The Challenge of the Internet

An interpretative guide to major topics and issues
Editorial

Over the past 15 years the Internet has permeated modern society more rapidly and comprehensively than almost any other technology. We search the Internet to find out what we want to know, present ourselves to our fellow human beings, arrange meetings and look for friends and life partners on the Web. A great many companies depend on a functioning Internet, while the most diverse political and social groups use the Web as a shop window or recruitment office. The Internet became a «critical infrastructure», touching economy, education, politics and leisure in equal measure.

For everyone involved, this global technology therefore poses a number of central questions: How can we use the enormous potential of the Internet sensibly? Do we really know the risks involved when we use the Internet? Given the myriad different faces of the Internet, these two fundamental questions can be broken down into many individual elements.

To be able to fully appreciate the opportunities and risks of this global technology, TA-SWISS intends to examine the effects of the Internet in depth. A multi-stage process should bring to light the questions that concern citizens about the Internet. This brochure is the first stage of that process. Its aim is to set out, briefly and concisely, how the Internet impacts on our everyday lives, and which aspects might be important for assessing the possibilities opened up by the Internet. The brochure outlines key contours of the Internet society, and should accompany the subsequent discussion process.
How this brochure is organised

In just a few short years, the Internet has evolved into a global technology with some 1.5 billion users around the world. This incredibly fast growth makes it harder to assess the social and economic effects caused by the use of the Internet.

In order to delimit the multitude of questions that arise, the brochure arranges them using areas of everyday life – the economy, education, politics and leisure. The term «Internet» will be used here in a broad sense, and therefore covers not just the technological aspect (the Internet as a platform for carrying digitalised information), but all applications as well – especially those that are related to the so-called «Web 2.0» in the public debate (e.g. Social Networks). Some thoughts and ideas pointing to possible future developments are inserted into the text, and are indicated by an arrow.

The opening introductory chapter contains information about aspects that cross over the different sectors. It focuses on the super-fast development of the Internet and the organisations involved in that development, questions about security and data protection, as well as legal and ecological aspects. The chapter also offers an outline view of possible future technical developments of the Internet.

The second chapter provides an overview of how the Internet is used in the economy. It covers issues such as the use of the Internet for business processes and in marketing, and also an assessment of the associated opportunities and risks. It also looks at changes in the work process and the relationship between employers and employees. Finally, it will tackle the question of how far the Internet supports a «virtual economy».

Chapter three describes the significance of the Internet for educational purposes. The central issue here is which educational goals are necessary in a knowledge society for its members to be able to deal sensibly with the possibilities of the Internet.

Chapter four looks at the significance of the Internet in the political sphere. How to use the Internet for the formulation of political demands and objectives? Also covered here are censorship and the neutrality of the Web for the broadest range of providers.

Chapter five gives an assessment of the impact of the Internet on people’s leisure-time habits. This tackles topics such as Social Networks, Internet games and the problem of Internet addiction.

This brochure supports a discussion process initiated by TA-SWISS about the opportunities and risks of the Internet. It is intended for members of parliaments, decision makers in politics and the economy and citizens who are interested in the Internet and want to use it with a discerning eye.

Further information

This text is available in an electronic version, with links to the organisations and sources consulted (see www.ta-swiss.ch).

Another source of information is the Coordinating Office Information Society of the Federal Office of Communications, where the Federal Council’s strategy on the information society can also be found (www.bakom.admin.ch/infosociety, available in English).

At EU level, countless initiatives have been launched; an overview is available on the website The Future of the Internet (http://ec.europa.eu/information-society/activities/foi/index_en.htm).

Further references (OECD, etc.) and a glossary can be found at the end of the brochure.

In 2008 the Internet is used by almost 1.5 billion people.
The origins of the Internet go back to the 1960s, but the public only started to become aware of it in the early 1990s, when in 1993, for example, Tim Berners-Lee, currently head of the World Wide Web Consortium W3C, developed the World Wide Web System at CERN, the European Organisation for Nuclear Research in Geneva. Numerous other technical innovations, such as browsers, made the massive growth of the Internet possible, and by 2008 it covered half a billion computers—not to mention the mobile phones and other technical gadgetry that can also be used to access Internet services.

Who is allowed to set the standards on the Internet?

Various organisations have been involved in defining technical and political standards which shaped the development of the Internet. Examples are—as apart from the mainly US Internet, software and hardware companies—the Internet Engineering Task Force (IETF), W3C and the Internet Corporation for Assigned Names and Numbers (ICANN). Then there are UNO organisations such as the Internet Governance Forum and other NGOs. The question here is whether these organisations are democratically legitimate.

One illustration of the incredibly rapid growth of the Internet is the increase in the number of people who use it. Globally, this figure could now total around 1.5 billion, with numbers in newly industrialised countries in particular having increased considerably in recent years. There is a corresponding rise in linguistic diversity on websites. English still dominates (30 %, figures from May 2008), followed by the Chinese Mandarin dialect (17 %) and Spanish (9 %).

The best known, and still the most widespread Internet services are e-mail and search engines. The last few years have seen the emergence of new services, such as Internet telephone services, Internet radio and Internet TV. This convergence of once separate media and communication channels, allied with the facility to access more and more places via wireless networks on the Internet, is one of the key trends of recent years which will continue to shape the future development of the Internet.

Can society keep up with the super-fast growth of the Internet?

The dynamic development of the Internet over the past few years has been quite astonishing, and has opened up a wealth of new opportunities for companies, for example. But with this meteoric growth also comes the question of how far it will accentuate the differences in a society, or even between states, that will be created as a result, because some people will no longer be able to keep up, and will be excluded from using the Internet. At a global level, this discussion has been ongoing for some time now, under the heading of «digital divide», and there are a great many initiatives for patching up this digital gulf. But are these efforts sufficient? Even within a society, there are differences in levels of skill in using the Internet. How should this problem be dealt with, when more and more areas of daily life depend on the Internet?

Web 2.0

A key expression often heard in the public discussion about the Internet is «Web 2.0». This term describes the development, over this decade, where greater numbers of Internet services have been introduced that enable users to feed data simply onto the Web themselves. Examples of these are services for creating and maintaining communities (e.g. Social Networks), blogs (online diaries on all kinds of subjects, where comments can to some extent be added to entries) and Wikis (services where users have direct access to the contents of a website and can even modify them). However, the term «Web 2.0» has never been strictly defined, nor has it been linked to any clearly delimitable technology.

Internet use in Switzerland is very high compared to the rest of the world.
THE CHALLENGE OF THE INTERNET

Security and data protection

The Internet services available today are associated with two problems which occur (to different degrees) in many applications: security and data protection. These topics will be dealt with in more detail here, but are also covered in the chapters that follow.

Who guarantees the security of the user?

If a person engages in any security-relevant activity on the Internet (such as operating online banking), this runs via an «electronic identity», using a program that is operated by the authorised user. In this case, it must be guaranteed that any activity from the program really does originate from this person, corresponds to what he or she actually wishes to do, and cannot be viewed by unauthorised persons. But programs like this are increasingly exposed to attack by hackers. Who is responsible for protection here, the user or the service provider? What does it mean for the future development of e-business if security is undermined like this?

The subject of security covers the protection of electronic identities (user names, passwords, etc.), or users’ computers and their data from theft, manipulation and unauthorised viewing. Key issues at the moment are unauthorised data acquisition and so-called botnets. The first of these problems affects individuals (identity theft), companies (industrial and commercial espionage) and governments and administrative departments (intelligence activities) in equal measure.

Botnets are computer networks that can be remotely controlled by an attacker – e.g. for transmitting spam, storing illegal content or attacks on the availability of web services (denial of service attacks). Unnoticed by the user, his or her computer may be part of a botnet.

Data acquisition and the setting up of botnets are largely dependent on malware infiltrating the user’s computer, through e-mails with malware attachments or through a link to a website which distributes malware. So-called drive-by infections are becoming increasingly important; a computer can be infected, for example, by a Trojan just by visiting a website, and it can happen without being noticed.

How trustworthy are sensitive data found on the Internet?

The problem of false information in databases (e.g. police databases) is not a new one, but it can be intensified as a result of the increasing use of the Internet. With careless handling, electronic identities cannot only be stolen, but even falsified, and this can have unpleasant consequences for those concerned. Are we sufficiently aware of this problem?

An underground market that is very difficult to penetrate has evolved in computer and network crime circles, for example in stolen electronic identities. The threat posed by Internet security is becoming increasingly organised, with criminal networks being set up to share the work between them (e.g. malware programming, hiring out botnets).

The issue of data protection refers to the protection of the individual, and has its roots in the notion of a person’s right of informational self-determination. This defines the right of individuals in principle to determine for themselves who to divulge their personal data to, and who to allow to use them.

How can a person’s own privacy be protected on the Internet?

Protection of privacy is based on two components: firstly, it must be guaranteed that the user who divulges private data knows what they are to be used for. Secondly, there must be a facility for these data to be modified or deleted by the user. Both elements – consent and control – are in fact hardly likely to be available on Internet applications. How can privacy still be guaranteed under such circumstances?

But there is also a social component to data protection. The growing digital capture of all data flows increases the ability of individuals to control data. The problem here is an inherent one of information and communication technology; it is a problem which requires extensive debate in society.

Attacks on computers can go unnoticed by the user.
The Internet and legal issues

The many different ways in which the Internet is used are raising a great many legal questions. These relate to aspects of criminal law (e.g. Internet fraud), civil law (e.g. right of revocation in online trading) and also administrative law (e.g. fixing the conditions for online voting), which affect many of the issues covered below.

Can legislation in the Internet sector keep up with the pace of innovation?

Because of the extremely rapid development of the Internet, the question of how far the law can limp along in its wake becomes acute. One of the issues currently under discussion in Switzerland is the extent to which data should be regarded as a legal interest, and what responsibility should be placed on the different service providers for the different operations on the Internet. The Federal administration is currently clarifying the extent to which action is needed, and there are different views on the pace and scope of such changes.

A rough distinction can be made between two types of criminal behaviour on the Internet: First of all there is conventional criminality (fraud, criminal content such as child pornography, circumvention of trademark protection, violation of copyright law, unlawful competition, etc.) where the Internet is used as a medium. Crimes of this sort do not depend on the Internet, but the Internet can certainly help their proliferation. Aspects of criminal and civil law occur in equal measure in this problem area.

Examples can be found in particular in contract law and the law of liability, in competition law, copyright law and data protection law. In the case of contract and liability law, for example, there must be some clarification of how the liability of electronic transactions can be accurately determined in the contents, so that liabilities are defined. The question for content providers is how far they can be held liable for (illegal or controversial) content that is stored on their servers.

The Internet also makes unlawful competition easier. One example is the use of «defamation sites» on which competitors and their products are belittled. As another example, comments about hotels or other services might contain false information whose reliability other consumers may find it difficult to check.

With copyright law, the problem is that the use of Internet services has made it much easier to breach (e.g. with digitalised music), and in many instances it can realistically be hard to bring the perpetrators to account. And finally, with data protection law, the particular problem is how the right to informational self-determination already referred to can realistically be guaranteed, because an originator (e.g. the user of a Social Network) can very quickly lose control of his or her digitalised data.

As well as conventional criminality there are computer and network crimes (e.g. attacks on infrastructure and data theft), which have only been made possible by the existence and spread of computers and networks. According to statistics published by the Cybercrime Coordination Unit Switzerland, the particular problems discussed by users are white collar crime, hard pornography and spam.

Independently of these problems, additional questions arise regarding the intensification of international cooperation, local jurisdiction over such crimes and the means available to the State for Internet prosecution.

Are there Internet problems that cannot be legally regulated?

For some time now, national differences in regulations (e.g. relating to the admissibility of certain content on websites) have proved to be a stumbling block in the legal war against the improper use of the Internet. It may well be that the international community will never be able to agree on certain points, and that it will always be possible to effectively undermine national regulations. How do we want to deal with this problem?

The framework terms for international cooperation in Europe are defined in the Cybercrime Convention of the Council of Europe, which came into effect in 2004. This convention places an obligation on the contracting states to punish computer fraud, data theft and falsification of documents on the Internet, and infiltrating a protected computer system, for instance. The document was signed by 42 States and has so far been ratified by over 20 States. Switzerland was a signatory, but has not yet ratified the convention.

The Council of Europe’s Cybercrime Convention represents an obligation to punish improper use of the Internet.
Future developments

Up to now, quite a few hyped-up Internet trends have subsequently proved to be short-lived, which makes it particularly risky to make statements about future developments. Nevertheless, a number of innovations are emerging which could well shape the future development of the Internet.

Is the Internet part of the problem or part of the solution of the climate issue?

The extremely rapid growth of the Internet raises its energy requirement. According to a number of estimates, the percentage of power required globally for the Internet is in low single figures, although it is difficult to distinguish this requirement from the energy consumption of other information technology systems (mainframe computers, etc.). At present, it is only possible to achieve huge data processing performance by accepting a low level of energy efficiency. The energy requirement for cooling is correspondingly high. On top of that, the behaviour of users has changed (systems are running for longer). It must, however, be noted that Internet applications can help to reduce the energy consumption for specific activities.

One key issue is how different data can be meaningfully organised and made accessible. Applications such as Google Earth, for instance, make it possible to «visit» many regions virtually via satellite images. It is becoming increasingly possible to bundle geographical data with other data wanted by the user (e.g. details of service offers, cultural events, etc.).

Research in the Semantic Web field could also help to improve such information clustering in future. What this means is that it should be possible to read and interpret information available on the Internet by machines. There is sometimes talk of a «Web 3.0», should such applications ever become widely available.

What must be done if Switzerland is to play a leading role in the development of the Internet of the future?

In a number of instances in the field of computer science, Switzerland had failed to convert early scientific innovations into marketable products, and thus to be involved in the organisation of the Internet. Current Internet research is focusing on central questions of the information society, and opening up a broad field of activity for the universities as well as for companies of the future. What must be done to enable Switzerland to make optimum use of this potential?

There are hardly any technologies currently in use on the Internet which are oriented to this idea of the Semantic Web. Should such technologies ever be used on a large scale, this could certainly raise some very fundamental questions. Visionaries like Tim Berners-Lee see «social machines» in such applications, whose activity could have far-reaching and difficult to predict effects on the relationship between man and machine. Some of these questions were discussed in the TA-SWISS Study «The Emancipation of the Computer», and will not be covered further here.

Another development can be grouped under the term grid computing (also referred to as cloud computing). In rough terms, this relates to the notion of a joint, coordinated use of resources and the joint solution of problems within dynamic, inter-institutional, virtual organisations. Thus for example any computer connected to the Internet could make unused computing capacity available to other systems. There are a number of research projects currently ongoing around the world in the field of grid computing.

A third development that should be mentioned falls into the sphere of the so-called «internet of things». This term describes the most diverse technologies and scientific disciplines that enable the Internet to access objects in the real world. Examples are networks of sensors or so-called radio frequency ID tags (RFID). RFID is a method of automatically identifying objects and living things, where radio frequency tags are attached to consumer goods, for example. The bill can then be settled automatically at the checkout with a reading device generating an electrical field that is picked up by the tags and converted into a return signal. This enables the corresponding object to be identified. Such technologies are opening up a broad range of new possibilities, and are raising questions that cannot be discussed in greater detail here.

«Today’s interactive applications are very early social machines, limited by the fact that they are largely isolated from another.»

Tim Berners-Lee
2. Economy: How much has the Internet already permeated our working lives?

There are countless business processes that depend on a functioning Internet: customer representatives can keep in touch with their parent establishment, firms can organise their supply chains via the Internet, organising the financial markets is inconceivable without the Internet, and both small businesses and large concerns sell their products on the Internet. The Internet has become a critical infrastructure, comparable with the energy and water supply networks.

Can firms react to a partial Internet breakdown?

The Internet, and even internal company networks, are becoming a tool for reproducing as many data flows as possible within a company in real time. This increases the management’s control capabilities and enables, for instance, processes to be run in a more energy-efficient way. In addition, software applications are increasingly operated via the Internet and are no longer installed locally. Companies’ reliance on a functioning Internet is therefore constantly growing.

It must be assumed that mature economies like Switzerland, which are dominated by the service sector, rely heavily on a functioning Internet. Fairly long power cuts in business centres where relevant parts of the Internet infrastructure are based could adversely affect Internet use all over Switzerland. Internet services for communications, in particular, are not available while such faults are being rectified. Once the power supply has been restored, however, the Internet infrastructure could very soon be available again.

Are Internet users sufficiently aware of security?

Industrial espionage resulting from the use of the Internet by companies is on the increase: sensitive data are stolen as a result of the theft of mobile data carriers (laptops, BlackBerry, etc.), company computers are hacked into. This calls for clear guidelines from the companies on the handling, storage and availability of data that have to be transmitted to their employees in a suitable form. Investigations in this area, however, repeatedly point to defects. For example, many Internet users do not have an up-to-date browser installed, which means that attackers are able to exploit gaps in security that have been known about for a long time.

The destruction of key Internet cables can also be a problem, as demonstrated by a number of examples from the fairly recent past. The destruction of undersea cables by an earthquake off Taiwan in 2006 affected access to the Internet within Taiwan for many days. Attacks by hackers on Web servers also cause problems, as happened for instance in 2007 in Estonia, and in 2008 during the war in Georgia.

The economic effects of such breakdowns are difficult to quantify. Initial estimates suggest that a partial week-long breakdown of the Internet in Switzerland could cost the Swiss economy billions – not counting indirect costs.

The extent of the loss to a national economy caused by a partial Internet breakdown reflects the enormous economic importance of the Internet. The Internet is now more important for contacts between firms (business-to-business, B2B) than for their contact with the end customer (business-to-consumer, B2C). Estimated annual turnover figures for B2B globally differ considerably, but are nevertheless in the region of several trillion dollars. By contrast, turnover in the B2C sector amounts to several hundred billion dollars – quite a bit lower.

How can Switzerland exploit the economic potential of the Internet to the maximum?

There is no doubt that the Internet has created an infrastructure that brings with it considerable commercial potential for a national economy. In the first instance, this directly concerns the development of new technologies, which can lead to the establishment of Internet-specific companies. Secondly, tools can be developed for using the Internet to optimise business processes, for instance, in existing companies. Thirdly, new possibilities are opening up for consumers. How can the Swiss economy derive the optimum benefit from this potential? Is there, for example, a need for state incentive schemes?

If there is a major week-long Internet breakdown in Switzerland, the resulting losses will be in the billions.
Internet and e-business

The economic significance of the Internet is certainly not something that can be dealt with in just a few lines, especially because the value-added chains of entire industries have to some extent been largely restructured. A few comments are nevertheless appropriate. One characteristic feature of e-business is that even very small groups of customers can be reached efficiently, and that good use can be made of so-called economies of scale. What this means is that the costs of selling and marketing products and services are low, and the volume of customers that can be reached is very high.

→ Does the Internet have a monopoly problem?

It is worth noting that in key sectors of the Internet industry, very few companies dominate a majority of the market, as in the network equipment sector, for example (Cisco), or search engines (Google, Yahoo). The incredibly rapid rise of these companies does, however, also show that such «quasi-monopolies» might be more unstable than in other industries. The question that therefore arises is what problems market power causes on the Internet.

The innovation dynamic in information and communication technology is extraordinarily high, if we compare them with other industries and research fields. This is evident, for instance, from the fact that global patent ranking lists are all dominated by IT companies such as IBM, Samsung, or Hewlett-Packard. But even an Internet-driven economy is not immune from speculative bubbles. Remember the so-called dot-com bubble in the period 1995 to 2001. At the time, forecasts of substantial profits, driven by new technological developments, mainly in the computer and Internet sector, caused the share prices of a great many newly established firms to rise sharply in a short time. When this speculative bubble burst between March 2000 and March 2001, a huge amount of investor capital was wiped out.

In the last few years, the number of Internet-based business models has once again increased considerably, although it is difficult to distinguish them from the ICT (Information and Communication Technology) sector as a whole. In Switzerland, there are around 13,000 companies in this sector, with a total of just under 107,000 employees (figures from 2005, IT staff in other industries such as banking are not included). The sector contributes over 7.3% to Swiss gross value added. Most of the associations within the sector are grouped together in the umbrella organisation ICTswitzerland.

→ How can we recognise serious service providers on the Internet?

Firms can look highly professional on the Internet at a relatively low cost. From the consumer’s point of view, this leads to the problem that it has become more difficult to distinguish serious from non-serious providers of products or services. The question that therefore arises is what measures industry federations or other organisations can use to bolster customer confidence in e-business.

Other sectors are coming under severe economic pressure because of the Internet. This affects, for example, companies that rely on enforceable copyright, such as those in the music industry. But there are also media companies that have had to react to the challenge of the Internet, especially because their sources of income, such as job adverts, have come under severe pressure because of the Internet. The business models of the sectors affected are currently undergoing a process of transformation.

The Swiss information and communication technology sector contributes 7.3% to gross value added in Switzerland.
Work and consumption

The use of the Internet is changing the world of work in many different ways. For an individual looking for work, the Internet already makes the search for new jobs easier. Today’s job seeker can find out much more about a future employer than before. Business-oriented Social Networks, which already cover millions of people, also make it easier to look for projects and jobs.

On the other hand, data on private individuals that can be found in all sorts of different places on the Internet means that companies are able to find out more about their future employees. There is therefore a growing number of Internet services which allow a selective search for available data from a specific person on the Internet.

Must I always be contactable?

The use of Internet-based communication tools means that employees are increasingly expected to be contactable at all times. Customers, too, increasingly expect a more rapid response to their needs. The traditional time-structuring of work processes (breaks, leisure time) is therefore being progressively neutralised – so it must be expected that the boundary between work and leisure time will become even more blurred. The fact is that the technologies associated with these forms of communication will allow a company to exercise much greater control over its employees (presence at the workplace, what sort of activity they are involved in, etc.). While a company can legally only collect data that directly relate to the employer-employee relationship, how can it be prevented from making use of the technical possibilities as well?

In the work process itself, there have of course already been many changes. Some working procedures (especially those that involve the writing of texts, programs, etc.) can be done irrespective of location and can be managed in new ways by collectives – a development described by the terms Crowdsourcing and Wikinomics.

Is the Internet mixing up the workplace again?

New Internet-based forms of work could well increase over the next few years. There has, however, as yet been little investigation of the extent and impact of a «digitally allocated work process». A number of different questions arise: To what extent will jobs be reallocated globally? Who will be legally responsible for mistakes in products generated by a community, if the employees are subject to different labour laws? What will such developments mean for the workers’ trade union organisation?

Crowdsourcing means the outsourcing of working processes to the working capacity of a large number of users – «digital home working», as it were. This work is either paid on a piecework basis or provided on a voluntary basis (as is the case with Wikipedia). The term Wikinomics refers to new ways of organising working processes without a strict hierarchy. At present, only a few workforces within a national economy could be integrated into such Crowdsourcing or Wikinomics systems, or earn the bulk of their income from such work.

The Internet does, of course, change consumer behaviour as well. Apart from the manifold possibilities of e-shopping, Internet services such as Social Networks are also becoming a source of information, and are competing with traditional advertising, Information from manufacturers and consumer guides by assessing products and services.

Is personalised advertising a blessing or a curse?

There are signs of a marked trend in advertising towards focusing on media in electronic channels, because this enables targeted canvassing of customers. This is made possible because Internet search and surfing behaviour, as well as personal data are stored on the Internet. Marketing companies see huge potential in personalised advertising, track the results of search enquiries or contact members of Social Networks directly. As a result, the boundary between advertising and non-commercial communication is becoming blurred. Data found in Social Networks also allows conclusions to be drawn about brand acceptance. This is expanding the spectrum of market research methods. Economic pressure is also certain to increase on media companies, which are financially dependent on advertising but are unable via their products to make focussed advertisements.

New forms of work allocation are evolving on the Internet.
Virtual economies on the Internet?

It is conceivable that broader economic effects might emerge as the Internet develops in the future. In the environment of major online games or virtual worlds, such as Second Life (see chapter 5), there are signs of an increasing trend towards the setting up of a virtual economy with its own currency. For example, a market has already been created for game performances (e.g. skills achieved in games), where players can acquire new skills for their gaming pieces, without actually having to win them themselves. Another example is the company Tencent – one of China’s biggest Internet portals – which has created a virtual currency with the QQ Coin, which were originally used as bonus points for successful online gamers and could be exchanged for ringtones and the like. So in 2006, they began to use QQ Coins generally as a means of payment. Because the Chinese government was afraid that in the long term this might evolve into a parallel currency to the Yuan, in 2007 it banned QQ Coins as a means of payment for real goods.

What effect do virtual economies have on real national economies?

The sales generated in virtual economies are still very low compared to the real economy. Nevertheless, it is conceivable that in such virtual economies questions will very soon become relevant that are also important for the real economy: Who will control the money supply? Who will enforce ownership rights? How will the added value generated there be taxed? What guarantee will there be that virtual economies cannot be used to launder criminal funds? There are thus many different sectors in which virtual economies could conceivably be able to bring some influence to bear on real national economies.

There is also a parallel currency in the virtual world Second Life, the Linden dollar, which can be used to generate profits that can then be converted into real dollars. In March 2008, for example, the company reported that transactions between users of Second Life had totalled the equivalent of over 25 million dollars. Such virtual economies are, of course, also of interest for economic research, because the economic process can be recorded digitally, and is therefore accessible to academics. In that respect, real economic experiments of uncertain outcome are being developed on the Internet.

New currencies are being created on the Internet.
3. Education: What must we know about the right way to deal with the Web?

The use of the Internet for educational purposes was a central element of the first Internet boom in the 1990s. Universities and research centres in particular played a substantial part in the setting up and development of the Internet.

Today, we can distinguish three different aspects of the Internet-education complex. Firstly, there is the question of which techniques have to be learned in order to be able to use Internet services at all. In the simplest case, this involves the ability to operate browsers, e-mail programs, etc. Occupations such as Web design, etc. call for a knowledge of more complex programs that may now be required at numerous vocational colleges, universities of applied sciences, universities or private schools. Secondly, it is a matter of using the Internet in teaching within the framework of so-called e-learning. Thirdly, it is about the Internet as object of reflection in teaching, and thus about the skills that are required for dealing with the possibilities of the Internet in a socially acceptable way.

The «Internet and education» complex is part of the fundamental question: which educational targets are required within a so-called knowledge society for members of a society to be able to deal practically with the possibilities of modern electronic media? A central element in this regard is to pass on media competence through the education system, which will help in understanding the qualities and differences of the content of mass media, as well as the Internet, and as a result to be able to tackle the issue actively and critically.

The repercussions of Internet use on social processes also have to be taken into account. It is known, for instance, that the use of new media impacts on the use of language.

How do we prepare children for dealing with the Internet, when it is changing so quickly?

The education system cannot restrict itself to passing on technical skills for using Internet services. It is rather the case that the Internet itself (and media relations generally) must be taught as a subject. Depending on the type of application, there are a multitude of other skills to be taught here, including general media skills and the ability to judge the correctness and relevance of data found on the Internet. It is also important to learn about how to use Social Network services – for instance regarding the publication of private data. But how quickly and comprehensively can the new and constantly changing possibilities of the Internet be added to the teaching curriculum anyway?

The Internet as a source of information

Viewed in purely quantitative terms, in the wake of the stupendous growth of the Internet, it has become possible to call up vast amounts of information. The number of websites is now (autumn 2008) in the order of 200 million, on which, according to different sources, between several tens of billions to over one trillion individual documents (web pages) are accessible. On top of that, there is a huge number of databases containing newspaper articles, scientific publications, patents, court judgements, etc., which are available from the Internet free or subject to a charge. Major projects such as Google Book Search – a collaboration between the Internet company Google and a number of major libraries to record the contents of all books digitally – will further expand this volume of data. As yet, these figures say little about the relevance and quality of the information, but they do illustrate a development in which the Internet plays a central role: data that are derived from human activities (writing, interacting, researching, searching on the Internet, etc.) are being increasingly recorded and stored digitally.

There are up to 30 billion web pages accessible on the Internet.
The Internet and e-learning

The period of the first Internet boom saw the establishment of e-learning as a general name for all forms of learning where digital media were used to pass on knowledge. There are numerous other, largely synonymous terms that are used, such as online learning, tele-teaching, Computer Based Training, multimedia learning and Open and Distance Learning.

How can we make optimal use of the new possibilities of e-learning?

The Internet allows simple access to huge volumes of teaching material, such as lecture notes. But nothing has been done about just putting the information together. The usability of Websites must therefore be guaranteed, simply making sure that the data made available is also available to people with disabilities, such as the blind. This is primarily a technical task, to extend the range of educational facilities to cover these groups and to assemble the data for the appropriate resources. Different socio-economic user profiles must also be respected, such as must be taken into account in internal company further training courses which are reliant on e-learning. There is also the issue of the age at which we should be confronted with electronic educational content.

Computers have certainly been used for educational purposes before. But the Internet makes it possible both for learning content to be adapted more quickly than is the case, for instance, when using CD-ROMs, and also for virtual learning communities to be educated in different time or geographical zones. Developments in recent years have led to a differentiation of e-learning in many different applications: Internet-based learning programs, lectures or learning games allow a multitude of interactive forms to be embedded between teachers and students using e-mails, chats and discussion forums, occasionally using audio and video streams (e.g. in the form of videoconferences or tele-teaching). The cost of producing such applications is sometimes considerable, and higher than for conventional aids.

The promises about the effectiveness of the new media for passing on learning content that accompanied the promotion of Internet-based e-learning in the 1990s have given way to a certain disillusionment. There is hardly anyone these days who claims that e-learning could largely supersede the conventional passing on of knowledge. It is rather the case that these new methods are regarded as complementing presence teaching – we also talk about integrated learning. The question that then arises is what financial resources should be made available for which form of education and for which educational medium.

What does Internet-based education mean for the way of learning?

Education via the Internet has an impact on the organisation of time in learning. Traditional learning in schools and other educational institutions is locality-bound (students gather in one place) and synchronised in time. These characteristics are fragmented by e-learning; this has both advantages and disadvantages, which are increasingly the subject of research in educational science. Asynchronous learning demands more self-discipline, goes hand in hand with social decoupling, and is more prone to distraction and interruption. In internal company training programmes in particular, there are indications of a tendency for employees to be expected to make more of their leisure time available for learning purposes. Such tools also enable learning success to be constantly controlled; this can have a positive impact on the individual, but also enables external monitoring and thus increases pressure on the learners.

E-learning cannot supersede, but can complement conventional presence teaching.
Beneficial value and misuse of Internet data

The Internet makes it easy to access, publish and distribute information, and in purely quantitative terms that has led to an enormous increase in digitally stored information. As a result, hitherto undreamed of possibilities for obtaining access to all sorts of knowledge quickly and (often) free are opening up for the individual.

→ Is the Internet encouraging superficiality?

Like no other generation before them, today’s schoolchildren and students have access to all kinds of data. But how are these data used? A number of studies have suggested that the use of Internet material for educational purposes often means that texts are dealt with over-hastily and superficially. The apparent information overflow there changes how material is handled; instead of looking at just a little information in depth, learning techniques such as speed reading and classification of information are becoming more prominent. What effects will that have on learning? Are we now learning a lot, but superficially?

The question of how far data accessible on the Internet are still relevant and new is one that is increasingly being asked – especially because in (higher) education the creation of something «new» (projects, essays, etc.) is part of the learning process. Plagiarism – the illegal use of other people’s texts and results for one’s own projects without indicating the source – is much easier to accomplish these days, and various studies have pointed to an increase in such cases of plagiarism in assessed qualification work at universities.

That is why a number of universities have therefore started to install special software which compares texts with texts that have already been published and are accessible on the Internet, and should therefore recognise cases of plagiarism. This counter-strategy is, however, limited in scope, because such software cannot access many texts (e.g. those in the databases of journals and periodicals that are subject to a charge), or because translations in other languages cannot currently be detected.

Apart from the problem of plagiarism, however, there is also a question mark generally over the correctness of data found in online encyclopaedias. Wikipedia, for example, currently (September 2008) combines around 15 million articles in over 250 languages. This led to the problem of interest groups, companies or individuals deleting or falsifying information in entries that they did not like. Traditional mechanisms for ensuring the correctness of data (such as specialist editorial departments) can only have an inadequate impact here.

Easy access to data encourages schoolchildren and students to resort to plagiarism.
There is already an abundance of e-learning products in Switzerland at public school level. The Swiss Education Server, for example, is a joint project between the Federal administration and the Cantons that has been in primary schools and at upper secondary level since 2001. It consists of a five-language information platform and an interactive work and learning environment for school and training where more than 400,000 teachers and learners have a virtual identity and virtual tools at their disposal.

Are teaching staff ready for this focusing on the Internet in teaching?

From a technical point of view, schools in Switzerland are well prepared for using the Internet. Converting a media education into practical teaching, however, also requires a high level of skill among teachers and compulsory content in teaching plans. There is still plenty of potential for development in these areas, but this competes with other demands placed on the school.

At higher education level, the Swiss Virtual Campus programme was recently completed; so far it has run over 80 online courses. These content-based products must be distinguished from the Public Private Partnership «School on the Web», which has also been completed recently. One of the outcomes of this programme is that more than 1,200 senior teaching staff have been trained and over 95% of all Swiss school buildings now have an Internet link.

Which Internet experts do we need?

Discussions are currently under way about the shortage of specialists in the ICT field, under the banner «shortage of computer scientists». The question here, however, is to what extent the key term «computer science» describes the relevant problem. The knowledge society of the future, in which Internet services will assume a crucial role, does not just call for the ability to design user-friendly computer systems and operate them skilfully. The questions here are rather more fundamental; for instance, how to optimise the process of searching for, categorising and using digitally represented information. This calls for a new approach to the structure of higher education in information science, which is breaking away from its focussing on technical computer issues. Have the politicians and representatives of trade and industry recognised the relevance of this topic in time?

Being conversant with information and communication technology is a key competence at all levels of training and further training.
4. Politics: Will the Web make us better citizens?

The Internet makes it easier for individuals and organisations to be involved in the processes of decision making and formulating objectives and demands of a diverse, mainly political nature – we call it participation. Particularly in Switzerland, with its system of direct democracy, the question that arises is how the Internet can be used for political debate and formulation of political objectives and demands.

The emancipatory potential of the Internet, carried along by the idea of a free exchange of information was generally described as the central element of an Internet revolution in the first boom phase of the Internet in the 1990s. The Internet is supposed to enable citizens to participate in formulating objectives and demands in politics and government in a multitude of ways. As well as this participation in politics in our own country, the Internet is also supposed to make it easier to form global opinion – for instance when there is a protest to be organised against some inhuman policy in certain states.

Where are the boundaries of freedom on the Internet?

The Internet has recently assumed greater importance as an instrument for mobilising the masses for political purposes – e.g. Social Networks for mobilising large-scale protest actions. In doing so, however, it also became evident that extremist groups are using the Internet for internal organisation (e.g. in preparation for demonstrations) or for spreading views that might be illegal, depending on the legislative situation in the countries concerned. How should the fine line between opinion forming and propaganda be dealt with on the Internet?

In the light of the Internet being used for political purposes, the question that arises is the relative importance of censorship – the control of information by a state or other organisation with the aim of only allowing information to be consulted if it is legally permitted or desirable. This then raises two different questions. Firstly, there is the question of how socially desirable censorship measures (e.g. the banning of child pornography) on the Internet can be put into effect. Legally, the situation is a fundamentally straightforward one (i.e. the law stipulates what content is subject to censorship), but from a practical point of view, it is much more difficult to punish a violation of the censorship regulations, because the people who distribute banned information (or their web servers) are often resident in states where there is no possibility of getting to them legally. But it is at least possible to be able to get hold of those using banned information within the national territory concerned (e.g. in the case of child pornography).

Secondly, there is the question of the dissemination of (often political) information in repressive states by opposition forces (and, of course, from the point of view of the states concerned this information is also banned by law). According to the OpenNet Initiative, political and other Internet content is currently censored in 26 states, including China and Iran. In these states, certain content is systematically blocked by the use of modern filter technologies – in Iran, for example, websites with political, sexual and feminist content. Such endeavours do, however, regularly come up against their boundaries: on the one hand, because filtering techniques can be circumvented, or on the other hand have too extensive an effect, which means that sites are unintentionally blocked that should actually remain open (e.g. those with scientific content or government propaganda).

How neutral should the Internet be?

New technologies enable network operators to control the nature and convenience of information usage. This violates so-called net neutrality. Accordingly, despite the fact that the Internet infrastructure is available, the question for the future may be whether there is free access to (certain) Internet services – especially because more services are being offered (e.g. Internet television, local information services) that place higher technical demands on the infrastructure. It is, for instance, conceivable that services providers such as Google, eBay, Skype or the like will be charged for access to their customers. In this case, there would also technically be the possibility of granting access exclusively, that is to just one service provider. This gives a new dimension to the problem of censorship.

26 states censor access by their citizens to the Internet.
Opinion forming on the Internet

In democratic countries, another issue arises, as well as the problem of censorship: that of Internet offers from different political parties or other services being used to influence opinion forming. In Switzerland, with the «Smartvote» service it is possible to compare the political profile of candidates and parties with one’s own profile. Surveys have shown that during the 2003 elections about three-quarters of those using Smartvote were reported to have changed their voting behaviour. More than 850,000 voting recommendations were made for the National Council elections in 2007. It must therefore be assumed that such services can certainly exert some influence on election results. But they can also change the role of the parties, which because of such services are no longer regarded as rallying points for certain political views.

Does the Internet support political prejudice?

The Internet provides a multitude of data which can add support to the forming of opinion. But what is questionable is whether these data should also be used in this way. Research in the USA is at least arousing doubts, because people who use political information services do so primarily to seek out those which provide information that corresponds to their own views.

A complex of themes related to this refers to the appearance of new forums for opinion forming and communication, especially in so-called political blogs. In the USA, as far as acceptance by their readers is concerned, some blogs have already caught up with traditional media. As a result, individual blogs form a key additional element in the political opinion forming process. Blogs – but also other applications, such as Social Networks – have eventually become, for the traditional media, a place where political issues are investigated and taken up. The Internet is therefore becoming, not just a place for research, but also to discover issues which can then enter the political process.

What will it take for the population to accept e-voting as secure?

One current topic relating to participation is the use of the Internet (and other communication systems) for elections and ballots (e-voting). Since 2003, Cantons Geneve, Neuchâtel and Zurich have been conducting trials with e-voting, which have so far run smoothly. But it could still be some years before e-voting is also used for popular ballots in Switzerland, especially because there must be a guarantee that such popular ballots cannot be falsified.

Finally, we should look briefly at E-Government, a problem area that has been under discussion for many years. What we understand by this is the simplification of the processes of information, communications and transactions between state institutions, the inhabitants, and also the companies of a country, by the use of the Internet and other communication technologies. This might, for example, be online access to the authorities or electronic voting. If any form of simplifying the shaping of political opinion using the Internet is meant, we call this e-participation.

In January 2007 the Federal Council adopted Switzerland’s E-Government Strategy. Accordingly, this should first of all improve electronic contact between administration and economy, and between and among administrations. But citizens should also have a greater potential for initiating processes with the authorities electronically (e.g. applying to the Federal Office of Communications for a radio franchise). There are a great many initiatives currently at the planning or realisation stage in this field.
5. Leisure: How much does the web determine what we do in our free time?

As well as the Internet being used for work, education and politics, leisure is the fourth area in which it has assumed much greater importance. These days, a great many people use Internet services for organising their free time – for planning holidays, initiating contacts or searching for cultural events.

Does the Internet make the search for partners and friends easier?

The Internet is still not the location of choice for initiating contacts, when looking for either friendships or for partners. But it could well assume an increasingly important role here. According to a study recently conducted in Switzerland, about one-sixth of those questioned indicated that they had found a partner through the Internet, and just under half of users could imagine themselves looking for a partner on the Internet. The main advantages people gave for initiating contacts on the Internet were the huge choice and the possibilities for selection. But the Internet also has an effect on existing partnerships, because it makes it easier to look (secretly and anonymously) for additional partners.

A number of studies provide a more precise estimate of which Internet services are used. However, it is often not clear what these services are actually used for. Activities that are clearly identified as relating to leisure, such as consulting events calendars (27%, Swiss figures for 2007), downloading music (17%) or films (5%), chat (13%) or using virtual worlds (over 1%) are, however, generally mentioned less frequently than commercial activities such as e-banking (35%), online shopping (28%) or price comparisons (23%)

The online study by the German broadcasters ARD/ ZDF in 2007 distinguishes between information and entertainment motives. It was particularly evident from this study that just under half of young Internet users (14–19 years) are only interested in entertainment. On average, people (in Germany) spend 54 minutes a day online, which still corresponds to almost a quarter of daily television viewing.

Is there such a thing as Internet addiction?

Since roughly the mid-1990s, social psychologists have been discussing the phenomenon of online addiction, or Internet addiction. This is not as yet an established diagnostic category according to the classification systems for psychiatric disorders. Among the ways that such Internet addiction manifests itself is an excessive use of chatrooms, playing games for hours on end, excessive consumption of pornographic material and compulsively searching for information. The benchmark for Internet addiction is if a person spends 35 hours or more a week on the Internet. According to a study published in autumn 2008, there may be as many as 70,000 online addicts in Switzerland.
Social Networks and games

One typical example of modern Internet use is the application of so-called social software and the setting up of Social Networks. Social software is a term used to describe programs that enable information, identity and relationships to be managed on Internet-based applications. These take many different forms, including tools for the free keyword indexing (tagging) of content or communal entries of Web content (Wikis).

Am I protected against cyber-mobbing?

Social software and information about a person on the Internet can be used to deliberately spread denigrating or libellous information about people; this is known as cyber-mobbing (if young people are targeted, it is also known as cyberbullying). If data (e.g. compromising photographs) are published without permission, this is regarded as an invasion of privacy. In practice, however, such attacks, which are generally anonymous, are hard to prevent, and the perpetrators difficult to trace.

Software applications which enable personal data (text, images, video) to be broken into, managed and put in contact with other similarly structured profiles, have become very important. In recent years, they have led to the setting up of so-called Social Networks – websites on which there are hundreds of millions of people with personal profiles present.

How much personal information should I reveal?

In Social Networks and other services, users essentially have a free hand with regard to what, and how much information they wish to reveal. Depending on what their aim is (looking for a partner, staying in touch with friends, etc.), people have different profiles, which may also contain false information. Current indications are that many people are incredibly generous with the personal data they disclose in their profiles. This occasionally observed «exhibitionism» on the Internet goes hand in hand with similar social trends that are encouraged by some mass media (e.g. TV shows in the style of «Big Brother»). This raises important questions regarding the protection of the private sphere. Accordingly, the information is prepared in a defined context and the right to informational self-determination prohibits this information from leaving that context. Do the operators of Social Networks take this principle into consideration? And can this context-dependency of information on the Internet actually be enforced anyway?

Another way in which the Internet is being used with increasing frequency are games. There are three distinct areas here: games of chance, online gaming with (more or less) defined game targets; and also virtual worlds with a more playful character and with no clearly defined rules. The first variants consist of products like online casinos, online poker, sports betting and other games of chance, although unlike real games for money the anonymity of the players is greater and the regulatory authorities are less able to control them. Reliable estimates regarding the number of players and turnover figures are very hard to come by, but annual turnover figures are certainly in the order of several billion Swiss francs. Global efforts are under way to ban, or at least to strictly control such products – apart from anything else because there is a suspicion that such products are used to launder illegal money.

Online gaming – games which are accessed via a computer network – can be regarded as a subgroup of computer games. Here too, it is difficult to obtain reliable figures on the number of players. So-called Massive Multiplayer Online Games are increasingly popular; these involve a large number of players. One well known example is «World of Warcraft», which currently has over ten million subscribers.

Finally, virtual worlds such as Second Life, in which users use artificial avatars to interact with each other, are probably regarded by users as primarily games. But such virtual worlds, with many millions of users already, can also take the form of simulated social interaction systems, in which as well as initiating contacts, or playing around with the possibilities of these certainly economically relevant activities (e.g. job searching).
Further information

Books on the subject


Selected reports
(last accessed: September 2008)

ARD-ZDF online study: www.daserste.de/service/studie.asp


Digital divide: www.itu.int/ITU-D/digitaldivide


Websites of organisations
(last accessed: September 2008)

Swissconf Education server: www.swisseduc.ch

German self-help organisation for online addicts and their families: www.onlinesucht.de

E-Business-Watch: www.ebusiness-watch.org

Educa, the Swiss education server: www.educa.ch


ICANN, Internet Corporation for Assigned Names and Numbers: www.icann.org

ICTswitzerland, umbrella organisation for the key associations and organisations in the Swiss computer science and telecom sector [only available in German and French]: www.ictswitzerland.ch

IETF, Internet Engineering Task Force: www.ietf.org

Information Security Society Switzerland: www.iiss.ch

Internet Governance Forum of the UNO: www.intgovforum.org

Internet World Stats: www.internetworldstats.com

The computer science year in Switzerland: www.informatica08.ch

Swiss Federal Coordination Office Information Society: www.bakom.admin.ch/infosociety

Cybercrime Coordination Unit: www.kobik.ch

MELANI - Reporting and Analysis Centre for Information Assurance: www.melani.admin.ch
About the Project

Experts consulted

The following experts were consulted in the course of preparing this brochure. Members of the academic supervisory group for the «Internet of the Future» project are listed in the column aside. TA-SWISS is grateful to all of these people for their cooperation and assistance.

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Glossary

**Avatar:** An artificial person, usually in the form of a graphic representation of a real person in the virtual world, for example in a computer game.

**Blog:** Contraction of «Web» and «Log»; a diary kept on a web page and therefore open to public view.

**Botnet:** An array of computers on which malicious software is installed, enabling them to be controlled by third parties for specific actions (e.g. mass sending of e-mails).

**Browser:** A program for viewing >Web pages on the >World Wide Web.

**Content Provider:** Individual, institution or company that publishes data on a >Website.

**Crowdsourcing:** Outsourcing of business tasks to a large volume of (spare-time) workers on the Internet.

**Denial-of-service attack:** Attack with the aim of stopping a service accessible via a >Website. If the >Website is attacked simultaneously by a lot of computers that are part of a >Botnet, this is known as a distributed denial-of-service attack.

**Drive-by infection:** Unintentional downloading of >Malware simply by visiting a >Web page.

**ICT:** Abbreviation for Information and Communication Technology. It refers not just to Internet technologies, but also to e.g. mobile telephone technology.

**Malware:** Artificial word made up from the terms «malicious» and «software»; generic term for programs that perform harmful functions on a computer.

**Net neutrality:** Requirement that access providers should transfer data packets to their customers regardless of where they come from or what applications the packets have generated.

**Tagging:** English abbreviation for shared indexing of content (for example allocation of keywords to texts).

**Trojan:** Also known as Trojan horse; a program belonging to the >Malware group which is disguised as a useful application, but performs another function in the background without the user’s knowledge.

**Web page:** A file accessible via the Internet and displayed in a >Browser.

**Website:** A standardised Internet site of an organisation, a company or a person that consists of a number of >Web pages and other files.

**Web server:** A computer which contains a >Website’s data and makes these accessible on the Internet.

**Wiki:** A >Website, whose content can be modified online by users, and not just read.

**Wikinomics:** A form of internet-based economic system with self-organised structures and hierarchies.

**World Wide Web (WWW):** All of the >Websites accessible via the Internet.
The Centre for Technology Assessment

New technology often leads to decisive improvements in the quality of our lives. At the same time, however, it involves new types of risks whose consequences are not always predictable. The Centre for Technology Assessment TA-SWISS examines the potential advantages and risks of new technological developments in the fields of life sciences and medicine, information society and nanotechnologies. The studies carried out by the Centre are aimed at the decisionmaking bodies in politics and the economy, as well as at the general public. In addition, TA-SWISS promotes the exchange of information and opinions between specialists in science, economics and politics and the public at large through participatory processes, e.g. PubliForums and publifocus. Projects conducted and commissioned by the Centre are aimed at providing objective, independent, and broad-based information on the advantages and risks of new technologies. To this purpose the projects are conducted in collaboration with supervisory groups comprised of experts in the relevant fields. The professional expertise of the supervisory groups covers a broad range of aspects of the issue under study. TA-SWISS is attached to the Swiss Academies of Arts and Sciences.