IMPACTS OF MEDICAL TECHNOLOGY IN AUSTRALIA
PRODUCTIVITY COMMISSION PROGRESS REPORT

COMMENTS BY AUSTRALIAN ELECTRICAL AND ELECTRONIC MANUFACTURERS' ASSOCIATION (AEEMA)

Introduction

The Australian Electrical and Electronic Manufacturers' Association Ltd (AEEMA) is pleased to provide written comments on certain of the findings in the Productivity Commission's Progress Report "Impacts of Medical Technology in Australia", released for public comment in April 2005.

AEEMA is the peak national industry body in Australia representing some 400 infrastructure providers for Australia's ICT, electronics, and electrical manufacturing industries. It is an incorporated association organised in three principal divisions (electrical, electronics and 'ICT Australia®'); member companies belong to some 17 industry fora. AEEMA has its head office in Canberra, and enjoys strong links with the Australian Government and regional government agencies.

Project-based activities are a signature of collaborative work between AEEMA member companies and other industry associations, government agencies and authorities. One of these, the ICTeHealth Project, commenced in 2001 supported initially by funding from the then National Office of Information economy (NOIE) and the then NSW Department of Information Technology Management (DITM). It was one of the first industry-government cooperative efforts aimed at investigating the flow of data through a hospital, from the perspective of the medical and support staff working with such information system flows on a daily basis.

AEEMA was the project manager for this activity from 2001. Other participants included the Australian Information Industry Association (AIIA) and NetMap

Analytics who provided the analysis software tool to identify trends and patterns concealed in large collections of information. Pat Gallagher from Casprel Pty Ltd has acted as strategic facilitator throughout the Project.

The findings from the first stages of the ICTeHealth Project are here presented for the benefit of the Productivity Commission in the context of its initial Progress Report findings under **Section 8.3 Technology Assessment**. This section of the Commission's Progress Report aims to identify institutional issues and health technology assessment issues by broad technology types, namely:

- medical procedures;
- prostheses and devices; and
- ICT systems.

AEEMA's comments herein are confined to the last of these technology types, ICT systems.

Project Description

AEEMA's ICT eHealth Project was established to investigate information flows in four (4) areas of clinical process within a hospital – pharmacy, purchasing, pathology and radiology. Data collected focussed on the mechanisms by which information passed between disparate data capture, storage and retrieval systems. In the vernacular, these processes were known as the 'pipes and plumbing' in hospital ICT systems. Ten (10) public hospitals in NSW were selected to participate in the project.

Data collected was analysed to identify and understand the causes of breakpoints in the information flows, and the consequences thereof. Remedial actions were proposed and provided to the test hospitals for implementation as necessary. On a broader strategic level the results were also targeted for use as benchmarks within Australian and international health systems, thus allowing the development of more relevant ICT standards, products and services for healthcare use.

The Need for Internal Data Interoperability

The benefits of ICT applications in any industry sector accrues from 'once-only' information entry. This means that information can be shared between people and systems without having to manually re-enter it into other information systems. This saves time, removes bottlenecks, and eliminates or reduces the risk of human error, all of which have penalties in terms of patient service,

professional efficiency and cost. It is the first step towards genuine interoperability between information systems.

In almost all organisations of any size, information systems have grown as 'silos' separate from one another. The introduction of 'Enterprise Resource Planning' (ERP) systems over the last decade has made great strides in breaking open and connecting the internal silos of corporate information – financial, HR and their associates such as payroll, project management, production control, material management, etc. The focus now is on the information systems that directly affect the business, most notably transactional e-commerce and other information flows that affect customer service and enhance operational efficiency.

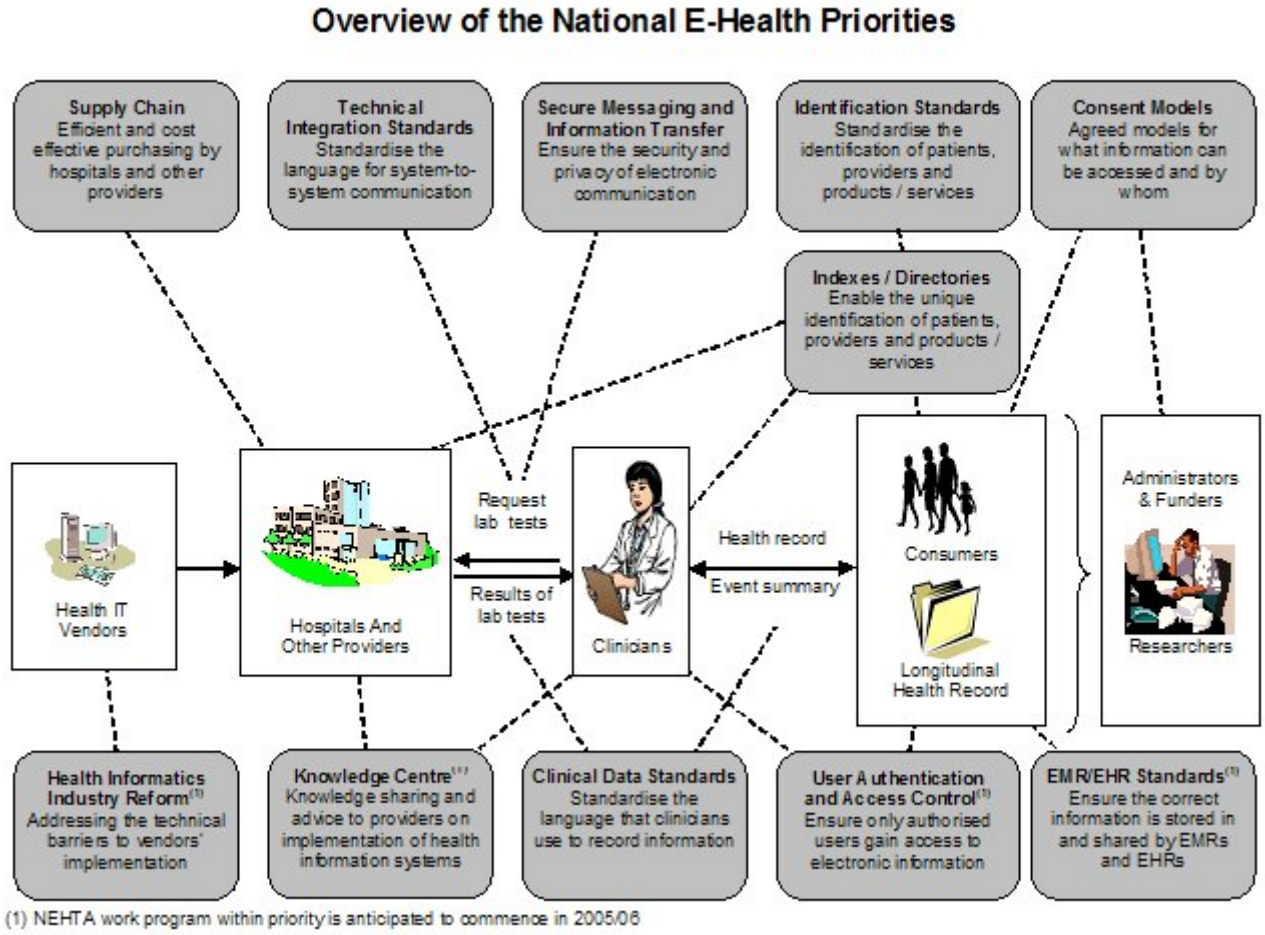
The Results of Health Technology Assessment – Productivity Commission Report

The Progress Report notes that while there are many ICT projects underway across national and state health environments, certain stakeholders reported concerns that these activities are "uncoordinated, inadequately resourced and suffer from diffuse accountability and decision making." (page 196)

In an effort to address those concerns the National E-Health Transition Authority (NEHTA) was established in 2004 to deliver on e-health priorities, namely *standards and infrastructure* requirements needed to support connectivity and interoperability of electronic health information systems.

AEEMA raises two issues in relation to this pertinent assessment by the Productivity Commission. We note that existing work is already being undertaken on ICT health standards via the various health-related technical committees within Standards Australia. In particular IT-014, comprising key health and ICT experts, is currently examining more than twenty (20) health based standards platforms including client identification, electronic health records, common data types and referral messaging. The recent suggestion of another standards-based program of work within NEHTA (see graphic representation below) runs the risk of replicating or complicating the work under way in IT-014. Understanding the relationship between the openEHR (developed by DSTC) and the work already undertaken by Standards Australia through IT-014 may explain the situation. AEEMA suggests it is of paramount importance that NEHTA representatives consult with Standards Australia about these potentially duplicated activities.

NEHTA ACTIVITIES



Secondly, the Progress Report further observes that assessment of the costs and benefits of Health*Connect* has been disjointed – see page 197. It goes on to say that the focus of Health*Connect* is primarily on General Practitioners rather than hospitals. "However, it appears that the major interoperability problems are **within and between hospitals**, as well as linking medical specialists into the system." (see page 198. Emphasis added)

While we do not wish to comment on the efficacy or efficiency of Health*Connect,* the higher level principle of appropriately assessing costs and benefits in the delivery of health services in Australia is an issue which AEEMA strongly believes must be addressed by government. The preliminary results of our own ICTeHealth Project highlight this clearly, and furthermore, *they support the*

observation made by the Productivity Commission that interoperability issues are most evident in the hospital system itself.

This is the situation in all OECD countries; however, the UK and the USA are spending significantly more than Australia in rectifying the legacy issues and investing in new ICT infrastructure. Commentators state that Australia needs to double its ICT investment to 4% or more of health costs over 5 years to gain parity with comparable spending levels in the USA and the UK.

AEEMA's ICTeHealth Project Results

Project Summary and Methodology Outline

Over the period of the project the nature and scope of the type of data mapped changed considerably. In the early days the project team thought the best survey method was to 'track a patient.' This was correctly amended to map the Information management (IM) links where data is captured and exchanged, reproduced using NetMap software into graphic representations of where data is reticulated manually and electronically.

Therefore, for the later hospitals in the Project the team produced a different 'picture' of the study outcomes in a spreadsheet format where the priority of ***what is*** and ***what must change*** was graphically indicated. The underlying goal was to illustrate, in care terms, what ***must*** be remedied as soon as possible, what ***should*** be implemented and what ***could*** then be put in place over time. From the beginning the project was an ICT industry initiative aimed at advising the health sector where the breaks and leaks in the internal hospital IM 'pipes and plumbing' are, and how best to repair the systems.

Key points emerged:

- Mapping operational practices needs to precede mapping the technology
- It is more likely that hospitals cannot produce a timely, accurate and useful discharge summary and when they do so, it is largely manually complied
- Top down change is required to include consultation with the workforce and deliver real and demonstrable improvements in outcomes, including clinical convenience and patient care
- Standards must be implemented and not merely acknowledged as 'nice-to-do'

- It should be accepted that security and privacy outcomes will be better in e-health platforms than in manual regimes
- To achieve seamless IM all *silo teams of service providers* need to see the patient as 'our' patient, not 'my' patient.

The project study found that no hospital in the group can deliver a seamless discharge summary without countless, error-incurring and debilitating manual re-working of information. This results in significant time gaps between patient discharge and summary records being available to clinicians outside the hospital.

We often hear the cliche statement that *'it is not technolgy, it is people'.* In this case that is a true observation. The analogous gaps and leakages in the ICT *pipes and plumbing* are a result of people acting in tribal silos with an entrenched attitude of 'them and us'. We now realise that silo work practices are ***the key issue*** to address. The mapping illustrates that inter-personal tribal rifts blur the inter-system technology gaps.

This shows that serious managerial and policy leadership as well as *courage* is needed to amend the culture. A way to see this is to accept that clinicians, between each other and with non-clinicians, use a different vocabulary to represent the same things. When this is converted into data for computers, the human 'babble' becomes replicated 'electronic trash', exchanged between two regimes.

Returning to the mapping methodology, we can group a number of elements that are identified as separate problems but are collectively part of the overall environmental and policy imperatives that must be addressed:

- The need for a common objective and purpose as to why any change to e-health applications is best *for the patient*, more convenient for the clinician and will sustain a ***world class*** health service outcome. This demands better *government leadership*

- The requirement for a common language to express work elements that can be replicated electronically at the source and re-used by any and all practitioners and staff involved in patient care – including the supply chain

through to the accounting department, not merely the disparate clinical functionality of IM

- The delivery to hospital staff positive change mechanisms so they realise technology is an aid not a burden

- The recognition that e-health cannot happen without a total implementation of (IT-014) health informatics technology open standards, and the elimination of duplication across various standards institutions

- Remedy the perception that ICT is not as reliable as it needs to be; often the justification for implementation delay is that 'the system lets us down.' The ICT industry must educate and deliver; its services and infrastructure must out-perform any manual system, be more convenient, impact positively on patient care and reduce medical misadventures

- Finally, the current invisible factor of non-interoperability must be ruthlessly reversed into a ***mandatory***, single, ***standard*** business requirement in the health sector.

The AEEMA ICTeHealth Project reached these conclusions from interviewing one hundred and eight (108) participants in six hospitals and observing them in the 'coalface' environment. Hospital participation was sought through correspondence from the NSW Department of Health and direct contact with public healthcare providers. Preformatted questionnaires and data sheets were developed for data capture. The lack of supportive government funding inhibited the project beyond the six hospitals reviewed with the final two hospitals being mapped without payment to the project facilitators.

Each of the clinical areas selected consists of a demand-side (clinical users) and a supply-side (service providers). Clinical users raise orders and\or materials (blood samples) that are transferred to the service provider for processing or analysis resulting in the return of human-readable results or materials (goods & medication). The Project aimed to demonstrate the variations by which these activities were achieved, what the major inhibitors to outcome were and how ICT improved that outcome.

Each time information or material changed format or location, new data was recorded and this process was mapped. This included variations required for a routine action, urgent action or out-of-hours action and each flow point was assessed against preset contributing factors such as description, time, mode, media, transport, richness, origin & destination, frequency and pull \ push subtype. Subsequently, each flow point was analysed against its contributing or inhibiting impact on outcome.

The data sheets and questionnaires were then entered into analytical software to create comprehensive overviews of data and material flows, map consistencies and inconsistencies and isolate action of greatest benefit to outcome.

This graphic data with explanatory descriptive formed the final report to the participating hospital and the basis for development of a generic, consolidated report.

The facilitators of this Project were left with the strong indication that in comparing public policy statements regarding health sector improvements with the current ICT and other change-related activity happening in hospitals, there is virtually no workplace engagement in these 'visions'. Rather, there is a ***survive-in-crisis*** culture of apathy, underpinned by a belief that the situation is unlikely to improve merely through ICT-induced change.

To date ICT solutions have been implemented without mapping current clinical practice thus failing in the alignment of ICT business-of-health solutions to the clinical practice-of-health. This has resulted in shifts in practice with resultant task transference from a service-provider to a clinical-provider or vice versa, thus creating the assumption of a benefit to one group and a failure to the other.

This project found that ***mapping*** a real-world situation with an aim that was heavily ICT focused, as it needs to be, has in fact illustrated that an ingrained cultural attitude of many dedicated clinicians and other supporting staff is certain to add to the chance of failure rather than success of e-health in Australia.

Mapping the journey of a patient's experience and consumption in terms of the discharge summary touches on almost every aspect of healthcare and requires a practical, provable, demonstrable, working model for all the elements mentioned above. Whatever happens to a patient in a hospital as an event-of-care, has to be

compiled into a record that will ultimately result in a billable event. Efficiencies must be achieved in these processes so that the costs of health service can be effectively managed.

Results

- Within the four clinical service areas reviewed there are isolated "key value points" that are the corner-stones of directing patient care. Within Pathology these corner stones are needs analysis and order creation, sample processing, turning material into human-readable outcomes and receiving results and using the information to progress patient care.

Area	**From Create Order**	**From Test Analysis**	**From Receive Results**
Hosp.1			
After hours	10	5	4
Acute Care	10	5	3
Routine	10	5	4
Hosp. 2			
Urgent	10	5	3
Routine	10	5	3
Acute Care	10	5	3
Hosp. 3			
Routine 1	9	3	4
Routine 2	10	3	4
Acute Care	11	5	6
Hosp. 4			
Routine	9	5	4
Urgent	10	5	4
Hosp. 5			
Routine	11	5	3
Urgent	10	5	4
Hosp. 6			
Routine	11	5	4
Urgent	10	5	4
Acute Care	12	5	7

Full flow captures demonstrated in attached document *"Process Flow Examples – ICT Industry"*.

- ICT solutions were not observed in any hospital reviewed for the whole clinical process, that is to say, a complete closed-loop process solution did not exist. For example, ICT solutions may be available in Pathology, but orders are still raised by the clinical providers on paper and require re-keying within Pathology. Concurrently, Pathology reports may be available on a computer terminal within the clinical areas, but they are written into the patient's record by hand as there are no printers.

- One ICT solution does not fit all. This was particularly obvious between adult and paediatric requirements. For example, for an adult the clinical provider raises an online order for an MRI and over time receives notification of appointment. Within paediatrics, the online order is raised only after the booking of an anaesthetist and a day-only bed, hopefully resulting in the alignment of the anaesthetist, admissions, MRI scanner & staff and patient at the same time. Lack of interoperability between ICT solutions means this requires multiple phone-calls and changes.

- Implementation of a single ICT solution to multiple sites does not result in common outcomes.

- ICT solution benefits were isolated. Radiology Departments receiving paper-based orders reported up to 80% of total orders were incorrect or incomplete resulting in significant productivity loss and inhibiting information flow.

- On average, Medical Record Departments receive approximately 12,000 "loose-leaf" information sheets per month that need to be entered into medical records as the patient tends to move faster than the information.

- ICT solutions are designed as a set, forward-flow structure from order creation to report. These single flow designs eliminate clinical discussion between services and care providers as team members and negate the opportunity for order amendment. For example, Accident & Emergency may create an online order for an urgent MRI. If the patient dies or is

transferred to the operating theatre, the order cannot be retrieved and amended, staff must pick up the phone or walk to the Radiology dept.

- There was no demonstrated interoperability between systems. For example, the Emergency Department Information System (EDIS) was not linked to the clinical diagnostic order system. Thus staff had to log-on in order to re-key all patient data and subsequently manually shift data between systems. In one hospital an advanced critical care ICT solution was used. This allowed prescriptions to be ordered online, unfortunately these orders went nowhere and the Pharmacist visited the ward, looked up the prescription, wrote it on a piece of paper and transferred the order by hand to Pharmacy.

- Retention of proprietary ICT solutions following the implementation of state-based ICT solutions isolates areas from consolidated logistical data collection with all the associated problems. Two examples were found, the Catering services ICT solution does not link with the logistics and finance ICT solution and within Pathology services "home-grown" order systems exist in isolation.

- The retention and storage of records varies from hospital to hospital and tends to be dictated by varied interpretations of Health Insurance Commissions requirements. For example, some service providers believed that they had to keep a hard copy of the order request and report in storage, whilst others removed paper-based copies for electronic data storage.

Summary of Findings

- ICT solutions provide benefit to patient outcome but are a long way from being implemented to their full potential.

- Lack of interoperability impedes clinical outcome and return on investment.

- Interoperability is impeded by the absence of a unifying medical records identifier.

- Currently ICT solutions do not match the clinical and business requirements regarding information and communication and therefore do not support the business practice of health as a team concept.

- In significant cases the patient moves faster than the information.

- Clinical practice-of-health has not been amended with the introduction of ICT business-of-health solutions.

- No two hospitals had consistent processes.

- ICT solutions must be individually assessed against each individual site.

- In certain areas there are isolated variations between clinical-practice needs for adults and paediatrics, thus ICT solutions will vary.

Conclusions

Prior to this Project there was no known publicly available research that demonstrated the review of current practices within clinical areas before the implementation of ICT solutions. Therefore, the isolation of the greatest inhibitors (time, data error) to currently achieving desired outcomes and the assessment of benefit from ICT solutions have never been fully accessed.

The Project demonstrated that there remains a need to streamline both clinical and business communication channels through establishment of protocols and alignment of ICT functionality to that of clinical team practice.

All hospitals participating in the Project have reported beneficial gain. The Project demonstrated that there are significant gains to be made through robust review of clinical and business practices prior to the implementation of ICT solutions. The isolation and removal of inhibitors to information and material flow enhance productivity and deliver efficient, patient-centric efficiencies.

Clearly there is no dollar expenditure or return on investment summary in this activity. Rather as the aim was 'mapping the landscape' it is only in that context that the Project can report on any KPI or other performance matrix. In terms of

identifying recognisable efficiencies, productivity, profitability and cost savings for Australian e-health aspirations, the Project's delivery value is compelling.

Factual and anecdotal evidence from UK and USA studies as well as published data in Australia indicate that the huge patient safety, quality, productivity and dollar factors are not merely substantial, but must be made sustainable. A broad estimate, commonly used, is in the order of 10% of *current costs* saved by the effective enablement of IM systems (see *Can A National Healthcare Information Network Work?* 06/15/2005 at **http://knowledge.wharton.upenn.edu**). Note however that this saving is on current costs only – it does not necessarily mean that healthcare will be "as cheap as it was 20 years ago." (see M. Pauly, Wharton Healthcare Systems, quoted at page 2 of the article cited above.)

This ICTeHealth Project has shown that as a part of the total IM framework, our hospitals are unable in any meaningful way to:

- accept incoming e-transactions from a wide range of clinical and industry partners
- reticulate information electronically within their walls or between departments in any campus, and
- transmit e-transactions to clinical, industry and other government recipient partners.

What the Project set out to do has been completed as best it can be in six randomly selected (NSW) hospitals. Naturally, there will be examples where things are better, worse or merely different in scale or impact. Obviously the current take-up of ICT applications in the healthcare sector is vigorous, which is not surprising considering the various projects that require tendering and responses to meet State and Federal programs such as Health*Connect* and many other allied examples.

Demand is not an issue. The type of ICT supply is a big issue. Canadian and UK programs are harmonising ICT implementation to address the issue of interoperability. To date, notably within the local hospital sector, there is little apparent practical evidence of this being achieved. A possible solution would be for all concerned to agree an interoperability code-of-conduct mission statement, to be observed by the ICT buyer and supplier to meet a national matrix of 'open' criteria. The ICTeHealth Project had as its central goal the development a code

statement that would benefit the participating companies to better serve their health clients who in turn can then deliver the benefit of e-health applications to the Australian public.

With the present lack of a customer driven demand for open systems, it is unreasonable to expect the ICT seller to somehow volunteer to change their business plans, and meet a vaguely defined, largely misunderstood and misinterpreted fact. Until interoperability is mandatory the community will never accomplish, experience or benefit from the promise of e-health

The potential ability of this ICTeHealth Project to be able to 'franchise' the methodology to other agencies within the health sector would be a very useful and rewarding plan.

As mentioned earlier in this document, the ongoing benefit will be greatly enhanced if more hospitals can be surveyed to value add findings onto what has so far been uncovered. And, in a way that further adds value by specifically focusing the mapping task to a single application – namely the discharge summary. A focused study offers the most for the least in terms of time and outcomes, because it requires data to be linked merged and reconciled from admitting GPs and specialists, from internal clinical service providers and the supply chain through to the EHR and billing functions.

Once a hospital can produce an e-Discharge Summary the outgoing IM value to GPs, specialist, Government and other agencies will be considerable. When the circle of data sharing is complete, Australians will receive better care at a more affordable cost.

Members of the ICTeHealth Project

Member	**Descriptor**	**Project Role & Contribution**
AEEMA	The ICT Australia Division of AEEMA is the key pillar of the Australian Electrical and Electronic Manufacturers Association.	**Role** Principal responsibility for project outcome delivery; co-ordinate AEEMA member participation. **Contribution** AEEMA secretariat and executive staff has shown constant high level commitment to the project. Notably the

		role of the Chair in terms of leadership and motivating political and industry understanding of the issues.
AIIA	The Australian Information Industry Association (AIIA	**Role** Provide project account management and administration; co-ordinate AIIA member participation. **Contribution** A similar secretariat commitment and level of encouragement to their members to understand the larger picture
DITM DoC	The Department of Information Technology Management \ Department of Commerce is the peak NSW Government agency responsible for all-of-government responsibility ICT strategy and planning.	**Role** Facilitate NSW government agency involvement in the project. **Contribution** DoC's role from the very inception has been pivotal, with a large cash investment that symbolised far more than the value of the funds that the project had great merit.
Pat Gallagher	Casprel Pty Ltd	**Role** Project Facilitator and Manager
NetMap Analytics	NetMap is an Australian software company that specialises in tracking and mapping data systems.	**Role** Provide software and technical consulting systems. **Contribution** Their incredibly powerful 'mapping' systems proved to be too powerful perhaps for the task. Their contribution was however extremely valuable as they did prove that ''the invisible can be made visible' which allowed the facilitators to modify study procedures to get the right results.

Date/Time: Page No \ Process No

Sample only – Data Collection Sheet

Node Type Ward, Pharmacy, Radiology, Pathology, Supply, Finance, Medical Records

Sub-Type Local, Internal – dept, Satellite, External - hosp

TRANSFORMATION PARTICULARS

Name: **OUT** – Order blood test, Obtain blood sample, Order Radiology test, Order Medication, Order Goods, File, Post finance, Report blood result, Report X-ray, Forward medication, Forward goods, Forward Medical Records

IN – Receive\Use blood results, Receive\Use radiology results, Receive\administer medication, Receive goods, Analysis blood, Attend X-ray, Dispense medication, Create order, Process order, Receive file, Receive finance

Transformation Origin:_____ **Transformation Destination:** _____

Main Actor: Doctor, Nurse, Radiographer, Clerk, Pathologist, Pharmacist, Supply officer, Supplier, Orderly

Patient Required to attend Yes / No

T-Id:_____**Primary Category** Info → Info, Info → Mat, Mat → Info, Mat → Mat **Type** Enriching, Admin, Necessary

Transforming Actions Create, Send, Receive, Collect, Test, Verbal, Hand written, Examine, Perform, File, Key, Print, Save, Summon

ORIGIN OR DESTINATION I.T. APPLICATIONS (if Keyed data)**F-Id**:_____Name of software:_____

MATERIAL FLOW **F-Id**:_____**Type** M1-Sample, M2-Medical Supplies, M3-Pharmaceuticals, M4-Patient, M5-Staff

PARTICULARS **F-Id**:_____**Type** M1-Sample, M2-Medical Supplies, M3-Pharmaceuticals, M4-Patient, M5-Staff

Date/Time: Page No \ Process No

Sample only – Data Collection Sheet

FLOWS

Name(Description) :_____

IN - Origin:_____**Type** [Info, Mat] **OUT - Destin**:_____**Type** [Info, Mat]

F-Id:_____**Type** [Order, Report, Notification, Clarification*, Chasing*] **Media** [Image, Text, Form, Conversation, Recording, Voice Entry]
Transport [Phone, Fax, E-mail, E-system, Pager, SMS, Display, Messenger, Mail, Carried, Pneumatic tube] **Sub-Type** [Push, Pull]
Freq*: Clar [__] Chas [__] **Richness** [Full Data, Synopsis] **Required** [Y/N] **Time :** [Worst _____] [Most likely _____] [Best_____]

Name(Description) :_____

IN - Origin:_____**Type** [Info, Mat] **OUT - Destin**:_____**Type** [Info, Mat]

F-Id:_____**Type** [Order, Report, Notification, Clarification*, Chasing*] **Media** [Image, Text, Form, Conversation, Recording, Voice Entry]
Transport [Phone, Fax, E-mail, E-system, Pager, SMS, Display, Messenger, Mail, Carried, Pneumatic tube] **Sub-Type** [Push, Pull]
Freq*: Clar [__] Chas [__] **Richness** [Full Data, Synopsis] **Required** [Y/N] **Time:** [Worst _____] [Most likely _____] [Best _____]

Name(Description) :_____

IN - Origin:_____**Type** [Info, Mat] **OUT - Destin**:_____**Type** [Info, Mat]

F-Id:_____**Type** [Order, Report, Notification, Clarification*, Chasing*] **Media** [Image, Text, Form, Conversation, Recording, Voice Entry]
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Freq*: Clar [__] Chas [__] **Richness** [Full Data, Synopsis] **Required** [Y/N] **Time:** [Worst _____] [Most likely _____] [Best_____]

PATHOLOGY	**Status Variable**	**Transformation**	Flow 1	Flow 2
Example 1.	Afterhours	Order Blood test	Order data onto Diagnostic system	Transfer & Print copy of order
Pos \ Neg \ Enviro			Pos	Pos \ Enviro
Function critical			***High***	Med
Interoperability			Fair - Med Record absent	Good but negated
ICT Impact				Potential enhancement
Data integrity			Good	Need print only Identifier HIC. **N1**
			Flow 1	Flow 2
Example 2.	Acute Care	Order Blood test	Order data onto Diagnostic system	Transfer & Print copy of order
Pos \ Neg \ Enviro			Pos	Transfer Pos \ Print Neg
Function critical			***High***	Med
Interoperability			Linked to Clinical Care System Good **N2**	Good but negated
ICT Impact				Potential enhancement
Data integrity			Good	Need print only Identifier HIC. **N1**
			Flow 1	Flow 2
Example 3.	Acute Care	Order Blood test	Patient data entered on Clinical System	Patient data entered on Diagnostic sy
Pos \ Neg \ Enviro			Neg	Neg
Function critical			***High***	Low
Interoperability			Poor - Nil	Poor
ICT Impact			High	High
Data integrity			Good	Fair - rekey
			Flow 1	Flow 2
Example 4.	Non Urgent	Order Blood test	Order data onto Diagnostic system	Transfer Order Online **N3**
Pos \ Neg \ Enviro			Pos	Pos
Function critical			***High***	Med
Interoperability			Fair - Med Record absent	Good
ICT Impact			Potential enhancement	Low
Data integrity			Good	Good
	Status Variable	**Transformation**	Flow 1	Flow 2
Example 5.	Urgent	Order Blood test	Order data onto Diagnostic system	Transfer & Print copy of Order
Pos \ Neg \ Enviro			Pos	Pos \ Enviro
Function critical			***High***	Med
Interoperability			Fair - Med Record absent	Good but negated
ICT Impact			Potential enhancement	Potential enhancement
Data integrity			Good	Need print only identifier HIC. **N1**
	Status Variable	**Transformation**	Flow 1	Flow 2
Example 6.	Non Urgent	Order Blood test	Order data onto Paper Form	Place in Pathology Tray

Pos \ Neg \ Enviro			Neg	Enviro - potential loss
Function critical			***High***	low
Interoperability			Poor - Nil	Poor - Nil
ICT Impact			High	N\A
Data integrity			Poor (80% error)	Poor

Flow 3	Flow 4		
Take Sample	Transfer Sample & Order - carry		
Enviro	Enviro \ Neg - High time lapse		
High	Med		
Poor	N\A		
N\A	High		
Human error potential - sample label	N\A		
Flow 3	Flow 4	Flow 5	Flow 6
Take Sample	Print Label - Apply to sample	Transfer Sample & Order - Pne tube	Doctor validates Nurse order 20%
Enviro	Pos - but high human error level	Enviro	Neg - selective admin
High	Low	Med	Low
Poor	Good	N\A	N\A
N\A	Low	Low	N\A
Human error potential - sample label	Good	Good - but duplicated	Good
Flow 3	Flow 4	Flow 5	
Order raised on Clinical System & Print	Take Sample	Transfer Sample & Order - Pne Tube	
Neg	Enviro	Enviro	
High	***High***	Med	
Poor	Poor	N\A	
High	N\A	Potential enhancement	
Fair - rekey	Human error potential - sample label	N\A	
Flow 3	Flow 4		
Take Sample	Transfer Sample & Order - Pne Tube		
Enviro	Enviro		
High	med		
Poor	N\A		
N\A	Potential enhancement		
Human error potential - sample label	N\A		
Flow 3			
Attend Sample collection round	Transfer Order & Sample - carry		

N1 - Print whole order. Issues of HIC requirements & storage - no ICT advantage. Really only need identifier to marry sample to online order.

N2 - Whilst the system has excellent interoperability within Acute Care - it must be printed for transfer or discharge.

N3 - Whilst low flow points - productivity is transferred to another area.

Notes

ROI for ICT is hampered by poor, or antiquated clinical process.

Poor interoperability indicates a high potential for ICT impact.

Enviro	Enviro \ Neg - High time lapse		
High	Med		
N\A	N\A		
N\A	High		
Human error potential - sample label	N\A		

Receive order for test
Receive order for test
Receive order for test
Receive order for test
Receive order for test
Receive order for test