# Clinical Communications

## Intranets and 'Extra'nets

Networks are the future... discover how to use them to your advantage. The principles, technology, standards, message specifications, architectures, approaches to systems integration, telemedicine and so on. We can define and engineer interfaces and messages specially for your needs; develop the business case for your intranet corporate information, develop a systems integration plan to link your clinical and administrative systems. These can completely transform the way your healthcare service functions.

We have a wealth of experience in clinical communications technology, systems integration and allied developments. It's a complicated area, but not insurmountable, and we have the depth of knowledge and experience required to help you understand the issues and concepts.

Why not read and print this overview page, and then

contact us by email today (consulting@hic-ltd.com) outlining your particular interests or concerns - or

- to enquire specifically about our associates' *'Messaging Toolkit' and 'Clinical Intranet'* products.



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## 1. What is communication?

Communication is the process of exchanging meaningful information. The process is usually split into two parts. First the means of exchange must be established and maintained – in other words the connection must be made between the communicators. Second the data exchanged must mean the same to both sender and receiver – in other words the two parties must share the same definitions and descriptions for the data exchanged (“speak the same language”). In computing terms the process of communication is fraught with complexity – for example connections may be lost or may fail to synchronise correctly, and 'noise' may interfere with the data passed. However for the most part it works!

Communications between computers is normally achieved by the passing of 'messages'. Messages may be structured, partly structured or unstructured. Structured messages are tightly defined: every data element has to be exactly the agreed length, expressed in the agreed terms and follow an exact grammar and syntax (eg EDIFACT or HL7). Unstructured messages (eg Email) may consist of little more than a block of text or numbers. In between are partly structured messages: these have some aspects defined (eg format) but may leave the content of the message to be defined by the sender.

Communications are generically of two types: 'push' and 'pull'. Push messages are where someone has information and sends it to another person – like Email. Pull messages are where one person wants information held by someone else, and has to arrange to pull the information from where it is stored – like using the World Wide Web. Healthcare requires the use of both. Some messages can be structured so as to elicit an automatic response from the host – this is called interactive messaging, where the response is automatic and does not require human intervention. Other messages are just sent and do not expect a response – 'batch' messaging.

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## 2. What is a network? An Intranet? The Internet?

A network is a functional arrangement between two or more computers whereby they share hardware and software resources. The machines are physically connected together and have networking software installed to manage the process. Various networking protocols can be used to pass information between the machines (eg Novell, TCP/IP).

The Internet is a global network of computers, which are linked using the TCP/IP networking protocol. Computers connected to the Internet come in all flavours and sizes, and use all manner of file formats and software. A subset of the computers comprising the Internet has adopted a specific way of holding information, and is called the world wide web. These machines store data as 'hypertext' using 'hypertext mark-up language (html): hypertext allows dynamic links to be set up between pieces of information, so enabling the user to 'jump' from one point to another to follow a particular line of enquiry.

An intranet is a computer network designed to be used by the members of an enterprise. The purpose of an intranet is to ensure the easy sharing of information across and enterprise. An intranet differs from an extranet (or the Internet) only in so far as the user group for the intranet is restricted.

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## 3. Why communicate in healthcare?

We recognise three quite different types of communication in healthcare – clinical, administrative and guidance. They have quite different patterns and technical requirements.

The need for clinical communication is self-evident. There is an old adage in medicine that '95% of the diagnosis lies in the history' – yet the history of the health of an individual is often spread out over many health professionals and often over entire continents. More and more experts are involved in even relatively mundane care events, providing opinions, undertaking routine tests and specialised investigations, carrying out procedures and generally providing the care. Each holds one part of the full story: the challenge is to ensure that those parts of the story are shared. Clinical communications is a mixture of 'push' and 'pull'.

However communications with administrative functions are just as important. The business of healthcare service provision is complicated and expensive. The need to strive towards greater efficiency in the production of care services, and effectiveness in the choice of services for a particular patient is paramount. Every care encounter can contribute to these goals. Various abstracts from the record of care are made and passed through to administrative officers in order to prepare claims, manage billing, accumulate throughput statistics, inform resource allocation, fulfil national reporting obligations, support basic and applied research, assist in continuous quality improvement and much more. Every one of these requires a message with a different sub-set of the data recorded for that encounter. The requirements of administrative communications can largely be satisfied with 'push' messages.

Finally there are communications relating to guidance and decision support. Patients and professionals are confronted by the need to reach decisions, often in situations where there is considerable ambiguity. Increasing quantities of high quality data being held around the world and placed on webservers connected to the Internet. Additional data of a regional flavour, such as relating to processes and procedures for accessing resources, are becoming available.

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## 4. What are the obstacles?

Recall that we identified two major aspects to successful communication – technical, including applications, file structures, operating systems, physical links, encryption and networking protocols and standards; and semantic, including message standards, syntaxes, vocabularies, data definitions, coding systems and data sets.

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## 4.1 Technical and connectivity

In the past many vendors have chosen (and some continue still) to adopt proprietary environments, for which only they are legitimately able to undertake modifications or establish connections. The exclusiveness of these environments was achieved by specification of particular ways of carrying out functions, as well as the use of proprietary file structures and communications protocols: these functions were then protected as the intellectual property of the vendor thereby preventing others from accessing or modifying them

Whilst this has in the past presented a major obstacle to developments, various communications and systems integration developers have created interfaces which enable

platforms with almost any technical specification to be able to communicate with each other. However it is considerably easier and cheaper to link together some technical specifications than others, and it here that the concept of 'openness' becomes important. Software and systems can be designed specifically with the intention of being easy to link together – this is precisely the approach adopted by the HL7 communications group, which has specified a common interface environment for the passing of healthcare messages.

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## 4.2 Semantic and data sets

Connectivity isn't the whole solution. It is when the linkages have been established that the need for a common language becomes vital. Healthcare is an entire language of its own, with more than 250,000 terms. The confusion arises for several reasons. The precise definition of many medical terms is not agreed by all parties; some words are used to mean different things in different contexts (homonyms) and some mean exactly, or more or less the same as others (total or partial synonyms). Spelling is always an issue, and where words are spelled differently, the computer assumes them to be different words so missing them in searches.

One approach to this issue is to minimise the amount of 'free text' communicated between the parties, and to agree on sets of data to be collected in different situations, with agreed definition of each item in the set. Commonly the data is then classified and coded using, for example, UMLS, SnoMed, Read, ICD or ICPC. This is ideal for structured messages that are pushed to their destination, for example reports on care events for claims management and administration, and test results. The other approach is to accept that there may be minor differences in clinical interpretation, but to assume that the reader is a competent clinician who will be able to read what is sent, comprehend the clinical situation, fill in the gaps and end up with a clear picture at least in part based on experience of similar situations. This is better suited to less structured clinical communications. In fact that is exactly what we normally do in communications between people – we leave the listener to sort out what the speaker means, and to clarify through questions if some parts remain unclear.

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## 5. What is the way forwards for healthcare enterprises?

All healthcare systems need to be capable of communication with others. We can think of healthcare systems as having two parts: there is the 'core' system as implemented in large enterprises such as hospitals; and there are the 'peripheral' systems, which may in many cases be just as complex (eg another hospital), but may also be much simpler (eg a primary or community care clinic)

Fundamentally there have been in the past (and to an extent still are) two approaches to development of the core system. One is to follow the 'big is best' approach and select a vendor who offers a complete integrated system. The other is to adopt the 'small is beautiful' approach and pick the best systems from different sources that meet the needs,

and then connect them together.

The need to connect to a growing number of peripheral systems presents a quite different problem. The core enterprise normally has no control over the systems adopted in peripheral clinics, and must therefore accommodate them whatever they may be. If the number is small enough, it has often been (fatally) attractive to consider a technical solution based on building interfaces between the systems to enable them to work together – this is a route to disaster, because whatever the number today, it will surely be considerably larger tomorrow. Fortunately in many cases the numbers have been too large for this approach to be seriously considered, and web-enabled communications have offered the only practicable solution.

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## 5.1 'big bang' integrated systems

Some enterprises have elected to implement a core system from a single vendor, usually based on a proprietary architecture. In these systems the links between modules are often idiosyncratic and non-standard, as well as being proprietary. The problems begin when one module from that supplier is identified as inadequate, and the users wish to replace it with an equivalent from another source. This invariably proves expensive and/ or impossible.

It is almost inconceivable that an integrated system will have the best functionality in every module, nor that it will maintain any performance advantage over time, so replacement becomes inevitable. At that point the need arises to extract the data and migrate it into a new environment: again in a proprietary environment this is likely to prove expensive if it is feasible at all.

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## 5.2 Best of breed 'connected' systems

In the light of the foregoing, the best option is clearly to select the most appropriate modules from different vendors, ensure that they store data in a standard format, and set about connecting them into a system. Various systems integration engines and toolkits exist for this precise purpose.

There is an additional consideration – how to link in also the various peripheral systems that must be connected to the network. These may be remote from the core, and are unlikely to have sophisticated communications of networking capabilities. This is where attention has shifted to the use of clinical intranets.

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## 5.3 Web-based intranet technology

Intranet technology is universal and cheap. The basic concept is that there are servers on a network, each of which provides a service to connected clients. The clients can be near or remote – it makes no difference to performance.

So, for example, in a hospital system each module (eg pharmacy, surgery) has a server to which the users connect as clients using standard web-enabled technology. Some peripheral systems (eg community clinic) will connect as clients: however many peripheral systems will be servers – for example national systems providing unique identification of patients, to which the core enterprise system will connect as a client.

The use of intranet technology standardises the communications and minimises the costs of sharing data. Even older proprietary legacy systems can normally be connected successfully into an intranet, so preserving the investment in them. Web-enabled technology permits easy transfer of full multimedia, and therefore is ideal for low cost telemedicine applications.

Let us tell you more about clinical intranets and how they could transform your information environment.

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