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Technology, Media & Telecommunications

Eye to the future

How TMT advances could change the way we live in 2010

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Foreword

The technology, media and telecommunications (TMT) innovations that are able fundamentally to enhance our lives are also those most likely to become the most significant contributors to the overall size of the TMT sector. The Internet and mobile telephony are two strong, recent examples of this.

Accordingly, **Eye to the future: How TMT advances could change the way we live in 2010** has been written from the perspective of how TMT innovations could impact daily life: how we travel, work, communicate, are educated, and are entertained.

Providing a view on the future is possible but requires a wide spectrum of inputs. Consequently, the Deloitte Touche Tohmatsu (DTT) TMT group, made up of the TMT practices of DTT's member firms, has based this report on comprehensive research around the world, the principal elements of which include:

- interviews with DTT member firms' 5,000 TMT partners, directors and senior managers around the world;
- a global survey of past, present and future TMT usage;
- conversations with DTT member firms' TMT clients; and
- dialog with leading industry and financial experts.

Each set of predictions includes DTT TMT's bottom line – suggestions to companies in the sector on how best to exploit the opportunities and avoid the pitfalls of the next five years.

DTT TMT does not claim to be able to see the future, but trusts that this provides a useful guide to how the world might look, given TMT's potential evolution, in 2010.

On behalf of DTT, and the TMT practices of its member firms, may I take this opportunity to wish you all the best for the future.



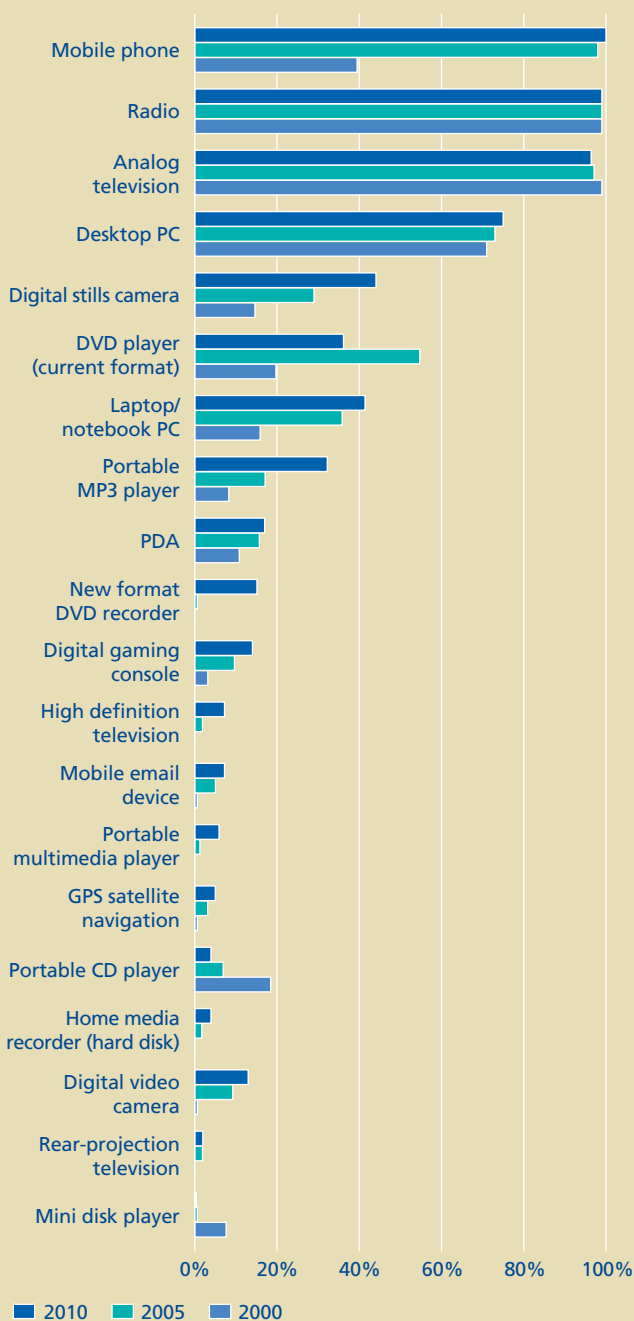
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Executive summary: A quiet revolution

A typical day in 2010 is unlikely to feel much different to today. We will probably not be teleporting breakfast or using quantum computers, nor will we be watching holographic TV or traveling to work in flying cars¹. A lucky few may likely be flying to the edge of space but for the rest of us, change will probably be more subtle, with TMT advances pervading ever more deeply into our daily lives.

Indeed the greater ubiquity of TMT – from the car to the classroom, the living room to the office and essentially everywhere in between is likely to be the most noticeable change. According to a DTT TMT survey undertaken for this report, people around the world will probably use a growing number of TMT products and services more often, in more locations, and for more purposes (see Figure 1).

Figure 1: The proliferation of technology in 2010



Source: Deloitte Touche Tohmatsu, March 2006.

Established technologies – from mobile phones to desktop computers – will still dominate, but they will increasingly be supplemented by a growing range of auxiliary devices. And with connectivity becoming ever more widespread, and content increasingly digital, it should be possible to access and consume services and content almost anywhere, whether we are stationary or mobile.

That growing ubiquity of TMT is also likely to blur boundaries in the **workplace** – both geographic and social. The virtual team, be this in the form of teleworkers or offshored staff, is likely to become much more common. Better technology and faster connectivity are the enablers that are expected to catalyze this trend. However, the division between work and private time will probably become yet more opaque, as the ability to connect and communicate becomes increasingly pervasive. By 2010, there may be few places to hide from either the phone call or email. At the same time, the growing range of web-based leisure applications may redress the balance for the worker, providing a growing opportunity for shopping and entertainment on company time.

One common, but negative consequence of the greater pervasiveness of technology is likely to be the deepening threat posed by viruses, worms and other malicious code. As our daily lives increasingly revolve around and rely on connectivity and computers, the potential for disruption will grow proportionately. With everything from classrooms to cars becoming connected, TMT companies should be ready to protect and patch an ever growing number of devices and systems.

There should be a steady growth in the number and diversity of technologies, devices, services and content. However, while consumer choice is generally positive, it may become apparent that too much choice can overwhelm some consumers. This is particularly the case with content. For example, though a small minority may find the ability to define their own schedule appealing, most consumers may prefer to default to what is offered from and scheduled by trusted broadcast brands, and may only occasionally use on-demand services.

The same is true for **communications**. Though options are likely to proliferate, consumers will probably settle on a preferred set of communications tools, which serves their particular needs best. Email will probably continue growing in popularity and usage, but voice will likely still be the dominant revenue-generating application in the communications world. Mobile voice is likely to dominate – taking a growing share of total voice volumes, while fixed networks suffer declining customer numbers, and Voice-over-Internet Protocol (VoIP) makes steady, but relatively modest, inroads (see Figure 2).

Broadband networks, both fixed and wireless, should continue to grow their footprint; but growth in coverage and customers may not be matched by revenue growth.

The trade off between price and performance may become increasingly important. Though companies will likely compete with each other on the basis of bandwidth, features and functions, some consumers may decide to ignore the best available technology as it far exceeds their needs.

By 2010, **education** will likely have undertaken rapid – and occasionally controversial – adoption of TMT innovations. Digital whiteboards and parental intranets are likely to have become commonplace by 2010.

However technology is still likely to support, rather than replace the teacher of 2010. No commercially feasible technology is likely to have become capable of emulating the varied skills of a good teacher by 2010. What technological advances may encourage, however, is cheating. Wireless technologies may facilitate communication between students taking exams; improvements in search engines might catalyze plagiarism. Furthermore, where podcasts, online notes and other electronic aids are provided to supplement classroom teaching, some students may choose to use these as a substitute for attendance.

Education may also be provided on emerging devices, particularly Digital Video Recorders (DVRs), in the home. The video game sector may broaden its appeal – and also its reputation among parents – by launching games with a specific educational intent.

Despite the growing range of alternative distractions, television will likely continue to dominate our **entertainment**, locking-in our attention by offering high definition content delivered to ever larger, flat-panel screens. On-demand television and video will likely grow in popularity, and will likely be selected and delivered using a variety of technologies and transports. Indeed for some, DVDs delivered by post may still be the preferred means of obtaining the widest selection of high definition movies in 2010.

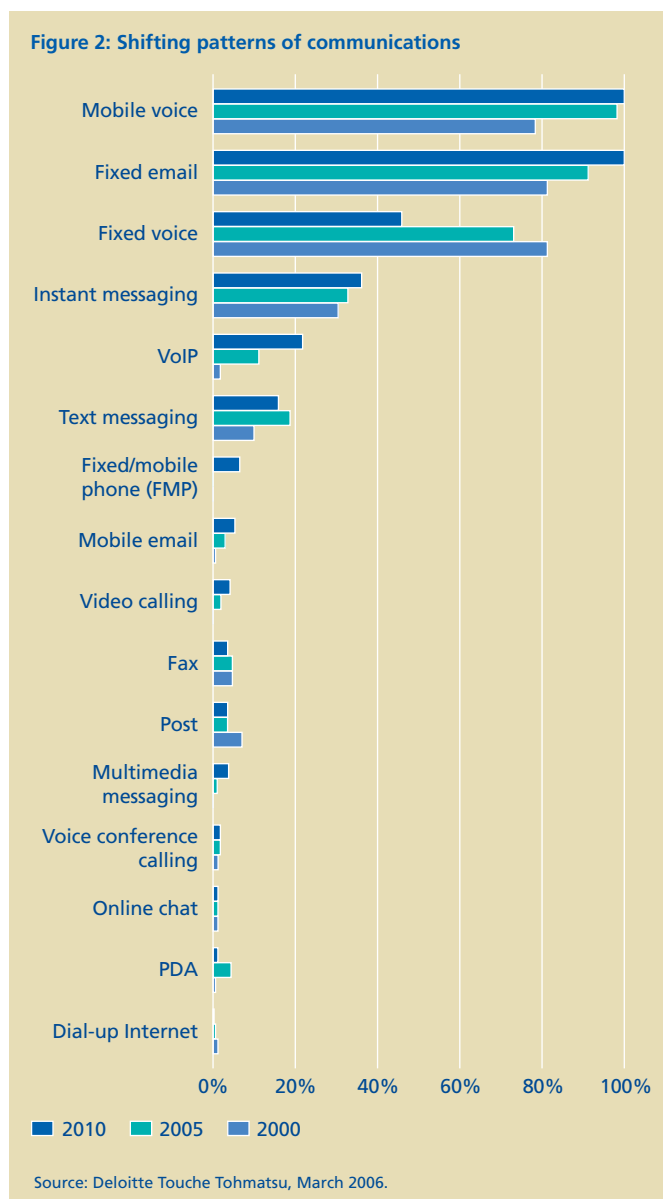
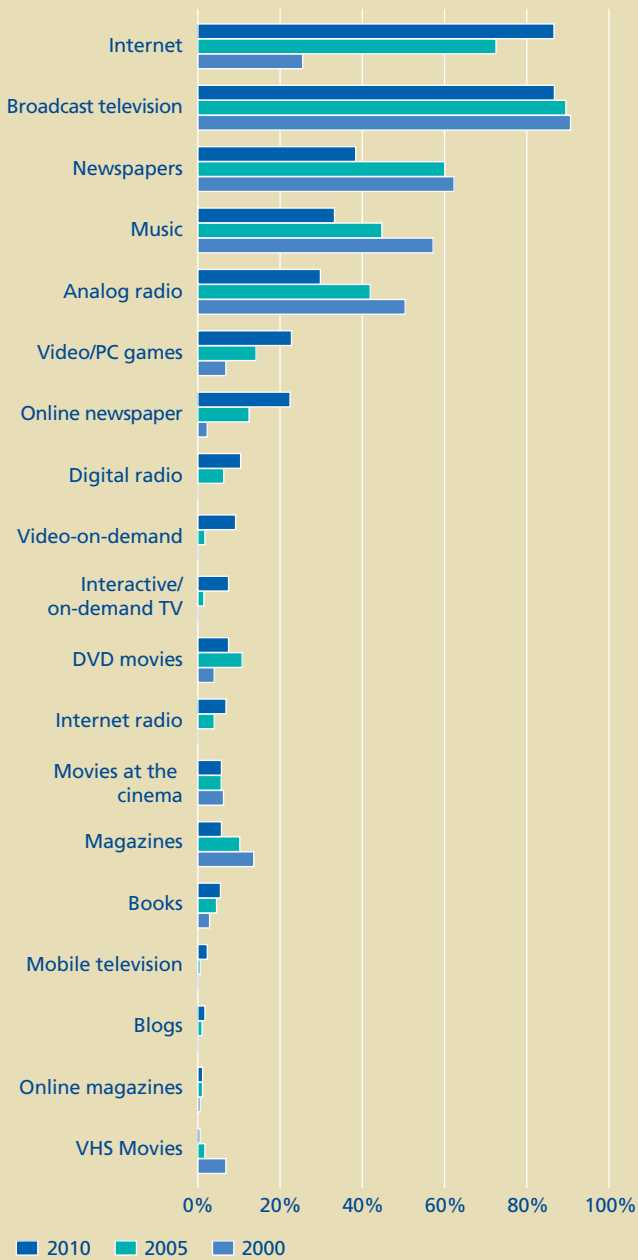


Figure 3: Entertainment for the 21st Century



Source: Deloitte Touche Tohmatsu, March 2006.

The Internet is likely to make strong gains in popularity, and in some markets may even displace television as the most popular form of entertainment. According to DTT TMT's survey, its power as a distribution medium for a huge and growing variety of content and services should be consolidated by 2010 (see Figure 3).

Another key focus for the TMT sector is likely to be safety, particularly within the context of **transport**. Robotic systems will increasingly support drivers, alerting them to hazards and even taking over steering and braking when circumstances require. Head up displays (HUDs) will present critical information on the windshield – allowing the drivers to keep their eyes on the road. Haptic systems will use drivers' sense of touch to issue warnings, and even wake up drowsy drivers. Drivers will increasingly use speech recognition to control satellite navigation systems and text to speech to listen to email messages.

Overall, therefore, the years to 2010 will likely witness a quiet revolution. New users, new uses and more frequent use of TMT innovations are likely to see the combined TMT sector grow in breadth and depth, creating value across a wider range of products, services, segments and geographic markets.

How TMT advances could change the way we travel in 2010

Overview

DTT TMT believes that the world of travel holds much potential for TMT companies through 2010. With connectivity becoming widespread and content increasingly digital, it is now possible to access and consume services and content almost anywhere – including while in transit. As a result, the car may start to resemble an entertainment hub in its own right, giving passengers the opportunity to play games, watch television and even access the Internet.

Increasingly, in-car technology will likely be used to promote driver safety and the car may well come to resemble a robot. Robotic systems will likely steadily expand the range of tasks delivered, from the mundane (controlling wipers) to the critical (keeping the vehicle within lane). Wherever HUDs are deployed, they will present critical information on the windshield – allowing the drivers to keep their eyes on the road. Haptic systems, – a set of technologies from the aerospace industry that add a sense of touch to the man-machine interface – will likely provide another means of warning drivers, in addition to visual displays. Advances in speech recognition will likely allow drivers to interact verbally with satellite navigation and other functionality.

However, the impact of TMT innovations and connectivity in vehicles may not all be positive. Hackers may well see the connected car as a prime target for malicious code.

Workers will probably increasingly be expected to be as productive while travelling as they are in the office, as the last few places of refuge from phone calls and emails disappear. 'I was on a plane' may no longer be a valid reason for not returning an email or taking a call.

Indeed the only refuge from work may be a spacecraft, which should have entered into scheduled service by 2010.

The robotization of the car

Many vehicles will likely incorporate a significant degree of automated control, with the driver's role becoming increasingly minor. By 2010, a car's on-board computer will likely be undertaking a growing array of functional tasks.

It is likely to assist the driver by undertaking such tasks as: giving directions, controlling headlamps and windshield wipers, muting audio systems when a phone call is received and guiding parking.

However it may also be undertaking more critical activities such as: regulating distance from the car in front, steering the car when it drifts out of lane and moderating speed when approaching an accident black spot.

But this may not necessarily mean that road travel will be safer. Safety innovations can give rise to a false sense of security, and may lead drivers to take greater risks². Furthermore, the growing number of warnings and alerts issued by these systems may well create additional driver distractions³.

Drivers get talkative

Systems such as on-board computers, in-car entertainment, mobile car-phones and satellite navigation systems may be increasingly speech-driven – and the computerized voice of the car will likely be much more realistic. Using speech instead of buttons, dials or touch-screens is likely to be seen as a major safety innovation – allowing drivers to keep their hands on the steering wheel and their eyes on the road. By 2010, more than 11 million automotive voice-recognition systems are forecast to be sold in the United States alone⁴.

Drivers may also be able to give more vague verbal instructions to their in-car systems. By 2010, saying 'find a gas station' may be enough to prompt the Global Positioning System (GPS) to give precise directions to the nearest source of fuel. And with useful personal locations stored in the memory of the device, the driver need only say 'take me home' or 'back to the office'.

Individuals lose their sense of direction

By 2010, our capacity to read maps and navigate streets may have been diminished by the growing use – and growing dependence on – satellite navigation systems. Integrated navigation computers and portable GPS devices will likely become far more widespread than today, with rapidly falling prices making satellite navigation a common feature even within mobile phones. By 2010, it is forecast that annual sales of integrated GPS equipment for cars will have risen to 12 million units (compared to just six million today)⁵. Handheld units are expected to sell in similar volume⁶, and with PDAs and even laptop computers more frequently incorporating GPS technology, there will be fewer and fewer reasons to get lost.

The passenger gets a living room on wheels

In many respects, by 2010 we are likely to expect cars to be an extension of the living room. Passengers (and to a lesser extent drivers) may enjoy a far wider range of in-car entertainment features. In the developed world, listening to the radio and playing CDs will no longer suffice – passengers may increasingly expect to be able to watch television and DVDs, select from thousands of MP3 tracks, play video games, connect to the Internet and even send messages to passengers in neighboring vehicles.

Though this new functionality will likely be integrated into many new vehicles, the majority of consumers may prefer their car to be able to connect to a broader range of existing portable devices, such as games consoles, media players and mobile phones. As a result, it is likely that Bluetooth may become the wireless standard of choice for intra-device networking within the car, since its bandwidth and range are ideal, its power requirements are minimal, the cost of chipsets is relatively low, and Bluetooth is already standard in hundreds of millions of mobile devices. As a result, the market for Bluetooth equipped vehicles is forecast to grow at a compound annual growth rate of 27 percent by 2010⁷.

Eye to the future

How TMT advances could change the way we live in 2010

Media on the move

Media companies may well start to produce content specifically for viewing in moving vehicles as they recognize people's growing desire for in-car entertainment. Games and video content are likely to be amongst the most popular, with new types of product developed to suit the dynamics of the car journey – relatively short, episodic games and video programs that do not require long periods of concentration or interaction.

The office extends into the car

By 2010, workers may select their car partly on the basis of the range of work tools provided. Desired features may include technology that can: read out incoming emails to the driver; allow the driver to dictate responses; permit the driver to set up meetings, update 'to-do' lists and write short memos. But safety concerns may dampen demand. Already studies have shown that the use of hands-free telephones is no safer than using a regular mobile while driving⁸, and concern is likely to grow about the safety of drivers that try and multitask.

Aerospace technology takes on automotive roles

Drivers' sense of touch may be used as an increasingly important means of communication. Haptics will likely become increasingly popular. Car makers may use haptic systems to warn of dangerous conditions or even wake up drowsy drivers, by vibrating the steering wheel or activating actuators in the driver's seat⁹.

For other drivers, the growing amount of information collected by in-car systems – on road conditions and weather, through to engine performance and emissions – is increasingly likely to be presented on HUDs. Another innovation from the aerospace arena, the HUD allows large amounts of information to be displayed on the windshield, within the driver's field of view, but without obstructing the view of the road. As a result, the market for HUDs is forecast to grow from just 100,000 units last year to over four million units by 2010¹⁰.

Anti virus for autos

By 2010, it is forecast that over 30 percent of drivers will regularly connect their car's systems to some form of external wireless network¹¹, by 2020 as many as nine million new cars may be sold with broadband access to the Internet¹². And as connectivity becomes more common in cars, there is a strong likelihood that people will have to deal with some of its more unpleasant drawbacks.

By 2010, it is possible that viruses and worms will have been written and launched with the specific aim of disabling electronic systems in connected cars. Already, car enthusiasts are able to control engine configuration and boost performance using a wireless games console as a controller; a malicious hacker could easily use the same access to disable a car.¹³

The exposure to digital sabotage could have a significant impact: electronic components may represent nearly 40 percent of a car's total value by the end of the decade¹⁴.

The last refuge from the office disappears

Other forms of transport – from buses, trains, trams and underground systems through to commercial aircraft – will likely offer passengers a growing number of connectivity, communications and entertainment options. Wireless connectivity – most particularly WiFi – will likely provide access to the Internet and send emails whilst on the move. Cellular mobile technology may also proliferate, even in aircraft¹⁵. But social norms, as well as excessive background noise, may dissuade most people from making phone calls in crowded planes, buses and underground trains. However, messaging services – from SMS to email – are likely to become increasingly popular as a means of staying in touch with the outside world. Nonetheless, for many, the almost universal ability to be in contact – even at 35,000 feet in the air or 200 feet underground – may represent an uncomfortable intrusion, prompting them to reach for the off switch.

Public transport reaches the final frontier

One of the most breathtaking changes to come in the travel industry through 2010 will likely only be accessible to wealthy elite. Scheduled journeys to the edge of space – on privately built, suborbital vehicles – will likely have become a practical reality by 2010¹⁶.

Bottom line

By 2010, the influence of the TMT sector on travel and transport will likely be felt more strongly than ever. And there will likely be a growing number of opportunities for TMT firms to generate value – bringing communications, information, entertainment and greater safety to travelers.

To maximize the opportunity, companies should work to establish standards quickly. Today, in spite of the huge variety of cars on sale, any qualified driver is able to get into almost any car and know exactly where all of the functions are. This degree of standardization and familiarity should also apply to TMT systems that are integrated into vehicles, from entertainment to navigation.

Where TMT equipment is integrated into a vehicle, new design considerations should be factored in. Devices and services for use within moving vehicles should be easy to use, with large buttons and bright displays and able to cope with variable ambient light and high levels of background noise. They should also be readily upgradeable, as consumers are likely to expect future-proofing to be built in by 2010. Other devices, from mobile phones to games consoles are increasingly supporting the capability for software based upgrades and fixes.

Furthermore TMT vendors and car manufacturers need to protect their customers' vehicles from the emerging threat from viruses and hackers. Malicious code can be more than just an inconvenience, it has the potential to endanger life.

TMT innovations in vehicles should also be designed so as to minimize driver distraction. Carmakers already use cognitive scientists and other specialists to ensure that in-car innovations do not distract drivers. The same consideration should apply to any TMT functionality being integrated into vehicles.

How TMT advances could change the way we work in 2010

Overview

TMT innovations in general, and advances in technology and telecommunications in particular, will likely add new dimensions of efficiency, productivity and flexibility to the world of work. Offshoring, virtual teams and remote working should all become much more widespread, as technology allows firms to bring together the best people for any given task, no matter where they are in the world.

The PC is likely to remain the most commonly used device in the workplace. Its supremacy in the workplace may even rise as it takes on new functions such as voice and video communications.

The growing trend to create material in digital format, as well as the digitization of existing analog data, will likely make search an increasingly important influence on a company's overall productivity and even competitive advantage.

In parallel, however, the pervasive power of TMT innovations may serve to put less technologically literate employees at a disadvantage. Indeed it may also make work life – and even home life – more difficult and complex for managers and employees alike, blurring the division between work and private time. Employees may well redress the balance, by shopping, surfing and even consuming content on company time.

And the perennial problem of hackers, viruses and worms is likely to pose an ever greater threat, as the potential for infection spreads way beyond the PC.

The work/life balance blurs yet further

Advances across TMT are likely to cause the work/life balance to continue blurring through 2010.

Employers may gain, for example, through equipping a growing proportion of staff with ubiquitous access to email. The number of employees with always-on, mobile email access is forecast to rise from the current millions to at least tens of millions (if not more) by 2010¹⁷.

Thus email, as well as other remotely accessible office resources such as intranets, will extend outside the office building, and outside office hours, into weekends, public holidays and increasingly into vacations.

However, employees may be able to redress this balance by accessing a growing range of non-work related, web-based applications during working hours¹⁸. The increasing availability of downloadable movies, television and radio, and the proliferation of e-commerce, combined with ever faster corporate IT networks is likely to lead to an increase in their consumption in the work place¹⁹. Indeed some media companies may deliberately target office workers as their audience.

The office team disaggregates

Thanks to TMT advances, and spurred by changes in work practices, the office team is likely to disaggregate yet further through 2010, providing greater flexibility to both employers and employees.

Advances in broadband penetration, network security, IP communications and other tools will likely allow a greater proportion of workers to choose to work from home, for at least some of the working week. It is forecast that by 2008, 41 million corporate employees globally may spend at least one day a week teleworking, and 100 million will work from home at least one day a month²⁰. Better technology and connectivity may also allow employers to make more use of contract workers. Companies should find it easier to engage securely, on an as-needed basis, self-employed workers located anywhere in the world.

By 2010, offshoring – another key manifestation of the disaggregation of the office team – may well have evolved into a common practice across all industry sectors, bringing together teams across continents and time-zones.

Offshoring is widely used among financial services companies as a means of reducing overall cost²¹. But by 2010 employers are also likely to use offshoring to gain access to the most qualified, talented workers – wherever they are on the planet – and may use IP communications, online collaboration suites and other tools to stitch teams together.

Search becomes key to productivity

The quality of a company's search engine will likely have an increasing bearing on employees' efficiency, the value of intellectual property and overall company productivity.

As the proportion of information created in digital format grows²², encouraged by the steadily falling price in digital storage, the ability to search rapidly and efficiently across a range of file types is likely to become a fundamental challenge.

Today the majority of text-based information is already created in a digital format. By 2010, audio and video will likely increasingly be created and stored entirely digitally, with perhaps the biggest impact coming from growing recording of VoIP phone calls. Companies may decide to record a growing volume of calls, partly because it is relatively easy and cheap to do, but also partly for legislative and governance reasons.

By the end of the decade, workers may search through stored phone conversations, video discussions and images, as well as text-based information.

Eye to the future

How TMT advances could change the way we live in 2010

The digitization of vulnerability expands

As working life increasingly depends on technology, there are likely to be concomitant increases in the risk associated with viruses, worms and other malicious code.²³

Through 2010 that risk is likely to extend beyond the computer and the server into the myriad devices that are becoming computerized and connected, and the ever greater volumes of data that are being stored. The impact of a virus today can be crippling expensive – up to several hundred dollars per event, per PC²⁴.

By 2010, when malicious code has the potential to take down not only IT networks, but also telephone exchanges, mobile devices, point-of-sale systems and even whole production lines, the impact and cost may be considerably higher²⁵.

Additionally, with employees carrying a wider array of portable devices, capable of storing ever larger amounts of data²⁶, there are likely to be far more opportunities for hackers and other criminals to steal passwords and other sensitive data²⁷. As soon as devices, data and digital keys leave company premises, the risk of theft rises, and with it the risk of digital crime.

The PC maintains its sovereignty within the workplace

In spite of the emergence of new devices and systems, the PC is likely to remain the dominant device in the office. By 2010, the PC is forecast to be more ubiquitous than today: the relatively mature markets of the United States, Europe and Asia-Pacific are expected to add 150 million new PCs, while developing economies are expected to add 566 million new computers²⁸. Overall, there may be some 1.3 billion PCs worldwide²⁹.

Some companies may try to reduce software licensing costs by using PCs as thin clients (with software stored centrally on a server, rather than on each PC). But they may find that the potential cost savings are offset by reliability and speed issues – particularly when workers use their PC outside the office. As a result, a number of firms might turn to open source software. Some companies may consider open source to be both cheaper and more robust for horizontal functions such as server operating systems, productivity tools and communications.

Technology proficiency becomes a career differentiator

Ability to use technology will likely have become an increasingly common requirement, even among blue-collar workers.

All workers, based in the office, factory or in the field, are likely to use an increasing array of applications, from online collaboration suites to video conferencing. Production line workers may be expected to use computers to control processes and ensure efficiency. For service industry workers, the ability to use a PC will likely have become a basic entry requirement. More and more, the ability to get things done is expected to depend on the ability to understand and use increasingly complex technology³⁰ – and those with a greater degree of technological literacy may find themselves moving up the corporate hierarchy more quickly than those without.

Administration gets automated

Automation will likely play a larger role in our working lives than at present. This may reduce some of the tedium in the working day, raise productivity and even allow customer service to be improved³¹.

Communication with customers is likely to become more frequent and overall more useful as a result of automation. Electronic messaging, over a range of devices and networks may well be used to communicate with clients. Automatically generated messages will provide a blend of alerts and information, from estimated delivery times to near real-time pricing changes. Currently much of this information may already be generated, but is typically not communicated.

Speech recognition may also undertake some of the more mundane call handling currently undertaken by employees. Advances in processor speeds coupled with declines in the cost of digital storage may make this automation feasible for a growing number of voice-driven applications³².

Bottom line

The way we work is constantly being reshaped by TMT advances. Over the past decade the Internet, email, messaging, computerized process automation, mobile telephony and a whole host of other developments have collectively transformed our working lives. And that transformation is likely to continue through 2010 as businesses around the world seek to improve their competitiveness.

This is an encouraging outlook for those supplying business: but there is no scope for complacency. Technology is not a panacea – and should not be sold as such. Rather technology should be positioned – from concept to deployment – as a set of specific tools that can be used to address fundamental business challenges, from having the most efficient supply chain to maximizing the value of a company's intellectual capital. Most employers are likely to prefer measurable metrics to magic wands.

Employers should also bear in mind that efficacious use of new technology and connectivity requires skilled staff to deploy and implement. Yet many nations may be facing an employment crisis by 2010, with the most acute shortages being in IT workers³³. Companies, governments and employment authorities should consider acting sooner rather than later to ensure that investments in technology are matched by investments in skills, training and broader education.

Management may also have to adapt, particularly if growing numbers of employees work remotely. Management of remote teams may be distinct from supervising staff face-to-face. Communication skills need to be developed such that there is a healthy flow of communication with staff in all locations. While email may be a tempting, quick approach to communicating with a widely dispersed team, unfortunately it may not be efficacious in the long term, as key messages may be lost among the hundreds of emails received. Some employees already spend almost nine hours each week reading email.³⁴

How TMT advances could change the way we communicate in 2010

Overview

Communications innovations have enabled some of the most rapidly and widely adopted technologies of all time – the Internet and the mobile phone being the most notable examples. That transformative impact is likely to continue through 2010.

With almost half of the world's population connected to fixed and mobile networks the volume and value of global voice should continue growing, cementing voice's status as the most ubiquitous networked application. Mobile voice is likely to take a growing share of total voice volumes; fixed networks may see customer numbers decline, particularly in developed countries; and VoIP may make only modest gains.

Increasing numbers of consumers and businesses are likely to adopt both fixed and wireless broadband services. Fixed broadband is likely to be the more popular means of using web based applications, outcompeting mobile with respect to average download speeds and cost per megabyte. Despite this, 3G subscriber numbers are likely to rise sharply, as mobile operators migrate their customers to 3G as a matter of course.

The convenience of broadband mobility may attract more people to wireless LAN, with the number of home and office deployments growing throughout the next five years. But consumers' willingness to pay for WLAN hardware may not be matched by a willingness to pay for access. Consequently commercial and municipal WiFi networks might struggle.

Overall, people are likely to communicate more in 2010, as their desire to interact is satisfied by a growing array of connected devices offering an ever expanding range of communications applications. In addition, human communications may increasingly be supplemented by machine-to-machine exchanges, as connectivity of all types reaches deeper into the supply chain.

As for tariffs, the age-old equation for charging for communication – distance multiplied by time – is likely to evolve steadily in response to the growing variation in functionality and convenience between different communications media.

Connected: half of earth's population

By the end of the decade, it is likely that for the first time ever, half of the world's population will have access to telecommunications services, most commonly via mobile telephony. Citizens in developing countries are likely to represent the bulk of the hundreds of millions of those entering the global telecommunications network for the first time³⁶. While most new connections will likely be to mobile networks, citizens in developing countries are also likely to contract to fixed line networks, growing the overall size of the public switched telecommunications network (PSTN) as a result³⁷.

Voice remains the 'killer application'

Voice usage is likely to grow strongly through 2010, because of a rapid growth in the number of connected people worldwide and falling call charges. By 2010, total voice usage could rise to over

12 trillion minutes per annum, up from under nine trillion today³⁸. Callers in the developed world will likely abandon their fixed phone, in favor of mobile. In a developed region such as Europe, 25 percent of homes are forecast to have relinquished their fixed line³⁹. Globally, fixed voice traffic is expected to have declined to just 30 percent of total voice call volumes from almost 60 percent today⁴⁰.

It is likely that the displacement of fixed by mobile will be due, in part, to continued steady declines in the mobility premium – the additional price of mobile calls over fixed. By 2010, up to eight trillion minutes of voice calls may be carried by mobile networks⁴¹ – over 60 percent of total voice volumes.

VoIP grows its share of volume, but remains a minor player

VoIP will likely gain in adoption, but its revenue impact may still be muted as of 2010. By that time, VoIP is forecast to represent approaching 10 percent of total voice volume⁴², but less than five percent of global voice revenues⁴³. Many corporations may have adopted VoIP; consumers might increasingly subscribe – sometimes without even realizing – to VoIP solutions. But if VoIP continues to be promoted as a low-cost option, there is a danger that few of its advanced features and benefits (such as unified messaging or high fidelity calls) will be actively promoted.

VoIP over broadband mobile networks (3G) and WiFi infrastructure is unlikely to be felt in any significant way by 2010⁴⁴. Users may well find using such services too complex, and any price discount will likely remain insufficient to compensate users for the lower quality, and higher handset prices, that may still characterize the service.

3G mobile versus fixed broadband – a zero sum game?

By 2010, mobile broadband is likely to gain ground on fixed broadband in terms of the number of connections. Consumer and business adoption of fixed broadband is likely to continue at a modest pace, such that by 2010, there will be approaching 490 million broadband connections⁴⁵. At this time, there may be as many as 300 million broadband mobile (3G) subscribers, although a proportion of these may not have actively chosen to migrate to 3G⁴⁶.

Both fixed and wireless operators are likely to deploy next generation network technologies over the course of the next five years. Fixed operators will likely move to enhanced asymmetric digital subscriber lines (ADSL2(+))⁴⁷ and to a lesser degree, fiber to the home (FTTH)⁴⁸. Mobile operators are expected to continue building out their 3G networks, and will likely add high-speed downlink packet access (HSDPA) and high-speed uplink packet access (HSUPA)⁴⁹ upgrades to give customers multi-megabit connectivity.

But revenues and margins may not grow in line with increases in bandwidth. Fixed operators are likely to continue to suffer from the commoditization of broadband connectivity, while mobile operators may continue to struggle to launch profitable mobile data services. Only a small number of people may find the highest bandwidth speeds available of practical use and more importantly, worth paying for.

The preferred set of communications tools emerges

By 2010 consumers are likely to be choosing a preferred set of communications tools. This is similar to the way that they have settled on a set of a preferred dozen or so television channels out of a choice of hundreds. As illustrated in Figure 4, the choices may not be dramatically different from today: however the degree of usage of each communications option will likely have changed.

The communications tools most likely to become established as part of each individual's preferred list is likely to be those that are easiest to use, offer best value, and are most relevant to that individual. The preferred set will likely evolve as personal circumstances change.

The availability of a wider range of devices, networks and communications options in 2010 may encourage us to communicate more overall. Some of the devices that we commonly use as standalone, unconnected devices today, may have become connected and communications-ready by 2010. Digital cameras with built-in picture messaging and email; games consoles with instant messaging, laptops with embedded mobile cellular access systems and even cars capable of sending and receiving email are all feasible by 2010.

The era of the video call arrives (as long as it is over fixed broadband)

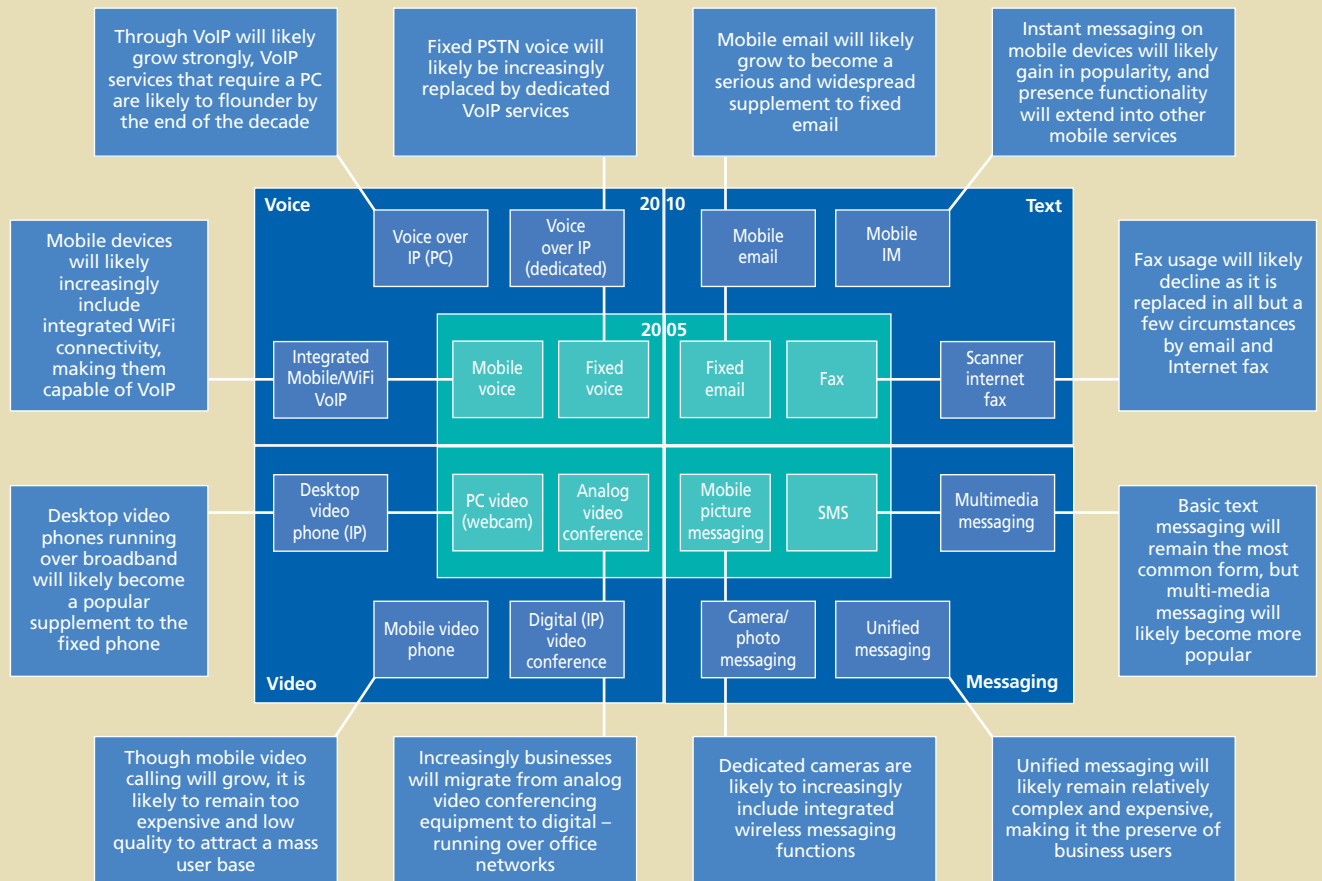
By 2010, video calls may have finally become mainstream, enabled by more widespread fixed broadband connectivity, falling costs, improving quality of service, and the more common integration of a camera into laptop PCs and computer monitors⁵⁰.

Furthermore, the growing availability of standalone, plug-and-play video-calling devices may drive demand for fixed video calls in the home⁵¹.

Video calls will be undertaken within both work and social contexts. Clearly, video is likely to be a far more effective way of conveying non-verbal communications such as body language, facial expressions and other mannerisms.

But while fixed-broadband video calls should grow in volume, they will likely still represent a minority of all calls. This will also be the case on mobile networks. Many mobile phones are likely to be capable of handling video calls by 2010, but this functionality may be little used. Quality and price of mobile video calls may remain poor relative to their fixed line equivalent.

Figure 4: The proliferation of communications options, 2005-2010



Source: Deloitte Touche Tohmatsu, 2006.

Wireless LAN thrives privately but struggles publicly

Broadband wireless is likely to have greatest success as an extension to fixed broadband connection, rather than as a wireless local loop. Homes and offices will likely continue to increase their adoption of WiFi connectivity, as prices fall, security improves, installation becomes easier and reliability becomes progressively better. The growing incorporation of WiFi within a range of devices – from laptops to gaming consoles, mobile phones to PDAs – should also strengthen the personal or business case for deployment of WiFi.

Municipal WiFi networks may also become widespread, particularly in the developed world, as local authorities and governments strive to bridge the digital divide⁵². But these schemes' potential may be blunted not only by targeted users' inability to afford a PC or other device needed to access WiFi services, but also by the fact that WiFi technology was never designed to provide blanket coverage⁵³. Regulators who sanction the availability of low cost or free wireless local networks where they had previously licensed service providers to operate a paid-for service may find themselves challenged by the latter group.

WIMAX finds a rural niche

WIMAX, a wireless technology capable of delivering broadband wireless connectivity over a wide area (up to several kilometres) may prove ineffective as a competitor to established fixed and mobile broadband networks. However, it may well become the most cost efficient approach to delivering broadband to rural areas that are too expensive to connect using wired or broadband cellular technologies⁵⁴. Occasionally, WIMAX may also find a secondary role providing backhaul for metropolitan WiFi networks and other managed data networks⁵⁵.

Have your machine talk to my machine

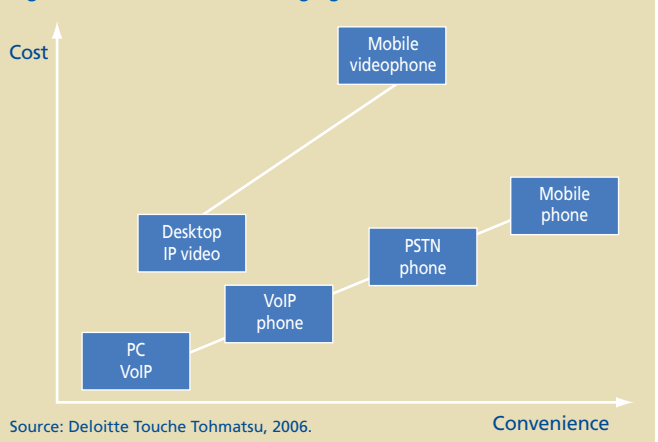
Steady growth in the range of devices that include some form of connectivity may catalyze growth in the volume of machine-to-machine (M2M) conversations. This could generate an industry worth over \$200 billion by 2010 (compared to less than \$50 billion today)⁵⁶. By 2010, tens of millions of vehicles may feature an integrated cellular mobile connection, allowing for applications ranging from remote maintenance to vehicle tracking⁵⁷. Furthermore, five percent of the world's televisions may be connected, directly or indirectly, to broadband networks, allowing remote programming, maintenance and even the insertion of personalized advertising⁵⁸.

Radio-frequency identification tags (RFID) may have become cheap enough for their mainstream use within supply chains – allowing automated systems to interrogate stock levels, check on the status of orders and deliveries, record environmental conditions and track individual items as they move from the factory to the customer⁵⁹.

Distance is dead: long live convenience

Historically, the cost of communications has been charged based upon the simple formula of time multiplied by distance. A short, local call was far cheaper than a lengthy, long-distance one. Deregulation, and the subsequent rebalancing of tariffs, changed this relationship a little. But overall the rule still held.

Figure 5: The evolution of charging for calls



However, the emergence of mobile telephony and VoIP has changed, and will likely continue to change, the criteria by which calls are charged. The greater the ease of placing the call and the immediacy of reaching the called party, the greater the cost. This may mean that calling from or to a mobile will incur the highest per minute charges. Conversely, calling a distant location from a fixed line may be far cheaper per minute. The most inconvenient calls – from PC to PC over a VoIP link, would have the lowest cost per minute.

Bottom line

The communications sector should continue to have plenty of opportunity for growth through 2010, as users are offered, and choose to adopt, an ever growing range of communications devices and services.

However, through 2010, a growing gulf may emerge between what communications functionality is offered, what is actually used and – more importantly – what is paid for. The standard list of functionality, particularly on mobile phones, is likely to expand relentlessly. The latest features to be added into mobile devices include games with 3D graphics and blogging software. But every new feature may add cost, and increase complexity and reduce reliability. As menus and options expand to accommodate the growing functionality list, users may find it harder to access core applications: voice calling and messaging. But these basic services are still likely to represent the lion's share of usage and revenues in 2010, and the communications industry should recognize that a focus on growing the number of communications functions and features may become an increasingly unhelpful distraction.

Companies should also be wary of becoming distracted by irrelevant goals, such as having the fastest network. Multiplying access speeds is unlikely to lead to a corresponding multiplication in network revenues.

The communications companies likely to be deemed winners in 2010 may well be those that have focused on delivering intuitive, mainstream and compulsive services that transform the way the majority of us interact.

How TMT advances could change the way we are educated in 2010

Overview

Technology is likely to become more pervasive across all areas of education, but is unlikely to have replaced the teacher by 2010. Digital whiteboards, extranets for parents and typed coursework may well have become commonplace by 2010. But it is unlikely that technology will be capable of emulating the interactivity, spontaneity, dynamism or communication skills of a good teacher.

TMT advances may have negative aspects, one of which may be to refine the art of cheating. Wireless technologies will likely facilitate communication with students taking exams; improvements in search engines may encourage plagiarism. Furthermore, where podcasts, online notes and other electronic aids are provided to supplement classroom teaching, some students may choose to use these as a substitute for attendance. Too much technology might also have the impact of dulling analytical faculties, rather than supporting them.

The best teachers may have become global 'brands' by 2010, thanks to advances in connectivity. This elite group may be lecturing to a collective class of thousands, using a combination video conferencing, streamed audio and podcasts as well as the traditional lecture theater.

In developed countries, the increasing use of technology within schools may make a PC and a broadband connection mandatory for any pupil⁶⁰. Yet poorer families may not be able to afford either, igniting debate over whether broadband and lap top computers should fall within the scope of universal service provision.

Technology supports, rather than replaces, the teacher

Technology is likely to become more pervasive across all areas of education. However the teacher is likely to still be at the heart of the educational process in 2010. Digital whiteboards, which are likely to be gradually rolled out through 2010 and beyond, will allow the teacher to focus on interacting with the class, rather than the blackboard. Students are likely to be using personal computers more regularly in class, often connected to classroom networks that allow the teacher to monitor progress in real time. School extranets are likely to facilitate communication with parents. Teachers are likely to source teaching material, including professionally developed graphics, video and animations from online exchanges.

Cheating 2010

Advances in technology and communications will likely present students of all ages with new opportunities for cheating.

Already wireless technologies facilitate communication between students taking exams⁶¹; search engines facilitate plagiarism by enabling rapid retrieval of others' work; online auctions provide a marketplace for paid-for coursework⁶², and email and instant messaging allow the rapid distribution of leaked exam questions⁶³. By 2010 the range and power of wireless technologies will likely be greater, search should be more efficient and there may be a myriad more ways to exchange valuable information.

As a result, educators and governments will likely have to work together to develop ways of stopping the abuse of powerful technology. Already some schools have deployed software that checks essays for plagiarism. This practice is likely to become more widespread through 2010⁶⁴.

Schools and colleges may also have to crack down on the use of camera phones and other mobile devices, particularly during exam time, in order to stop students sharing their answers. Education authorities and exam boards may have to monitor online auction sites, file sharing sites and even blogs, in order to prevent exam papers from being distributed in advance.

One of the difficulties in identifying cheating lies in the anonymity of the typed response, which has become the standard format for submissions in some establishments. Handwriting, by contrast is relatively unique.

2010 may thus witness a return to the handwritten exam paper, unless examining boards can establish a way of authenticating the authorship of typed papers.

The teacher becomes a global brand – enabled by greater connectivity

An elite group of teachers, which today is only able to reach a mass market via books, lecture tours and articles, may be lecturing via video conferencing, streamed audio and podcasts to classes of thousands by 2010. Indeed students in the lecture theatre may represent the smallest audience. Recordings and transcripts may also be made available for purchase and download to a global audience.

Faster, cheaper connectivity may also allow greater access to specialist subjects in smaller teaching institutions. Such schools may not be able to justify hiring a teacher in a niche subject, but may be able to afford a share in a teacher whose class would be delivered by video-conference. Video-based classes may not be an ideal method of teaching, but they are still better than none at all.

The digital divide deepens

The increasing use of technology in education is likely to heighten debate over the digital divide, both between developed and developing countries and also between rich and poor regions within each country.

If a PC and broadband connection became mandatory for any pupil, poorer families, who may not be able to afford either, could find themselves seriously disadvantaged⁶⁵. Governments will thus need to consider whether broadband and lap top computers should fall within the scope of universal service provision.

Universities use technology to reinforce – students may use it to skip class

In line with other educational establishments, universities are likely to continue to intensify their use of technology. Currently some are experimenting with podcasts, online lecture notes, videos and other digital materials as means of reinforcing the learning process^{66,67}. However there is a risk that some students may consider a podcast as a substitute for, rather than a complement to attending a lecture⁶⁸.

As a result, lecturers and educationalists around the world will likely increasingly recognize that although technology has the potential to improve the way educational material is gathered, presented and shared, the teacher will remain the life-blood of education – ensuring that students actively engage and interact with the learning experience. Consequently, in spite of the growth in high-tech digital material, lecturers may revert to distinctly low-tech tactics to ensure attendance⁶⁹, such as headcounts and regular surprise tests that contribute to final grades.

Limitations in educational technology appear

Although the more widespread use of technology in schools will likely translate into higher levels of computer literacy amongst children, concerns may well increasingly be voiced about the effect of technology use on core skills, such as reading, writing and arithmetic.

Some may argue, for example, that word processors have a negative impact on spelling, punctuation and handwriting skills; spreadsheets stunt the development of mental arithmetic, the ease of copying and pasting encourages plagiarism and the use of technology overall can stunt children's capacity for critical reasoning⁷⁰.

Bottom line

The issue of how best to use technology within education is complex, as technology can both bolster and blunt the educational process. A great deal of work may be required in order to understand fully how technology is best deployed, and how it can improve the dynamics of teaching and learning processes. Companies developing and supplying educational technology should take the lead in answering these and other questions by conducting rigorous, evidence-based research in co-operation with governments, education authorities and academia.

Communicating the results will also likely be key. Helping parents to understand the benefits of technology in education will likely help speed the process of acceptance. Even before the widespread introduction of technology in the teaching environment, the processes and practices of education have changed markedly since most of today's parents were at school or college. Companies have an important role to play in ensuring that parents are able to keep up with rapid change, and fulfill their part in the education process.

One of the powerful roles that technology could fulfill would be to reduce the administrative burden on teachers, allowing them to spend more time with their pupils. Teachers are already overloaded with work – from marking coursework and exams to preparing classes, handling administration and keeping up to date with changes in the curriculum.

Technological literacy will likely become an ever more important element of education, from primary school onwards. Yet governments, educational authorities and individuals should recognize that technology skills represent just one element of a broader educational program that should also include attaining excellence in fundamental skills such as reading and writing, as well as critical reasoning and knowledge-based learning.

How TMT advances could change the way we are entertained in 2010

Overview

DTT TMT believes that entertainment will likely evolve in a number of key ways thanks to TMT advances. The Internet, once an obscure technical curiosity, may, for some individuals become the single most popular form of entertainment.

The video game market is likely to consolidate, broadening its appeal as new uses for consoles emerge. Indeed devices that once only exercised thumbs, may increasingly be used as a means of exercising the body and even the mind.

All entertainment formats may become available in ever smaller portions as consumers seek out entertainment that can be consumed in the briefest of dead times: be this waiting in line, commuting or even during pauses in conference calls.

Despite the growing range of alternative distractions, television is likely to continue dominating our entertainment, locking our attention through high definition content delivered via ever larger screens. On-demand television and video will likely grow in popularity, through a variety of technologies, of varying sophistication. In 2010, for some, DVDs delivered by post may still be the preferred route to the widest selection of movies, at the highest resolution. And although on-demand programming and interactive television will likely grow, the scheduler's job will remain, as many people may be too lazy to watch anything other than whatever happens to be on.

User-generated content will likely also grow in volume. But the large majority of it – from blogs (personal web logs) to home videos – may be of little interest or value to mainstream audiences.

Broadband turns surfing into prime time entertainment

Households with broadband may be spending more time surfing the Internet than watching television by 2010, making Internet-related activities the most popular leisure pursuit⁷¹. Searching, email, instant messaging, exchanging personal photographs, updating blogs, playing games and e-commerce will likely all become mainstream leisure activities⁷².

Realizing the potential of audio-on-demand

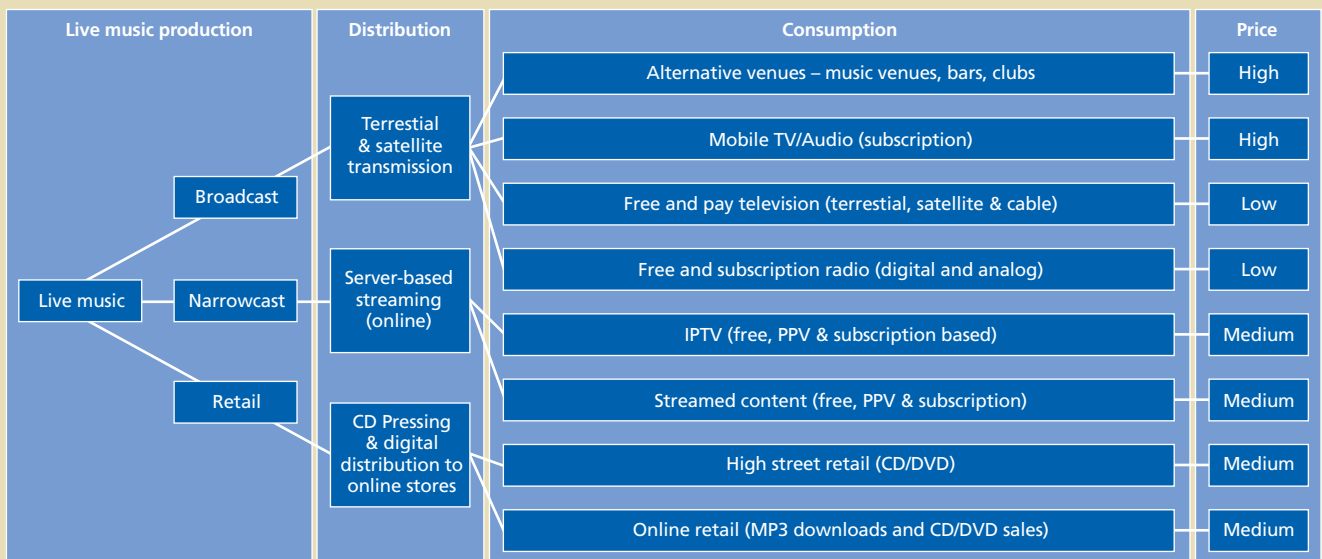
Much of the excitement around on-demand delivery of content focuses on video, but it is audio-on-demand (AOD) that may have become most significant by 2010.

Despite the roll out of higher speed broadband networks by 2010, the sheer size of video files, along with the growing demands on bandwidth to the home in general, may make video-on-demand (VOD) technically and economically difficult to deliver on a widespread basis by 2010. Audio on the other hand, requires significantly less bandwidth to stream or download. Furthermore, audio files are typically shorter or more easily shortened. Comedy programs for example can readily be cut into individual sketches and soap operas are typically designed to be at most 30 minutes long. Audio archives are also more readily digitized, while presently it is often still cheaper to maintain video archives on tape.

Technology takes live music into new dimensions

Live concerts may be able to reach audiences in the hundreds of thousands by 2010, thanks to TMT advances. High-speed networks could allow a concert to be relayed to a range of other locations, such as smaller concert halls or public spaces that would show the event on large screens, to televisions in the home to online retail sites (see Figure 6). This could have a significant impact on potential revenues, and should allow supply to start catching up with demand⁷³.

Figure 6: Raising the value of live events



Source: Deloitte Touche Tohmatsu, 2006.

Our media collections start going online

While many consumers will still likely enjoy the collector's thrill of filling shelves full of DVDs, CDs, books, photographs and other media, by 2010, a bold, trusting minority may decide to have most of their media stored virtually. Access would be on-demand, from any device with a sufficiently fast connection.

Online collections will likely be most prevalent for media that require relatively little bandwidth to deliver immediately. Thus music, talking books and photographs may well be the most common media stored online by 2010.

Entertainment gets snack-sized

Consumers may increasingly be drawn to entertainment that can be consumed in small portions: when standing in line, commuting, or even when working. The portable video-games player, MP3 player, portable DVD player, the free newspaper and even online gaming already address this need – but by 2010, there may well be a much wider variety of products and services that are designed specifically to provide entertainment in small doses. Ultra-mobile PCs, portable media players and other devices are likely to deliver an ever wider variety of short-term distractions.

Video games burn billions of calories and develop the mind

By 2010, the video game will likely have consolidated its position in western countries and should be increasing penetration levels in developing countries⁷⁴. An estimated 80 million adults are forecast to be regular games players by 2010⁷⁵. Playing video games, however, could have evolved from being a largely sedentary activity. A growing range of games may require players to use their bodies to control their virtual player, rather than relying on buttons and joy sticks. The falling price of infrared sensors and video cameras should allow increasingly accurate capture of a player's movements.

The video game may even become a recognized source of intellectual growth, forming the basis for educational programs, sports instruction and even personal development⁷⁶.

Video-on-demand should grow – but not always via IP

The nuisance of going to the DVD store should have become a distant memory for many people⁷⁷ – but not necessarily because of brand new technology. By 2010, many may still be content to select their DVD online, for postal delivery the following day.

VOD via an IP link may only be an imperative for a highly time-constrained minority who demand absolute immediacy. VOD via IP may see additional demand as a means of sourcing diverse content that is not available on mainstream channels. Cricket fans resident in North America or baseball fans in Europe may rely on VOD as the only option to obtain live video coverage of their team.

Schedulers should stay in employment

However, program schedulers should consider their jobs safe: they should still have a major role to play, despite the growth of AOD, VOD and increased penetration of digital recorders that facilitate the time-shifting of broadcast content.

Currently the average viewer consumes 24 hours of television and radio per week⁷⁸. If this average is maintained through 2010, the consumption of television and radio will likely remain a predominantly passive activity, as self-programming 24 hours of content may simply take up too much time and require too much effort.

Consumers start leaning forward when being entertained – occasionally

Viewer participation may well have become a more widespread feature in mainstream broadcast programs, as a growing minority of consumers show their willingness to pay for the privilege of control. Voting, participating in competitions and other forms of interaction – particularly where conducted over mobile networks – may become increasingly substantial sources of revenue for program makers and broadcasters. Indeed, there is likely to be a growing move to structure a wider range of programs to exploit consumers' appetite for participation, in order to increase revenues and fund future program development.

In turn this may lead to more sophisticated ways to participate, allowing viewers not only to influence the fate of individual characters, but also to shape the plot.

User generated content creates cheap entertainment if professionally filtered

User-generated content is also likely to grow in volume. But the large majority of it – from blogs to home videos – may be of little interest or value⁷⁹. However, a gifted few will produce material with broad appeal, and a new category of search business may emerge as a result, helping consumers to avoid the morass, and get quickly to quality material.

The small screen gets bigger and smarter

Television is likely to remain a dominant entertainment medium through 2010. The growing availability of high definition content (coupled with innate vanity) should drive the average television screen size steadily higher. By 2010 wealthier households may be boasting 100-inch screens⁸⁰ and the majority of new televisions sold in developed countries will be flat panel⁸¹.

Functionality that may emerge by 2010 includes three-dimensional (3D) viewing – without the need for special glasses. The availability of increasing powerful processors in post-production will enable image perspective to be altered enabling images to appear to be in 3D⁸².

Eye to the future

How TMT advances could change the way we live in 2010

Bottom line

Although advances in TMT are likely to change the way we consume entertainment in 2010, the underlying reasons that consumers buy will remain the same. They will still generally want simplicity, value, understandable benefits and thrills. They will likely want as many opportunities to consume entertainment as possible, perhaps to balance out the increasing opportunities provided by employers to work whenever possible.

As a result, the technologies, products and services that have the most profound impact on the entertainment market will likely be those that consumers find easiest to use and access.

Companies that put most focus on how consumers' entertainment may be maximized as a result of implementing new technology or connectivity are likely to enjoy the greatest success. Companies that are more obsessed with delivering the latest technology, with lesser regard for the user experience or the underlying economics, may not fare as well.

Managing choice, from both supplier and consumer perspectives, should be carefully handled. Suppliers already face a growing number of competing technological standards in television, radio, mobile telephony, storage media and multimedia software. It may not be economically sustainable for an entertainment company to support each of the current standards, let alone the standards that have yet to be invented. Backing too many technologies may prove as fruitless as backing the wrong one: each new technology represents an additional layer of cost and complexity. And with each, not only does management become more difficult, but consumers are given another reason to become either confused or adopt a wait-and-see approach.

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How TMT advances could change the way we live in 2010

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About TMT

The Deloitte Touche Tohmatsu (DTT) Technology, Media & Telecommunications (TMT) Industry Group consists of the TMT practices organized in the various member firms of DTT and includes more than 5,000 member firm partners, directors and senior managers supported by thousands of other professionals dedicated to helping their clients evaluate complex issues, develop fresh approaches to problems and implement practical solutions.

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"Making the offshore call: The road map for communications operators", Deloitte Touche Tohmatsu

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