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Bloodhound Supersonic Car

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BLOODHOUND SSC modelled in NX

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Issue 6

eBritain
leading the technology world

Supercharged 21st century solutions

As the financial crisis deepens the cutbacks in technological research could have long-reaching effects on the UK's leading role in many areas. The BBC reported that the UK science budget has been frozen in cash terms which amounts to a fall of around 10% over four years. For example under cuts proposed by the Biotechnology and Biological Sciences Research Council (BBSRC), around 30 neuroscience research groups are expected to be wound up.

We all know that we have been lumbered with the results of mismanagement in the financial sector and government failure to sufficiently regulate the industry. But the brightest element on the horizon is our technological prowess and the knowledge economy. Our universities, science parks and technology-based businesses are respected worldwide.

In these pages we report on the UK's holding of the land speed record and our bid to go for a record breaking 1,000 mph. Richard Noble OBE, the project director of Bloodhound outlined at our World Hi Tech Forum at The Dorchester how, through the internet, this project is inspiring school children and could influence many to go into engineering. It was one of the most inspiring speeches at the Forum and I realised how apposite the title of that speech was "21st Century Solution: Supercharged education for our Industries." That is exactly what we need.

Looking around at the exhibits at the Science Museum in the "Making the Modern World" hall during our Forum gala dinner that evening, with everything from Stephenson's Rocket to modern aeroplanes on display, I was struck by the range of technological innovation of the past and how we are clearly continuing in that vein today. Ideas and their fulfilment in technological terms is something we are good at and can benefit all areas of society in terms of jobs and creating efficiencies. It would be disastrous to lose those benefits due to the activities of a few unscrupulous bankers.

Dr M Farmer
Editor-In-Chief

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Faster than the speed of flight

Richard Noble OBE, Project Director of the Bloodhound project, which aims to top 1,000 mph next year

Whether you drive a Bugatti or a Toyota you most probably had a few moments of excitement when you and the car were travelling fast; you may have wondered just how fast a car could be persuaded to go and what it might be like to drive really fast. It's happened to most people and it happened to Compte Chasseloup Laubat in 1898; he went on to establish the first world land speed record at 39mph/ 62kph on a Paris road. The performance was actually a disappointment because the bicycling record was faster but you have to start somewhere.

Shortly after the World Land Speed Record took hold as an incredible international competition requiring extreme design innovation and courage from the drivers. In the 1920's the cars were travelling faster than current fighter aircraft and the drivers were elevated to the status of the 1960's astronauts. The power requirement varies as the cube of the speed and the run site requires a smoothness and length that could only be found on beaches and dried desert lakes, so the cars required aero engines and tyres that would somehow hold together as vehicle and wheel rotational speeds increased driven by intense international competition. There was very little in the way of instrumentation and so the drivers were taking huge risk driving their cars into the unknown and rightfully claiming the glory for great personal accomplishment. By 1947 the record had been raised to 394mph and then 403mph in 1964. This signalled the peak of British wheel driven achievement and for a while the British lost interest as the Americans introduced jet and rocket cars which cost less to create and could accelerate four times faster. The American influence took the record to 622mph by 1970 but with the moon landings now drawing the global attention, there it stuck. It seemed very much a side show when compared with NASA's monumental achievements.

It took the Thrust 2 team 6 years to recover the World Land Speed Record for Britain in 1983. The Thrust2 programme started from just £175 and using a 30 year old Rolls-Royce Avon 302 engine and afterburner from a BAC Lightning Mach 2 fighter the record was raised marginally to 633mph with the car peaking at Mach 0.84. Again there was only primitive instrumentation and so it wasn't until that evening celebrations when the limited data finally emerged – it showed the car was within 7mph of involuntary flight and with a power to weight ratio greater than of any jet fighter the potential control less flight would have made very spectacular media footage. But one factor was clear - Thrust 2 was almost unique among land speed record projects in achieving its design speed of 650mph.

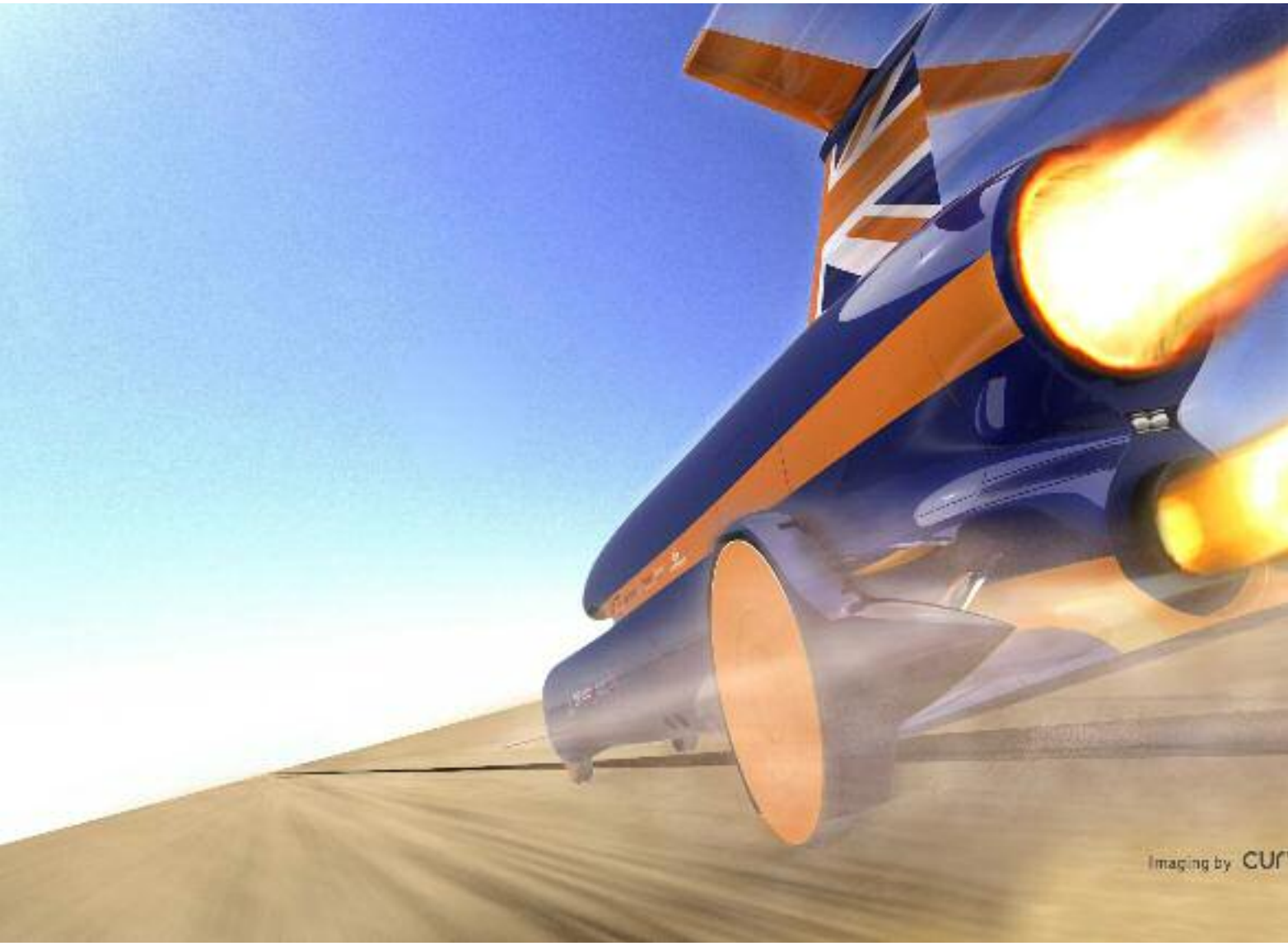
But there was something about the Thrust2 effort which generated enormous global media coverage; the moon shots had finished and there was a shortage of international derring do and challenge. The point had been well and truly made – the World Land Speed was within an ace of the speed of sound- and this was a high technology World First what ought to be challenged. Three teams took up the challenge- the McLaren Formula1 team had the money, the Spirit of American team had money and reputation, the ThrustSSC team (SSC = supersonic car) had no money but they had the aerodynamicist. The ThrustSSC project advanced through its research phase using for the first time CFD to evaluate the transonic aerodynamic performance and then

confirming it with rocket model testing on the long test track at Pendine S Wales. By good fortune an almost perfect correlation between the rocket test and the CFD results emerged, thus calibrating the CFD and proving the validity of the ThrustSSC car design. The huge achievement should have led to considerable industrial support from Britain's large corporate community, but because of scepticism and culture change it never happened – and the 15 person team had to finance its efforts from its 5,000 supporters and the web. And for the first time the web interest was able to disprove the British media's chronic and long held belief that the public had no interest in high technology. The McLaren project never made it into the build and the Spirit of America turned on its side at Mach 0.9 when the trailing shocks lifted the tail and a crosswind did the rest. The Thrust SSC powered by two Rolls-Royce Spey 202 units from an F4 Phantom made 5 supersonic passes, eventually including the mandatory two supersonic passes within the hour, to gain the current World Record at 763.035mph Mach 1.02, driven by the very brave Andy Green RAF.

The ThrustSSC record was famous for its World First, but there were other great achievements. Prior to the web, sponsors could only judge the public reaction to a sponsored event by media coverage levels. But there was a flaw: there was no way in which the sponsors could be sure how the individual consumer actually reacted to all the exposure. With the internet this now became possible and the huge global interest became apparent when the ThrustSSC website peaked at 17 million pages a day, 59 million visits in the year (equivalent to 300 million pages) which made it 30 times the size of 2010 Formula 1 team. The other key point was that for the first time it was possible to get quality performance data from the car – thus enabling engineering prediction and protection for the driver. The Land speed record driver was still taking high personal risk but that risk was reduced by the ready availability of quality data. The land speed record driver was no longer driving into the unknown and hoping to make it through by personal endeavour alone. The Land Speed Record had become much more interesting and much safer.

In 2005 it looked as though the Americans were to mount a challenge to the British record and it was decided to build one more car – to be the very best ever. The chosen power was to come from a combination of jet and rocket, enabling fine adjustment of thrust together with minimal

jet intake area. A key moment came when Green and Noble approached Lord Drayson Minister for Defence Equipment and Support. The idea was to encourage the minister to make an early EJ200Eurofighter engine available. The suggestion was received badly and the meeting was decaying to a close when the Minister made an unexpected request. He explained that the Ministry of Defence's main problem was the shortage of engineers –and he had a radical solution. had poor skills and could not replace the 40-60 range so consequently a vast number of apprentices would be required immediately. A study of the Apollo effect of the 1962-72 manned space programme showed that the US PHDs conferred had spectacularly increased from 12,000 a year in 1962 to 30,000 in 1972. The curve coincided with the NASA manned space program thus suggesting that a high technology project could deliver cultural change. But the project would have to iconic - airpast. Because there was no media promotion of engineering and not much in the way of spectacular engineering taking place in Britain the unfortunate STEM teachers were having a hard time exciting their classrooms about science and engineering. The whole country was losing its ability to design and manufacture. When the financial crash of 2008 came it became quite clear that the bloated financial services industry had blown its credibility and that the country would have to return to design



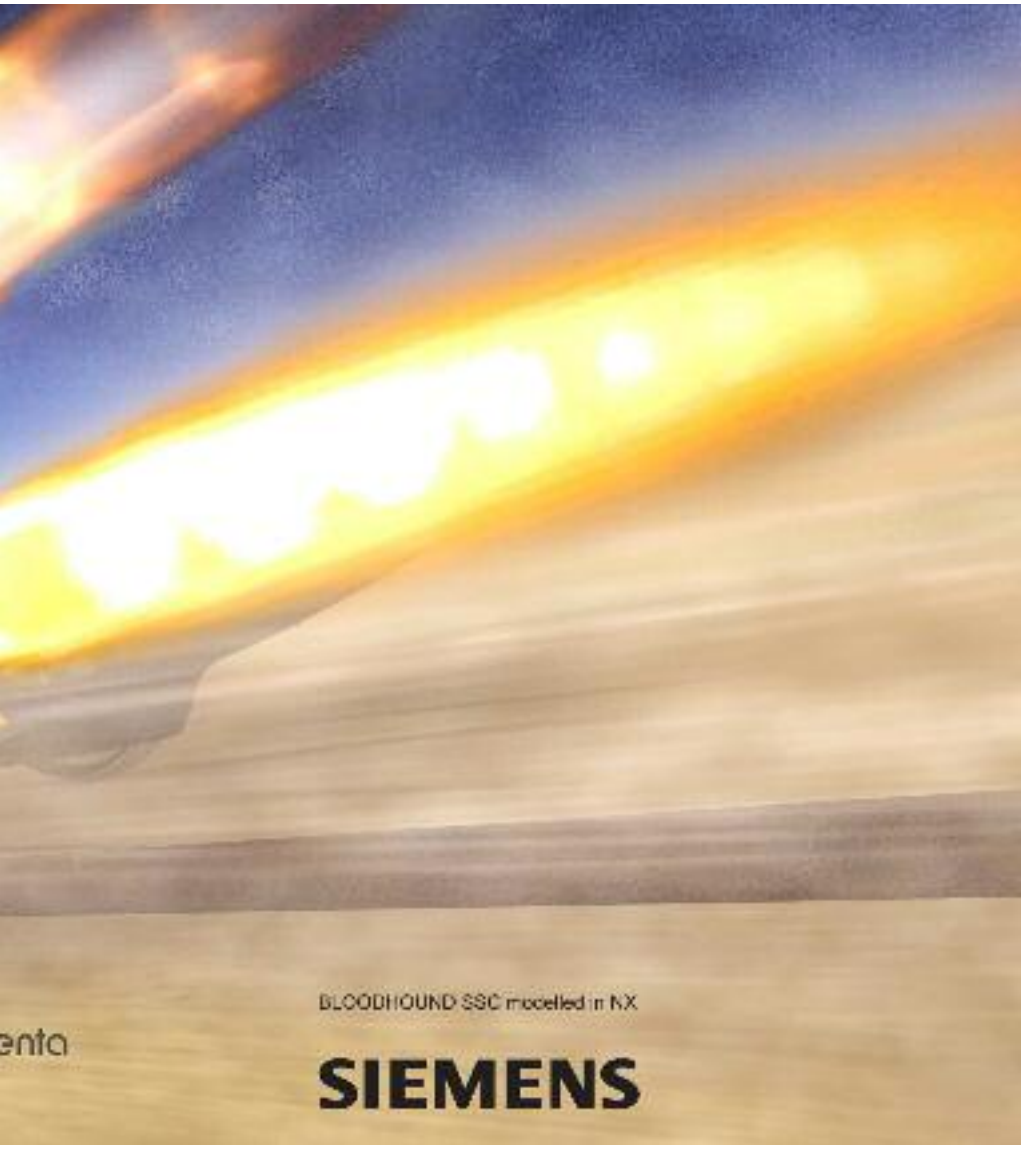
Remembering the fanatical interest among schoolchildren in the frantic development of prototype military aircraft during the Cold War, he asked Noble and Green to create an iconic project and run it through all the schools. Hoping this would lead to the EJ200 Noble and Green eagerly accepted.

The education research threw up fascinating facts – the Leitch Report of 2005 showed that the UK skilled workforce was primarily in the 40-60 age range and that in the next 20 years 60% would be lost through retirement. The 25-40 age range craft and space travel was out due to high costs and certification requirements – so it would have to be another car.

The shortage of engineers seemed to be something of a British problem – for years the UK media had been concentrating on its own territory, music drama and television stars and neglecting engineering. There was thus limited encouragement for school children and it didn't help that the then current culture was promoting a post industrial economy where engineering and manufacture had been consigned to the engineering and manufacturing. But the country was only producing round 24,000 graduate engineers a year - 30% of whom were diverted into banking financial Services and the BBC.

The key to the whole Bloodhound concept was the FIA land speed record design rules which in an effort to encourage unlimited racing and avoid liability from prescriptive design restriction resulted in minimal design rules – simply that the car must have four or more wheels and be controlled by the driver. Because all land speed

record have to be innovative to achieve ultimate performance, the lack of tight design rules means that all competiotor cars are substantially different. This being the case then all the project technology can be made available without fear of aiding a competitor for the simple reason that the competitor will have its own ideas – and have no means of knowing whether imported experimental technology will work in a its application. The new Bloodhound project is making all its technology available



live on the web as the project develops – this enabling legions of followers to understand how the project is progressing and in the process producing a new form of education-education by stealth! But for the classroom STEM teachers Bloodhound provides what they have been looking for - a live high profile high technology with all the data made available live as the project develops.

The Bloodhound project started informally in 2007 and the gestation was particularly difficult. The design speed was set at 1050mph. Since ThrustSSC had peaked at Mach 1.03 there was the small matter of a Mach 0.37 increment to tackle. Each design iteration became a nightmare, requiring the car to be designed to a fine tolerance before the CFD could be initiated. The design had to go through three years and 10 design iterations at a cost of £3m before with substantial help from the projects IT partner INTEL Corporation and Rolls-Royce plc a truly outstanding aero design was achieved featuring neutral lift from 0 to Mach 1.3. In parallel the projects 27,500lbs thrust hybrid rocket had to be developed from scratch involving 10 development firings to develop the catalyst pack and define fuel grain regression. The fullscale rocket was fired for the first time in November 2009.

At the time of writing the project is progressing to build with the target of achieving rollout early next year. Three obselete EJ 200 engines with unused flight hours have been loaned by the Ministry of Defence and 220 companies are taking part in the programme. The objective is to undertake first runs on a runway in the UK in Q1 2012 and then high speed runs on the Hakskeen Pan in South Africa where desert preparations are already underway.

The projects education programme is developing strongly with 3,800 UK schools taking part – and this expected to increase to 7,000 schools by end 2011. Overseas the project is proving popular with a further 440 schools taking part. Towards the end of 2010 INTEL Corporation plan to link up their global education programme SKOOOL with Bloodhound – thus taking Bloodhound to a further 6 million teachers. In the meantime the Bloodhound team have to recruit a further 600 education ambassadors in order to support the UK schools and in parallel develop a tailored e-learning process so that web followers can be brought up to education levels where they can interpret the data flowing from the cars 450 data channels when it starts to flow in Q1 2012.

As the project education develops it finds it is being driven by demand and a number of the UK engineering education academies now wish to establish local Bloodhound centres. The project is responding by creating a franchise arrangement to enable to centres to have their own Bloodhound show cars and presentations.

The next months of the project are likely to be the toughest as the build programme has to adher to a very strict plan in order to keep costs and delivery tightly under control. The reciprocal part of the programme is the funding machinery which has to deliver the funds from sponsorship just in time in order to maintain financial pace with the build.

In short the entire project represents a new education process which is already stimulating education in UK and overseas. There is still a very long way to go – but it might just be that the World Land Speed record will have a very considerable future in education – to prove it all we have to achieve is the 1000mph record.

And there is one last point, the Bloodhound SSC car will travel faster than a Eurofighter Typhoon at the car's operating level of 3,000ft. Land speed record cars will once again travel faster than planes.

See page 11 for Richard Noble's WHTF speech and page 13 for his BITE **"Championing of Technology"** *award.*

World Hi-Tech Forum: **Focus UAE**

Dr Peter Robinson presents a précis of some of the key speeches at last year's Forum held at The Dorchester

Baroness Neville-Jones
Minister of State for Security and Counter Terrorism

Security and Technology

Technology can be an enabler for us in meeting some of the most important security challenges. It is also important because the security and defence industries are contributing to the modernisation and expansion of the UK economy. The cyber and security industries are an important means of seeking to close our vulnerabilities, defeat enemies and working with our allies.

We face challenges in security and defence here and overseas and those old distinctions between foreign and home policy are breaking down since in counter terrorism all parts of the globe are involved. In the UK we are facing financial stringency at the moment. Technology is neutral it is what you do with it that is important. Improperly used it can be oppressive and intrusive to privacy, well used it can be liberating and unobtrusive. We are faced by a technology arms race with a skilled enemy of terrorists involved in asymmetric warfare. Intelligence is a key element in our response and technology generates intelligence. You can never win unless you know what is going on around you whether in Afghanistan or terrorism at home. Technology leads to the development of new techniques and becomes a driver for the tasks we have set ourselves. There are new analytical tools, visualisations, complex information displayed more simply and we can be more effective in our responses. We have to constantly move on, technical innovation does not stop, there is a permanent state of change.

We have to deploy technology for human security, to protect our national infrastructure and to ensure business continuity. There must be normality even when under attack, business as usual even in a crisis through well protected backup systems. A good national security policy involves prevention and deterrent, not just cleaning up after incidents have occurred. A lot of important work lies in developing resilience in everything on which the country depends. However, many services are in private hands and they must ensure resilience.

Intellectual development is an important part and we are supportive of the links between government, the security industry and academic institutions. Our intellectual innovation is ahead of the game. But we need rationalised government procurement and the security industry is fragmented. There could be greater consolidation and partnerships with government creating a bigger approach. Government must also be a champion of small and medium sized companies as this is where innovation often comes from.

International relationships like those with the UAE and all of the GCC which this Forum represents are important. Public private partnerships will continue in security as in defence. The Government and private industry must develop long term relationships across the world and particularly in the Gulf. Our education institutions are participating in this. We must consolidate relationships such as the recent security partnership signed between the government and Kuwait covering shared objectives in fighting counterterrorism and crime. This Forum is a valuable tool in this process and our hopes for the future.

Sir Paul Stephenson QPM
Commissioner of the Metropolitan Police

Delivering Security

The opportunity to work with international partners to share our expertise in security is invaluable since terrorists have increasingly complex capabilities. Anti-terrorism was mainly about sweeping up after bombings looking for traces that would give us evidence to bring charges and prevent further atrocities. Now CCTV provides the earliest scientific evidence and recognition which can deliver outstanding results. The 7/7 bombing trials saw graphic security images of the terrorists involved in the bombings demonstrate the value of CCTV.

Seizures of suspected terrorist personal computers is also an important area. Less than a decade ago just two constables in an office in Scotland Yard were involved. This quickly grew into a team of over 20 hi tech forensic examiners supplemented by 32 computer viewers. These teams are supported by the counter terrorism unit which specialises in the internet and the telecommunications intelligence unit which analyses complex telephone data. When we seize a PC, lap top or smart phone we can go through everything a terrorist suspect had downloaded, emailed, saved or generated. This has added a whole new dimension to our terrorist investigative practices. Storage capacity on PCs has become cheaper and grown from around 340 megabytes in the nineties to 1.5 terabytes. Terrorists use computers for posting inflammatory propaganda promoting acts of extreme violence, planning attacks using internet based mapping systems and raising funds. When using technology for these clandestine activities they try to conceal incriminating evidence using trade craft. We have to rise to these technological challenges. It is not just about the numbers of police officers involved. Our counter terrorism command hi tech unit has become a policing centre of excellence for forensic recovery and examination of computer storage and hard drives engaging in numerous partnerships domestically and internationally to deliver community safety. In 2008 we set up a dedicated viewing unit, the first of its kind in the world, which is cataloguing all their findings and these dedicated viewing techniques are now being exploited internationally.

Beyond terrorism, computer-based policing is used against crime, credit and debit card fraud, passports fraud and compromised credit card numbers. International crime can now be orchestrated from a lap top in a teenagers bedroom. Advances in technology will continue to test our resilience and innovation. Advanced technology in the wrong hands presents a significant threat and we must use technology to gain the advantage and deliver the security our citizens deserve.

Richard Noble OBE

21st century solution: supercharged education for our industries

This Forum is all about global partnering, diversification and structural change. In the UK we have been going through a serious recession similar to many countries. We have seen that the economic structure is wrong and we need to press the reset button just as the UAE has been moving from dependency on oil to embrace technology. To rebuild industries we need a fundamental change in our educational system starting right at the bottom at primary schools. The primary agent for this rapid change and change in behaviour is the internet, the most powerful weapon we have ever had.

I specialise in high technology start-ups, and we are probably best known for high speed thrust land speed record cars. These are just one example of engineering excellence, creating cars that accelerate faster than a jet fighter using Rolls Royce engines. The land speed record in 1983 of 633 mph which we got back from the Americans with my car, Thrust 2, has come to symbolise the engineering challenge. We built the first ever supersonic car. The power of the internet was demonstrated by the 1997 project. About 250,000 gallons of fuel were needed for this project and so we approached followers on the internet to buy it. Our website has 300 million page views. In 1997 we took on the first supersonic car with 763 mph hour recorded which has never been beaten.

The Ministry of Defence were having trouble getting engineering graduates so they asked us to start an iconic engineering project and run it through the schools. They found that 25-40 year olds do not have the engineering skills the UK needs. Engineering Phds in the US have been growing and contributed to the success of the space programme then a huge IT industry which changed America before the advent of the internet. We started with another car, an iconic car with the goal of a speed which would seem impossible, 1,000 miles an hour, a 30% increase on the existing record. In schools it started grabbing the attention of teachers who said that there had been no exciting projects to reference for their pupils. A new generation had not been encouraged to enter engineering, the classroom has to compete with video games. We found the sweet spot, a live project they could follow. While the space and defence industry cannot give out their information, all the data on this car is live as it happens. It is a gigantic educational software game, an engineering adventure with £3m in research and 3 years to get the car right. There have been 10 changes now we have the right design.

We have developed our own rocket motor, a Eurofighter engine with a booster rocket motor. It has the equivalent output of a formula one car just to drive the fuel pump. The project has a huge public following, with 400 schools using our lessons and followed in many other countries. In December 2011 we will complete the car and in June 2012 will be in South Africa for the record attempt. We aim to undo the neglect in UK education in classrooms using the internet as the driver.

David Delpy
Chief Executive, Engineering and Physical Sciences Research Council

Energy Research Programmes

We are part of seven Research Councils ranging from engineering to the arts and can tackle problems across the spectrum with a budget of £3 billion. The Physical Sciences Research Council has a budget of £800m a year for engineering and physical sciences. The Councils bring together major national and international programmes. We make sure academic ideas get used through partnership so that there are genuine impacts in products, ideas and the arts.

We work with many companies including 2,500 SMEs in the UK and international companies. About 40% of this research takes place in universities with partnerships with end users. Partnership is the key to success and UK academia is good at translating research through to product or making sure it is picked up by relevant users.

In the UK, energy is funded through an enormous number of agencies. The research councils fund at the beginning and the hope is to pass over to other energy funding agencies later on and then companies and venture capitalists. Hopefully there is seamless support from the beginning to the end in the product, idea or policy change. We also help provide trained manpower.

Energy funding has grown tremendously since 2002. The energy programme now supports the full spectrum of energy research delivered in partnership, internationally and nationally. Memorandums of Understanding have been signed with China, India, Japan and Europe. We are working together on cleaner fuels, solar energy and joint training. The delivery mechanisms in the UK by the Energy Research Centre is through Imperial College and Oxford University which fund a consortia of academic and business partners.

A future emerging theme for the Council lies in reducing home energy consumption and demand. We must consider the problem of solving the social problem of changing people's behaviour and use of energy. It is a challenge to the academic community to reduce energy consumption in the home. There is also speculative work being carried out in considering energy options. We are involved in accelerating energy partnerships and using the deployment of energy technologies we already have. We are also ensuring more doctoral training with more Phds in the energy community and every Council is linked into this work.







Peter Ripley
Managing Director of ACWA Services

The Middle East water sector

Companies looking to do business in the water and sanitation sector in the Middle East are undoubtedly joining the market at an interesting point. While the market has been to an extent constrained by the economic downturn, the background need for sustainable, intelligent water and wastewater solutions means that for those that can meet the region's high expectations there are significant opportunities.

The Middle East as a whole faces considerable water and sanitation challenges, and the scale and required pace of development mean that water is a key area that is receiving special focus from governments across the entire region.

There are a number of issues that provide impetus for growth despite the weak global economy. The area is characterised by acute water shortages exacerbated by the considerable challenges in providing adequate economic signals to restrain water use (given that in a number of countries water is provided free of charge). The statistics underline the challenge: while the Middle East is home to 5% of the world's population, it has just 1% of the world's renewable fresh water.

Environmental and health hazards surrounding the disposal of untreated effluent, marine pollution and deteriorating ground water quality are seen as not only key challenges but market opportunities in the region. Some large, private developers are using advanced wastewater treatment technologies, and wastewater treatment and reuse is likely to be widely adopted in the region.

The market is also seen as highly price sensitive, with profit margins for low-tech products coming under increasing pressure according to market analysts Frost & Sullivan. Component suppliers face competition from low-cost products from nations such as India and China. The report suggests that the onus is on technology providers to produce increasingly cost-effective products in challenging market conditions.

However, the potential benefits of success are considerable - the region is set to spend more than $120 billion on water investments in this decade, which experts believe is required to avoid severe water shortages by 2050. Water is also vital to support tourism, and building projects also inevitably consume large quantities of water, placing further pressure on groundwater reserves and existing desalination capabilities.

Professor Leslie Hobson OBE,
Deputy Principal, British Institute of Technology and E-commerce

Technology and Education

When one thinks of the United Arab Emirates , one usually thinks of energy and oil resources in particular. In recent years the more forward-thinking leaders and politicians have realised that the key to the long term future of countries like the UAE is not only oil but how well their country can embrace the challenges of education.

It is well understood that all countries must be able to keep in touch with the latest technologies and to have a University or higher education sector that is on a global level is a must for the future development and prosperity of that country. The British Institute of Technology and E-commerce has a great track record of global partnerships which specialise in keeping in with the latest innovations in technology and exploiting them in ways best suited for the partner country.

Leadership and Management Education is vital but creating the leaders and managers to exploit technology is often neglected. The British Institute of Technology and E-commerce has one of the largest MBA programmes in the UK and specialises in innovative Management and leadership. This has proved to be a great boost for countries who have engaged with our programmes and many of our graduates have moved on to positions of great influence in their home countries.

The education which produces the skills and aptitudes needed to produce goods and services is required all over the world but especially in countries like the UAE. At the British Institute of Technology and E-commerce we can carry out a needs assessment of the existing education provision and install staff development programmes to " Train the trainers " which has proven to be a great success in improving the provision of the right type of skills required by various countries.

The 3rd World Hi-Tech Forum (WHTF) last year focused on the UAE and was held at The Dorchester hotel, followed by the Gala dinner and Awards at the Science Museum in London on October 14th 2010.

It was a resounding success and attracted the attention of chief executives, directors, ambassadors and parliamentarians. The Forum concentrated on promoting British companies to strengthen their relations with UAE and GCC countries, identifying new areas of cooperation and global partnership. The forum brought the UK and UAE business community together to facilitate technological and business partnerships.

The Minister of State for Security and Counter Terrorism Baroness Neville-Jones highlighted the role of the World Hi-Tech Forum in promoting global partnering and technology transfer. The Forum was opened by Lord Ahmed of Rotherham, chairman of the All-Party Parliamentary group on Entrepreneurship and welcomed around 300 delegates. Nicholas Owen the BBC journalist was MC of the event.

The themes of the role of the government; the innovation process; innovative manufacturing; transformation technologies, global partnering and the latest internet developments were covered. The thrust of the forum this year highlighted UK strengths in the Civil Nuclear, Aerospace, Defence, Security, Automotive, Water and Finance sectors. There was a broad spectrum of organizations and companies representing both the public and especially the private sectors inclusive of sponsors, strategic and media partners.

At the gala dinner in the evening at the Science Museum, BBC television presenter Nick Ross presided over awards to leading international companies including Khalaf Ahmed Al Habtoor chairman of the Al Habtoor Group; Tony Weeresinghe of the London Stock Exchange and Richard Noble's Bloodhound project. See photo highlights on facing page.

This year the project management and team was experienced and streamlined. This ensured that the WHTF was presented as a world-class event logistically and organisationally. With more advanced forward planning and a commercialisation strategy the WHTF is being reviewed to take on the global stage beyond a London-centric approach. In terms of responding to the rapidly changing global economy the next WHTF is envisaged to go global and have a Globe trotting circuit which is responsive to requirements of focus countries.

The forthcoming WHTF will be built on building-block events planned for the BITE St.James's seminars and Shrublands residential summits in 2011.

Moeen Yaseen
Head of Strategic Relations

WHTF Awards Ceremony at the Science Museum

from top, left column: **"Outstanding Business Leadership" Award** - Khalaf Ahmed Al-Habtoor, presented by Lord Ahmed

"The Most Innovative Trading System" Award - Tony Weeresinghe, presented by Mike Woodward, KPMG

"Promotion of Open Innovation, Academic Research and Education" Award - Khalifa University of Science, Technology and Research (KUSTAR), UAE, presented by Ivan Boyd, BT

right: **"Best MBA Dissertation" Award** - Nivethitha Sivanandan, presented by Mike Woodward, KPMG

from top, right column: **"Championing of Technology" Award** - Richard Noble, Bloodhound Supersonic Car Project, presented by: Ric Parker, Rolls-Royce Group

"Security Innovation" Award - Dr. Ali M. Al-Khouri - Emirates Identity Authority, presented by Naser Ziadeh, Microsoft

"Best MSc Dissertation" Award - Evgenia Korsukova, presented by Naser Ziadeh, Microsoft

UNIVERSAL GRAMMAR:

A few arguments for its existence

Mariana Gotseva

In the contemporary globalized world English tends to be the main language for business communication, education and cultural collaboration. Hundreds of people of different age learn English in order to be successful in their endeavours. Therefore, it might be interesting to know a few facts about the nature of language acquisition and the theories behind the process of acquiring and learning a language.

This article focuses on Universal Grammar (UG) as formulated by Noam Chomsky and his followers, using the cognitive approach. UG is seen as a linguistic theory, which postulates principles of grammar, shared by all languages and considered to be innate to human beings. Chomsky proposes that there is a set of grammar rules responsible for organizing the language and explaining the process of children's language acquisition. This set of rules belongs to the Universal Grammar.

The article presents a few arguments for the existence of Universal Grammar, namely: the Structure-dependency and the Projection principle which explain the structural relationship within the sentence and the close interdependency between syntax , lexical information and phonetic representation. The variety of languages can be explained with the existence of universal parameters, which are set differently in different languages. The process of setting these parameters has been studied by Chomsky's Principles-and-Parameters Theory and is closely connected with children's first language acquisition.

What is Universal Grammar?

Chomsky has defined UG as "the system of principles, conditions, and rules that are elements or properties of all human languages" (Chomsky, 1976, p.29).This means that a native speaker of a language knows a set of principles that can be applied to all languages and parameters that vary from one language to another.

Contrary to the taxonomic approach of traditional grammar, Chomsky takes a cognitive approach to studying grammar as, in his view, linguistics should discover what knowledge enables people to speak and understand their native language fluently, and therefore, it is just a part of the much wider study of cognition – what human beings know. It is a fact that native speakers have tacit knowledge about their native language grammar: i.e. they know how to combine words together to form sentences and how to interpret sentences without any formal learning. They also have the ability to judge sentences' grammaticality.

Language has been characterised by Chomsky as "a perfect system which has optimal design" (Chomsky, 1998, 1999, 2001, 2002) and which interfaces perfectly with humans' speech and thought. The grammar of a language contains a few components: lexis (all the words or lexical items of the language with their linguistic properties) and syntax (the combination of the lexical items into syntactic structures. Syntactic structures then, as seen by Radford (2004) find input into two further components of grammar: the semantic component, which "maps or converts the syntactic structure into a corresponding semantic representation of the linguistic aspects of its meaning" and a PF component, which in its turn, "maps the syntactic structure into a Phonetic Form representation, telling us how each word is pronounced" (Radford, 2004, p. 5). In Radford's model below it can be seen that the semantic representation interfaces with the systems of thought and the PF representation – with systems of speech. Radford (2004, p. 5).

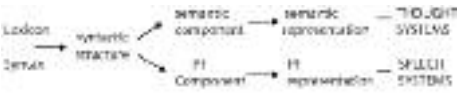


Fig. 1 Radford's model

The Universal Grammar Model and language acquisition

The early Universal Grammar Model (Chomsky, 1964) gives an idea how the UG model works:

Fig. 2 Early UG model

Following this model, the process of language acquisition includes data going into the Language Acquisition Device (LAD) and coming out as a formed grammar.

Universal Grammar enforces the form which the grammar of a certain language can take. But this does not happen by providing ready-made rules for a child to incorporate them into his grammar. UG rather sets parameters which are fixed according to the input a child receives. These rules constrained on the child's grammar are called "the core grammar or core rules" of his language (Ellis, 1985). Apart from them, there are other rules which are not core and are not enforced by UG. They are called periphery rules. Cook (1985) defines the periphery rules as ones either derived from the history of the language or borrowed from other languages. They have to be learnt without the help of UG.

Later, Chomsky gradually abandons the LAD model of acquisition in favour of the parameter-setting model. This improved model of language acquisition claims that Universal Grammar exists in the child's mind as a system of principles and parameters. Influenced by the surrounding environment, the child creates a core grammar that sets values to all the parameters of a certain language which he speaks as native. Cook (1988) sees the UG principles as "principles of the initial state" and the Projection principle, Binding, Government, and so on, as "the building structure of the language faculty in the human mind" (Cook, 1988, p.56). The child does not actually acquire certain grammar rules but rather settings for the different parameters, which combined with the system of principles, form the core grammar. This means, that acquiring a language is mainly setting all the UG parameters appropriately. Apart from that, a child learns a huge amount of vocabulary items, together with their pronunciation, meaning and syntactic restrictions. So, apart from setting a few parameters, a child has to learn the lexicon of his L1, together with rules which are not core but "peripheral". To summarise, using Chomsky's idea, "what we know innately" are the core grammar principles and the parameters associated with them; what we have to learn are "the values of the parameters and the elements of the periphery" (Chomsky, 1980b, p.47).

Arguments for the existence of the Universal Grammar

The hypothesis that the process of language acquisition depends on an innate language faculty is called the *innateness hypothesis*. The innateness hypothesis,

put forward by Chomsky, claims that the process of language acquisition is genetically predetermined by an innate language faculty. This language faculty incorporates a set of universal grammatical principles that influence the way grammatical operations work.

However, some linguists like Carnie (2002) have a different view on the innateness hypothesis. Looking at language from a logical perspective, he argues that "an infinitely productive system like the rules of Language cannot have been learnt or acquired" as "infinite systems are both unlearnable and unacquirable". So he suggests that "it is built in" (Carnie, 2002, p.13). Carnie also claims that the reason for infinite systems to be unlearnable is the input you receive can never be sufficient to make sure you have all the relevant facts. This is the so-called '*logical problem of language acquisition'*. Generative Grammar gets around this logical problem by suggesting that a child who acquires his mother tongue relies on Universal Grammar in constructing his knowledge of language. UG actually restricts the number of the possible functions that map situations to utterances, thus making language learnable. So, finally, this fact supports the existence of the Universal Grammar.

Another argument for the existence of the UG concerns the ability of L1 speakers to judge the grammaticality of sentences. Nobody has ever taught them what is and what is not grammatical, nor can they draw a conclusion from the data they have heard. The conclusion is that they were born with this knowledge. This argument is called the *underdetermination of the data argument*.

There are also *typological arguments* which support the existence of an innate language faculty. As Carnie (2002) puts it down, it is a fact that all the languages in the world share certain properties. These are called *universals of language*. He explains their existence as a result of the fact that "all speakers of human languages share the same basic innate materials for building their language's grammar" (Carnie, 2002, p.18). A proof for this claim is that children "go through the same stages and make the same mistakes when acquiring their language, no matter what their cultural background". Finally, Carnie points out a few *biological arguments* in favour of UG. He characterises Language as "both human-specific and pervasive across the species" (Carnie, 2002, p. 18). Every human being, unless he has some physical impairment, seems to have Language. This points out to the fact that Language must be "a genetically endowed instinct". Research in Neurolinguistics has also confirmed that certain parts of the brain are linked to specific linguistic functions.

The ability to speak and acquire languages is unique to human beings and natural languages abide principles which are unique to humans and reflect the nature of the human mind. What is more, language acquisition is an ability which all humans possess independently of their intelligence. An interesting fact which deserves attention in the process of language acquisition, as noted by Radford (2004) is that "the uniformity in the types of grammars developed by different speakers of the same language suggests that children have genetic guidance" in constructing their L1 grammar (Radford, 2004, p. 7). The rapidity of L1 acquisition points out to the same fact. It is also difficult to explain children's L1 acquisition only by the input they are exposed to as very often it is imperfect or even ungrammatical. And, at the same time, it is a fact that any native speaker can judge correctly the grammaticality of a sentence, i.e. human beings are genetically predisposed to do that with their native language. Fromkin and Roadman (1998) also point out to the fact that "grammaticality" is not based on anything taught but rather on "the rules constructed unconsciously as children" (Fromkin & Rodman, 1998, p.106). This "grammatical judgement" is always correct and does not depend on whether the child has ever heard the sentence before. Neither does it depend on whether the sentence is meaningful or not; or whether it is true or not. For the authors the explanation is that "unconscious knowledge of the syntactic rules of grammar permits speakers to make grammatical judgements".

All the evidence for UG mentioned so far is quite convincing. But still, there are so many different languages around the globe., and they differ in terms of words used in them, so vocabulary is something which has to be 'learnt' or 'memorized'. Other differences between languages concern the basic word order of the sentences, which has to be acquired. This process is usually described as setting certain innate parameters by selecting among possible variants. Language variation is thus reduced to learning the correct set of words and to selecting from a predetermined set of options. But, first of all, which are these UG parameters?

UG parameters

While principles of UG "define the structural architecture of human language, variation between particular languages is accounted for by a small number of parameters of variation allowed within the overall

design defined by the principles" (Hawkins, 2001, p. 13). It is not possible that all aspects of the grammar of languages are universal; otherwise all natural languages would be the same and there would be no necessity for grammatical learning involved in language acquisition. With the situation as it is, grammatical learning should not include learning those aspects of grammar which are universal (i.e. determined by universal grammatical operations and principles). It would only involve learning the language-specific parameters and the range of parametric variation which can be found in natural languages.

A type of parametric variation across languages can be demonstrated by using the following sentences in two languages: English and Italian.

(a) Marco parla italiano.
(b) Parla italiano.
(c) Marco speaks Italian.
(d) *Speaks Italian.

What we can see from the examples above is that in both languages the verbs can take an overt subject and object. But while in Italian the verb might be used without an overt subject (or it has *a null subject*), in English the verb *speaks* cannot exist without an overt subject. So, sentence (d) is ungrammatical. In conclusion, we can say that Italian is a null-subject language, while English is not.

This is a clear example that apparently, there exists a parametric variation between languages concerning whether or not they allow finite verbs to have null subjects. As Radford (2004) points out, the *Null-Subject Parameter* is a binary one: it only has two possible settings for a particular language: it either allows or does not allow finite verbs in this language to have null-subjects.

An interesting question raised by Cook (1988) concerns principles which are not found inall languages, namely, the concept of *movement* which is widely employed in some languages like English to explain constructions such as passives or questions. However, certain languages do not share this necessity of movement as a syntactic structure. Japanese, for instance, uses a completely different mechanism for constructing questions and does not require a syntactic movement. Therefore, Cook considers the presence or absence of syntactic movement to be a parameter of variation between languages. Such parameter of variation between languages concerns the word order in wh-questions. Therefore, it is called *Wh-parameter*. Radford (2004) gives convincing examples with sentences in Chinese and English to prove that these languages differ in the requirement to front a single wh-word in English but does not have to move to the front of the sentence in Chinese. Again, this is a binary parameter: a language either does or does not allow a wh-movement.

Still another variation concerning the possible word order within a phrase is the position of heads and complements. In English the head normally precedes the complement, no matter whether the head is a noun, verb, preposition or an adjective, so it is a head-first language. However, a language like Korean, for example, is a head-last language and the phrase head takes a postposition: it follows its complement. This is an example of the *Head-Position Parameter*, which, as Radford (2004) points out, is "within narrowly circumscribed limits" as there are lots of possible variations of the position of the complement, depending on the nature of the verb within the phrase.

Hawkins (2001, pp.14-15) though, specifies that "the structure of every phrase in every human language is of the same type". It always consists of a head X (which stands for any of the categories N, V, A, P) that projects to a phrase consisting of the head and its complement, or X' = X-bar. So, a N' means a phrase, consisting of an N and its complement; V' – a phrase consisting of V and its complement and so on. The "maximal projection" of all these phrases is XP (a phrase of the type X) and the *X'-theory* is actually a hypothesis about a principle of UG. As the author describes it: "phrases in all languages are projected from head categories, and optionally consists of two higher levels of structure: X' and XP". Different languages, however, opt for different settings of these parameters. For example, in English specifiers normally precede and complements follow the head. But in Japanese both typically precede; in Malagasy both follow, and so on.

All the examples so far prove that there are universal constraints on the parametric variation of certain language properties. The theory of parametric variation explains that with the existence of the language faculty which "imposes genetic constraints on the range of parametric variation permitted in natural language grammars" (Radford, 2004, p. 16). What is more, in most cases parameters constrain the variation between languages to the simplest choice possible: to a binary one.

As for the question whether a principle is universal if it happens to be present only in some or one single language, Cook refers to Chomsky's words: "I have not hesitated to propose a general principle of linguistic structure on the basis of observations of a single language" (Chomsky, 1980b, p.48) and further hypothesises that aspects of the theory of UG are "disprovable", and a principle might have been attributed to UG and turned out later to have its peculiarities in languages like Chinese or English or to be breached by a certain language but this is the normal situation with any scientific hypothesis.

If we compare UG principles and UG parameters, we can say that the former enforce a set of requirements which have to be met by any human language, while the latter cater for the syntactic variation between languages. Any particular language then has specific settings for the UG parameters. As Chomsky puts it down: "The grammar of a language can be regarded as a particular set of values for the parameters, while the overall system of rules, principles and parameters, is UG which we may take to be one element of human biological endowment, namely the "language faculty" '(Chomsky, 1982a, p.7).

Parameter Setting

The theory of parameters has significant implications on the theory of language acquisition. In the process of L1 acquisition, a child has to construct a grammar of his language. The innate Language Faculty enforces a set of universal grammatical principles and a set of grammatical parameters or constraints on the language in question. If grammatical variation contains a lot of binary parameters, it makes the process of acquisition much simpler and easier as a child only has to find out which of the twoalternative parameters is the appropriate one for his native language. Certainly, an L1 learner also has to acquire his native vocabulary, the range and combination of words. In other words, he has to perform the task of lexical learning, apart from the grammar parameter-setting. So, these two tasks are the focus of the *Principles-and-Parameters Theory* (PPT), developed by Chomsky at the beginning of 1980s (Chomsky, 1981).

The PPT model hugely facilitates the acquisition process as the universal grammatical properties do not need to be learnt. Only the ones which are subject to parametric variation across natural languages have to be learnt and in most cases this learning process is simplified to a binary choice. This leads to the assumption that grammar acquisition involves a series of simple settings of binary parameters and explains the fact why it is so fast and error-free with young L1 learners.

The Government/Binding Theory

In his later works, Chomsky (1981a) develops the Government/Binding Model which explains the connection between "sounds and meanings", a connection between apparently unrelated aspects of language. On the one hand, "sounds are the physical form of speech, meaningless in themselves" as Cook (1988, p. 28) defines them. On the other hand, meanings are "abstract mental representations, independent of physical form". It is a fact that one and the same abstract notion is expressed in different languages by a totally different string of sounds. Describing a sentence from a grammatical point of view will include not only how it is pronounced (the string of sounds, stress, intonation and so on) but it should account for its meaning (the semantics), as well as the syntactic structure which connects them. Cook (1988, p.29, Figure 2.1) presents a model in which it is clear that "syntactic structure plays a central mediating role between physical form and abstract meaning":

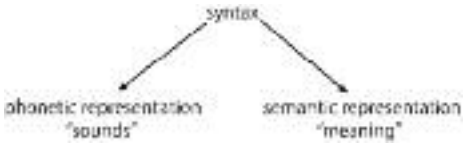


Fig. 3 Cook's model a

However, Chomsky's Government/Binding theory (GB) presents a slightly different connection between "phonetic form" (PF) and "logical form" (LF) as "representations of syntactic meaning, mediated through syntax" (Cook, 1988, p. 29, Figure 2.2):

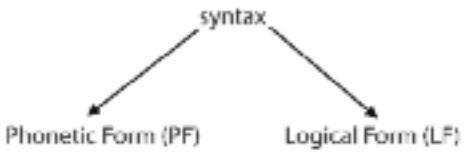


Fig. 4 Cook's model b

As seen in this model, PF and LF form the relation between grammar and other areas. "PF and LF constitute the interface between language and other cognitive systems, yielding direct representation of sound on the one hand and meanings on the other as language and other systems interact"(Chomsky, 1986, p.68). However, Cook (1988, p.30) argues that Fig.2.1 is a clearer representation of the fact that syntax functions as a "bridge" between sounds and meanings, claiming that what a child acquires in his L1 is "the syntactic interface rather than phonology or meaning".GB theory further elaborates the syntactic representation, presenting the idea of *deep structure* ("at which all the elements in the sentence are in their original location") and *surface structure* ("at which they have been moved") as Cook (1988, p.30) puts it down.

So, the d-structure contains the essential structural relationship between the sentence elements, which, through movement, are represented in the s-structure. The s-structure still indicates the original location of the sentence elements through "traces". As Cook (1988, pp.31-33) puts all the strings together, d-structure accounts for the phrase structure through the X-bar theory, which in its turn, "sets the value for the head parameter". The Projection Principle that projects the lexical meaning onto syntax, connects the d-structure to s-structure and "LF to the lexicon by specifying the possible contexts in which a particular lexical item can occur". Syntax also accounts for the functional roles of the sentence elements, called θ-roles by GB. By interaction with the X-bar parameter and the projection principle, θ-roles are assigned to sentence elements.

These roles express "a type of meaning directly relevant to the LF component and indirectly to the semantic component" and satisfy the θ-criterion. The movement between d-structure and s-structure is restricted by the Structure-Dependency principle and by the Bounding Theory, which limits the distance an element can move. One more sub-theory, the Case Theory (which caters for the "assignment of particular 'cases' to Noun Phrases in the sentence" and for the difference between certain surface forms like she, her, hers, etc.) can be linked to d-structure and s-structure, thus coming to the complex Cook's model (Cook, 1988, p.33, Figure 2.6), which elaborately matches syntax to PF and LF components:

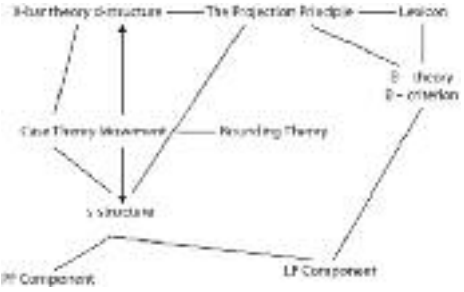


Fig. 5 Cook's complex model

In conclusion, we can say that all the examples presented in this article prove convincingly the existence of the UG as a system of universal principles and rules, present in all human languages. UG principles and parameters are of significant importance for structuring the grammars of the existing human languages. While the principles are universal, parameters might opt for different settings, hence the variety of grammatical rules. The examples also demonstrate the close link between apparently independent aspects of language, such as syntax, lexis and phonetic form. However, the article does not claim to have covered all the aspects of UG or the variety of parameters and their different settings in many different languages.

It does, though, present a few arguments for the existence of Universal Grammar and throws some light on the universal principles to which all human languages abide and universal parameters, set differently in different languages, which explain the variety of existing languages.

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Every Cloud has a storage lining

Seagate's **Wes Perdue**, Cloud Strategy, Enterprise PLM, explains how the Cloud's growing traction with enterprises presents opportunities for storage players

Cloud Computing is positive for storage. It's good for the storage service providers and for the storage infrastructure suppliers. As more and more applications are developed and computing resources demanded more storage is created. According to IDC, storage is the fastest growing Cloud service, growing from 9% of all Cloud service revenues in 2009, or $1.6B, to 14% in 2013 or over $6B of Worldwide IT Cloud services revenue . The arms dealers providing storage hardware, software and professional services to the Cloud service providers raked in $2.9B in Cloud storage infrastructure revenue in 2009, according to IDC .

This growth will continue as an increasing number of enterprises experience the ability to deliver more value with fewer resources while keeping up with constant change, one of the many benefits provided by Cloud Computing. Due to the Cloud's rapid elasticity of compute resources and lower cost structure, Cloud Computing will drive more applications and computing demand that will result in a higher demand of storage across all enterprise storage tiers. In addition to the shear growth of storage driven by Cloud Computing, there are opportunities to provide new storage device solutions that will help solve Cloud data center cost challenges and operational inefficiencies.

It is easy to become carried away in all of the hype and excitement brought on by Cloud Computing, but it is delivering real value to enterprises, SMBs and consumers. Cloud Computing and Storage is real, it's sustainable and although it's relatively a small percentage of the overall IT market today, it is becoming a disruptive and significant opportunity. Although an increasing number of commercial and large enterprise companies are benefiting from Cloud Computing today, we believe it will take 3-5 years for broad-scale Cloud adoption.

What is the Cloud?

The Cloud has become such a popular term that its meaning has been adapted for a wide variety of services and applications, so it's necessary to outline the Cloud as we see it. Essentially, the Cloud is a new model for delivering and consuming IT resources, such as, computer (server) resources, data storage, network bandwidth, and even applications. The model includes characteristics such as on-demand, self-service; rapid elasticity; measured service (pay-as-you-use); resource pooling and broad network access.

There are three well-known Cloud service types: Software as a Service (SaaS), where a customer uses a service provider's application over a network; Platform as a Service (PaaS), where a service provider's platform is used to deploy a customer-generated application to the Cloud; and Infrastructure as a Service (IaaS), where customers pay for the usage of processing, storage, network bandwidth and other IT resources. There are four kinds of Cloud deployments including Public, which are typically mega-scale infrastructures used and shared by multiple customers; Private, which are owned or leased for use by an individual customer; Community, which is a shared infrastructure by customers who have a common interest, such as medical centers; and Hybrid, which is a composition of two or more Clouds.

Why Clouds form

Although many different surveys are being conducted to examine the perception and adoption of Cloud Computing, they are finding similar results. While security and integration issues are the biggest concerns about Cloud Computing, these concerns have not dissuaded companies from adopting Cloud Computing. Furthermore, for those companies that are already using Cloud Computing, there is a very high satisfaction level. 70% of those that are currently using Clouds plan to move additional applications within the next 12 months. Cloud Computing is becoming a permanent part of the IT discussion and strategy.

So what is drawing companies to adopt Clouds? Although there are many drivers, cost savings and agility are the two biggest reasons companies are adopting Cloud Computing. The pay-as-you-use cost model and CAPEX reductions that Cloud enables is one of the top reasons that companies are adopting Cloud. Also, the dynamic scaling to quickly provision and de-provision IT resources that Cloud Computing provides adds tremendous business value to new programs and initiatives that companies need to launch in a timely manner. Below is a chart that breaks out the driving factors for adopting Cloud Computing.

Companies are deploying several categories of business applications that are driving rapid data growth and require a more dynamic storage infrastructure to accommodate this growth. Given those deployments and today's dynamic markets, companies need an IT infrastructure that is dynamic and can respond quickly to changing business needs. Cloud Computing provides the dynamic elasticity required to achieve their business objectives. The chart below illustrates the range and popularity of reason why companies favour Cloud Computing:

The big hitters in terms of applications that are being moved to the Cloud include: E-mail, Archiving, CRM and Storage. Some industries are moving faster to the Cloud front than others. The top 3 industries adopting Cloud Computing are Technology, Financial Services and Legal/Professional Services .

What makes Clouds different

There are fundamental design differences that make Clouds different from traditional on-premise data centers. Service Providers perspective on their data center is one of a value or revenue generating asset. A traditional on-premise data center is typically viewed as a cost center. This difference is one of the key reasons why the two environments are architected differently. Many of the large internet data center companies' philosophy on architecting a Cloud environment is based upon deploying low-cost, scalable, commoditized hardware with a software layer that glues the inexpensive hardware together to create a more scalable model.

Clouds are also based upon a self-service model, multi-tenancy enabled in part by virtualization, and a high level of autonomics and homogeneity. A traditional on-premise environment is typically a heterogeneous, shared-service model with less automation and manages assets independently for each user or application. A Cloud's deployment model is distributed as opposed to decentralized with a client-server model.

Another very important difference is that Clouds are designed for failure instead of failover, which aligns well with their utilization of replication as the primary model for data protection due to its simplicity and massive scalability.

Finally, open-source software is common in Cloud Computing driven by a symbiotic relationship. While massive data centers built on low-cost commodity hardware and virtualized operating environments provide the technical foundation for global, cloud-based services, open-source software enables global, service-based business models. These differences enable Clouds to achieve lower service costs through greater resource sharing, greater economies of scale, greater levels of architectural standardization, greater process optimization and automation, and the ability to modify the usage of those resources much more quickly than traditional IT environments.

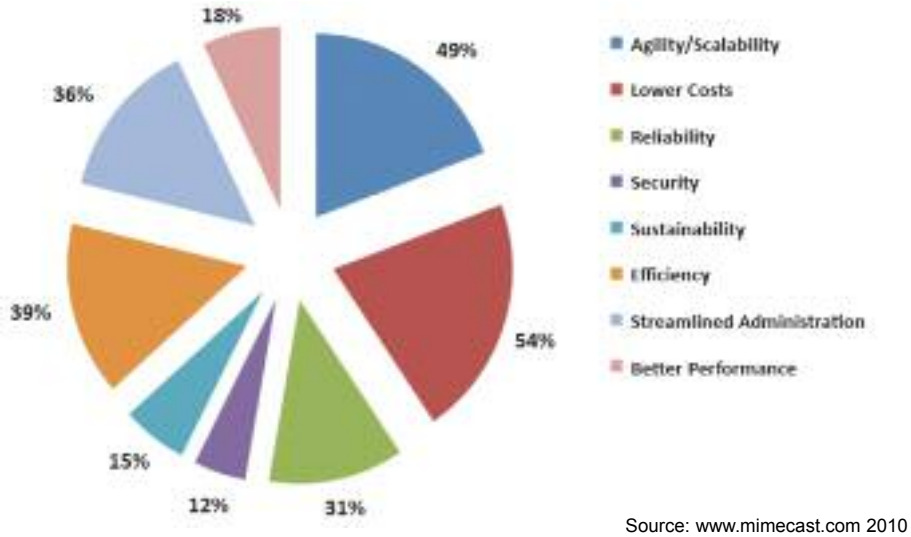
The Cloud is demanding

Of course, any new technology presents challenges and Cloud Computing is no exception. As Cloud Computing datacenters are architected based upon a simple, "design for failure" infrastructure model, it is not practical to purchase off-the-shelf systems designed for the traditional mass IT market. These products are too expensive and include features that do not meet the Cloud's unique data center environment and application requirements. Clouds use low cost, purpose-built, scalable solutions; including, purpose-built servers, storage systems and networking products, while still utilizing standard delivery models and massive economies of scale.

Cloud Computing has established new rules that require change. The Cloud ecosystem operates under a different business model than the traditional on-premise IT ecosystem, employing a deal or RFQ model for procuring server, storage and networking infrastructure. Large storage OEMs have reorganized the need for Cloud-focused business units, and have aligned their business models with the Cloud service providers; responding in a streamlined, transparent manner to RFQs and delivering purpose-built solutions that more exactly meet the needs of the Cloud.

What does this all mean for storage?

Applications drive the workload, reliability and performance needs of any system. Applications in Cloud data centers run 24x7, have high workloads and run in high vibration environments that require enterprise-class storage devices, such as, HDDs and SSDs. Enterprise-class drives are designed for a multiple drive system environment such as servers and external storage systems that operate 24 hours a day, 7 days a week, 52 weeks a year. Non-enterprise class or personal storage drives are designed for a single drive environment and have a much lower design usage, lower duty cycle and a simpler, lighter workload. To ensure success with demanding Cloud applications, it is highly recommended to use enterprise-class drives that are designed for enterprise applications that run in a Cloud data center environment.



Source: www.mimecast.com 2010

Storage architecture needs to be well aligned with the Cloud architectural approach to increase simplicity, lower costs and achieve greater scalability. It's important to provide a unified approach that reduces complexity and optimizes energy efficiency and performance footprint for the data center. By simplifying around a single interface and form factor, and upon a single foundation for security, a unified storage approach promotes sustainability and creates a foundation of powerful, yet simple enterprise-class storage solutions for the demanding and multiple array of different applications in the data centers.

There is a massive opportunity for storage companies that have a broad enterprise portfolio of drive products, specifically designed for each tier of storage and for each type of application and quality of service level in a data center. To a large degree, the application's workload determines the type of physical resources, including type of drive, but as enterprises needs change they need a storage supplier that can integrate seamlessly.

How the Clouds will form

In summary, we believe that the Cloud will continue to evolve and expand driving more applications, more computing demand which will in turn, drive more storage for the data centers as well as more local storage.

However, the Cloud will wholesale replace enterprise data centers. We believe that many companies will move from an internal IT model to an outsourced Cloud model. Most of these will be the small-to-mid-size companies. The larger enterprise companies will migrate their non-critical applications and data to the Cloud, and some will migrate and outsource their entire IT operations. However, many larger companies will keep their critical applications and data internally, behind their firewall. Many larger companies will also adopt a hybrid model, utilizing the Cloud for providing certain IT services while at the same time maintaining other internal IT services.

We estimate mainstream Cloud adoption to be in the 2012-2013 timeframe. To the degree that companies will adopt Cloud services for their diverse set of applications boils down to many factors; one of the more important of these is trust. Earning this trust will take some time.

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Casio Bluetooth Low Energy Watch Communicates with Smart Phones

Casio's prototype features wireless technology for short-range communication.with very low power consumption. A prototype of the watch was exhibited at the International Consumer Electronics Show in Las Vegas.

Taking advantage of the low power consumption of the new Bluetooth technology, the new watch powers functions with a single button-cell battery, the same kind used in small devices and watches. It does this without losing any battery life compared to conventional wristwatches. The battery life is estimated at approximately two years based on the prototype model, assuming that the Bluetooth® wireless communication function is used for 12 hours per day. This means that users can wear it everyday just like a wristwatch, without the bother of the recharging required by typical mobile devices.

Casio's new prototype can communicate with smart phones equipped with Bluetooth Low Energy Wireless Technology, which will be available in the near future and be able to connect to networks of various kinds of devices. The prototype demonstrates how to expand the ways people use their watches, unlike anything ever seen before, as new applications are developed for smart phones to enable communication between watches through smart phones.

Casio will manufacture its first Bluetooth Low Energy Watch later this year. Meanwhile, Casio will call for partner companies to develop applications compatible with smart phones and other household devices in such areas as sports, health, home entertainment, security, and communication with family members and friends.

Overview of Casio's prototype Bluetooth® Low Energy Watch

Main features:

- Wireless communication is powered by the button-cell battery used in small devices and watches
- Battery life with the communication functions is the same as previously released watches
- The size of the watch case is a comfortable 53.4 (D) x 44.4 (W) x 12.8 (T) millimeters

Main functions:

- Accurate time information can be transmitted from a smart phone to the watch to ensure correct time
- The watch includes an alert signal to notify of incoming calls and e-mail messages sent to the user's smart phone
- A smart phone's ring alerts and vibration can be stopped by tapping the watch
- Alarm and vibration functions of a smart phone can be activated using a watch button.

Main Specifications of the Prototype Bluetooth® Low Energy Watch

Communication Specifications	Data Transfer Rate	1 Mbps
	Signal Strength	0 dBm (1mW)
	Signal Range	2–5 m (may differ depending on surrounding conditions)
	Encryption Method	128-bit Advanced Encryption Standard (AES)
Communication Functions	Time Correction	The watch can be synchronized with time information transmitted from a smart phone
	Incoming Call and E-mail Alert	The watch alerts users of incoming calls and e-mail messages sent to a smart phone
	Finder Function	Alarm and vibration functions of a smart phone can be activated using a watch button
Watch Functions	Alarm	5 independent daily alarms; hourly time signal; vibration function
	Stopwatch	1/100-second; measuring capacity: 23:59'59.99"; split time
	Countdown Timer	Measuring unit: 1 second; Input range: 1 minute to 24 hours
	World Time	100 cities (35 time zones, daylight saving on/off) and Coordinated Universal Time
	Light	Electro-luminescent backlight with afterglow
	Other	Full auto-calendar, 12/24-hour format; sleep mode
Power Source		CR2032
Approx. Battery Life (Based on Prototype Model)		Approx. 2 years (assuming the communication function is used for 12 hours per day)
Size of Case		53.4 × 44.4 × 12.8 mm
Total Weight		Approx. 50g

Employees Ease Work Woes by Shopping Online

- 4pm on Wednesday is the peak-time for workplace shopping
- Post-lunch fatigue sends workers online to shop
- Online shopping surges by 52% at 4pm during the working week
- InvisibleHand's real-time pricing technology has identified almost £20 million in savings for UK online shoppers
- Download and use InvisibleHand for free at www.getinvisiblehand.com

% increase in online shopping		Mon	Tues	Wed	Thurs	Fri	**Average**
From	**To**						
12pm	2pm	11%	27%	3%	3%	12%	**11%**
9am	4pm	53%	42%	75%	36%	52%	**52%**

Employees are hitting the online shopping aisles during office hours to get away from work pressures, according to research from real-time online shopping tool Invisible Hand.1

Workers hit a post-lunch slump and as a result head online for some retail therapy, as data shows an 11% increase in the number of online shoppers at 2pm, compared to midday.

2pm isn't the only time workers whip out their plastic to pass those work hours by, as research shows the largest surge of online shopping during the working week is at 4pm. Figures from Invisible Hand show there is an average 52% increase in online shopping compared to the morning.

The largest shopping rush comes when employees are celebrating the 'hump' of the week seeing a 75% increase of shopping at 4pm on Wednesday.

Pre-Monday work blues means that midnight shopping on a Sunday is the most popular midnight hour for spending on plastic, with a 27% increase from the lowest level of the week.

Robin Landy, founder of InvisibleHand, says: "With work providing a number of stresses and problems, there's little wonder people head online to spend money. Whether it is for yourself or someone else, browsing the online stores offers light relief at work and at home.

"Whenever people are shopping online they should make sure they are not paying over the odds for products. Rather than shopping around and visiting a number of sites, often with out of date prices, Invisible Hand will automatically notify a consumer of the cheapest price without them ever having to leave the site they are on."

InvisibleHand is free to download in less than a minute via the website, www.getinvisiblehand.com.

Global Partnership during Economic Crisis

Dr Muhammad Farmer, Principal of the British Institute of Technology and E-commerce, spoke at a Forum on Partnership in Chennai, India .

"O mankind! We have created you from male and female and have made you into nations and tribes, that you may know one another. Indeed the most noblest of you with Allaah is the one who has the most piety."
The Quran

I thank you for inviting me to this important Partnership Summit. The ideals of this annual event are close to my heart for in the UK the organisation, which I head, the British Institute of Technology and E-commerce (BITE) holds a similar annual event, the World Hi Tech Forum in London which brings the global community together to facilitate technological and business partnerships. Speakers and delegates from organisations around the world meet to discuss partnerships based on developing technology and high-level, shared learning.

I cannot emphasize enough the importance of international dialogue like this. Through it we make new friends and contacts. Even those who seem to have opposed ideas can find that their differences melt or at least they can gain new perspectives on problems when they meet regularly to decide how they can work together. It is a pity that there often has to be a problem for us to work together. In this world of rapid global communications we should be doing it as matter of course.

Throughout the year we also hold ad hoc seminars to discuss current events such as our Leadership in Times of Crisis seminar last year where one of our guest speakers, the former Malaysian Prime Minister, Tun Dr Mahathir considered lessons we can learn from the Currency crisis of 1997-98 - because history does seem to repeat itself and we can learn from our mistakes.

World economy

The world economy has gone into an era of de-coupling of the emerging economies from the traditional powers. This has created two new economic landscapes one led by United States and its allies and other by the collection of countries known as BRIC. Despite the largely touted word of interdependence both economically and politically the countries such as those making up the BRIC block are fast emerging as economic locomotive of the 21st Century.

In an address to bankers Mervyn King called attention to the, "extraordinarily sudden, severe, and simultaneous downturn of activity and trade in every corner of the world economy."

The governments steering of low interest rates in the UK has been welcomed by businesses, however banks have been unable to make this available to their customers. The banks which have assured government they will widen their lending are proving recalcitrant with only the relatively safest borrowers often succeeding in getting loans. Banks have shown little imagination, or some would say resolve in sharing some of the benefits derived from the government's wise interest policy.

Major regulatory failures were at the very heart of the crisis. But with the succession of reports of the bonuses those working in financial institutions are still receiving even when their banks have been backed by government has left the public suspicious. Many governments have promised to take action to build a stronger, more globally consistent, supervisory and regulatory framework for the future financial sector, which will support sustainable global growth and serve the needs of business and citizens. But the question the Prime Minister, Gordon Brown and other leaders must surely answer is how to draw the lessons out of what has proved to be a near cataclysmic financial and socio-economic conjuncture.

To tackle the financial and economic crisis that spread across the globe in 2008, the G-20 members were called upon to further strengthen international cooperation. The G-20 has already delivered a number of significant outcomes. For example, it committed to implement expansionary macroeconomic policies, including the fiscal expansion of US$5 trillion, significantly enhance financial regulations, notably by the establishment of the Financial Stability Board(FSB); and substantially strengthen the International Financial Institutions(IFIs), including the expansion of resources and the improvement of precautionary lending facilities of the IFIs.

The question is whether the new strategy is a practical solution to the present crisis. The G20 plan is based on the belief that growth, to be sustained, has to be shared and that the global plan for recovery must have at its heart the needs and jobs of families, not just in developed countries but in emerging markets and the poorest countries of the world. The G20 leaders believe that the only foundation for sustainable globalisation and rising prosperity is an open world economy based on market principles, effective regulation, and strong global institutions. But the question is, can world leaders of diverse economies work together on a common plan which they can actually implement when budgets are tight?

Also while the G-20 is committed to deliver the scale of sustained fiscal effort necessary to restore growth, nobody knows to what extent this package will create a significant surge in employment or if it will just burden fragile economies with more debt.

Manufacturing

Manufacturing is usually one of the main sectors hit during recession so I would like to consider how global partnerships can help spread the risk and ensure that technologies continue to be developed. Manufacturing is increasingly involving close international partnerships covering the whole product evolution process from concept to production. One of the significant factors in success in the future will be a clear vision of the whole process from technology to market. Entrepreneurs must consider the global picture in all aspects of their planning, whether it is technology creation and development, production or marketing. Innovation is essential, whether it is in the form of new technology or in the

approach to business development and partnering.

A key consideration is the rapidly changing balance of research, technology and manufacturing between developed and developing nations. It is no longer enough to develop a product and then look for 'cheap manufacturing' elsewhere. Developing nations have expertise in all stages of the process, and this must be harnessed efficiently.

Our first World Hi Tech Forum focussed on India**.** India is increasingly a favoured destination for manufacturing. Why? A well educated, motivated work force, willing to take the initiative and fluent in English and a move to break some of the bureaucratic systems which have hampered it in the past. In the longer term, close partnerships covering the whole product evolution from concept to production will become the norm, but there is no doubt that production will still form a key part of the partnership.

The sectors affected are wide, include communication, aerospace, automotive, information technology, electronics and printing. Key aspects include Design and Future-proofing in prototyping; Evolution from Manufacturing to Service Models; Aligned buyers and sellers in Service Systems; Energy recycling in Electronics; Closed loops, recycling and Polymers and Closing loops for mobile phones.
Areas of concern are skills development, training, informing and consulting.

Partnerships
In considering partnerships, let's look first at the role of Government. BITE has been successful in training government and corporate departments. The current financial turbulence has created the need for developing countries to undertake training to raise their staff skills to the level of the developed nation in order to interact and better facilitate business development. BITE's re-skilling and training is based firmly on client objectives and cultural and social background, rather than any generic approach. The importance and complexity of technology creation and its utilisation is common to many nations all around the world, with varying degrees of support from governments. The adoption of e-Government practices is a sign of a committed government.

Governments have a prime need to foster science and technology, not only for the nation's reputation but also for their own needs (as in defence) and for the economic strength of the nation. The success of high-technology industry will often depend on government backing and a regular supply of new developments to achieve and maintain a global lead. We need to have seminars such as this to hear from both governments and industry about best practice, in both the support and exploitation of research and considerations of intellectual property protection.

A planned Innovation Process is crucial. In today's world, new inventions and their use in innovative products and services are the basis for many new businesses. An essential pre-requisite is thus the existence of a strong science base, whether national or international. Business success usually goes to the first to identify and utilise these new discoveries for benefit to business and the economy. One key aspect of this success is the ability to identify relevant new technologies at a very early stage and to acquire them for business benefit. In the 'global economy', these discoveries could arise anywhere, so a truly world-wide approach is essential.

Whilst it is not possible to predict every development in technology, and certainly not new fundamental discoveries, the successful organisation will have the ability to identify and assess new discoveries and developments as they emerge. Relevance to the operation of the organisation must be judged, and decisions taken whether to monitor or actively pursue these matters.

Transforming business
Throughout the history of technology, there have occurred new developments that transform business environments, presenting major opportunities to adopters, and major threats to established suppliers. Think back in time to the advent of the telephone, steam engine, air travel, computers etc. They changed the world as we know and how we live and work in it. Make no mistake, future technological inventions will make even more radical changes to how we live and work, let's make sure these changes benefit all of us and enhance the qualities of our lives.

The research community is truly world-wide. In seeking innovation and competitive advantage, whether for a company or a nation, it is essential that a global view is taken. In particular, the rapidly changing balance of research, technology and manufacturing between developed and developing nations must be taken into account. Equally, the resources needed for development and production are available in many nations. The successful organisation will consider this in all aspects of their planning, whether it is technology creation and development, production or marketing, and form global partnerships to their mutual benefit.

There is a clear need to improve on an internet infrastructure which is as inherently fragile, in business security terms, as the present one. It is essential that we look at ways to optimise and render safe the cyber business world. There is need for a concerted effort by heads of government to reach a common agreement on establishing a regulatory body who will take charge of the security, standards, technology and management. In achieving this, the economic powers of the world must support the developing countries in a shared initiative if they wish to realise the potential of a common global 'enhanced internet' to work for the benefit of all.

Finally let me consider world trade and education. Growth has underpinned rising prosperity for half a century. But it is now falling for the first time in 25 years. Falling demand is exacerbated by growing protectionist pressures and a withdrawal of trade credit. Reinvigorating world trade and investment is essential for restoring global growth. We must not repeat the historic mistakes of protectionism of previous eras.

I firmly believe that amidst all this change we must never lose sight of the moral dimension. In a global society our responsibility is not just to ourselves our families and our country but to everyone on this planet through partnership. For if we take the selfish route of simply attempting to enrich ourselves, this will come back to haunt our children through global crises in future generations. In all we do we have a global responsibility to all humanity.

Higher education plays an essential role in society, creating new knowledge, transferring it to students and fostering innovation. Institutions throughout the world are working to modernise, both in terms of the course they offer and the way they operate. The British Institute of Technology & E-commerce is one such organisation.

Many today perceive the excellent British pedagogic system as the best amongst the developed nations. It is therefore not surprising to know that education has overtaken the banking sector in the UK and the non-domestic student population contribute no less than twenty billion pounds annually.

China Goes Global

Topics: Socio-Politico-Economic Influences; Effects of The Business Environment (Developed & Emerging Economies); Competing with US for Eco-politico-business leadwership; Critical Success Factors; Western Eco-political theories and models and China's trajectory on Macro & Micro levels.

Dr Lawrence M. Akwetey

Introduction

CHINA SHAKES THE WORLD - James Kynge (Weidenfeld & Nicolson £18.99)

'Let China sleep, for when she wakes, she will shake the world.' Napoleon Bonaparte's words seem eerily prescient today as the shock waves from China's awakening reverberate across the globe. James Kynge explores the way we are increasingly dependent on China's products and markets and the way the slightest change in the Chinese economy quickly reaches our doorstep. He explains how this spectacular change has occurred and what it will mean in the 21st century

China has taken over from the US as the largest exporter to the Middle East, with trade between the region and Asia growing more than five times between 2001 and 2008, rising from $110bn to $600bn, according to HSBC.

When the Industrial and Commercial Bank of China became the first Chinese bank to open a subsidiary in the Middle East, it was touted as a significant step towards expanding overseas and promoting an "internationalisation strategy.

ICBC's loan book grew from zero to about $500m last year, while off-balance sheet activities, mainly letters of guarantee, were valued at about $1bn, Mr Tian says. Its net profits for the year were approximately $3m. The bank expects to open a branch soon in Abu Dhabi, the wealthy capital of the United Arab Emirates, to go with those operating in Qatar and Dubai, and Mr Tian hopes to double business this year.

And Chinese companies are "knocking on" ICBC's doors in search of information about Arab markets, says Mr Tian.

Social Influences

- Corporate social responsibility and the best strategies to pursue accelerated economic development.(in Africa-Emerging Economies)

- Extractive Industry Transparency Initiative for Africa and the emerging economies (Leon H. Sullivan Foundation)

- How companies can contribute to economic and social development in Africa (After the partition and exploitation of Africa by the Colonial powers).

- Taking over ailing and heavily mismanaged/non-performing companies

- Energy in Africa is big business. The source of vast amounts of energy resources and often times similar amounts of political turmoil, Africa is home to one billion potential consumers whose growing demand for energy is greater than anywhere else in the world. Despite Africa's wealth of resources

- Low emissions give most African nations surprising leverage when it comes to global carbon markets, which remain a largely untapped source of capital for developing new energy projects on the continent.

US Conditions

- Political goodwill, positive encouragement, constant support for civil society and the principles of democracy

- Constant dialogue with those that are part of the political elite. Support for civil society and an independent press. And a willingness to put our resources and money on the table to help reform - institutional reform that will strengthen democracy.

• If we see people not doing the right things, people who are undermining the values of democracy, people who are corrupt, we should not only step back, but we should criticize in a principled fashion

Economic Influences

• Africa has unrealized potential as a pioneer in the new global energy economy

• Skyrocketing demand and relatively little legacy energy infrastructure make Africa ripe for the expansion and development of green energy like wind and solar.

• Potential opportunities that Africa has to develop a green energy infrastructure

• Global shift in energy production towards the African Continent

• China's carbon-based energy technologies gles to expand electrification to the masses in Africa.

Political Influences

• In less developed countries (e.g. in Africa), weak governments and political turmoil (Business Exchange, 2010)

Globalisation's Effects on the Business Environment of firms in Developed /Emerging Countries/Africa

• China's investments in Nigeria are worth $7.24 billion, its Economic and Commercial Counsellor in Nigeria , Mr Rong Yanson, has said

• "The Chinese enterprises have made great contributions to Nigeria's economy and they have enjoyed sound business relationship with Nigerian firms,"(Daily Trust, (22-02-2010).

• No fewer than six Chinese firms had signed trade cooperation agreement with the Kaduna State Government

• In 2007, Industrial and Commercial Bank of China made Beijing's biggest direct investment in Africa when it bought 20 per cent of South Africa's Standard Bank for $5.5bn

Developed Countries:

• The rise of Chinese manufacturing is no cause for hysteria; while it poses some challenges, the good news far outweighs the bad. Nowhere is this more so than in China itself: millions of people are being lifted out of poverty each year by the country's rapid economic growth, a story of human progress too rarely acknowledged by those who fear China. Yet citizens of the developed world also benefit from the "China price" as consumers (FT 11 August 2008)

• The news that China is poised to overtake the US as the world's largest producer of manufactured goods would cause alarm in some quarters –were it not for the fact that the people likely to be alarmed about foreign competition tend to assume that China overtook the US 15 years ago. (FT 11 August 2008)

USA

Most people in the US Treasury would subscribe to the view that the Chinese don't have much choice," said Nicholas Lardy of the Peterson Institute for International Economics, a Washington think-tank. "So they probably won't give them too much credit for this announcement. For those who think China doesn't have much leeway to diversify, this just states the obvious."

He added, however, that "on the margins" this could make the US Treasury less likely to cite China as a currency manipulator in a report expected next month. According to most analysts and government officials in both countries, China does not have the option of wielding foreign exchange purchases as a weapon in bilateral relations.

"China can diversify a bit on the margins but when it comes to investing the $30bn-$40bn (€22bn-€29bn, £20bn-£27bn) a month Beijing is accumulating in foreign exchange reserves, there are only two markets deep and liquid enough – the US and eurozone government bond markets," according to Stephen Green, head of research in greater China for Standard Chartered Bank. "The euro market has shown brilliantly in recent months that it is not exactly risk-free."

The prospect of China dumping dollars caused a flurry of excitement last month when the US Treasury published preliminary data showing that China cut its holdings of Treasuries by $34.2bn in December. Total holdings, according to revised figures, stood at $895bn at year end.

US monthly Treasury data is notoriously unreliable at showing exactly how much China or other countries are investing in US government bonds. One reason is that monthly surveys are unable to determine the ultimate buyer of Treasuries if they use third parties or subsidiaries in financial centres such as Hong Kong and London to make purchases.

China's State Administration of Foreign Exchange (Safe), which manages the country's $2,400bn in foreign exchange reserves, is known to route purchases through its offices in these two cities. Taking this into account, Standard Chartered estimates that China's US Treasury holdings actually stood at about $1,020bn at the end of 2009.

"Overall, it looks like China's US holdings, as a ratio of its total holdings, are still within the normal historical range" of about 68 per cent of its total reserves by the end of 2009, Mr Green said. "In other words, there has been no abnormal break with the dollar so far."

(FT March 10, 2010)

• Historically unique financial symbiosis that had developed between China and America.

• This paradox could mark the end of another attempt to make the world safe for global finance

US & China

Yet the accumulation of large war chests of foreign reserves through currency intervention carried negative externalities. The arrangement opened a Pandora's Box of financial distortions that eventually came to haunt the global economy. The glut of savings from emerging markets has been a key factor in the decline in US and global real-long term interest rates, despite the parallel decline in US savings.

Lower interest rates in turn have enabled American households to increase consumption levels and worsened the imbalance between savings and investment. And because foreign savings were predominantly channeled through government (or central bank) hands into safe assets such as treasuries, private investors turned elsewhere to look for higher yields. This led to a repricing of financial risks and unleashed the ingenuity of financial engineers who developed new financial products for the low interest rate world, such as securitised debt instruments.

This is not to say that reserve accumulation was the only cause for the current crisis. Yet the core issue remained the Chinese willingness to fund America's consumption and borrowing habit. Without this support,

interest rates in the US would almost certainly have been substantially higher, acting as a circuit breaker for the developing debt-consumption bubble.

Beijing and others cannot be blamed for reckless lending into the housing bubble or leverage in western financial institutions, but it is clear that a vast amount of capital was flowing from a developing country with a per capita income of one tenth of the western world to one of the richest economies in the world. Water was flowing uphill in unprecedented amounts.

Critique

Moreover, the past years have shown that capital outflows from emerging markets, including China's reserves accumulation within the constellation we called Chimerica, have themselves contributed to the build-up of macroeconomic imbalances and financial risks that brought the global economy to its knees. After the dust has settled, members of the economics profession will have to think hard about what the right policy advice drawn from financial globalisations 2.0 and 3.0 should be. Neither model has passed the practice test with flying colours.

China

To a large extent, Chinese industry is dominated by low-productivity, labour-intensive manufacture. The bargain that the Chinese elite has struck with the population in exchange for political legitimacy rests on the ability of the economy to generate enough jobs to absorb the continuous stream of workers flocking to the cities. As has been noted by many commentators, the Chinese job-generation machine provides high headline figures of economic growth, but hides much waste and inefficiency. Further down the line, there is the spectre of a glass ceiling to Chinese competitiveness. To move from a manufacturing model that is integrated into the supply chain of WalMart and the production lines of more advanced industries in the developed world to one that challenges the developed world for dominance is a step that may not be so easy to take. It is easy to compete with Mexico for access to US markets, but harder to compete with Silicon Valley

Financial Times : Common goals for China and the US

The biggest challenge the world confronts is coping with the rise of China. Relatively stable world orders do not easily adapt to the emergence of new powers. There are painful dislocations at best; catastrophic tragedies at worst. In so far as the current global financial and economic crisis partly originated in imbalances generated by China's enormous trade surpluses – something Beijing disputes – the potential scale of such disruptions is already clear. The same applies to China's ambitions to project diplomatic and military power.

But handled correctly, the task is not intractable. One does not need to be a modern-day Neville Chamberlain to recognise that it is only natural for China to seek increased military muscle to match its growing economic clout. Japan provides a telling example of how, without credible military projection, even economically potent states struggle to gain influence.

Two decades of double-digit spending have transformed Beijing's military capabilities: it now possesses a large and increasingly sophisticated submarine fleet, a Russian-built air force, and vastly improved ballistic, satellite and cyber-warfare capabilities.

The trick for the US is to ease China into supporting common goals, which is, after all, akin to Beijing's stated ambition of peaceful emergence. In that context, the resumption of a high-level US-Sino military dialogue – suspended because of Beijing's anger at US arms sales to Taiwan – is very welcome. Childish rhetoric about Taiwan must now be put aside.

The two should talk about more important things. Dialogue is necessary first to prevent accidents from spiralling into crisis.
It should also be used to address legitimate Washington concerns over Beijing's lack of transparency in military spending, its support for repressive regimes and its efforts at espionage, often against the US itself

But the agenda should be more forward looking than that. It is time to engage China more formally in international efforts against piracy and terrorism. More thought should be given to China's developing role in peacekeeping operations.

There are plenty of pressing diplomatic issues – from North Korea to Pakistan-Afghanistan – where US and Chinese goals at least superficially overlap. By seeking to formalise some of these concerns – six-party talks on North Korea were a promising start – trust can be gradually built. The gap between US and Chinese military power will shrink. That is inevitable. Conflict is not.

Washington Post: China Passes Germany With 3rd Highest GDP(01/20/09)
BEIJING, Jan. 14 -- China leapfrogged over Germany to become the world's third-largest economy in 2007, sooner than predicted, underscoring how quickly the concentration of global economic power has shifted.

While earlier estimates had put growth of China's gross domestic product that year at 11.9 percent, revised figures released by the government statistics bureau Wednesday show that its economy actually expanded by 13 percent to $3.38 trillion. That compares with Germany's 2007 GDP of $3.32 trillion. "It was inevitable," said Ting Lu, a Merrill Lynch economist based in Hong Kong.

Whether the growth trajectory will continue, however, has been complicated by the global recession, which has already prompted massive layoffs and waves of company closures, especially across southeastern China, the heartland of its export-driven economy. If China were to continue to grow at its current rate, economists say it could surpass Japan in as soon as three years and the United States in 18 years to become the world's No. 1 economy.

In 2007, the United States remained the world's largest economy with a GDP of $13.8 trillion and Japan the second-largest with a $4.38 trillion GDP, according to calculations based on an annual average of daily exchange rates by Merrill Lynch.

China is one of the few major economies that is on track to have positive GDP growth this year. Merrill Lynch calculates that China will have a GDP growth of 8 percent as compared with a 2.8 percent decline for the United States, a 1.3 percent decline for Japan and a 0.6 percent decline for the European Union.

"In 2007, the gap between the growth rates of China and other big countries was huge. Actually in 2009 the gap between will be even bigger," Lu said.

But even if China achieves a projected 8 percent growth rate this year, that may be insufficient to stop the wave of company bankruptcies and layoffs that have alarmed China's leaders. Economic data released this week added to the pessimism: Exports dropped 2.8 percent in December from the same month a year ago, the sharpest decline in a decade.

In the early days of the global economic crisis, some economists had debated whether China would serve as an engine that would keep Asia from being pulled into the turmoil. Pakistan, which was suffering from a balance-of-payments crisis, even came to China looking for a loan. But this fall, China found its own economy cooling so fast that its leaders issued statements saying the best thing it could do to help the world economy was to help itself.

Coming into this global slowdown, 30 years of capitalist-style reforms pioneered by China's then-supreme leader Deng Xiaoping had transformed China from an isolated and impoverished nation into one of the world's great economic powers.
Years of white-hot, double-digit growth driven by exports and investment went hand in hand with achievements in politics, science, engineering and the arts.

Huang Yiping, chief Asia economist for Citigroup, said China grew so quickly because it had the "advantage of backwardness. As China used to be a very backward country, there was huge potential for the economic and technological development."

China has trumpeted its achievements, especially in the past few years: It hosted the Olympics, pulled off its first spacewalk, and native sons and daughters such as Jet Li and Zhang Ziyi became Hollywood darlings. Its engineers have created the world's largest building (the Beijing airport terminal), the longest transoceanic bridge (connecting Shanghai to Hangzhou), the longest plateau railway (to Tibet), the fastest train (Shanghai's "maglev") and the largest dam (Three Gorges).

China has been using its increasing wealth to buy political clout by investing in underdeveloped parts of Asia, Latin America and Africa. It is gaining influence in global economic institutions such as the Group of Eight and the International Monetary Fund, which have long been dominated by Western powers. It is the biggest holder of U.S. Treasury securities.

Economists said that despite all the wealth implied by such a large GDP, China should still be considered a poor country.

Yi Xianrong, a researcher at the Chinese Academy of Social Sciences, a government-affiliated research group, emphasized that widespread unemployment and rural poverty are still major problems. China's 1.3 billion residents have a per capita GDP of about $2,500 while Germany's 82 million inhabitants enjoy a per capita GDP of $40,400.

"If we look at the per capita figures, we still have a long way to go," Yi said.

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Advancing Telecare Research and Development:

How Technology Can Improve the Quality of Independent Living for the Elderly

Dr Ying Lui

The world's population is aging and seeing rapid changes in the social and living environment. Reportedly, the number of elderly (aged over 65) is increasing by 8 million per year[1]; By 2025 in UK, more than a third of the population will be over 55[2]. But in living longer, not everyone is staying active and healthy in the later life.

"[In the UK] Aging combined with an increasing burden of chronic disease threatens to make current models of healthcare unsustainable within a few decades. … The costs would start to rise in 2010 and by 2050 delivery using current models could cost four times what it does now"[3].

Recent R&D (research and development) shows that advanced telecare technology may hold the keys to solutions to these problems. Telecare is referred to as being the delivery of health and social care services at a home setting by the use of sensor, information and communication technologies (ICT). But to what extent can the new technology improve the quality of elderly peoples' lives? In this article, we share our research experiences, highlight some of the most promising aspects in the near future, as well as the significant barriers and challenges we currently have in such development.

Living Alone but always in touch

Lets consider the following scenario.

Helen is 67 and lives alone. She has diabetic retinopathy (a side effect of diabetes that is a leading cause of blindness among the working-age population). Because of her poor health, she needs to see her doctor regularly. Helen has heard about the Telecare services that install a computer and wireless kit in her home. The device provides access to social services with tone-and-shaped touch buttons and recognises Helen's face and finger print, so nobody else can unlock and use it. She can talk to her carer about her situations; the gadget updates her records with real time information, and reports to her surgery whenever it is necessary. The gadget comes with a supply of wearable sensors. She can attach the sensors supplied to her body and wear them to get her health conditions checked: blood pressure, weight, pulse and blood glucose levels. The gadget wirelessly collects and transports the data to the medical centre to be analysed. The gadget also reminds her regularly to check a number of times a week at specific times. If she is not at home, the gadget stores the data temporarily and remotely transmits these to her surgery.

Investment

There is a considerable amount of investment and research effort for advancing highly portable systems that monitor the health status of people with chronic (e.g. diabetes and asthma) and degenerative (e.g. respiratory and cardiovascular) diseases. Googling on the Web with key word such as "Telecare," "Body Sensor Network," "Ubiquitous Healthcare," "Pervasive Healthcare," "Assisted Living Technology", one can easily find the large variety of healthcare and medical applications of wireless networks. Many of the applications also are fielded, e.g., community based integrated screening, a use of modern transmission of glucose values to reduce the costs and need for clinic visits; a multi-site emergency based telemedicine service; a use of 3G mobile phone links for telecom consultation between a moving ambulance and a hospital base station. Even though significant research and fielded work toward the telecare advancement has been done, there is a dearth of desirable service products.

Typically, as Figure 1 shows, advanced telecare services must underpinned by ICT infrastructure at the back-end, and by devices at the user front-end that measure physiological status and other data. The network elements transmit data to a service centre and then to a health professional (e.g. physician) for review; It also has components that enable the "right" medical and healthcare professionals to access the patients' data records, or appropriately speaking Electronic Health Records (EHR), and present any feedbacks to indi-

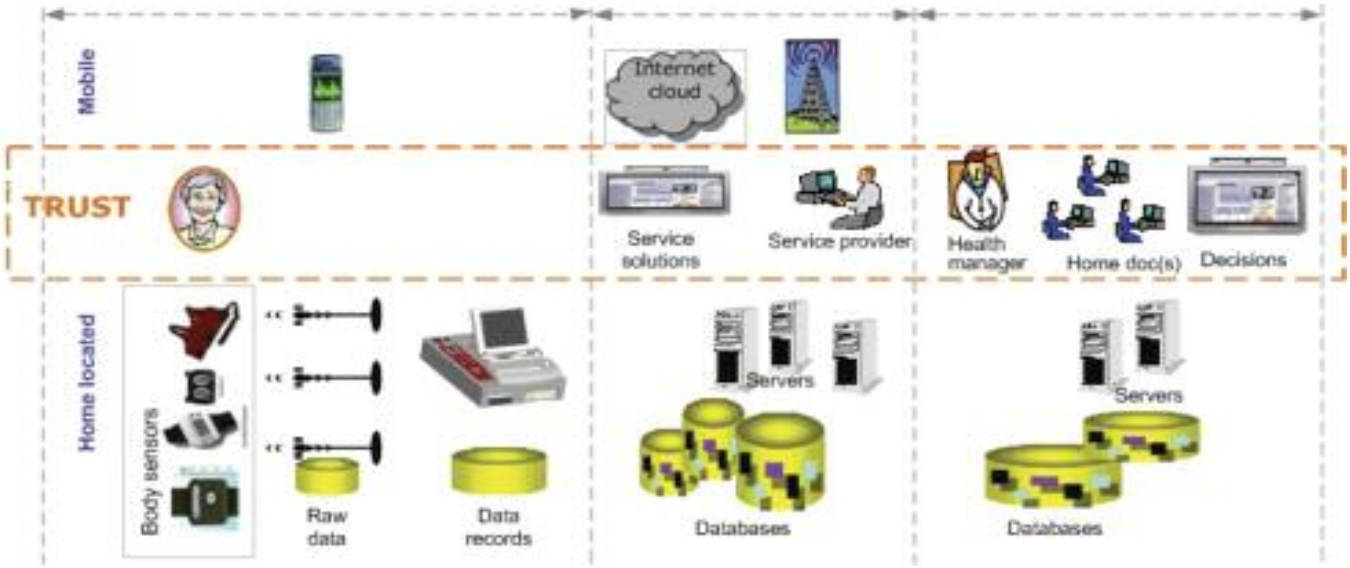

Figure 1: an illustration of telecare infrastructure

vidual users. All this must be done in a timely, secure, trusted and reliable manner, and this imposes a great challenge to provisioning a large scale of Telecare Services in real world communities. For instance, ubiquitous EHR cannot be interoperated in absence of what, where, who and how we propose the systems to be used.

"If you have devices receiving data and you don't have EMR in place, then you don't have the ability to monitor exceptions from care guidelines."[4]

The role of communication in patient safety must be envisioned. This has been evidenced by efforts constantly made for improving the effectiveness of communication among EHR and health/medical care professionals. High risks of market failures due to "design-reality gaps" are inevitable. Ineffective and insufficient service provisioning may frequently cause preventable harm to patients, or result similar failures in health information systems.

What also must be noted is that barriers exist in users' access to telecare. When devices add new features, the relevant services may have to adopt the changes, e.g. incorporating vibration-tones and downloadable information in Braille formats. There is a strong correlation between disability and age: up to one-third of the population aged between 50 and 60 have a disability. This also means that the prevalence of disability in society is set to grow with predicted demographic changes in the population. They may have difficulty walking or climbing steps, a hearing or vision loss, dyslexia or other reading-related disability. Thus, despite the ethical issues concerning trust, privacy, security and reliability, which have been long debated, many users' contexts may be more difficult to understand, and can be inadequately represented in a phase of device specialisation. It is necessary to know how the various devices' special properties may function in many alternative use cases, so as to make bespoke solutions feasible. A service platform is needed to allow devices to "plug-and-play" to meet the specific needs of the various users.

In summary, rapid deployment of wireless sensor technologies, together with handheld and ubiquitous computing, sensor networks, data communication networks, mobile and wearable smart devices, make it possible to provide services for smart homes or remote healthcare monitoring. Whilst advanced telecare technologies offer new potentials to support elderly's independent living, the technologies also can give rise to new problems. The technologies will have a profound impact on the type, content, location, operation and functionality of care products and services. An innovative approach is required so that the increasingly specialised devices can be supported by a flexible architecture for dynamic, non-text reading services, and all this must be integrated with the earlier services. The management of emerging technologies must be sustainable and coordinated, and this cannot depend only on applied research dedicated to the preservation of the technologies or, more significantly, on an organisation dedicated to changing services as technologies improve. A service architecture must be able to incorporate a new technology, upgrade a service, or create a new one.

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eCall: Smart cars to save lives?

Graham Jarvis takes a look at how mobile telematics in the form of the European Commissions' Emergency Call (eCall) project could help to reduce road accident fatalities.

The European Commissions' Emergency Call (eCall) project could reduce road injuries by up to 15%. According to the European Commission, there are at least 38,000 fatalities on Europe's roads each year. Some 2005 statistics suggest that with the enlargement of the European Union (EU) this figure increased to about 48,000 deaths involving motor vehicles. Even so, the EU says that more than 1.6 million people are also injured in road accidents each year.

Back on the UK agenda

"The subject of eCall is very much back on the UK agenda. My colleague, Peter Bourke is currently investigating with the British government and British Telecom how we can bring this safety feature to Britain for the benefit of our customers in the UK."

Stuart Anderson, PSA Peugeot Citroen, Corporate Communications

The equally sad thing is that the mass adoption deadline is likely to be overshot by at least a year or two, and that's even though the eCall type of system has been around for more than a decade. Independent business consultant, John Archer, thinks that even this prediction is optimistic. "You are talking about 12-18 years to get to 80% market penetration of all cars", he says while predicting that only 8% of all vehicles will have the system installed by 2011. This represents a lost opportunity to more immediately reduce road accident fatalities and injuries, involving cars and other vehicles, by at least 15%.

How can eCall save lives?

Well, imagine that you are stranded after a breakdown or an accident somewhere deep into the countryside, and with very few people around. It could take hours before someone finds you and then calls the police, fire or ambulance services to deal with your injuries or situation. This would reduce their chances of saving your life or the opportunity to minimise the

No demand, no eCall option
"We are not offering eCall as an option at the moment, because customers aren't requesting it enough and its adoption has to be market driven. However, we are working towards developing a low cost eCall option, and have taken this challenge to the European Commission.

Renault is also ready to sign an agreement with all of the original equipment manufacturers (OEMs) to launch such an option as this…"
Christian Rousseau, Director Delegate of Transport Policy Department, Renault SA

impact on your injuries, leading to longer convalescence periods.

In contrast a car fitted with an eCall system can automatically send an SMS or dial to make a 999 or 112 emergency call to a state regulated or private contact centre (a Public Service Answering Point - PSAP), alerting the emergency services in an instant. Through eCall the contact agents receive information called the minimum dataset (MDS), giving data about the location of the vehicle, the time, the severity of the incident, and specific details about the vehicle (type, registration number, colour and so on) to make vehicle identification much easier – speeding up the ability of the emergency services to locate it and save lives.

Work to be done
The trouble is that there is still some work to be done to create common communication protocols, infrastructure standards and human-related processes, to make the public more aware of the system and its benefits than it is presently, and there are questions about whether mass adoption will only occur through increasing market demand for the systems, or as a result of new legislation being introduced. The latter might become an absolute imperative if the EU is really to meet its own road safety targets. That's simply because different vehicle manufacturers offer different marketing and technological approaches to eCall, and different countries do too. So the other key success factor is about making sure the system becomes truly pan-European, both integrated and standardised to enable an eCall to be received by any PSAP within the EU. Surely this requires pan-European legislation to achieve? Leaving it to be just an add-on option to a new car won't help to enough save lives, nor will a lack of overall systems and process integration. Can we rely on market demand alone to achieve the European Commission's targets? There's evidence that it needs more of a push than a pull to make sure that eCall becomes a standard fitting in all new and used vehicles.

"When regulation is implemented, the volume of new cars equipped with eCall will grow considerably, ad we will see higher levels of market penetration", says Joost Van Den Bosch, Global Extended Offer Manager of Volvo Cars. He also highlights the key problem that the vehicle manufacturers have in terms of stimulating demand. When asked most people think that the system is a good idea, but there's a totally different reaction when you ask them how much they would pay for it to be installed in their cars. "They say nothing as they feel it should be part of the car, and so manufacturers need to add other services that you can charge customers for, and vehicle tracking is an example of this", he adds.

Increasing awareness
Volvo has an integrated system, which is currently being sold in 12 European markets. Sales volumes vary between the different countries, but its eCall sales stand at about 2-5% of its total sales. The UK has had prior exposure to telematics systems like vehicle tracking, so as a market it is ahead of rest. There is still some work to be done to increase people's knowledge, awareness and understanding of what eCall is all about. Note too, that the manufacturers often give their own eCall solutions different product names – which could add to any potential confusion.

Renault made an Emergency Call system available to its customers back in 1998, which was called Odysline and available on 2 cars. "It was not so well understood by our customers and it was too expensive", says Christian Rousseau, Director Delegate of Transport Policy Department, Renault SA. So the idea behind eCall is not new, but it's essentially a European Commission project for the pan-European standardisation of the system. "There are no systems out there that qualify as being pan-European", says Archer before adding that it "almost died."

Customers view eCall systems as being a matter of "public due services", says Rousseau, Director Delegate of Transport Policy Department, Renault SA. This again seems to supports the view that demand will only increase if legislation plays a role in making it a standard fitting with all vehicles rather than just offered as an option. Although the company is committed to the project, Renault's prior experience is making it tread cautiously with eCall. Like Toyota, eCall is not currently being fitted into Renault's new vehicles. David Crouch from Toyota's press office says, "First we need clear technical standards and an infrastructure that can support eCall."

Examples of eCall Module Vendors
Wavecom
Telit
Infineon
Cinterion
Delphi
Autoliv
Magnetti Morelli
Bosch
Continental
Flextronics

Slow progress

Progress is slow, and negotiations are continuing. Apparently there has been some agreement about which transport protocols will be used to send and receive the data. "The rest of the standards are up in the air, and so there is still a lot of work to do with standardisation", explains Archer.

He feels there is too much talk and not enough action to drive the project's implementation forward. He says there was a meeting recently to set up another new committee to "look at how to move eCall forward, and they gave the chairmanship to Ertico."

While some are confident about all of the stakeholders coming together, from the vehicle manufacturers and insurance companies to the telecommunications companies and the eCall module vendors, he believes that it will not be possible to "move all of the parties with different interests into a single direction."

Rousseau is more hopeful and less sceptical about the progress that is being made. "Renault is waiting for the approved standards to create an efficient and relevant eCall service, and we hope this will be 100% achieved by the middle of 2009", he says.

Whether or not this target is reached, and even demand plays a role, Archer believes the Commission has to grab hold of the initiative and make it a legislative issue. Good will and partnership, in his view, is not going to be sufficient make eCall commonplace in every vehicle – new and old - in the European Union.

"Mass adoption of eCall may happen through demand, but it won't be pan-European as specified for all makes of cars", he says before adding that "there may also be pressure from consumer bodies and insurance companies in its favour."

The use of seat belts, for example, was once an option but now in the UK at least it's a legal obligation. Wearing a seat belt saves lives. If eCall can too, then why should it be left as an optional extra?

eCall costs are prohibitive

Unfortunately, as things are, the European Commission's stated aim of having it installed in all cars is likely to not happen – or least not for a while yet. Beyond the technical and infrastructure-related factors, the cost of the systems themselves is seen as prohibitive. An eCall system can cost customers up to and over £918 (1,000 euros) for an integrated system (one that is fitted by the factory into the vehicle, and works when the airbag is engaged). The drivers of low end market vehicles may not be able to afford eCall, and that's even though they are potentially more vulnerable than someone driving a BMW 7 Series car.

If you were to compare the retail price tag to what eCall costs the automobile manufacturers, you'd probably wonder what the fuss is all about. John Archer reckons that Volvo's integrated system, which is available for about £918, probably costs the company no more than £183 (200 euros). He says he'd be very surprised if it were to be more expensive than this. An eCall TCU costs between £55-65 (60-70 euros).

On the face of it eCall doesn't look that costly, but it all adds up and it's not seen as very profitable. So the car manufacturers are looking for compensation from the European Commission in order to keep prices down and to give them a small profit margin. Unfortunately, the Commission is

The vehicle manufacturer's dilemma

"I think eCall is never going to be a standalone service. They will package eCall with other telematics service to allow them to create a revenue stream because eCall is pure cost. It doesn't create a revenue flow back to the manufacturer. You either just break even, in terms of awareness and perception of brand quality or you offer other services on a pay per use basis – which would make them money."

John Archer, Independent Business Consultant

BMW case study: not just eCall

Emergency 999 Call (eCall)

Manual: to summon help for you and other road users with the SOS button.

- Automatic: in the event of an accident, the exact vehicle position is forwarded to the 999 Emergency Service Centre.
- Excellent reliability in an accident thanks to an embedded SIM card.

Breakdown Call (B-Call)

- Intelligent roadside assistance.

Information Plus

- Telephone enquiry service: personal, free-of-charge assistance with direct transfer of addresses to the navigation system, or telephone numbers for use with a paired Bluetooth telephone.

My Info with Google Send to Car

- Search and send business listings or residential addresses from Google Maps.

Remote Services

- Remote door locking and unlocking via the *BMW service centre.*
- Intelligent roadside assistance.

Source: **www.bmw.co.uk/bmwuk/connecteddrive/0,,___,00.html?siteID=1312**

unlikely to accept this proposal though. Herein lies another potential blockage to the eCall project.

Look at the after sales market first?

"If you want to be innovative, I have always said you have got to go for the aftermarket first", says Archer. This is because older vehicles are more likely to crash, and therefore they would benefit the most from having an eCall system. There is consensus that the old cars represent a significant opportunity, but most of the focus is more likely to be on new vehicles to begin with. Cost remains a potentially limiting factor here too. "Renault has to think about the aftermarket offer; one that can be adapted to for use in old cars, and at the cheapest price", says Christian Rousseau who sees the eCall aftermarket as a commercial issue, dependent on customers demanding the systems.

Joost Van Den Bosch says that aftermarket solutions are not fully integrated, and as a result they won't activate automatically when the airbag is released. Instead this kind of standalone eCall system is activated by a shock sensor upon impact in accident. Although available as an option, in comparison Volvo's eCall system is said to be able to provide more information than a non-integrated aftermarket solution can do, and he says that Volvo's system can offer additional services in conjunction with telematics provider WirelessCar. "When a crash occurs our system sends a lot of data to the call centre, whether the engine is running, battery status, doors open or closed. You can send information about how many people are in the car", he says. He adds that Volvo's eCall system doesn't quite send all of this data yet, but stresses that there is an enormous difference between the two offerings. Volvo's system will soon enable the sending of information about how many people are in the car to the emergency contact centre. Like the other vehicle manufacturers Volvo is in "Discussion with the emergency services about what is important and what is not." Volvo is very keen to profit from eCall in order to maintain its brand image, that of producing some of the safest cars on the road though innovation. Its system is similar to BMW's offering, which is also fully integrated into its own cars.

"Volvo are not fans of pan-European eCall", claims Archer, "because they would have to adapt their system to every market". He says that Volvo's system in not line with the notion of being pan-European, because it doesn't yet use the same technologies that are required to make it so. However, it does much the same thing and Volvo are "claiming to be ahead of everyone else", he explains.

But is eCall Big Brother?

"It's not a case of Big Brother watching you, because It's only activated when the customer decides – only be people within the car, or when an accident occurs", says Van Den Bosch. He has found that customers like it.

Smarter Cars

In the near future we will have systems that allow us to speak to other drivers in their cars or receive information from a module that updates us about the traffic ahead. Volvo also has a system that uses radar technology, automatically breaking when it detects an object – whether a person or otherwise – and prevents an accident from occurring. Accidents caused by blind spots can also be prevented by having rear-facing cameras, which warn you when overtaking if another vehicle is in your blind spot.

Some manufacturers are also offering a night vision system, allowing you see what's ahead when your vision as a driver is impaired. Most of these innovations are designed to make cars safer, to prevent accidents. In contrast eCall is essential for saving lives once one has happened, and that's why we need the appropriate legislation now. When it comes to life there should be no gamble, and eCall shouldn't just be an option but an obligatory system that's fitted into each and every car. It's time to get smart!

Further reading and information:

eCall Safety Video, European Commission, 2007:*http://212.68.215.195/esafety/ecall_hq_2b.wmv*

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The European Union's 'Intelligent Car Initiative': http://ec.europa.eu/information_society/activities/intelligentcar/index_en.htm

The European Union's Intelligent Car Brochure: http://ec.europa.eu/information_society/activities/intelligentcar/docs/right_column/intelligent_car_brochure.pdf

BMW ConnectDrive Website: http://www.bmw.com/com/en/insights/technology/connecteddrive/overview.html

Volvo On Call: http://www.volvocars.com/uk/salesandservices/Volvo%20on%20Call/Pages/default.aspx

Renault: http://www.renault.co.uk/

At Enterprise Forum 2009, Alcatel-Lucent demonstrates a next generation integrated solution for emergency call handling, based on PSA Peugeot Citroën eCall system: http://www.alcatel-

lucent.com/wps/portal/!ut/p/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLd4x3tXDUL8h2VAQAURh_Yw!!?LMSG_CABINET=Docs_and_Resource_Ctr&LMSG_CONTENT_FILE=News_Releases_2009/News_Article_001476.xml

***ACEA -** European Automobile Manufacturers' Association: http://www.acea.be/*

eSaftey Forum: http://ec.europa.eu/information_society/activities/esafety/forum/index_en.htm

eSafety Support: http://www.esafetysupport.org/en/esafety_activities/esafety_forum/

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ETSI: http://www.etsi.org/WebSite/homepage.aspx

The Impact of Nanotechnology on the Construction Sector

Dr Alan Smith and Yakub Ahmed

Nanotechnology is attracting a lot of attention in many quarters, and we are already seeing nano-based products arriving in our homes. Technology roadmaps for the construction industry herald the impact that nanotechnology will have on the sector.

'Nano' is derived from the Greek for dwarf, and nanotechnology refers to the technologies that result from being able to exploit the very different properties that occur when one is working at extremely small dimensions. One nanometre, by the way, is one millionth of a millimetre, and 80,000 nanoparticles in a row would still only be the diameter of a hair from your head. If you take a cubic metre of a material, the surface area is 6 square metres. If you grind that cubic metre down to nanometre cubes, the surface area would increase to 6,000 square kilometres; London occupies only 1,500 square kilometres! For the construction industry it is these nanoparticles and nano-films that will provide different and beneficial properties for just about every aspect of what we find in our homes. No wonder nanotechnology has been described as the next industrial revolution.

Nanotechnology has been highlighted in a Technology Roadmap for Building Construction that was produced for Australia[1]., and in another one from a Danish laboratory[2].

If you are not familiar with roadmapping, it is really a future strategy for a sector or technology, and only differs from a Foresight exercise in that it emphasises how to reach the vision. There are now a vast number of roadmaps freely available on the web, and even in the materials and chemicals area there were about 20 recorded in 2003[3].. Figure 1 summarises the types of roadmaps that have been produced. Industry roadmaps have ranged from glass[4] to the steel industry[5], with the technology specific ones, for example in nanomaterials[6], being much more numerous. Product specific ones tend to be company roadmaps, to improve a particular product range, and hence remain confidential to the company.

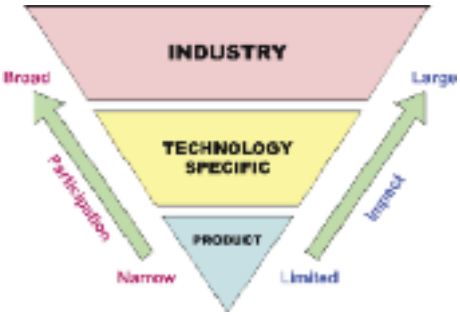

Figure 1: Types of roadmaps

The procedure for the majority of roadmaps is to gather knowledgeable people together and go through the process shown in Figure 2. The first step of course is to know where the sector or technology is at the present time. For the "Where are we now?" section it is really a benchmarking exercise – what are the trends and drivers and where do we stand relative to the competition?

Figure 2: Stages in the roadmapping exercise

The next step is the vision for where we want to be, which is very similar to a Foresight exercise. The third stage is to look at what is going to stop us getting to that vision, i.e. what are the barriers stopping us achieving our objectives. Finally, the priorities have to be decided regarding what has to be done, and in what time frame, to overcome the barriers to progress.

There have been other studies that have either carried out including foresight exercises related to the construction industry[7], and some have been more specific, covering, for example, smart materials[8].

Nanotechnology in the construction industry has received some attention in the past. The previously mentioned Nanomaterials roadmap 6. sets out the priority products and processes for housing and construction as:

- Improved bonding and strength / toughness (smaller materials)
- Concrete (nanotubes or carbon fibre fillers)
- Drill bits (stronger, longer lasting)
- Steel (stronger because of nanostructures).

In addition, Nanocom[9], the Scottish Centre for Nanotechnology in Construction Materials has held a symposium on Nanotechnology in Construction, and a report from nCRISP[10]. gives an excellent summary of nanotechnology affecting coatings.

The Australian Building Construction Technology Roadmap is more general and looks at the house of the future and the technologies that will influence changes. The number of homes in Australia is predicted to go up from 8 million to 11 million by 2025, because of the demographic changes that are occurring worldwide:

- Ageing population, increasing number of divorces, women more financially independent, and increased home-based work, will mean high-density, low-occupancy, flexible communities.
- Continued drive for energy efficiency and reduction of waste will influence housing

design, changes in equipment and management.
- Information technology and communications, will be seen more in homes through more monitoring, connectivity to the outside world and general automation.

The roadmaps note the following likely changes:

Home construction and maintenance

Prefabrication and off-site construction will increase, and there will be more flexibility in design to take account of lifestyle changes. Maintenance and servicing will be very different with self-cleaning surfaces inside and out, monitoring things such as structural defects, use of longer-life coatings, and use of online diagnostics for appliances.

Nanotechnology will be used for smart windows which will incorporate nanoparticles such as zinc oxide for spectral selectivity and thermal control. Nano-coatings are already being used for self-cleaning glass. Pilkingtons have a product called Activ™, where the glass has a 50 nm layer of titanium dioxide on the surface which, with the help of sunlight, breaks down dirt on the surface, and is then washed off by the rain (Figure 3). Similarly, there is increasing interest in the use of titanium dioxide nanoparticles to break down the environmental pollutants, such as oxides of nitrogen and sulphur. This technique was first used on a church building in Rome, with a view to breaking down exhaust fumes from cars, but has also been found to provide a cleaner environment by incorporating titanium dioxide into concrete for roads[11].

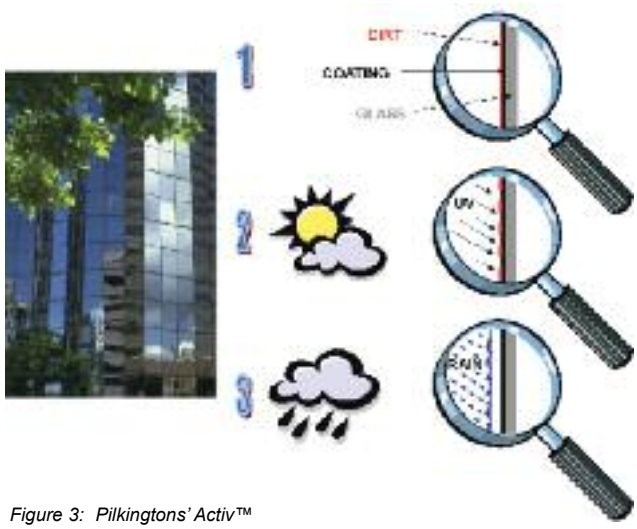

Figure 3: Pilkingtons' Activ™

In addition, Samsung are using silver nanoparticles to provide anti-microbial surfaces for refrigerators by incorporating them into the plastic mouldings. Other companies are known to be developing anti-microbial nano-surfaces for kitchen and bathroom surfaces for stain and mould resistance.

Also in the bathroom it is possible to purchase products which stop water droplets hanging onto the surfaces in showers. This silica-based lotus effect which provides super-hydrophobicity, and has received a great deal of press in relation to clothing. The Nanocare fabric repels red wine or coffee and demonstrates just how disruptive the technology will be to the detergent producers. The earlier products were good for aqueous stains but poor with oil based spillages. However other surface treatments have been developed that repel all types of stains, which have resulted in them being used for upholstery. There is working going on to develop fabrics that are cotton but have the feel of silk due to nanotechnology, and smelly socks seem to have gone out the window with recent launches of anti-odour nanotechnology coatings.

Other nanotechnology opportunities that are at an early stage are improved sealants and adhesives, flame-retardant materials, and new insulating materials for both heat and sound.

The final lacquer coating on some models for Mercedes cars now has scratch-resistant surfaces that are nanoparticulate, and provide surfaces that stay brighter. The side-body mouldings of the Chevrolet Impala are a polypropylene nanocomposite. Both Toyota and Mitsubishi have replaced metal parts under the bonnet with nanocomposites because they provide lighter weight and can withstand high temperatures than conventional composites. The most exciting developments though will come from the use of what are called carbon nanotubes that will provide materials that are 50 to 100 times stronger than steel at one-sixth the weight – watch this space. These anti-scratch surfaces and also the lighter weight materials are likely to find applications in the construction industry.

Utilities

The roadmaps go into detail about the changes in how construction and design will cope with changes in our use of water, energy and communications.

It is unlikely to be just an Australian problem but the suggestion is for a third water pipe in houses that will be used for the collection and re-use of 'grey' water (bath water, washing machine water, etc.) driven by sanctions and rewards. Here the suggestion is that multi-functional nano-porous filtration for removal of chemical and biological impurities in water will be used. Water quality is an important issue throughout the world and nano-membranes are being developed which can filter out bacteria and viruses[12].

Increased pressure to conserve energy will see the increasing use of smart metering, and embedded technology to run smart appliances and automated management. This will require micro and nano sensor development. Some of the more intensive activities involving nanotechnology are in ultra thin films for solar cells. The traditional silicon solar cells are robust and fairly effective, but with the increasing demand for silicon chips in China in particular, the cost for the single crystal silicon that is essential, has gone up dramatically. The search is on for solar cells that are just thin films of silicon, and an added requirement is that the cells should work well in areas of low sunlight. Other coatings being examined are based more exotic combinations such as cadmium telluride, and copper indium gallium selenide, as well as novel organic systems. This is a rapidly expanding area, incentivised by governments introducing credits for those installing cells in their own homes. There are a number of roadmaps that focus on these photovoltaic cells for generating energy, coming from the US, the UK, Europe as a whole, and even from smaller nations such as

Lithuania. For those wanting more detail, the European one is very comprehensive[13].

For communications, the home will have increased data and connectivity capacity with smart wiring, wireless, and self-diagnosis of problems. Again nano-sensors will play a major role. These are based on the fact that at the nano-scale things happen fast and more sensitively, which is also creating a great deal of interest in the medical sector where groups are working on devices which will detect diseases before they have taken a hold on the body.

Office and Leisure

Houses will see an increasing use of the home for both office and leisure activities. There will be increased use of communication technology and holographic / video conferencing. The major trend of home theatre will flourish along with increased usage of the Internet.

There are many examples in the leisure sector that are already employing nanotechnology to provide improved products. Wilson Sports have nanocomposite tennis racquets that have enabled Federer to hit the ball even harder, and with more accuracy. The Wilson Double Core tennis ball has a nanocomposite butyl rubber layer on the inside that keeps the air in the ball when Federer hits at 150 mph down the Centre Court. We are likely to hear the call "new balls please" less frequently. Such barrier properties are also being used in food packaging to keep the flavour in and keep out UV light that might cause spoilage of the foodstuff. Wilson Staff fairway woods utilise nanoparticulates and carbon nanotubes to enable golfers to hit the nanocomposite ball further and more accurately.

Just as development products are tested out in Formula 1 cars before they arrive in our own cars, we can expect some of the developments described above to find applications in building construction; certainly the barrier property applications could be an early opportunity.

Security and Safety

Many roadmaps highlight population pressures and safety concerns having an effect on homes with more sophisticated, automated security systems and environmental control, remote diagnostics, germ control, and fail-safe data transmissions.

Specifically, nanotechnology is seen as being involved in families of filters for air and water flow to control germs, bacteria, dust, pollen and pollution. By way of example, the new Dreamliner, Boeing's 787 model which is just coming into service, has silver nanoparticle based high quality air filters to keep the air fresher during long transatlantic flights; they kill 99.7% of influenza germs.

Clearly nanotechnology will have a massive impact on many aspects in the construction industry; it is just a case of 'watch this space'.

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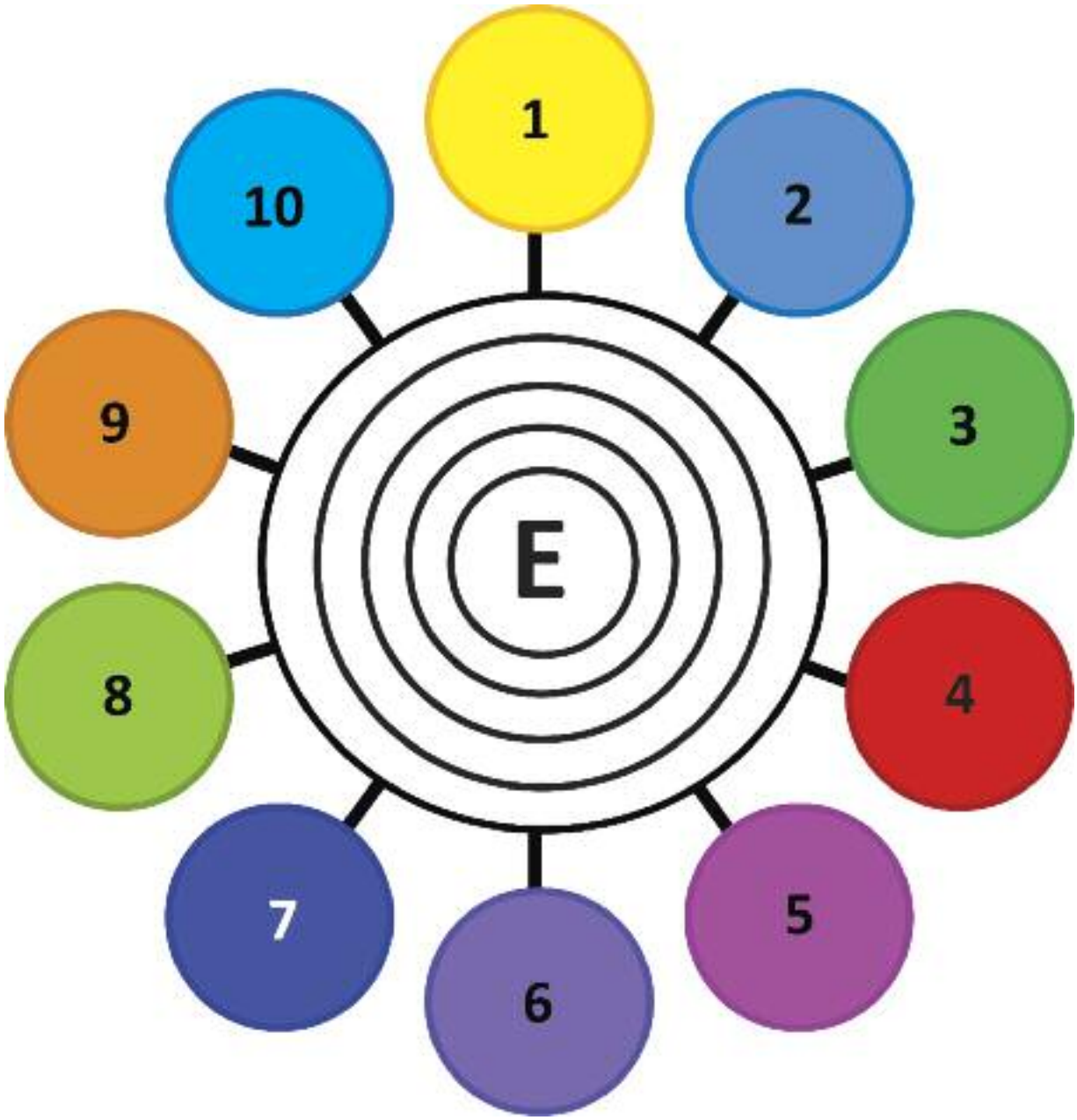
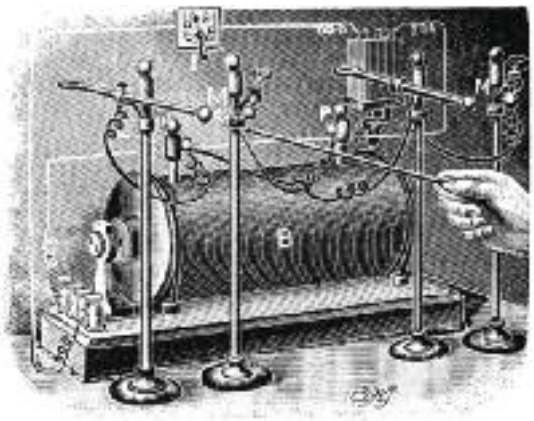
SPIRALE



By finding 10 six letter words ending by the letter 'E', discover the name of a Polish physicist born in the 19th century who worked in Paris in partnership with her husband.

1- Machine which squeezes water from clothes
2- Wide street in a town
3- To take away
4- Money received regularly
5- To persuade to do something by offer of pleasure
6- A married pair
7- To remove from cover
8- To make deep, continuous sound
9- In prison
10- To break free

Solution on back page



Picture clue

Dr Joy Joseph

Financial Planning

In my previous article I highlighted the need for proper financial discipline and a systematic management of money. Now I will focus on the necessity of proper financial planning and control through personal accounting and budgeting.

In his study on 'family behaviour', B.V. Cunningham (1936) stated that even the best kind of budget might do more harm than good if it is carelessly planned and not accepted by all members of a family group. Bernstein (1960), in his article 'Self-Determination: King or Citizen in the Realm of Values', has stated that there is a wide variety of goals from which an individual or family may choose.

The ultimate goal of financial planning is to secure one's financial security. In order to reach the family's financial potential and maintain the desired quality of life, one must initiate a positive personal financial management programme. This will require the preparation of plans and budgets that can act as navigational aids in plotting the course towards achievement of both the family's short term and long term financial goals.

"Building a sound financial plan is conceptually similar to erecting a building." (Gable, R.C., 1983) In both building construction and financial endeavours, a sure foundation and strong framework support the finished structure and help it to last. Comprehensive planning creates the foundation and superstructure for success.

WHERE TO START?

A systematic management of finance should be *properly recorded and documented with evidence of expenditure*. We have to start with recording our daily expenses and income. For the first few months it will seem to be a somewhat tiresome duty, but later it will become a habit. Buy a new diary or an accounting-book and, before going to bed, record all your monetary transactions and keep the bills and vouchers for them for at least one year. It may seem to be difficult for the first few months and it may seem to be a waste of time, but if you practice regular recording you can avoid a number of financial blunders and reduce unnecessary tension within the family.

As an example I would like to highlight some of my personal experiences. I have been practicing regular accounting since 1983 and have saved a lot of money through keeping all my bills and vouchers. By saving a receipt for £25, I have saved an overall expenditure of £1,055. Recently when I moved home, I received an electricity bill for £1,080 instead of the £25 I had estimated it should have been. The gas bill was then inadvertently adjusted to include the previous tenant's bill. By recording the meter reading from the beginning of my tenancy and keeping the receipt I received for paying the initial bill, I have saved a lot of money as I was able to inform the gas board of just how much I had used since I moved in.

Also, after remitting the TV licence fee for one year, two more bills came, including a warning notice for the previous tenant's liability for non-payment. It was the same for the water bill – another one came addressed to 'The Occupier' (of the same house where I live) for payment of the bill, threatening to disconnect the water supply if it was not paid. By keeping a record of when I had moved into the present property and being able to provide evidence of how much I had used and the prompt payment of my own bills, I was able to clear up the matter. It is important to keep a record as this would otherwise be hard to explain to the utilities companies and the TV Licensing Authority.

Yet consumers are being cheated in so many ways. It is a never-ending process. Here, I would like to present a good example which tells everybody to take the necessary steps before taking financial decisions.

KEEPING THE BANKERS IN CHECK

One day I asked my bank to sanction a loan of £10, 000 to cover all my credit cards (costing more than a nominal additional 30% of the initial outlay). The assistant agreed the rate of 16.5%. However, when the Customer Care Officer told me about the insurance policy, I thought that the rate would be an additional 1% of the loan amount (the rate of insurance agreed by the same banker for another transaction) and it would not come to more than £100 per year. The loan was for a period of 5 years and, as per their calculation, I had to make a payment of £300 per month. Even though I asked about the present rate of insurance, the officer avoided that question and turned to another matter.

After getting a copy of the agreement, I tried to verify the insurance rate but it was made unclear by a staple being put in the middle of the paper. Moreover the contract was printed in a very low font size. I tried to open it to check the details, but found I could not. After closely reading the contract, I noticed that I was committed to paying £20 000 instead of £13 000 as the average interest rate was now more than 36%. I applied for a loan of £10 000. He allowed that amount and another loan of £5000 to cover my insurance for the period, plus interest for the second loan, at 16.5%. The total came to about £ 7000 more for insurance. Altogether I had to pay approximately £ 20 000 within five years. I was upset about this transaction and resolved to do something about it.

I immediately called the Customer Care Officer, but did not receive any reply. The next day I went to the branch, but he was not working on that day. I was told he only worked on Saturdays, so I waited until the next weekend. At the same time I also gave a written application to cancel my insur-

ance arrangement. Even though I told him that I was financially sound (having also set up a direct debit for the regular payment without any arrears as proof of this) and that I had some other insurance, he stated that, on the contrary, I did not have any other source of finance and was not financially sound. What he recorded was blatantly untrue!

The next time when I saw him he told me that I could not cancel within the first three months of signing the contract. I knew that I could within 14 days. I showed him the relevant clause in the contract and he acknowledged his ignorance. When I tried for an application for cancellation he told me that the paperwork was unavailable. I told him that I would make a written application, stating the matter clearly and submit it to the Senior Manager. Then he assured me that he would arrange for an application. The next day I got the application form from the Senior Manager, completed it and submitted it officially. Finally they removed the insurance from my loan account and now I need to pay no more than £200 per month - a saving of £100 per month up to five years, including interest. Therefore, ***I was able to save more than £7, 000***. In future I will not sign any document before reading it thoroughly!

I advise readers to do the same because they could easily fall prey to the unscrupulous practices of apparently respectable high street banks. These institutions are driven by the need to hit sales targets rather than invest in the policy of providing good advice to borrowers and they often achieve these through the tactics of hiding crucial information in small print provisions. Though it perhaps should be illegal practice, there is nothing to prevent this from happening – apart from the diligence of the client.

OTHER WAYS TO SAVE MONEY

The question may be asked as to ***how can we achieve financial discipline*** and what are the steps for an effective and systematic financial management programme? Keeping a ***simple record of expenditure*** is a good way to start.

After recording all expenses and income for one month the next process is to ***summarise your expenses*** under the following headings:

1. Food
Expenses for food include amount spent for provisions, fruits, vegetables, meat, fish, milk, food from outside, soft drinks etc.

2. Shelter
Expenses for house include rent paid (for leasehold property), telephone charges, expenses for electricity, water, gas, council tax, insurance, maintenance, repairs, decoration, valuation and legal charges etc.

3. Clothing
Under this heading come amounts spent for the purchase of new clothes including shoes and bags, and for dry cleaning, washing, ironing, stitching etc.

4. Health
Expenses for medicine, healthcare, hairdressing, cosmetics, beauty care, consultation fees, travel for health etc. are included under this heading.

5. Education
Includes fees paid, library fees, books purchased, internet charges, printing costs, stationary, travel for study purposes, subscriptions, uniforms etc.

6. Travel
Expenses for travel, for travel cards, bus passes, oyster card charges, maintenance of car, insurance, petrol and diesel, tax, MOT etc.

7. For Social Obligations
Includes expenses for parties, family get-togethers, for special occasions, gifts, donations, charities, support to family members and friends and relatives etc.

8. Personal Habits
Amount spent on liquor, cigarettes, chewing gum, stamps, photography, pets, hobbies etc.

9. Entertainment
Expenses incurred for music, dance, games, CDs, film, internet connection for entertainments, etc are included under this heading.

10. Miscellaneous
Other expenses like postage, for child care and for any other items not included among the above items are included here.

After preparing a summary of your expenses and income, you can also prepare a summary of your ***capital transactions*** – purchase of assets, sales of assets, loans taken, loans paid back including interest, any investments made, any loans given, any loans given back and the final savings you have in hand and at the bank(s).

THE IMPORTANCE OF HAVING A REVIEW

The next step is an ***evaluation or a review of the transactions*** during the month and you have to think whether you could have avoided any unnecessary expenditure or not. In the light of the above facts and figures you can proceed to ***prepare a budget for the next month***. A budget is a ***financial plan*** for the future which involves the estimation of future earnings or income and estimation of expenses, savings and investments.

BE YOUR OWN FINANCIAL ADVISER

This process allows you to follow a systematic approach which enables you to manage your finances properly without any waste. A wise forecast can help you in this. After two or three months' practice you will become an expert in financial planning and thereby you can achieve financial discipline.

Thus a systematic personal finance management enables every family to prepare for a financially bright future. An awareness of the personal financial principles stimulates every person to establish proper financial goals, to prepare a suitable budget, to exploit and utilise the existing resources and thereby achieve the financial security of their family. ***Personal financial planning enables them to take better decisions relating to income, expenditure, savings and investment and hence to improve the satisfaction, quality and wealth of the family.***

"It is true that money isn't everything, but the fact must be faced that ***money is important***. Most people need it for economic security and to share in the many material things available to make their lives more enjoyable. Earning all one can, spending it wisely, and giving generously, should help achieve a happy life." (Willet, E. R., 1964).

Forget about the past. Plan for the future. If we can start today, by the 2012 Olympics, the financial position of every person, every family and every institution will improve and that will lay the foundation for a great change in the Global Family - the Financial Discipline of the Global family.

In the next issue the author will focus on the management of income and the possibilities of increasing income.

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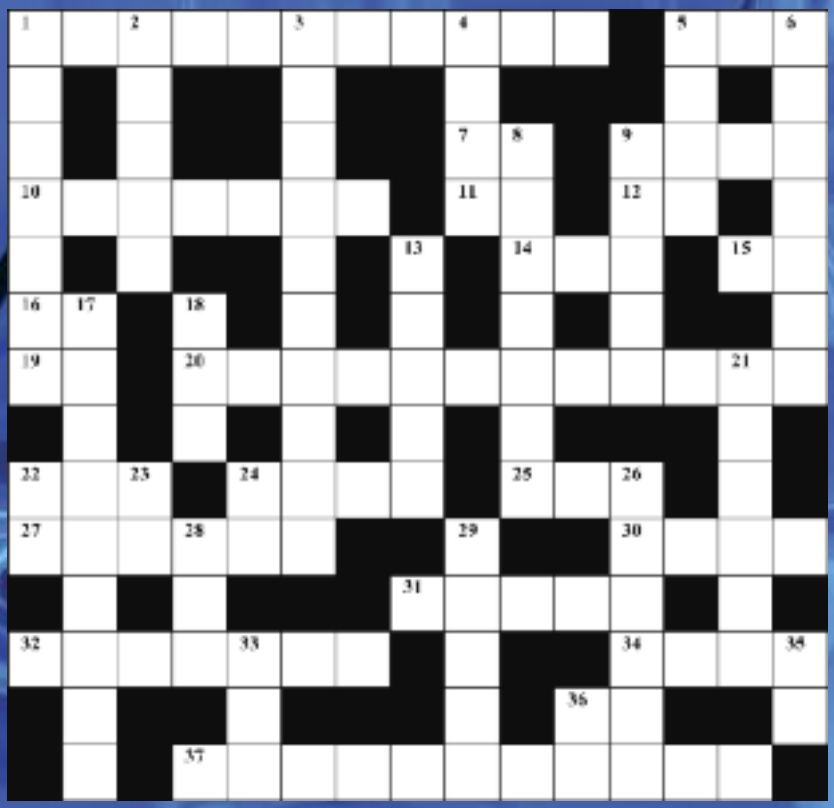
Chemistry Crossword



Across

1 Chemical reaction absorbing heat (11)
5 Two adjacent nitrogen atoms between two carbon atoms (3)
7 Its atomic number is 3 (2)
9 Plant with big white flowers (4)
10 Metal liquid at room temperature (7)
11 Symbol for the element named after Einstein (2)
12 Symbol for lanthanum (2)
14 Substance lighter than and insoluble in water(3)
15 One of the alkali metals (2)
16 Element found in salt (2)
19 One the poor metals in group 13 (2)
20 Chemical decomposition by electric action (12)
22 Charged atom (3)
24 One of the noble gases (4)
25 7th Greek letter (3)
27 Stationary part of an electric motor (6)
30 Other name for calcium oxide: quick ....(4)
32 Organic compound such as PVC (7)
34 Measure of land (4)
36 Its atomic number is 13 (2)
37 When a solid turns directly into a gas (11)

Down

1 Found in the periodic table (7)
2 Journal (5)
3 Measure the density of liquids (10)
4 Amount of a substance that contains the same number of atoms as in 12g of carbon-12 (4)
5 A faintly shining shadow surrounding the human body (4)
6 Tendency of solvent to diffuse through porous partition (7)
8 Carbon-14 is an ..... of carbon-12 (7)
9 Bronze is one (5)
13 Truncheon (5)
17 Graphite is one of carbon (9)
18 Unit for intensities of sound (3)
21 2-methyl propane is an ..... of butane (6)
22 Conjugated form of 'to be' (2)
23 Other way of saying 'no' (2)
24 Negative answer (2)
26 Caustic soda is one (6)
28 Amuses children (3)
29 Queasiness (5)
33 Baldmoney (3)
35 Symbol for europium (2)
36 Symbol for astatine (2)

Solution on back page

An idyllic weekend in the Cotswolds

Hélène Maurice

The Lamb Inn
A family with a young toddler often finds that hotels will not welcome them. Luckily the Lamb Inn in Burford, part of a group of hotels in the Costwolds, is not one of them. We have always found this part of England very romantic with its beautiful houses and quaint little villages built with warm, very recognisable Cotswolds honey coloured stone.

The Lamb Inn situated in Sheep Street just off Burford's High Street has well-proportioned public rooms, a bar, several very cosy bedrooms and an award-winning restaurant. It has all the charm you would imagine of an old English inn with thick stone walls, cosy rooms, open fires and squeaky, uneven floors.

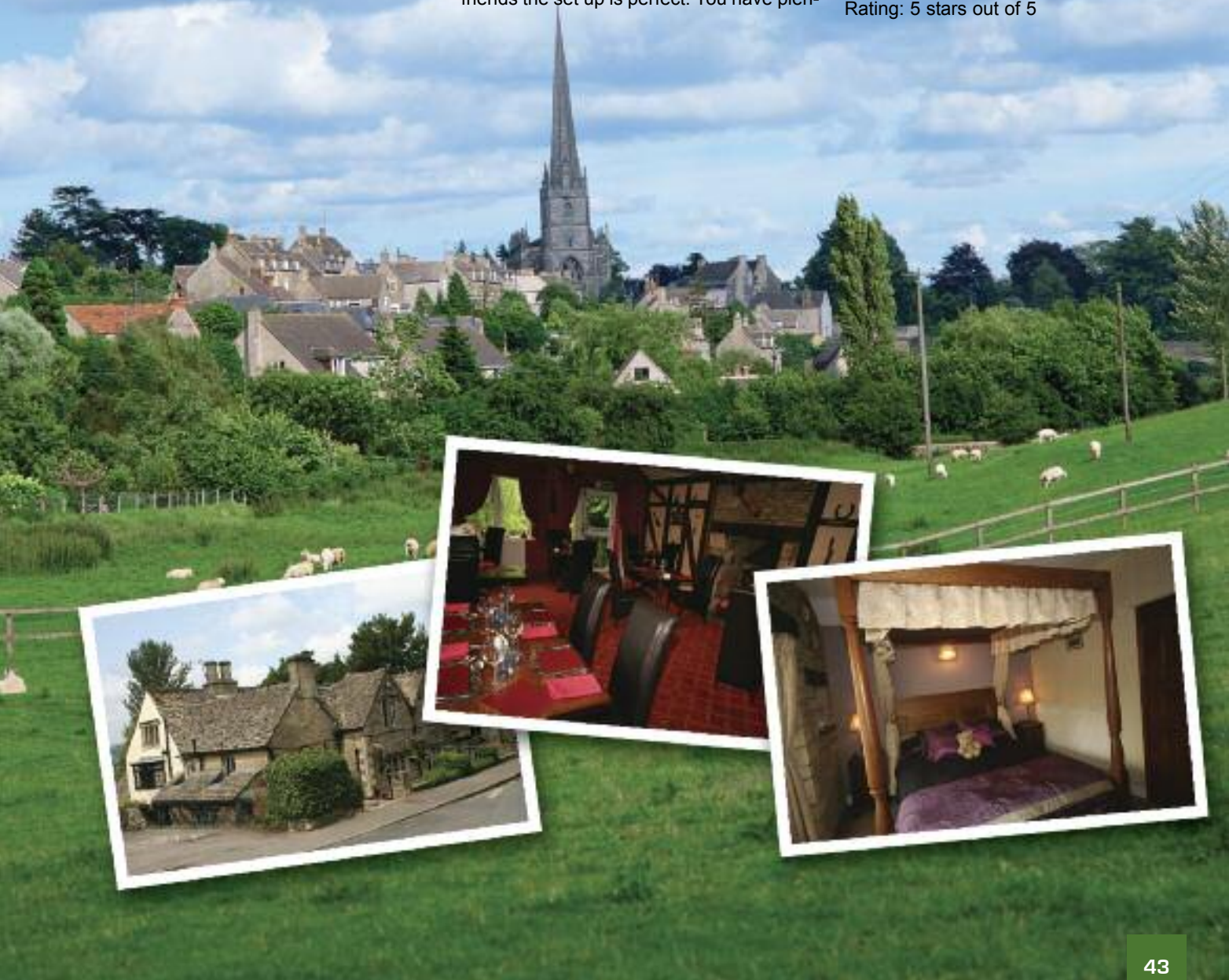
Staff
Very friendly, helpful and discreet. As our toddler could not seat through a three course meal, we wandered a couple of times along the corridor to the bar and each time someone came to let us know when we were about to be served. We never felt it was an issue.

Food
Very well presented and refined. Small tasty extras are presented to you at the beginning and before the desert. Whether one is there for a romantic soirée or with friends the set up is perfect. You have plenty of time to chat, digest and enjoy a lovely evening. One does not feel pressurised to move on. However with a toddler the service is a little too slow. We had to entertain him for two hours. The wine list is varied and if one prefers beer with one's meal they serve delicious local brews, or so said my partner.

Atmosphere
Cosy and warm both in both the rooms and the restaurant. On a cold winter evening one can forget the world outside and relax in the glow of the fire.

☆☆☆☆☆

Rating: 5 stars out of 5



Marlow: a weekend away on the River Thames

Hélène Maurice

Marlow is one of those charming little Buckinghamshire towns nestling along the River Thames. Less than an hour's drive away from London, it's a relaxing destination.

You can wander around this historic market town with medieval and Georgian buildings in an afternoon. It hosts several events all year round such as a Sunday farmers market, regattas, races, the Marlow May Fayre and a carnival in September. Whatever the weather it is usually bursting and buzzing with visitors.

Marlow bridge and All Saints Church

The High Street, although attractive with its selection of cafés, restaurants and shops, is quite congested during the day since it is the main artery leading to the river. For eating, a great variety of places are on offer though the prices reflect the popularity of the town. A French brasserie like Chez Gérard with an outdoor patio hidden away in a quiet alley is definitely worth considering. The food is simple but reliable and affordable. Otherwise try the Marlow Bar and Grill with a patio at the back and a murmuring cascade from a mini waterfall. The modern food is highly priced but the atmosphere is pleasant.

To escape the noise of the traffic, aim for Higginson Park along the river. It is dominated by a grandiose Georgian mansion used for events and the bronze statue of Sir Steve Redgrave, Marlow's Olympic rowing winner. The park is bare due to a lack of flower beds but one can spend an entire day there picnicking, idling, wandering, watching the passers-by, the boats on the river or feeding the flocks of geese and swans.

If one is interested in famous people, see the house of the writer Mary Shelley (1797 – 1851) and the Romantic poet, Shelley in West Street, number 104. Unfortunately it is not open to the public. There she wrote her worldwide famous Gothic story 'Frankenstein'. The poet TS Eliot was also an inhabitant of Marlow in the same street. A more contemporary celebrity bought a house in the area too - Robbie Williams.

Another attraction is the 1832 suspended bridge by William Tierney Clark who also designed bridges in Hammersmith (London) and Budapest. Next to it lies the All Saints parish church on the river: A lovely site to rest or to look at from the bridge especially at night when it is illuminated. Facing it, on the other bank of the river, next to the weir, one will find The Compleat Angler inn. It owes its name to the book of the same title by Izaak Walton (1593–1683). The rooms are pleasant and one knows what to expect as it is run by MacDonald's hotels. It is very popular due to its setting. The prices are high and the food overpriced despite the hotel promoting itself for the quality of it. Even the coffees are basic. However if one is after a romantic weekend or just unwinding, it is worth a stay.

Cliveden House

On the way back after a stay visit one of the National Trust properties nearby such as Cliveden, a spectacular estate overlooking the Thames with various walks and gardens. Or try Hughenden Manor near High Wycombe, once the home of the Victorian statesman, Benjamin Disraeli who lived there from 1848 till his death in 1881.

The Thames at Marlow

Family House Secrets

Hancox, A House and a Family
By Charlotte Moore
468pp, Viking
£20.00 hardback

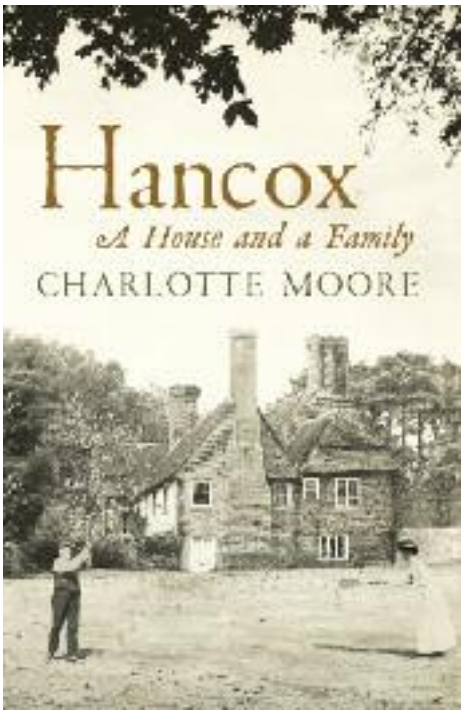
Hélène Maurice

Charlotte Moore has the privilege of still living in the house of her ancestors. This gave her the idea of trying to find out more about the history of the house since the building contains the ghostly presences and physical modifications of successive generations of the family. A house which has housed and been changed by one family for so long begins to act as both a spiritual and physical embodiment of that family.

Hancox, a Tudor house situated in idyllic rural Sussex, became part of the Moore family with the marriage of Milicent Ludlow a strong-willed Victorian woman who had acquired it in 1891, to her cousin's husband Norman Moore in 1903.

The book takes the reader through the ups and downs that every family inevitably goes through. But what makes it special is the colourful, influential and talented characters and unique personalities who lived in the house. The family was related to Florence Nightingale and could count the Darwin family and Kipling as friends.

It is captivating to have a glance at this sort of domestic social history which usually remains hidden and unwritten. However it is the sort of story one has to read through in one go as it is very easy to get confused and lost with all the different members of the extended family.



Flowers and Herbs:

The Delicate Rose (Rosaceae)

Hélène Maurice

Many of us love sitting in a warm garden surrounded by beautiful rose shrubs diffusing an intoxicating, rich scent. But in big cities many people cannot hope to do that. But you can head for the parks when spring then summer arrives. In London, the Rose Garden in Regents Park has an amazing variety of roses on display from June till August.

Often a symbol of beauty and love, the rose is also recognised as having culinary and medicinal purposes. Rose flavoured food was very popular in Elizabethan times and throughout history roses have been used in a wide range of sweet recipes: rose water, rose butter, rose candies, crystallised rose petals to decorate cakes.

In his book The English Physician, the physician Nicholas Culpeper (1616-1654) mentions several remedies involving roses from relieving inflammation of the liver to aching joints. The rose's essential oils have various properties from heart tonic, antidepressant, antiseptic antiviral to diuretic. Rose water is also beneficial to all types of skin, hence the French saying, 'un teint de rose' for a healthy complexion. The only time that it is to be avoided is during the first four months of pregnancy.

Books...

Mark Winfield

Boldly Gone

Dan Dare: Pilot of the Future: a Biography
Daniel Tatarsky
Orion Hardback
Price £14.99

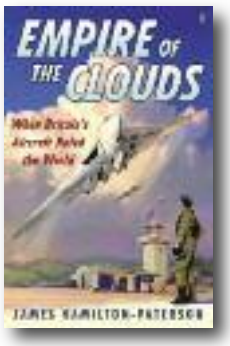
Dan Dare is one of the most famous British cartoon characters of the 20th century. Despite having been introduced to the world (well the UK at any rate) in the first edition of the *Eagle* comic in 1950 he remains an icon of the heroic age of British science fiction. By now those who knew him directly in his early days would be in their 70's but he continues to fascinate new generations. Dan's future was 1995 but though 60 years old now the vision of the future still appeals. If only 1995 had been half as exciting as it was in the comic strips. We might have iPods and 3D movies but where is an effective UN world government and space battles with the implacable Mekon and his evil Venusian underlings?

I was too young to really experience Dan at first hand but as an eager Cub Scout (it soon wore off) I helped out at the jumble sales that generated income for the troop. I always volunteered for the book stall as this let me have first pick of whatever had been donated and at a preferential rate. It was there that I discovered the old Eagle Annuals which contained complete stories for all the favourites, PC 49, Harris Tweed – Extra Special Detective (A pompous buffoon entirely reliant on his young assistant -I was type cast as him in the school play), Riders of the Range and Luck of the Legion but far and away the best was Dan Dare – Pilot of the Future. Dan was always in full colour on the front page and every frame was beautifully drawn and full of such splendid detail. The future was bright and stylish, the world was at peace with itself and in Colonel Dare and his plucky companions it had the answer to any uppity aliens with evil intent. Even as a child I found the moral rectitude of the Colonel quite hard to take. He never swore or acted badly, and he hardly ever used his ray pistol to lethal effect even on that most deserving villain, the wonderfully resilient and utterly remorseless Mekon, usually addressed as "The Mighty Mekon". There was a good reason for this, Dan Dare had been devised by a vicar specifically to be an exemplar of Christian behaviour to the children of Great Britain. At one stage he was actually going to have been a spacefaring chaplain but fortunately he became a pilot and was thus able to save humanity and a whole host of alien races too. Two fisted and pipe smoking, he was the epitome of British pluck and decency. He ought to have been insufferable but he wasn't, he was just a thoroughly good chap. No one objected to the high mindedness when the stories were so exciting and well drawn

It is the sheer quality of the strips that stands out, particularly with the first artist Frank Hampson, a perfectionist who sounds as though he was hell to work for. He was also the very best of his generation. The level of detail and consistency in continuity was achieved through a studio system using models, photographic references of people in costume and mock ups of the aliens and their space ships. It was Rolls Royce engineering applied to simple comic strip but the quality showed and helped the Eagle to achieve rapid pre-eminence in the market right after its launch. Hampson more or less burnt himself out (and several colleagues too) and left when the magazine was sold and the new owners were not prepared to make the expenditures necessary for such a superior product. He was succeeded by a very good graphic artist but the richness of the original strips was never quite achieved. Even within Dan Dare there are degrees of nostalgia.

The strip still has an active fan base and reprints of the classic stories sell well. The rare original designs that come up at auction command impressive prices and memorabilia also trades at high rates. There is persistent talk of a movie but I wonder if the highest skills in computer generated graphics could ever really recapture the pristine 2D worlds of Frank Hampson. Better perhaps to concentrate on eradicating poverty and getting that UN World Government set up!

An Aerial Last Huzzah



Empire of the Clouds
James Hamilton - Paterson
Faber & Faber
Hardback
Price £20.00

This is the story of the last fleeting golden age of British aviation from the end of the Second World War until the early sixties. It saw Britain's aircraft industry decline from a position – if not of world eminence- then certainly that of a major player to the current situation where complete aircraft are no longer built in the UK, only engines and sub-assemblies. It is a story which is well known and much lamented by those familiar with economic and aviation history but the author does not merely re-visit such well know disasters as the Comet 1 (quite literally), the Bristol Brabazon, Fairey Rotodyne and TSR2, which were commercial failures. The brilliant design concepts that never made it into production or failed to live up to their full commercial potential.

Hamilton-Paterson is best known as a novelist and he brings a writerly sensibility to how it felt to attend the air shows of the early post war period focussing on the SBAC (Society of British Aircraft Constructors) shows at Radlett and later Farnborough which showcased British products and where daring test pilots diced with death. The opening chapter deals memorably with the Farnborough of 1952 when a twin boom, twin jet DH 110 Vixen prototype flown by John Derry disintegrated during a display killing both him and his observer and 27 people in the crowd when an engine ploughed into the assembled spectators. He captures brilliantly the romance and hopes of the New Elizabethan era when it seemed as if a second British Empire of technology, commerce and arts might replace the old one which we were losing.

This was just after the war and the companies and the test pilots accepted appalling risks and losses in the same spirit as they had in combat during the war. The attitude infected the whole industry to some extent. One British flag carrier British South American Airways had such a bad record for fatal accidents that its unofficial company slogan was said to be not "We get you there and home again" but "We will inform your Next of Kin". The MD when pressed about the losses said they were trivial when compared with those he was used to in Bomber Command! Personal bravery was the hall mark of most test pilots and they needed it, their job was scarcely less dangerous than it had been in war time but there was a desperate attitude of over complacency and a spirit of "we beat the Luftwaffe, we can beat the competition.

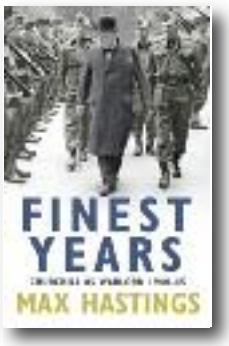
In 1945 the UK did have the only operational jet fighter amongst the Allied Powers in the Gloster Meteor, a rather sturdy looking twin jet which was eventually developed into a useful aeroplane which had a great international sales success and held many world records. It was a lead that was not to last. The USA's first efforts at jet propulsion were not particularly useful but in the swept wing North American Sabre they produced a second generation jet that pretty much left the Brits standing. In Korea it could cope with its swept wing rival the Mig 15. The straight winged Meteors and Vampires of the RAF were completely outclassed and the FAA was valiantly trying to do its bit with the propeller driven Sea Fury, a wonderful aircraft in many ways but by then a technological dead end. The fact that they actually did shoot down one Mig 15 is a wonderful testament to British Pluck but no way to win an air war.

In fact a bit less pluck and rather more application not to mention a clear and consistent strat-

egy shared by government, industry and British Overseas Aircraft Corporation (BOAC) the national flag carrier, might have led to a different result. Already severely handicapped by restrictions imposed by the Americans under the terms of the war time lend-lease agreements the civil aviation industry was always going to struggle. It was incapable of the sheer production volume that the USA could achieve and lacked the coordination of its rivals. It was fragmented and reliant on ever changing requirements from the Ministries of Defence and Supply not to mention in BOAC a company which seemed to hate its own aircraft industry. It was not short of brilliant designers and engineers but it just could not get a really good product to the market in full working order on time. The RAF had to get Sabres as a stop gap until the Hawker Hunter was fully developed as the new jet fighter and struggled along with frankly sub standard types like the Supermarine Swift and Gloster Javelin, both of which looked fabulous but hardly worked properly until just before they were retired from service. Ever the poor relation the FAA had to make do with the mirth inducing Supermarine Attacker. BOAC wanted Boeings and you begin to see why. The Comet was a world beater, it just kept breaking up in mid air. A 707 had a greater payload and range and it worked.

The story is inevitably a sad one. The tragedy of the lives lost and the waste of commercial opportunities cannot be seen as anything else but the author is very good at evoking what might have been and was at its best glorious. There were the three V Bombers, the successful prop liners, the eventual success of the Comet 4, and the world speed and altitude records.

Leadership in Action



Finest Years: Churchill as Warlord
Max Hastings
Faber & Faber
Hardback
Price £20.00

Max Hastings has written a splendid tribute to the man who led the Empire through the darkest hours of the Second World War. In many ways it forms a trilogy with his two equally weighty books on the end of the war in the west ("Armageddon") and the east ("Nemesis"). All three have an almost superhuman grasp of telling details and incident combined with the ability to depict great matters on the broadest of canvases. It cannot have hindered him in that he clearly loves his subject very much.

Churchill was the very embodiment of the saying "cometh the hour, cometh the man". Not in truth a very successful politician or in any sense a party man his career seemed largely to have ended by the thirties. He had occupied great offices of state, changed parties, been involved with the disaster of the Dardanelles and briefly commanded a battalion on the western front following that episode. He was larger than life and it is hardly surprising that many people in politics detested him, either as a turncoat or only interested in himself.

What Churchill (*right*) did have however was an immense energy and enthusiasm which quite belied his years. He bought to the war leadership a relish and an enthusiasm which no one else could match amongst the British political establishment, indeed there were very few fighting men who could either. In a way Churchill retained the same relish for adventure and martial glory that he had shown as a young cavalry subaltern and as war correspondent on the North West Frontier, at Omdurman and during the second Boer War. Alone of his fellow politicians he actually enjoyed making history no matter how desperate the situation.

Hastings is acutely aware that Britain was not the dominant partner amongst the allied powers once Russia and then the USA finally entered the fray and understands the shifting relationships between Stalin, Roosevelt and Churchill. He sees Stalin as the monster he was and Roosevelt as an essentially chilly and unsympathetic character interested only in pursuing American national interests. Churchill knew full well that Britain could never win the war alone and assiduously courted the Americans from the outset. It was a long and troubled relationship however "special" it might strive to be. The Americans wanted cash on the nail for any aid and felt entirely free to criticise the Brits for their lack of martial success. In this area Hastings returns to a theme which informs his other books about the war. In many ways the British Army's performance was inferior to that of the Americans. Lack of material and war weariness can account for a good deal, particularly by the stage that the Americans entered the fight in the west, but man for man the Brits were just not as aggressive as the Yanks. Hastings gives credit to the RAF and rates the Royal Navy's performance very highly (apart from its carrier operations) but there is no disguising that when it came to real fighting and dying it was largely done by the Russians. Churchill was usually dissatisfied with his commanders, sometimes unreasonably so and interfered terribly but he did care. Hardly anyone had his fighting spirit and some of the ones, who had, like Wingate, were too barking mad to be useful in war but for real stalwarts like Brooke, Slim, Cunningham, Tedder and Portal it was galling to be constantly asked for more activity. Of course Churchill remained wedded to side shows throughout the war which led to such fiascos as the Aegean campaign and annoyed his allies as well as his generals. Fortunately Churchill really did believe himself to be the servant of his country and not its Fuhrer so he was not allowed to impose his crackpot ideas very often and his caution about when to open a second front in France helped to insure that sufficient men and material were assembled to ensure success when it did take place in June 1944.

What stands out is Churchill's resilience and single mindedness. He knew what Roosevelt and Stalin were really like and also that the British Empire was in a very weak position. It never stopped him from doing what he had to do to let Britain survive. He might have to curry favour and accept slights but that mattered nothing so long as Nazism was defeated. Churchill was never without enemies at home even during his most embattled or triumphant moments but people generally realised that here was the man for the job. Churchill's clear sightedness about the need for victory was matched by an equal refusal to devote any time to considering what needed to be done domestically after victory was achieved. He wanted to preserve the Empire and fend off Soviet ambitions in Europe but was disinterested in what to make of an exhausted and bankrupt – though victorious – country. The populace at large knew that too and he was swept from power in the General Election three weeks before VJ Day. Stalin was astonished. How could they arrange these things so badly under capitalism?

Finally Churchill was a wonderful personality, patrician and dismissive of even the white dominions let alone the natives of the empire that meant so much to him; he was capable of pity even for the Germans when they were defeated. He was also unstoppably witty. With Churchill at the helm the ship of state might be sorely battered but she would stay afloat and she would never surrender.

Exhibitions:
Cézanne's Card Players

The Courtauld Gallery
Dr Peter Robinson

Cézanne's card players sit together, yet in the isolation of their own private worlds of concentration. Except that they never sat together. The effect of this series of iconic paintings was achieved by several studies of individual farm workers on Cézanne's family estate in Aix-en-Provence which were then tried out in various group combinations.

This mini-exhibition, Cézanne's Card Players, which was at The Courtauld Gallery in London till January, combined multiples versions of The Card Players paintings. Preparatory oil sketches, watercolours and drawings show that these works, which create a sense of realism and spontaneity, are actually a product of a highly worked process of underdrawings and revisions.

But why does the artist, in whatever medium, often become obsessed with a particular subject; engaging in studies over several years incorporating different perspectives, combinations and techniques? What is the relationship between this subject and the psyche of the artist? What is being worked out in these repetitions?

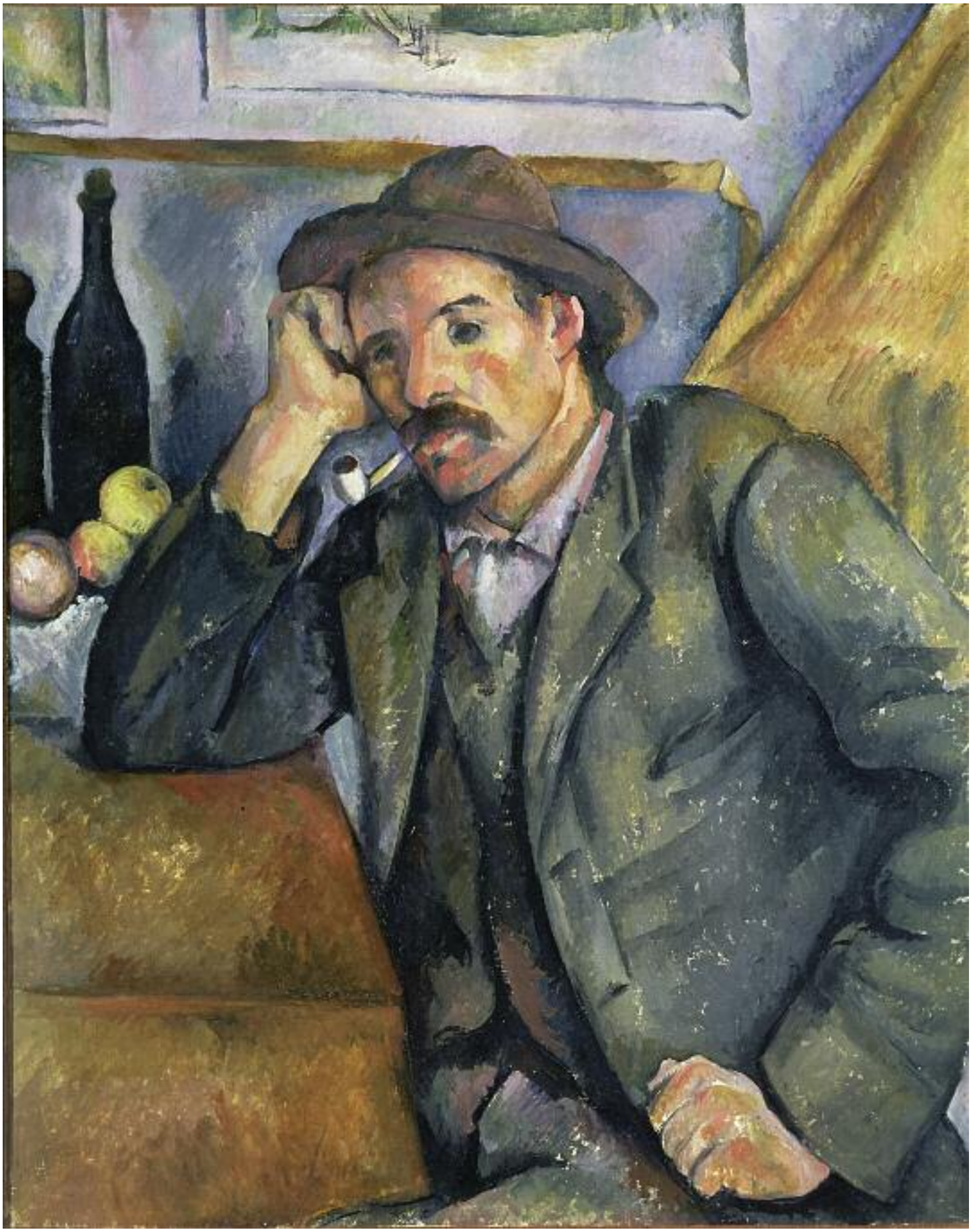
Van Gogh painted multiple versions of radiant sunflowers, Cézanne found inspiration in a sombre group of card players. A rich man, yet in these workers playing cards he found an essence, a gravitas, absorption and dignity. "I love above all else the appearance of people who have grown old without breaking with old customs" he said.

A friend of the novelist Emile Zola, in these studies Cézanne shares a naturalist approach in depicting the harsh yet dignified, stoic lives of working people. The apparent realism is filtered through a style seemingly as coarse and weathered as his subjects.

These paintings and studies were reunited from international galleries to complement The Courtauld's collection and reveal the gestation and experiment that can go into what may appear to be a spontaneous work of art. Every picture in this exhibition tells this story vividly, helping to show the creative process.

The Card Players, c. 1890-92; oil on canvas, Musée d'Orsay, Paris

The Card Players, 1890-92; oil on canvas, Metropolitan Museum of Art, New York



The Smoker, c. 1891; oil on canvas, Hermitage Museum, St Petersburg

Life, Legend, Landscape: Victorian drawings and watercolours.

The Courtauld Gallery, London 17 February - 15 May 2011
Dr Peter Robinson

John Everett Millais (1829-1896), The Parting of Ulysses, c.1862
Watercolour and gouache on paper 118 x 103 mm

Hidden Treasures
What museums and galleries let us see is often but a fraction of their collection. Why don't the publically funded institutions rotate their collection more often so that those who contribute to their upkeep may see them, at least once in their lifetime? In the absence of this level of access perhaps an exhibition like this is the next best thing. Online access seems the fastest and most workable option to democratisation, but of course it can never be a substitute for the visceral experience of seeing the original work of art. The Courtauld Gallery, part of the University of London, has received a gift from the International Music and Arts Foundation to build on its more recent attempt to allow some of the contents of its vaults of over 7,000 drawings and watercolours a public viewing, some for the first time.

This is a miscellany of Victorian drawings and watercolours, the exhibition's catchall title *"Life, Legend, Landscape"* indicating its catholicity. The fine catalogue edited by Joanna Selbourne with many supporting pertinent articles(footnoted details of these students and other writers would have been appreciated) makes this work both an artistic and scholarly achievement by one of the top rated arts research institutions worldwide. It reveals a richness of lesser known works by well and lesser known artists across the long Victorian period in the more seldom seen mediums of drawing and watercolour. Tate Britain's exhibition *"Watercolour"* (until 21 August) also highlights the diverse uses of the medium.

Millais, a few years ago the subject of a spectacular exhibition at Tate Britain, is the centre of the Courtauld's promotion of this exhibition. While it may seem that we have seen the best of the Pre-Raphaelite Brotherhood in a series of detailed exhibitions in recent years, The Parting of Ulysses (c. 1862), a small watercolour (*pictured top left*) copied from a woodcut engraving, is an example of hidden PRB treasure. It's a roughly sketched, azure meeting of sea, land and night sky, combining watercolour and gouache, showing the mythical parting of Circe and Ulysses. It's a pairing painted by John William Waterhouse, recently exhibited at the Royal Academy's study of his work in terms of a modern Pre-Raphaelite, and not such a poignant romantic pairing as the Millais work suggests, which is more a case of art for art's, rather than mythic reality's, sake.

Frederick Walker (1840-1875), The Old Farm Garden, 1871
Watercolour and gouache over graphite on paper, 273 x 405 mm

A recent arrival at The Courtauld Gallery after being lost for many years, is Frederick Walker's The Old Farm Garden (1871) (*pictured left*). Not surprisingly, the art critic, John Ruskin admired this work, no doubt because of its truth to nature approach, investigated in another recent Tate Britain PRB exhibition, in the detail of the flowers and had Walker not died at just 35 years old he would surely have become better known. The placing of the figure in the extreme left of the picture, the painting

technique of the diaphanous dress and deft suggestion of pending movement of figure and cat is sensitive and innovative. As Millais noted the subjective perspective of the painter is critical in aesthetic appreciation. He wrote to Charles Collins, the painter and younger brother of the novelist, Wilkie Collins in 1855, "nature is too variable in itself to give more than a transient feeling of pleasure. Aspect, is the great secret. The *prospect* of the aspect" (Millais' italics). It is Walker's unusual composition of this scene with its gash of a path dividing human/animal and the vegetative which takes it beyond the confines of this, at first sight, conventional, traditional scene.

As its title suggests the exhibition includes life studies, landscapes, genre scenes and subjects from literature and legend. It features works by some of the major artists of the age, from Turner (*pictured*), William Etty and Edwin Landseer, to other Pre-Raphaelites such as Dante Gabriel Rossetti (*pictured*), and works of the fin de siècle from Whistler to Aubrey Beardsley. Entrance is £6 for adults, concessions £4-50. Free admission for under 18s, full-time UK students and unwaged. Free entrance on Mondays, 1000-1400 except public holidays.

Daniel Maclise (1806-1870)
Enid and Geraint: Illustration to Tennyson's 'Idylls of the King', c.1860
Pen and ink over graphite on paper, 200 x 250 mm
© The Samuel Courtauld Trust, The Courtauld Gallery, London

William Henry Hunt (1790-1864)
Chaffinch Nest and May Blossom, c.1845
Watercolour on paper, 241 x 375 mm
© The Samuel Courtauld Trust, The Courtauld Gallery, London

Dante Gabriel Rossetti (1828-1882),
Study for Venus Verticordia, c.1863-64
Graphite on paper, 508 x 369 mm
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J.M.W. Turner (1775-1851)
Brunnen, Lake Lucerne, c.1843-44
Watercolour and graphite on paper, 240 x 297 mm
© The Samuel Courtauld Trust, The Courtauld Gallery, London

The U.A.E. in the Global Satellite Training Dynamic

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In March 2010 at the Global VSAT[1] Forum (GVF) Middle East and North African regional satellite communications summit entitled The MENA Communications 'Knowledge Exchange': Development Dynamics in the Broadband Satellite & Hybrid Wireless Applications Market – held during the CABSAT/Satellite MENA 2010 exhibition in Dubai – a Middle East-based GVF representative presented on the topic of the 'Successful Deployment of Satellite Networking Technology in MENA: Leveraging off the Satellite Operator-Supported GVF Training Delivery & Certification Advantage'.

I had the distinct pleasure of acting as Chairman of this Summit and was very pleased to have such a distinguished individual as the Dubai/Beirut-based Mazen Nassar, CEO of MenaNets, on the programme to discuss the vital role that GVF – at the global level – and he – on the regional level – has played, and continues to play, in addressing the vital issue of satellite signal interference mitigation strategies.

I: The GVF

GVF is the international satellite industry's non-profit association. Founded in 1997, the Forum is the single and unified voice of the global satellite industry, bringing together organisations engaged in the delivery of advanced broadband and narrowband satellite services to consumers, and commercial and government enterprises worldwide.

Headquartered in London, GVF is an independent, non-partisan and non-profit organisation with 230+ members from more than 100 countries. Its broad-based membership represents every major world region and every sector of the satellite industry, including fixed and mobile satellite operators, satellite network operators, teleports, satellite earth station manufacturers, system integrators, value added and enhanced service providers, telecom carriers, consultants, law firms, and users.

Since its foundation, GVF has included amongst its portfolio of activities the development of a range of capacity-building programmes to serve the entire spectrum of communications stakeholders worldwide. Amongst these programmes GVF has, either directly or in collaboration with other

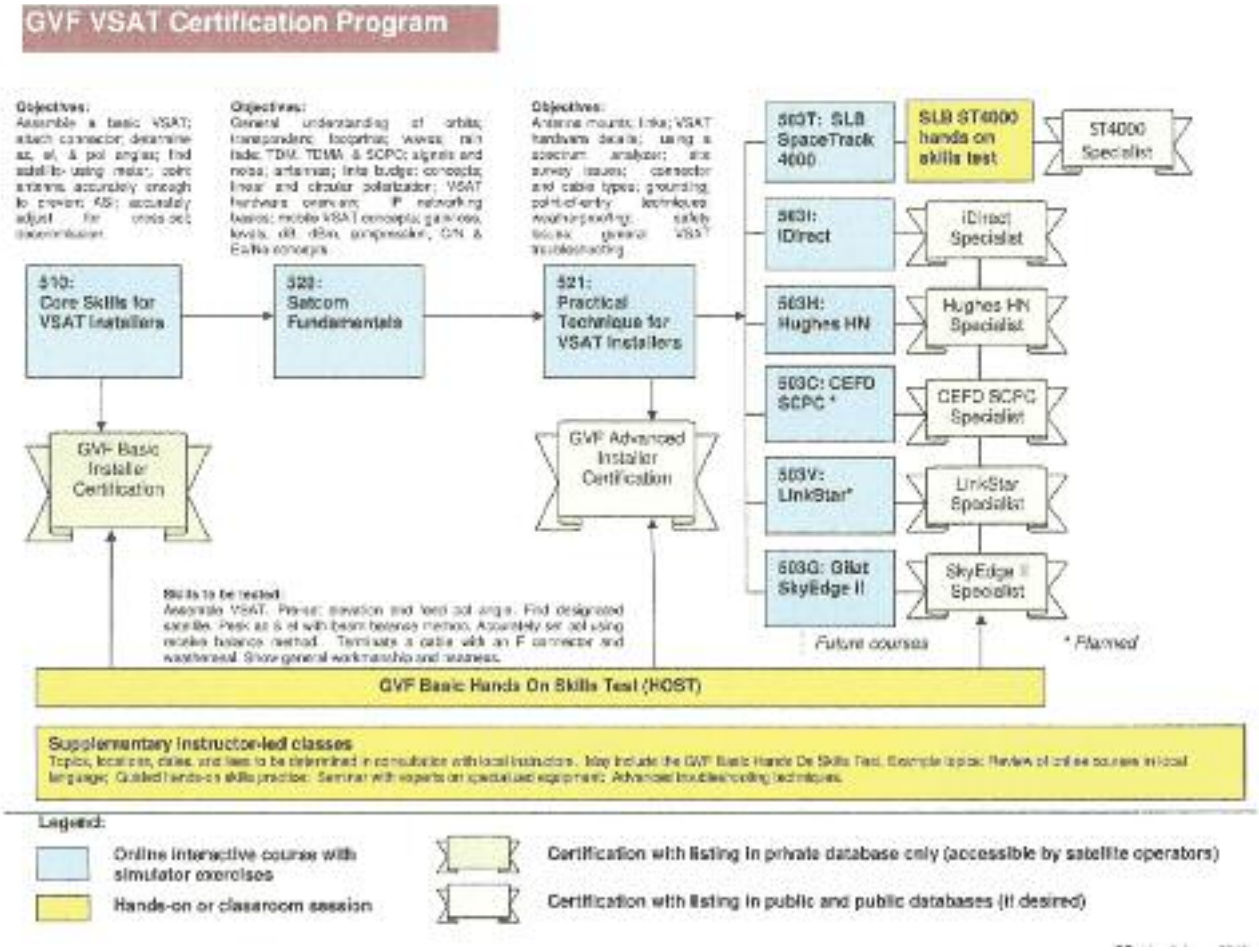

Figure 1: GVF VSAT Training Certification Programme – Overview of Course Structure. Detailed information is available at http://gvf.coursehost.com

entities, developed a range of offerings, each of which aims to facilitate the communications community's provision, use of, and/or regulation of, satellite-based communications solutions.

II: The GVF VSAT Installation & Maintenance Training Certification Programme

One such offering is GVF's running of the satellite industry's global VSAT Installation & Maintenance Training Certification Programme which won a 'Best Skills Developer Award' at the SatCom Africa Conference in Johannesburg in 2009, and has also been cited in the Society of Satellite Professionals International (SSPI) 'Industry Innovator' awards.

The GVF VSAT Installation & Maintenance Training Certification Programme is a series of highly interactive, 3-D animated, simulator-driven courses provided online, covering topics beginning with satellite basics, progressing to installation techniques to mitigate uplink interference, VSAT fundamentals, and practical VSAT installation techniques. The certification process includes a hands-on-skills-test (HOST) for Basic and Advanced certification, and there is also a series of manufacturer specific 'specialist' certifications for certain specific VSAT terminal equipment from particular manufacturers/vendors.

Regular updates on the continuing roll-out of GVF training resources are provided through the online publication, the GVF Training Newsletter, which is produced in partnership with its training partner-organisation, SatProf. A recent edition of the newsletter cited the endorsement of GVF installation and maintenance training by the Satellite Operators Interference Initiative, the membership of which organisation currently comprises 19 of the world's satellite operating companies.

III: The Satellite Operators Interference Initiative

The Satellite Operators Interference Initiative has the objective of controlling the serious problem of satellite uplink signals interference. In recent years, the satellite communications industry has experienced an escalation of signal interference, adversely affecting broadcast and telecommunication services, and the Initiative has launched a multiple front campaign to combat this trend.

One of these fronts is a carrier ID working forum to pursue industry implementation of carrier ID: a means to identify interfering signals. The second aspect is the formation of the Space Data Association to facilitate collecting and sharing interference event

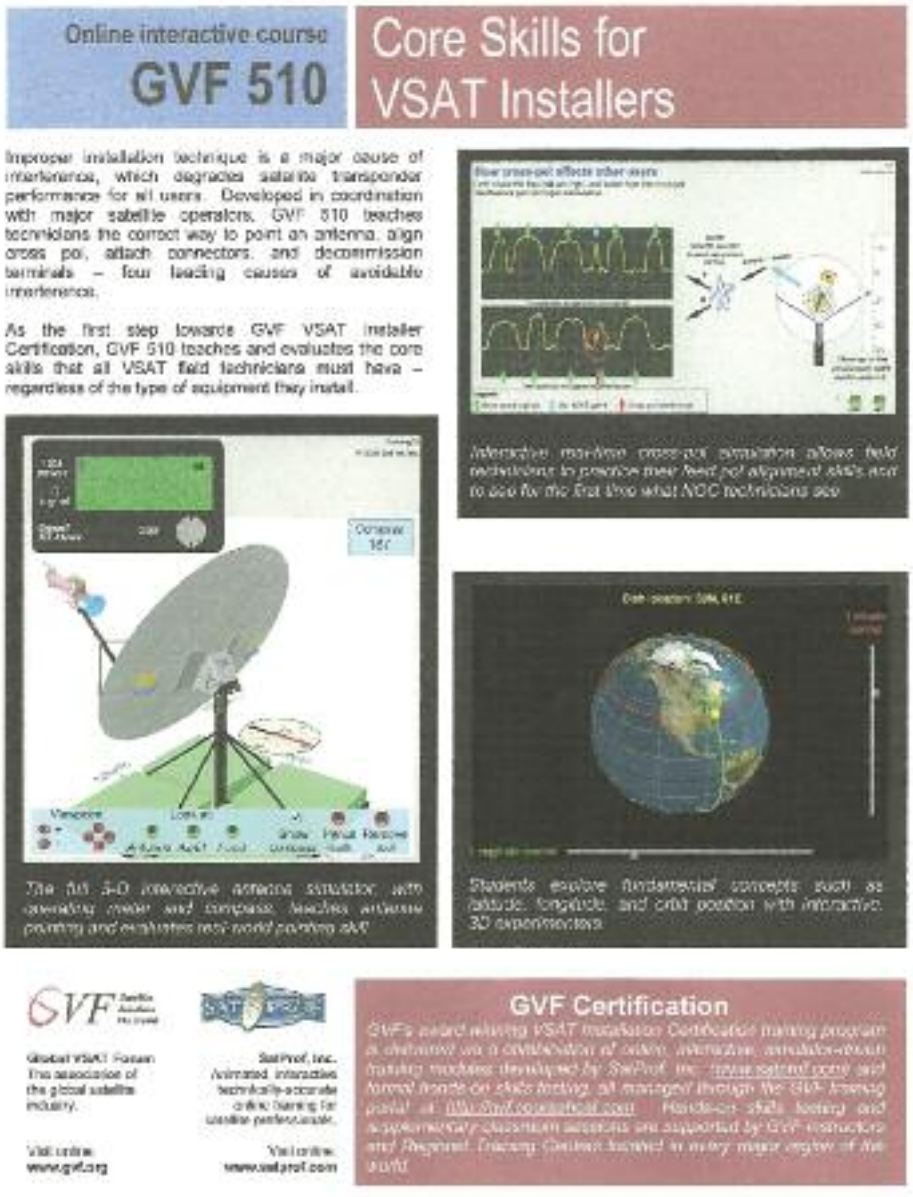

Figure 2: Front page of one of the GVF VSAT Training Certification Programme information brochures – GVF510 'Core Skills for VSAT Installers'

data amongst its satellite operator members. The third aspect is the GVF VSAT Installation & Maintenance Training Certification Programme.

Installation by inadequately trained technicians is one of the main causes of interference identified by the Satellite Operators Interference Initiative. GVF has responded by enhancing the established VSAT Installer Training Programme to focus even more strongly on the skills necessary to avoid accidental generation of adjacent-satellite, cross-pol, and re-radiation interference.

Whether it is mitigating uplink interference via the Basic Certification, providing solid knowledge and skills in VSAT installation, maintenance, and troubleshooting via the Advanced Certification, or gaining skills for installation, maintenance, and troubleshooting of specific equipment types via Specialist Certifications, the GVF Certification Programme provides training for the knowledge and skills needed to be successful in the VSAT industry.

Details of the courses available, and the processes and steps required to achieve GVF certification are fully detailed at the GVF/SatProf training portal at http://gvf.coursehost.com, but the three levels of certification can be quickly summarised as follows:

- GVF Basic VSAT Installation Certification. Basic skills that all VSAT installers must have to help prevent interference. Requires completion of online course GVF510 and the formal GVF Hands-On-Skills-Test.

- GVF Advanced VSAT Installation and Maintenance Certification. Knowledge and theory for all expert VSAT field technicians. Requires completion of online courses GVF510, GVF520, GVF521, and the formal GVF Hands-On-Skills-Test.

- GVF Speciality Certifications. Requires GVF Advanced Certification plus completion of one of the online specialty courses, such as iDirect (course GVF503i), or Hughes (course GVF503H).

Much more information is centrally located within the training portal, including details of the Andrew Werth Scholarship Programme for trainees from developing countries – defined as those nations classified as Least Developed Countries by the UN (http://www.un.org/ohrlls/), or as those classified by the World Bank (http://web.worldbank.org/) with economies in the low income, low-middle income, IDA, or HIPC groups – as well as details on how to become a GVF Certified Examiner.

IV: GVF Training in the United Arab Emirates

Mazen Nassar is Chief Executive Officer of MenaNets with offices in Beirut, Lebanon, as well as in Dubai. He serves as the GVF's Master Installation Trainer for the MENA region, and MenaNets operates pan-regional training delivery on behalf of GVF throughout the region and beyond, sometimes with the additional assistance of other GVF personnel and training instructors.

MenaNets is a system integrator providing installation and networking services over satellite, and is also the authorised distributor/reseller for a range of VSAT satellite equipment manufacturers, including ASC Signal, Skyware Global, iDirect, Anacom Inc., Paradise Communications, and others, covering hardware products including modems, dishes (1.2 metres to 2.4 metres), feeds, LNBs, BUCs, filters, connectors, adaptors, and tools, etc.

GVF training in Dubai has grown over the years to include a small training facility within the city for small groups, and another training site suitable for up to 40 trainees which is located at the MenaNets warehouse in the Jebel Ali free zone. Together these facilities afford generous capacity to hold training sessions at various times throughout the year, including immediately after two of the most important telecommunications-related exhibitions in the Dubai events calendar – CABSAT/Satellite MENA and GITEX. Tens of thousands attend these exhibitions, and GVF/MenaNets provides opportunities for trainees to take advantage of spending one or two extra days in the city to complete the hands-on-skills-test (HOST) element of their training.

Figure 3: Scenes from GVF installer training at the MenaNets facility in Dubai

Other training sessions are also scheduled throughout the year to provide more flexibility for those who are not able to attend during the exhibitions, and other sessions are scheduled to meet the demand or the timing-requirements of trainees even if there are only relatively few registrants.

The Dubai facility has grown to host many trainees from various satellite communications companies, and from the non-government organisation (NGO) sector, across a region spanning from Afghanistan to Morocco and from Iraq to all over the African continent. In addition to the open sessions described above, private dedicated training HOST sessions have been designed for organisations like the World Food Programme in Dubai, Orascom Telecom in Algeria, Alkan in Egypt, NigComSat in Nigeria, etc. These organisations had a training requirement for multiple trainees and the HOST session was in each case designed to meet their needs in their respective countries/locations.

V: Installation & Maintenance Training Delivery

As shown in the illustration at Figure 1, in order to progress through to their GVF Certification, all students must successfully complete the hands-on-skills-test (HOST). The HOST comes at the end of the trainee's period of study of the series of interactive, 3-D animated, simulator-driven exercises that are provided online through the aforementioned GVF/SatProf training portal at http://gvf.coursehost.com. The period of time which each student devotes to their study period is essentially under their own control, though there is a guideline study period-duration indicated for each course (see Figure 2) within the training programme.

Typically at the MenaNets facilities, each session is kept to a maximum of 15 to 20 trainees and is approached with a flexibility that allows for one or more days training (see Figure 3). This allows the trainees to benefit from their training according to their own needs. The training appeals to individuals with a range of roles within their own organisations. Trainee installers get to see and use the different types of satellite communications hardware; and, managers attend to focus on what the hardware looks like, how it is packed, how long it takes to install, and what planning is needed to successfully undertake equipment installation projects. Additionally, company financial personnel sometimes participate to understand the need for customer acceptance test and signatures, safety procedures, documentation needs, spectrum analyzer features and cost, hardware differences and how to avoid equipment shipment errors and other unnecessary, and costly, mistakes.

GVF, in partnership with MenaNets, works successfully to achieve the objective of providing the VSAT industry with a simple, reliable, comprehensive, achievable, and accessible training certification that leads to improved quality of service delivery, improved savings, safe professional practices, and, not least, more reliable satellite communications.

Notes:

1. VSAT is the acronym for very small aperture terminal

MA
strategic management

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The course is designed to develop a comprehensive knowledge of strategic management, and the ability to critique and analyse information vital to making strategic decisions. Taught theories and concepts are shared by leading professionals, directors and professors.

Candidates for entry will normally have a first degree in business, management, accounting, or finance, or an equivalent professional qualification and experience. The course aims to teach the skills and knowledge required to develop strategic choice capabilities in today's competitive business envronment.

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A Study of the Underlying Technologies and Design Principles of Mobile Commerce

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Abstract
Mobile commerce, also known as m-commerce, is very similar to electronic commerce or e-commerce in many respects. However, in many other respects the two are quite different. M-commerce includes a number of underlying technologies and concepts like communication technology, web technology and growth in mobile communication in terms of connection speed and the device capabilities. In this article we will present an overview of these technologies and concepts that over time made m-commerce possible.

Key Words: M-commerce, Mobile Communication, Communication Protocols, Design Strategy

Introduction
It is very difficult to estimate the speed at which technology is progressing, but, however fast or slow the progress, the growth of technology is gradual except at the times when some radical invention or discovery is made. M-commerce does not fall in the category of a radical invention and therefore its progress can be traced phase by phase. Google's Ngram viewer locates 1980 as the time which marked a sharp growth in the phrase "mobile phones". We will choose 1980 as our anchor year to explore the development of m-commerce. M-commerce is defined by Nigel and Phillips as the interconnection of portable computing technologies and the wireless telecommunications networking environments necessary to provide location independent connectivity within the business information system domain (Nigel, Elliot, 2004). At this point a minimum of one more definition is required to clear the concept of term 'mobile' in m-commerce. Although m-commerce is the commerce carried out in a wireless environment, but it should not be confused with e-commerce conducted in wireless mode. The term mobile has a distinct connotation which is supported by altogether different technology than what is used in wireless communication. Müller-Veerse described m-commerce as "any transaction with a monetary value that is conducted via a mobile telecommunications network". The mode of communication is very important as it has direct consequences on 1) the communication protocols 2) changes in the web design and accessibility 3) the display of information 4) quality of multimedia 5) the availability of bandwidth 6) connection stability and 7) convenience; and indirect consequences on 1) Software support, 2) microprocessor capability 3) memory size 4) full use of operating systems and 5) power consumption. Mobile devices, including mobile phones, pagers, Family Radio Service and some satellite phones, are designed for the situations where the handset is expected to be in motion during use (Gow & Smith, 2006). M-commerce, as such, means to carry out financial transactions anytime anywhere using handsets working on mobile communication system based on cellular technology.

Fig 1. Google Ngram Viewer result for the phrase "Mobile Phones"

Cellular technology
Cellular networks are based on small radio coverage zones known as 'cells' allowing the system to use same frequency in non-adjacent cells in variety of cluster patterns. This design was a breakthrough which made communication mobile and pervasive. One of the most important technological challenges was to overcome the connection breaks while moving from one cell to another cell where the signal strength becomes weak and overlapping. The connectivity was maintained by a very important cellular network design called hand-off. The hand-off is the process that permits a mobile customer to move between radio cells without losing connection (Gow & Smith, 2006). That completed the fundamental design of the cellular networks. The user was now able to make or receive calls anywhere and anytime in full duplex mode. Commercial cellular phone networks took off in the 1980s. The same decade saw exponential growth of giant mobile pioneering companies like Nokia, Ericsson and Motorola. However, first generation 1G and second generation 2G networks operated with inadequate data transfer speed to access web links from the mobile phone. 2.5G systems based on either Cellular Digital Packet data (CDPD) or General packet radio service (GPRS) enhanced the data rate up to 28.8 kbps. Still less than broadband but this data transfer rate made it possible to access the web from mobile phones. 3G technologies like Universal Mobile Telecommunications System (UMTS), High Speed Packet Access (HSPA), Worldwide Interoperability for Microwave Access (WiMAX) and Long Term Evolution (LTE) are able to provide high speed mobile data service termed as mobile broadband. The quality of the mobile broadband is gauged by its coverage, capacity and the speed. According to the BBC there are more than 5 billion mobile connections in the world (July 2010), out of which 500 million users use 3G according to website GSM Arena.

Mobile devices
Several facts are responsible for the kind of popularity mobile phones enjoy today. One of the outstanding achievements is the evolution of the mobile devices in terms of miniaturization. Early mobile phones which could not be commercialized were as heavy as 16 kgs. The size of the phone restricted their portability and hence mobility. The Motorola Dyna-TAC 8000X , known as the 'brick' was the first handheld cellular phone. It weighed over 1 kilogram, had one colour

LED display and memory to store 30 telephone numbers. By the mid 1990s the mobile became as small as practically possible. The keypad and display limited any more reduction in size. At this point size was no longer the priority. Mobile phones with extended features came into the market. 1996, Nokia introduced the Communicator, a GSM mobile phone and handheld computer. It had a QWERTY keyboard and built in word processing and calendar programs (Farley, 2005). At the present time there are over 5000 handset types available (Cartman, Ting, 2009). Mobile devices have evolved into powerful convergent devices with better processor capability, sharper screen resolution, better colour display and better overall features (Cartman, Ting, 2009). Although Nokia 1100 and other basic models are still popular with first time buyers in third world countries and far flung areas of developing countries smart phones from Blackberry and iPhone are fast grabbing the market share in developed countries. In most of the third world and developing countries people still use GSM and therefore need for smart phones is less, however, in North America and Europe where mobile penetration is high with 3G or later technology, smart phones with in-built micro-browsers are in great demand. More powerful features are incorporated in the mobile devices. Screen resolution and graphic support is becoming comparable with that of laptops or desktops. Software support is very impressive as well in modern phones. Documents To Go enable the user to view, edit and create Microsoft Word, Excel and PowerPoint files. Adobe PDF files can also be viewed on Android-powered smart phone.

Communication Protocols and software support

The wired and wireless communication systems are governed by TCP/IP network architecture. TCP/IP architecture make end to end communication possible. The communicating machines (sender and receiver machines) are assumed to be either fixed or moving within a single network connection making it logically stationary with respect to network movements. Hypertext Transfer Protocol (HTTP) is application level protocol responsible to fetch web pages from the web servers. In contrast, in mobile communication WAP architecture is used. WAP stands for wireless application protocol. WAP is not a single protocol but a complete layered architecture. The layers are embedded in both server side technology and the client side technology so that the two parts can effectively communicate with one another in a wireless environment. Wap architecture sits on the underlying communication technologies like GSM, GPRS, CDMA, PDC, TDMA, etc. The five layers of the WAP make it possible to access data on the Internet. The WAP architecture was developed to overcome the disadvantages of the mobile phones seen as compared to desktop or laptop computers. In order to enhance the web experience on mobile phones the disadvantages like slower Internet speed, smaller display size, reduced capability to display rich multimedia, low quality connectivity, and cost of accessing the Internet are the key areas that WAP architecture takes care of. The protocol stack defined in WAP architecture works on the design that optimises the communication resources available to the mobile user. For example, website design is simpler with less multimedia features occupying less device memory and less bandwidth when downloaded. According to the white paper published by WAP forum, HTTP/TCP/IP use 17 packets to process a stock quote query which is 65% overhead whereas WSP/WTP/UDP use only 7 packets for the same job resulting in only 17% overhead(WAPForum, 2000). The WAP specification defines a microbrowser that is the ultimate thin client, able to fit in a

limited amount of memory in the handheld device. The use of proxy technology and compression in the network interface reduces the processing load at the handheld device so that an inexpensive CPU can be used in the handset. This further helps to reduce power consumption and extends battery life, meeting the needs of both handset manufacturers and wireless subscribers. (WAPForum, 2000).

Wireless markup language WML is used to develop the websites for mobile phones. WML uses a different design procedure in which web pages are designed as a deck of cards which can be downloaded with a single request on to the device and then can be navigated from the memory rather than making fresh requests. This makes the web navigation faster and saves bandwidth as well. xHTML,a code sub-set of XML, and WML are converging technologies for the web development. Web content developed using xHTML can be viewed both via web browsers on PCs or laptops and WAP enabled mobile devices. Among other technologies used to develop web content for mobile phones, Sun Microsystems' J2ME-java 2 Micro Edition-is very popular among the developers.

Mobile websites

Apart from other bottleneck problems like data transfer rate, memory size and microprocessor capability, one of the biggest challenges for the mobile medium (website or application) is small screen size. The design concepts for PC based medium and mobile based medium therefore differ. It is reported in the literature that designers stress the need of redesigning rather than miniaturizing the websites designed for PC and laptops. W3C has come up with the guidelines to be used in the design of mobile sites keeping in view the limitations of the mobile environment. Many recommendations are given for content control, clarity of the information and the navigation. Control on the use of images is essential for mobile sites. In PC-based websites a number of multimedia elements less relevant to the information presented on the web pages can be included, e.g. background images, button images, banners and flash elements. In mobile sites such elements can easily be avoided. Clarity of the navigation elements is also very important. Most of the page's content should be displayed on loading the page with contrasted navigation links. Structure of the page should remain consistent, except in the cases where the context of the given page changes. Good colour contrast is maintained and blue and purple font colours are used only for hyperlinks. A number of other strategies for mobile interactive design process are reported in literature. The aim of the design strategies is to improve the

user experience when accessing the web from mobile devices.

Conclusion

Mobile Commerce is still in its infancy, however, as it is not a completely a new concept its growth is envisaged to be huge in the coming years. The users are already familiar with the use of traditional web and online financial transactions. Mobile commerce is a result of gradual and continuous development of communication technology. This paper provided an integrated view of different technologies responsible for m-commerce to take place. The article paves the way for further research in different areas of m-commerce.

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Glossary

1G,2G,2.5G,3G	First, second, between second and third and third generations of mobile communication
CDMA	Code Division Multiple Access
CDPD	Cellular Digital Packet Data
CPU	Central Processing Unit
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communication
HSPA	High Speed Packet Access
HTTP	Hypertext Transfer Protocol
J2ME	Java 2 Micro Edition
LED	Light Emitting Diode
LTE	Long Term Evolution
PC	Personal Computer
PDC	Personal Digital Cellular
PDF	Portable Document Format
TCP/IP	Transmission Control Protocol/Internet Protocol
TDMA	Time Division Multiple Access
UDP	User Datagram Protocol
UMTS	Universal Mobile Telecommunications System
W3C	World Wide Web Consortium
WAP	Wireless Application Protocol
WiMAX	Worldwide Interoperability for Microwave Access
WML	Wireless Markup Language
WTP	Wireless Transmission Protocol
xHTML	eXtensible HyperText Markup Language

A study on transaction scheduling in a real-time distributed system

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Abstract:
The transaction in a real time database system has deadlines to process the workloads. Many transaction complexities are there in handling concurrency control and database recovery in distributed database systems. And complexity increase in real time applications by placing deadlines on the response time of the database system and transactions processing. Such a system needs to process Transactions before these deadlines expired. The performances depend on many factors such as traffic workloads, database system architecture, underlying processors, disks speeds, and variety of operating conditions. A series of simulation study have been performed to analyze the performance under different transaction scheduling condition such as different workloads, different environments, varying file selection time, and varying arrival rate. The scheduling of data accesses are done in order to meet their deadlines and to minimize the number of transactions that missed deadlines. A new approach "firm randomization" method is introduced to help to distribute workloads to all sites uniformly.

Keywords- Transaction scheduling, Real time system, deadlines, firm randomization, throughput.

I. INTRODUCTION

A real time distributed computing has heterogeneously networked computers to solve a single problem. If a transaction runs across two sites, it may commit at one site and may failure at another site, leading to an inconsistent transaction. Two-phase commit protocol is most widely used to solve these problems [Silberschatz02]. To ensure transaction atomicity, commit protocols are implemented in distributed database system. A uniform commitment is guarantee by a commit protocol in a distributed transaction execution to ensure that all the participating sites agree on a final outcome. Result may be either a commit or an abort condition.

In a real time database system the transaction processing system that is designed to handle workloads where transactions have complete deadlines. Many real time database applications in areas of communication system and military systems are distributed in nature. To ensure transaction atomicity, commit protocol are implemented in distributed database system. This paper shows report of study the performance implications of supporting transaction atomicity in a real time distributed database system with the help of simulation. Experimental performances of transaction scheduling under variety of workloads and different system configuration are evaluated through this simulation.

The section II describes the concept of a real time database system. In section III, detail simulation model and simulation parameters are given. The detail experiment results and analysis are given in section IV. The overall conclusions are discussed in section V.

II. REAL TIME DATABASE CONCEPT

Database researchers have proposed varieties of commit protocols like Two phase commit [Gray'78, Mohan et al.'86], Nested two phase commit [Gray'78], Presumed commit [Lampson and Lomet93] and Presume abort [Mohan et al.'86], Broadcast Two phase commit [Oszu and Valduriez'91], Three phase commit [Oszu and Valduriez'91, Kohler'81] etc. These require exchanges of multiple messages, in multiple phases, between the participating sites where the distributed transaction executed. Several log records are generated to make permanent changed to the data disk, demanding some more transaction execution time [Lampson and Lomet93, Nystrom and Nolin04, Ramamritham et al'04]. Proper scheduling of transactions and management of its execution time are important factors in designing such systems.

Transactions processing in any database systems can have real time constraints. The scheduling transactions with deadlines on a single processor memory resident database system have been developed and evaluated the scheduling through simulation [Robert et al'92]. A real time database system is a Transaction processing system that designed to handle workloads where transactions have complete deadlines. A centralized timed Two-phase Commit protocol has been designed where the fate of a transaction is guaranteed to be known to all the participants of the transaction by a deadline [Davidson et al'89]. In case of faults, it is not possible to provide such guarantee. Real actions such as Firing a weapon or dispensing cash may not be compensatable at all [Levy et al'91]. Proper scheduling of transactions and management of its execution time are the important factors in designing such systems. In such a database, the performance of the commit protocol is usually measured in terms of number of Transactions that complete before their deadlines. The transaction that miss their deadlines before the completion of processing are just killed or aborted and discarded from the system without being executed to completion [Jayant et al'92].

III. SIMULATION DETAILS

A.Simulation model

The study follows real time processing model [Jayant et al'92] and transaction processing addressing timeliness [Han'03]. Such model consists of a database that is distributed in a non-replicated manner, over all the available sites (say 8 sites in this study) connected by a network [Jayant et al'96,90,91]. In the actual model, each of sites has six components: (i) a source: generate transactions, (ii) a transaction man-

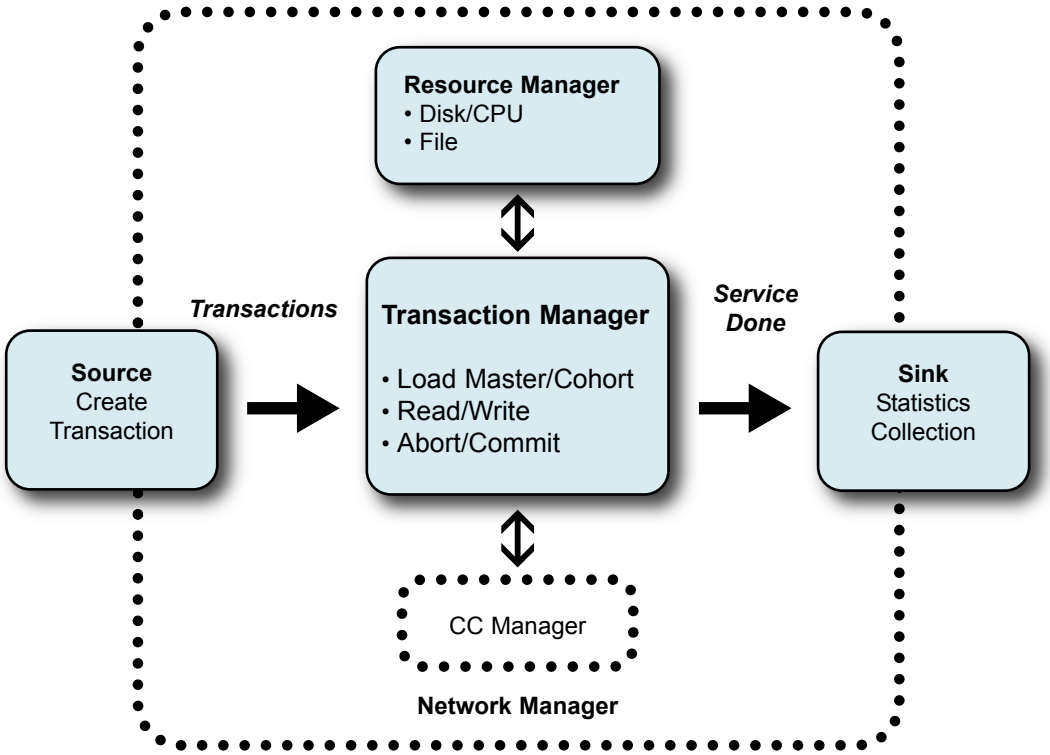

Figure 1. Real time distributed database model.

ager: models the execution behavior of the transaction, (iii) a concurrency control manager: implements the concurrency control algorithm, (iv) a resource manager: models the physical resources, (v) a recovery manager: implements the details commit protocol and (vi) a sink: collects statistics on the completed transactions. A network manager models the behavior of the communications network. The study is concentrated in managing the transaction scheduling under different workloads. In this study, the part of concurrency control is not fully implemented. The modified model is shown in Fig 1. The study has concentrated to minimized numbers of the percentage of miss transactions in order to optimize the atomicity problem in a distributed database system. The definition of the components of the model is given above.

(i) The source:
This component is responsible for generating the workloads for a site. The workloads are characterized in terms of files that they access and number of pages that they access and also update of a file.

(ii) The transaction manager:
The transaction manager is responsible for accepting transaction from the source and modeling their execution. This deals with the execution behavior of the transaction. Each transaction in the workload has a general structure consist of a master process and a number of cohorts. The master resides at the sites where the transaction was submitted. Each cohort makes a sequence of read and writes requests to files that are stored at its sites. A transaction has one cohort at each site where it needs to access data.

To choose the execution sites for a transaction's cohorts, the decision rule is: if a file is present at the originating site, use the copy there; otherwise, choose uniformly from among the sites that have remote copies of the files. The transaction manager also models the details of the commit and abort protocols.

(iii) The concurrency control manager:
It deals with the implementation of the concurrency control algorithms. In this study, this module is not fully implemented. The effect of this is dependent on algorithm that chooses during designing the system.

(iv) The resource manager:
The resource manager models the physical resources like CPU, Disk, and files etc for writing to or accessing data or messages from them.

(v) The sink:
The sink deals for collection of statistics on the completed transactions.

(vi)The Network Manager:
The network manager encapsulates the model of the communications network. It is assuming a local area network system, where the actual time on the wire for messages is negligible
.

B. Execution model and Simulation Parameters
The execution model is discussed below. A common model of a distributed transaction is that there is one process, called as Master, which is executed at the site where the transaction is submitted, and a set of processes, called Cohorts, which executes on behalf of the transaction at these various sites that are accessed by the transaction. In other words, each transaction has a master process that runs at its site of origination. The master process in turn sets up a collection of cohort's processes to perform the actual processing involved in running the transaction. When cohort finishes executing its portion of a query, it sends an execution complete message to the master. When the master received such a message from each cohort, it starts its execution process.

When a transaction is initiated, the set of files and data items that, it will access are chosen by the source. The master is then loaded at its originating site and initiates the first phase of the protocol by sending PREPARE (to commit) messages in parallel to all the cohorts. Each cohort that is ready to commit, first force-writes a prepared log record to its local stable storage and then sends a YES vote to the master.

At this stage, the cohort has entered a prepared state wherein it cannot unilaterally commit or abort the transaction but has to wait for final decision from the master. On other hand, each cohort that decides to

abort force-writes an abort log record and sends a NO vote to the master. Since a NO vote acts like a veto, cohort is permitted unilaterally abort the transaction without waiting for a response from the master.

After the master receives the votes from all the cohorts, it initiates the second phase of the protocol. If all the votes are YES, it moves to a committing state by force-writing a commit log record and sending COMMIT messages to all the cohorts. Each cohort after receiving a COMMIT message moves to the committing state, force-writes a commit log record, and sends an acknowledgement (ACK) message to the master. If the master receives even one NO vote, it moves to the aborting state by force writing an abort log record and sends ABORT messages to those cohorts that are in the prepared state. These cohorts, after receiving the ABORT message, move to aborting state, force-write an abort log record and send an ACK message to the master. Finally, the master, after receiving acknowledgement from all the prepared cohorts, writes an end log record and then forgets and made free the transaction. The statistics are collected in the Sink [Jayanta et al'90,92,96].

The database is modeled as a collection of DBsize pages that are uniformly distributed across all the NumSites sites. At each site, transactions arrive under Poisson stream with rate ArrivalRate, and each transaction has an associated firm deadline. The deadline is assigned using the formula DT=AT+SF*RT (1).

Here DT, AT, SF and RT are the deadline, arrival rate, Slack factor and resource time respectively, of transaction T. The Resource time is the total service time at the resources that the transaction requires for its execution. The Slack factor is a constant that provides control over the tightness or slackness of the transaction deadlines.

TABLE 1. *SIMULATION PARAMETERS*

Parameters	Description
NumSites or Selectfile	Number of sites in the Database
Dbsize	Number of pages in the Database
ArrivalRate	Transaction arrival rate/site
Slackfactor	Slack factor in Deadline formula
FileSelecton Time	Degree of Freedom (DistDegree)
WriteProb	Page update probability
PageCPU	CPU page processing time
PageDisk	Disk page access time
TerminalThink	Time between completion of one transaction & submission of another
Numwrite	Number of Write Transactions
NumberReadT	Number of Read Transactions

TABLE 2. *VALUES OF SIMULATION MODEL PARAMETERS*

Parameters	Set Values
NumSites	8
Dbsize	vary(max.2400)
ArrivalRate	6 to 8 job/sec
Slackfactor	4
FileSelecton Time	3
WriteProb	0.5
PageCPU	10ms
PageDisk	20ms
TerminalThink	0 to 0.5 sec

In this model, each of the transaction in the supplied workload has the structure of the single master and multiple cohorts as described above. The number of sites at which each transaction executes is specifying by the Fileselection time (DistDegree) parameter. At each of the execution sites, the number of pages accessed by the transaction's cohort varies uniformly between 0.5 and 1.5 times CohortSize. These pages are chosen randomly from among the database pages located at that site. A page that is read is updated with probability of WriteProb. Summary of the simulation parameter is given in table 1.

C. Parameter Settings

The values of the parameter set in the simulation are given in table II. The CPU time to process a page is 10 milliseconds while disk access times are 20 milliseconds.

In this simulation mainly concentrated in processing timing of commit protocol. It is sure that if it is reduced the number of miss transactions, it can also able to reduce the atomicity problem. If the transaction's action deadline expires either before completion of its local processing, or before the master has written the global decision log record, the transaction is killed and discarded.

IV. EXPERIMENTS AND RESULTS

The study for performance evaluation starts by first developing a base model. Further experiments were constructed around the base model experiments by varying a few parameters at a time. The experiment has been performed using different simulation language such as, in report [Jayanta et al'96] using C++Sim, and in report [Jayanta et al'92] using DeNet. For this study, GPSS World [Minutesmansoftware'01] is used as a simulator. Literatures are also collected from several recent studies [Xiong and Ramamritham'04, Datta and Son'02, Gustavsson and Andler'05,Ziong et al'05,Jan 06,Kang et al'07, Idoudi et al'08].

The performance metric of the experiments is MissPercent that is the percentage of input transaction that the system is unable to complete before their deadline. The

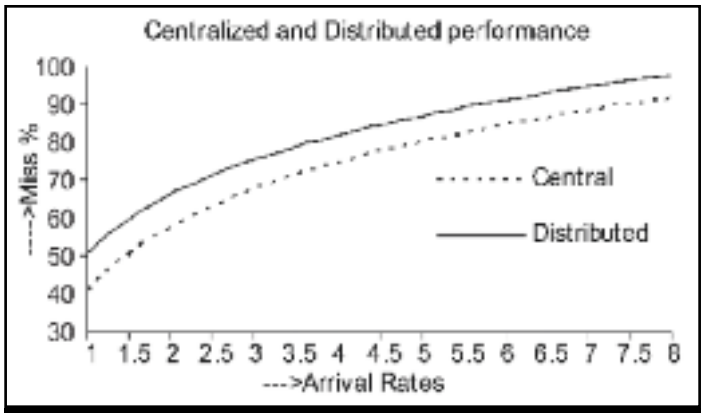

Figure 2. Comparison of Centralized and Distributed performances

MissPercent values in range of 0% to 20% are taken to represent system performance under "Normal" loads, while ranges of 21% to 100% represent system performance under "heavy" loads. The study analyzes the performance of the system under different workload with varying the arrival rate of the transaction and their deadlines. Also the study analyzed the performance using this new concept of firm randomization technique (given below). Only the statistically significant results are discussed. The comparison of the performance of the system under Centralized commit and Distributed commit processing also shown. The experimental results are discussed below.

This section discusses the statistical results of this simulation under different environments. The distributed systems have higher percentage of miss Transactions than centralized system. The higher miss percentage of transaction creates problem in managing atomicity of the transaction in such a system. This leads to design of a new distributed commit-processing protocol to have a real-time committing performance. The comparison of Centralize and distributed performances is shown in Fig 2.

4.2.Impact of file selection time to Individual sites

The simulation was performing by taking 8 distributed sites and by varying their file selection timing. The performance analyses of each of the sites under a normal workload are shown in Fig 3. The miss percentage of transaction is reduced in increasing the file selection timing.

4.3. Impact of arrival rates to Individual sites

In this set of experiments, the impact of increasing the arrival rates was observed on the performances of the each of sites under normal load and heavy load. Fig 4 presents the results obtained. Here s1, s2 etc are representing the 8 sites. Under both conditions, the miss percentage is reduced at the lower values of arrival rate of the transactions for each of the sites. In both the normal and heavy load the arrival rate play an important role to give a minimized miss percentage. The success ratios of the transaction are also increase by lowering the arrival rate.

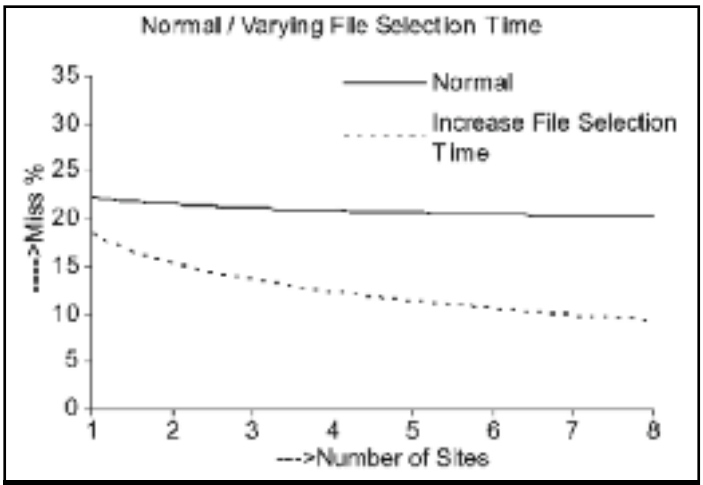

Figure 3. Effect of File Selection Time to Individual Sites

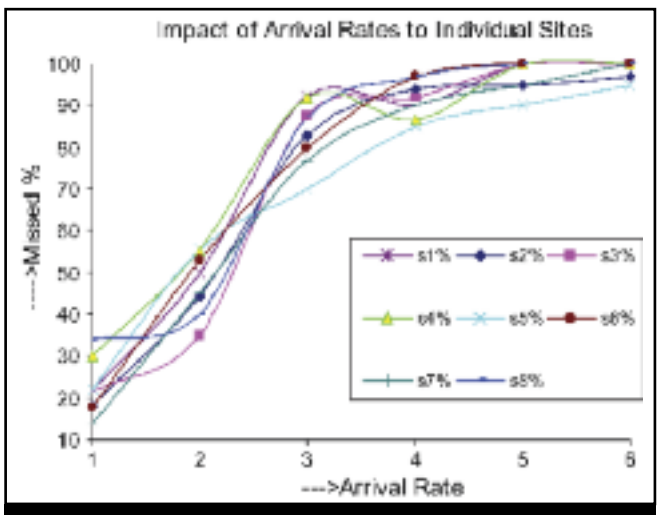

Figure 4. Impact of Arrival Rates to Individual Sites

4.4. Impact of arrival rate to Throughput

In this set of experiments, the impact of increasing the arrival rates was observed on the throughput of the system. Fig5 presents the results obtained. The throughput initially increases with increase in arrival rate. But it drops rapidly at very high loads. So the more studies are required to observe the correlation between missed % and the throughput to have an optimized performance.

4.5. Firm Randomization

General randomization rules may give a repetition value in a short iteration. A work is assigned to a site number, which is generated by the randomization rule among 8 sites. For example, the first work may be assigned to site number 5 and the second work may be assigned site number 2. The third work may be assigned to site number 5 again, if the randomization rules generate 5. This value 5 should not be generated again at least before completion last iteration. A sites or cohort need some time to complete a previous work and to process another new workload. Here introduced a new concept of randomization for distributing workload to sites so as to avoid assigning more worked load to a busy site. There are "n" numbers of sites in the system. It is made the firm randomization in such a way that, any randomized value should not be repeated twice, at least in between "1 to n" iteration; repetition is allowed after "n+1" iteration. This helps to distribute a heavy work uniformly to all cohorts. The new techniques also give better statistics as compared to the normal randomization rule

4.6. Comparison of Normal and new firm Randomization

In this set of experiments, the performance comparison under normal available randomization and new firm randomization process are observed. While distributing the works to different sites, the new firm randomization process helps in avoiding continuous assignments to some specific busy sites. It helps to distribute the works uniformly to all sites. Fig 6 shows that the performance of the system gets better under firm randomization technique by about 10 to 6%. So proper choice of the distribution or randomization are require designing a best-real time distributed processing system.

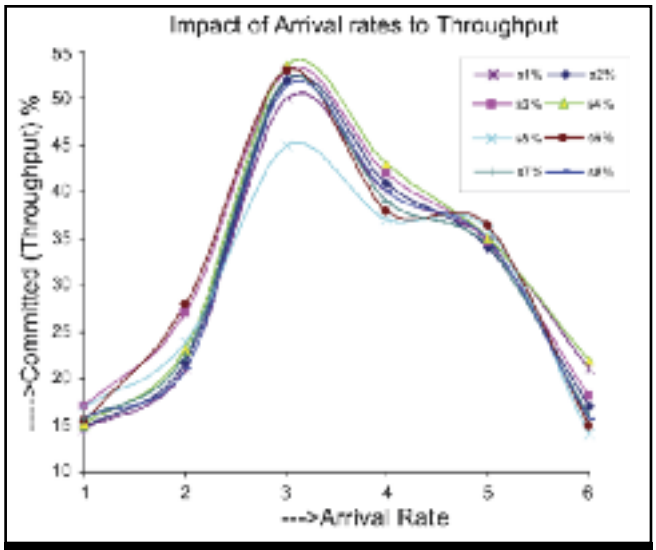

Figure 5. Impact of Arrival Rates to Throughput

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V. CONCLUSION

The real time distributed processing system has been simulating under different traffic load such as normal load and heavy load. In both conditions the arrival rate of transaction plays a major role in reducing number of miss percentage and improved performance. The analysis report of the individual sites also shows that a smaller value of the arrival rate is important to have a less percentage of miss transactions which will give better performance. It also demands the larger value of File selection timing to minimize the miss percentage to give better results.

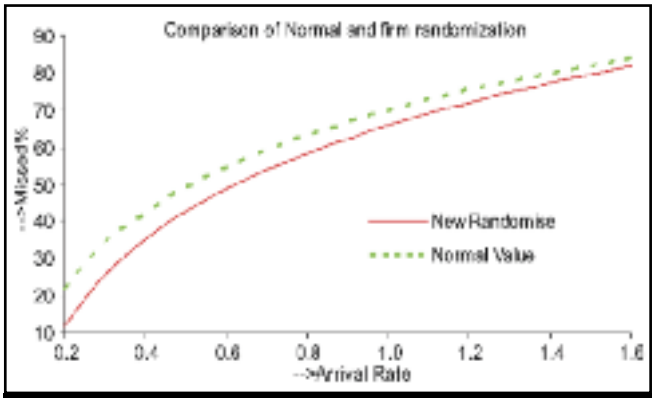

Fig 6. Comparison of Normal randomization and new firm randomization process

The throughput initially increases with increase in arrival rate. But it drops rapidly at very high work loads. So the more studies are required to observe the correlation between missed % and the throughput to have an optimized performance.

Time consumption on busy sites by repetitively assignment of new workload and reassigning that to other sites can be solved by proper distribution or randomization process. A new approach "firm randomization" method helps to distribute workloads to all sites uniformly so that percentage miss transactions are minimized. Once a workload is over assigned to a busy site, reassignment of works to some other free sites will take extra time. The new 'firm randomization' will prevent from taking extra time by directing to free sites in initial assignment.

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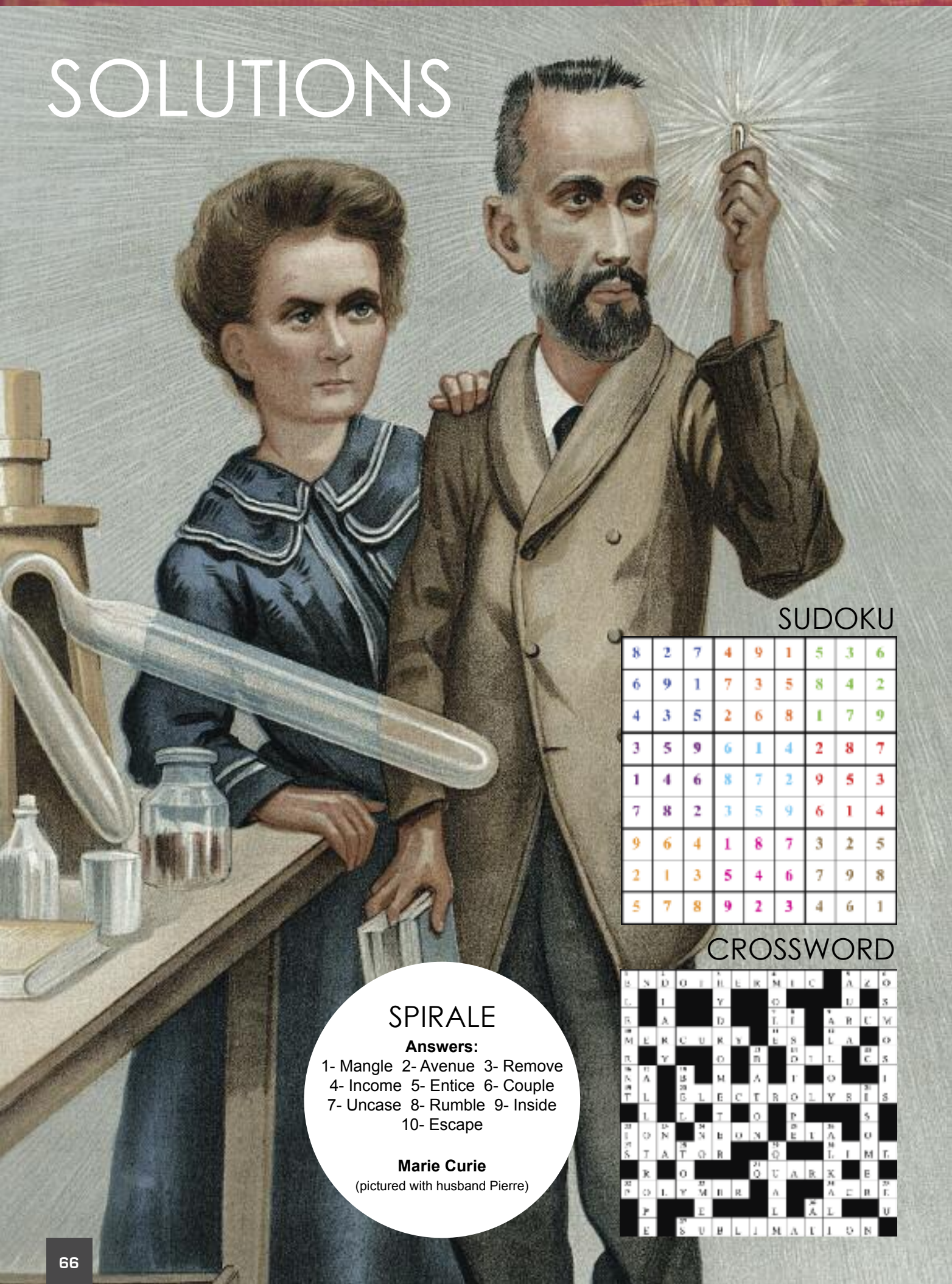
SOLUTIONS



SUDOKU

8	2	7	4	9	1	5	3	6
6	9	1	7	3	5	8	4	2
4	3	5	2	6	8	1	7	9
3	5	9	6	1	4	2	8	7
1	4	6	8	7	2	9	5	3
7	8	2	3	5	9	6	1	4
9	6	4	1	8	7	3	2	5
2	1	3	5	4	6	7	9	8
5	7	8	9	2	3	4	6	1

CROSSWORD

SPIRALE

Answers:

1- Mangle 2- Avenue 3- Remove
4- Income 5- Entice 6- Couple
7- Uncase 8- Rumble 9- Inside
10- Escape

Marie Curie
(pictured with husband Pierre)

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