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Modelling communication requirements in aged care using HL7 V3 methods

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MODELLING COMMUNICATION REQUIREMENTS IN AGED CARE USING HL7 V3 METHODS

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Certification

I, Isobel Margaret Frean, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Computer Science and Information Technology and of Mathematics and Applied Statistics, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledge. The document has not been submitted for qualifications at any other academic institution.

Isobel M. Frean

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List of Abbreviations

ACAT	Aged Care Assessment Team
ACCR	Aged Care Client Record
AGIMO	Australian Government Information Management Officers
AHMAC	Australian Health Ministers Advisory Council
AIHW	Australian Institute of Health and Welfare
ANSI	American National Standards Institute
ANT	Actor Network Theory
AR	Application Role
AS	Australian Standard
CACP	Community Aged Care Package
CAST	Center for Aging Services Technology
CBS	Common Basic Specification
CDH&A	Commonwealth Department of Health and Ageing (currently known as the Australian Department of Health and Ageing)
CDA	Clinical Document Architecture
CEN	European Committee for Standardization
CHDM	Conceptual Health Data Model
CHIME	Community Health Information Management Enterprise
CMET	Common Message Element Type
CP	Care Provision (HL7 domain)
DAM	Domain Analysis Model
DCITA	Department of Communications, Information Technology and the Arts
DH&A	Department of Health & Ageing
DIM	Domain Information Model
D-MIM	Domain Message Information Model

DSTU	Draft Standard for Trial Use
DVA	Department of Veterans' Affairs
EACH	Extended Aged Care at Home
EHR	Electronic Health Record
E-R	Entity-Relationship modelling notation
FIAB	Financial Accounts and Billing (HL7 domain)
FICR	Financial Claims and Reimbursement (HL7 domain)
GP	General Practitioner
HACC	Home and Community Care
HDF	HL7 Development Framework
HL7	Health Level Seven
HREC	Human Research Ethics Committee (University of Wollongong)
ICT	Information and Communication Technology
ICTSC	Information and Communication Technology Standards Committee
IOM	Institute of Medicine
IP	Industry Partner
IRT	Illawarra Retirement Trust
ISO	International Standards Organisation
ITS	Implementation Technology Specification
LIM	Local Information Model
LOINC	Logical Observation Identifiers, Names and Codes
MBS	Medicare Benefits Scheme
MDS	Minimum Data Set
NACA	National Aged Care Alliance
NHS	National Health Service (United Kingdom)
NCVHS	National Committee on Vital and Health Statistics

NHII	National Health Information Infrastructure
NHIM	National Health Information Model
NEHTA	National E-Health Transition Authority
NHIMAC	National Health Information Management Advisory Council
NHIMG	National Health Information Management Group
NHISAC	National Health Information Standards Advisory Council
NHPAC	National Health Priority Action Council
NHPC	National Health Performance Committee
NOIE	National Office for the Information Economy
NSW	New South Wales
NZS	New Zealand Standard
OECD	Organisation for Economic Development
OLOC	Our Lady of Consolation
OOSE	Object-Oriented Software Engineering
OSI	Open Systems Interconnection
PA	Patient Administration (HL7 domain)
PC	Patient Care (HL7 domain)
PCPR	Patient Care Provision Practice (HL7 domain)
PM	Personnel Management (HL7 domain)
POV	Product of value
RACGP	Royal Australian College of General Practitioners
RCS	Resident Classification Scale
RER	Resident Entry Record
RIM	Reference Information Model
R-MIM	Refined Message Information Model
RN	Registered Nurse

SCC	Southern Cross Care NSW & ACT
SDO	Standards Development Organisation
SIG	Special Interest Group
SSK	Sociology of Scientific Knowledge
TC	Technical Committee (HL7 Global)
TSC	Technical Steering Committee (HL7 Global)
UML	Universal Modelling Language
V2	Version 2 (HL7)
V3	Version 3 (HL7)
VHC	Veterans' Home Care
WHA	World Health Assembly
WHO	World Health Organisation
XML	Extensible Markup Language

Abstract

Australia and other western nations are actively formulating strategies that will increase the adoption of information and communication technology (ICT) amongst private-sector providers of aged care. The drivers for this technological change involve population ageing reforms, concerns about the quality and safety of healthcare, and global strategies encouraging governments to transform the way they do business. This research set out to examine these drivers and to inform development of a national aged care ICT strategy in Australia. The research questions prompted an examination of how national health information systems and e-health reforms in Australia and overseas address aged care, with a view to describing a hierarchical structure of standards for interoperability using the Health Level Seven (HL7) Reference Information Model (RIM).

HL7 refers to the international organisation involved in developing and supporting healthcare standards.

A review of the implementation of national health and technology reforms revealed there are gaps in most western nation's approaches to e-health reform when it comes to identifying the information management and communication requirements of private-sector aged care providers. Through the participation of aged care provides in Australia, detailed requirements were gathered using a Delphi approach and analysed using healthcare information modelling methods to inform the development of a hierarchy of Australian aged care messaging and communication standards.

The methodology chosen for documenting these requirements was the HL7 Development Framework (HDF), the methodology which all HL7 Technical Committees are required to follow in the development of Version 3 (V3) standards. The first three of the seven formal phases to the HDF were employed to document a consensus business vision for interoperability in aged care and some 82 storyboards. This provided detailed understanding of the likely system-to-system interactions and the associated application roles and receiver responsibilities of some 121 discrete interactions. Ten of these storyboards were subjected to international review as part of the published requirements for the HL7 V3 Care Provision standard in 2005. This

comprehensive set of requirements informed development of an aged care Domain Analysis Model (DAM) whose elements were mapped to the HL7 RIM. This enabled the development of some early examples of how the aged care domain might be modelled using RIM conformant design models and how these might in turn be represented in an aged care Domain Information Model (DIM).

Modelling the requirements of aged care providers using the HDF revealed four areas of communication complexity: Accessing an aged care service; Contractual documentation associated with securing and funding an aged care service; Effective coordination of service delivery; and Consistent documentation of services delivered. A number of solutions for addressing these complexities are proposed including migration of the current aged care referral process to an electronic application process; adoption of a new aged care case-management structure by collaborating healthcare and aged care providers; and adoption of a suite of national forms-based specifications using the HL7 Clinical Document Architecture (CDA) standard. These proposals offer possible solutions for achieving the interoperability vision described in this research and they are supported by the proposed aged care DIM. They will, however, rely upon the adoption of uniform messaging standards by aged care providers and by healthcare providers interfacing with them such as hospitals, General Practitioners and Aged Care Assessment Teams. To engender adoption of such standards, a role delineation model for implementation of the proposed hierarchy of aged care messaging standards is described. Together, these finding offer practical contributions towards the development of a national strategy for the adoption of ICT in aged care which is capable of supporting the objectives of population ageing and quality and safety reforms.

How to live happiest, how to avoid the pains,
The disappointments, and delights, of those
Who would in pleasure all their hours employ,
The precepts here of a divine old man
I could recite. Tho' old he still retain'd
His manly sense and energy of mind.
Virtuous and wise he was, but not severe:
He still remember'd that he once was young;
His easy presence check'd no decent joy.

John Armstrong, The Art of Preserving Health (1781)

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