Survival in the e-Business Jungle

One of the nicest things about being a consultant in the communications business is the sheer variety of projects you work on. Not that long ago, each of these projects would have been quite distinct, both in terms of the technology and its application. But something has happened in the last couple of years to change this. Nowadays, all paths seem to converge on one goal. It doesn't matter if you are designing an optical transmission network, developing some Internet software or integrating operational support systems. Whatever the activity, there appears to be only one show in town, and that show is electronic business - e-Business.

In some ways, this should be no surprise. After all, Bill Clinton has estimated that world-wide electronic business worth about $375B will be handled electronically by 2002 - a figure disputed by Nicholas Negraponte who reckons that the president has underestimated it by a factor of three. Little wonder then that everyone is keen to get in on the act. But will information networks and computers really be the medium of choice for future business? If so, where do those durable but unpredictable entities called human beings fit? And, if this is the golden future, how do you find the best path through the jungle of technology, hype and eBabble.

I'd like to say that this article answers each of those questions in turn. In truth it doesn't even get close. But there are some ideas which, with a little development, may help along the way.

We have the technology

It is easy to do good business if you are fast, cheap and available. So how does modern communications technology measure up against these criteria? The answer is pretty well and here are a few illustrations

Fast
Optical networks now cover the globe. And the amount of data that can be carried in each strand of fibre in these networks is growing. Dense Wavelength Division Multiplexing allows 40 channels of 40Gigabits/sec to be sent down one fibre - enough to transmit the whole of the movie 'Gladiator' in a fraction of a second. Every year, more wavelengths (or colours) will be available and each will carry more information. There is enough raw transmission capacity, at least on main trunk routes, to satisfy the world's traffic requirements several times over.

Cheap
The Internet is everywhere. Before this (by now familiar) phenomenon's dramatic growth, electronic trade was routinely conducted but it relied on complex, expensive and proprietary equipment that ran over private data networks. There was little to commend it and although it succeeded in making a steady income for some niche companies, it failed to take the business world by storm. The Internet makes it possible to transform electronic trading from an expensive and specialised process into a cheap and realistic proposition for the masses. To illustrate, there are dozens of free Internet service providers, you can buy 'instant on-line shop' products for around $100 and the cost of transmitting data has been falling at about the same rate as other IT equipment - halving every eighteen months. This trend is so persistent that it
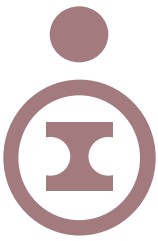
has a name - Moores Law, after Gordon Moore, founder of Intel.

As transmission costs have fallen, the capability of switching technology has risen - routers can cope with Terabits of data, mechanisms have been developed to assure quality of service and there is convergence in fixed and mobile data. Even the humble local phone loop has its story, with DSL allowing high speed data (1-2Mbits/sec) to be switched to a home user. There is lot more but suffice to say that getting packets of information from A to B will not be any sort of barrier to the growth of e-Business.

Available

The Internet is already available in most places and its reach continues to grow. Recently, mobile data has advanced quite dramatically and this extends the potential reach of e-Business and, perhaps more significantly, adds roaming capability. Mobile packet data technology, such as GPRS can refresh the parts that the fixed Internet fails to reach. It is quite feasible to use a WAP enabled mobile phone to search the web for hotel rooms and make a reservation while your train whisks you to that conference.

Power is nothing without control

There is little doubt that we have enough raw technology already. The challenge facing many providers of e-Business solutions is packaging the technology so that it delivers a pleasing user experience. This is not easy and there may be some useful lessons from history here.

In the early days of computing the software that drove the large (and for their time, powerful) computers was largely unstructured. As the software became an ever more important component, so techniques for its systematic development evolved. Dijkstra's structured programming ideas pervaded the industry and the craft of software development was turned into a profession. By the 1980s, it was feasible to develop a multi-million line of code software-rich product with a team of a hundred or more engineers.

Acolytes of structured programming would probably throw a blue fit if they saw much of the Java, HTML and CGI script that controls many of the current e-Business applications. The argument is not that people have become more cavalier, but that methods have not kept pace with applications.

Are structured techniques such as SSADM, JSD and Yourdon well suited to e-Business applications? And are structured code walkthoughs and quality reviews feasible when products are on a three month Design-Code-Test-Launch cycle. A key issue here is time. Many of the software products - operating systems, transaction processing, telecommunications switches etc - developed with structured methods were on schedules extending over several years. These products would be expensive and have a shelf life of up to ten years and more. By contrast, the Internet and the applications that run on it tend to be produced in months and last about as long. A large part of the e-Business world runs on 'dog years' - about 7 times the clock rate of normal time!

So how do you achieve the advantages of structure and peer review without compromising aggressive timescales? The answer may lie in the experience of developing the Linux operating system. This highly successful product was shepherded into existence by a loose federation of engineers who believed in consensus and running code and worked on the principle that 'given enough eyeballs, all problems are shallow'. The very fabric that supports e-Business - the Internet - also provides the ideal medium to support co-operative development. More than one IT supplier espouses the 'work is an activity, not a place' ideal. The survivor in the e-Business jungle may be those that actually follow it.

The logical end point of the federated development argument might appear to be that users make their own e-Business applications from freeware and shareware components (as is already the case for most web content). And perhaps this may be the case one day. But for now the real issue is that the integration and end-to-end design aspects of e-Business applications are difficult and ill supported areas. With structure
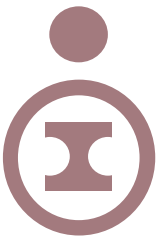
and standards some way off, the know-how of the craftsperson is at a premium.

It's business, Jim, but not as we know it

People have transacted business for centuries and we have had the wherewithal to exchange the electronic data to support it for over twenty years now. What has happened to make electronic business the intriguing, and very lucrative, proposition that it is now perceived as?

The answer probably lies in the flexibility offered by a market based on a platform as open and accessible as the Internet. This allows e-Business to offer more than one trading model. For instance, there is the age-old idea of a marketplace owned by one organisation, populated by (authorised) traders - Barclay Bank's Barclay Square and NatWest's Buckingham Gate are good examples of this. And this model can be extended to add the idea of having 'guilds' that control standards within their particular area.

There are many other trading models, such as auction (conventional as typified by e-Bay, Dutch, sealed bid). Then there is barter - e-Business draws on a lot of history! All have their merits and are suitable to a certain type of trading. Most on-line trading models have a physical dual….but some don't.

Whatever the market looks like, it can usually be categorised by the dominant party. In seller driven markets, it is the large, dominant vendor that sets the price, not really for negotiation. In a buyer driven market there are many people selling into the market and a small number of dominant buyers who take best bids (for example, UK supermarkets are often accused of having undue influence - downwards(!) - on the price of agricultural produce). It is these dynamics that determine the appropriate technology for e-Business. There are also open markets in which the buyer and seller negotiate, or a free market, where the behaviour of the market itself sets prices. Insurance brokering is an example of this, as are the optimisation packages used for pricing and selling airline seat capacity. These e-Business market dimensions are illustrated below.

Drive – (whose brand attracts participants?)

|	**Seller**	**Marketplace**	**Buyer**	
Offer	Supplier with strong brand in their market, publishing a catalogue, Direct banking	Supplier without very strong brand, publishing product catalogues in a strong marketplace, Auctions	Hub & spoke model focussed on very strong buyer(s), incorporating product catalogues	**Offer-led markets**
Either		Classified adverts, Spot markets	Hub & spoke model incorporating tenders as well as product database	**Jointly-led markets**
Requirement	Supplier with strong brand selling customised products	Service allowing buyers to issue RFQs for products and services	Very strong buyer issuing ITTs	**Requirement-led markets**
	Seller-driven Markets	**Open Markets**	**Buyer-driven Markets**	

Lead – (what is advertised?)
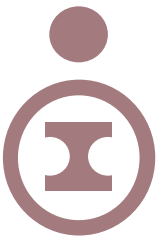
Trust me - I'm a doctor

Whatever the market type, the key barrier to entry is trust. Are you dealing with a genuine Bank, retailer or individual or is it an impostor? You probably can't check as you would a recommended restaurant - you could be thousands of miles apart - but there are security techniques, such as digital certificates and encryption, that ensure that people are who they say they are and that ensure that transaction are conducted in private. Are these techniques really up to the job?

On-line security is based on encryption and the difficulty of cracking an encryption algorithm increases with the number of bits used in the key - the figure below illustrates the role of the key.

attempts, all divided by 2. Or 2^(key length-attack rate)/2. To illustrate just what this means, here is a practical example. A US based finance organisation recently built a hardware cracker, enticingly called "Deep Crack", for the modest investment of $210,000. Deep Crack was capable of testing around 92,160,000,000 keys/sec, which is just under 2^47 keys/sec in our preferred notation. This is an impressive performance and one that well outstrips the typing capability of the average superhighwayman.

The algorithm under attack (the widely used DES) has the feature of a rather simple key schedule which considerably simplifies the design of a cracking machine. Hence, you would expect a rapid result - and, indeed, you get one! Applying
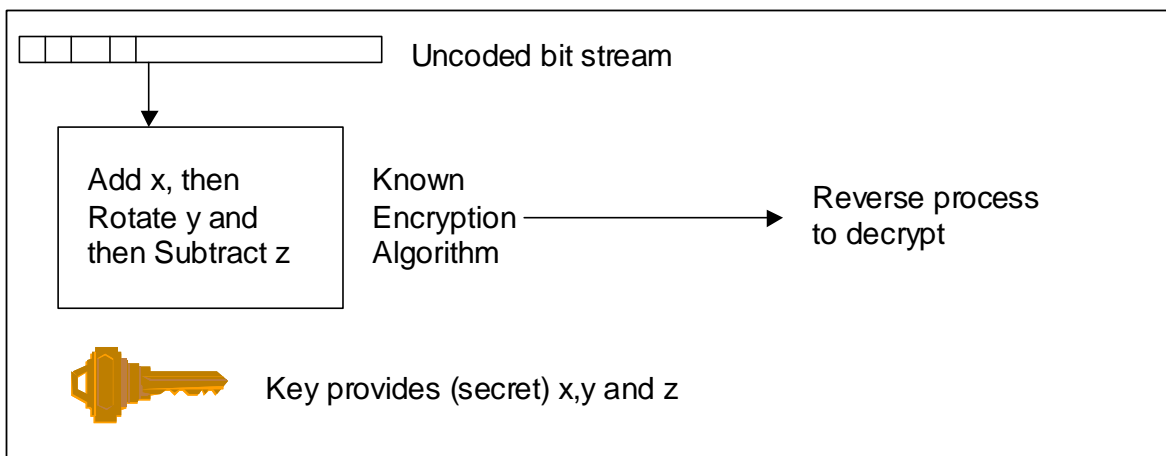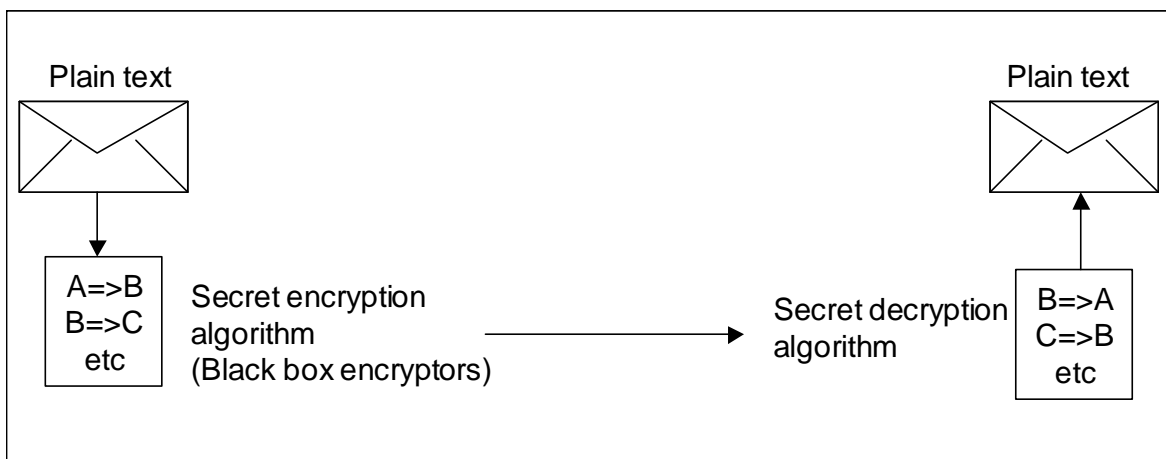
The general rule is that the time required to crack (i.e. illegally obtain) a key is 2 to the power of the number of key bits minus the number of key

our known 'time to break the code' formula, 56 bit DES fell victim to Deep Crack in 2^(56-47)/2 seconds - a little under five minutes. And this
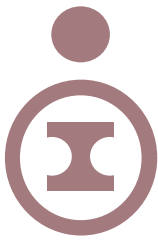
assumes that we didn't get lucky and find the key on the first attempt.

Should we be worried about this? Are the sceptics right to say that security over the Internet simply isn't up to the demands of e-Business. Let's look a little deeper. If we assume an antagonist can build a Deep Crack look-alike for your chosen algorithm, is prepared to invest say $27M dollars (128 times the previous budget), and improvements in technology give a fourfold increase in search speed of the machine. This all adds up together to give an effective hit rate of 2^{47} x 2^2 x 2^7 = 2^{56} keys/sec. If we are using one of the more sophisticated of today's systems with a 128 bit key, Deep Crack II should find the right key (on average) in $2^{(128-56)}/2$ seconds. Which is about 74 billion years.

Perhaps, the worries over net security are based more on perception than actual threat. Technology is clearly up to the task. The real problem, surely, is how people use it. e-Business is something of a Swiss Army chainsaw - powerful and flexible but deadly if not handled by an expert.

Not in my back yard?

One of the most interesting aspects of e-Business is that it transcends established physical boundaries and so makes established legal and tax regimes difficult to apply.

Little did I ever think that my home in sleepy Suffolk would become neighbour to the first independent principality in cyberspace. Yet, the proposed siting of a large web site on a concrete platform, called Sealand, just 8 miles out to sea off the coast of Felixstowe is just that. Why would anyone want to place state of the art computing equipment out in the cold, grey and less-than-hospitable North Sea? The answer probably lies in the tension between governments who wish to impose control and an industry that aims for independence of action. There are several recent events that illustrate the tension.

First, an individual who took exception to references to him on a web page recently accused an Internet Service Provider (ISP) of libel. The ISP contended that they could not possibly police the huge amount of information put on line by their members. It seems reasonable that individuals should be accountable for what they do - but there is clearly some confusion over the role of the ISP.

Second, and perhaps more of a worry, is the consideration by the British government to require on-line traders to lodge security keys so that they can be used to decode mail or other net based transactions if crime is suspected. To many, this compromises the (rather delicate) trust element to e-Business by removing what is (with reference to the previous section) a strong guarantee of privacy. So, the prospect of losing business has at least one trader, quite literally, all at sea.

There is a serious point, and that is whether those countries that impose constraints on the development of e-Business will be shunned the by entrepreneurs who drive it. And what happens when business is conducted outside of any established tax and legal jurisdiction? e-Business cannot live entirely in cyberspace - many transactions result in the purchase of physical goods and the trader has to fulfil delivery to complete the bargain. If an ISP can be held accountable for the behaviour of its members, perhaps Fedex or UPS could be prosecuted, as the delivery agent of an e-Business trader deemed illegal in a particular location. Let's just hope that the governments behave wisely and don't tie the future in red tape.

Survival is Optional

The e-Business jungle is a lot like the real thing. You have to know the rules if you are to survive. One of the better rules I've seen over an engineer's desk is that 'There are two types of people who work here - those who manage technology they don't understand and those who understand technology they don't manage'. One of the nice things about e-Business is that it probably breaks that rule - no-one understands all of it and everyone manages some of it.

There is little new in the technology of e-Business. The interest and excitement is centred around the way in which the technology is used
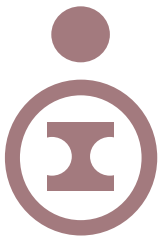
and how people work with it. When business drives and technology serves, new rules emerge - whatever you offer in the e-Business market will be offered for free by a competitor within a month. Fortunately, nothing is really free and it is how you arrange reward for effort (or spot obligation for gain) that makes this jungle an interesting one.

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