial opportunities – educating and upskilling of current staff, attracting, recruiting and retaining talent in digital health, and creating digital health career pathways. Emergent concerns around data sovereignty required many countries to review their laws and government policies to ensure compliance with privacy and data security obligations. Poorly designed IoT devices available in the healthcare environment reiterated the need for co-design to ensure the user experience was positive and healthcare providers were willing to prescribe them to other citizens. Lastly, digital literacy has become more prominent for both citizens and healthcare providers, and continued effort is required in this area.

The significant leap forward in artificial intelligence, machine learning, augmented reality, virtual reality, and genomics holds great hope for future healthcare planning, delivery, management, education, evaluation, and research. These themes feature in the

8–12 July MedInfo 2023 sessions, displaying how these digital approaches will revolutionise the healthcare environment through improved quality health outcomes and reduced potential for error. It is anticipated that attendees at MedInfo 2023 will not only exploit the benefits of these technologies but also collectively identify ways to overcome their associated challenges.

Dr Jen Bichel-Findlay FAIDH CHIA
MedInfo 2023 Editorial Chair

About the Conference

Like the phases of the Moon and the daily cycle of the sea tides, we have hopefully returned to the normal cycle of in-person biennial MedInfo conferences for the international medical and health informatics community.

Digital advances during the pandemic years rapidly moved so many things from 'eternal pilots' to business as usual and made continued services in those difficult times possible to continue, yet perennial challenges remain to be resolved in areas as diverse as public trust outside of emergency periods, equity of healthcare provision, workforce crises and building real learning health and care systems. These are all areas where informatics has pivotal contributions to make.

In Medinfo 2021, IMIA highlighted that human health cannot be considered in isolation, we need to consider the "one health" concept and recognise the planetary ecosystem. We cannot lose sight of that bigger picture as we now focus on the accessible future.

The future is accessible, but for whom? Of course, as science fiction author William Gibson is famously quoted as saying, "The future is already here – it's just not very evenly distributed." The digital divide is a major concern for health and care informatics professionals, whether in global economic disparities, digital literacy gaps in the healthcare workforce or the general public, or access to reliable information and knowledge about health.

The worldwide community of the International Medical Informatics Association continues to work as a global partnership for a healthy, digitally innovative future. The 19th World Congress on Medical and Health Informatics, MedInfo 2023, was hosted by the Australasian Institute of Digital Health in Sydney, New South Wales, from 8–12 July.

The Medinfo 2023 Scientific Program Committee (SPC) called for submissions under five themes:

- Information and knowledge management
- Quality, safety and outcomes
- Health data science
- Human, organisational and social aspects
- Global health informatics

We received 670 academic submissions and 265 industry submissions from 53 countries across all IMIA regions. Peer review was organised by the SPC co-chairs, and eight track chairs and co-chairs involving 279 reviewers. Finally, 228 full papers, 43 student papers and 117 posters were accepted and are included in these proceedings.

The SPC would like to thank the track chairs and co-chairs, the reviewers, and the CEO of IMIA for their invaluable contribution to the success of this first MedInfo conference since the global pandemic.

Dr Philip Scott and Dr Paula Otero
MedInfo 2023 SPC Co-chairs

Scientific Program Committee Track Chairs

Melissa Baysari, Co-Chair, Human, Organizational and Social Aspects Track, University of Sydney, Australia

Arriel Benis, Co-Chair, Health Data Science & AI Track, Holon Institute of Technology, Israel

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Lucia Sacchi, Co-Chair, Health Data Science and AI Track, University of Pavia, Italy

Vignesh Subbian, Co-Chair, Information and Knowledge Management Track, University of Arizonia, USA

Oscar Tamburis, Co-Chair, Global Health Informatics Track, Università “Federico II” Napoli, Italy

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The Australian Health Informatics Competency Framework: Conceptual Design, Framework Development, and Certification Delivery

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Abstract. The Australian Health Informatics Competency Framework (AHICF) guides the healthcare workforce in identifying the required competencies to perform as a health informatician, and more definitively defines the foundational body of knowledge on which the discipline is based. The aim of this paper is to describe the conceptual foundations in developing the AHICF v1.0, detail the methods used to revise and publish AHICF v2.0, and explore the certification and workforce outcomes achieved. This paper contributes to the competency framework and certification discourse, and knowledge of the increasing importance and recognition of health informaticians through certification. Further, implications for workforce training and education, career advancement and recruitment strategies, are also discussed.

Keywords. Competency frameworks, professional certification, professionalism, workforce development

1. Introduction

Most countries are attempting to digitise their healthcare environments, improve the digital health literacy of their workforce, and ensure they have qualified health informatics personnel to guide the design, adoption, implementation, and evaluation of clinical information systems. To formally recognise health informatics knowledge, some countries have developed credentialling programs based on a framework of competencies. Ten years ago, Australia chose certification as a pathway in response to limited undergraduate and postgraduate degrees related to health informatics [1].

The Australian Health Informatics Competencies Framework (AHICF) was launched in 2013 by the Health Informatics Society of Australia (HISA), in collaboration with the Australasian College of Health Informatics (ACHI) and the Health Information Management Association of Australia (HIMAA), to provide a framework for the discipline. The framework was also intended to assist in recruitment, education and

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training activities, career pathway definitions, and raising the profile of health informaticians [1]. Guided by similar programs available worldwide (American Medical Informatics Association, International Medical Informatics Association, and Canada's Health Informatics Association, for example), the framework comprised six knowledge domains and 52 competencies across four levels – knowledge, comprehension, application, and analysis. For eight years the AHICF was used as the basis for Australia's professional certification program (Certified Health Informatician Australasia) [2] and informed a range of postgraduate health informatics and digital health programs.

The dynamic and evolving nature of the digital healthcare landscape and the need for professional practice to lead and not just respond to this dynamism, resulted in the newly formed Australasian Institute of Digital Health (by the merging of HISA and ACHI), embarking on a comprehensive review of the framework to ensure it is fit for contemporaneous use. The aim of this paper is to describe the conceptual foundations in developing the AHICF v1.0, detail the methods and rationale used to revise and publish AHICF v2.0, and explore the certification and workforce outcomes achieved.

2. Methods

As previously described by Martin-Sanchez et al. (2017), the initial framework was developed and published in 2012. Following the establishment of the Certified Health Informatician Australasia (CHIA) program and Examination Committee (EC) in 2014, the EC assumed custodianship of the framework. The EC contains expert members of the healthcare and health informatics sector covering academia, clinical expertise, health information management, technology professionals, and industry consultants. The EC undertook a comprehensive process to review the competency framework, commencing with an international environmental scan to examine changes in the extant competency frameworks to which the AHICF was mapped [3-5]. This included international frameworks from Canada, Saudi Arabia, the United States of America, and the United Kingdom. The competency domains were compared and analysed for contemporary applicability in the Australian health informatics context.

Secondly, relevant, contextual competency frameworks were identified, compared and analysed for contemporary applicability in the Australian health informatics context [6-8]. Thirdly, other new or additional competencies and frameworks in the technology, healthcare, and management environment were also reviewed for their relevance for inclusion. The EC collectively undertook an expert analysis review using in-person and online discussions and reached a consensus draft version of the revised competency framework, which was then submitted for review by the CHIA Board. The EC analysed and responded to feedback received from the Board, and agreed on a final revision of the competency framework.

The revised competency domains were reviewed against Bloom's Revised Taxonomy of Educational Objectives [9] in a top-down approach, to ensure consistency of the underlying competencies and related questions. This also included a decision to eliminate the use of Bloom's *Remember* level, as simple recall of facts was considered insufficient for health informaticians to demonstrate their competency, and thus achieve certification. The next stage of the review then included specific analysis and comparison of the competencies themselves, with both domains and competencies being reworded to use Bloom's verbs between *Understand* and *Analyse.* The advantage of having a live

'use-case' for competencies in the certification program meant the EC was able to apply the drafted AHICF to the certification, to test the value of the updated Framework.

An analysis of the examination multiple-choice question repository demonstrated that in addition to the necessity for questions related to the new competencies, the merger or division of old competencies required a remapping of some questions, and the associated revision of questions required to match the updated Bloom's Taxonomy levels. The EC, working in small teams, produced and reviewed an initial automated mapping, with individual questions remapped as required. The revised mapping was reviewed by three teams to ensure consistency.

A final review of all examination questions was undertaken by the EC Chair, with subject matter expert support as required, to ensure consistency of mapping, levelling and style across all questions in the multiple-choice examination repository. The *Australian Health Informatics Competency Framework*, second edition was published in April 2022 [10] and the revised question bank for CHIA was placed into production. Ongoing monitoring of outcomes of the revised questions was implemented in line with the quality management framework adopted by the EC.

3. Results

The AHICF version 1.0 comprised 52 informatics competencies across 6 domains of expertise. The six domains of expertise were: 1) Health Sciences, 2) Information Science, 3) Information Technology, 4) Leadership and Management, 5) Social and Behavioural Sciences, and 6) Core Health Informatics. The review of the competencies by the EC resulted in these domains being streamlined, simplified, and modernised, commensurate with the cognitive competence required of health informaticians.

In version 2.0 of the AHICF, all competency statements across the six domains, except the domain *Health Sciences*, were deemed to require cognitive competence at Bloom's level of *Applying,* at a minimum. All competency statements in the *Health Sciences* domain are at the *Understanding* level, as the EC determined practitioners only require an understanding of health science to be able to communicate and contextualise their work. Table 1 shows the distribution of competency statements mapped to Bloom's levels. Bloom's level indicates the minimum level of cognitive competence required for that competency statement, recognising many candidates will have a higher level of cognitive competence in some domains compared to others, and that this variation will differ depending on the candidate's formal training and experience.

Table 1: Mapping of version 2 of the AHICF to Bloom's Taxonomy.

Domain		Bloom's level		
		Understanding	Applying	Analysing
1)	Health Sciences	9		
2)	Information Science	1	5	
3)	Information Technology	1	2	
4)	Leadership and Management		11	
5)	Social and Behavioural Sciences		6	
6)	Core Health Informatics	1	5	12

Several competency statements were merged during the review and a number of new competency statements created to address gaps in version 1, and include emerging areas

of health informatics and digital health. Additional leadership competencies were added to the 'Leadership and Management' domain and two new areas of skills were also added – *Leadership strategies* and *Stakeholder engagement*. *Sociotechnical concepts* were added to 'Social and behavioural sciences' to recognise the importance of informational, technological, and social systems in digital health. *Health literacy* was also added to this domain to recognise the need to integrate best practice in health literacy in digital health. There were several additions to the domain 'Core health informatics' to recognise the evolving nature of the discipline, including *Health economic concepts*, *Stakeholder education*, *Indigenous Data Sovereignty*, and *Digital divide*.

The new competency statement for *Indigenous Data Sovereignty* was developed in consultation with a First Nations health information organisation. Some competency statements were moved to align with more relevant domains, such as *Health informaticians ascertain the appropriateness, ethics, effectiveness, and efficiency of information and information system governance* was moved from the 'Core Principles and Methods' to the 'Leadership and Management' domain. This resulted in the AHICF version 2.0 comprising of 53 informatics competencies across the 6 domains of expertise.

4. Discussion

This paper contributes to the competency framework and certification discourse, and knowledge of the increasing importance and recognition of health informaticians through certification and professionalism. It showcases the maturity of the Australian health informatics sector and has global relevance to other similar frameworks. A mature, validated, and most importantly, industry relevant framework provides the foundations for workforce planning and strategy, at both the individual and organisational level.

In Australia, the framework is intended for several purposes. It is the basis of the CHIA program, which was established in 2013, and includes certification via an online examination that is based on the competencies outlined within the framework. Any revision of the underlying framework, therefore, impacts the existing repository of over 300 multiple-choice examination questions. Whilst certification is not a requirement in all health informatics position descriptions, there are successful CHIA candidates who, as individuals or through organisational sponsorship, value the attainment of knowledge across the framework domains to fulfil their digital health roles and progress their health informatics careers. The credibility of certification programs is strongly associated with currency and comprehensiveness of content, and therefore it is necessary to ensure the framework that it is built upon reflects the currency of knowledge in digital health.

Further, the framework is the basis of a proposed accreditation framework for education providers and underpins the work the AIDH is progressing with building digital health and health informatics capability across the Australian health sector. With the Institute forming a Professionalism Committee in 2023 to develop, amongst other areas within its scope, an accreditation program for Australia, this framework will again provide a foundation for quality evaluation. There will be other workforce training and education development implications, and career advancement and recruitment strategies, related to the framework which will serve to further validate the framework and improve its evolution and practical value, as Australia continues to address the digital health capabilities its health workforce requires, both now and into the future.

5. Conclusions

The AHICF guides the healthcare workforce in identifying the required competencies to perform as a health informatician, and defines the foundational body of knowledge on which the discipline is based. The conceptual foundations in developing the AHICF v1.0 underpinned the comprehensive review which was completed in early 2022. This review included an environmental scan, a review of relevant competency frameworks, an identification of new competencies in the technology, healthcare and management environment, and an expert analysis review submitted for evaluation by the CHIA Board. The CHIA EC analysed and responded to feedback received from the Board, and agreed on a final revision of the competency framework. The revised competency domains were reviewed against Bloom's Revised Taxonomy and then published as AHICF v2.0.

This paper contributes to the competency framework, certification and professionalism discourse, and knowledge of the increasing importance and recognition of health informaticians through credentialling. Further, implications for workforce training and education development, career advancement and recruitment strategies, are also presented. In the fast-moving digital world, currency of knowledge in digital health is essential, therefore, it is necessary to ensure that the AHICF reflects the currency and comprehensiveness of content, to guide assessment of competence, associated credentialling, accreditation programs and the foundation for quality and impact evaluation, which could provide the focus of future research endeavours.

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