Introduction

I sent my first email in 1978. I had started at IBM and, as an enthusiastic systems engineer, got myself a log on for the local VM service. That meant that I had access to a personal operating system (CMS) running in a virtual machine on a mainframe running in the data centre in the basement of the building (the IT crowd always seem to be in the basement – I have just done some work for a law firm and their IT crowd were also in the basement).

Figure 1 I sent my first email in 1977 on one of these, an IBM 2741

You might also note that infrastructure as a service, using VM provisioning, is not that new a concept. I discovered that our VM mainframe in the basement was connected, over a leased line, to the VM mainframe in London which was in turn connected to other VM mainframes. The protocols used were specific to VM and called VNET. They enabled each mainframe to operate as a relay node for the usual applications: logon pass through enabling me to access my VM from any other VM service; file transfer; and message transfer, called VMail. There was an application (eventually called CallUp) that distributed the local directory of users to all the other nodes in the network which meant that I could use it to find anyone's VMail address and send them a VMail. By the middle of 1978 I was almost exclusively using VMail for my communications with anyone technical (managers, administrators and sales people didn't generally have VM access as it was considered 'techy'). At that time no one,

except those administering orders, had a terminal on their desk, nor did they until 1983, when IBM UK pioneered a national office system (NOSS). In late 1978 I discovered that there was a telex gateway on VNET and found I could telex anyone in the world using VMail. That would be the equivalent today of using SMS from Outlook (why can't we do that by the way?).

There were eventually over 10,000 nodes in VNET making it the world's largest network at the time. It had been entirely built as junk works projects (mainly by Mike Cowlishaw of UK labs, it seemed, who went on to invent REXX, a scripting language that leaves Perl in the shade, but I digress) and was used by the world wide IBM technical community for personal computing and communications.

Figure 2 By 1984 we all had our own screens

On the other hand, all IBM's record keeping applications were on a completely different infrastructure using SNA communications (not VNET), MVS mainframes (not VM) and TSO for personal computing not CMS. This network did not provide an equivalent of VMail or CallUp, and was restricted to users with a need for the record keeping applications run on the mainframes (accounting and order administration mainly). A terminal in a branch was either connected to this network or to VNET,

they couldn't be shared. Even odder, there was another entirely separate infrastructure, running the 'hands on network for Europe' or HONE, which gave access to IBM announcement letters via a fully inverted text index (this was IBM's equivalent of Google - they probably used MapReduce to produce it).

What was even odder was that IBM provided all this for its own employees, vastly improving our productivity, but didn't sell anything like that to its customers. They were sold MVS, or its little brother DOS, for enterprise applications such as accounting, personnel, stock control and manufacturing planning. Eventually, IBM created an office system for Amoco based on the VM capabilities, which was then made into a program product called PROFS (professional office system) at about the same time as the IBM PC was announced in 1981. PROFS added a document creation and management function to VM and integrated it into a client for VMail (a green screen version of Outlook). I am still waiting for an email client that manages the attachment of documents to messages for me – if I wrote a proposal and attached it, only the document reference was attached. If the email went to a remote PROFS user, the system fetched the reference and stored a single instance of the document locally. So we had the equivalent of a URL, a cache and a document store back in 1982, all integrated into the email and document creation system. Oddly, that law firm I mentioned with its IT crowd in the basement was trying to implement the same thing using a combination of Outlook, Exchange, Interwoven and Sharepoint!

Given that background you won't be surprised to discover that I consider IT for communications, as implemented by VM in the musing above, to be completely different and completely separate from IT for business record keeping, as implemented using MVS above. For those not privileged to have learnt their technology in the IBM of the 70s and 80s,

the historical accident that the same technology was used for both at IBM's customers (unlike at IBM itself) has lead to most enterprises using the same group of people, IT, to implement both today. This was also true outside the IBM mainframe world, where DEC all-in-one was the competitor to PROFS on the VAX and extremely popular. There were pure communications technology products that might have won the enterprise communications technology battle, of which the IBM 5520 and Wang were two leaders, but these were all crushed by the whirlwind success of the PC. By the time email had become main stream, around 1995, it was firmly ingrained in people's minds that the IT crowd does both communications technology and business technology.

Looking at this from an information systems point of view helps. An information system involves people interacting with systems as illustrated below.
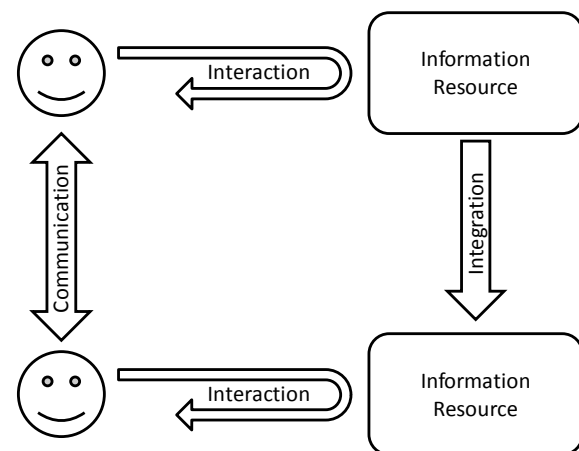

Figure 3 Information Systems

People interact with information resources. They can interact in order to change the state of the resources, but adding, changing or deleting the information and they can interact in order to get information. That is, they can create business events or get content. In all cases, the people interact synchronously with the information resource. If an event at one resource causes a change in another, then a one-way message goes from the first

resource to the second. That is integration. Finally, if a person interacts with another, that is communication. Whether people are interacting or communicating, they use agents to do it (except where the communication is not automated in any way). For communication agents include phones, email clients and instant messaging clients. For interaction agents include user interface applications and browsers. Sometimes both, when the user interface runs as javascript in the browser. This is summarised in the diagram below.
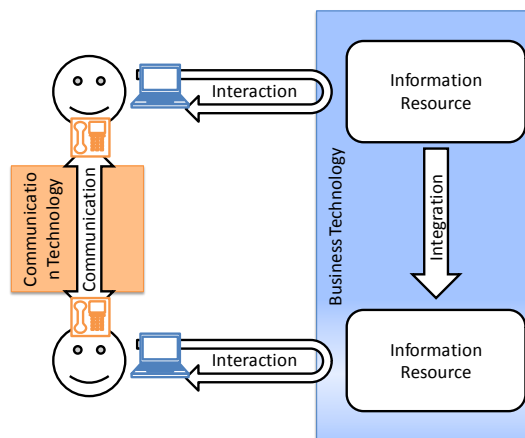
Figure 4 Business and Communication Technology

The diagram shows business technology and its agents (shown as a laptop) and communication technology and its agents (shown as a phone). Sometimes a single agent can serve as both an interaction agent and also a communication agent, so the agents are not completely distinct, rather they are roles that can be played.

From the point of view of the one level enterprise (see the paper) all of the business technology (BT) is inside the business domains and all the communication technology (CT) is outside the business domains. This is why we call this approach to enterprise architecture 'Inside Outside'. The diagram below shows the relationship of CT and BT to one level enterprise domain.
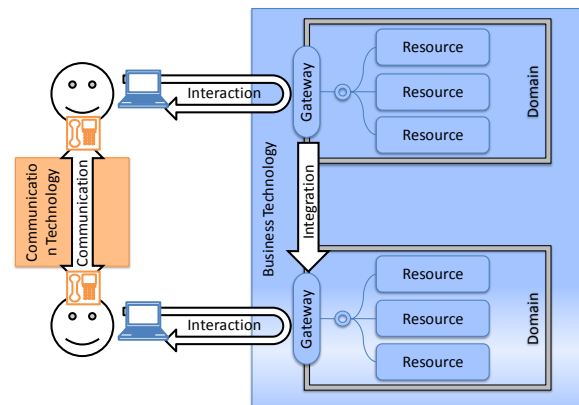
Figure 5 Inside and Outside Domains

But if CT is outside any business domain, this immediately raises the question, who owns it? And the answer is either the person that uses it (in the case of personal communication technology) or the group that uses in (in the case of groupware such as Sharepoint or Sourceforge). The truth is that people communicate independently of their place in the organisation structure, and so the organisation does not own their means of communication.

To the extent that organisations currently do own communication technology, they are probably doing so in order to give the IT department something to do, not because that is what the IT department should really be doing.

How to manage Outside Technology

The consequence of separating inside technology from outside technology is that all the outside technology that the business wants for its communication is probably best acquired and managed by the business for itself, not by IT. The business may decide that it needs to establish standards for communication across the enterprise, but this is no longer an IT standard, it is now a business standard. In particular, enterprises that set up knowledge management divisions (service companies, government, academic institutions, intelligence services and so on) should probably assign responsibility for CT standards and approaches to that division rather than IT. This will ensure that the

enterprise adds the most value it can to the communication of its people.

Things that are outside

Some people find the concept of communication technology confusing. Why is email a communication technology and not a business technology? After all, it runs on a server and has a client, it has a database and worries about transactions. If this helps, I like to classify information systems, or applications, into three kinds:

- Personal
- Groupware
- Enterprise

The characteristic of personal applications is that they are for a single user and typically run in memory and don't use two phase commit transactions. Such applications include Word, PowerPoint, Excel, Outlook and Access.

The characteristic of groupware applications is that they are for multiple users and are likely to use a database and transactions. However, they make a closed world assumption, that is, they assume that the data in the application comes entirely from the users of the application. For example, Exchange is a groupware application that assumes that the data in its store is either email sent by Exchange users or email received by Exchange users.

The characteristic of Enterprise applications is that they are for multiple users but make an open world assumption. They assume that some of the data they store will come from integration interfaces with other applications in the enterprise. Another way of thinking of this distinction is that the enterprise applications expect to implement 'causality' – one business event happens which causes another business event to happen. An email server assumes that all it does is email, it has no belief that it is implementing a part of the enterprise value chain. An enterprise application assumes on the other hand that it part of an enterprise value chain and so will have to accept events from other applications and will have to send events to other applications. For example, SAP has the Idoc interface for emitting and receiving events. Similarly, ClaimCenter (an insurance application for processing claims) assumes that it will have to integrate with a policy administration application.

We believe that personal and groupware applications are outside and only enterprise applications are inside. That is, we believe that business technology is about automating the value chain (see the paper on front middle back) whereas groupware is about helping people communicate.

In the rest of the paper we look at different communication technologies in turn to discuss how they relate to an enterprise and what we think the enterprise should do about them. These technologies, which we think are CT rather than BT, include:

- Voice
- Email
- Document Management
- Human Workflow
- Source Code Management
- Social Networking
- Report Writing

Roughly speaking, we believe that all groupware and all personal computing count as communication technology rather than business technology.

Voice

When phones first came out it was common for someone to have a phone at work but not at home. In any case, before mobile phones, the enterprise had to provide its employees with phones in order to let them communicate, both with each other and with the outside world (though some organisations would not give employees access to outside lines to save costs just as some organisations do not provide Internet access on the grounds

– or pretext – of security). I would suspect that very few graduates (and possibly very few school leavers) enter employment today without their own mobile phones. The organisation is possibly better off adding value to the technology the employee already has (providing an allowance, obtaining better terms, adding services such as a phone book) than paying for another phone alongside the one they already have. Certainly in my case, having a second phone rather than integrating the one I have makes my life worse not better.

Email

Most organisations provide their own email service, typically behind the firewall, to their employees. When I sent my first email in 1978 there was no other way for me to do it. However, almost all graduates coming into employment now already have their own email provider, typically a service such as Yahoo, GMail, AOL or Hotmail. As for phones, it makes more sense for the enterprise to add value to the communication rather than create another place the employee has to go to communicate. The ultimate craziness is forcing employees to punch through the corporate firewall to access their email. This both gets in the way of communication and also reduces the security of the corporate network. At the moment I have a company email service that I have to access behind the firewall, which has a 20 mb limit on the inbox. This forces me to use PST files for my email, which means that if my laptop is on Outlook, emails are not available on my phone. It is literally the worst of all worlds. In any case, our corporate email is run like a cottage industry compared to services like GMail. Google replace hundreds, if not thousands, of failed disks every day. If a disk failed on one of our Exchange servers we would probably be down for two days. The service is not designed for our needs, for instance my administrator finds sharing calendars on Exchange slower than using Google calendar. The IEEE Computer Society

provides me with a computer.org email address which I can redirect to any email system I want (currently, Yahoo). This is what enterprises should think about doing for their employees.

In the meantime, large numbers of businesses are moving their employees to Google instead of Exchange both to reduce costs (according to Forrester it costs $25 a month to host Exchange on site compared to $8.50 a month for Google Applications) and also to focus IT attention on the enterprise's value chain where the money is made).

Document Management

Documents, whether spreadsheets, presentations, screeds like this one, or even unstructured documents like video recordings and photographs, are used for human communication. It may be possible, in some cases, to create a business event out of a document, but in general documents are just for human consumption. Documents that are significant for the business, such as contracts, important emails, scans of important documents and so on, need to be kept by the business in a safe document store so that they can be referenced from business record keeping. The irony is that IT departments are doing what they should not (providing an email service) and not doing what they should (connecting significant documents and emails to the business domains). This is at once a sin of omission and a sin of commission. We believe that the provision of the document store is a business

Human Workflow

The ClaimCentre application mentioned above, interestingly, is mainly an activity manager for the people who process claims. A notification of loss kicks off a series of activities among loss adjusters, finance, customer service and so on. This kind of workflow is what we mean by 'human workflow'. Almost all business processes can be divided into the inside

part (the record keeping associated with the business events raised by the process) and the activity among the people progressing the process (the human workflow). In ClaimCentre a single piece of software implements both. This makes sense for people who mainly process claims and do not have much other human workflow to interact with. Eventually however, we believe that business organisations will start to choose, configure and manage their own workflows, possibly using capabilities they share on the Web. Human workflow could be subsumed into social networking, as business networking.

Source Code Management

In a previous consulting company the best tool provided to me for doing my job was SourceForge enterprise. Each new engagement got its own SourceForge project and we could even invite third parties to join the project. We didn't have to fire up the VPN to access SourceForge. Projects immediately had access to a Wiki, discussion forums (or should that be 'for a'?), task trackers, document management, status reports and source code control. We used the source code control for both code development and document development. The document management system was only used for document deliverables. Using the source code control (subversion) for document development was very productive. Firstly, we could put links to the document in emails, not attachments (almost giving me what I had with PROFS in 1983). Next we didn't have to worry about changing the name of the document each time we changed it, as the source code control automatically versions all changes. Finally, with a single click (we used Tortoise on our laptops) we could synchronise documents and work while offline. That eliminated the torture of passing USB sticks around that had happened before SourceForge.

What I learned from this is that source code is just another form of documentation. And source code

management is outside groupware, not part of the value chain of the business. This is true even if your business is developing software. Indeed, software companies (I have worked for four) do not let the IT department touch their development environments. IT did not even provide the technology infrastructure, as they did not understand the need for fast provisioning for test.

Social Networking

We all increasingly communicate with our friends and family using social networking sites on the Web. Indeed, amongst the current batch of teenagers, email seems to have taken a back seat to Facebook. The people who run sites like Facebook (as opposed to those that use them) regard the technology they use to run them as inside technology (for them). Nevertheless, for their users the service being provided is outside technology. It is groupware enabling people to communicate by using the facilities of the Web site. In general, successful consumer technology eventually overwhelms business technology that does the same thing. If this holds for social networking, we expect businesses eventually to move to using versions of social networking for their own human workflows. This is already happening in consulting companies where many are dropping their own skills databases in favour of LinkedIn.

Report Writing

Reports used to be written by programmers in COBOL. Increasingly, reports are written in Excel by non-programmers outside the IT department. Even report writer products, like those from IBM (Cognos) and SAP (Business Objects) are now targeted at end users. In some enterprises Finance has complete control of its own report writing tools and in some cases, databases. The view is that IT has a role in getting the business events to Finance, but from there on it is Finance's job to do the rest. Although we do not see departments running their own

data warehouses outside IT (the data warehouse is inside technology), we do see all of the report writing as being outside.

About John Schlesinger

John Schlesinger is a Principal at Atos Consulting where he leads its Enterprise Architecture practice. John is an advisor to enterprises specialising in middleware and integration architecture. He has lead integration architecture development in retail banks, investment banks, retailers and manufacturing, both for integrating applications and for integrating information.

John has worked both as a consultant and also as a developer with software companies. He has taken over two dozen program products to market at IBM, Information Builders, One Meaning, SeeBeyond and iWay Software. These products included the world's most successful commercial software (CICS) and the world's most successful data middleware (EDA/SQL). John also led the Architecture department at Dun and Bradstreet when its IT department went global.

A member of the ACM and the IEEE, John has an MA in Physics and Philosophy from Oxford University and a Post Graduate Diploma in Software Engineering from Oxford University.

John has spoken at numerous conferences including the CIO Cruises run out of New York, during one of which he was the first speaker on after the collapse of the World Trade Towers in 2001.

John can be contacted at john.schlesinger@atosorigin.com