

# **Refinement of the HL7 Australia EDS Work plan**

## **Final version**

**A report for the Australian Health Information Council  
Electronic Decision Support Steering Committee**

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# Refinement of the HL7 Australia EDS Work Plan

## Table of contents

Introduction.....	2
Task list and prioritisation.....	3
Task 1, Priority 1: Standards for data exchange.....	6
A means of specifying interactions .....	6
Adoption of a suitable technology .....	7
An infrastructure to enable implementations .....	8
Deliverables .....	9
Short tem deliverables .....	9
Medium term deliverables .....	9
Long term deliverables .....	9
Human resources required.....	10
Timelines .....	10
Management structure suggested .....	11
Acknowledgments .....	11
Appendix I (Health System Approach).....	12
A quality assurance system to facilitate cost-effective health care. ....	12
The role of IM/ICT.....	12
Support for a National IM/ICT Best Practice Reference Centre.....	13
Sustainable Business Models for Clinical Information Resources .....	15
1. Public funds to achieve a public good.....	16
2. End users pay.....	16
3. A mixed funding model.....	17
Export earning potential.....	17
Appendix II (NPS RADAR Program).....	18
RADAR functionality.....	18
Enabling a RADAR button.....	18
The RADAR pop up.....	19
Full RADAR document display .....	19
The RADAR browser.....	20

# Refinement of the HL7 Australia EDS Work Plan

## Introduction

At a meeting held on April 19, 2004 the Australian Health Information Council (AHIC) Electronic Decision Support (EDS) Steering Committee requested that HL7 Australia clarify aspects of a work plan previously submitted. This document addresses that request by re-stating the need for the work plan, prioritising the tasks required and defining short, medium and long term deliverables. In addition, we provide a timeline, the human resources required and the investment needed to achieve the deliverables described.

We also outline the health systems approach that underpins the project and support the formation of a cross-jurisdictional “Best Practice Reference Centre” recently suggested by the Boston Consulting Group<sup>1</sup> as part of a new independent “National Health IM/ICT entity” (Appendix I). Our aim is not only to achieve important deliverables in a staged and timely manner but also to build the capacity and linkages necessary to further develop EDS and assist the numerous information providers who need to integrate best-practice resources into clinical software in a standard manner. We believe that such a Centre would have considerable export earning potential.

The background to the HL7 EDS work plan can be briefly summarised as follows.

1. The increasing use of computers in clinical practice necessitates that best-practice information resources move from printed volumes residing on the health workers bookshelf to electronic versions accessible from the clinician’s desktop computer. The latter are more likely to influence clinical practice because they are easier to access and can provide more succinct and patient-specific advice via decision support software. However, while most information providers have produced an electronic version of their product there is currently no agreement on either a standard electronic format for such information or on how such products should be integrated into the disparate clinical software used in hospital and general practice in a standard manner.
2. In August 2003, HL7 Australia held a workshop on clinical decision support standards which resulted in a project grant application to the National Office of the Information Economy (NOIE). The aim of this project was to develop open-source standards of electronic guideline representation and interfacing so that best-practice clinical guidelines from various authoritative sources could “plug & play” with the wide range of clinical software in use. The NOIE grant application was unsuccessful but it did lead on to:
3. A trans-Tasman EDS workshop organised by HL7 Australia & New Zealand, supported by the Australian Department of Health and the N.Z Ministry of Health, held in December 2003. This workshop reviewed EDS activities in both countries and produced a broad work plan to progress these matters. The workshop program, presentations and final report are available at: <http://www.hl7.org.au/CDSS.htm>.
4. The HL7 EDS work plan that resulted from 2 above was submitted to the AHIC EDS Steering Committee in April 2004. This resulted in a request to clarify some aspects of the plan and provide a presentation to the next EDS Steering Committee to be held in Melbourne on June 25, 2004.
5. Subsequently, the National Prescribing Service (NPS) has kindly agreed to join with HL7 Australia in refining the work plan because of common objectives, complementary projects and shared technical staff. In addition, Therapeutic Guidelines Limited (TGL) has indicated in principle support for this project (yet to be ratified by the TGL Board).

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<sup>1</sup> Report available at: <http://www.health.gov.au/healthonline/index.html>

# Refinement of the HL7 Australia EDS Work Plan

The NPS Rational Assessment of Drugs And Research (RADAR) project is a new service provided by the NPS at the request of the Australian government. It provides independent information to health professionals about medicines that have a new or a changed listing on the Pharmaceutical Benefits Schedule (PBS). RADAR drug monographs have recently been incorporated in four leading GP prescribing packages using the XML<sup>2</sup> interface described in the original HL7 Australia work plan.

TGL and the NPS were industry partners in a 3 year SPIRT<sup>3</sup> project, *Towards Electronic Decision Support*, which has refined the electronic production process at TGL and also produced a substantial amount of therapeutic guideline material available in XML format (*eTG complete*).<sup>4</sup> The next step is to link this material into prescribing software and make its recommendations easily accessible for a specific clinical problem. A related SPIRT PhD project has greatly assisted this process.<sup>5</sup>

Meanwhile, the National Centre for Classification in Health (NCCH) has been working on a clinical “terminer” application which uses the index of ICD-10-AM (about 65 000 nested terms) to point to a smaller number of concepts in a tabular list. We believe this work provides a pragmatic solution to the standard clinical code set that is required to link clinical software to best-practice guidelines while more definitive solutions are being explored.

## Task list and prioritisation

The original work plan tasks are listed below with a priority added.

Task	Priority
1. Standards for data interchange between current electronic best-practice medication and therapeutic resources and clinical (prescribing) software in order to: <ul style="list-style-type: none"> <li>1.1. Make context specific best-practice information readily available (given a clinical problem &amp;/or medication of interest) by opening a relevant national therapeutic resource at the right page. These resources include the NPS RADAR material, Therapeutic Guidelines and medication monographs such as those found in the Australian Medicines Handbook;</li> <li>1.2. Provide more patient specific (and succinct) information by interaction between electronic guidelines and elements of the patient’s electronic medical record (EHR) such as age, sex, weight, allergy status, etc.</li> </ul>	<b>1.</b>

<sup>2</sup> eXtensible markup language: <http://www.w3.org/XML/>

<sup>3</sup> Strategic Partnerships with Industry for Research & Training (an Australian Research Council grant)

<sup>4</sup> See: <http://www.tg.com.au>

<sup>5</sup> Deveny, E. 2004, When Computing Meets the Clinical: Prescribing Decisions in Australian General Practice. Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy at the University of Melbourne.

# Refinement of the HL7 Australia EDS Work Plan

<p>2. Standards for identification of medication and clinical problems / diagnoses required for data interchange:</p> <p>2.1. Medication/substance identification sufficient for safe prescribing at the substance and package level of identification;</p> <p>2.2. Disease/problem identification.</p>	<p>2.</p>
<p>3. Standards for medication formulary (monograph) representation which incorporates sufficient identifiers to enable lookup.</p>	<p>2.</p>
<p>4. Standards for electronic guideline (and care plan) representation to enable knowledge and work flow to be more readily incorporated into decision support systems.</p>	<p>2.</p>
<p>5. Standards for data exchange of medication-medication interaction data and the development of standard content for the most common and serious medication-medication interactions.</p>	<p>3.</p>

**Task 1** is listed as priority 1 because we believe that pragmatic (and clinically useful) progress can be made in this area while tasks 2-5 are being progressed by others. Our approach to task 1 is detailed further below.

**Task 2.1** (Standardised medication identification / coding / terminology) is designated priority 2 because work in this area is currently underway via the Australian Catalogue of Medicines (ACOM) project, supplemented by more recent plans for the development of an Australian Medicines Terminology (AMT) aimed at extending the ACOM work to make it suitable for use in electronic decision support (as well as a number of other areas). HL7 Australia has recently held two workshops (May 24, 25 in Melbourne and June 9-11 in Canberra) as well as a seminar on June 8 in Sydney to progress this area. A report on the AMT project and a proposed data model agreed by industry will be provided to DoHA in the near future. Meanwhile, the RADAR project has shown that proprietary MIMS drug codes &/or non-proprietary PBS codes can provide an interim solution to the problem of linking drug specific information together (at least for general practice software).

**Task 2.2** (Standardised disease / problem identification) is also designated priority 2 because this area is less well developed at this point in time. Different GP prescribing systems currently use varied clinical coding systems such as DOCLE<sup>®</sup>, ICD10-AM and ICPC2-plus. In addition, many GPs do not use the problem identification and background coding capabilities of their prescribing software (because they perceive it provides little benefit).

In 1999 the General Practice Computing Group (GPCG) established a “Coding Jury” to select a single coding system that would be suitable for use in computerised general practice clinical systems. In August 2000, the GP Coding Jury recommended that ICD-10-AM, with the addition of specific and essential general practice terms, be adopted as the coding system to be used in general practice in Australia for the next five years.<sup>6</sup> As mentioned above, the NCCH have been working on a clinical “terminer” application which uses the index of ICD-10-AM as a pragmatic solution to the clinical coding problem.

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<sup>6</sup> <http://www.health.gov.au/hsdd/gp/pdf/juryrep.htm>

# Refinement of the HL7 Australia EDS Work Plan

The long-term recommendation of the coding jury was that Australia should become involved in the development of SNOMED<sup>®</sup>-CT. The jury also emphasized the need to "flag" the terms used by general practitioners, thereby facilitating the presentation of more relevant "pick-lists". The report also commented that intervention, pathology, radiology and medication terminologies were also important for General Practice. The "GP Vocabulary Project" resulted to facilitate mapping of GP interface terms to terminologies and classification systems such as SNOMED<sup>®</sup>-CT, ICD-10-AM, ICPC2-Plus and DOCLE<sup>®</sup>. The report of stage 1 of this project (covering the domains of diagnoses and problems) is now available.<sup>7</sup> This work continues to be progressed.

In the interim, we believe that a pragmatic solution to Task 2 can be achieved by using the ICD10-AM index work of the NCCH for the identification of clinical problems / diagnoses and PBS codes and generic drug names for the identification of drugs. This can be supplemented by outcomes from the ACOM and AMT processes as they become available. Combined with the outcomes of Task 1, this will allow

- Provision of clinically relevant best practice guidance information at the time it is needed;
- Tailored to patient characteristics, and
- Presented in a consistent way across prescribing systems.

In the longer term, use of more sophisticated coding systems such as SNOMED<sup>®</sup>-CT will allow the refinement of this approach (and can be cross-mapped).

**Task 3** (standards for medication formulary (drug monograph) representation is also designated priority 2 because of ongoing developments elsewhere. In the USA, an evolution of the HL7 clinical document architecture (CDA) called Structured Product labelling (SPL), is being used for FDA product labelling (approved drug information). CDA and SPL use XML to identify document sections and headings. In Australia, the NPS RADAR program has used XML for the same purpose. At the moment, XML topic tagging appears able to be sufficiently standardised to make pragmatic progress in incorporating drug monograph information into clinical software.

**Task 4** (standards for electronic guideline and care plan representation) is currently more confused. Candidate standards such as GEM<sup>8</sup> are being explored by the NHMRC while EDSML<sup>9</sup> is used in the Australian Integrated Care Program Phase 2(ICP P2). In addition, TGL is using a combination of XML and JavaScript to achieve similar ends.<sup>10</sup> Once again, we believe that pragmatic progress can be made by using the TGL approach while others investigate the pros and cons of alternative methods of electronic guideline representation. The NPS / GPCG project, *Modelling the Clinical Processes of Prescribing*<sup>11</sup> should also prove helpful in this area.

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<sup>7</sup> [http://www.generalpractice.adelaideuni.org/content/res\\_content/current/vocab/gp\\_vocab\\_final\\_report.pdf](http://www.generalpractice.adelaideuni.org/content/res_content/current/vocab/gp_vocab_final_report.pdf)

<sup>8</sup> Guideline Elements model: <http://ycmi.med.yale.edu/GEM/>

<sup>9</sup> Enhanced Decision Support Markup Language: an XML based decision support paradigm incorporating workflow, rules and e-forms.

<sup>10</sup> Lewis, B. 2003, Format and Integration of Clinical Guidelines, Background paper, HL7 DS Workshop, Melbourne.

<sup>11</sup> <http://www.healthinformatics.unimelb.edu.au>

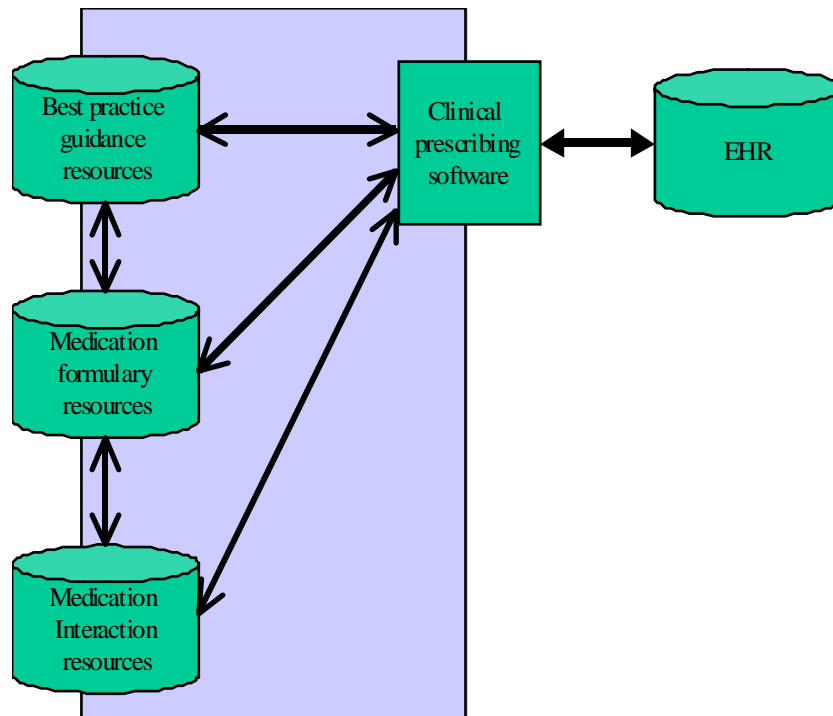
# Refinement of the HL7 Australia EDS Work Plan

**Task 5** (medication-medication interaction standards) is designated as priority 3 because, while important, the tasks above do not depend upon it. In addition, it is being progressed elsewhere. A committee from the drug standards group of the U.S. Pharmacopeia has created an evidence-based methodology to identify and classify the most dangerous drug interactions in order to integrate them into clinical point of care software. We have established contact with this group and have recently received information about their work.

The rest of this document will focus on Task 1, Priority 1: Standards for data exchange between current electronic best-practice medication and therapeutic resources and clinical (prescribing) software.

## Task 1, Priority 1: Standards for data exchange

Figure 1 (below) depicts each the various elements of Task 1 and their interrelationships.



**Figure 1.**

The development of standards for data interchange will require the development of an interface. Interface development will require:

1. A means of specifying interactions between the information resources and the clinical software;
2. Adoption of a suitable technology, and
3. An infrastructure to enable implementations.

### ***A means of specifying interactions***

We propose using an expanded XML Interface (XI) that has already been used to successfully integrate the RADAR therapeutic knowledge resource into GP prescribing software (details in Appendix II). The technical details of this interface have been described in a background

# Refinement of the HL7 Australia EDS Work Plan

paper prepared for the December 2003, HL7 EDS workshop (attached).<sup>12</sup> XI has the following advantages:

## **Specification and documentation of the XML Interface is within the interface itself.**

Because the interface mechanism is an XML document (XI.xml) and includes specific descriptive elements, generation of documentation directly from the interface itself is possible. The current interface that has been developed can be viewed and tested at: [http://www.nps.org.au/radar\\_repository/unsecure/XI.htm](http://www.nps.org.au/radar_repository/unsecure/XI.htm)

In short, XI is proposed because

- it is already in use within the domain;
- relevant software vendors have already implemented it for NPS RADAR;
- its structure is open and will be presented at HIC 04;
- it allows interface development for both Internet (web service) based and direct access integration.

## **The structure of the XML documents can change without affecting integration.**

Because the means of accessing the parameter is specified and the mechanism for retrieval is provided, should the location of the value in the XML document change, the only thing that needs to be changed is the <location> file. Changing this file is the responsibility of the XML document authors and need only be done once.

## **Integrating developers do not have to interpret the structure of the XML documents.**

For example, in order to retrieve the list of drug names from an XML document in the absence of the XI, it would be necessary to determine where the drug names were in the XML structure, and to develop a retrieval mechanism for it (such as an XSL file, or passing an XPath query).

## **Inconsistencies between integrations will be reduced**

Because there is only a single mechanism to retrieve the drug names from a document (for example), different integration implementations developed will return consistent values.

The future of application integration will be based on web services. The infrastructure to support this for health informatics in Australia is not likely to be sufficient for several years. The proposal allows for the development of a solution that is immediately implementable and which can be evolved to utilise web services as they become available. Figure 2 and Figure 3 depict how this can be achieved.

## ***Adoption of a suitable technology***

To achieve the second part of enabling the interface we propose the use of XML and XSLT technologies as the principal access mechanisms to the interface. This will allow immediate and consistent implementations of the XI to be developed.

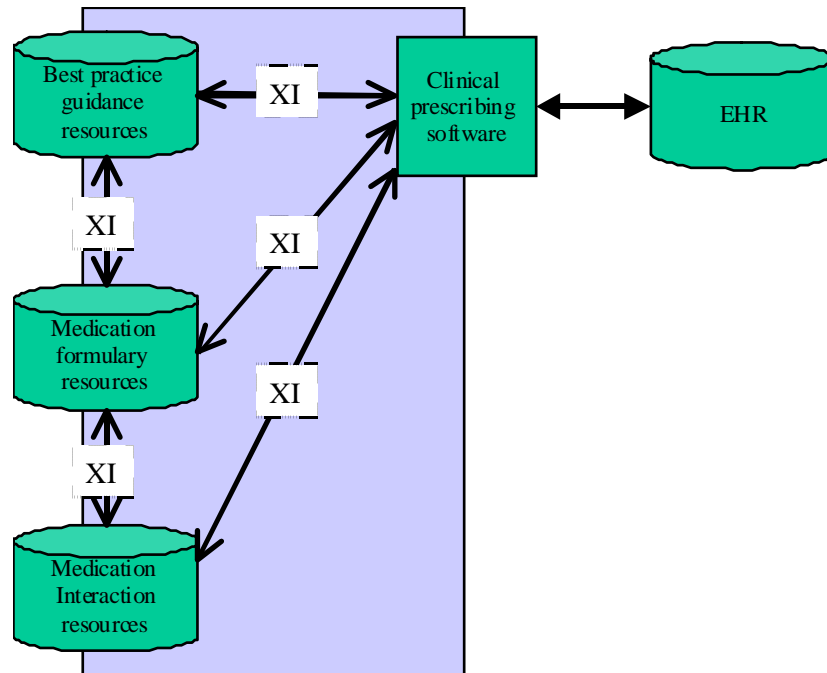
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<sup>12</sup> Lewis, B. 2003, Format and Integration of Clinical Guidelines, Background paper, HL7 DS Workshop, Melbourne.

# Refinement of the HL7 Australia EDS Work Plan

## *An infrastructure to enable implementations*

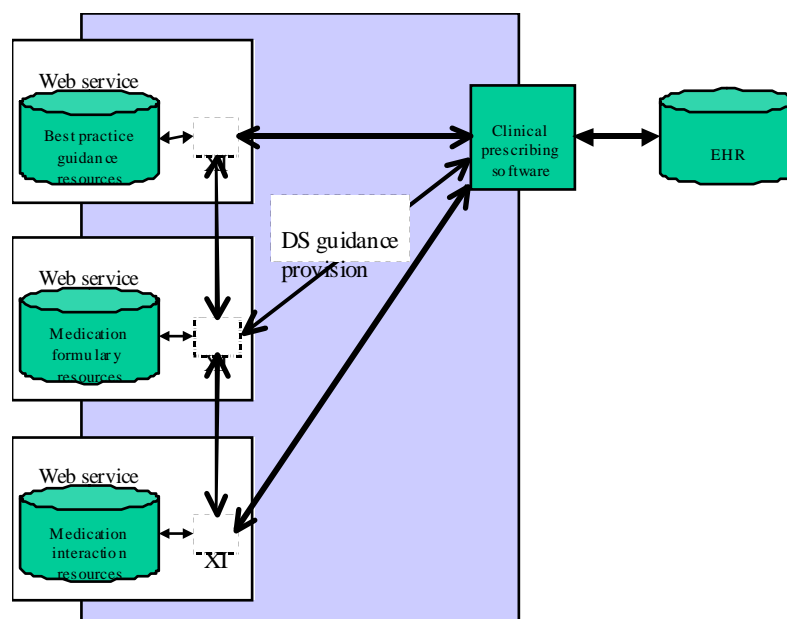
Figure 2 depicts an architecture for which the infrastructure is already in place. The only additional requirement is an asynchronous distribution mechanism for each of the resources.



**Figure 2. Initial implementation of interchange standards.**

Evolving the architecture to that depicted in Figure 3 requires Internet infrastructure to be put in place over the next 2-5 years. The web services implementations required could be developed over that time, once the initial interface (Figure 2) has been achieved.

Note that the technology required for Figure 3 is currently in place and in day to day use in non-health domains. The infrastructure requirement in the health domain is a scaling up of resources. This is a logistical rather than a technological issue.



**Figure 3. Web service based implementation of interchange standards.**

# Refinement of the HL7 Australia EDS Work Plan

## Deliverables

### ***Short term deliverables***

Within 3 months of having the project team established we will have established proof of concept of the expanded XML interface by embedding trial topics of *eTG Complete*<sup>13</sup> in a test-bed clinical computer system (McCauley Software Pty. Ltd.). There are approximately 2,500 topics in *eTG Complete* currently.

Within 6 months, given the co-operation of commercial GP software vendors, we will have a subset of content equivalent 10 percent of *eTG Complete* embedded in two of the four leading GP prescribing packages. In addition, given the co-operation of the Australian Medicines Handbook Pty. Ltd. and commercial GP software vendors we will also have the electronic version of *Australian Medicines Handbook* embedded in the same leading GP prescribing packages.

### ***Medium term deliverables***

With 12 months of commencing we will have content equivalent to an additional content equivalent to 2 books of *eTG Complete* embedded in two of the four leading GP prescribing packages. We will also be working with the Health Connect electronic health record (EHR) team on extracting items such as age, sex, weight, allergy status, etc. from a “virtual medical record” to demonstrate a working prototype of Task 1.2. We anticipate exploring the use of openEHR Foundation archetypes for this and related purposes (Dr. Sam Heard, et al. and Ocean Informatics) as well as leveraging the availability of a Clinical Context Object Workbench (CCOW) server in NSW as part of the recent EHR tender, won by a consortium including Orion systems.

### ***Long term deliverables***

Over three to 5 years we would anticipate that our team would be servicing a number of other information providers (both Australian and international) and integrating their content on a regular basis as envisaged in Appendix I.

## Resources and investment required

The size of the team, resources and budget required to achieve each of these tasks depends on the scale of work and the timescale that is desired. We have made an assumption that the initial commission will be for the first 12 months with an expectation that funding will continue if the deliverables promised are achieved. Thus the estimates (over page) are for the first 12 months only. Depending on the business models chosen (see Appendix I) it is possible that income derived from charging for services provided could result in the project achieving self-sufficiency over 3-5 years.

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<sup>13</sup> Assuming TGL Board approval

# Refinement of the HL7 Australia EDS Work Plan

## Human resources required

Task	Requirement	Effort	Resource
1.0	XI supporting software	12 weeks	Developer
1.1a	Development of XI for TG and AMH	39 weeks	Developer
1.1b	Development of XI in a prototype prescribing system (MEDbase from McCauley Software Pty. Ltd.) with extension to other large commercial vendors	15 weeks	Developer
1.2	Development of XI for EHR data	30 weeks	Developer
2.0a	Coding professional to confirm coding process (via liaison with NHCC)	12 weeks	NHCC coder
2.0b	Development of sustainable code assignment process (and supporting software)	9 weeks	Developer
2.1	Editorial staff (with pharmacy knowledge) to assign codes to AMH	20 weeks	Pharmacist editor
2.2	Editorial staff (with pharmacy knowledge) to assign codes to TG topics	45 weeks	Pharmacist editor
All	Documentation and support of deliverables	15 weeks	Developer
All	Specialist medical advice	4 weeks	Medical consultant
	Project management (0.75 FTE)	39 weeks	IT / IM Management
	Administration staff (0.5 FTE)	26 weeks	Admin

## Timelines



# Refinement of the HL7 Australia EDS Work Plan

## Investment required

Resource	Rate per week*	Rate per hour	Effort (weeks)	EFT	Total
Medical Consultant	\$5,000.00	\$125.00	4	0.08	\$20,000.00
IT & IM Project Manager	\$3,400.00	\$85.00	39	0.75	\$132,600.00
System Architect / Developer(s)	\$2,800.00	\$70.00	120	2.31	\$336,000.00
NHCC coder	\$2,000.00	\$50.00	12	0.23	\$24,000.00
Pharmacist Editor	\$2,000.00	\$50.00	65	1.25	\$130,000.00
Administrative support	\$1,000.00	\$25.00	26	0.50	\$26,000.00
Travel (Melb-Can-Syd-Ade-Bris)					\$12,500.00
Sub total			266	5.12	\$681,100.00
Plus GST @ 10%					\$68,110.00
TOTAL					\$749,210.00

\* includes on-costs.

## Management structure suggested

We suggest a project management committee involving representation from HL7Australia, the AHIC EDS Steering Committee, the Medical Software Industry Association (MSIA), the Commonwealth Department of Health and key partners such as the NPS, TGL, AMH & NCCH.

The team proposed could either become a “virtual unit” within the proposed Best Practice Reference Centre” suggested by the Boston Consulting Group or it could be a free-standing commercial entity reporting to the project management committee. In either case, given the geographical spread and “virtual” nature of the team, we believe an experienced IT & IM project manager is the key to the project’s success. In addition, there will be a need for a travel allocation to support several face-to-face meetings and on-site visits.

If the above concept is approved by the AHIC, the physical location of the core team will require further negotiation as it is possible that in-kind support for this could come from a University or other partner.

## Acknowledgments

Therapeutics Guidelines Limited was a partner in the original SPIRT grant application, provided a letter of support for the HL7 NOIE grant application and has supported this application (with the caveat that formal approval will be sought at the next TGL Board meeting). Marcus Harvey, IT& IM Consultant, Therapeutic Guidelines Limited provided valuable input with respect to project management and costing. Earlier versions of this paper were generously reviewed by Dr. Paul Ireland, Project Director, National Institute of Clinical Studies (NICS) and Dr. Bob Jansen, Senior Research Fellow, Centre for Health Informatics, University of New South Wales. Regardless, the authors accept responsibility for any remaining errors, lack of clarity or infelicitous concepts.

# Refinement of the HL7 Australia EDS Work Plan

## Appendix I (Health System Approach)

Concern about the escalating cost of health care in Australia is merely one example of a general problem faced by all countries; how to provide equitable, evidence-based, cost-effective health care within the capacity of a country's ability to pay. Advances in medical science and technology have outstripped the capacity of all countries to pay for the many interventions now possible. In all countries, an aging population (and a relatively static health care workforce) is increasing the pressure on health services. Preventative health care is still significantly under funded compared to disease management. In addition, there is increasing evidence of excessive, inappropriate and wasteful health care interventions which have significant opportunity costs (as well as under-utilisation of cost-effective interventions).

To address these problems there is an increasing realisation that governments, in association with health professional organisations, must set up an appropriate quality assurance system to facilitate equitable, evidence-based, cost-effective health care. Australia has many components of the system required and the Australian Health Insurance Commission has won a number of international tenders to advise other countries about such matters.

### ***A quality assurance system to facilitate cost-effective health care.***

This system needs to:

- Regularly distil the scientific literature (and conduct research) in order to define locally applicable cost-effective guidelines, care-plans, etc. concerning best-practice;
- Assist health workers to compare their own practice (investigative ordering, prescribing and referrals) with what is recommended, and
- Where discrepancies exist, provide opportunities for practitioner reflection, targeted education and incentives to reduce the gap. This may also require system reform to remove perverse incentives that encourage inappropriate use. In addition, the discrepancies found should also be used to improve best-practice guidelines (and education) by an iterative process.

These principles must be incorporated into undergraduate, postgraduate and continuing education of health professionals. In addition, given that consumer "demand" plays some part in determining practitioner behaviour, public education campaigns that address particular problem areas are also required. Furthermore, given the increasing use of clinical computer systems in both hospital and general practice (and the use of the Internet by consumers), information management and information and communication technology (IM/ICT) has a crucial role to play in system improvement.

### ***The role of IM/ICT***

IM/ICT applied to health care can:

- Make the "right choices the easy choices" by providing consumers and health workers with ready access to patient-specific advice, alerts and reminders based on up-to-date best-practice guidelines interacting with electronic health records via electronic decision support (EDS) systems;
- Assist clinicians to optimise their practice by providing an objective basis for self-assessment, peer comparison and external assessment against agreed performance indicators. Such assessment can also be linked to appropriate educational material (and possibly best-practice incentive payments) to encourage improvement.

# Refinement of the HL7 Australia EDS Work Plan

- Provide a feed-back loop between front-line clinicians, consumers and the expert bodies who revise best-practice guidelines and CDS systems in order that new problems can be identified, guidelines and CDS systems can be improved and the entire system optimised in an iterative manner.
- Assist in changing the paradigm of health care<sup>14</sup> from isolated health practitioners, silos of specialists (and government departments) and fragmented health services to a consumer-centred, integrated health system with coordinated prevention and care facilitated by IM/ICT including interoperability standards, electronic health records and CDS systems based on best-practice guidelines.

This broad quality assurance framework (and the changing paradigm of health care being brought about by IM/ICT) is used to underpin the technical work plan proposed.

## Support for a National IM/ICT Best Practice Reference Centre

In 2004, the new Australian Health Information Council (AHIC) commissioned the Boston Consulting Group to review the current portfolio of health IM/ICT projects, prioritise the national agenda, and provide suggestions to gain traction on the agenda. The outcome was a report titled, *National Health Information Management and Information and Communications Technology Strategy*.<sup>15</sup> This report proposed a cross-jurisdictional “Best Practice Reference Centre” as part of a new independent “National Health IM/ICT entity” (Figure 1).

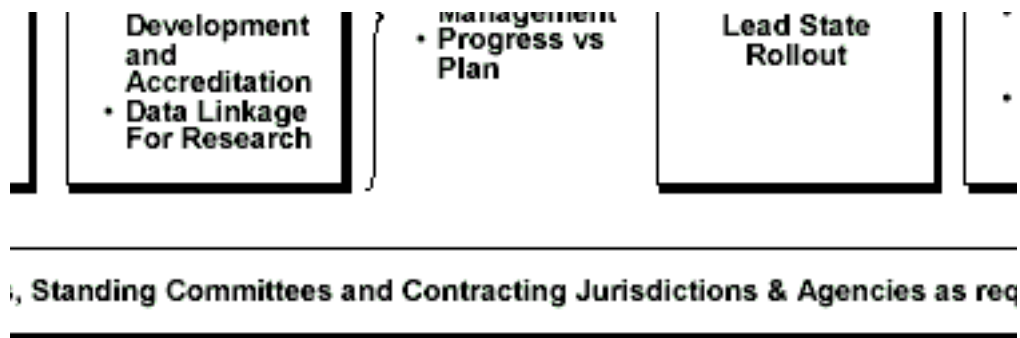


Figure 1 (from Boston Consulting Group Report, 2004).

<sup>14</sup> Smith R. Can IT lead to a radical redesign of health care? *BMJ* 2004; 328 (15 May); <http://bmj.bmjournals.com/cgi/content/full/328/7449/0-f>

<sup>15</sup> Available at: <http://www.health.gov.au/healthonline/index.html>

# Refinement of the HL7 Australia EDS Work Plan

We suggest that the proposed Centre embraces the quality assurance system outlined above and provides a broad range of IM/ICT, educational and evaluative services to service the needs of domain specific knowledge providers.

All specialised best-practice information providers face similar challenges. These include the need to provide more evidence-based information, to improve the consistency of recommendations produced by disparate groups (and minimise duplication of effort), to update their information more often, to provide consumer friendly versions, to augment printed guidelines with a variety of electronic formats and to integrate their electronic products into existing clinician's electronic desktop software. The latter includes the need to move from "static" text based electronic guidelines (e.g. PDF, HTML) to "active" guidelines in which the data elements, suggested action and the underlying logic is made computer-readable (XML, etc.) and capable of interacting with the health worker, epidemiological data and the emerging electronic medical record (computerised decision support).

The development of decision support systems requires existing guideline providers to acquire (or gain access) to new skills in health informatics and evidence-based medicine, new standards (HL7, XML Schema, etc.), new tools with which to compose, store, edit and extract machine readable guidelines (currently under development) and new linkages with clinical software vendors. Efficiencies would result if these new standards, skills, tools and linkages were developed collectively and made generally available.

The following domain specific groups may be interested in being supported by such a cross-jurisdictional "Best Practice Reference Centre":

- Therapeutics groups:
  - Therapeutic Guidelines Ltd.
  - Australian Medicines Handbook
  - National Prescribing Service
  - State Teaching Hospitals groups with local guidelines and care pathways such as VDUAC, NSWTAG, WADTC, SADUAG, etc.
- Immunisation E-Handbook Working Party (Immunisation Section, Population Health Division, Commonwealth Department of Health and Ageing).
- Infection Management Section, Population Health Division, Commonwealth Department of Health and Ageing.
- NHMRC Electronic Working Party (NHMRC guidelines).
- Royal College of Pathologists of Australasia (Manual of Pathology Tests).
- Royal Australian & New Zealand College of Radiologists (Imaging Handbook).
- Royal Australian College of General Practitioners (Preventative Guidelines, etc).
- The Royal Australasian College of Physicians (Clinical Support Systems Program).
- The Central Australian Rural Practitioners Association (CARPA) Standard Treatment Manual (which specifically addresses the needs of remote aboriginal health workers and nurses).
- Medical Software Industry Association (MSIA)

A cross-jurisdictional "Best Practice Reference Centre" could also assist with the integration of best-practice guidelines produced by disparate bodies. Patients present with multiple problems which often require a judicious mix of investigations, therapeutic and/or preventative management and patient education. Clinicians and consumers want integrated and consistent knowledge resources, not a plethora of overlapping and inconsistent resources in different formats, lacking a common clinical problem index. Clinicians need these

# Refinement of the HL7 Australia EDS Work Plan

resources to be integrated into the practice management and/or prescribing software in order to receive timely assistance with diagnostic ordering, prescribing, immunisation procedures, patient recall and reminders. Consumers want consumer-friendly versions placed on accessible and authoritative Web portals such as Health*Insite*.<sup>16</sup> If this is to be achieved, software vendors and webmasters need electronic guidelines produced in standard formats and with a standard interface mechanism as proposed in the above work plan.

Finally, it has long been shown that best-practice handbooks and guidelines, by themselves, rarely change behaviour. This material needs to be augmented by a holistic educational update service using proven methods, not the current variety of ad-hoc and competing vertical programs addressing therapeutics, pathology, radiology, immunisation and other preventative measures in isolation. Efficiencies would result from a common educational update service servicing a number of disciplines rather than the current separate activities, funded from various silos, working in isolation. Ultimately, the National Prescribing Service (NPS)<sup>17</sup> needs to be incorporated in a broader Australian Clinical Information Update Service (ACIUS) coordinating a range of specialised information domains such as therapeutics, pathology, imaging, immunisation, and working in partnership with knowledge distillers, software vendors and end-users such as the RACGP and consumer organisations.

## ***Sustainable Business Models for Clinical Information Resources***

One of the background papers of the trans-Tasman HL7 EDS workshop was, “A business case and funding models for initial implementation and long-term sustainability of best practice electronic health information resources”. This was because a technical solution to integrating electronic health information resources with clinical software will not be implemented unless an appropriate business case and funding model is also available to drive and sustain the process. Because this important issue has not been resolved the arguments in this background paper are repeated below.

The business case for bringing together national information resources in a common electronic format was first made in 1997. It remains even more pertinent today. In 1997, the then General Practice Branch of the Commonwealth Department of Health and Aging (DoHA) initiated a project to bring together a number of best practice information resources onto a common CDROM. The aim of this project was to help busy practitioners keep up-to-date. An explosion of medical knowledge had resulted in a number of groups distilling medical information into more digestible best-practice compendium. The increasing computerisation of general practice had created a need to transform these print-based resources into a common electronic format that could be readily accessed via the clinicians computerised desktop.

The information resources suggested for the original CDROM project included the Australian Medicines Handbook, Therapeutic Guidelines, the RCPA Manual of Use & Interpretation of Pathology Tests, the RANZCR Imaging guidelines and the NHMRC Immunisation Guidelines. However, this project failed to come to fruition, not because of technical problems, but because the DoHA eventually decided not to pursue an appropriate funding arrangement for reasons that were never entirely clear.

Today, the dilemma of who should pay for the distillation and dissemination of best-practice information remains unsolved. The Commonwealth and the States have no consistent policy

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<sup>16</sup> <http://www.healthinsite.gov.au>

<sup>17</sup> <http://www.nps.org.au>

# Refinement of the HL7 Australia EDS Work Plan

on this matter; some resources such as the Cochrane database, Australian Prescriber and the Australian Adverse Drug Reactions Bulletin are funded by the Commonwealth government, others like AMH & TGL operate on a user-pay, cost-recovery basis. Some States have paid license fees to make a variety of best-practice information resources available to their health professionals; other States have not, nor has the Commonwealth accepted similar responsibility for general practitioners. Some resources, such as Medical Director prescribing software, are made more readily available through pharmaceutical advertising subsidy; other groups regard this strategy as anathema.

Some general practitioners vocally object to paying for best-practice resources delivered under a market model. However, they have not clearly articulated how high quality knowledge distillation can be achieved entirely by volunteers. For example, Therapeutic Guidelines could not have evolved from one 30 page publication on antibiotics to a comprehensive set of print and electronic therapeutic guidelines without paid pharmacists, administrators and IT staff to support the unpaid expert writing groups. The goal of TGL is not to run a business; it is to improve prescribing by distilling best-practice information. However, the latter cannot be sustained unless the underlying business model is viable.

In addition, a number of health professionals in both hospital and general practice have reiterated that they want information resources (including patient educative material) readily available, integrated into their clinical software, on their hard disk, not just available over problematic low-speed Internet connections.

But, as information providers and software vendors have noted, the on-going distillation of best-practice information requires resources as does integrating these information resources into clinical software. Someone must pay!

Three funding models have been proposed:

## 1. Public funds to achieve a public good

This is a similar model to that currently used for Health Connect & MediConnect. It could be implemented by the Australian Health Department negotiating appropriate funding arrangements with groups producing “national treasures” (RACGP / TGL / AMH / RCPA / NHMRC / etc.) together with funding a cross-jurisdictional “Best Practice Reference Centre” to assist the integration of these resources with clinical software and also provide educational and evaluative services as proposed above.

This model has the virtue of making key resources freely available to all health professionals (via clinical software) and all consumers (via HealthInsite). It would also make Australian health information resources available internationally which could bring much credit to Australia.

However, some have expressed concern that dependence on government funding could compromise the independence of the knowledge producers. Unfortunately, there are several examples where the government &/or the DoHA has attempted to influence organisations who are dependent upon government money. If this option was pursued, specific measures would need to be put in place to protect against such machinations.

## 2. End users pay

The current policy of leaving the production and distribution of major therapeutic resources to market forces has produced competition rather than cooperation, fragmented scarce human resources rather than developed a critical mass of expertise and has impeded end-user uptake rather than increased it. It has also resulted in users of licensed resources

# Refinement of the HL7 Australia EDS Work Plan

passing on their userid and passwords to others. This in turn, has led some information providers to consider the introduction of license protection strategies which could further decrease usage by alienating users.

In addition, because electronic conversion has been done by different organisations, working competitively, there is no commonality of data structures, indexing, etc. making it impossible for existing resources to "plug & play" in the equally disparate clinical software that exists in hospital and general practice.

Some stimulus (e.g. competitive R&D funds) would be needed to assist integration and break the current impasse between information providers and software vendors. Then, information resources would be unlocked in clinical software by end-users who had paid the appropriate licence fee. This model has the virtue of less cost to the government, less possibility for government interference and keeping a competitive market. However, it has the disadvantage that many end-users would not pay and thus not use national best-practice resources. It would also do nothing to overcome the major problems that have resulted from a market competition model.

### 3. A mixed funding model

In this model, the Commonwealth would assist by providing competitive R&D funds for integration and PIP reimbursement (say 80% of the license fee) for private practitioners who purchased a license for approved "national treasures". Ownership of the latter could become an accreditation requirement. State health departments would purchase a State license for health professionals working in the public system. This model has the virtue of spreading the cost, minimising government interference, keeping a competitive market and most probably increasing the uptake of national best-practice over 2 above.

However, this option would have high transactional costs to administer PIP payments and keep track of multiple licences. In addition, it would further alienate those practitioners who believe that best-practice information resources should be freely available, not subjected to commercial licenses let alone mandated.

### ***Export earning potential***

Regardless of the funding model chosen it is our belief that a National IM/ICT Best Practice Reference Centre would have considerable potential to generate export earnings. Many countries are facing the challenge of keeping best-practice resource material up-to-date and integrating this into clinical software. TGL has successfully exported their electronic guidelines to a number of counties (as a template for localisation).<sup>18</sup> In the same manner, we could export the software necessary to keep best-practice guidelines up-dated and produced in a form suitable for integration with clinical software.

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<sup>18</sup> Harvey K, Dartnell J, Hemming M. Improving antibiotic use: 25 years of antibiotic guidelines and related initiatives. *Commun Dis Intell* 2003; 27 Suppl: S9–S11.

# Refinement of the HL7 Australia EDS Work Plan

## Appendix II (NPS RADAR Program)

The RADAR program is a new service from the NPS aimed at providing independent information to health professionals about medicines which have a new or a changed listing on the Pharmaceutical Benefits Schedule (PBS). Until now, when a medicine is listed on the PBS most information available to general practitioners (GPs) has been provided by pharmaceutical manufacturers and is often promotional in nature. This has led clinicians to prescribe PBS drugs for indications other than those found to be cost-effective.<sup>19</sup>

As timing is a critical factor to the success of the RADAR program the service will be delivered to GPs through a select number of print media, a web notification service and through commercial GP prescribing software. In the longer term, RADAR will only be available electronically. This enables the RADAR program to dynamically respond to changes in the national and international body of evidence on safety and efficacy of new or revised drugs.

RADAR must be available at the time a drug is selected by a GP. Ideally this would occur once the GP has recorded the reason for prescribing using a standard clinical terminology set. However, at the moment not enough GPs are using their prescribing software to record the reason for prescribing (a clinical problem or diagnosis). For this reason, NPS has selected to link the delivery of RADAR information to the selection of a new PBS drug within the prescribing systems.

### ***RADAR functionality***

The NPS has specified the functionality of each prescribing system (PS) that is integrating RADAR documents. Each RADAR document specifies the generic drug name, the product brand names and the product and pack types of the drug products that the documents are referring to. As a variety of coding schemes are in use by prescribing systems, XI uses a flexible mechanism to specify its drug codes.

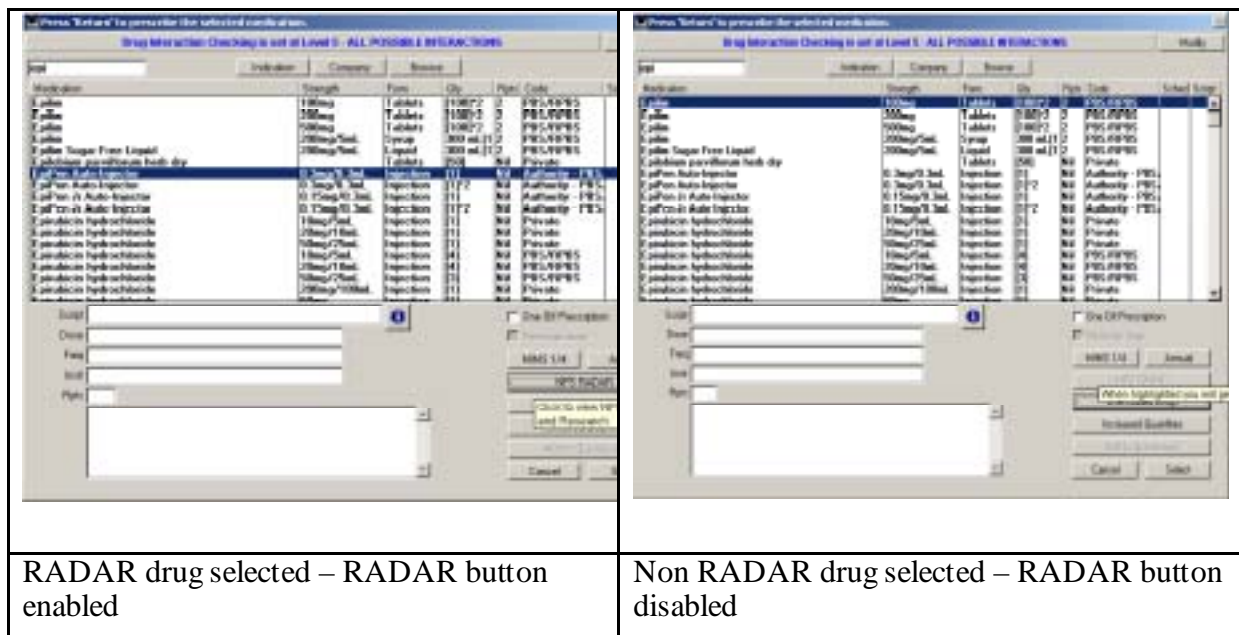
### **Enabling a RADAR button**

Enablement of an “NPS RADAR” button occurs when a RADAR drug is selected in a PS dialog box (see over-page).

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<sup>19</sup> Dowden, J. 2003, Coax, COX and cola [Editorial], Medical Journal of Australia; 179: pp. 397-398. Available: [http://www.mja.com.au/public/issues/179\\_08\\_201003/dow10457\\_fm-2.html](http://www.mja.com.au/public/issues/179_08_201003/dow10457_fm-2.html)

# Refinement of the HL7 Australia EDS Work Plan



RADAR drug selected – RADAR button enabled

Non RADAR drug selected – RADAR button disabled

Figure 4. Selection of a RADAR drug enabling the NPS RADAR button.

## The RADAR pop up

The RADAR pop up displays a summary of the RADAR document and links to the full document. The RADAR pop up is generated the first 3 times a RADAR drug is prescribed, or continually generated if the user has indicated this preference.



Figure 5. Summary display automatically generated when a RADAR drug is prescribed for the first 3 times.

## Full RADAR document display

The full RADAR document is displayed when the NPS RADAR button is clicked or when the user links to the full document from the summary.

# Refinement of the HL7 Australia EDS Work Plan

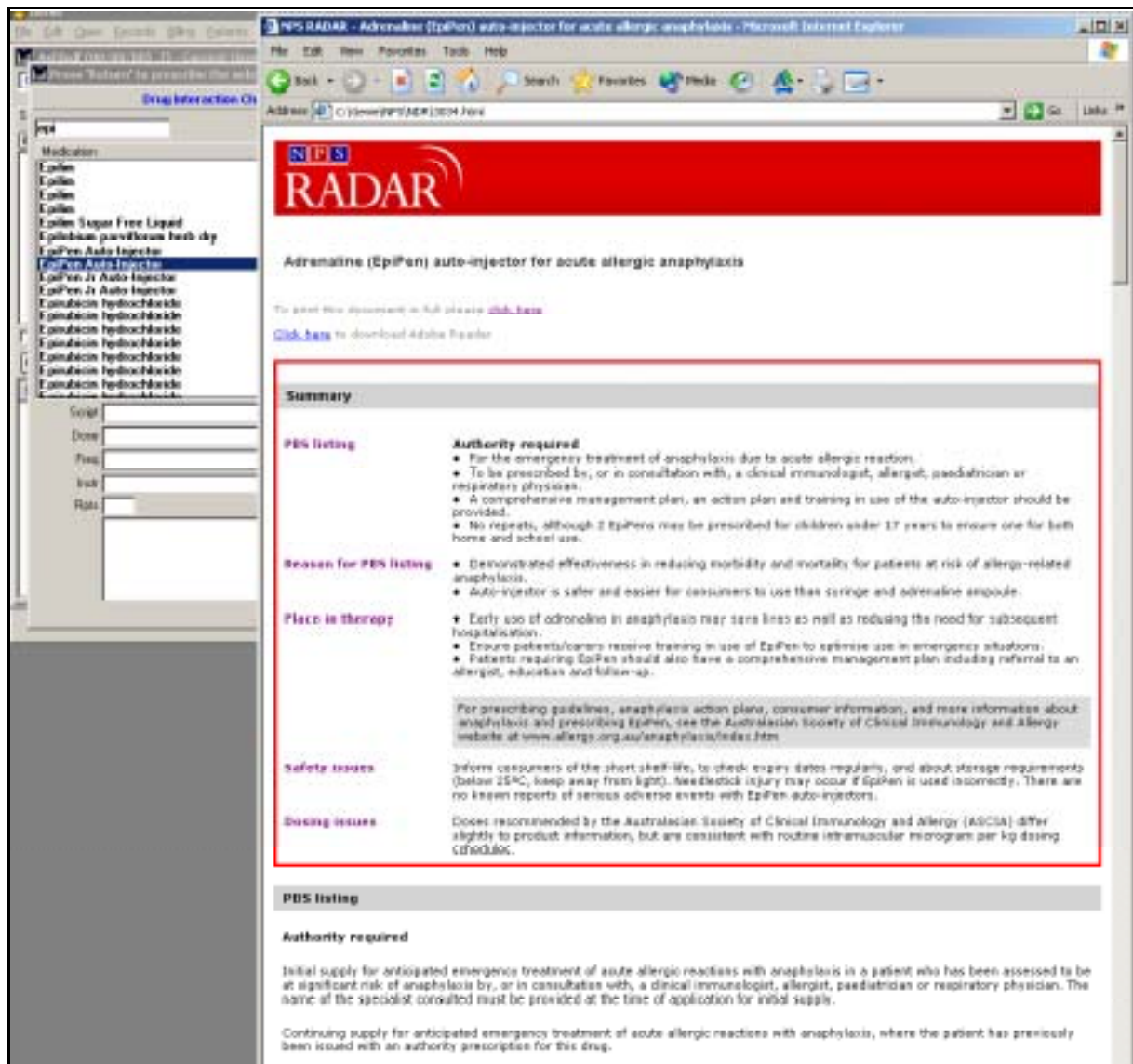


Figure 6. Display produced when the enabled NPS RADAR button is clicked.

## The RADAR browser

The RADAR browser is an interface developed for users who wish to browse the complete set of RADAR documents. It is accessible from the resources menu of the integrating Prescribing Systems.

# Refinement of the HL7 Australia EDS Work Plan

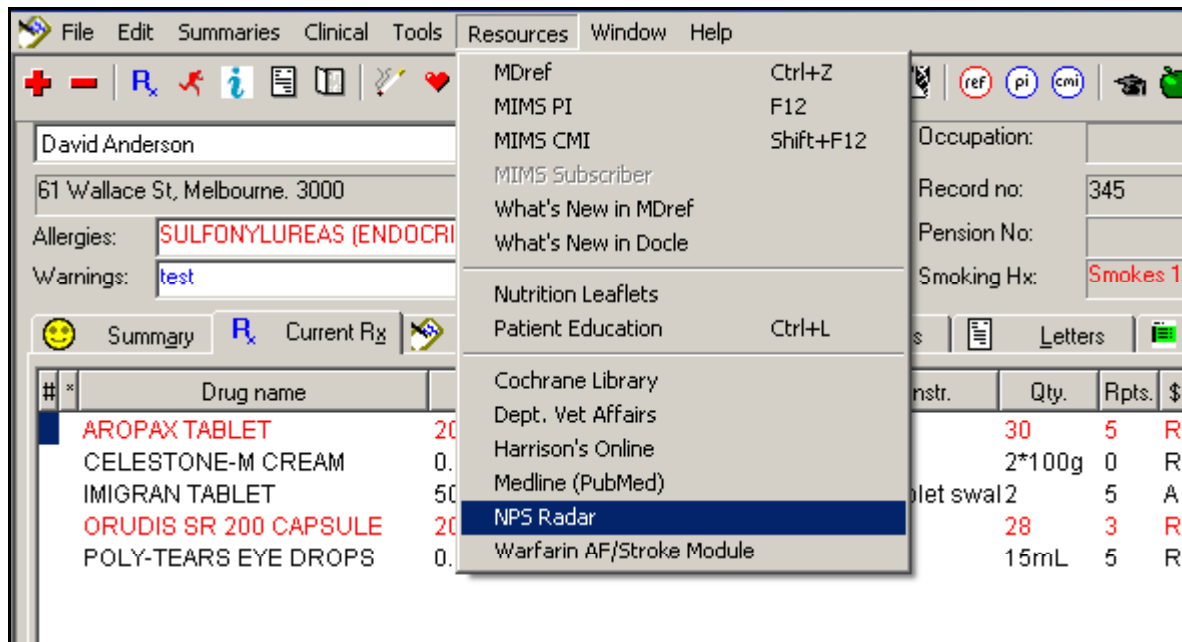


Figure 7. NPS RADAR browser available on the resources menu.

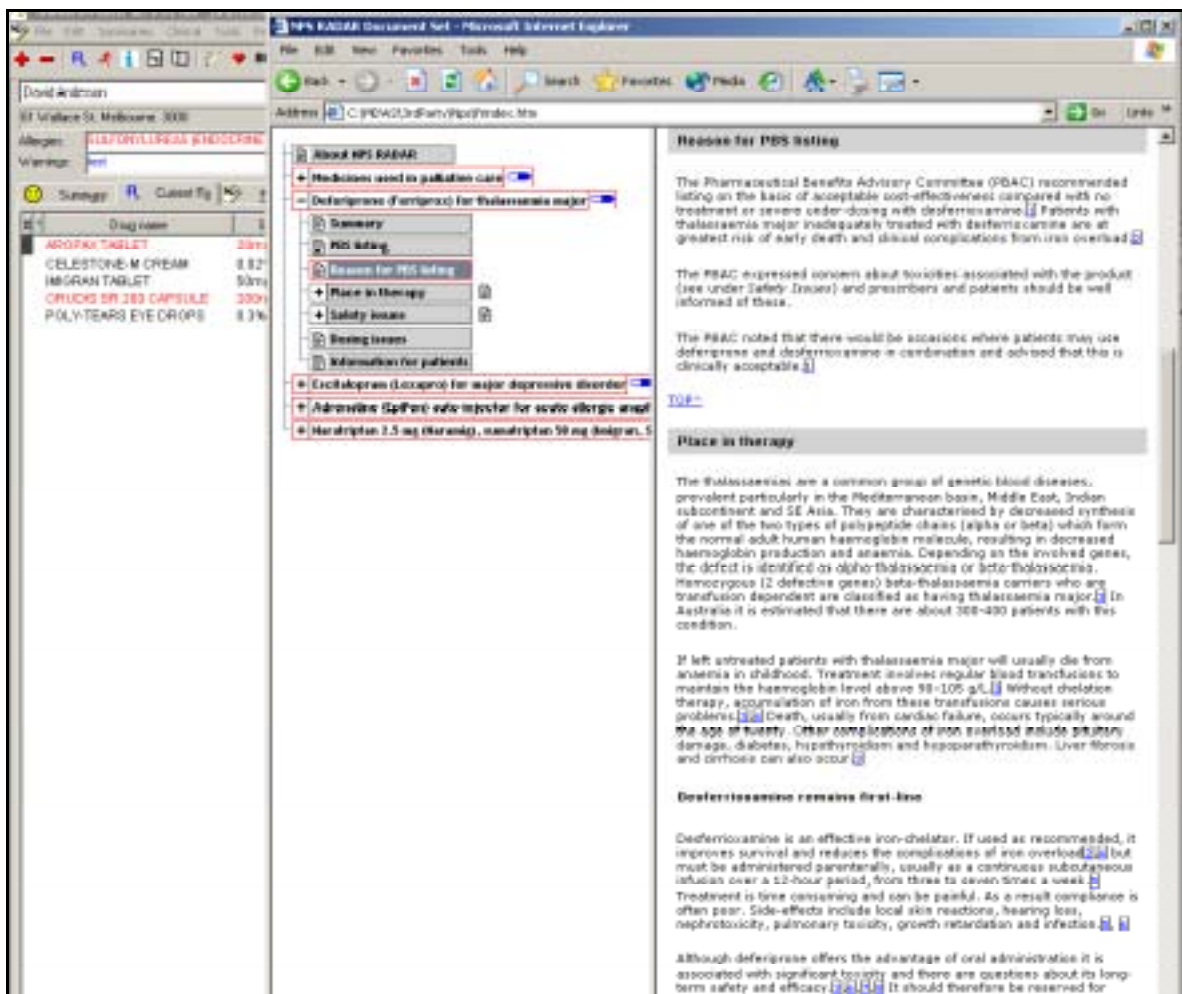


Figure 8. RADAR browser displayed form resources menu.

# Refinement of the HL7 Australia EDS Work Plan

RADAR has been integrated with four general practice prescribing systems, resulting in the delivery of RADAR to over 90% of computerized general practices. As integration was to a variety of prescribing systems, the main issues of consistency faced were:

1. That the same content is provided to all systems;
2. User actions result in the same response to integrated information in all systems;
3. Integrated information is displayed in the same way in all systems.

Objective 1 can be guaranteed through appropriate use of XML. This is one of the characteristics of XML that has recommended it as a standard for data exchange.

Objectives 2 and 3 are only possible if the definitions of “sameness” are loosely interpreted. Each of the integrating systems has different user interface mechanisms, different work flow models, collect varying data of varying granularity as input and define user events in different ways. In the absence of a universal model of clinical work flow, it is necessary to make some assumptions about how certain pieces of information should be displayed in order to provoke a similar experience in the user interface of different systems.