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# An Architectural Approach to Health Communications Services

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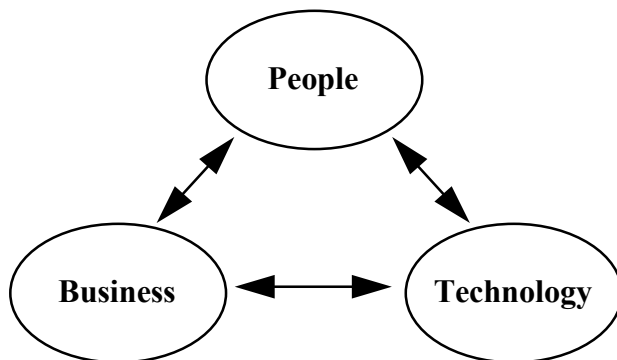
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Communications services for the Australian health system have received a great deal of attention lately, especially as a result of the national initiative called the HCN (Health Communication Network). The presence of an entity which provides a focal point and forum for debate and discussion is helping to bring cohesion to the many disparate efforts being undertaken in this area. Importantly, the presence of the HCN also sends a signal to health and the information-related industries that the government is now serious about the need to improve the way information is used in the health sector.

This paper presents a framework to guide the many people and organisations who have an interest in health communications services to interact in what is essentially a new market. The framework encourages a wide view and a collaborative approach.

## 1. Domains that Impact Success

Communications services are really to help *people* communicate with *people*. Often the services will also enable access to knowledge, which is after all a product of human creativity and information. In a sense, information and how to use it effectively become second order issues in this endeavour. Sometimes well-intended people promote specific technology as *the solution* to problems that are often not well understood. Sometimes they get it right, but usually for the wrong reasons. The domain where the foundation for solutions is created, is that of people interacting with people. There are a great deal of professional and related issues in healthcare that need to be resolved before answers to questions about technology can be effectively given. Anyone who ignores these human aspects and promotes the latest and greatest technology might have a few wins but won't make a significant impact.



Another important domain, which is about how things get done, can be called business. Everyone in every job has *business* that they attend to and deal with. An example in healthcare where a business issue has a key impact on technology and people, is in *gain-sharing*. In a number of the early implementations of health communications services, it has been observed that an investment made by one party (eg. GP) can provide a significant benefit to another (eg. hospital).

This begs the question: What structural elements are needed to ensure that appropriate investments are made, and that the gains from these are shared equitably amongst the parties involved, including the consumers? Sharing the investments in a way that's consistent with the patterns of the gains may well be an

important principle to emerge in this area. A related issue to this is how the services charged for, ie. who pays who and for what?

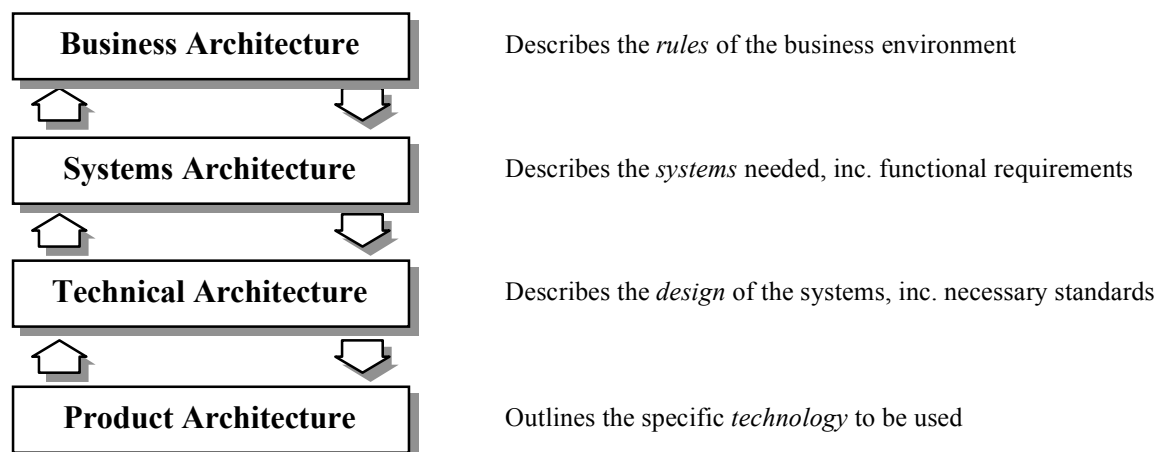
So we have a dynamic where all these domains need to be considered in order to move forward. None of these can be considered in isolation. They all interact and are dependent upon each other. A change in one will nearly always impact the others.

## 2. Architectural Layers

The environment of Australia's health system presents some particular challenges to organisations looking to design, build and operate health-related communications services. Structures, that in one sense help, but in others hinder need to be identified and factored into planning processes. Examples of some of these structures include the public-private

dimension, federal-state-local government boundaries, and the many funding mechanisms. As in any environment, the adage that *structure determines behaviour*, also holds true here. The responsibility for much of the structure in Australia's health system lies with the commonwealth government, through legislation and also through the medicare charging and reimbursements systems.

An objective in setting about to design and implement products to deliver health communications services is to minimise the impact of changes in the environment in which it will operate. A related objective to this, is for the design to have attributes of modularity that permit changes to be made to components in a relatively independent manner. When we consider the issues raised in the previous section, and these objectives, it would be helpful if we had a model in which we can sort issues and consider their relationships. An example of a model that can help is below:



While it would be ideal to start at the top and work your way to the bottom layer, in reality this is not practical. What tends to happen, and is quite effective, is that the issues are addressed on multiple fronts, and through a cyclic and consultative process all the issues and needs are identified and worked through. It doesn't really matter where you start, as long as you do; although best results can be achieved if initial focus is put into either of the two middle layers. The effect of doing this is that a greater clarity of the important business level issues are gained as systems related issues that are dependent on the business environment are dealt with. This provides an accurate base of knowledge on which changes to structures at the business level can be progressed.

As identified earlier, a business issue in Australia's health system that needs to be dealt with in order for broad scale health communications services to be introduced is how the investments and resultant cost savings and profits are to be equitably shared.

### 3. Health Communications Services - a New Market

The Australian health system, besides being fragmented like that of many developed countries, is basically structured to suit the people and organisations who run it, and not those who use it. This is evident in the many structural elements of the system that operate fairly independently. The system tends to be considered in an institutional paradigm, eg. hospitals, general practice, nursing homes, pathology, etc. This is despite that fact that many of these institutions *share* the same patients and that our requirements for health care cuts right across these institutional boundaries.

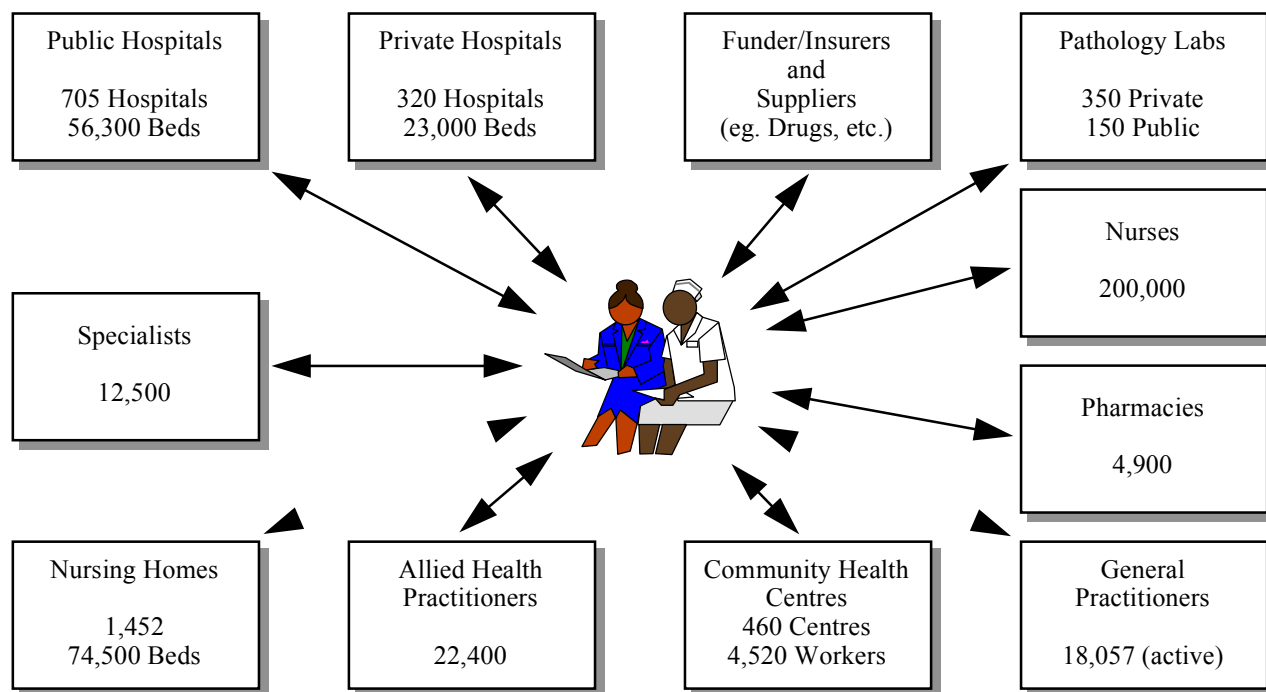
When efforts are made to "improve the health system", what typically happens is that programs are put in place that are focussed entirely on one of these institutional structures, eg. to improve productivity, quality, etc. in, for example, general practice. As a result of this, and that technology investment decisions occur within this stove-piped environment, *information* that is in the health system tends to cluster around these institutional structures and rarely crosses their boundaries. A further result of this is that the information industry has tended to map itself over that structure with organisations that specialise in the various institutional elements in the system.

Many projects in Australia, including the pilot projects of the HCN, and others from overseas, indicate that when the gaps between the health institutions are bridged with communications services, that significant benefits are created, especially for the consumer.

What we are seeing with the focus that the HCN is providing, is the emergence of a new market in the Australian healthcare sector. Telemedicine has been around for a while and many successful projects have demonstrated its value. However, the HCN is providing a concentration of focus and energy, and a signal from *the* major health services funder, viz. the commonwealth government, that it is time to get serious and to go about it in a nationally coordinated way.

At the time of writing, the exact role and nature of the HCN organisation has yet to be finalised. However, this will really determine the mechanics of who does what, rather than what needs to be done. To provide input for the answers to both questions, an industry group has been formed which is identifying issues and developing processes to work through them. The group comprises parties with an interest in the development and operation of health communications services.

### Health Communications Services: Australian Market Profile



Source: HCN May 94

As can be seen from this diagram, the opportunity for health communications services is quite vast, even daunting when you also consider the health work force is approx. 500,000 people, and that the whole population of Australia could be users of some of the services. So, given that improved communications in the Australian health sector does have the potential to improve both the overall effectiveness of the system and the particular health services provided to individuals, then the questions of what will they look like and how will they operate, become important.

I don't intend to cover the question of how the health communications services would operate in this paper, but would like to offer a model that can help to answer the question of what they might look like.

#### 4. An Architectural Model for Health Communications Services

Drawing on the information provided above, we can identify a number of important dimensions that need to be considered when working out what health communications services might look like.



What we know about the needs of people in the health sector, when it comes to communications services, is that their top priority is patient care, and that services need to be designed to improve this and not to add unnecessary complexity to how they go about doing their business.

The way that the services are *presented* to the users needs to be integrated with their normal working pattern and provide the ability to be changed as their working patterns change. As much as possible these changes should be undertaken directly by the user of the service. It has already been established as an important characteristic by the HCN that the services be designed to use *appropriate* technology. For example, a telephone may be the appropriate interface for some services, and a letter via Australia Post may be appropriate for the delivery of some information. Of course, some sophisticated communications services will require more advanced technology, but a clear design parameter is to ensure that the services are not limited to a particular style of *information appliance*.

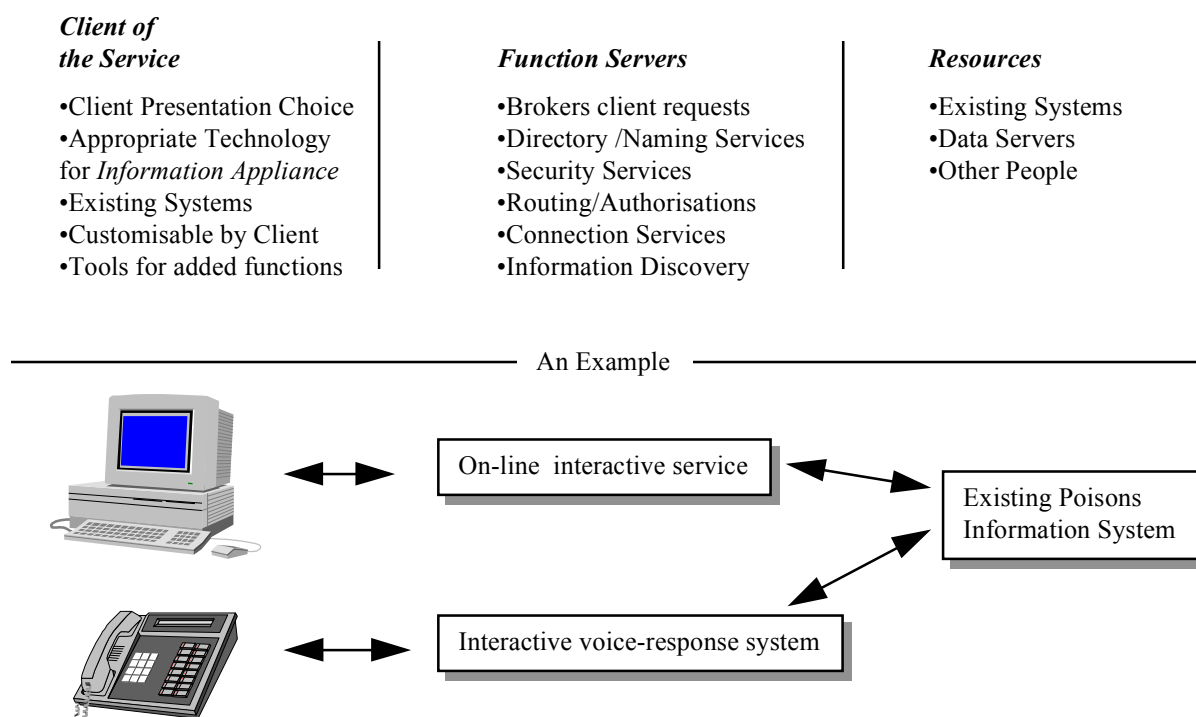
To a large extent the users of the communications services (called clients, from now on) shouldn't care what happens behind the scenes. However, in order to implement services that utilise different styles of user interaction via appropriate technologies, the service developers do have to, and a lot.

The style of interaction that would provide the clients with this level of transparency, is for them to interact with the service by telling it *what they want done*, rather than *how to do it*, which typifies many of the present systems. Let's call this approach a Business Function approach. For example, a GP may simply request a "patient admission", and the service knows what's involved in doing this and initiates the process, including for example, scanning for free hospital beds, preparing admission information and scheduling the necessary hospital resources in co-ordination with the hospital's own admissions systems.

In this type of scenario, it would be impractical for the GP to hold all of the information needed for this transaction on the systems in their own practice. This is where the *network* comes in. In this example, much of the systems and information needed are already in place. At a technology level, it just needs to be connected up with the appropriate communications technology along with necessary authorisations and security/privacy controls. This piece is relatively straightforward, however as highlighted earlier, technology is not the only component of the solution. A great deal of People and Business work needs to be done for this scenario to operate.

This example introduces the main components for the architectural model that I'd like to introduce in this paper. In terms of the layering introduced earlier, this architectural model is basically a high level Technical Architecture.

### Architectural Model for Health Communications Services



The previous example and the one illustrated in the above diagram both serve to describe the way in which the communications service interacts with the client environment, and a broad outline of what would happen behind the scenes. A problem with many architectural models and implementations in the past has been that the systems at the client end have had to know everything about the network, applications and data, down to the types of databases, their names and structures, etc. In a distributed environment as illustrated, the client essentially makes a request of the network, in a functional manner, via their chosen information appliance and the network responds, because the "rules of the road" are known to the network and the communications service knows what needs to be done for the requested function.

### 5. A Model for Collaboration

This model can become a useful map for people looking at what's involved in entering the health communications market, which by the way, I intend to especially include health practitioners and informatics specialists. Each of the three areas in the model, viz. the Client, the Function Servers, and the Resources, has particular needs and requires relatively different skills to design and develop. For example, creating technology for the way in which the

communications service is presented to the client may require expertise in human factors, GUI design, and integration with existing practice management or other local software. This set of skills is different to those required to create technology for the middle piece, and different again for those required of the Resources area, where for example "wrapping" existing systems to provide network access is needed.

The message that I'm conveying with this, is that to create effective health communications services, the people involved would be wise to consider bringing organisations into their teams that have skills in each of these areas. In this regard the model provides a relatively straightforward means of identifying the areas where additional skills are needed. Again, the People and Business domains also need to be addressed.

Another way to bring additional richness to the model is to create some depth for particular service candidates by taking horizontal slices across the model. In doing this, the high level design of the services remains consistent, which additionally provides the opportunity for modularity and re-usability. Examples that can be considered include those service areas that the HCN has already identified, viz.

- Hospital to community care communication services
- Servicing organisations, eg. committees, working parties, etc.
- Pathology communications
- Comprehensive drug management services

By adding this extra dimension, we are able to see a wide range of possibilities and opportunities in this new market.

## **6. The Role of Technical Standards**

It seems clear that standards will be required in order to design and develop health communications services, especially when you consider the goals of health that are related to the principles of universality and access, which, by the way, are Business Architecture level items. The technical architecture presented above will help people make decisions about what types of standards are needed. An architectural model after all is in essence just an aid to decision making.

A word of caution though, and that is that the presence of standards or even compliant products, on their own won't cause the health community to rush in and take up communications services. A lot of work in the People and Business domains needs to be done before the health community will be ready to talk about design aspects for communications services, which is what will determine what types of standards are needed. This of course will vary with the different areas of communications services that you deal with, however, it is a sound starting point. If ignored, a lot of effort can be wasted by information specialists debating standards when our health colleagues basically don't care about those types of questions, at that particular time.

So what I'm suggesting, is to use the above technical architecture as a framework in which decisions can be made about standards, when they need to be made. The model already describes the necessary elements and their relationships. It is wise to firstly agree on the framework and functional requirements and then on the specific standards. This approach will also aid in providing a common language for all concerned. Confusion around semantics abounds in this area. For example, what is a network service vs an application service, network management means different things to computer people and telecomms people, etc.

## **Acknowledgments**

- a) Some of the ideas for this paper come from the time that I worked for Digital Equipment Corporation and my work with their IAC (Information Architecture Consulting) service.
- b) The HCN unit of the department of Human Services and Health kindly provided me with the health system profile information and permission to publish it.
- c) The Architectural Model for Health Communications Services is broadly based on the 3-tier client/server model developed by Professor John Donovan of the Cambridge Technology Group.