"Neural Business" – Enterprise ICT Evolution for the next 25 Years

A Business Proposal for a Multinational ICT Company.

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(1) Background – Past & Present

This informal proposal is based upon my 30 years of experience within the global ICT sector starting with British Telecom – Long Range and Strategic Studies back 1978. On joining Digital Equipment Corporation I initiated and managed the European Internet Business Group from 1994 to 1999. More recently I've worked in senior positions with European ICT companies working on Comparison Shopping, eCommerce, Networked Security, Wireless Networking as well as consulting for the Georgian Parliament. In parallel, during the last 6 months I've been working on a book focused upon the next 25 years of computing, intelligent services and the neural society.

Following dinner discussions with a business colleague on "the next big thing", it was clear that we were both thinking along similar lines, and it was agreed that I should prepare an informal proposals for the next concrete steps. Today we have the world of social computing in which the cost of storage, processing & communications is effectively diving to zero $$$ for the typical user compared with historical costs. At the same time, the range of networked applications is highly divergent as we explode through another generation of VC-funded broadband businesses mimicking the web1.0 Dot Com Boom. What I believe we require now is a complete "futures framework" of where computing services, information processing & networked applications will evolve during the next 10 - 25 years.

This proposal provides an overview of some of the underlying concepts and dynamics of the projected "neural business" evolution & revolution. I'll also be preparing a supporting PowerPoint Presentation during April 2008 for discussion with relevant teams & organizations within "ICT PLC". I've spoken with several respected colleagues – now ICT industry leaders - during the last year who've all, without exception, encouraged me to document my forecasts for "neural business". Our 25 year forecasts for Project EIGER back in 1985 were pretty much "spot-on" including the accurate forecasting of the multimedia Internet from the early days of the US-DOD Arpanet. It is my hope that the projections reviewed in this short proposal, and documented in detail in my upcoming book will provide an equally accurate & productive framework for the design and implementation of ICT services for the next 25 years for the management & customers of the Multnational ICT Company.

(2) Marketplace – Future

The marketplace is transitioning from products to services, with computing, storage and even applications as networked utilities within the "cloud". If we explore the ICT marketplace to the next 10 to 25 years then we can distinguish 3 key dynamic trends:

(a) Real-Time Business – Enterprise Business moves and adapts as fast as a foreign exchange dealing room – Decisions in milliseconds, and many operational functions are automatic. Strategic meetings are taken by strategic decision makers anytime 24/7. The Board Room is virtualized!

(b) Intelligent Business – Moving from Real-Time Business to Embedded Intelligent at EVERY node of the business, customers, partners and suppliers. Essentially embedded "adaptive neurons" in the pervasive computing network. Interfaces to the application services will be through intelligent avatar agents that will transition over 5 to 10 years to full 3D customized Avatars both for Business and Domestic marketplaces. Intelligent Business will have some extra level of self-organisation, and fail-safe in the case of disasters as part of the new generation of Business Continuity Services.

(c) 3D Virtual Business – From around 2020 onwards we can expect much more extensive application of fully immersive 3D Virtual Business environments for ALL aspects of both business and domestic life – Team meetings, Home Shopping, Parties, Supplier Negotiations, New Product and Service Simulations. Just take applications like Second Life and project them forward 15 years. 3D Business will come equipped with full customizable virtual avatars that are used as intelligent agents for every category of business function. The business will manage legacy requirements such as spreadsheets, project plans and all those labour intensive functions in 20th Century Business. The impacts of "real-time", Intelligent Business and 3D Virtual Reality will completely transform business organization from the "information business model" to "neural business" organization.

(3) Competition

The global computing industry is transitioning enterprise IT from networked PCs & large computing facilities, to computing services as the utility in the cloud, more akin to the supply of electrical energy. This means that the entry barriers are much lower, with software moving from proprietary to "open-source", as well as the hardware, security and networking standards all transitioning to worldwide IEEE & related formats. Competition will come from a new generation of networked application services vendors. Google was the 1st, and celebrates its 10th birthday next year, but others will emerge, targeting the marketplace for intelligent business applications supporting new neural organizational models, with all business functions being virtualized as utility services.

(4) "ICT PLC" - Current Position

"ICT PLC" is well positioned with a dominant position in the marketplace today, but is vulnerable to "neural age" application service providers that have extremely low barriers to entry that could emerge from new marketplaces such as SE Asia, China, India or Russia. These countries have the skills and access to the worldwide Web2.0 Internet, and hence to ALL "ICT PLC" enterprise customers. In addition, much of the hardware and networking infrastructure is manufactured in these countries, and now they are richer with significant available investment. Already China is leading the world in security solutions, and migrating to integrated service solution too.

"ICT PLC" has world leading research through its Research Laboratories, but this needs to be far more focused upon the enterprise IT roadmap for the next 5 to 10 years. I've read several examples of the public domain technical reports, which demonstrate high intellectual capabilities, but are not necessarily strongly enough focused to real-world customer problems. In the world of Web2.0 it is often better to first "Go to Market", and solve some of the deeper intellectual problems during the subsequent journey. The market itself is a real-time monster! So now is the time for "ICT PLC" to launch an aggressive new programme to transition its own business from the information to neural business model, together with the necessary supporting application services. Tools such as the SOA – Service Oriented Architecture Model – are of course essential, but still have a long way to go before they fully adapt to the complete requirements of the converged business in which "real-physical" and "virtual-electronic" business are fully integrated as a managed enterprise "neural business".

(5) Core Proposition –"Neural Society"

Now we come to the core "Neural Business" Proposition for the proposed work with "ICT PLC" – Adaptive Enterprise Solutions. I've taken 9 of the major dynamic trends as the basis of the proposition. This is to support "ICT PLC" development teams in the design and launch of a new family of adaptive enterprise services that build upon traditional strengths, but transition customers from the 20th C information business to the 21st C neural business. This will take all the relevant resources and technical platforms from the "ICT PLC" Research & Development Labs, and mesh them as critical components within the total jigsaw for Neural Business, as well as merging 3rd Party Applications to plug gaps.

(a) Adaptive – Already a key component within "ICT PLC"'s Marketing programmes, and now ready to be integrated with further mission critical components of the "neural business" of the 21st Century.

(b) Real-Time – Customers now demand real-time consummation of all their transactions, whilst businesses try to turn-over inventory in the theoretical "zero-time". We're now in the era in which ALL businesses should run themselves as if they're trading foreign exchange, bonds or futures.

(c) Learning – Acquiring new semantic knowledge mapped over across the business operations, data warehouses, as well as processing event driven information alerts from intelligent data mining.

(d) Organic – New styles of hybrid organization, modeled on the parallel overlays of neural networks as well as other biological metaphors. Hybrid models include hierarchical, peer-to-peer networking, tribal chiefs & scaled democracies. Alternative models adapt to specific environments.

(e) Self-Organizing – More advanced intelligent behavior in which the business and intelligent agents make their own decisions within boundaries pre-defined within profile limits set by human operators. Self-organisation works well in highly networked and connected environments, and underpins both positive and negative behaviours. Viruses and DDos Attacks may be self-organising, whilst viral networking & branding within social networks is also related to such behaviours. Self-Organisation underpins much biological behavior from the symmetry breaking instabilities within the womb, to the ant hill, and collective reproductive behaviours within certain single cell species.

(f) Virtualization – Today this refers mainly to the outsourcing of storage, processing and networking to the enterprise cloud, and to 3rd party companies that may be located anywhere in the world. In this proposal, the meaning is extended to the virtualization of business itself, as well as domestic activities and decisions that may be virtualized to intelligent agents operating within simulated virtual worlds that are further discussed below. The evolution of virtualization is a key trend in the explosion of intelligent life within the world as a whole. Mankind is making more and more detailed & accurate models of our environment – such as Google Earth, and Global Geological 3D Maps. Now we also need to make more accurate probabilistic maps of our future, much as we do weather forecasting today based upon probabilities being assigned to alternative longer term scenarios. The explosion of virtual worlds and business virtualization follows the previous explosion of information during the latter 20th century. Virtualisation will include new semantic & knowledge focusing tools to filter out required information & alerts that require strategic decisions from real human decision makers. In this way, businesses will to some extent start to run themselves at a basic operational level, gradually virtualising some of the processes that evolved from the industrial and information societies of the 19th/20th Centuries.

(g) Embedded Intelligence – Every node within the communications network, every gadget, human implant, software module, virtual and real world asset will have some embedded intelligence even if it is only an RFID device or virtual world ID Tag. Increasingly this intelligence will be pervasive, and nano-engineered devices will be embedded in every physical asset, even screws, panels, and every component within complex systems. These nano-intelligent devices will communicate any functional weaknesses, as well as possibly GPS location information, movement, vibration and other characteristics in order to provide far more advanced failsafe devices and total systems.

(h) 3D Virtual Reality – Today such interfaces are restricted to specific applications such as Second Life and for Game Machines. However, these 3D Interfaces will gradually take over for many current Web2.0 Applications since they provide for "Nintendo" like Wii interfaces that are easy to navigate for non-computer literate users. In fact with the embedded nodal intelligence, the computer servers and storage will become a remote invisible utility, rather like the electrical power stations from the 19th/20th Centuries. Computers & Intelligence will simply merge and converge within the background business & domestic infrastructure that we'll connect to, primarily, with wireless, optical & laser communications at speeds of 100GBits up to 1TeraBit/Sec and beyond. These will power both business & domestic 3D "Next Generation Halo Media Rooms" with full immersive 3D virtual reality capabilities and hands-free sensory & body induced interfaces.

(i) Knowledge Focus – The information explosion requires focus, and hence the invention of the conceptual "knowledge lens" or "decision lens" that I first documented 20 years ago in my Key Note address for the UK Conference on Expert Systems – Brighton, 1988. We can conceive of both time lenses and space lenses, as well as hybrid variations of space-time lenses. Focusing information in space is the traditional way of using a lens from BC to 20th Centuries whilst focusing through time will be the primary way from the 21st Centuries onwards. The "Time Lens" focuses information as an event or time-defined process which may last from nano-seconds to years depending on the scope and complexity of the decision process or strategic project. Generally a time lens will involve data sourced from multiple environments, countries, companies, and then consolidation for the short duration of the "neural decision process" within the time lens. The time lens can also relate to the consideration and integration of remote historical events, and their dynamic projection into the future. Ideally, the relevant historical "statistical" data set should be of at least a similar time series to that which is being projected to the future. So to project 25 years into the future it is best to go at least 25 to 50 years into the past to understand the historical dynamics.

(6) Personal Role – Value Proposition

My unique value proposition is that I've been actively involved in ICT now for 30 years since joining British Telecom Long Range and Strategic Studies in 1978 – Cambridge, England. Since then I've been involved in advanced studies and research projects including the 1st UK Government Committee on IKBS, and then initiated and co-directed BT's EIGER Programme on New Generation Systems from 1985 to 1987 on converged voice, data services. Within Digital my 1st role was to drive forward the pioneering Business Blueprint for the next 10 years of products & services, which amongst other things, included the forecasting of the emergence of social community networks. Further, I was responsible for the establishment and growth of Digital's Internet Business across EMEA from 1994 to 1999. All these roles mean that I have a comprehensive and probably unique

understanding of the dynamics of the ICT industries, future trends, and the potential for new products and services for "ICT PLC" enterprise customers. My proposal is that I should work with the research laboratories as a senior consultant to recommend and manage the front-end definition and productisation of new "ICT PLC" adaptive enterprise services. In particular, to advise and to take responsibility for the 3 to 5 year product roadmap, as well as the extreme long-term 10 to 15 year roadmap, and to help vision & drive forward the R/D priorities of the $3.6 Billion Programme over 23 Laboratories. This may include responsibility for the evolving "product & services" supporting the adaptive enterprise & the emerging "neural business". Further I'd be actively working with the "ICT PLC" Labs to productise current research, identifying gaps, and then discussing and deciding upon the options for insourcing or outsourcing critical software services within the new architectural model.

(7) Proposed Programme - Like any good plan, the programme is divided into 3 phases:

(i) Q2 - April/May/June - Discuss the ideas, models, and concrete ideas for new products and services within the "neural business" with "ICT PLC" Management, as well as senior "ICT PLC" Labs Research.

As an immediate action it is suggested that we schedule a UK/US Video Conference to review this proposal, and agree the next steps. Meet with selected UK/European "ICT PLC" Management to discuss the ideas behind the "neural society" model for adaptive enterprise services as a model for the transitional market of next 25 years.

(ii) Q3 – July/August/Sept – "ICT PLC" Decision on possible full-time / part-time role within organization, based in the UK, but working as an interface between enterprise clients, sales and marketing and the "ICT PLC" Research Labs Research Teams within the UK/EMEA Marketplace, with Language Skills.

(iii) Q4 – Oct/Nov/Dec – Release 1st Phase of the New Products/Services Enterprise RoadMap for the next 5 years – 2009 to 2014, with extreme perspective until 2020 for directing Research Labs.

(8) "ICT PLC" Business Payoff

"ICT PLC" has to act to survive the next make ICT industry transition from the information to neural society. Today most enterprises understand their computing requirements, but during the next 25 years they'll regard it as an outsourced utility within the "neural cloud". The focus will be on the "real-time", "intelligent agents", and 3D Virtualization of Business, and the transition of business from the real world to the converged and hybrid world of virtual reality. Shopping, team meetings, product negotiations, product launches, all taking place within this hybrid immersive environment which is already being trialed within Second Life today. "ICT PLC" should be its own reference model for this major business transformation, and re-focus its R/D to concrete

objectives, products and services within the roadmap. Further, "ICT PLC" will be outsourcing some non-critical R/D and checking out most other accessible public domain research from corporations, national governments, as well as possibly small entrepreneurial start-up business ventures. R/D itself is now an "open" exercise, in which public technical blogs may contribute as much as conference participation.

Annex (1) – Frequently Asked Questions - FAQ

(a) Why Neural Business & Neural Society? – We require a powerful metaphor that fully represents the requirement of the adaptive enterprise of the 21st Century. The biological neural brain is actually a hybrid adaptive organisation, with some significant redundancy of control that extends through the nervous system through the whole body, including sensory organs, and limbs.

Enterprises today require a new model that allows them to manage the information explosion in ways that filter and focus the necessary information that need to be processed for quality decisions. The neural metaphor for both business and society provides an excellent model for understanding how the global networks, servers and storage capabilities may be productively used and managed during the coming 10 to 25 years, In the future ICT products and services it should be understood that we're not trying to replicate the human brain, but simply to engineer some of its more useful features such as graceful degradation in the case of failure, redundancy of control & continuous and effective adaptation, self-organisation and learning within dynamic and often chaotic environments.

(b) Business is already Real-Time – Businesses are certainly approaching real-time, but many mission critical business functions remain labour intense such as the management of financial spreadsheets and data mining. In a true real-time enterprise, most of these lower levels of operation will be managed autonomously within pre-set limits, and "human decision makers" will only be alerted with triggering events are go outside normal operating zones. Increased on-line competition will mean that *every* enterprise CIO will need to implement a strategic programme to transition to "real-time" operations within the next 5 to 10 years.

(c) Are Decision Lenses just Vapourware? – Time Lenses or Decisions Lenses are actually very real. Business today probably collect and store too much information and data, much of which may never be required. The human brain is more pragmatic and stores information and memories that are directly relevant to successful competitive adaptation and survival. In the same way, enterprises need to focus their terabytes of information in real-time to process and filter the necessary information for specific urgent management decisions. This is the role of those decision lenses. Following an individual, team or Board decision, the lens then store the processed results of the decision into the data warehouse as well as communicating the results to relevant staff and partners.

(d) AI failed to deliver, so why the Semantic Web? – We're simply at the next stage of understanding how to model intelligence, using computing and software tools that were unavailable back in the 1970s and 1980s. It is imperative that we organise information in more structured ways such as our computing systems can themselves start to understand the semantic logic of knowledge.

(e) Surely 3DVirtual Reality (3DVR) is just for Gamers! – Not at all! In fact several defence organisations in both the UK and USA are actively recruiting gamers in order to further develop simulated virtual worlds for more serious military objectives. The reality is that many of us will be doing most of our on-line shopping in virtual worlds within the next 25 years, whilst business meetings and conferences will also be conducted in simulated virtual worlds. The application of 3DVR will extend to the arts, music, theatre, and in fact to every branch and activity within society, just as the Internet, after less than 15 years has already impacted *every* business and social function.

(f) How does all this relate to Google? – It assumed by some that Google represents the future of Web2.0 and the Internet. Clearly Google has a strong market share, and excellent vision, but the vision of the "neural business" and "neural society" provides many other roles for emergent business that are not currently offered by Google Inc today. In particular, "ICT PLC" can exert considerable leverage through its own brainpower and $3.6Billion R/D programme to explore some of the "Terra Incognita" within the emerging marketplace for "neural products and services".

(g) Business runs OK today so why change! – The reality is that business is *not* running so well today, and the current global financial problems resulting from the sub-prime mortgage issues provides an excellent demonstration of why information networking and processing needs to transition to a new generation of embedded intelligent software, processing & decision tools. During the last 200 years we've evolved through a succession of business models from the industrial society through to the information society. We are still deploying many legacy systems that slow down business, and reduce efficiency and adaptation that are mainly unrelated to technology. So it is imperative that we transition to organisational models – based upon "neural business" that provide greater freedom for enterprise adaptation and learning during the next 25 to 50 years.

(h) Won't we lose control to runaway software agents or "bots"? – Yes! – As always there are some risks with deploying new intelligent software applications and services. They need to be programmed and managed by intelligent and responsible management teams. However, by the very nature of the "neural business" architecture, there will be greater protection for business continuity in the case of failures, crises or disasters. Transitioning from information to adaptive neural business should ideally take place in a controlled way – step-by-step – phased in over 3 to 5 years.

(i) Who else is offering Neural Business Solutions? – The leading players in this marketplace are probably the major suppliers of data mining and data warehouse solutions such as Business Objects and SAS Institute, as well as the major ICT Players such as Oracle, Microsoft and "ICT PLC" itself. However, the solutions offered today are quite primitive software services and really only represent early precursors of the solutions that "ICT PLC" could engineer and launch during the coming 3 to 5 years. I believe that it is important to develop a compelling "story" regarding the whole "neural business" architecture, benefits and services so that enterprise CIOs are confident in the next steps to making a commitment to a multi-year investment plan.

(j) These 3D Media Rooms seem like some Sci-Fi Dream! – Not at all! All the technology is actually available today, although the prices would be prohibitive for most enterprises, and certainly too high for normal domestic users. However, based upon current price trends and technological advances, we can expect ultra-thin screens to be available within 15 to 20 years, along with the higher speed optical and wireless networking – 1 Terabit/sec+ - required to support real-time simulated virtual reality for a complete Halo Media Room Plus++ with body controlled I/O sensors.

(k) I don't understand this convergence of "real" & "virtual" business worlds! – This is one of the mission critical concepts. During the 19th/20th Centuries, business developed within the "real" world with "real infrastructure based upon concepts and models from the industrial society – the woollen mills and ironworks from the 19th Century. This included the "real" physical Board room for meetings of Directors, and the whole heavily bureaucratic hierarchical command and control organisation. By contrast, the "virtual" business only started 15 years ago with the emergence of Web1.0, eCommerce, eBusiness, and then Web2.0 with advanced Search, Social Networking and Mash-Ups of every possible combination of on-line application service! Most of the successful virtual businesses have emerged as start-ups that are less than 12 years old such as eBay, Amazon, Google, YouTube, MySpace, Facebook, Bebo and the rest! By contrast, traditional enterprises have established "virtual" business as operations quite separate from their "real" mainstream business. During the next 10 to 20 years, all these "virtual" business will become fully converged within the "real" business in a sort of operational duality in which both "real" and "virtual" have similar strategic business importance. Parallel with this convergence, we'll see the implementation of scaled virtual worlds within *all* levels of the enterprise, SMEs and domestic environments.

(l) I like this ICT "Neural Business" Futures Vision! How do I sign Up! – Well to be honest, the "neural business" model is really powerful & compelling, whilst the extensive conceptual framework can be used to incorporate most ICT dynamics and trends. The aim of my proposal is to

suggest a collaboration between myself and "ICT PLC" on either a part-time or full-time basis in order to further develop and implement this model for new adaptive enterprise products and services!

Annex (2) – 25 year RoadMap

Phase 1 - Real-Time Business – 2008 to 2012 – I should begin by stating that all three trends for real-time business, neural business and converged business are already taking place today, and this division into phases is to indicate when I believe each of these developments will "mainstream". It is difficult to imagine that on-line business only really kicked-off just 10 years ago, and that now digital advertising on GOOGLE already performs television advertising on the major UK – ITV Independent TV Channel. Customers now expect "instant" consummation of on-line purchases and continuous confirmation of dispatch, and delivery, using courier track and trace services. Similarly, when the business the directors now expect "instant" dashboards, KPIs, and any form of financial and sales pipeline info immediately – 24/7. Business Intelligence Solutions are now moving towards "real-time" in which alerts are event driven according to pre-defined criteria, and tolerances placed on changes within the data time-points.

Every enterprise will be running in real-time within 5 to 10 years, resulting in some staff reductions, but primarily to a re-direction of staff to the front-line, and to responding to event alerts, leaving the ICT applications to run the "business as usual". Event alerts will be encapsulated within a "decision lens" which includes all the relevant data parameters, prior information and decisions – all of which is embedded within the enterprise semantic web. The business is starting to understand itself and to display the first very early signs of intelligence – hence the emergence of the neural society in which our supporting networks & machines are starting to develop higher levels of intelligence – within the virtual world. So just as Meatball Sundae provides a pivotal change in marketing & advertising, so this Vision shows that business needs to re-organise itself rather than just add on the eBusiness Group for on-line sales and marketing – In the converged business, both classical real world and on-line virtual world become integrated within the *same* real-time neural organisation, which itself exists and adapts within the converged neural society – man co-operating, and essentially immersed within the next generation ICT machines.

The next generation interface being simulated avatars "living" within virtual immersive worlds – We'll all be living part of our lives within tailored "simulated environments" from the time we wake-up, to when we sleep, which brings to mind films such as the Matrix or the 13th Floor which also feature completely immersive virtual realities, indistinguishable from "reality!

Phase 2 - Neural Business – 2012 to 2020 – In less than 5 years the neural society will start to mainstream. If we think back to the 1990's, the World-Wide Web was invented in 1990/1991, and

this moved to business mainstream within 5 to 10 years, leveraged by the original MOSAIC Browser, subsequently Netscape, and then succumbing to the competitive pressures of Microsoft. So now we've at the conception point of Neural Business which is enabled by all the various Web2.0 applications, with GOOGLE itself currently acting as the global "killer" service, followed closely by services such as Wikipedia, eBay, Amazon and then the plethora of Social Networks including Facebook, Bebo, MySpace and the rest! Neural Business has several key dimensions, all of which involve some element of adaptive intelligence embedded within the network. (a) Intelligent Agents – Man Machine User Interface (b) Autonomous Business – Embedded within the Semantic Web & Data Warehouse (c) – Adaptive Applications – Specific to each Intelligent Networked Software Module. In fact every gateway, applications, user interface will have some level of intelligence just as the human neural system is distributed through the entire human body, and every sensory organ. So the future 21st Century Business will also have adaptive modules – "neurons" embedded within EVERY scaled level of the enterprise operations, EVERY Business function, and EVERY interface for customers, partners and employees. A key part of the organisational transition will be the extension and ramification of real-time communications to all the front-line employees whether they are "internal sales", media call centres, or travelling on sales or support calls. Greater resources will be focused upon the front-line as the back-office tasks are either automated or re-structured into more horizontal "organic" cellular organisation – more like a honeycomb of networked cells within a beehive or anthill – allowing some level of autonomy and self-organisation within the new peer-to-peer enterprise of the 21st Century.

Phase 3 - Converged Business – 2020 to 2033+ – This next step is no less fundamental than real-time and neural business. Now the final stage of this metamorphosis results in the complete integration of the classic "industrial style" real-world business with the neo "internet style" virtual-world business. This is mediated through the implementation of virtual world universes for each enterprise. These are customised and even branded to adapt to their cultures, products, services, and style of management. In essence these are the virtual architected "offices" show rooms, canteens, conferences rooms – Rather like a populated version of Second Life! Every physical real world environment will have a virtual world analogy, for every business – and scaled from document storage to Business Park or university campus, or even government complex & parliament. So the immense peta-bytes of information will also be modelled so that users can access information more akin to the real-world – Through actually filing "virtual paper reports", as well as requesting reports and graphics, or even 3D architect drawings that appear in the virtual world as if they were real world assets. So again the enterprise will no longer be able to marginalise their on-line business, or simply build an experimental office in Second Life. Now the 3D Virtual Reality is for real, both in the "real world" office, as well as the domestic Halo Room. In reality, the entire enterprise is virtualised – not just the ICT, but the complete reality as in the Matrix Trilogy. No asset remains only in the real world – Every real AND virtual world asset is tagged either with RFID (real world), or with code tags (virtual world – as within Second Life

objects). This scales up from individual, through business, nation and society in general. And also scaling down through *every* single real world object, assets, eventually right down to nano-objects. But the message is clear – Real and Virtual Worlds are mirror-images – Duals, and every business will need to operate both in the real and virtual worlds, just as individuals will have both their real world and their virtual world ID & persona – starting today with social networks.

Phase 4 - Neural Society – 2033 to 2100+ - This is the primary thesis, that we are about to transition to a very different form of business organisation, and society during the next 25 to 50 years. I've called this neural society to emphasise the focus on knowledge and intelligence, in contrast to the "industrial society" when the focus was on systems and machines, and the information society with its focus upon databases, and networked information. Now after 50 years since the formation of the British Computer Society, and the Foundation of Digital Equipment Corporation, we are drowning in information, email, financial spreadsheets, instant messages and SMS. Hence the requirement for embedded intelligent within EVERY part of the network, such that information can be focused through decision lenses which encapsulate the information that we need to know at specific points in space & time. In fact we can conceive of both space and time lenses which I first described more than 20 years ago in a keynote address to the Annual UK Conference on Expert Systems in Brighton. Traditionally, information is focused spatially from a number of sources and geographical locations, and then filtered and focused for decision makers.

However, now we require "time lenses" that act upon real-time streams of information, rather like an intelligence agent searching for certain code words within a secret encrypted transmission. Increasingly our information systems will be coded as semantic webs, which have a certain understanding regarding their embedded content. Software Agents will parse the incoming information and generate alerts or events at pre-defined levels that will be communicated to specified decision-makers that may be "real persons" or possibly "virtual agents" in the medium term future.

So we conceive of neural society as being the 3rd tier in our route to civilization – starting with machines, then computers, and within the neural society – intelligent applications, networks & machines. In effect we are virtualising every aspect of our life, our environment, our world, and modelling & coding this as an intelligent virtual reality. We're modelling & re-creating super-intelligence, 3D videos & virtual worlds. Remember that we started painting and modelling our reality back in the stone-age with the Neolithic Cave Paintings – representations of our life – hunting the wild mammoth and sabre-toothed tigers. Then in the Renaissance we became more sophisticated with iconic paintings of our saints, medieval wall frescos and the great Leonardo, Michelangelo, Raphael and the rest!

Step by step we've evolved our culture to the point that we now scientifically code our business, life environment and all sensory information into networked servers – we take thousands of digital

photos and hours of digital videos that we never have time to watch, as well as hours of recorded digital Television that again will often remain unseen due to time constraints. So, within the information age we've reached the limits of modelling our environment merely through collecting and storing the information. We urgently need the semantic, adaptive and intelligent web to allow us to model with some meta-level of processing, such that the computer processing, storage and networking as the 3 primary elements start form elements of the enterprise "brain" in which information, statistics, project plans, spreadsheets are filtered and focused through "decision lenses" prior to being presented to the employees, customers, partners or other stakeholders. Hence the neural business, and neural society upon which we'll be totally dependent in a symbiosis between man and machine.

Even today, when there is a power cut, or the computing systems crash, business stops – no email, no transaction processing, no on-line orders or dispatches. In the future the dependence will be absolute, with an even greater requirement for BCP and DR Planning, as well as a strong focus upon embedded security, co-located with all the embedded network and system intelligence. This level of neural society will endure until such time that man can move forward to next level of a neuro-genetic-society, when we transition to the next step of virtualised intelligence, as well as the next step in human genetic enhancement, and the embedding of intelligent nano-devices within ourselves.

So, restricting ourselves to the neural society, what are the benefits and suggested strategies for "ICT PLC"? The Good News is that this is a spectacular opportunity to boost the value of the networked computing infrastructure, software, hardware, storage, consultancy and intelligence. However, the architectures and organisational models will be very different to the "fluid" models required during the "information society" and the current Web2.0. We're moving to a gaseous organisation, with employees, customers and partners that are increasingly mobile, and networked into far looser business organisations, maybe working from their Home Halo Cubicle, or even working from vacation in a rented community media room in Fiji, or in a mountain chalet near Aspen/Vail!

Now the transition from Information to Neural Society is already taking place, but will not mainstream for another 10 to 15 years. This will be precipitated by the decline in storage, processing and networking costs, coupled with the realisation that businesses need to radically re-organise in to fully exploit the developments of Web2.0 – a la Meatball Sundae. New global businesses, as well as political groups will emerge that will successfully crystallise within 2 to 3 years through fully leveraging the neural tool, just as Google did from 1999 to 2002. In the full presentation we shall move to the specific practical consequences of the neural society for a number of the major business sectors, as well as for generic themes such as security, mobility, the environment, & government. It will soon become clear as we explore these more detailed

scenarios that 21st C Life & Society is *very* different from the information society of the late 20th Century.

Annex 3 – Some Enterprise CIO Issues

(1) Transitioning to Real-Time Business – By 2020. ALL Businesses will migrate to "real-time" to survive or else die during the next 5 to 10 years. Real-Time means that the business operates like a global foreign exchange dealing room, with synchronisation across the classical business functions, and then across to partners and customers. In particular, customers now expect "real-time" electronic confirmation of every transaction, so businesses need to at least simulate this requirement, even though some internal activities are asynchronous in a quasi off-line mode whilst the new real-time business architecture is phased in during the next few years.

(2) Accurate Information at Any Place and Time – CIO's need to ensure that "master copies" of databases, engineering drawings, legal agreements are maintained, and that the networked information is always accurate, definitive, and that master versions are appropriately updated. In particular, multimedia information needs to be accessible by "any device", anywhere in the world.

(3) Synchronised Information across of Business Functions – During the 1990's, there were information silos within each business function – Finance, Marketing, Sales, Operations, Directors. The transition to real-time means that we require generic horizontal networking across functions so that the complete business model – in effect the report & accounts – is always available 24/7.

(4) Managing Information Transactions with Partners – Neural Society requires communications with all trading partners, both upstream and downstream, as well as "real-time" customer access.

(5) Evolution to Open Business – The full implementation of "Open Business" enables customers, partners and regulatory agencies relatively open access to most areas of the business operation – Databases, Personal Information, Tracked shopping data, Delivery Information – Which puts customers, partners and in control, and the business, to some extent as the neural partner. Peer to Peer business – which increasingly becomes – Brain to Brain – Neuron to Neuron. Open Business is Organic Business with Adaptive, Self-Organising Systems, Intelligent Agents and more to mediate interactions within this "instant world". So the new intelligent user interface becomes – hyper personal – since YOUR avatar will actually know practically everything about you, and your requirements & is essentially the next step in the transition from GOOGLE World to Neural World.

(6) Meeting Government Regulatory Requirements – Typically in the USA this is the Sarbanes-Oxley Legislation which requires really detailed decision audit trails for several years, and may grow even tougher to meet in the 21stC Real-Time world due to the terabytes, and even Petabytes of information flowing, and being processed – 24/7. Who will house, and own these audit silos?

(7) Implementing Business Intelligence 2.0 – The next generation of BI will be event driven, and in our Business Vision will be focused using the knowledge lens, or decision lens – Filtering out the required information for decision makers at known locations in space & time, and then feeding the results back into the data warehouse, More like Flight Simulator in the war zone, than the Monthly Board meeting of the Industrial Society or 19th Century Cotton mill. Future BI3.0 and beyond will be largely driven through intelligent agents generically mining the "semantic web" – At present we have the classic AI problem of the domain specific expert system, whilst the business requirement is for "self-adaptive" ontologies that are able to generate their own domain specific networks.

(8) Integration of Classic "Real World" Business and "Virtual World" eBusiness – The CIO's Information Foundries of the last 10 Years are usually very much "real world", with a peripheral eBusiness Data Warehouse. However, during the coming 5 to 10 years, we'll see the full convergence of the classic "real world" business (Enterprise Networks of the 1990's), and the "virtual world" business (Internet, eCommerce, and eBusiness of the 2000's). In fact the virtual world will be the MAJOR real-time enterprise driver and customer/partner business interface.

(9) Information and Business Security – The increasing business dependence upon the information and the semantic web as a real "business asset" makes more vulnerabilities to security. Issues include corrupt information, hacked business, false business intelligence, and information "walking" with disillusioned or redundant workers. The CIO may also have responsibility for the TOTAL Business Security including the physical building, and assets, as well as electronic information, documents, agreements, customer & partner databases, and secure financial info.

(10) Business Continuity Planning & Disaster Recovery – A parallel aspect to security is the requirement to ensure the business, or government continues to function despite possible failures in the Information Utility caused by either internal or external crises. These many include fires, earthquakes, Distributed Denial of Service Attacks – DDoS, as we electrical and IT failures. Most larger businesses and national governments have some form of quick-start remote back-up service.

Annex 4 – Examples of Possible Dimensions for "Neural Business" Products & Services.

(a) Embedded Intelligence in all products – "Intelligent Web" – Generic SDK with packaged semantic web applications & tools for developing your own specific business ontology Interfaces.

(b) Sector Specific Neural Business - SDK's: Custom features for banking, government, education, healthcare, retail, travel & transportation

(c) Technology Specific Applications targeted on: Security, Intelligent Network Management, Mobility, Real-Time, Business Continuity Planning/Disaster Recovery, Business Intelligence 2.0.

(d) Enterprise Neural Lenses: These are customised versions of Business Intelligence 2.0 to provide real-time visibility and decision making in the neural business – Examples will be in the hi-speed decision

environments such as banking/finance, retail/FMCG, advertising/branding, and defence/military (Next Generation - C4ISR). In addition there will be: Healthcare Lens – Government Lens and Knowledge Lens (Education) that are specific decision lenses for the management of resources, policies & decision making in these public sectors.

(e) Intelligent Agent/Avatar SDKs - Scaled for Media Room, including 3D celebrity templates.

(f) Virtual Networked Board Rooms (3D Virtualised War Operations Rooms – Custom Halo)

(g) 3D Enterprise SME & Home Media Room Kits (Complete – H/W, S/W, Wall Furnishings, Screens – DIY) – Present-Day PCs/Laptops/PDAs/Mobiles will gradually become redundant in the Neural Society since computing is an intelligent wireless/optical networked utility. (Halo 3D Plus)

(h) Core Parallel Neural Servers – Terabit/Sec Processing Speed

(i) Quantum Computers for special security/cryptographic tasks

(j) Nano-Scale Computers – Embedded in Physical Object, Gadgets & Living Entities.

(k) Enterprise Modelling & Mapping Consultancy – Focused upon the migration from legacy IT/IS solutions to the neural business solutions. This should again be sector focused, and be driven by "ICT PLC" through partners with leading edge neural applications within these markets In summary the idea is to sell the idea of "neural business" and then to roll out a comprehensive new product & services development programme, coupled with sales and marketing – spanning all channels – worldwide! Suggest setting up a high level CIO Customer Panel to act as a Business Focus Group to sanity check some of the ideas, new products & services, and to customise them for "real world".

Annex 5 – Professional Profile – Dr David E Probert – (*VAZA* International – www.*vaza*.com *)

During the last 30 years, David Probert has provided the strategic vision and thought leadership for many successful projects including:

Long Range Planning Model (LRPM) – The 1st Dynamic Strategic Planning Model for British Telecom that was developed during advanced management research at Cambridge University during the late-1970's. The model was used to support BT Board Level strategic analysis and decision-making both "pre" and "post – privatisation".

Computer Integrated Telephony (CIT) – Established and led British Telecom's £25M EIGER Project during the mid-1980s' to integrate computers with telephone switches (PABX's). This resulted in the successful development and launch of CIT software applications for telesales & telemarketing operations in a worldwide marketplace.

Blueprint for Business Communities – Visionary Presentation for Digital Equipment Corporation during late-1980's that included the creation of the "knowledge lens" and "community networks".

European Internet Business Group (EIBG) – Established and led Digital Equipment Corporation's European Internet Group for 5 years, from 1994 to 1999. Projects included support for the national Internet infrastructure for the countries of Central and Eastern Europe, Russia & the Former Soviet Union and the countries of the Middle East. Dr David Probert was a member of the European Board for Academic and Research Networking (EARN/TERENA) for 7 years (1991 ➔1998)

Supersonic Car (ThrustSSC) – Worked with Richard Noble OBE, and the Mach One Club to set up and manage the 1st Multi-Media and e-Commerce Web-Site for the World's 1st Supersonic Car – ThrustSSC.

KolaNet – Established and led the KolaNet Project within the Arctic Kola Peninsula, Russia. This multi-national project run from 1992 to 1998 and provided Internet Communications, Web-Sites and Training to Research and Government Institutions within both Russia and the Former Soviet Union. The primary applications for KolaNet were the monitoring of radioactivity from nuclear power plants and sea-borne reactors as well as other harmful industrial chemicals & heavy-metals

Secure Wireless Networking – Business Director & VP for New Venture to establish a portfolio of innovative secure wireless networking products with advanced technology partners from both UK and Taiwan. Dr Probert was also appointed as the New Products Director (CTO) to the Management Team of the Blick Group plc in the networked security products sector prior to its successful acquisition by the US Multi-National – Stanley Works.

Republic of Georgia – Senior Security Adviser – Appointed by the European Union to investigate and then to make recommendations on *all* aspects of IT security, physical security and BCP/DR relating to the Republic of Georgia's Parliament – Tbilisi, Georgia.

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Dr David E. Probert is a Fellow of the Royal Statistical Society.

He has a 1st Class Honours Degree in Mathematics (Bristol University) and PhD Degree from Cambridge University in the field of Self-Organising Systems ("Evolution of Stochastic Automata").

His professional biography is included in the 2007 Edition of the Marquis Who's Who Worldwide.

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