

Information Management and Technology Education, Training and Development Strategy

A Strategy for NSW Healthcare Workers

*‘Meeting the
challenge of
the information
technology
impact on
clinical practice’*

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SHPN: (IMD) 020062
ISBN: 0 7347 3411 5

Information Management and Technology Education, Training and Development Strategy – A Strategy for NSW Healthcare Workers
NSW Government Action Plan, Sydney.

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June 2002

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Executive summary

The Report of the NSW Health Council¹ gave priority to information management and technology initiatives that would better support clinical practice at the point of patient care. The NSW Information Management and Technology Strategy (IM&T) was revised in April 2001 to encompass the recommendations of the NSW Health Council and subsequently the NSW Government's Action Plan for Health (GAPH). The IM&T initiatives are clinically focussed and incorporate systems for patient administration, point-of-care clinical, community health, Telehealth and links to General Practice to deliver clinical information supporting continuity of care. All of these systems contribute source information for the Electronic Health Record (EHR), which is a key recommendation of the NSW Health Council. A telecommunications framework, standards, privacy and security and a 'Unique Patient Identifier' to link records across the continuum of care underpin all of these initiatives.

Inherent in this framework for information management and technology in healthcare is the need to educate staff to understand information dynamics, which includes recognising the potential and value of information to support business needs. The IM&T Education, Training and Development Strategy was developed to provide guidance to Area executive, hospital management and program managers who have the responsibility to ensure that staff receive education and training appropriate to their information needs.

The vision of the IM&T Education, Training and Development Strategy is:

The provision of targeted and accessible IM&T education, training and development, and on-going support for healthcare workers. This is to enable the delivery of high quality clinical services to the NSW community.

The key messages of this strategy are to ensure that IM&T education, training and development is incorporated into the implementation planning for all IM&T programs. A structured IM&T education, training and development program will:

- create an information culture that values information as a critical resource to support quality healthcare and clinical practice that is evidence based.
- develop the information skills of healthcare workers to support day to day work practice and to promote a learning culture that will improve the level of understanding of information management for its better application to healthcare.
- ensure that health professionals know how to access information to make well informed decisions so that consumers of healthcare receive the best possible care.
- improve communication of information between healthcare providers and encourage a culture of information sharing.
- assist health professionals to realise identified benefits at a strategic, organisational and personal level.

Better information management supported by IM&T education, training and development

Information is a health organisation's most critical resource. Information technology is an effective means of managing information to improve efficiency and achieve quality outcomes through improved access to and integration of information across the continuum of care. IM&T education, training and development is therefore crucial to maintaining and enhancing the abilities of the staff who provide that service to assure the highest possible standard of care.

Executive summary

To achieve the goals of the NSW GAPH, the Information Management Implementation Coordination Group (IMICG) established a Working Group to develop an IM&T Education, Training and Development Strategy that would support the IM&T priority programs for clinical reforms. The strategy was refined through consultation with a range of stakeholders within the healthcare system.

Development of an effective IM&T education, training and development strategy required:

- a clear understanding of the relevant organisational environment
- a change management framework to create and promote a receptive information culture
- adequate resources, including facilities to train staff away from the workplace and trainers and educators who can address all levels of learning
- on-going support and education and training models incorporating an evaluation framework.

Australia is moving rapidly towards the adoption of information management and technology in Health. The national strategy has been evolving over the last few years through the work of the National Electronic Health Records Taskforce. The EHR Taskforce recognised four main necessary building blocks for the implementation of the EHR:

1. Privacy and confidentiality
2. Security
3. Standards
4. Telecommunications infrastructure

As well as providing encouragement for the uptake and use of information technology, the taskforce also recognised that the education and training of healthcare providers is vital to the success of the information network for Australia.

Other imperatives for change include a transformation to a knowledge-based society, changes in healthcare reimbursement and delivery, rapid improvements in information technologies and an increasing volume and complexity of clinical information. The emphasis is therefore not only on the uses of information technology in healthcare but also on information management².

Lessons from the literature

Different authors have identified the implications of the emerging information age for healthcare workers including Carlile and Sefton⁴, Cordell et al.³, Coiera⁵, Nagelkerk et al⁶, Gibson and Silverberg⁷, Russell⁸, Gravely et al⁹, Sherry and Gadd¹⁰. Variation in computer skills (information literacy, information management) and knowledge among the existing workforce and undergraduates is a common concern.

Opinions abound on the need for education and training, and the types of curricula needed for undergraduate and post-graduate programs. However, the evidence on the effectiveness of these programs is lacking. This in part may be related to the relatively recent development of technology for healthcare.

A model for NSW Health

A model for IM&T education, training and development is presented that is flexible yet requires a collaborative approach by key stakeholders, including NSW Health, professional bodies and educational institutions. The key result areas include:

- organisational readiness
- fostering a learning culture
- change management
- benefits realisation.

Critical success factors

The key to successful implementation of an IM&T Education, Training and Development Strategy is to adopt a participative change strategy. To ensure that staff are receptive to change and to promote acceptance the following will be needed:

- program management education
- principles of change management
- benefits realisation education
- project management education and training
- health informatics education and training
- information management specialists.



Barriers to training and education must be addressed including cultural, organisational and environmental barriers with the recognition that associated costs are the major barrier underpinning all others.

For an organisation to be successful in implementing information technology there must be a clear link between strategic initiatives and education and training programs. As well there needs to be an adequately resourced education and training program with skilled staff, time to train, user friendly training documentation and training facilities conducive to an adult learning environment.

Communications and marketing are also seen as critical success factors. The following key messages need to be conveyed in support of an information culture:

- Information management is essential to effective healthcare.
- Managing the change is a proactive activity that is the responsibility of all staff and involves collaboration between a wide range of stakeholders and professional bodies working together.
- The legislative and policy framework related to health information is of growing importance and needs to be understood.

Responsibility for marketing and communications lies with a number of stakeholders including the Information Management Division, Health Public Affairs, Human Resources and the Area Health Services (AHS).

Governance is a fundamental issue for education, training and development

Clinical governance is the framework that underpins the continuous improvement of quality services and requires the development of strong and effective partnerships between clinicians and managers for the safe and effective provision of healthcare.¹¹

The IM&T Education, Training and Development Strategy recognises that under a clinical governance framework, quality care requires the development of an IM&T skilled health workforce to promote **evidence-based practice, professional development** and **lifelong learning** to deliver a high quality health service.

The governance structure that oversees the implementation of strategic information systems will need to incorporate IM&T education and training as an integral program function. There will not be a need to have a separate governance structure to oversee IM&T education, training and development. However, it is recommended that a working group of the program governance committee take responsibility for the:

- development and maintenance of policies, guidelines and standards
- determining priorities for education and training sessions
- development and implementation of competency based evaluation methodologies
- making recommendations for the funds to be invested in the education and training of healthcare workers for skill development in IM&T.

Inherent in the management of IM&T programs that are being implemented is the need for a 'Program Sponsor'. The program sponsor will have the responsibility to ensure that appropriate resources are assigned to IM&T education, training and development to achieve the maximum benefits of the investment in information systems for healthcare workers, the organisation and the consumers of healthcare.



Recommendations

The following are the recommendations of the IM&T Education, Training and Development Working Group. The full strategy follows these recommendations and the section and page numbers refer to this document.

Recommendation	Section/page
<p>Goals, objectives and strategies</p> <p>That:</p> <ul style="list-style-type: none"> • The IM&T Education, Training and Development Strategy is used as a guide to the development of: <ul style="list-style-type: none"> – the NSW Health Department and AHS strategic plans, business plans and IM&T strategies • The program governance model which needs to have representation from all stakeholder groups • The NSW Health IM&T Governance Committee, in consultation with key stakeholders, oversees the development of: <ul style="list-style-type: none"> – a policy framework to guide education, training and development processes – change management programs which incorporate IM&T education, training and development – standard evaluation methodologies to demonstrate skills in using information technology 	A / 4-7
<p>Benefits</p> <p>That:</p> <ul style="list-style-type: none"> • NSW Areas adopt a benefits driven IM&T Education, Training and Development Strategy that addresses: <ul style="list-style-type: none"> – organisational benefits – staff benefits • IM&T education, training and development priorities need to be aligned with pre-identified benefits • The benefits measurement processes are linked with the IM&T Education, Training and Development Strategy's Evaluation Model 	A / 9-11
<p>Information culture</p> <p>That NSW Health encourage the development of an information culture that promotes knowledge management to support evidence based healthcare by:</p> <ul style="list-style-type: none"> • developing partnerships with the health education sector • providing appropriate funding and resourcing to support the IM&T Education, Training and Development Strategy • implementing structures to effectively oversee a comprehensive IM&T Education, Training and Development Strategy • facilitating the establishment of effective IM&T education, training and development programs through the provision of customised education, training and development • ensuring that all staff have access to appropriate IM&T education, training and support to allow them to fulfil their role 	B / 15-17
<p>Change management</p> <p>That NSW Health:</p> <ul style="list-style-type: none"> • adopts a participative change strategy that incorporates teamwork, consultation, collaboration, education, training and development • supports work practice and organisational change through education, training and development programs which include understanding, skills and knowledge of policy, process and effective use of information • commits to the development of strategies to address organisational, cultural and environmental barriers to the adoption of an effective IM&T strategy • Incorporates education and training into every IM&T program and ensures it is appropriately funded and resourced 	B / 18-21



Recommendations

Recommendation	Section/page
<p>Alignment with IM&T Programs</p> <p>That NSW Health key stakeholders align the education, training and development strategy with IM&T strategic initiatives to achieve maximum proficiency in the use of the systems, realise patient care benefits and maximise the benefits from the investment in information technology for the organisation.</p>	B / 25-30
<p>Communications and marketing</p> <p>That a comprehensive marketing and communications strategy for IM&T includes education, training and development and is written in consultation with AHSs, NSW Health Department and key stakeholders.</p>	B / 31-32
<p>Education, training and development</p> <p>NSW Health:</p> <ul style="list-style-type: none"> Adopts the model of education, training and development that is based on collaborative management to achieve: <ul style="list-style-type: none"> a state of readiness a learning culture change management benefits realisation Ensures that implementation of the IM&T Education, Training and Development Strategy is accompanied by an agency evaluation program that identifies: <ul style="list-style-type: none"> progress at the staff and organisational level effectiveness of the adopted strategies achievement of planned benefits Ensures that implementation of the IM&T Education, Training and Development Strategy reflects differing user and business needs 	C / 33-42
<p>Evaluation</p> <p>The NSW Health Department and AHSs need to ensure that implementation of the IM&T Education, Training and Development Strategy is accompanied by an agency evaluation program that identifies:</p> <ul style="list-style-type: none"> progress at the staff and organisational level effectiveness of the adopted strategies achievement of planned benefits 	C / 42-44
<p>Costs</p> <p>That NSW Health facilities adopt this model to determine the costs of education, training and development</p>	C / 45
<p>Implementation issues</p> <p>That a working group of the program governance committee take responsibility for the:</p> <ul style="list-style-type: none"> development and maintenance of policies, guidelines and standards determining priorities for education, training and development sessions development and implementation of competency based evaluation methodologies recommendation of funds to be invested in the education, training and development of healthcare workers for skill development in IM&T 	D / 47-50





Section A

Introduction

Introduction

A To achieve the goals of the NSW GAPH, the Information Management Implementation Coordination Group (IMICG) established a Working Group to develop an IM&T Education, Training and Development (ETD) Strategy that would support the IM&T priority programs for clinical reforms. The Working Group determined that in developing a strategy for IM&T ETD, the needs of all healthcare workers to learn IM&T skills should be addressed.

In the current environment, there are many information systems that support healthcare and many more being planned to establish the information and technology infrastructure that is required to achieve better healthcare and desirable health outcomes. The Australian Health Ministers endorsed an Electronic Health Record (EHR) as a national initiative. Concurrently, NSW Health has developed a strategy to implement a NSW EHR (EHR*Net) which will be the NSW node of the national EHR, *HealthConnect*. The infrastructure systems of Unique Patient Identifier, Patient Administration, Point-of-Care Clinical Systems and the Community Health System will provide the required information for the EHR. Inherent in all of these large systems is the need to educate staff to understand information dynamics, which includes recognising the potential and value of information to support business needs. In addition, there is a large investment in time, resources and funds required to train staff to be adept at using the technology for maximum benefit at both the personal and organisational level.

The major aim of this strategy is to provide a guideline for the AHSs to ensure that the investment in information technology is supported by a framework for IM&T ETD. Inherent in the strategy is the need to:

- promote an organisation-wide learning culture that values IM&T ETD
- align IM&T ETD with business plans, IM&T strategic plans and clinical ETD
- promote a collaborative approach to ETD utilising the skills of the health education sector, informatics associations and industry
- propose a governance model to ensure ETD has a high priority within the overall program management for information system initiatives
- propose a supporting infrastructure that includes ETD facilities, skilled trainers and time to learn
- develop a model and strategies for ETD supported by the professional literature
- develop a policy and evaluation framework for ETD
- communicate the strategy to key stakeholders across the health system.

These major aims are incorporated into the body of the report in the sections that address the issues. The scope of the strategy in relation to IM&T ETD is outlined in Section A. Section A also includes the vision, goals objectives and benefits and provides strategies to address all issues. Section B presents a situational analysis incorporating a review of the literature, which supports a philosophy of learning for life within the context of an evidence-based information culture. Change management issues include the need to review work practices, develop change management strategies and address the barriers and critical success factors to IM&T ETD. It proposes a communications and marketing strategy that is closely aligned with program management for all IM&T initiatives.

Section C provides a model and presents the priorities for IM&T ETD. It describes a framework for operational support for end users and the roles of the support groups. Section C describes the clinical environment and provides some examples of clinical business processes and the expected benefits of IM&T programs to support the core business. The strategy provides models for evaluation to determine the effectiveness of ETD. A cost model is also provided to enable key stakeholders to cost the various components of providing this service.

Section D presents the proposed IM&T strategy governance structure and describes how ETD is incorporated into program governance. The role of the Program Sponsor and the responsibilities for ETD are also provided. This IM&T ETD Strategy is presented as a guide for NSW Health to ensure that key stakeholders receive IM&T education and training appropriate to their information needs to support the business of healthcare.

A

Scope

A The Working Group of the Information Management Implementation Coordination Group (IMICG) was responsible for the development of an IM&T ETD Strategy for the NSW public health system. The aim of the strategy is to provide the framework that will guide management in ensuring that doctors, nurses and allied health professionals (clinicians) achieve the maximum benefit from the investment in information technology.

The scope of the strategy was to:

- identify the goals, objectives and benefits of IM&T ETD for health professionals, the AHSs and the wider NSW Health system to benefit the consumers of healthcare
- appraise the current IM&T ETD environment and determine barriers, success factors and trends through a process of literature review, analysis of current experience and consultation with stakeholders
- identify strategies to create an information culture and address change management issues including work practice review
- align the IM&T ETD needs with the strategies being developed to support clinically focussed systems including the EHR
- determine the ETD needs of all stakeholders in relation to their information requirements to support core responsibilities in the delivery of patient care
- identify resource requirements and optimal models to support and sustain a realistic program of IM&T ETD
- provide a cost model for ETD to enable the Areas/Program Managers to determine costs
- make recommendations in relation to ETD to the Department's Executive, CEOs and hospital managers.

The Working Group submitted a completed IM&T ETD strategy to IMICG in May 2001. The output of the Working Group is a strategy that can be used by the AHSs as a guide to conducting IM&T ETD. It includes a guide to educational approaches that best equip health professionals in the transition to using information technology in care delivery focussing on enhanced health outcomes such as improved safety and quality of patient care.

The strategy was refined through consultation with a range of stakeholders within the healthcare system including AHSs, Teaching and Research (TRIG) and other Implementation Coordination Groups, professional organisations, Divisions of General Practice, community health and other key stakeholders.

Vision

Vision

“The provision of targeted and accessible IM&T education, training, development and on-going support for healthcare workers. This is to enable the delivery of high quality clinical services to the NSW community.”

The vision to be achieved through the optimal use of information technology, the promotion of an information culture, the accomplishment of work practice changes and benefits thus supporting the health reforms of the Government Action Plan for NSW.

Goals, objectives and strategies

The IM&T ETD Strategy adopted by NSW Health has major implications for the health community and how they manage information and integrate information technology into their work practices.

Developing an effective IM&T ETD strategy requires that sufficient attention must be given to understanding and adapting to the organisational environment within which IM&T ETD is to be carried out. This will involve establishment of a governance structure that views IM&T ETD as a core element within program management from the planning and implementation phases through to on-going support. This also requires a change management framework to create and promote an information culture to empower the users with knowledge so that they accept the need for ETD to gain maximum benefit from using information systems. To support IM&T ETD, adequate resources are required including the facilities to train staff away from the workplace and trainers and educators who can address all levels of learning and on-going support around the clock which reflects the business of healthcare which is a 24 hour service. ETD models incorporating an evaluation framework is a key goal of this strategy. The following table details the goals, objectives and strategies to support IM&T ETD.

A

Table 1. Goals, objectives and strategies to support IM&T education, training and development

	Goals	Objectives	Strategies
Organisational environment	Ensure IM&T ETD is aligned with state and national information technology initiatives	Develop processes for maintaining the currency of IM&T ETD requirements	Establish a governance structure that has representation from all stakeholder groups National initiatives are kept informed of state progress through the governance model
	Maximise the organisation's performance, resource management, outcomes and outputs in relation to ETD ETD is consistent with business strategies and quality frameworks	Strategically plan and run efficient and effective ETD programs to enhance business performance Adequately resource ETD programs Strategically plan for on-going support Incorporate ETD requirements in business plans and quality frameworks	Develop a policy framework that drives processes Develop clear roles, responsibilities, outputs and reporting mechanisms Provide regular meetings and team building Strategic partners Cooperative resourcing and budget Review operations and goals

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	Goals	Objectives	Strategies
Organisational environment <i>continued</i>	Build and manage relationships to enable the organisation to meet its goals and priorities	Consolidate vendor relationships	Establish meaningful and strategic partnerships with industry
		Foster links between those developing and delivering ETD (vendors, service departments, partners etc)	Establish and foster consultative networks
	Healthcare workers are familiar with the relevant federal and state legislative framework	To engage professional organisations (eg HISA, HIMA) to align their IM&T business strategies with IM&T ETD programs	To promote collaboration between healthcare providers in meeting IM&T requirements
Information culture	Promote an information culture that values and encourages the development of health informatics Foster a learning culture within the NSW Health Service that is supported by ETD	To inform healthcare workers of the relevant State and Federal legislation affecting the privacy of health information	Provide standard and current documentation and training to relevant staff
		To promote an information culture underpinned by an effective governance structure	Create a clinical governance structure that supports planning, implementation, support and evaluation of IM&T within a quality framework
		Market the strategy benefits of investing in public health service ETD	Conduct research to evaluate the effect of the change processes
		Educate and advise its application	Develop a benefits strategy Develop a marketing and education strategy Promote competency development
		To gain commitment from Department/Area and Hospital Executives to support the need for a change management strategy	Identify champions to lead the change process and to commit funds and resources to a change program
To demonstrate the benefits of IM&T ETD to achieve lasting change in attitudes and behaviour	Design standard evaluation methodologies, short and long term, to demonstrate the benefits of using IM&T		
Build and manage relationships to enable organisations to meet their goals and priorities	Adopt the Web as a medium to share information statewide, nationally and internationally Market the concept of information sharing to relevant stakeholders		

6

	Goals	Objectives	Strategies
Information culture <i>continued</i>	To establish an information culture within the workplace that embraces change to achieve quality healthcare	To gain commitment from key stakeholders for IM&T training, education and on-going support	Consult with relevant organisations and key stakeholders/ groups to ensure they are adequately briefed on the impact of the information system on user groups (eg NSWNA, AMA)
		To develop change awareness programs to gain wide acceptance for the use of information technology as an integral part of a health professional's role	Incorporate IM&T change management into local education programs
	To create an information culture that acknowledges the relationship between health informatics and communication to support quality healthcare	To improve the level of communications within the healthcare system to optimise the quality of healthcare	Identify communications behaviours Assess technologies that support communication of information
	To develop an information culture that promotes knowledge management to support evidence based healthcare	To develop ETD modules underpinned by knowledge management concepts	Incorporate IM&T knowledge management into local education programs
Resources	To expect that resources are readily available, appropriately utilised and maintained to implement and sustain the IM&T ETD requirements for all healthcare workers	To identify resource requirements for IM&T ETD including skilled staff, technology, facilities, media and budgets	Incorporate IM&T ETD resourcing into business planning
		To develop a resource strategy to meet local needs	Seek executive level commitment to resource IM&T ETD
	Resources are made available to support flexible learning for information management and technology in healthcare to meet current and future needs	To secure commitment at Executive level to meet appropriate resource requirements for IM&T ETD	Link IM&T Strategies to CEOs performance agreements Develop an implementation strategy for IM&T ETD Develop a sustainable strategy for on-going training and support as new staff are employed and new systems are deployed or upgraded
To identify current and future knowledge and skill requirements for the various stakeholders within the organisation		Identify the user profiles required to meet the information needs of stakeholders Tailor IM&T training to user profiles Develop flexible learning strategies for all IM&T initiatives	

A

	Goals	Objectives	Strategies
ETD	Appropriate healthcare workers have equity of access to IM&T education, training and support	To educate healthcare workers about health informatics	Provide healthcare workers with a context document to communicate the strategy
	Foster the development and delivery of relevant, high quality ETD to ongoing competency development	To align business drivers with education needs and project implementation with training needs	Develop a needs analysis survey to identify the education needs of the relevant stakeholders
	Ensure ETD outcomes match user needs	Support and monitor the development of ETD and ETD products (eg manuals, handouts and on-line resources)	Develop a training plan that profiles training modules for each stakeholder groups
	Ensure training systems remain accessible, responsive and equitable	To provide training at a level to meet user needs therefore maximising the benefits from health information systems	Establish a skilled group of key trainers (super-users) who are the advocates for their professional group to act as a resource for training colleagues
		To promote training in basic computer skills to enhance stakeholder skills in using more complex applications	Develop a tool to assess existing facilitator IM&T skills and education resources and programs within the organisation to support ETD
	Ensure the range of ETD services and resources reflect the differing needs of groups	To support user groups with on-going ETD in the use of information systems to improve healthcare	Identify flexible models for ETD to meet the needs of the user groups: <ul style="list-style-type: none"> • Workplace • Classroom • On-line
		To provide workplace support for users by ensuring that the system is operational 24 hours a day	Structures in place to ensure that there are processes to provide operational support 24x7
	All healthcare workers are competent and confident in using health information systems in their professional role	To provide equity of access to IM&T ETD by ensuring availability of technology, applications and support	Areas to ensure that the infrastructure is in place to support all categories of users
	Ensure effective monitoring and feedback on staff skill development and performance		Areas to adopt a collaborative approach to education, training and support within the framework of Alliances and partnerships
		To develop training plans and programs that take into account the implications of emerging clinical, non-clinical and aggregate information standards, technical standards, and other relevant national deliverables	Incorporate standards and policies into ETD programs Include education on legal and ethical issues of using information in clinical practice, research and education

	Goals	Objectives	Strategies
ETD <i>continued</i>	Enable a flexible, highly skilled public health workforce	<p>To evaluate how well ETD programs are meeting users needs</p> <p>Clearly describe the competencies required in the workplace</p> <p>Promote the use and value of competency standards</p>	<p>Incorporate evaluation of IM&T competencies to review performance</p> <p>Develop self assessment programs</p> <p>Develop competency standards</p> <p>Develop an education plan for competencies</p>
Evaluation and research	IM&T ETD strategies are supported by an evaluative and research framework	To establish collaborative and strategic linkages with the tertiary sector to assist with the development of IM&T evaluation methodologies	Use existing governance structures (eg CPPC) as a forum for consultation with the tertiary sector
	Build health's knowledge base on issues related to on-going competency development and system implementations	<p>To evaluate how well ETD programs are meeting users needs</p> <p>Monitor health service trends and benefits</p>	<p>Develop an evaluation tool to determine how well objectives are being met</p> <p>Conduct or influence relevant research</p> <p>Develop information capture mechanisms</p> <p>Set-up an on-line list server for sharing issues, problems and solutions</p>

Recommendations – goals, objectives and strategies

That:

- the IM&T Education, Training and Development Strategy is used as a guide to the development of:
 - the NSW Health Department and AHS strategic plans, business plans and IM&T strategies
 - the program governance model has representation from all stakeholder groups.
- the NSW Health IM&T governance committee, in consultation with key stakeholders, oversees the development of:
 - a policy framework to guide education, training and development processes
 - change management programs which incorporate IM&T education, training and development
 - standard evaluation methodologies to demonstrate skills in using information technology.

Benefits

The value of effective information management in health is a direct outcome of the quality of the learning and thinking of staff at all levels within an organisation. It is essential therefore that core skills of learning and thinking are attained by healthcare workers through effective ETD programs. This will lead to better understanding of the need for change to better manage the complexities of their work, to enhance their ability to cope with the change and to actively contribute to the achievement of its goals and objectives.

The overriding benefit of effective ETD is higher attainment of work competencies, better analytical and decision making skills leading to enhanced staff satisfaction with their job, improved work practices and ultimately better health outcomes to the communities we serve.

The anticipated ETD benefits identified below reflect the resolution of the IM&T ETD Strategy to identify the problems of the current system and to formulate and make benefits statements which provide the criteria for measuring the success of the intervention.

A

Table 2. Anticipated education, training and development benefits

Staff benefit	Organisational benefit	Problem with current system	Supports EHR*NET benefits
Strategic benefits			
Increased staff skills & knowledge of the NSW Health Information Management policies & their implications in clinical practice	Informed and educated workforce able to operate within the required information and information policy framework thus ensuring organisational compliance with the NSW Health Information Policy Framework	The workforce has a poor understanding of the current information management policies	Improved quality of progress notes that adhere to legislative requirements eg coronial enquiries
	Knowledge Management philosophy is underpinned by effective information management	Knowledge management is not embraced by staff or the organisation	Decision-making is facilitated as clinical reporting provides a tool to capture and analyse variances on the clinical pathway and review outcomes
Educational programs developed & implemented to influence change by increasing individual & collective awareness of information & its potential	Standardised approach to ensuring the development of an information culture across all healthcare workers	The workforce is poorly informed and educated in the use of information	Decision-making is facilitated as clinical reporting provides a tool to capture and analyse variances on the clinical pathway and review outcomes The improved provision of information increases the ability to respond to changing health needs, creation of new models of service provision to meet population needs and consumer satisfaction
Operational planning benefits			
	Information system and technology skills are core competencies for all staff, both clinical and managerial ETD for information technology and information management are core components of the health care activities	Minimal Information system and technology skills across all sectors of healthcare staff. Core computer competencies have not been developed Scarcity of staff with analysis and interpretation skills to effectively use information	Staff are competent in the use and analysis of information in the EHR
Development of valued career paths in ETD through the increase in demand for the skills	Improved retention of educators/trainers through greater demand and recognition of the role	Training programs are often ad hoc which leads to inefficient use of resources\ Staff ETD does not always have the required level of commitment from Hospital and AHS Executive	Skilled staff to educate and train users so that the value of information is recognised
Increase in staff knowledge & skills to develop innovative & effective healthcare practice & health delivery models	Foster the development of an innovative environment supportive of service improvement	There is limited use of information to improve practice due to a lack of information and the skills to use that information effectively	The improved provision of information increases the ability to respond to changing health needs, creation of new models of service provision to meet population needs and consumer satisfaction

Staff benefit	Organisational benefit	Problem with current system	Supports EHR*NET benefits
Operational planning benefits <i>continued</i>			
Different levels of education developed which encompass IT systems & the application of those systems to work practice	Develop standardised IM&T training profiles Facilitated cross boundary & facility collaboration leading to shared skill, knowledge & expertise	Education programs have focused on how to use the application & not on how the system can be used to improve work practice Current ETD programs are usually profession specific leading to 'silos' of knowledge	Improved coordination of client care across multiple episodes due to availability of client health information
Monitoring & evaluation benefits			
All staff have a clear understanding of their role & contribution to the quality of health information	Better informed & effective workforce	The value of quality information in healthcare is not routinely reinforced The understanding of the role of quality information by staff is not currently monitored	Accessibility of information for audit & research purposes
Increase in staff skills & knowledge to analyse & interpret health information, understanding the importance of data quality, access & use of information	Have effective workforce that values information as a critical resource to support healthcare A skilled & knowledgeable workforce is available that understands the relationship between information & quality healthcare Demonstrated evidence that information is used to support clinical & managerial decision making & is used strategically to define health objectives & outcomes Improved utilisation of information resources by more skilled staff leads to better decision-making & improved service	There is poor ownership of information at the operational level There is no process to monitor & evaluate the use of information in the delivery of quality care There is no process to monitor & evaluate the use of information There is limited understanding of how information is used to improve decision making at the organisational level	Improved legibility & accountability as event summaries are electronically transmitted Improved information for population health studies Reduction in the cost of healthcare through fewer ADEs & duplication of treatment
Operational benefits			
Increase in staff skills to utilise new technologies in the work place	Better value from IM&T investment	There is a lack of information technology in the work place hampering access to health information	Timely access to health records for authorised health providers
Staff skill development will be supported by dynamic interaction with information	Information available for the clinicians & managers is high quality	Limited feedback mechanisms of the effective use of data & information to support an understanding of the importance of accurate quality health data	Decision-support at the time of ordering guides the clinician to make the best treatment decision Improved quality of care through alerts, standard protocols, care plans & decision-support tools

A

Staff benefit	Organisational benefit	Problem with current system	Supports EHR*NET benefits
Operational planning benefits <i>continued</i>			
Increase in staff knowledge & skills to use information in clinical & managerial decision making	A safer health system	There is a lack of ETD in the use of information to improve decision-making	Improved quality of care through alerts, standard protocols, care plans & decision-support tools
Increase in staff knowledge & skills to evaluate better practice	Information skills are a core competency of all staff, both clinical & managerial	There is a poor understanding of the required competencies	Decision making is facilitated as clinical reporting provides a tool to capture & analyse variances on the clinical pathway & review outcomes
	Improved staff expertise in information management & enhanced awareness of information as a resource	There is a lack of an information culture to support the use of information	A best practice evidence based health system. Improved efficiency & integration of service provision through increased access to timely, quality, & accurate client clinical information & current management plan regardless of location
ETD programs provided 'just-in-time' in line with staff needs	Increased productivity of staff & more effective use of systems & tools	Current ETD is project orientated & does not take on a 'whole of health' perspective	Reduction in operational costs through a reduction in adverse events Reduction in clerical staff in diagnostic areas as transcription of orders is eliminated & phone calls by providers for results are reduced
Improved staff confidence Cross discipline ETD leads to staff shared skills, knowledge & expertise	Better acceptance of change	Lack of clear direction for the implementation of information systems.	

Recommendations – benefits

That:

- NSW areas adopt a benefits driven IM&T Education, Training and Development Strategy that addresses:
 - organisational benefits
 - staff benefits
- IM&T education, training and development priorities need to be aligned with pre-identified benefits
- the benefits measurement processes are linked with the IM&T Education, Training and Development Strategy's Evaluation Model.

Section B

Situational analysis

Review

Literature review

B Australia is moving rapidly towards the adoption of information management and technology (IM&T) in Health. The national strategy has been evolving over the last few years through the work of the National Electronic Health Records Taskforce¹². The EHR taskforce recognise four main necessary building blocks for the implementation of EHR. These are privacy, confidentiality and security, standards, telecommunications infrastructure, and encouraging uptake and use of information technology. The taskforce also recognised that the ETD of healthcare providers will be vital to the success of the information network for Australia.

Other imperatives for change include a transformation to a knowledge-based society, changes in healthcare reimbursement and delivery, rapid improvements in information technologies and an increasing volume and complexity of clinical information. The emphasis is therefore not only on the uses of information technology in healthcare but also on information management³.

Issues associated with information technology in the healthcare environment

Different authors have identified the implications of the emerging information age for healthcare workers. Carlile and Sefton⁴ recognise that for staff to use information systems appropriately there needs to be fairly radical changes to the implementation of standards for both data access and the manipulation of data. Cordell et. al.³ argue that healthcare workers need to be educated to use information tools to manage information and create knowledge as well as be trained in the use of information systems and data analysis. Coiera⁵ identified that some practising medical clinicians have had no formal training in information technology yet all have to work for many years in an environment dependent on IT literacy. His finding is consistent with the Nagelkerk et al⁶ conclusion that up to a third of nurses have no experience with computers or feels uncomfortable or intimidated by them.

Literature on the computer literacy of undergraduates of the healthcare professions has identified the same impediments. Gibson and Silverberg⁷ highlighted the variation in the skill range across students. Russell⁸ argued that in order for the medical profession to move forward and keep pace, medical schools need to formally teach IT as a core component to all students as widespread access to the Internet will continue to explode.

Gravely et al⁹ evaluated undergraduate students perceptions of their computer literacy before and after a focussed training intervention involving a series of sessions on IM&T. Despite a relatively high proportion of students having a home computer with almost a third using Internet services, general skill levels were slightly below mid level. Older students reported a lower level of skill. The paper highlights the need to better understand why participation in the training was low. It is suggested that this may reflect anxiety rather than any other barrier.

Sherry and Gadd¹⁰ have identified the key role of user training and change management and the difficulties associated with the buy in of medical staff. The lessons learnt from their implementation of a Theatre Management System highlighted the need for early involvement of users who need to understand the reason for change and the functionality that they are trying to address by implementing an information system.

Increased adoption of an evidence-based approach to the delivery of healthcare has implications for ETD in effective knowledge management. According to Davenport¹³ the key success factors for knowledge management include: linking knowledge management to economic performance, technical and organisational infrastructure, a flexible knowledge structure, a knowledge friendly culture, a clear purpose and language, a change in motivational practices, providing multiple channels for knowledge transfer and senior management support. All are essential components of a comprehensive ETD strategy.

In summary, variation in computer skill (information literacy, information management) and knowledge among the existing workforce and undergraduates is a common concern.

Addressing the IM&T ETD issues

There is an abundance of literature on how IM&T ETD is addressed. These can be classified into three broad categories; namely, at a professional level, at the clinical environment level and at the university level.

At professional level

The United Kingdom adopted a collaborative partnership approach to aim at achieving an effective national strategy¹⁴ and proposed an independent National Centre for Health Informatics. This is similar to the approach taken by the US where nursing convened a National Nursing Informatics work group to provide leadership and guidance in setting a national informatics agenda for nursing education and practice¹⁵.

Various authors such as Cheek¹⁶, Carlile and Sefton⁴ have advocated the concept of lifelong learning, recognising that information literacy is critical for accessing information. The need for accessing information has been emphasised by numerous authors as the requirement to adopt an evidence-based approach to the delivery of healthcare took shape. More recently, knowledge management has been emphasised by proponents such as Davenport¹³ and Hansen et al¹⁷. Davenport's¹³ knowledge management includes creating knowledge repositories and improving knowledge access, enhancing the knowledge environment and managing knowledge as an asset.

At clinical environment level

Kidd and McPhee¹⁸ argued that there exists a 'lost generation' currently in the workforce, which is not prepared for the use of information technology. Computers are often seen as an unnecessary imposition for this group. The authors¹⁸ recommend that the introduction of information technology into clinical areas needs to be accompanied by staff training programs that are appropriate, and require technical support to allow them to focus on their principle priority of providing patient care. They also suggested that educational strategies need to be

designed to work through clinical scenarios and identify the information issues and the personal applications for learners rather than didactic approaches. They highlighted the three-pronged approach of learning about computers through computers, with computers.

In a survey of medical staff, Church et al¹⁹ found that computer access was a problem for a small group of trainees, with Internet access to be the greatest barrier. As the Internet was used for a wide range of resources, and the educational use of Internet can be expected to increase, the authors argued the need for trainees to be taught how to access resources.

With respect to nursing staff, Sinclair²⁰ advocated that most training can be further enhanced through the provision of basic training programs, access to on-line library materials, computer assisted instruction (computer based training) and ready access to electronic networks, including the Internet. They further suggested that decision-support and expert systems should be provided, including staffing and acuity-based systems and experts' decision-support systems to support nurses in the workplace.

A training needs analysis to implement an information system was advocated by Fyffe and Fleck²¹ They argued that a flexible training program can be developed to meet the users needs by using focus groups, questionnaires, observation and interview methods.

The risk of failure with the high cost implementations is seen as a high risk that requires support with top management. Reeve and Rose²² surveyed CEOs from 236 hospitals. The results showed that there is no relationship between CEO participation in IT activities and the progressive use of IT in hospitals. This study result is contrary to other study findings²² that the CEOs' attitude to IT and participation in ETD in IT has a significant positive relationship with the progressive use of IT with attitude being more important than participation.

B *At university level*

Haux²³ argued that the quality of information processing influences the quality of medicine and healthcare, and that ETD in health and medical informatics need to be directed at various levels such as postgraduate clinical training, health informatics programs, at data administrators and technicians.

In the nursing literature, Simpson²⁴ highlights the lack of nursing informatics education across all schools in the US with a very fragmented educational picture; and that there is also significant under resourcing of technology within schools. Sinclair et al²⁰ in surveying new nurse recruits found that although attitudes to computers were uniform and relatively positive, the level of competence in the use of computers was lower. The authors argued for the identification of a core set of competencies to support a training approach for all new recruits. Their approach is similar to that advocated by the Association of American Medical Colleges¹⁵.

The importance of teaching clinicians the management of information has been identified by Coiera⁵ who highlighted the importance of information management and proposed ten essential clinical informatics skills required by clinicians which include communication aspects, searching and assessing knowledge, interpreting, structuring and analysing clinical decisions.

In summary, the concerns on variation in computer knowledge and skills are well documented in the literature, which were mainly related to medical and nursing staff, other healthcare workers have been under represented. Opinions abound on the need for ETD and types of curriculum for undergraduate and post-graduate programs have been suggested. However, the evidence on the effectiveness of these programs is lacking. This in part may be related to the relative recent technological development in Healthcare.

Creating an information culture

Creating an information culture requires a commitment to ETD and to consulting and collaborating with the key stakeholders to ensure that their information needs are met and their concerns are addressed. Information is what the users determine is required to support their core

business, and the information is available where and when it is needed in an accessible intuitive format. The following strategies and outcomes are proposed to achieve an information culture in support of ETD in the use of information technology.

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Table 3. Strategies and outcomes for creating an information culture

	Strategies	Expected outcomes
Health education sector	Influence curriculum development in the health education sector to create an information culture	Students entering the workforce will understand the value of information & be skilled in the use of information technology
	Promote the use of information systems and enable access to students of the health professions while on clinical placement	Students are able to contribute to clinical care as they have equity of access to information
	Use new graduates to influence the existing workforce in adapting to an environment that embraces information technology to improve work practices	The existing workforce will be encouraged by new graduates to use information technology as a tool to improve the way they manage information
Organisational issues	Include the need for a budget and resources for IM&T ETD in the Information Management Strategy, Business Cases and Implementation Planning Studies	IM&T ETD is viewed as an integral component of any information technology implementation
	Lobby management to create: <ul style="list-style-type: none"> • a clinical informatics position to support clinical users in the transition to information systems • user trainers from business units to support their peers in using information systems 	Clinicians will be able to relate to someone who speaks the language of clinicians & who can educate in the judicious use of information as well as train to use a computer system Users will be able to relate to a trainer who understands their business processes
	Use the information technology environment as a recruitment strategy Create expectations through job advertisements that computer skills are desirable	Applicants will be aware that the organisation is a knowledge environment with a strong focus on the use of information technology
	Involve key stakeholders to mandate or formulate policies and guidelines in the planning and implementation of information technology	A culture of participative decision making has been fostered in the development of policies & guidelines
	Engage key stakeholders from the relevant professional groups to develop business requirements for an information system and to evaluate and select solutions	Key stakeholders will have a sense of user ownership & will be more receptive to the need to change work practices
	Provide sufficient funding for ETD	ETD needs of the users are being met

Information culture

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	Strategies	Expected outcomes
Communication and governance	Establish a governance structure to oversee all activity from definition and acquisition to implementation and evaluation	Information & learning needs are addressed through a committee structure that includes focus groups to engage the end users
	Senior management to participate on governance committees to demonstrate commitment	Senior management are seen to be supporting a clinical environment where access to knowledge & use of information is valued
	Representatives from relevant business units to participate on governance committees	The interests of all key stakeholder groups are addressed through committee representation
	Network with professional organisations, unions and the health education sector on the impact of information technology on the organisational culture	All groups are accepting of information technology in the workplace
	Implement communication strategies that focus on informing staff of impending information systems implementations Establish a regular consultative forum whereby staff can raise issues and ask questions	Staff are well informed at all stages of the specification, acquisition & implementation of information systems
ETD requirements	Implement education sessions that inform of the benefits in the clinical environment	The value & benefits of using information technology are understood
	Develop training models including classroom, face to face & computer based training packages to ensure that diverse training needs are met	Staff receive an appropriate level of training to maximise the use of the information system
	Allocate appropriate & timely training hours to ensure that staff are adequately trained to perform their roles effectively Timely training which is scheduled to align with implementation	Staff are able to leave their work environment & have adequate time allocated to receive training
	Ensure that there are adequate training facilities to meet the needs of adult learners	Staff have access to a comfortable well equipped training environment that is conducive to adult learning
	Develop tools to evaluate skills in using information technology & understanding the use & value of information, eg core competencies, problem based learning	Evaluation of knowledge & skills & identifying where more ETD is required
	Educate staff in information policy including privacy, security, disclosure & consent	Staff are aware of the policies that govern the use of information & technology
Computer access	Ensure that the information system selected is intuitive & integrated with key information systems	Staff readily adapt to the change & all key information is available from the one location
	Enable access to patient information systems using a single user ID & password	Time will be saved for busy staff who will not have to use multiple logons to access multiple applications
	Determine an appropriate number of computers in a clinical environment to ensure that staff can work efficiently without having to queue for access	An adequately equipped working environment to support information access needs
	Provision of a computer at the point of care	Clinicians will have access to a computer at the point-of-care/ bedside

	Strategies	Expected outcomes
Implementation	Encourage staff from business units to participate in building and testing the system	Participation at every critical milestone gives staff a sense of user ownership
	Implement modules incrementally to give staff time to adapt to the changes in work practice	Staff are not overwhelmed by too much change
	Implement modules (eg discharge summary) that can achieve short term benefits	Benefits can be realised in a short time frame
	Provide help desk facilities around the clock and establish procedures for 24 hour assistance in the workplace	Staff have access to assistance 24 hours a day, seven days a week
	Provide on-going support throughout the lifecycle of the information system	Staff are retrained as necessary whenever changes are made to the system

Recommendations – creating an information culture

That NSW Health encourages the development of an information culture that promotes knowledge management to support evidence based healthcare by:

- developing partnerships with the health education sector
- providing appropriate funding and resourcing to support the IM&T Education, Training and Development Strategy
- implementing structures to effectively oversee a comprehensive IM&T Education, Training and Development Strategy
- facilitating the establishment of effective IM&T education, training and development programs through the provision of customised education, training and development
- ensuring that all staff have access to appropriate IM&T training, education and support to allow them to fulfil their role.

Change management

B The change process

The implementation of health information systems will require many changes to current work practices and challenge traditional methods of care delivery. Implementation of a system will be a destabilising event. Unlike other healthcare technologies, it is invasive in that it challenges assumptions and routine behaviours requiring a change to an institution's culture. The new system is a catalyst for change. It compels the organisation to review current processes, organisational and physical structures and to determine how best to adapt to the new system so that anticipated benefits, such as improved productivity and efficiency, can be realised. Automating existing inefficient practices will not result in enhanced productivity and efficiency hence the need to create an awareness of the nature and need for change.

People are often resistant to change for economic, social and personal reasons. An individual may fear job displacement, unemployment or demotion. The individual may perceive little personal benefit while acknowledging that there are benefits to the organisation. There may be a fear that current skills will be lost or diminished and that the push for change implies the existing system is inadequate. Abolishing the existing system may result in a loss of personal pride and induce a fear of incompetence in relearning a new system and nothing is more threatening to individuals than this kind of uncertainty.

There is still today a great deal of truth in Machiavelli's²⁵ analysis of the acceptance or acknowledgment of change within a traditional system. He stated that:

“... there is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage, than the creation of a new system. For the initiator has the enmity of all who would profit by the preservation of the old institutions and merely lukewarm defenders in those who would gain by the new ones.”

Successful change can only be accomplished by addressing both the cognitive (knowledge) and affective (attitude) aspects of individual behaviour. People will accept change if they are empowered with knowledge about the new system that they will be expected to use. This knowledge will result in cultivating a positive attitude, which in turn will shape individual behaviour if staff are consulted and encouraged to participate. The process by which change is managed will have a major effect on the success of the core clinical system's implementation.

Introducing large-scale computer systems, such as Patient Administration Systems (PAS) and Point-of-Care Clinical Systems (PoCCS), has far reaching implications that need to be explained to those most directly affected, and key personnel introduced to the anticipated long-term benefits. The way in which the systems are introduced is critical to the success of implementation. The preferred approach is a phased implementation to allow staff to gradually become accustomed to the wide range of functionality that the systems provide.

The key to successful implementation is to adopt a participative change strategy. The essential ingredients for successful change management are teamwork, consultation, collaboration and education and training. To ensure that staff are receptive to change and to promote acceptance the following strategies need to be initiated:

Change strategies

In an increasingly complex and uncertain organisational environment NSW Health and AHSs will need to develop and foster a learning organisation, with the capabilities for anticipating, reacting and responding to change, complexity and uncertainty. In developing the capabilities to respond to change, information management and technology learning is considered an essential component for fostering innovation, knowledge management, and lifelong learning. In supporting organisational change, the IM&T ETD program should have strong links to other ETD programs within the organisation including leadership, management development, clinical governance and health improvement education programs.

Additional IM&T related education programs that will be required to support the change process include:

Program management education

Program management is managing a series of projects and activities leading and linking to improved organisational performance and provides a framework for managing the change process in an orderly manner²⁶. It is the specific overarching approach which helps senior managers by providing a clear, structured framework within which one can define organisational change requirements, articulate a benefits model, prioritise resulting projects and conduct change impact analysis. Rather than focusing on a single area, program management aims to maximise the benefits of multiple projects²⁷. Therefore the development of program management education knowledge and skills including benefits identification and measurement, will be required to support the series of business change programs of which the IM&T ETD Strategy is a major component.

Principles of change management

To support the change within an organisation, education programs targeted at managers and other senior staff to assist in developing skills, knowledge of change principles, processes and management will be required.

Benefits realisation education

As all of the Information Technology and Management initiatives are designed to achieve major benefits for the organisation it will be essential to improve the level of understanding and skills into benefits based approaches to implementation, planning and evaluation to ensure benefits realisation.

Project management education, training and development

Effective project management skills will be required to manage the range of Information Technology and Management initiatives.

Health informatics education, training and development and information management specialists

As organisations become increasingly information focused new roles such as health informatics and information management specialists will evolve to support the interface between clinicians and information technology specialists. ETD to support the development of these new roles will be required.

Work practices

1. Business Process Review ETD Programs

ETD programs that cover methodologies to support effective review of business processes, process benchmarking, process improvement, integration of the new systems in the business processes and development of better practice process models. This should be undertaken in context of the NSW Health Quality Framework and organisational business process review programs and may include ETD for key quality process review facilitators.

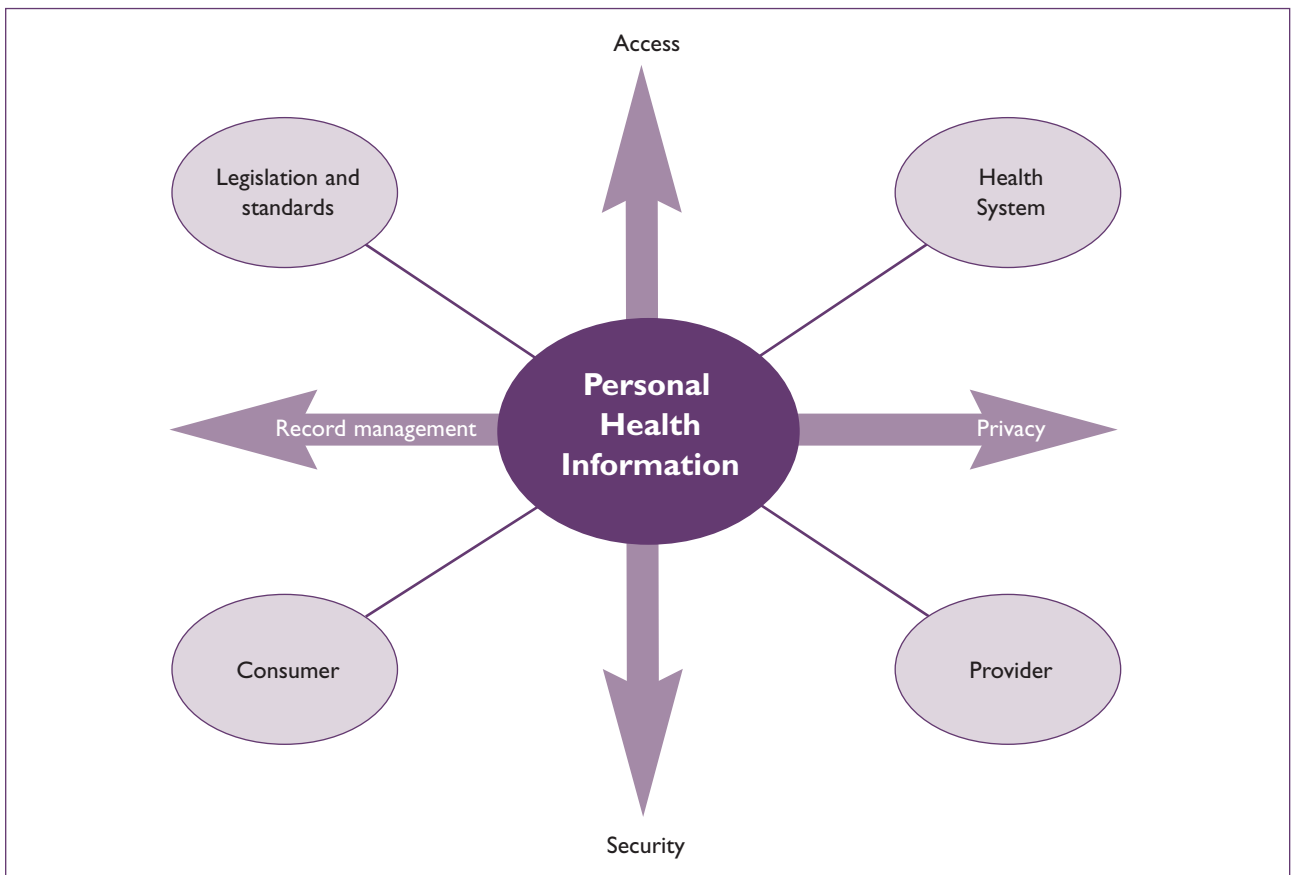
2. Education programs to improve the understanding of policy changes in support of work practice and organisational change covering:

- Healthcare workers need to be aware of competing pressures

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- Informing and educating staff about the NSW Health Information Policy, which outlines the role and importance of information to clinical care and the development of health knowledge. The information policy provides a framework for the definition and management of information as depicted in diagram 1 and where:
 - information is person centred (over a life time).
 - consumers require greater access to and explanation of their health information and information about healthcare issues.
 - healthcare providers require access to information to provide effective care.
 - the health system in general can derive management and clinical review information to support outcomes monitoring best practice development, effective management, and new service delivery models to support improving the health of the population.
- the legislative framework at both state and federal level, in which the information environment operates, includes information privacy and confidentiality, security, records management and Freedom of Information (FOI) as depicted by the arrows across the information environment model. This includes the education on current legislative requirements on privacy management plan.
- improving the level of understanding and knowledge to effectively use information for clinical and managerial decision-making in support of developing clinical better practice, developing innovative and effective solutions for new models of healthcare and to support clinical governance processes.

Diagram 1. Understanding the information environment



Barriers to education, training and development

Learning is a key characteristic in the business of healthcare. The development of a learning culture requires a strategic approach which accepts that staff require IM&T ETD to maximise the benefits of the investment in information systems at both a personal and organisational level. The more complex the system the greater the need for an education strategy to precede training and eliminate the barriers to a successful adoption of information technology.

Barriers can be described as cultural, organisational and environmental with the associated costs being the major barrier that underpins all others. The need for ETD must be incorporated into every IM&T program and appropriately funded and resourced. Support for this needs to come from the organisation's executive, and the program sponsor must ensure that ETD is a core component of the change management program.

There are many key stakeholders in creating and sustaining a learning organisation. Given that a major barrier is the lack of staff skilled to teach and train IM&T skills, strategies must include developing partnerships with the health education sector, professional organisations and industry to assist in this endeavour. This should also include investing time and funds to train staff in-house to support users 24 hours a day. The environment must be conducive to learning and it is important that there is a local training infrastructure with appropriate training rooms, computers and printers as well as skilled trainers.

Finally, within the program budget there must be an adequate allocation of funds to support ETD requirements. While there are numerous measures to determine the success of a system, low utilisation can be attributed to how well the implementation process was managed. There is strong evidence to support the view that adequate ETD incurs positive attitudes and perceptions, which in turn leads to high levels of system use.²⁸

A further argument for ensuring that adequate education, training and on-going support is provided with the implementation of a computer system is the case of *Chambers v Macquarie Pathology Services Pty. Ltd.*²⁹ In this case, because of the doctor's inadequate knowledge and training, she did not realise that there was a second part of a pathology report to be printed. Part two of the report indicated that there was no evidence of overt malignancy while the first part suggested an adenocarcinoma. Macquarie Pathology Service was found not to have provided adequate support to its pathologists in the use of the computer system and was found partly responsible for damages to the plaintiff who had unnecessarily had an oesophagostomy. This case demonstrates the need for an intuitive information system, adequate levels of education and training to ensure that users are appropriately instructed in how to retrieve information and that they are aware that they must actively seek information from the computer system.

The following table 4 depicts the barriers to IM&T ETD and provides strategies to overcome the barriers.

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Table 4. Barriers to IM&T education, training and development and strategies to overcome barriers

Barriers		Strategies to overcome barriers
Cultural barriers	Commitment	<ul style="list-style-type: none"> Promote sponsorship at government & senior management levels Promote buy-in by senior management & ensure they have a leadership role on implementation committees Promote user ownership
	Change processes and the pace of change	<p>Manage the change process:</p> <ul style="list-style-type: none"> Identify & develop information champions & opinion leaders at different organisational levels Develop a learning culture that is participatory & embraces knowledge management Develop & maintain partnerships with the university sector for ETD Develop & implement education programs to create an understanding of the benefits of information technology to current work practice Develop & implement training programs to create expertise in the use of information technology to complement work practice Influence curriculum development in the university sector to promote IM&T skills development Identify negative experiences with IM&T to turn these around to positively influence attitudes to future technology
	Communication patterns	<ul style="list-style-type: none"> Identify communication needs Develop communication systems & identify communications patterns & behaviours to inculcate technological change into daily routine
Organisational issues	Standardisation	<ul style="list-style-type: none"> Respond to progress of IM&T strategy developments to align ETD requirements
	Policies	<ul style="list-style-type: none"> Align ETD needs with policy development & implementation
	Staffing issues	<ul style="list-style-type: none"> Develop leadership & management development programs Develop programs that meet the learning objectives of the professional groups & align with the organisation's objectives Develop an evaluation framework to measure learning outcomes
Environment	Resources	<ul style="list-style-type: none"> Develop the skills of IM&T staff & staff within business units to become core group trainers Develop a skilled workforce trained in the use of IM&T Provide adequate training facilities that will enable staff to learn in an environment free from the stress of the workplace. Support multiple training models to incorporate <ul style="list-style-type: none"> Classroom ETD Computer based training packages Unit based support for one to one training Develop help desk procedures to ensure 24 hour support
	Technology life cycle	<ul style="list-style-type: none"> Develop training programs that take into account software upgrades & that the need for additional training as on-going support is critical to success
Cost		<ul style="list-style-type: none"> Develop a methodology to cost ETD models Seek commitment from management to fund ETD sessions, release staff from their work & provide backfilling where necessary

(see attachment 2 for a paper by the **Teaching and Research Implementation Coordination Group** on 'Examining the impediments to changing the way in which healthcare is managed and provided'.

Critical success factors

Healthcare relies critically on information exchange therefore the organisation must value information to support the core business of health. For an organisation to be successful in implementing information technology there must be a clear link between strategic initiatives and ETD programs.

Commitment to an information technology program comes from the executive level and this includes a sponsor from senior management and representation on committees that lead the implementation. A change management framework will include business process review and identification of benefits and must be done in consultation and collaboration with key stakeholders. Critical success factors also include an adequately resourced ETD program with skilled staff, time to train, user friendly training

documentation and training facilities conducive to an adult learning environment. Inherent in this is an undertaking to monitor, review and evaluate the ETD programs. Staff will need to have on-going support 24 hours a day with access to key trainers and help desk facilities. Staff should also have their say in all stages of the program's implementation, including user representation on key committees to promote a sense of user ownership. Ongoing support is critical to success.

Finally, the cost of ETD should be identified and budgeted within the total program. There is little point in investing millions of dollars in a system if staff are not appropriately trained to use it to gain benefits from having an information system.

The following table provides further detail on the critical success factors:

Table 5. Critical success factors

Critical success factor	
Commitment	<ul style="list-style-type: none"> • Commitment from CEOs to invest in ETD for Information Management & Technology implementations • Executive sponsorship at the state and AHS/hospital level • Commitment from the Area and Hospital Executive • Commitment from heads of departments and department managers • Continued government and Department of Health commitment to fund and support the system's implementation process • Vendor commitment and support • Committee structures to support the implementation process • Commitment of clinical, administrative and clerical staff to use the system
Resources	<ul style="list-style-type: none"> • A dedicated resource within the IM&T program to coordinate ETD • Educators and trainers who understand the clinical use of the information as well as the integration between different sources of information • Appropriate levels of staffing for the implementation phase and for on-going support of a program • User representation from key departments • Dedicated funding as part of the overall program funds for IM&T ETD • Training rooms with adequate facilities
Training and support	<ul style="list-style-type: none"> • Commitment to releasing staff for initial training • Commitment to ongoing training, education and support as an integral part of working in an environment that relies on information technology as a tool to perform the job appropriately • Adequate number of skilled trainers • Adequate number of training rooms suitably located • Training environment that simulates the system available 24 hours a day • Computer based learning packages available on-line 24 hours a day • Training plans that are 'user friendly' • Development of user acceptable documentation • Development of user proficiency evaluation criteria for each module

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Critical Success Factor	
Training & support <i>continued</i>	<ul style="list-style-type: none"> • Overall program evaluation methodology post implementation • Establishment of a help desk for 24 hour support • The help desk has adequate training and documentation to be equipped to provide user support • Establishment of a post implementation support plan • Establishment of training programs for IT professionals to keep up to date with program developments
Change process	<ul style="list-style-type: none"> • Establishment of a well defined change management process • Clearly defined benefits plan with 'before and after' measurements • Formation of an effective communication network within the area • Development of policies and procedures to direct work practice changes • Relationship management • Selling and achieving benefits to all stakeholders
Funding	<ul style="list-style-type: none"> • Adequate funding to support ETD for each program • Adequate funding for on-going training, education and support • Allocation of funding to all members of the organisation who require training
Technical	<ul style="list-style-type: none"> • Adequate hardware in wards, units and departments • Correct selection of printers and VDU/PC's • Appropriate use of technology • Adequate support including a help desk function 24x7
Program management	<ul style="list-style-type: none"> • Well developed program plan with clearly defined goals, benefits and deliverables that have realistic and achievable timeframes • Program management remaining on budget and schedule • A quality review process that is continuous throughout the planning, implementation and evaluation phases • User ownership – not to be seen as an IT project • Strategy for long term viability • Quality of service provided by ETD

Recommendations – change management

That NSW Health:

- adopts a participative change strategy that incorporates teamwork, consultation, collaboration, education, training and development.
- supports work practice and organisational change, ETD programs that include understanding, skills and knowledge of policy, process and effective use of information.
- commits to the development of strategies to address organisational, cultural and environmental barriers to the adoption of an effective IM&T strategy.
- incorporates education and training as new IM&T programs are introduced and ensures it is appropriately funded and resourced.
- ensures that all healthcare workers receive training on an ongoing basis appropriate to their information needs.

Alignment with Electronic Health Record developments

The NSW Health IM&T ETD Strategy needs to take into account the broader context of the proposed incremental development of the EHR. The building blocks of the EHR consist of infrastructures such as HealthConnect and NSW EHR*Net, as well as an array of information systems, programs and other initiatives.

HealthConnect

The National Electronic Health Records Taskforce defined the EHR as:

“An electronic longitudinal collection of personal health information, usually based on the individual, entered or accepted by healthcare providers, which can be distributed over a number of sites or aggregated at a particular source. The information is organised primarily to support continuing, efficient and quality healthcare. The record is under the control of the consumer and is stored and transmitted securely.”³⁰

This definition is very broad and the achievement of this vision necessitates an incremental approach in the implementation of the information systems that comprise the fundamental building blocks of the EHR. The National Electronic Health Record, HealthConnect is still in the planning stages and the architecture is yet to be finalised. A number of lead site projects have been proposed and NSW Health will participate in these initiatives. Concurrently NSW Health is planning and implementing a number of infrastructure projects, which will prepare NSW Health to take a lead role in EHR developments.

The Better Medication Management System (BMMS)

The Better Medication Management System (BMMS) is an initiative of the Commonwealth Government. It is a centralised electronic medication record system endorsed by state health ministers at the Australian health ministers

conference in July 2000. It is based on voluntary participation of consumers, prescribers and dispensers. Access by doctors, pharmacists and hospitals is with consumer consent only and suppression of certain medication events is at the request of the consumer. The aim of BMMS is to enhance the quality of healthcare for individuals and to obtain information for analysis and planning better health services for all. Benefits include:

- improved health outcomes
- access to improved medication information:
 - in emergencies (eg presentation at an Emergency Department)
 - in prescribing
- safer prescribing and dispensing environment
- improved medication information on admission and discharge
- less admissions/readmissions for adverse drug reactions
- improved communications – consumer, doctor, pharmacist, hospital
- empowering consumers to be involved in decisions about their own medication
- improved PBS safety net calculation³¹.

The BMMS project is an initiative of the Commonwealth Government and is still in the planning stages. The stages of the process include:

- consultation with consumers, prescribers, dispensers in both the public and private sectors
- developing a policy and legislative framework
- technical development
- communication and marketing of information
- implementation with GPs and community pharmacies as the initial participants.

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B It is anticipated that the public hospitals will link to BMMS as the program develops. Initially this may include discharge medications prescribed and dispensed but there is the potential to incorporate all medications prescribed and dispensed in a hospital in-patient stay. Examples are chemotherapy, analgesia, contrast medium (for ERCP, CAT scan) and anaesthetic drugs.

NSW Electronic Health Record Network (NSW EHR*Net)

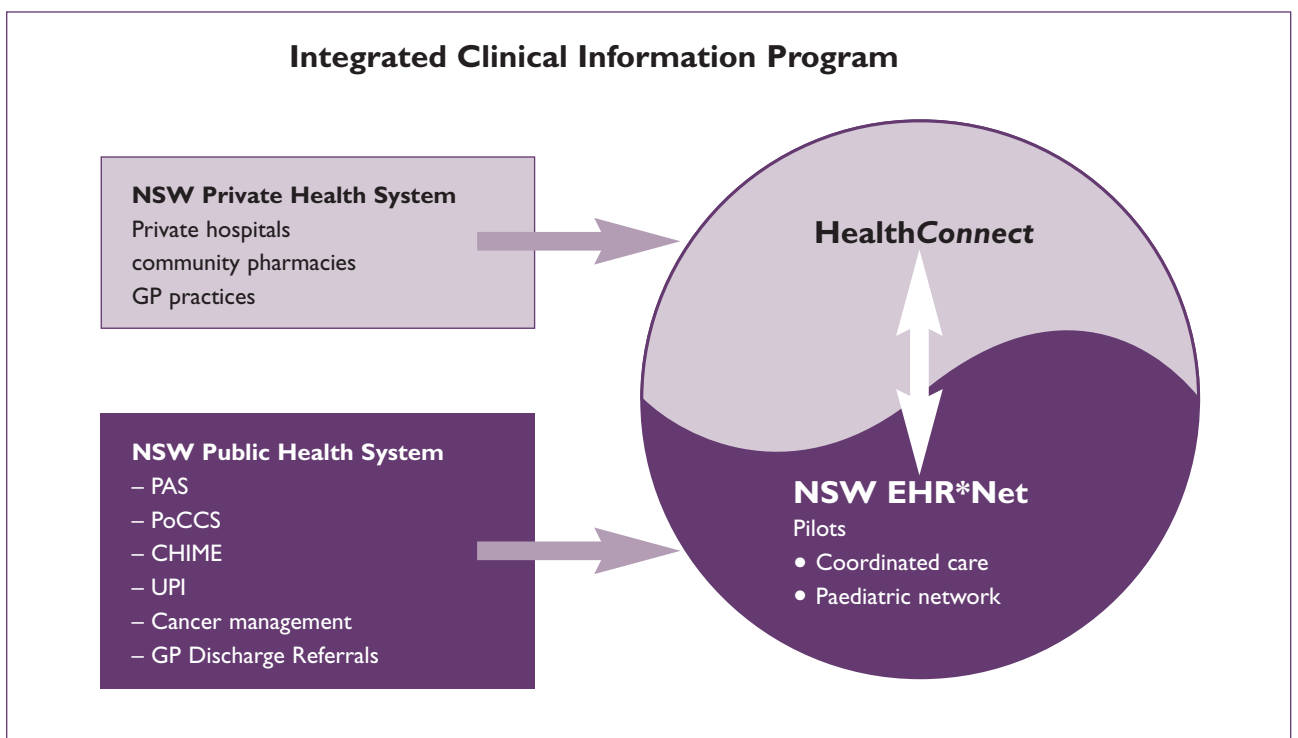
The NSW EHR*Net will be closely aligned with the National initiative and could be viewed as the NSW node of HealthConnect. It will be a system providing authorised web-enabled access to the personal clinical information held by the NSW public health system. The system will provide substantial clinical information across the continuum of care, in formats appropriate to the needs of the various users and will be the repository for event/outcome summaries. The system will integrate data from the Patient Administration System (PAS), clinical support

systems (pathology, radiology etc) and other PoCCS. PoCCS comprises modules that include results reports, order management, patient history, care planning, clinical pathways, alerts, consultations and discharge referrals.

PAS, PoCCS, Unique Patient Identifier (UPI) and the Community Health Information System (CHIME) are essential foundations for the NSW EHR*Net as these information systems will provide the source data to create the event summaries and outcome information. EHR*Net requires a system that can collate the data stored in a range of systems and support the provision of the required information in a range of formats such as for disease management and event summaries. EHR*Net will support interoperability and information sharing between AHSs. EHR*Net will also receive data from other sources including the paediatric network and coordinated care trials.

The following conceptual diagram shows the relationship between the Integrated Clinical Information Program, NSW EHR*Net and HealthConnect.

Diagram 2. EHR Development Framework

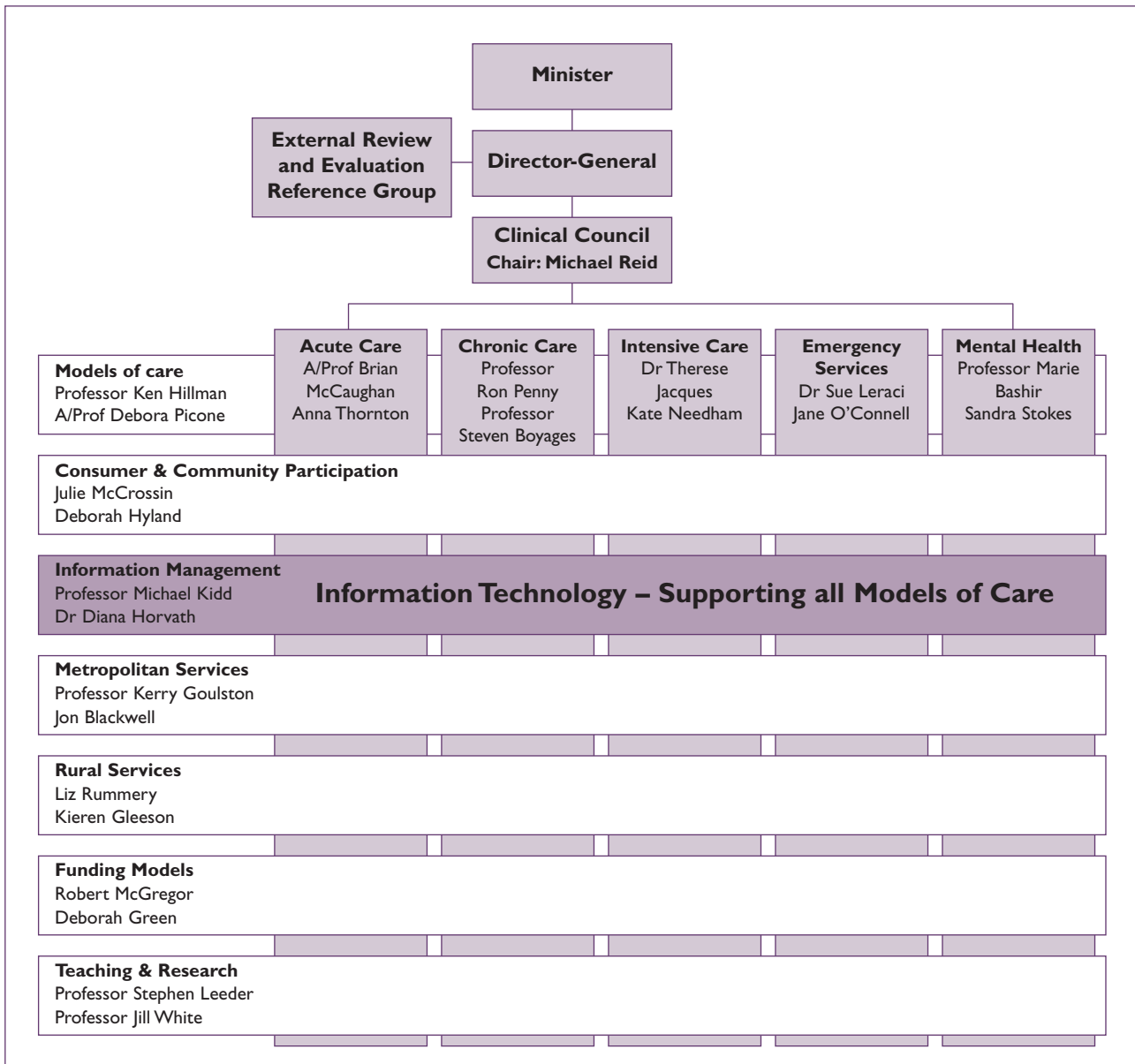


The Integrated Clinical Information Program

Under the GAPH there are five ‘Models of Care’ Implementation Coordination Groups where health reforms are targeted. (Diagram 3) The Models of

Care include Acute Care, Chronic and Complex Care, Emergency and Intensive Care and Mental Health. The majority of information needs of these groups can be met through the Integrated Clinical Information Program.

Diagram 3. The GAPH Implementation Coordination Group Structure



B EHR*Net event and outcome summaries are populated from multiple information systems across the continuum of care. The major source systems currently being planned and implemented are incorporated into the Integrated Clinical Information Program, which includes the following:

The Unique Patient Identifier (UPI)

Information on the health of people in NSW is based on individual episodes of care provided by individual health service providers. The principles of person-centred information and evidence based medicine require the development of longitudinal health records and therefore the capacity to identify patients over time and across settings. Further, the capacity to link records is essential to support effective evaluation of health outcomes, the use of health interventions and furthering population health research. The UPI is the key to identification of the patient without fear of having the wrong record about the patient's health history. The UPI will facilitate improvements in the integrity, comprehensiveness and completeness of demographic information, which will enhance the safety of patient care. Unless a patient can be identified uniquely there is the potential for misadventure and adverse patient outcomes. The UPI underpins the EHR. The UPI is critical for Chronic and Complex Care and Mental Health, as multiple providers service patients/clients across NSW government agencies. However, in Emergency Departments, the UPI will be a means of linking to information from another institution that may be life saving for a patient.

Patient Administration System (PAS)

PAS is the primary source of demographic information, which hosts the Area Wide Identifier that links to the State Unique Patient Identifier to enable access to patient encounter information across the continuum of care. PAS also provides resource scheduling including outpatient appointments. It will also provide some source data for the proposed Event Summary including admission and discharge diagnosis and procedure performed. All models of care require the PAS, as it is the fundamental information infrastructure for all patient information systems.

Point-of-Care Clinical Systems (PoCCS)

PoCCS provides clinical data that will populate the EHR. This includes results reports and on-going orders, clinical documentation components comprising medical, psycho-social and family history, care plans/clinical pathways, medications, medical alerts, treatment, outcomes of care and referrals.

Information from the PoCCS is a critical dependency to a useful EHR if it is to adequately support continuity of care for on-going care provided by nurses and community health workers as well as medical staff. The Event Summary is populated mainly from PAS and PoCCS. PoCCS information is required in varying degrees of complexity and intensity by all models of care and is the fundamental information on which event summaries will be based.

GP linkage

A number of projects include event notification from the PAS and the Emergency Department System, diagnostic results from radiology and pathology and discharge referral information, which is populated by numerous departmental, administrative and clinical systems. This information is transferred from the public health system to general practice. Information from general practice will populate the EHR*Net through *HealthConnect*.

Community Health Information Development Program (CHIME)

This comprises a range of initiatives, including infrastructure implementation, information management, benefits realisation and ETD, which will establish the platform across the State for the roll out of the CHIME community based health information system, which is being piloted in Hunter AHS from January 2001.

The Community Health Information System is an amalgam of PAS and PoCCS in the community setting. It incorporates service request information, allocation & tracking, management plans, clinical notes, alerts, medication recording, appointments and reporting. This system will be significant to the chronic, complex and mental health models of care.

Alignment with other initiatives

While the above systems are the focus of the IMICG portfolio of Government Action Plan priorities, EHR*Net will form the basis of a broader system providing the information for a range of requirements across the continuum of care.

Ambulatory Information Infrastructure Project

This project has developed information models and data standards for non-admitted patient activity and is providing funds to support enhancements to both the new PAS outpatient systems and emergency systems to comply with the agreed functional requirements and information standards.

Statewide Chronic and Complex Coordinated Care Trials

Many of the trials will rely on access to information from disparate systems within the public health system and across a range of government departments. A unique identifier is a key mechanism within the public health system for linking these patient encounters in a coherent architecture to provide continuity of care. This project is currently evolving into a prototype EHR for NSW Health.

Albury-Wodonga Joint Interim Transformation Project

This is a feasibility study into the region's capacity to build an integrated health delivery network which will take account of the issues associated with improved coordination of services not only in different settings but which are also provided across state boundaries.

Many other information systems such as diagnostics, cancer management, pharmacy management and the paediatric network will provide source data for the NSW EHR*Net.

Aligning IM&T initiatives with IM&T education, training and development

It is evident from the large number of programs that are to be implemented over the next ten years, that there is a critical need to ensure the key stakeholders receive an appropriate level of ETD. The aim is for staff to achieve maximum proficiency in the use of the systems, realise patient care benefits and maximise the benefits from the investment in information technology for the organisation.

Each application has its major user group, and users will require varying degrees of ETD according to their business needs. For example, the user groups for the key infrastructure applications such as PoCCS, PAS and CHIME will require the largest investment in ETD as these key stakeholders comprise the greatest percentage of staff in the organisation.

For clinicians, the use of clinical information systems is based on making the best decisions using the best evidence to support those decisions. This requires the use of decision-support tools such as rules, prompts, alerts and links to references and protocols. The complexity of clinical systems and the implications for patient care require a higher degree of ETD to use the systems proficiently. The Commonwealth Government has committed funding of \$15M over three years for initiatives in General Practice.

Table 6 shows the professional groups that are the users of the three major infrastructure systems. This demonstrates the effort and resources required to both educate and train the users.

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Table 6. The User Groups for PAS, PoCCS and CHIME

PAS Users	PoCCS Users	CHIME Users
<p>Multiple user designations including:</p> <ul style="list-style-type: none"> • Ward Clerks • Other Administrative Officers • Health Information Managers • Waiting List Coordinators • Clinical Bed Managers • Casemix/Statistics staff • Researchers – for clinical classification/casemix reporting • Management – for clinical classification/casemix /utilisation reports <p>Clinicians:</p> <ul style="list-style-type: none"> • Nursing staff (where decentralised functionality for bed management) • All clinical staff – patient enquiries • Medical staff – view surgical waiting list & episodes of care 	<p>Clinicians including:</p> <ul style="list-style-type: none"> • Staff Specialists & VMOs • Registrars, Residents • JRMOs & Interns • General Practitioners • Nursing Unit Managers • Clinical Nurse Consultants • Clinical Nurse Specialists • Clinical Nurse Educators • Registered Nurses • Enrolled Nurses • Physiotherapists • Pharmacists • Social Workers • Occupational Therapists • Dietitians • Speech Pathologists • Psychologists • Drug & Alcohol Counsellors • Podiatrists <p>Ancillary Staff including:</p> <ul style="list-style-type: none"> • Laboratory Scientists • Radiographers • Technicians – Clinical Measurement (ECG, EEG, etc) <p>Management including:</p> <ul style="list-style-type: none"> • Senior Nurse Managers • Quality Management Unit • Medical Administration • Community based health service managers <p>Health Professional students:</p> <ul style="list-style-type: none"> • Medical Students • Nursing Students • Allied Health students • Researchers 	<p>Community Based Health professionals including:</p> <ul style="list-style-type: none"> • Nursing Unit Managers • Clinical Nurse Consultants • Clinical Nurse Specialists • Clinical Nurse Educators • Registered Nurses • Enrolled Nurses • Physiotherapists • Pharmacists • Social Workers • Occupational Therapists • Dietitians • Speech Pathologists • Podiatrists • Drug and Alcohol Counsellors • Psychologists • General Counsellors • Community based Medical Staff • Staff Specialists and VMOs • General Practitioners • Registrars, Residents • JRMOs and Interns • Clerical • Health Information Managers • Clerical Staff <p>Management including:</p> <ul style="list-style-type: none"> • Senior Nurse Managers • Community Based Health Service Managers <p>Health Professional students:</p> <ul style="list-style-type: none"> • Medical Students • Nursing Students • Allied Health students • Researchers

Recommendation – alignment with EHR developments

That NSW Health align the Education, Training and Development Strategy with IM&T strategic initiatives to achieve maximum proficiency in the use of the systems, realise patient care benefits and maximise the benefits from the investment in information technology for the organisation.

Communications and marketing

Communications and marketing are seen as critical success factors to ensure there is acceptance and an optimal level of support from all stakeholders to demonstrate the benefits of the use of information technology in the healthcare setting to improve patient outcomes. Key messages of an IM&T marketing strategy in support of developing an information culture include:

- information management is essential to effective healthcare
- managing the change is a proactive activity that is the responsibility of all staff and involves

collaboration between a wide range of stakeholders and professional bodies working together

- recognise the growing importance of the legislative and policy framework related to health information

The following table identifies the key stakeholders, communications media and the expected outcomes to be achieved from a communication and marketing strategy.

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Table 7. Marketing the Education Training and Development Strategy to Key Stakeholders

Target Group (Stakeholders)	Strategies	Expected outcomes
Consumers	<ul style="list-style-type: none"> ● Print media ● Television, radio ● Meetings, conferences, seminars ● Internet 	<ul style="list-style-type: none"> ● Consumers are aware that an educated and skilled health workforce is using quality information available via the technology to assist with clinician decision-making ● Consumers are assured that patient information remains confidential and available only to clinicians responsible for their care across a secure network
<p><i>Internal:</i> Health Professionals Health Students Executive Management Internal Services (HR, IT, Finance) Administrative Staff</p> <p><i>External:</i> GPs</p> <p><i>Other:</i> Health Education Sector Health Professional Colleges Professional Organisations (eg AMA, NSW Nurses Association, Health Information Managers, Librarians) Special Interest Groups (eg Health Informatics)</p>	<ul style="list-style-type: none"> ● Communication/marketing utilising ● Existing local committee structures ● Clinical IM&T champion or clinical informatics resource ● Summary of the Education, Training and Development Strategy (6 pages) ● Workshops ● Newsletters, flyers ● Meetings, conferences, seminars ● Internet, eg CIAP, HealthWeb/Net, universities/colleges, professional organisations websites ● Email, listservers, threaded discussion groups ● Local intranets ● Universities/colleges ● Professional organisations ● Professional journals ● Information folders/kits 	<p>Stakeholders are informed about:</p> <ul style="list-style-type: none"> ● the IM&T implementation process ● the strategic importance of IM&T in healthcare planning and delivery through the provision of quality information ● how technology will deliver better care through the provision of timely information related to a patient's clinical history and current treatment ● how to access to the latest clinical knowledge, research, effective practice and health outcomes information to support clinical decisions ● the potential to decrease the costs of care due to a reduction in duplication of information ● where to access feedback mechanisms in place to provide feedback on implementation of IM&T

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Target Group (Stakeholders)	Strategies	Expected outcomes
Government organisations/ NSW Health	<ul style="list-style-type: none"> • Utilise the following multimedia • Publications – newsletters, flyers, brochures • Meetings, conferences, seminars • Internet • Universities/colleges • Television, radio 	Other Government organisations are aware of <ul style="list-style-type: none"> • the potential to reduce fraud • costs of healthcare • duplication

Implementation of the marketing and communications strategy

Implementing this marketing and communications strategy is critical in gaining acceptance of the information management initiatives, its benefits, and improvement in healthcare that results from access to quality information. The marketing and communications strategy should be able to demonstrate to the key stakeholders how ETD will support the changes that are required within the workplace.

Communications Directorate will need to provide their expertise to lead the process of marketing ETD to both consumers, consumer organisations and clinicians in the NSW Health System. This will require a multi-pronged approach and must aim to achieve a level of consistency with related national programs to avoid sending mixed messages to the community. Employee Relations will need to be involved in discussions with major professional groups and industrial organisations that will be impacted by this process.

Recommendation – communications & marketing

That a comprehensive marketing and communications strategy for IM&T includes education, training and development and is written in consultation with AHSs, NSW Health and key stakeholders including the Information Management Division, Communications Directorate and Human Resources.

Section C

IM&T education,
training and
development

IM&T education, training and development

C Philosophy

The philosophy of this strategy is encompassed in the vision which is:

“The provision of targeted and accessible IM&T education, training, development and on-going support for healthcare workers. This is to enable the delivery of high quality clinical services to the NSW community.”

The vision is to be achieved through the optimal use of information technology, the promotion of an information culture, the accomplishment of work practice changes and benefits thus supporting the health reforms of the Government Action Plan for NSW Health.

Education, training and development priorities

Table 8. Priorities and expected outcomes

Priority	Expected outcomes
Readiness to adapt to an information and learning environment	<ul style="list-style-type: none"> • Informed healthcare workers who are educated on the benefits of information systems to improve and support care delivery for optimal health outcomes • A workforce appropriately engaged to participate in the development of an information culture that creates a learning culture • Adequate and effective resources for IM&T education, training and development to support the information requirements of the core business units • Core competencies for staff have been identified and developed • Committed and effective healthcare workers
Effective education, training & development programs	<ul style="list-style-type: none"> • Training and education courses meet the needs of users and equip them with better analytical and decision making skills • An evidence based information culture is supported through education, training and access to appropriate information resources • Staff satisfaction is achieved by meeting their information needs through an intuitive and accessible system • A collaborative relationship between healthcare organisations, health education sector, professional organisations and the private sector (industry) address all training and education needs across all learning environments • Improved work practices that lead to better health outcomes for the communities served by NSW Health.
Creating a knowledge organisation that provides quality care to consumers	<ul style="list-style-type: none"> • A lifelong learning culture is instilled to create and sustain a knowledge organisation • Healthcare delivery is positively affected as health professionals are educated in the use of information to influence care decisions • Health professionals learn within an evidence based quality framework • Policies, standards and guidelines support the knowledge environment

Education, Training and Development Model

The Education, Training and Development Model as depicted below is not a prescriptive model but one that requires a collaborative management arrangement between key stakeholders at state, Area and local levels of the public healthcare and education systems.

It identifies the most important aspects toward achieving a successful implementation of an information system. It does this through its core goal of providing targeted, accessible education, training, development and on-going support to all levels of healthcare workers using or impacted by the system.

Efficient, effective education, training and development is key to enabling the delivery of high quality services to the NSW community we serve, in this case through the use of information technology.

The model puts into context a collaborative strategy in which Areas can operate strategically in line with their core business of health by requiring involvement of managers, clinicians, information and technology specialists, analysts, planners,

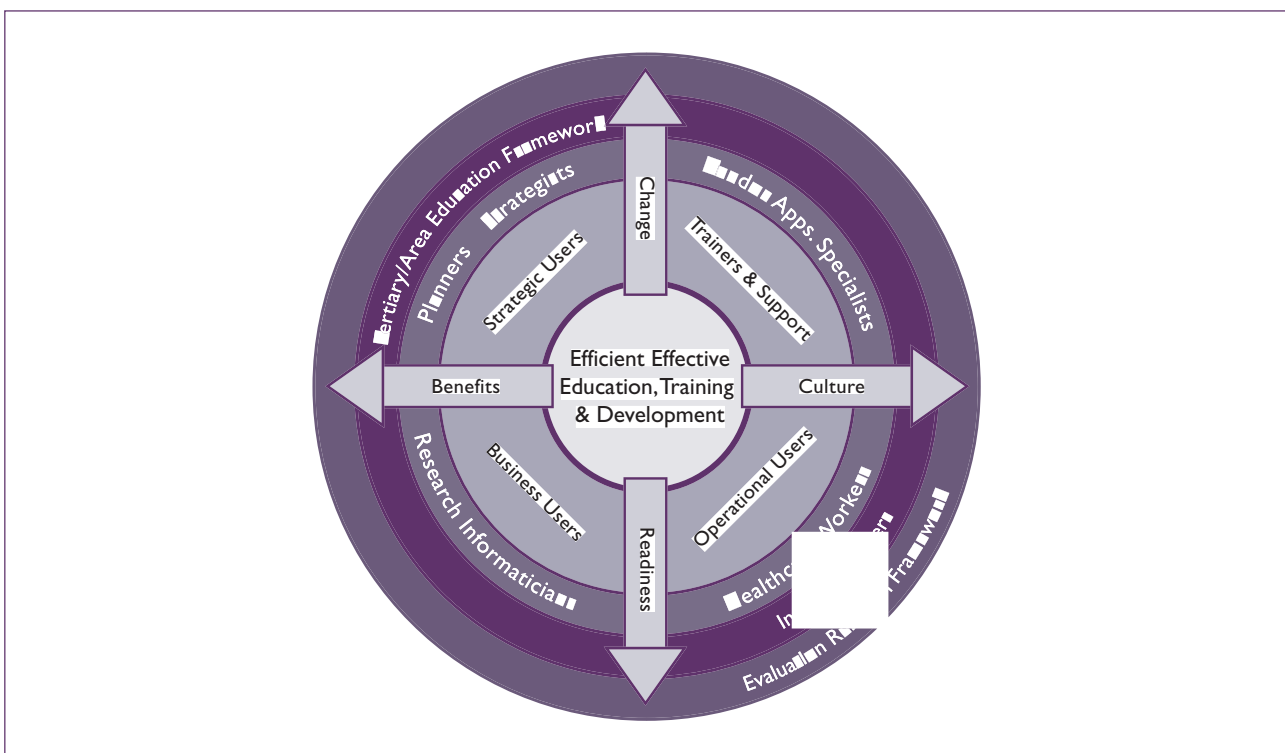
vendors, trainers and educators from both health, education and research sectors.

The arrows denote key result areas which encompass the four levels (rings) of the model. These are:

- Organisational readiness to embark on the implementation of technology to enhance its core business of health.
- Fostering a service learning culture that is supported by quality education, training and development thus enabling the development of a more flexible and skilled workforce.
- Change brought about by competency/standards development, practice and process changes, enhanced knowledge application and maximising organisation performance, resource management outputs and service outcomes.
- Benefits achieved range from research links between business outcomes, investment in staff education, training and development and improve health services and community outputs and outcomes.

The model clearly depicts the building and management of links and relationships at each level to enable the organisation to meet its goals and priorities.

Diagram 4. Education, Training and Development Model



C Target groups

The changing nature of work in the public health system, particularly in areas of information and knowledge based systems demands increasing need for depth and diversity of communication and technology skills at all levels of the organisation.

Importantly, the growth of networks and collaborative practices offer sharing of services and resources which can be organisation-wide and across departmental and professional lines and geographic boundaries. The type of structure has implications for the management of education, training and development however distinct target groups of users can be identified and their needs clearly assessed.

The target groups for IM&T education, training and development are healthcare workers who work at different levels within an organisation, that is, at the unit and operational level, at the monitoring and evaluation level, at the operational analysis and planning level and those at the strategic level. The other target group is those that actually do the ETD in the product and its application and provide on-going and helpdesk support.

Operational information users

Operational users are the largest group of users in the organisation. These users include data input staff and local managers, clinicians, ancillary and administrative staff who document, process, analyse, review, evaluate and communicate a plethora of information and data from a variety of sources to support patient care at the point of service.

Business users – managers and analysts

Business users include groups of staff who retrieve and review the outputs and outcomes of the data and information taken from the operational level. These include unit and department managers, accounts department and decision-support staff.

Business users – operational planners

These staff take the aggregated data and information from the previous users and identify service management and planning. These business users include hospital managers and clinical managers who use this information for management, planning and performance monitoring.

Strategic users

Specialists in the development and interpretation of the data produced by the various systems and who develop policies and guidelines for the ethical use of information. This group includes epidemiologists, information specialists, quality improvement staff, workforce planners etc.

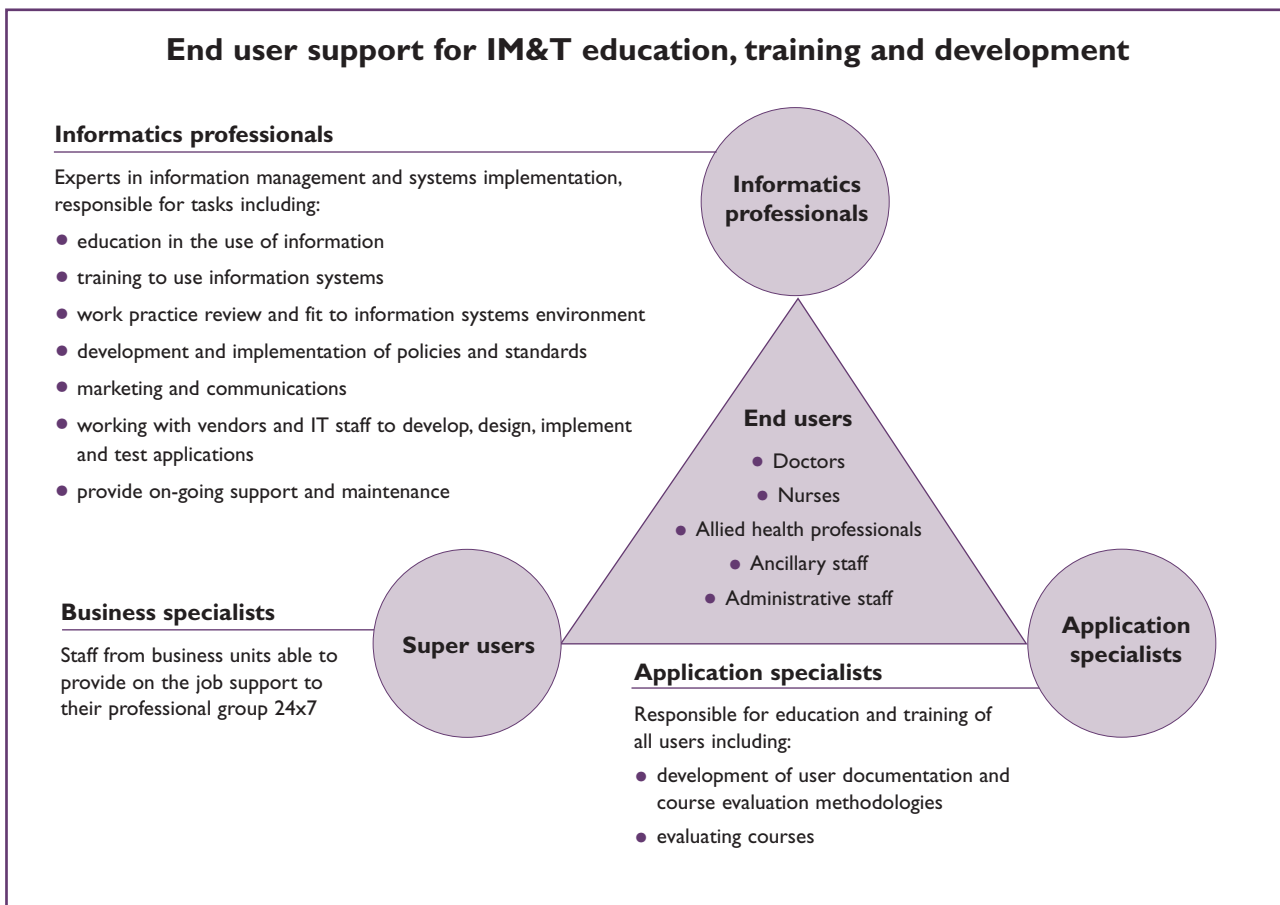
Application specialists and training support

Applications specialists design the training courses, user documentation and course evaluation methodologies and provide the hands on training to teach staff how to use the information system. They also provide retraining when new modules or system upgrades require staff to learn additional functions. Application specialists prepare super-users to provide on-going training support to staff in their business units when and where it is required.

Informatics professionals

Informatics professionals work with the vendors and the information technology staff to develop, design, implement, test and maintain the information systems. This includes defining the data within the tables and specifying the rules, prompts and links that drive the system. Informatics specialists have the expertise in the core business functions so that they can advise the vendor what is required. The following diagram proposes how education and training should be supported for the end users.

Diagram 5. Operational and business support for education, training and development



Identifying communications needs

Communication is more than the exchange of information, it involves cooperation, sharing and mutual agreements. Communication is about cooperation between/among parties to construct a message or meaning. Such a message is based upon shared and agreed signs and symbols used by those in the communication process³². Communication does, however, involve the ability to translate information openly, accurately and in a timely manner³³. Information is encoded in a message that is sent via a communication channel to the receiver, who in turn must acknowledge that the information has been received and understood using a feedback mechanism.

Ineffective communication has been identified as contributing to adverse events in patient care³⁴. A retrospective study of Australian hospitals found that problems in communication were directly related to adverse patient outcomes and was the most common cause of preventable disability or death³⁵.

Communication needs can be identified at different levels, individual; inter-personal (dyadic and group) where people interact and influence each other, and societal, where communication contributes to, and is constrained by, social and organisational structure and culture³⁶.

Organisational communication

Communication between individual members of an organisation is a vital part of the process of work. The ideal organisational structure, it is suggested³⁷ is the 'network organisation' where communication in such organisations is dense, fluid, flexible and crosses organisational boundaries. Technology is believed to support changes in organisation and communication patterns, resulting in many organisations investing in communication and information technologies to improve communication. Hence, as the use of communication technologies continue to propagate throughout organisations, management is faced with decisions about which tasks are better suited for the new media (eg email) and what is best suited for traditional face to face communication³⁸.

C Interpersonal communication is the essence of any organisation because communication creates structures that in turn affect ‘what else gets said and done and by whom’³⁹. Organisational effectiveness is therefore largely dependant on how well the members of the organisation can communicate with each other and use the relevant information available to them⁴⁰.

Hospitals are an example of highly complex organisations within the health system where communication between members of the clinical team is fundamental to the delivery of healthcare. Current communication systems within healthcare have been criticised as being cumbersome inadequate and frustrating⁴¹. Coiera and Tombs⁴² found that hospital communications tend to create an interruptive workplace, which results in inefficient work practices.

Kreps⁴⁰ proposes the application of organisational development to address the communication problems within organisations. Organisational development involves data collection and theory building based on strategies for directing change within the organisation to promote organisational effectiveness⁴⁰. It involves identification of problems in the communication process developing intervention strategies and mobilising the necessary resources to implement the appropriate plan⁴⁰.

Technology can be employed to facilitate communication within an organisation. Technology can be applied to relay information, enable informed decision making, promote healthy behaviours and manage demand for health services⁴³. The potential disadvantages as well as the advantages of new methods of communication must be acknowledged and appreciated. Although interactive communication can offer improved access to information and support networks, and provide more opportunity for users to interact with healthcare providers, the potential for harm must not be overlooked. Inappropriate treatment or delays in seeking medical attention, potentially misleading information and issues relating to patient confidentiality must be considered⁴³.

In this era of evidence-based medicine it would be wise to apply the same principles to the introduction of new technologies as to a new drug treatment. In this way future directions would be based on an evaluation of current technology its impact and effectiveness.

However information and communication technology must be applied in order to meet the specific needs of clinicians in the delivery of healthcare. Most recent work seems to have been driven largely by technology without an understanding of the clinical requirements⁴². The technological tools employed to allow physicians and patients to interact need to be able to be used safely and appropriately by our multicultural multilingual population⁴⁴.

The clinical information environment

Clinicians are accustomed to the concept of continuous professional development and lifelong learning as applied to clinical practice, education and research. This includes the use of information technology to computerise patient/client records, clinical business processes and the professional literature that supports evidence based practice.

The current clinical environment in most organisations has little in the way of information systems to support the patient care processes. A consequence of the Clinical Information Access Program (CIAP) is the availability of the Intranet and/or the Internet at the clinical workstation although there is still a low penetration of PCs at the point of patient care in many hospitals.

The CIAP provides access to a myriad of clinical information to support clinical practice, education and research including drug databases, professional literature, journals and textbooks, policies, guidelines, clinical pathways and protocols. Inadequate telecommunications and technology infrastructure has inhibited the wider use of this system at the point of care.



Diagnostic results reporting systems are available in most organisations with results available at the clinical workstation. The downside of this is that results are from disparate systems, only available for pathology and radiology and there is no integration with clinical systems. There are only two hospitals that have introduced computerised order management and no instances of clinical documentation. These are the processes that would most benefit from computerisation in terms of quality outcomes and improved patient safety.

Part of the education process is to teach clinicians how clinical information systems can improve clinical practice. The following are some examples of how information technology can support and improve business processes that can compromise patient care:

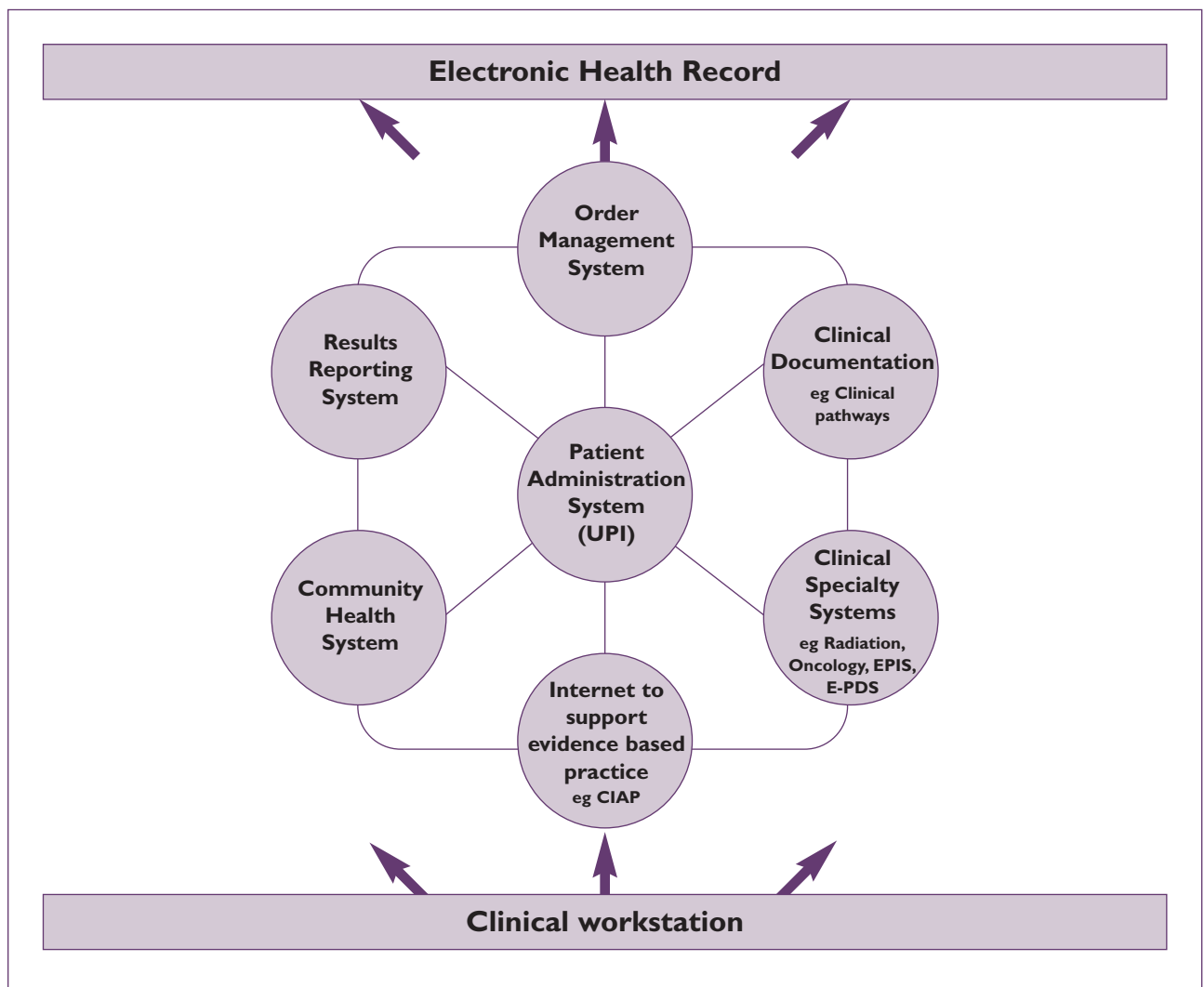
Table 9. Clinical business problems and the computer solution

Business problem	Computer solution
Information about a patient cannot be accessed across multiple care settings	Clinical information systems are linked using a Unique Identifier and authorised care providers can access the information
Handwritten orders for pathology tests, x-rays etc are transcribed by the service department into the department's management system increasing the margin for transcription errors and wasting clerical time in duplicating data entry	Order Management enables the ordering person to directly enter an order into the computer, which eliminates transcription errors and duplicate data entry NB. Time will be saved in multiple ordering of tests and services. Time will NOT be saved in ordering a single test
Adverse drug events compromise patient safety, cause disability or death and prolong a patient's stay in hospital Assumes medical staff enter their own orders as they must take action from alerts and prompts. This requires a policy to be in place governing ordering of tests	Decision-support in the form of rules, prompts and medical alerts that are built into a PoCCS, greatly reduce the error rate and avoid adverse drug events
Lost test results – eg Test results on the paper form do not reach the patient's file from the pre-admission clinic visit and have to be repeated on admission	All orders and results are available on-line as soon as entered into the computer & are accessible from any location
The patient's medical record is not available as another care provider is using it or the patient (with record) is out of the ward	Information is available from any PC regardless of the patient's location
Hand written orders are illegible increasing the margin for error in interpretation and transcription	Information is legible and the margin for error has been eliminated as the ordering person keys it directly into the computer system
Handwritten requests have been sent to a service department by more than one clinician on the team causing duplicate tests to be ordered	The system prompts the user if an order has already been generated – duplicate order checking prompts the ordering person to check the necessity of a second order

C Diagram 6 shows the information systems that create the Clinical Information Environment at the point-of-care. These are the primary systems that will be used by clinicians, which should all be accessible from the clinical workstation. A single User ID and password should provide access to all authorised systems. Given the range of functionality in each of these systems and the large number of clinical users, ETD is critical if the systems are to be

used appropriately for maximum gain. Clinicians need to learn not only the practical skills in using the systems but also how to search for information and use information to support decisions based on best evidence. Evidence based practice is a key driver for learning information skills.

Diagram 6. The Clinical Information Systems Environment



Clinicians will generally be more receptive to new methods of working if it is going to be more efficient than the traditional processes and provide a clinical benefit. It is often useful when looking at the potential benefits of an information system to map the manual process to compare with the

computerised process. Clinicians are not always aware of the issues until they are pointed out and they need to be convinced that there is a clinical benefit. A diagrammatic representation clearly shows how the computerised process will be more efficient and safer for patient care.

The following diagrams (7 & 8) depict the current manual process and the issues of a manual system as well as an example of an improved process for ordering diagnostic tests and the benefits that will follow.

Diagram 7. The manual ordering process for an X-ray

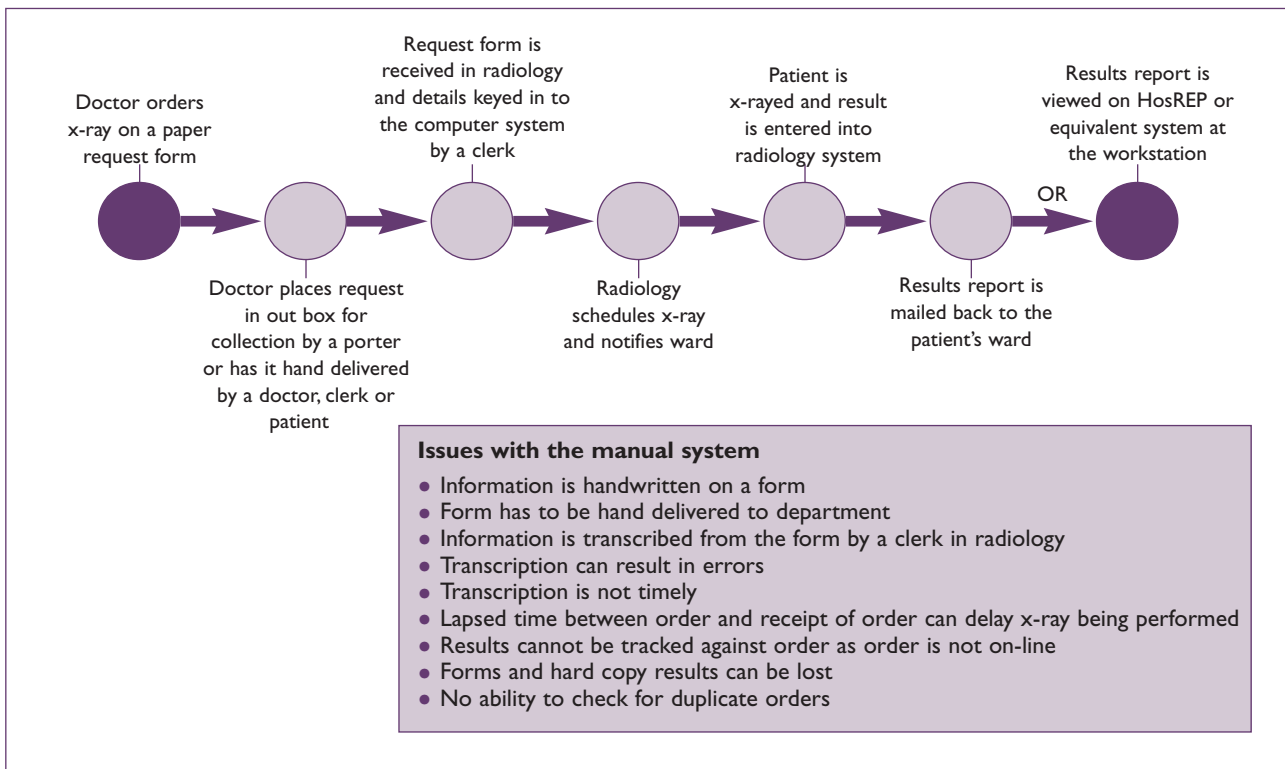
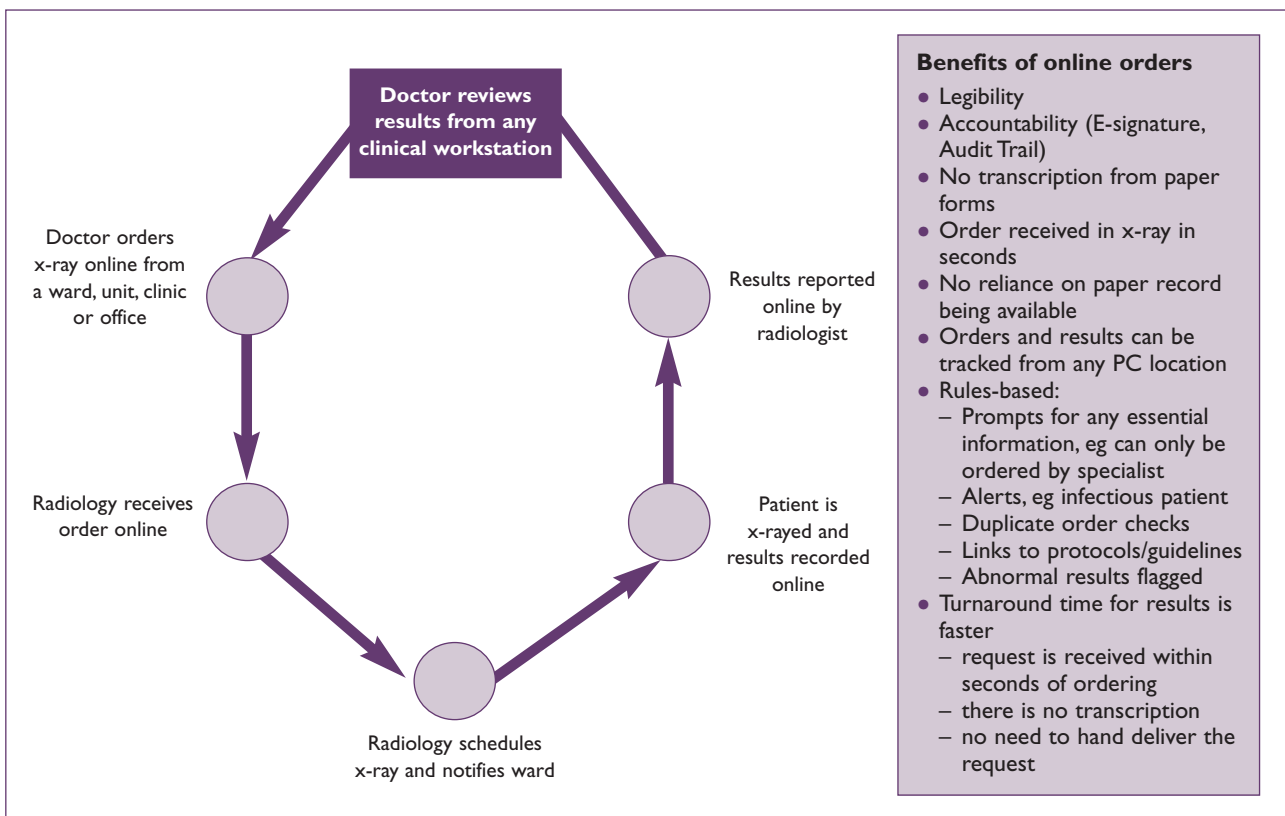


Diagram 8. The computerised ordering process



C Education, training and development needs analysis for clinicians

Given the range and complexity of the above information systems it is essential to assess both the ETD needs of each group of users. ETD needs arise when:

- new staff are recruited to the organisation
- a new information system is implemented
- information systems are upgraded and there is new functionality that requires additional training
- there are changes in work practices which require the use of information technology
- a new policy is implemented which changes a process that requires the use of information technology.

Another factor to consider is the large turnover rate for clinicians, particularly doctors and nurses. For example, 100% of interns, 75% of residents and registrars may rotate through and across hospitals on a regular basis. The annual nursing turnover rate⁴⁵ is 16% for registered nurses and 15% for enrolled nurses with a fortnightly orientation for new staff. Many nursing staff work permanent night, evening or weekend duty, which requires that their ETD needs be met within those hours of duty. Agency and other transient staff also need to be considered.

The clinical information environment is therefore more complex than for other healthcare workers given the:

- rate of turnover requiring training, education and support that needs to be available more frequently than for other healthcare workers
- large numbers of clinicians (approximately 60-70% of a hospital's staff)
- agency and transient staff, eg locums
- difficulty of freeing them from patient care responsibilities to attend training
- need for clinicians to:
 - learn how to use information to challenge and change clinical practice
 - be aware of medico-legal and ethical issues in using information

- know when and how to use clinical guidelines to inform clinical decisions
- understand the use of rules, alerts and prompts to inform decisions
- understand the benefits that can be derived from using information systems.

These factors must be considered when incorporating ETD plans into program management plans.

The technology environment

In recent years we have seen major on-going developments in health relating to information technology direction and use. These developments have included wide spread adoption of the Internet/Intranet as well as the embracing of new clinical applications to support patient care and administration.

The typical technology environment in a health organisation supports the transfer of technology based information, but does not consciously support the transfer of knowledge. Problems are addressed and decisions are made with little or no exploration of the organisational context of the problem.

A more comprehensive framework needs to recognise the evolving technology in health and best practice considerations in an electronic/internet environment, and provide more detailed guidance to AHSs in initiating and operating systems in that environment. We must also build a comprehensive network of ETD within this framework that evolves with changes in new technologies.

It is important in health that we ensure our valued professionals have the tools, technology and training within our fast changing environment necessary to provide the calibre of service that is expected by our customers.

Access to information technology

Access to the information technology services and facilities in health is governed to a greater degree by the IT departments within the individual AHSs. The IT departments endeavour to provide employees with access to hardware and software to support workplace requirements within the resources available and appropriate to their needs. The local policy of the AHSs encourages departments to purchase their own PC requirements from preferred vendors, while the IT departments should be responsible for documenting and circulating guidelines to assist managers to purchase appropriate equipment and configure it as required. Presently within some AHSs accessibility at the clinical desktop incorporates both new and old technologies.

The information systems or information technology organisation in every large enterprise is always a work in process. At any point in time, there are systems operating beyond their useful life cycle and productive systems doing their intended job, high maintenance systems barely keeping up with business requirements. Few organisations will admit to having up to date architecture, systems templates and sound configuration documentation.

When addressing the technology view towards accessibility the following fundamental areas should be addressed:

- **Diversity:** We should use the best type of technology platforms for the intended purpose while reducing the diversity of different technologies within a single type of platform, in preference to one common standard per platform type.
- **Interchangeability:** We should choose and implement technology components such that we have the option of interchanging vendor products for functional, performance, or cost reasons with no or minimal disruption to the technology service.
- **Workstation Orientation:** We should utilise intelligent multifunctional workstations as the exclusive or primary means of delivering functionality to end-users.

- **Network Orientation:** We should attach all workstations directly to the network, either locally or through wide area networks (wired or wireless) with secure communications linkages to all required servers.

Evaluation

“Evaluation is central to establishing the way forward—or to finding that one has started from the wrong place⁴⁶.”

Organisational and managerial issues

While researchers have sought to link organisational characteristics to outcomes for healthcare workers and patients, the knowledge about the nature of the relationship is still not clear^{47 48}. However, attempts to highlight the relationships between structures, processes and outcomes, clearly indicates healthcare workers must have cognisance of how they work together, and the way care is organised affects patients’ experience of the healthcare system, ie their quality of care⁴⁹. The issue of quality of care has taken greater prominence since the early days of Donabedian⁵⁰. Donabedian elucidated on the need to understand the nature of the interpersonal exchange between patient and healthcare worker, to identify and quantify its attributes, and determine in what ways these contributed to the patient’s health and welfare. He further argued that information about the processes and outcomes of care need to be more complete and accurate. Information and communication technologies are now playing an increasingly complex role to facilitate the delivery of quality care, and to enhance efficiency and accountability of health systems.^{51 52}

Contextual issues

Southon⁵² explains health information is identified in terms of three basic dimensions of information associated with managers, healthcare workers and patients, and therefore focuses on different objectives. In addition, the structure and function of the information is different; different social processes control the information, and the information is complex and diverse within the dimensions.

C Therefore ongoing education, training and development is essential to involve healthcare workers in a collaborative and committed process to improve the capture, processing, and distribution of information within the healthcare system. Such a course not only takes time, but must be directed to familiarise healthcare workers with ‘the generic, enduring issues which comprise health informatics, not with fleeting trends in computer hardware and software’.⁴⁶

Evaluation framework

Southon^{51, 52} believes that effective evaluation is important for suitable deployment and use of information and communication technologies, and states, that the broad range of roles and environments in which technology is used challenges traditional evaluation approaches.

Regardless of their experience, healthcare workers (eg managers, educators, clinicians, IT specialists) involved in the development and implementation of education and training programs must be responsible for evaluation. Information is therefore needed about the steps and issues involved.

The framework for designing education and training evaluation studies is based on Donabedian’s quality of care assessment (structure, process and outcomes) approach, and constructed to integrate in schematic form the components of the healthcare delivery system⁵³. The theoretical basis links social systems theory to developments in organisational sociology, organisational behaviour, management studies and soft systems methodology⁵⁴.

The model demonstrates that an integrated IM&T policy, along with social theories and science, determines which ETD interventions are best suited to different outcomes. The effects of the interventions, in turn, lead to achieving program goals (skilled, informed and lifelong learning healthcare workers) and organisational goals (quality patient care and cost containment).

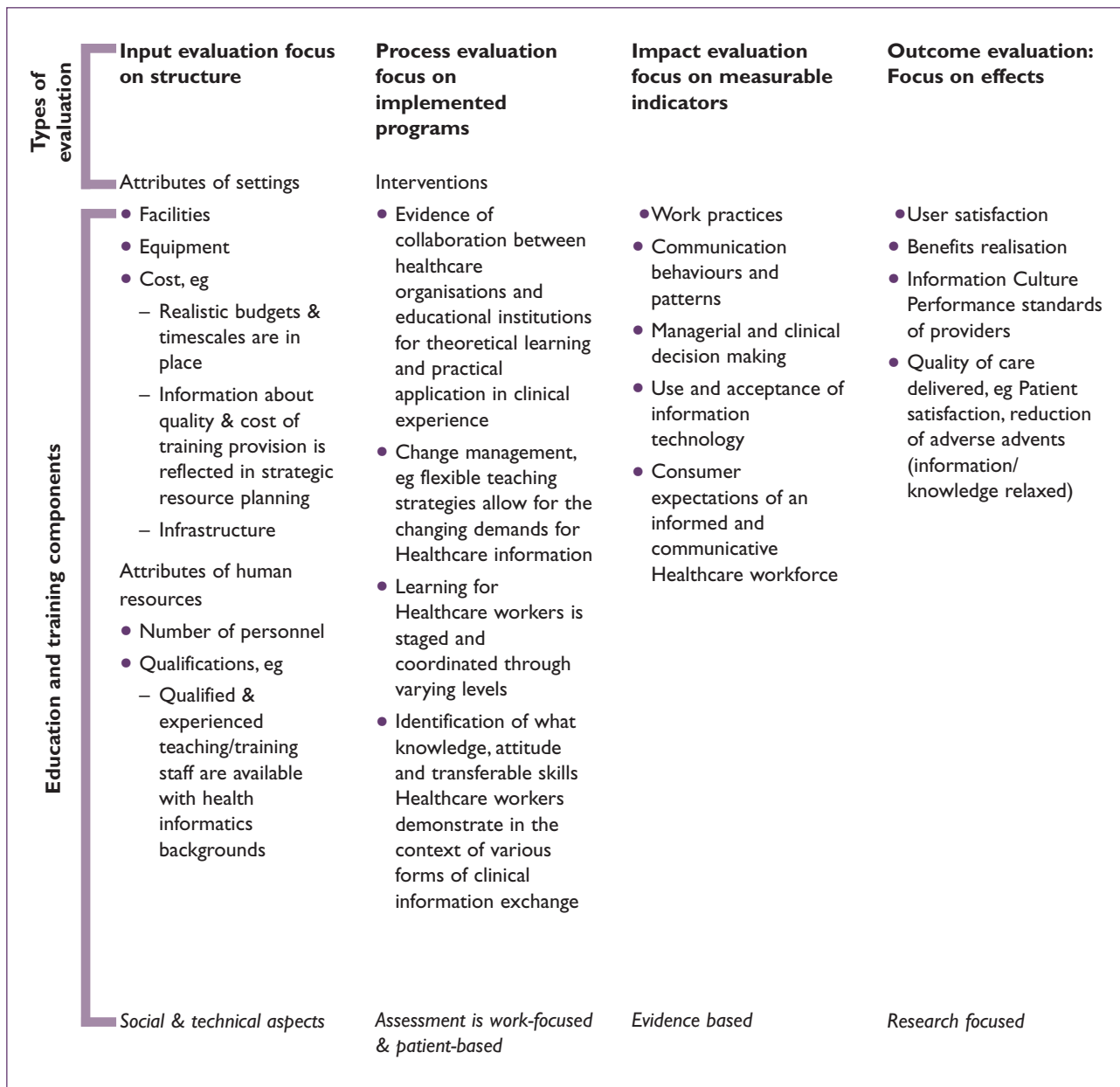
Consumers role in ETD of healthcare workers

Research indicates that access to health information enables consumers to be dynamic participants in the treatment process;⁵⁵ be better informed, have healthier outcomes and complain less (Health Complaints Commission). Likewise, the quality of the healthcare experience for the consumer is enhanced, (not to be confused with clinical quality of healthcare) through more effective communication.⁵⁶

Health education is an important aspect of healthcare worker-patient relationship communication. Patients report that they want to be informed about their health status and the process of sharing information promotes the healthcare worker-patient relationship. Some of this information can be provided using information and communication technologies⁵⁷.

Consumers have a major claim in ensuring that strategies for ETD for healthcare workers acknowledges them through increased and more effective access to healthcare information. The developments in technology for information and communication is changing the way healthcare is delivered, and will change the way in which consumers receive information and interact within the healthcare system⁵⁵.

Framework for designing education, training and development evaluation studies



C Costs

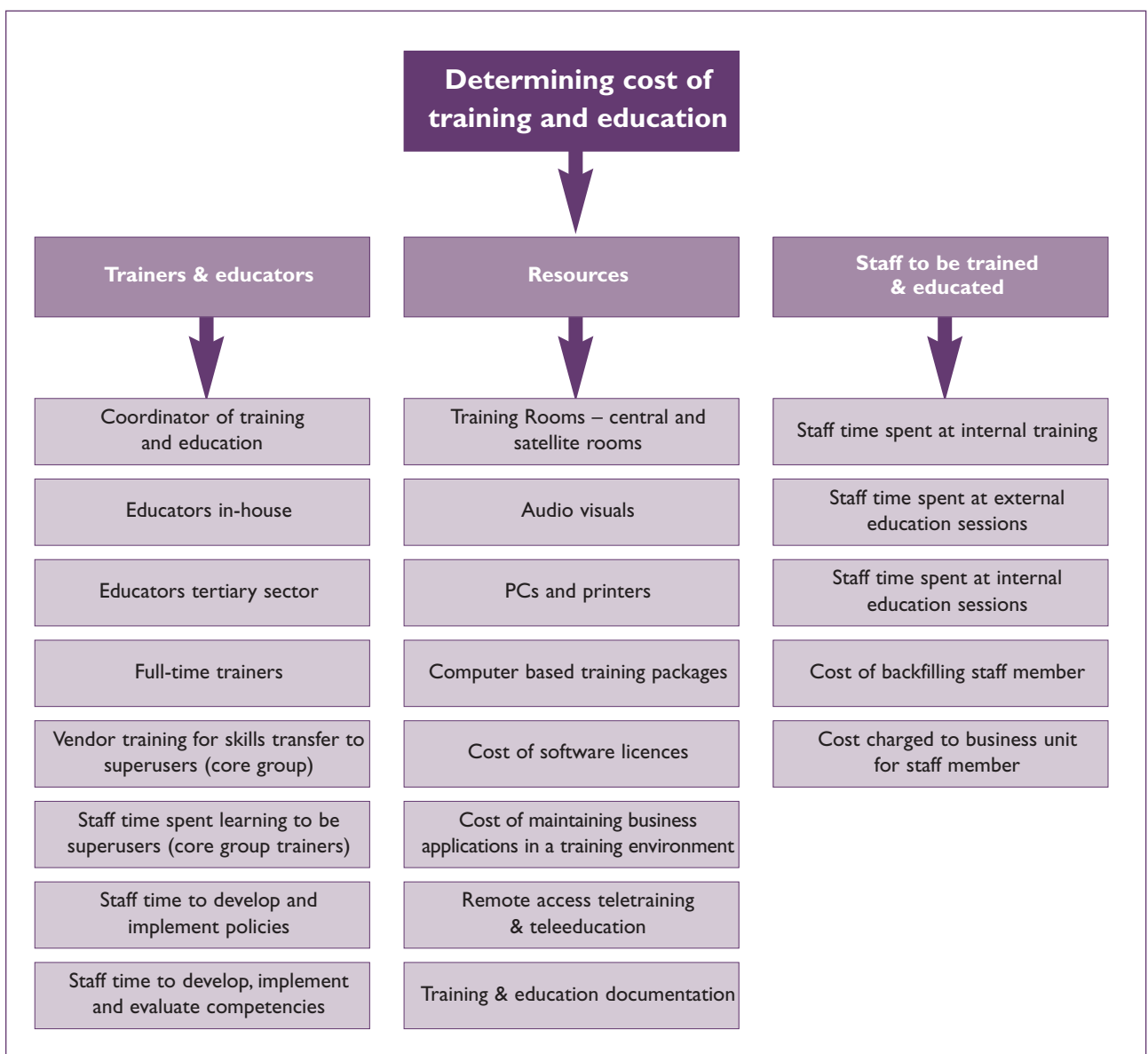
The following model illustrates the components to consider when determining the costs of establishing ETD programs. It is not feasible to attempt to determine costs in this strategy as the requirements for every AHS, health organisation or IM&T program will vary according to the:

- Infrastructure already in place – (training rooms, hardware, equipment etc)
- Professional salary level of trainers and educators
- Professional salary level of the staff to be trained
- Hours of training required

- Fees charged by vendors, consultants and other external providers
- Sources of funds available
- Model used to allocate cost of ETD within the IM&T program budget

A health organisation’s decision regarding the investment in ETD should be informed by the identified priorities of individual staff, consequences for patient care, the complexity of the application and learning implications for a successful implementation of the IM&T program. It should also be emphasised that ETD is not an option, it is a necessity.

Diagram 9. Cost components for education, training and development



Recommendations – education, training and development

NSW Health:

- adopts the model of education, training and development that is based on collaborative management to achieve:
 - a state of readiness
 - a learning culture
 - change management
 - benefits realisation.
- ensures that implementation of the IM&T Education, Training and Development Strategy is accompanied by an agency evaluation program that identifies:
 - progress at the staff and organisational level
 - effectiveness of the adopted strategies
 - achievement of planned benefits.
- ensures that implementation of the IM&T Education, Training and Development Strategy reflects differing user and business needs.

Recommendations – evaluation

The NSW Health Department and AHSs need to ensure that implementation of the IM&T Education, Training and Development Strategy is accompanied by an agency evaluation program that identifies:

- progress at the staff and organisational level
- effectiveness of the adopted strategies
- achievement of planned benefits.

Recommendation – costs

That NSW Health facilities adopt this model to determine the costs of education, training and development.

Section D

Implementation
issues

Implementation

Implementation issues

D Governance

Clinical Governance is the framework that underpins the continuous improvement of quality services and requires the development of strong and effective partnerships between clinicians and managers for the safe and effective provision of healthcare¹¹.

The IM&T ETD Strategy recognises that under a clinical governance framework, quality care requires the development of an IM&T skilled health workforce to promote evidence-based practice, professional development and lifelong learning to deliver a high quality health service.

The governance structure that oversees the implementation of strategic information systems will need to incorporate IM&T ETD as an integral program function. There will not be a need to have a separate governance structure to oversee IM&T ETD. However, it is recommended that a working group of the program governance committee take responsibility for:

- development and maintenance of policies, guidelines and standards
- determining priorities for ETD sessions
- development and implementation of competency based evaluation methodologies
- making recommendations for the funds to be invested in the ETD of healthcare workers for skill development in IM&T.

Diagram 10 depicts a proposed governance structure for strategic information systems implementations.

Alignment with the IM&T ETD Strategy

The following describes the role of the main governance committees depicted on diagram 10, 'Proposed IM&T Governance Structure'.

The broad conceptual framework for this structure is that there is a hierarchy of authority with respect to decisions and that decisions can only be taken by a group that are appropriate and relevant to its terms of reference. The key inter-relationships between these IM&T groups and mainstream departmental bodies need to be described and understood by each Chair. Appropriate reporting arrangements and referral processes need to be established between groups within IM&T governance structures and groups operating within the structure of the Department and Health Services generally.

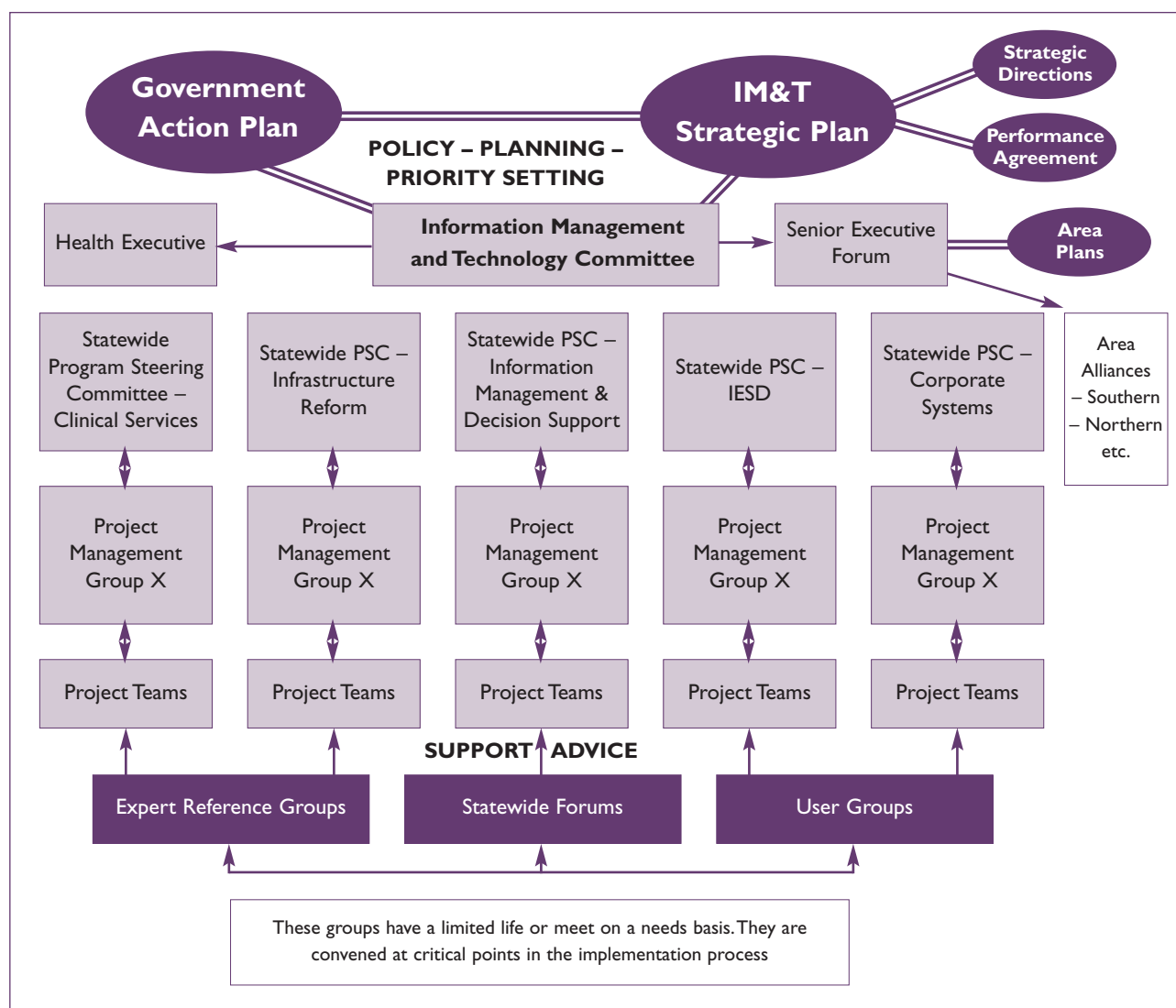
There is a need to expand clinical involvement and representation on key groups and to promote dual or multiple membership so that information is shared and the rationale for decisions more widely communicated and understood.

The review undertaken by Deakin Consulting of the IM&T strategic planning highlighted some basic principles which need to be applied in creating effective governance structures. They need to:

- be relatively simple
- focus on key tasks
- have clear responsibilities and accountabilities
- make decisions quickly

The recommended structure is underpinned by these principles and reflects the aims of clarity, coherence and comprehensibility to all those in the Health System who are stakeholders in the process of IM&T implementation.

Diagram 10. Proposed IM&T Governance Structure



Information Management and Technology Committee

This is the peak policy, planning and priority setting body. The work of this Committee is derived from the IM&T Strategic Plan whose development it initiates and oversees. It recommends key consultation and endorsement processes for its development and determines the communication strategy. The Committee's work is supported by the Information Management Division. It seeks advice and support for initiatives from the Senior Executive Forum and ensures that the work of the Information Management Implementation Coordination Group is completed within timeframes. It complements the GAP process.

It endorses the establishment of Program Steering Committees and statewide forums for the dissemination of information, the identification of key implementation issues, the discussion and recommendation of standards and other key activities.

Statewide Program Steering Committees

The IM&T Strategic Plan contains a number of programs for implementation. Each program consists of a number of projects. These committees drive the statewide program implementation. The project management groups are responsible to a steering committee. These complement the work of Alliance Steering Committees established by areas to drive implementation at that level. It would be desirable for Program Steering Committees to include the chairs or conveners of all Alliance Steering Committees.

- D** There may be committees formed for the following:
- Clinical Systems (ICIP)
 - Infrastructure Reform (IT&T Strategy)
 - Information Management and Decision Support
 - Consumer and Community Information Management (ESD initiatives)
 - Corporate Systems

The business objectives of the IM&T Strategic Plan are framed within program categories, for example, Clinical Systems. These will be further divided into projects. Steering Committees may initiate project management groups so that there may be a PAS or UPI or CHIME management group.

- **Chairs:** Area CEO or Senior Clinician
- **Co-chair:** CIO or Deputy CIO
- **Executive Member:** Director, Information and Business Solutions OR Director, Enterprise Information Technology depending on program area and projects covered.
 - Members:
 - Project Directors
 - Area representatives
 - Implementation Team Leaders
 - Clinician representatives
 - User groups

Program sponsor

Inherent in the management of each program that is being implemented is the need for a Program Sponsor. A Program (or project) may be a statewide solution, Area-wide or may impact on one hospital or department. The Program Sponsor must therefore be appointed appropriate to the needs of the program. He/she must have the appropriate level of seniority and resources to effect organisational change and have the necessary skills and motivation to undertake the task and engender enthusiasm in the project team.

The Program Sponsor⁵⁸ is accountable for ensuring that:

- the program is aligned with organisational strategies, business plans and business objectives
- organisational benefits are identified, are measurable and achievable and that benefits are realised following program implementation and evaluation
- the program meets the budget, milestones and quality criteria
- adequate resources are assigned to the program and that staff have clearly defined roles and objectives
- change management is an integral part of program management and incorporates, work practice review, ETD and communications and marketing
- timeframes and milestones are realistic and achievable
- the program is monitored and reviewed at identified decision points and appropriate action is taken to resolve issues.

The attributes of the Program Sponsor are as follows:⁵⁸

- Be a member of the Area/Hospital Executive or a senior clinician.
- Act on agreements reached at Steering Committee meetings.
- Have the authority to make decisions on the budget and resources for the program.
- Consult with the experts and take responsibility for decisions made.
- Understand the business processes and the broader organisational context within which the system is being implemented.
- Understand the implications of implementing information systems including change management, the need for ETD, communications and marketing.
- Be able to represent the interests of professional groups, management and consumers affected by the implementation of an information system.

- Be cognisant of project management processes including risk management and quality management.
- Ensure the program achieves established milestones and adheres to the timeframes.

ETD is inherent in any implementation program and the needs of each of the professional groups that will be users of the system will vary. It is the responsibility of the Program Sponsor to ensure that appropriate resources are assigned to this activity.

Recommendations – implementation issues

D

That a working group of the program governance committee take responsibility for:

- development and maintenance of policies, guidelines and standards
- determining priorities for ETD sessions
- development and implementation of competency based evaluation methodologies
- making recommendations for funds to be invested in the ETD of healthcare workers for skill development in IM&T.



Section E

Conclusion

Conclusion

E The IM&T ETD Strategy was developed by a Working Group of the Information Management Implementation coordination Group (IMICG). The IMICG was established to meet the information management objectives of the GAPH, which was to implement the recommendations of the NSW Health Council Report. The information management priorities determined by the NSW Health Council included the EHR, the Unique Patient Identifier, Patient Administration and Clinical Systems comprising Point of Care and Community Health, and an expanded Telehealth program. Inherent in the implementation of these systems that support the core business is the need to educate and train the healthcare workers who will be the users of the information systems. This is a large undertaking, as the users of these systems comprise approximately 80% of the health workforce. Of these, the majority are nurses, doctors, allied health and administrative staff who work at the point of patient care. This strategy therefore, has focused predominantly on the needs of these healthcare workers.

The strategy aimed to provide a guide to IM&T ETD for the NSW Health Department and AHSs. In developing the strategy the working group defined the vision, goals, objectives and benefits of ETD for the health workforce, the organisation, consumers of healthcare and the wider NSW Health System. In conducting a situational analysis, the working group appraised the current IM&T ETD environment to determine barriers, success factors and trends through a process of literature review and analysis of current experience. Strategies to create an information culture and change management issues including work practices were also addressed. The current NSW Health IM&T initiatives and the alignment with national initiatives were described and the training and education requirements related to these information systems were identified.

IM&T ETD priorities were acknowledged and included the readiness to adapt to an information and learning environment, effective ETD programs and the creation of a knowledge organisation that provides quality care to consumers. The working group also identified resource requirements and optimal models to support and sustain a realistic program of IM&T ETD. The clinical environment was described and improved processes using information technology were given as examples to use when educating clinicians about the benefits of IM&T and changes to work practices. A section on evaluation and a framework for designing ETD evaluation studies is presented to provide guidance on how to achieve effectiveness and benefits at both the professional and organisational level. A model illustrates the components for costing IM&T ETD within IM&T programs and as an on-going support activity.

The final section of the strategy discusses implementation issues including governance and the proposed governance structure from the NSW IM&T strategic plan. IM&T ETD does not require a separate governance structure but should be incorporated into the overall program management. On-going support post implementation must be provided by organisations for business applications. The role of the Program Sponsor in effecting organisational change, which incorporates IM&T ETD, is also described.

This IM&T ETD Strategy aims to support the vision that:

“All healthcare workers in the NSW public health system will receive IM&T ETD and on-going support at the local level to optimise the use of information technology, promote an information culture and support quality healthcare within the Government Action Plan framework for health reforms.”

A structured IM&T ETD program as proposed in this strategy will therefore:

- create an information culture that values information as a critical resource to support quality healthcare and clinical practice that is evidence based
- develop the information skills of healthcare workers to support day to day work practice and to promote a learning culture that will improve the level of understanding of information management for its better application to healthcare
- ensure that health professionals know how to access information to make well informed decisions so that consumers of healthcare receive the best possible care
- improve communication of information between healthcare providers and encourage a culture of information sharing
- assist health professionals to realise identified benefits at a strategic, organisational and personal level.

A change management framework that prioritises IM&T ETD as a key activity will gain clinician buy in and achieve maximum benefits on what will be a major investment of funds and resources.

Appendices

I-4

Literature review Appendix I

Introduction

Numerous authors have highlighted the growing gap in information management and technology education, training and development for the healthcare workforce. All healthcare workers, clinical and non-clinical, need such education in the face of the rapidly expanding application of information technology in their fields.

In particular, the growth in biomedical and clinical data fuelled by rapidly developing information technology are placing special demands on Healthcare workers and impacting on the doctor-patient relationship. Carlile and Sefton⁴ highlight the need for a new approach to primary and continuing medical education to take account of these changes. They emphasise that the growth and expenditure on healthcare has been accompanied by an expectation that information technology (IT) will play a role in containing healthcare costs, particularly by improving the mechanism of collection analysis and sharing of relevant data.

Various authors have highlighted the importance of developing focussed approaches to education, training and development to meet the needs of craft groups at undergraduate, graduate and postgraduate level. These strategies should address not only core competencies but should also engender a culture of lifelong learning which facilitates growth in the knowledge of the workforce concomitant with growth in technology and its applications.

Health Online Report

Australia is moving rapidly towards the adoption of information management and technology (IM&T) in Health. The national strategy has been evolving over the last few years through the *Health Online Report*⁵⁹ and, more recently, the *National Electronic Health Record Taskforce Report*¹².

The *Health Online Report*⁵⁹ addresses the impact of information and technology on the medical profession. Recognising the potential benefits of deploying computer technology within the healthcare system, the report highlights the barriers to adoption of technologies, as well as the strategies for dealing with them. A major factor is the need for effective education, training and development. Although the report recognises the importance of education, training and development to provide health professionals with a degree of computer competence to resolve their perceived technophobia, very little strategic guidance is provided. The report also highlights the fact that the training of practitioners has been identified by medical bodies such as the AMA in the RACGP strategic framework and those of many of the professional colleges, as a focus for providing health professionals with the necessary competence to make the best use of technology. No mention is made in the report of the issues confronting other clinical groups or healthcare workers in general.

The report recognises that a key reason for failure in implementing IM&T solutions in Health is the lack of established education, training and development plans. Training has to be regarded as part of the infrastructure development. As a consequence, the following recommendations are made, (particularly with reference to general practice), that:

- A. The training of GPs be implemented, in the use of health informatics to facilitate access to health data, with the use of patient electronic records so that a consistent record of consultations be maintained.
- B. Approved coding and classification systems be purchased to facilitate the recording of health information and data on the electronic patient record to proceed, and that this task be implemented in parallel with the promotion of adequate understanding of the usage.
- C. Funding be provided for the establishment of a help desk to provide computer advice for all general practitioners.

The Health Information Network for Australia

The subsequent report, the *Health Information Network for Australia: the National Electronic Health Records Taskforce*¹² on establishing an electronic health information network for Australia highlights the important issues of education, training and development as part of the overall uptake of information technology. The report recognises that states and territories have come to acknowledge the importance of equipping students with information technology skills to facilitate their participation in the broader information economy. This will be critical to bringing about generational change.

A major impediment to facilitating the uptake of information and communication technologies in health is the lack of support and training on the practical implications of both hardware and software applications. The low skill base amongst many healthcare workers, as well as the lack of opportunities to enhance the knowledge in this area has been impeded by a lack of day to day support and relevant training opportunities.

In contrast, industries and specific organisations (Divisions of General Practice) have initiated more coordinated approaches to IT support and education at the local level. While supporting further efforts to enhance the skills being developed by GPs, the report recognises that support also needs to be given to the development of education, training and development models to increase the use of uptake of information technology amongst workers in all health sectors.

Education, training and development is essential for all users of electronic health record (EHR) systems and consumers. Job specifications need to be changed to recognise the importance of integrating IM&T. Failure to do so can have a direct impact on patient care, workflow, etc. The report recognises the implications for a national approach in Australia. Undergraduate and ongoing postgraduate training and skill development in health informatics is important for the future success of design, implementation and evaluation of EHR systems. In order to ensure the safety of clinical support systems, it is recognised that accreditation procedures may in fact be required for clinical support in EHR systems.

What is needed for an effective IM&T education, training and development strategy?

Experiences globally have helped develop a focus on health informatics and the requirements for successful adoption of IM&T by the workforce. Much has been written from the perspective of different clinical groups but in particular, the medical and nursing professions have contributed significantly to the debate.

Medical issues

The American Association of Medical Colleges recognises that medical informatics is basic to understanding the practice of modern medicine. Medical informatics should become an integral part of the medical curriculum. Seven goals for medical informatics in the undergraduate curriculum are presented¹⁵. These include computer literacy, communication, information retrieval and management, computer-aided learning, patient management, office practice management and hospital information systems. Initiatives are now in place in the United States to extend medical informatics education into the post-graduate and continuing medical education areas. Medical schools will need to make a commitment to planning, designing and implementing medical informatics⁷.

The United Kingdom experience

The importance of IM&T education, training and development to clinical training has been recognised by all clinical streams. Experience in the United Kingdom (UK) has highlighted the importance of adopting a collaborative partnership to achieve an effective national strategy¹⁴.

The strategy adopted in the UK provides policy level guidance about the requirement to develop new skills and change the culture of information management and use in the National Health Service (NHS). Importantly, it sets a context for the education, training and development policy programs, as well as outlining processes, initiatives, partnership roles and responsibilities. The strategy is a useful model for NSW. The resources provided address not only the policy context but go further to provide a series of documents to support the communication of the strategy. The development of

the UK strategy followed a detailed audit of the issues surrounding IM&T in Health in the UK.

Wyatt⁶⁰ addresses the findings of the UK Audit Commission, which looked at information and its management in acute hospitals in the UK and specifically, how and why it is failing and what can be done to address it. Developing an understanding of these issues is critical for the development of a supporting IM&T education, training and development strategy.

The audit highlights that information is one of the most important resources that a hospital holds. High quality patient data, whether at the individual or group level, is the foundation for decisions at all levels in the healthcare system. Collecting data consumes a significant proportion of a healthcare worker's time, as well as a significant proportion of budgets, despite relatively small expenditure on IT systems. Although good management of information is recognised as not being an easy task, it needs to be directed at data capture, coding and technical solutions, organisational and cultural issues, communication between systems, confidentiality, the poor quality of systems and improving the use of data. Software is probably more important than hardware as the solution to data capture. Key elements in ensuring accurate data are that well managed information is based on data that has been validated through day to day use and all data must be collected for a purpose. The emphasis is on hardware and software, with less emphasis on abstract informatics and organisational issues, including training, which are sources of recurrent problems.

A key component of IM&T education is to ensure a cultural shift amongst users by helping them to understand the value of information and its potential. The dynamic nature of information also needs to be recognised. The importance of information management is gaining increasing credibility among clinicians. Education, training and development initiatives need to take these factors into account and coordinate the agenda of education, training and evaluation as systems are progressively implemented.

In the UK, the need for an independent National Centre for Health Informatics was recognised.

The preparedness of clinicians to deal with IM&T issues is becoming increasingly recognised as the greatest challenge. Not only is this a challenge for undergraduate training but it is also a critical issue for practising clinicians.

Carlile and Sefton⁴ have looked at the implications of the information age for medical education. They recognise that for medical students and doctors to use systems appropriately there needs to be fairly radical changes to the implementation of standards for both data access and the manipulation of data. This has led to the adoption of a new approach to preparing medical students for future clinical practice. Information technology has become integral to healthcare in Australia for monitoring documentation, results, prescribing and report generation and is continuing to incorporate new technologies to facilitate mobility and access to systems and information. The impact will be felt not only in hospital practice but also in general practice and in the patient-doctor relationship.

All of these issues have a major impact on information technology and medical education. Information technologies are slowly being integrated into secondary and tertiary education. They recommend that the approach be overhauled. Health informatics can no longer be offered as ancillary courses. To be effective, training needs to be integrated into the medical curricula and be used to exploit the information of procedural models that are currently used in medical practice.

It is recognised in teaching hospitals in Sydney, that the level of IT competency amongst the interns and residents is generally low. This impacts on the clinician's ability in generalising across different hospital systems to access information they need in their clinical practice. IT competency is equally important in fellowship training and continuing medical education. The approach adopted in their program provides access to a range of flexible teaching and learning options, including self-pacing, customisation and self-evaluation.

The system needs to enable doctors to manage and exploit the technological change necessary to cope with information management demands. To achieve this they stress that educators need to focus on the process of learning and on reinforcing the natural curiosity that underpins the attitude of “learning for life”. This is particularly important for doctors who need to be able to continually evaluate new information in the context of evidence-based medicine. This approach is now being integrated into medical training around the country.

Carlile and Sefton’s⁴ paper highlights the program being implemented at Sydney University. The program teaches students to make clinical decisions on the basis of critical appraisal of evidence. Computers are used to access information and learning resources to support communication, to access databases and to use basic office tools for preparing written work and presentations and for analysing data.

However, Coiera⁵ identifies that there is a greater challenge confronting the community of practising clinicians, most of whom have had no formal training in information technology yet all have to work for many years in an environment dependent on IT literacy.

Coiera⁵ emphasises that whilst it is important to teach basic computer skills, there is a broader challenge of teaching clinicians the management of information. Information skills are basic to medical practice. Clinicians need to understand the principles of data interpretation, the logical foundations of a diagnostic process and the management of uncertainty and clinical knowledge. He highlights that the problem-oriented medical record is just an information instrument and that clinicians need to know when its use is appropriate and whether there are alternative formulations. This impacts on the dynamics of communication through the various media. Understanding the value of these options is essential to developing effective communication skills. He highlights ten essential clinical informatics skills required by clinicians:

These include:

1. Understanding the dynamic and uncertain nature of medical knowledge, and be able to keep personal knowledge and skills up to date.
2. Knowing how to search for and assess knowledge.
3. Understanding the logical and statistical models of the diagnostic process.
4. Interpreting uncertain clinical data and dealing with artifact and error.
5. Structuring and analysing clinical decisions in terms of risks and benefits.
6. Applying and adapting clinical knowledge to the individual circumstances of patients.
7. Accessing, assessing, selecting and applying a treatment guideline, adapting it to local circumstances and communicating and recording variations in treatment plan and outcome.
8. Structuring and recording clinical data in a form appropriate for the immediate clinical task, for communication with colleagues, or for epidemiological purposes.
9. Selecting and operating the most appropriate communication methods for a given task.
10. Structuring and communicating messages in a manner most suited to the recipient, task and chosen communication medium.

Coiera⁵ highlights that when these skills are used badly, they waste time and money by creating inefficiencies and dysfunctional communication. An effective IM&T education, training and development strategy needs to address these challenges for the future and current workforce.

The missing curriculum

Ghali et al⁶¹ go further in emphasising the need for medical educators to target basic skills in information management where an Evidenced Based Medicine (EBM) approach to training has been adopted in clinical schools and residency training programs. These include:

- recognition of the requirement for information
- refining information needs to formulate focused clinical questions

- using the resulting questions to direct targeted searches
- critical appraisal of information
- applying information to a given clinical problem.

To be successful, all of these skills need to be addressed. Isolated teaching interventions are not sufficient for promoting EBM. Creating a longitudinally integrated curriculum targeting each of the component skills of EBM is essential.

There is an important parallel for the successful introduction of a knowledge management culture and the adoption of evidence based medicine that needs to be reflected in the NSW IM&T Education, Training and Development Strategy.

The ‘Lost Generation’

Kidd and McPhee¹⁸ focus on what they refer to as ‘the lost generation’ currently in the workforce but not prepared for the use of information technology. Computers are often seen as an unnecessary imposition for this group. They stress that there is a sense of needing to be wary of technology, along with a perceived push to computerise all aspects of clinical existence, without evidence of proven clinical benefit. This further fosters feelings of fear and inadequacy. They recommend that an approach should be adopted that supports the introduction of information technology into clinical areas accompanied by staff training programs that are appropriate. Strategies need to educate clinicians about the use of information technology and clinical practice, demonstrating value and promoting its benefits. To do this effectively, clinicians need technical support to allow them to focus on their principle priority of providing patient care.

The bigger challenge is not mastering technology but rather coming to accept the technological advance that can improve the quality of patient care in developing a willingness to incorporate technological change into a clinician’s daily routine. Educational strategies need to be designed that work through clinical scenarios and identify the information issues and the personal applications for learners rather than didactic approaches. Clinicians need advanced skills in information management to meet the challenge of evidenced-based healthcare,

support coordinated care and manage information overload. They highlight the three-pronged approach of learning about computers through computers, with computers and their potential application in healthcare, how to use the technology and the importance of integrating the technology into daily work.

Kidd and McPhee¹⁸ draw attention yet again to the National Health Service in the UK, which has produced recommendations for health informatics training for clinicians. This is an essential document entitled *Learning to Manage Health Information*. Bristol: National Health Service Executive, 1999.⁶² The recommendations essentially highlight the common elements of clinical practice relevant to all healthcare workers, including communication, knowledge management, data quality and management, confidentiality and security, secondary uses of clinical data and information, clinical and service audit, working systems and telehealth.

The recommendations also identify basic computing skills which Coiera⁵ advocates but in a more clinically focused way. The recommendations include:

- organising electronic information
- using word processing
- entering and manipulating data
- searching simple databases
- undertaking searches on the world wide web
- retrieving/downloading electronic documents from various sources and between applications
- explaining the reasons for electronic networking
- sending/retrieving/acknowledging e-mails plus attachments
- identifying examples of uses of information technology as effective tools in the delivery and management of healthcare
- evaluating the effective use of information systems.

Necessities for the future

Haux²³ highlights the fact that education, training and development in health and medical informatics is done at various levels, ranging from educational components in curricula through to continuous education. Well-trained healthcare professionals raise the quality of information processing. The quality of information processing influences the quality of medicine and healthcare. Courses in health and medical informatics are provided as part of educational programs or through dedicated programs in health and medical informatics. He indicates that the broad educational programs address primarily the needs of medical students, other clinical groups, informatics and computer science students, and are part of other programs for nursing or epidemiology. On the other hand, dedicated programs are directed more at postgraduate clinical training, health informatics programs, and at data administrators and technicians. Separate courses are for continuing education for fellowship training in health and medical informatics.

To meet the needs of the future and ensure that information technology is used properly and that the processing of data information and knowledge is carried out systematically, healthcare professionals need to be educated in applying methods and tools for information processing.

Haux's²³ paper highlights the need for courses customised to local environments, and that recognises also the emergence of health medical informatics educators. Courses need to be provided not only at universities and professional schools but also as part of continuing education programs in the workplace. To facilitate this there needs to be workplace training and practically orientated training. The target group includes all healthcare professionals who intend to work in fields of medicine and healthcare.

Nursing issues

Many authors addressing nursing issues in health informatics have highlighted issues similar to those of medical clinicians. Nagelkerk et. al.⁶ stress that nursing is rapidly evolving into a technologically sophisticated practice discipline. Recognising that up to a third of nurses have no experience with computers or feel uncomfortable or intimidated by them, there is a need to prepare nurses to use computers. A model is presented identifying six essential competencies for preparing nurses for computerisation built around strong leadership. They include change, effective communication, special software that aligns functionality with need, a detailed time frame identifying activities required for implementation, including resourcing, and finally a carefully planned training process.

Most training can be further enhanced through the provision of basic training programs, access to on-line library materials, computer assisted instruction (computer based training) and ready access to electronic networks, including the Internet. Decision-support and expert systems should be provided, including staffing and acuity-based systems and expert decision-support systems to support nurses in the workplace.

The technological imperative

Nursing in the US convened a national nursing informatics work group to provide leadership and guidance in setting a national informatics agenda for nursing education and practice. Simpson²⁴, in discussing the recommendations of the group, points to the change in definition of nursing informatics from the use of IT to what now encompasses information management and processing of nursing data for use in healthcare delivery.

Simpson's paper highlights the lack of nursing informatics education across all schools in the US with a very fragmented educational picture. There is also significant under resourcing of technology within schools.

The group recommended five goals including to:

1. **Educate nursing students and practising nurses in core informatics content**

This includes informatics skills in undergraduate, graduate and continuing education programs to encompass the full range of informatics skills and training not only in the use of systems, but in how to collect, record, analyse and interpret information. Recognition also needs to be given to legislative frameworks and the implementation of policies that stem from them such as information privacy.

Goal: To prepare nurses to collect and process healthcare information to make appropriate clinical and administrative decisions.

2. **Prepare nurses with specialised skills in informatics**

Goal: To facilitate the development of IT that can help improve healthcare access, patient involvement in care decisions and monitoring care quality. Encourage postgraduate programs to facilitate furthering nursing informatics.

3. **Enhance nursing practice and education through informatics**

Evaluating emerging technologies such as telehealth, decision-support systems, education initiatives such as electronic global health conferencing, virtual education and health information networks.

Goal: To enhance the quality of clinical practice for patients and providers in under served areas.

4. **Prepare nursing faculty in informatics**

Goal: To speed the adoption of IT by increasing the number of faculties prepared to teach it.

5. **Increase collaborative efforts in nursing informatics**

Goal: To increase the number of nursing informatics resources in nursing education and practice.

This type of collaborative approach takes a broader view in establishing a national framework to enhance nursing education, training and development in health informatics.

Information literacy

Cheek¹⁶ introduces the concept of lifelong learning raised by others as an essential ingredient to equip clinicians for a career in healthcare. Her paper highlights the importance of ensuring that nurses have a high degree of information literacy as a resource to enable them to become 'lifelong learners' so as to keep pace with the rapid changing status of clinical knowledge. Information literacy is critical for accessing information. It is a complex concept that encompasses a range of tasks, from identifying a problem through to sourcing the appropriate information, and applying it to solve a problem. Such an approach is essential for facilitating an evidenced based approach to healthcare. Technology needs to be seen as a means to an end rather than an end in itself.

Cheek¹⁶ stresses that creating a learning culture that produces graduates with the capacity for lifelong learning in a rapidly changing, complex information abundant environment, requires a change in the prevailing education curriculum. There needs to be a shift from educators being transmitters of education and controllers of learning activities to facilitators of learning as promoted by Billue⁶³. IT needs to be recognised as both a driver and facilitator of this process. Indeed, the paper highlights the fact that amongst nursing students there is a growing computer literacy and technical competence but there remains an ongoing problem of identifying, defining, analysing and articulating the nature of the information requirements of students. There is a risk that with the inappropriate application of IT people will simply access and obtain more information rather than better information. The key issue is how that information is sourced, interpreted and applied.

Nurse education

As was highlighted with medical clinicians Sinclair et al²⁰ point out that there is a need to recognise the varying range of experience and competency with information technology in nursing recruits. Despite the difficulties, there needs to be appropriate planning to accommodate the requirements of new recruits. The authors highlight the experience and attitudes of incoming nurse education students. They found that although

attitudes to computers were uniform and relatively positive, the level of competence in the use of computers was lower. There is a need to identify a core set of competencies to support a training approach for all new recruits. This would boost confidence.

The paper highlights the fact that the adoption of a core IT approach could also present opportunities to plan courses in such a way that students with different levels of competence could pursue the same general training, thus providing a sound foundation for the promotion of more sophisticated use of IT systems in the workplace and for personal development.

Simpson et al²⁴ stress that ensuring experience in the use of computers in a clinical setting is to some extent secondary to ensuring that classroom-based training adequately addresses the IT knowledge, skills and understanding that clinical practice will demand.

Professionals must be more than competent, they must be capable of upgrading their skills as technologies and applications continue to improve and change.

A cohort study was undertaken in undergraduate nursing students to assess perceived competence in computer usage, basic knowledge tests and attitudes towards computers. There was strong endorsement from all groups for the perceived career-related importance of computers, but there was a relatively weak perception among students of their confidence in using computers. Any training program must embrace the job-specific needs of the professionals involved. This will often demand 'in situ' training in the workplace.

Like other professional bodies, the American Association of Colleges of Nursing has recognised information management as one of the trends that baccalaureate students must be cognisant of and versed in during this transformation in healthcare. They advocate preparation of the graduate to use "traditional and developing methods of discovering, retrieving and using information in nursing practice".

Gravely et al⁹ evaluated undergraduate students perceptions of their computer literacy before and after a focussed training intervention involving a series of sessions on IM&T. Despite a relatively high proportion of students having a home computer with almost a third using Internet services, general skill levels were slightly below mid level. Older students reported a lower level of skill. Despite a low participation rate the outcome was good with an average increase in skill levels of 4 points (10 point scale). The paper highlights the need to better understand why participation in the training was low. It is suggested that this may reflect anxiety rather than any other barrier.

Educational programs need to develop some means of pursuing basic computer literacy of applicants. However, nursing schools also need to provide ongoing opportunities throughout their nursing studies, to continue to enhance their competencies.

User training needs analysis

At the practical level the implementation of a nursing information system, according to Fyffe and Fleck²¹, requires a recognition of the importance of adopting a training needs analysis. They emphasise that the investment of time and resources in including people in the process of change is central to change management. A needs analysis is essential to planning an effective training program that aligns with the needs of all the users. Despite the growing familiarity of nurses with computerised systems the impending implementation of a different system is still perceived to be a major change that could ensure nurses continue to be reluctant users. They apply a systematic approach to detecting and specifying training needs and examining them to determine how best to meet them. The process also identifies any possible gaps and discrepancies in performance between what staff are capable of doing and what they should be doing, now and in the future.

Using a standard methodology they suggest working with the target groups and they stress the need for using internal resources and senior management commitment. Four key methods of data collection were used including focus groups, questionnaires, observation and interview. The sequencing is important as one methodology may be dependent on the outcome of another. The training program designed was based on two clusters of needs that were identified for clinical staff, including:

1. The technical skills and knowledge required for operating the computer system.
2. The skills and knowledge required to underpin the application of the system in day to day practice.

A flexible training program can then be developed to meet the users needs.

Changing the culture

Changing the clinical culture to accept new technologies and in particular IT is not simply about education, training and development . Coiera⁶⁴ stresses that technological development is inevitable and that we need to come to terms with the changes that follow. He flags that there are numerous barriers to the acceptance of innovation and technology. Two major barriers are the culture of the organisation and of society. Much of the technological innovation is coming from outside the clinical professional culture, which leads to a state of technophobia, with clinicians largely being adopters rather than innovators of technology. The risk that this poses is that more small groups feel threatened and the acceptance of IT by the larger organisation is likely to be stifled. Successful organisations recognise the need to change. There is a need to be able to create the vision that seeks to take the clinical community with it. This requires a pro-active approach. "It is however not technology that will transform medicine - it is our vision of medicine that will define the change"⁶⁴.

Implications for the implementation of an Electronic Health Record

Planning for the introduction of the *Electronic Health Record* needs to take into account the complexities of clinical communication which are integral to the process of providing healthcare. Hardy et al⁶⁵ studied the interactions with traditional formal information sources, such as the medical notes of patients, paper forms, the computer or literature. These were all coded as conversations, permitting comparison with informal conversations.

Their observations in an emergency clinical setting showed that doctors had 9% interactions with formal information sources and 91% interactions with informal sources (eg phone, pager, face-to-face conversation). The physiotherapist had 6% with formal sources and 94% with informal sources.

Given that the EHR is aimed at replacing the formal interactions, it suggests that over 90% of the information exchanges observed in this study cannot be directly replaced by the EHR. It may therefore put an upper boundary on its potential for improving information and communication processes within a healthcare organisation⁶⁵.

Berg⁶⁶ acknowledges that the computer-based patient record as a tool is likely to have great impact on the practice of medicine. However, a fully integrated EHR 'up and running' in a clinical setting is hard to find. Ideally, Berg⁶⁶ argues, a health record both supports the clinician's clinical problem solving and serves as a 'repository of information' for use by multiple parties. It should guide the clinician's thought processes towards 'an efficient, scientific problem-solving method' and allow for quick, efficient access according to widely diverging needs.

Medical personnel continually struggle to ‘make’ a patient’s casework. Historical information, examination results and medical criteria are continually reconstructed. Medical work is directed at finding an answer to the question ‘what to do next?’ The acquired solidity of historical information and examination results can continually be undone. Coherence is restored by reconstructing a piece of information. All data (historical, examination and lab) can be reconstructed.

Medical work is situation dependent. It is ad hoc, reactive and draws upon opportunities immediately available. It is characterised by the inter-weaving of ‘social’ and ‘medical’ issues and the reconstructed nature of medical data and criteria. The health record is a tool aiding memory, communication and so forth – it is not a mirror of work. It does not ‘represent’ the work but feeds into it, structures and transforms it. A crucial part of doctor training is to learn how to present a case ‘lined in its causality and diagnostic in its quest’. It leaves out uncertainties and re-orders events to fit the prescribed canon.

Because the health record is a tool that fulfils multiple inter-woven roles, every fundamental change in the structure of the record will have major implications for the practice. The paper record cannot simply be replaced. The implementation of an EHR is a process in which the whole process is transformed. This implies that successful design and implementation requires full-blown participation from very early on in the process. It implies setting requirements, designing and prototyping with the users so that EHRs might actually support their work.

What works?

Russell⁸ makes a plea for the medical profession to incorporate information technology fully if it is to move forward with patients as widespread access to the Internet continues to explode. Medical schools must be the starting point for this. IT should be formally taught to all students as a core essential with anatomy and physiology.

A number of successful programs for clinical education, training and development in IM&T have been reported. These include a range of models. A two-year experience teaching computer literacy to first-year medical students used skill-based cohorts.

AMAC in 1984 recommended that “a general education should prepare medical students to learn throughout their professional lives rather than simply master current information and techniques”. The recognition of the program of lifelong learning has meant that information management and retrieval skills have become indispensable⁷. Gibson and Silverberg⁷ highlight the variation in the skill range across students and recommend a structured approach to instilling a minimal level of competence as well as targeting those students who are in need of further instruction. The focus of their program included computer basics, e-mail management, Medline and Internet search tools. This approach was advocated as institutional provision of opportunities and support for medical students to acquire the necessary technical skills has been comparatively slow and inconsistent. The paper recognises that for the immediate future it is incumbent upon clinical schools to provide instruction ensuring that all students begin their studies with adequate skill level and sufficient core knowledge to enable them to act in institutions with computer based resources and develop habits of continued acquisition of new knowledge⁷.

Gibson and Silverberg⁷ advocate a course designed to precede clinical training. The course was designed as an elective in view of the pressures created by the current curriculum. The computing course was related to clinical and hospital activities to make it more meaningful and motivating for medical students. The main aim of the course is to give students an understanding of the contribution computing has made, and will make, to better healthcare through its use by organisations and personal use by students in their future medical careers.

Church et al¹⁹ identify the growing use of the Internet for postgraduate medical education, as additions to the armamentarium of clinicians who need to continue learning and developing professional skills through their working lives. They highlight that the acceptance of computers as an educational resource has been relatively slow but that this should change with a growing IT literate workforce. This has been paralleled by a significant growth in educational software. They conducted a survey of trainees, which showed that computer access was a problem for a small group of trainees, but with internet access the barrier was highest. Access occurs both at home and in the workplace. The internet was used for a wide range of resources. The educational use of internet can be expected to increase. Trainees need to be taught how to access resources.

A common theme in the implementation of IT solutions is user resistance. Many authors have addressed the barriers to acceptance. Burgess⁶⁷ in discussing two practical initiatives to implement an electronic medical record highlights many of these common issues as well as solutions.

Many providers initially were not enthusiastic about an electronic record. Many lacked basic computer experience. They felt it would require too much time and were afraid that data would be lost if the system went down.

These challenges were met by providing typing programs to sharpen skills. Also, test patients were loaded into a test environment in the EHR so staff members could learn to use the system. Providers had the choice of dictating or directly entering information. Transcription services had a sharp increase in dictation initially following implementation but this settled after six months. Initially, the EHR was printed for the file resulting in increased loose sheets but this was soon stopped.

Brown⁶⁸ identified a key strategy for user acceptance of an EHR is that there be strong support. This was achieved by using an existing group of departmental experts who provided broad-based end-user computer support in each area as part of the education, training and development strategy. A larger group of 'super-users' was trained to provide focused end-user support. Another success factor was the influence provided by an informal group of 'clinical champions' who support the

program via interaction with colleagues and trainees, committee membership and creative development of time-efficient approaches to computer use.

They also adopted the approach of having a regional group of implementers discuss the challenges, solutions and progress monthly. This approach highlighted that both implementation and meeting the education, training and development needs required coordination but that it was an interactive process that needed ongoing review and modification to meet circumstances.

The leadership and support of senior management is an essential organisational factor for the implementation of EHR initiatives and facilitates both ongoing acceptance and participation by clinicians.

Responsibility for 'train-the-trainer' sessions was placed at the facility level and end-user training at the department level. Approaches to end-user training ranged between formal classes and individualised tutoring (eg two hours of end-user training for physicians and four hours for other users).

Adequate training facilities are an essential resource both in the formal training setting and the workplace.

Sherry and Gadd¹⁰ describe their experience of the implementation of a Theatre Management System at the Repatriation General Hospital, Daw Park in South Australia. They identified the key role of user training and change management and in particular, the difficulties associated with the buy in of medical staff. Despite the team doing the 'right thing' they recognised that approaches have to be developed that address the needs of the user community, as a lack of support from any one of the many key stakeholders can and will have a detrimental effect. The lessons from this implementation apply broadly to education, training and development and highlight the need for early involvement of users who need to understand:

- the reason for change
- the functionality that they are trying to address by implementing an information system or replacing an existing information system
- the need for flexibility in meeting user requirements.

Selection of an implementation process needs to be contextual

Lytle et al⁶⁹ highlight that selection of an implementation process needs to be contextual. This has a direct implication for IM&T education, training and development. They emphasise the value of a streamlined approach when using traditional project management procedures. However, non-traditional processes allow for more flexibility, but equally more confusion of roles with deleterious impacts on key stages in the project. Practical experience would highlight the fact that being the beta site is difficult enough. The effect on staff implementation, education, training and development can have longer-term deleterious effects. It is far better to apply a standard methodology to robust tried and tested systems. There is, however, a balance that needs to be obtained if one wants to be at the leading edge as opposed to the 'bleeding edge'.

Creating a culture of knowledge management

IM&T education, training and development needs to ensure that systems support the prevailing approaches to care. There is an increasing acceptance of the need to adopt a more evidenced-based approach to the delivery of healthcare. Moody and Shanks⁷⁰ discuss the implication of knowledge management to support evidence based medicine through the Clinical Information Access Program. The key objective of this NSW led project was to provide clinical staff with access to the latest medical knowledge at the point of care in order to improve the quality of clinical decision making.

Knowledge management is intellectually intensive rather than IT intensive. Organisations focused on delivering services, have a large number of employees who are professionals (knowledge workers) and its assets are more intangible than tangible. Whilst well recognised in the corporate world, this is equally characteristic of health where the focus is shifted to evidence based medicine where the aim is to bring research and practice closer together. It is the time lag between the development of clinically proven treatments and their use in every day care.

A key success factor is synthesis of evidence and facilitation of its dissemination and use by clinicians. This requires not only assembling the correct information and making it accessible but also the provision of appropriate and focussed training.

Davenport¹³ identified four categories of knowledge management. These include, creating knowledge repositories and improving knowledge access, enhancing the knowledge environment and managing knowledge as an asset.

Hansen et al¹⁷ identified two broad strategies for implementing knowledge management with a focus on explicit knowledge and tacit knowledge. Explicit knowledge is more coding and storing knowledge while tacit knowledge focuses more on sharing knowledge between people. Usually both need to be applied with one being dominant and the other supporting. Education strategies need to build on this approach for the successful adoption of knowledge management.

Davenport¹³ identified eight key success factors for knowledge management. They include:

- linking knowledge management to economic performance
- technical and organisational infrastructure
- a flexible knowledge structure
- a knowledge friendly culture
- a clear purpose and language
- a change in motivational practices
- providing multiple channels for knowledge transfer
- senior management support

Many of these are essential components of a comprehensive education, training and development strategy for IM&T in health.

The CIAP was able to demonstrate success according to all these outcomes other than financial return as this was not a private sector project focused on profit. Other success indicators included user satisfaction, organisational impact and in particular an improvement in patient care. A key lesson from this project is that benefit can be brought to clinicians through a knowledge management approach which is far more suited to

the clinical environment yet leads to a more successful uptake of technology to support the broader goals of evidence based medicine. This approach demonstrates how it is possible to share information across all professional groups across the health sector. Combining a knowledge management culture with the emerging availability of patient information through the electronic health records has enormous potential to enhance patient care. Although not highlighted in the article integrating this approach into IM&T education, training and development strategy it is far more likely to lead to user acceptance of clinical systems and optimisation of their use.

The increasing emphasis on quality in healthcare and clinical governance necessitates addressing the IM&T education, training and development implications in parallel. McColl⁷¹ stress the need to adopt a National coordinated approach. The adoption of computerised clinical decision-support systems can help to improve performance and patient outcomes. Clinicians need to be both educated into the benefits as well as the use of such systems. Uptake is not driven only by their availability but by appropriate use of IT systems by clinicians. Collecting information on clinical quality is best done from computers in the practice. The MIQUEST project is one of the national facilitating projects within the NHS information management and technology strategy. It aims to help practices standardise their data entry and provides software to assist with data extraction.

Leading change

Reeve and Rose²² tackle the subject of what is an appropriate role for the CEO. Many authors pay lip service to the need for Senior Executive support as a key success factor in any IM&T strategy. The enhancement and development of information management and technology has major potential to transform the way health organisations are managed and the way in which they operate with a broad range of applications and benefits from the office to the clinical environment⁷¹. The risk of failure with the high cost implementations is seen as a high risk that requires support from senior management. Studies have shown that the CEO's attitude to IT and participation in education, training and development in IT has a significant positive relationship with the progressive use of IT with attitude being more important than participation.

Reeve and Rose²² report on a survey of CEOs from 236 Australian hospitals. The results highlight that the more positive the CEO's attitude to IT the more progressive is its use in hospitals. However, there is no relationship between the CEO's participation in IT activities and the progressive use of IT in hospitals. Other studies have suggested that both have a positive influence, particularly if a CEO does not have the same level of IT exposure or education. "It is more appropriate for CEOs to communicate their vision for IT and their view of the importance of IT for the Hospital's success than engage personally in IT related management activities"²².

Appendix 2

Examining the impediments

Examining the impediments to changing the way in which health care is managed and provided

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A paper prepared by the Teaching and Research Implementation Group

Objective

The objective is to gain a better understanding of the impediments (barriers) to the implementation of the changes which were designed to improve health care and the systems that underpin the delivery of that care (NSW Government Action Plan for Health – (GAP).

*Perpetual change is here to stay*⁷²

Introduction

The Australian health system is under constant pressure to adapt to a rapidly changing external environment: advances in health technology and information, spiralling health care costs, an ageing and culturally diverse population, changes in community values, higher expectations of health and wellbeing from increasingly well-informed consumers,⁷³ and increasing concern about some clinicians' level of sensitivity to consumer needs and demands⁷⁴. Within the health care system there also exist misgivings: unexplained variance in clinical practice; doubts about the efficacy of many diagnostic and treatment regimens; and perceived shortcomings in the medical profession's capacity to ensure accountability of its members.

While these pressures are becoming more acute, none of them are new. As the demands on health services increase, the health system responds by repeated restructuring, with the stated goals of increased accountability, efficiency and effectiveness. There has also been a succession of schemes designed to improve the quality of health service delivery, most of which are usually imported from the market-driven private sector and designated by acronyms (TQA, CQI, etc).

Yet there is little evidence that these solutions have been effective in resolving the serious problems confronting the health service. The persistence of these problems is a testimony to the effectiveness of impediments to change.

This paper is in two parts. The first part describes an analytical tool which has been found to be helpful in developing clearer knowledge and understanding of the impediments to change. The second part is an exploration of some of the categories of impediments to change, and may help to explain why, as Prince Machiavelli observed long ago, change is so hard to achieve. It may also aid in the identification of how change can be achieved and, equally important, how change can be made sustainable over time.

Clarifying the nature of impediments to change

The Table (on the following page) demonstrates an approach designed to analyse the nature of impediments to change, using the example of care for a chronic condition such as diabetes. The first step in implementing this approach is to describe the elements of the existing system (*'what we have now'*). The second step is the articulation of the desired new state (*'what it could be like'*), and the third step is to identify the changes required to achieve the desired state (*'what has to change'*).

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Table – Improving clinical care for people with diabetes

The present reality	The future vision	The way to the future
What we have now	What it could be like	What will have to change
No one health professional has a clear mandate for coordinating care	Consultation with the patient results in the identification of a primary carer. All practitioners are aware who the primary carer is & communicate with this health professional in a timely way. Patient is the coordinator of their own care	Change in the relationship between health professionals & patients. Changes in the role of health professionals. Availability of a patient held record (smart card)
Each of the many health professionals involved in the care of a patient operates independently eg – general practitioner, specialist endocrinologist, dietitian, podiatrist, & diabetes educator	All health professionals involved in the care of a patient are supported by systems & processes which enables reduction in the fragmentation of the provision of service	Compatible IT system for transfer of patient information across health professional boundaries, eg clinical information about a patient who is discharged from hospital is provided directly to general practitioners & others in a timely way
Conflicting advice is often relayed to patient about diet, exercise, medication & aims of treatment	All health professionals relay consistent information to patients based on agreed standards of care	Standards of care developed, disseminated, & taken-up & used by all health professionals in clinical decision-making, eg goal for HbA1c is 7.5 mmol/L Variation to this goal for clinical reasons is communicated to all health professionals involved in the care of the patient
	Consumers have access to information about their condition & options for its treatment/management when the knowledge is required	Graded clinical information available on Web
Diagnostic information is not available in a timely way eg medication is often prescribed prior to pathology tests results being available	Timely clinical decision making based on diagnostic results	Change in medical culture

Clarifying the nature of impediments to change

The examples in the Table will be used to illustrate a number of categories of impediment to change, and to explore ways of surmounting them.

Example 1: Improving integration and coordination of care

Improved health outcomes for patients have been shown to occur when health care is integrated to enable continuity of care and when clinicians formalise the coordination of care across health care settings⁷⁵.

In NSW better integration of health care is constrained by the legislated separate responsibilities of three tiers of government in Australia. The funding of health care in Australia illustrates the complexity of the Australian federal system, with state and federal governments having different responsibilities for funding health care. For example, funding for general practice is provided by the Commonwealth Government, while hospitals are funded by the state government through a system of grants from the Commonwealth. These structural arrangements have resulted in complex funding arrangements and perceptions of cost shifting between the Commonwealth and state, which has resulted in loss of trust between these agencies.

Further, the current Commonwealth–state health agreement is based predominantly on a fee for service basis, which encourages medical practitioners to limit their activities to seeing as many individual patients as possible. The current modus operandi of these separate entities creates perverse incentives which hinder better-coordinated and/or integrated care for the patient.

These are examples of **structural** barriers to change. Not only do they have the capacity for creating substantial perverse incentives, but they are also among the most intractable of the impediments to change, given the nature of political power.

There are other impediments to better coordination of care. Over the past thirty years general practitioners in metropolitan areas have been limited to providing care in a community setting and have been progressively excluded from providing care in hospitals. Paradoxically, general practitioners have not been actively involved in the delivery of community health services⁷⁶. This can often result in general practitioners being outside the ‘loop’ in the transfer of patient care from a hospital setting to a community setting adding further complexity to facilitating continuity of care, an important element of better coordinating and/or integrating health care.

These are examples of **cultural** barriers: the relationships between health professions are an example of how **professional culture** can impede change.

A higher value is often placed on working in a large teaching hospital, and/or in a specific medical sub-specialty than on providing generalist care in a community setting. To change this culture it will be necessary to make it more attractive for health professionals to work outside hospitals; and to ensure that health professional training includes the development of the skills to enable health professionals to involve other health professionals and patients in decision making about care; and for attractive career paths to be developed for those clinicians and managers who wish to become generalists and/or work outside traditional settings.

In Area Health Services, the focus of the provision of health care is hospital based, and there is strong resistance by hospital staff to changing the way that care is provided⁷⁷. This is despite the evidence of the inability of hospitals to operate efficiently and effectively³, and the need for integrated systems of care to manage people with chronic disease.

Apprenticeship models of learning which are well established within the health system, result in the practical training of most health professions being largely confined to a hospital setting, even though there is evidence that currently over 90% of health care occurs in the community. The training experience is often limited to providing treatment in an acute care sub-specialist environment rather than exposing students to a holistic range of options and settings for providing health care often resulting in qualified health professionals being reluctant to work in a generalist setting.

These are further examples of cultural barriers; in these cases, it is the organisational culture that is impeding change.

Example 2: Improving communication between health professionals and patients

Improving communication between the primary secondary and tertiary health care systems is enhanced through having information systems in place to monitor the clinical status of patients over time and for these information systems to be networked across health care settings.

However, in the health system mechanisms are not well developed for:

- providing clinical feedback to, and for facilitating communication among, health service providers, and between health service providers and their patients
- collecting the right data for measuring changes in health outcomes⁷⁸
- determining the level of patient satisfaction with the outcome of the medical intervention.⁷⁹

This is another example of how **organisational culture** can be the stumbling block.

2 Organisational culture can be changed, but it is often a slow process. In order to bring about change, managers of health services and governments often resort to artificially creating ‘uncertainty’; for example, by changing the structure of health services, and using technology to encourage incremental change. This action is based on evidence that changing an existing organisation’s culture is more likely to occur if an organisation is new or there is a level of uncertainty within the organisation, which results in the organisation being weak⁸⁰. Uncertainty in the workplace however, can have unintended negative consequences for example, it can reduce the commitment of staff to their work which in turn may result in lower retention rates of staff, and increased costs of recruitment and job familiarisation.

There is some evidence to suggest that professional culture may be more powerful than organisational culture. Decision-making patterns were stable within a number of professional cultures in the hospital setting (clinical nurses, nurse managers, clinical doctors, medical managers, and hospital managers); across a range of organisational settings (hospitals within Australia; as well as teaching hospitals in Australia, New Zealand and England) and cultures (centralised decision-making verses decentralised decision-making)³.

Example 3: Improving clinical management

Improved health outcomes for patients have been shown to occur when clinical decision making is based on agreed standards of care⁴. It is often the case however, that patients with a chronic condition receive conflicting advice from different health care professionals involved in their care.

The degree to which agreed standards of clinical care are taken-up and used in clinical decision making by health professionals across and within, professions is greatly influenced by **professional culture**.

A further category of impediment is the **personal** barriers. Because these are often more local in their impact, they may not feature prominently in broad-brush analyses such as the one depicted in the Table on page 76. This impediment to change may range from personal incompatibilities between leading players, through fixed personal beliefs held by those in positions of power, to personality attributes which make it difficult or impossible to work collaboratively with an individual.

It is uncommon to find examples in the health system where impediments to change in this category are confronted directly. They are more often overcome by organisational restructure, or they may disappear through natural events or the passage of time.

Conclusion

In summary, there is and always will be, a wide range of principles and practices of care for people with ill health. Differences exist between teaching hospitals and local practitioners, and between regions of the country. Differences exist among patients in educational level, skills in personal self-control, and finances available to pay for medical care, supplies and the often-expensive foods that facilitate good health. Health professionals who deal with a range of clients from diverse ethnic backgrounds also encounter cultural differences. To implement change in such a complex environment requires a philosophical and practical commitment to communication, cooperation, collaboration, and formalised mechanisms for exchange of information and participation in providing care⁸¹.

Successful development and implementation of alternative ways to provide care also requires: a well designed policy and planning process, which facilitates a balance between the work of policy makers and health service planners (the top-down approach) and the work of primary health care providers, patients and their carers (the bottom-up approach)⁸². This combined approach requires control of resources and assets, and involvement of policy makers, planners, service providers and patients early in the development of policies and plans to enable all those people to have ownership of the final product. This approach was used by the NSW health system in the development of the ‘NSW Government Action Plan for Health’.

To achieve success in implementing the alternative ways to provide care such as those outlined in the current health system reforms, health professionals and managers will require also an understanding of both the types, and uses, of power, and the role of leadership in influencing change.

Lastly but possibly the most important component of managing change is a strong commitment from the leaders, which must be reflected in time, behaviour, in budgets, and, most of all, in the way in which leaders deal with people⁸³. In particular leaders, by their actions, give clear messages to staff (and others) about the organisation's priorities⁹. For example, health leaders communicate to staff the importance of patient care by how they include in the provision of care the views of patients about the type of health care that best meets their physical, emotional and social requirements.

The way forward

The NSW Health Department's Clinical Council recommends the Area Health Services devise strategies for addressing barriers to change within their Areas and develop criteria for accountability in relation to overcoming those barriers outlined in the paper.

Appendix 3

Acronyms

3

AHS	Area Health Service
AMA	Australian Medical Association
BMMS	Better Medication Management System – A project of HealthConnect which records a life record of medications prescribed and dispensed
CAT	Computerised Axial Tomography
CHIME	Community Health Information Management Enterprise
CNC	Clinical Nurse Consultant
CNS	Clinical Nurse Specialist
CPPC	Collaborative Projects Planning Committee. A committee comprising representatives from NSW Health and the Health Education Sector established to promote education in the environment of information systems
EHR*Net	The term for the NSW Health node of the Electronic Health Record
EHR	Electronic Health Record
EPR	Electronic Patient Record
ERCP	Endoscopic Retrograde Cholangiopancreatography – A diagnostic test which examines the bile ducts
ETD	Education, training and development
GAP(H)	Government's Action Plan for Health
GEHR	Good Electronic Health Record HealthConnect The name given to the National Electronic Health Record
HIANSW	Health Informatics Association of New South Wales
HISA	Health Informatics Society of Australia
HIE	Health Information Exchange (Data warehouse)
HINA	Health Information Network for Australia. The report of the National Electronic Health Records Taskforce
HL7	Health Level Seven. The messaging standard for health
HSBA	Health Service Business Area
IMD	Information Management Division
IM&T	Information Management and Technology
IMICG	Information Management Implementation Coordination Group. The Information Management Group of the NSW Government's Action Plan (GAPH)
ICIP	Integrated Clinical Information Program. The name given to the priority programs to meet the GAPH priorities for information systems IT Information Technology
JRMO	Junior Resident Medical Officer
NHDD	National Health Data Dictionary
NSWNA	New South Wales Nurses Association
NHIMG	National Health Information Management Group
PAS	Patient Administration System
PC	Personal Computer
PCR*Net	Patient Centric Referral Network. The middleware component of the EHR
PMI	Patient Master Index
PoCCS	Point-of-Care Clinical Systems. A system that provides order management, results reports and clinical documentation
UI	Unique Identifier. A number that uniquely identifies a patient/client record
UPI	Unique Patient Identifier. As above
VDU	Visual Display Unit
VMO	Visiting Medical Officer

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