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## National Dependability Policy Environments

### SWITZERLAND

Report Version: Final  
Report Preparation Date: 1 November 2002  
Classification: Public  
Preparation led by: Ernst Basler + Partner (CH)

Contract Start Date: 1 June 2001      Duration: 18 months  
Project Co-ordinator: RAND Europe (NL)

Partner: RAND Europe (NL, Project Coordinator); King's College London (UK);  
Cell Network (S); IABG (D); Almaweb (I); LINK (P); ELIAMEP (GR);  
Ernst Basler + Partner (CH), Isdefe (E)



IST-2000-29202

Project funded by the European Community  
under the “Information Society Technology”  
Programme (1998-2002)

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## **Overview of the Country's Information Infrastructure**

Switzerland is an advanced ICT country. Within the OECD, Switzerland has the highest per capita expenditure on information and communication technologies, followed by the USA and the Scandinavian countries.<sup>1</sup> Switzerland's ICT expenditure per capita in 1997 was 1990 EUROS and rose to 2706 EUROS in 2000. This represents a growth rate of 36 % and an annualised growth rate of 11 %.<sup>2</sup> The contribution of ICT to the GDP has increased over the past five years. Whilst the contribution was only a little higher than 6 % in 1997, it was almost 8 % in 2000.<sup>3</sup> In the year 2000 total ICT sales reached 34 billion EUROS.<sup>4</sup> In international terms, the portion of the ICT sector to total employment in Switzerland is high. In 1995 it represented 5.2 % and increased to 6 % in 1998. Employment in the ICT sector is dominated by services representing 54 % of total employment (30 % wholesale, 24 % IT services).<sup>5</sup> In terms of the contribution of ICT manufacturing and services to foreign trade, Switzerland's balance of trade is negative in all product segments of the ICT sector. It is especially apparent in software (23 %), computer hardware (23 %) and communication technology (48 %).

In terms of ICT penetration, Switzerland is more advanced compared to most OECD countries.<sup>6</sup> In 1997, 13% of the population used the Internet. This increased to 51 % in 2001, of which 45 % use it at least once a week.<sup>7</sup> More than 90% of all Swiss households now have access to cable television. This is the highest figure in the world. Furthermore 60,000 households have broadband access to the Internet via a cable modem.<sup>8</sup> With regard to penetration in businesses, in the year 2000, 82% of all small and medium-sized enterprises (SME) in Switzerland used PCs. In 45% of the enterprises more than 50% of all employees have access to a PC. In 2000, 33% of all SMEs had their own web-site, and more than half (57%) used the Internet.<sup>9</sup> Today, 35% of all companies in Switzerland use electronic data interchange (EDI)<sup>10</sup> with suppliers and customers. This figure places Switzerland in fifth position in the European rankings, behind Finland, Ireland, France and Great Britain.

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<sup>1</sup> 3rd Report of the Information Society Co-ordination Group (ISCG) to the Federal Council, 30 April 2001, p. 17.

<sup>2</sup> European Information Technology Observer (EITO) 2001, p. 505.

<sup>3</sup> EITO 2001, p. 505.

<sup>4</sup> Protelecom the Swiss Telecom Association, Jahresbericht 2000, available at [http://www.protelecom.ch/upload/file/JB\\_2000.pdf](http://www.protelecom.ch/upload/file/JB_2000.pdf) (visited on 19 December 2001).

<sup>5</sup> "Statistik Schweiz, Informationsgesellschaft, Beschäftigte in IKT-Wirtschaftszweigen im internationalen Vergleich", available at [http://www.statistik.admin.ch/stat\\_ch/ber20/indic-soc-info/ind30602d\\_2\\_synth.htm](http://www.statistik.admin.ch/stat_ch/ber20/indic-soc-info/ind30602d_2_synth.htm) (visited on 19 December 2001).

<sup>6</sup> See Footnote 6.

<sup>7</sup> Baromedia, jährliches Barometer der Schweizer Medien, available at [http://www.webdo.ch/downloads/baro2001\\_d.pdf](http://www.webdo.ch/downloads/baro2001_d.pdf) (visited on 19 December 2001).

<sup>8</sup> Swisscable news, available at [http://www.swisscable.ch/deutsch/startframe\\_d.htm](http://www.swisscable.ch/deutsch/startframe_d.htm) (visited on 28 November 2001).

<sup>9</sup> 3rd Report of the Information Society Co-ordination Group (ISCG) to the Federal Council, 30 April 2001, p. 22.

<sup>10</sup> Electronic Data Interchange is a standardised data format for exchanging business information across computer networks. A substantial amount of business-to-business electronic commerce is conducted using EDI. In the past, EDI transactions were made across closed networks. However, the internet, intranets and extranets, are now being increasingly used as data carriers for EDI.

In the public sector, public administration has only recently promoted e-government developments. Since greater demands for customer-friendliness and competitiveness have been imposed on the administration under the framework of “New Public Management” projects, the significance of Internet use for these objectives was quickly recognised.<sup>11</sup> Now, for example, each cantonal administration has on average over 20 PCs per one thousand employees, although in only a quarter are more than 80% of PCs connected to the Internet. Every canton has a web presence. This percentage in municipalities varies with their size.<sup>12</sup> The most important use of Internet portals at municipalities remains information – only a limited number of transaction solutions are planned or as yet available.

15 out of 21 cantons today have an Internet strategy or intend to implement one by the end of 2001. The cantons and municipalities are valuing the importance of e-government more highly. The lack of personnel or financial resources is the most important factor preventing early adoption. It should also be noted in comparison to traditional ways of voting, e-government services are not perceived as adding great value. 61% of private individuals whose local authority provides a web-site have visited it at least once in the past 12 months. In the overwhelming number of cases (80%) however, frequency of use is described as sporadic and/or rare.<sup>13</sup> The number of PCs per inhabitant in Switzerland continues to be amongst the highest in the world. There are currently more than 60 PCs per 100 inhabitants.<sup>14</sup>

In terms of ICT infrastructure, the telecommunications market has witnessed major developments since deregulation in 1998. Particularly noteworthy is the number of licensed providers and providers subject to registration – 161 and 155 respectively in 2000. According to the latest estimates, the number of mobile phone users in Switzerland is currently more than 4,618,000, a penetration rate of 64.5 %.<sup>15</sup>

Switzerland has traditionally had an excellent system of wired phone connections with one of the highest density in the world.<sup>16</sup> In 1998 there were 68.2 lines per 100 inhabitants. This figure increased to 70.9 per 100 inhabitants in 1999. The density of ISDN lines<sup>17</sup> is also comparatively high. In 1998 there were 47.8 lines per 1,000 inhabitants. In 1999 the number of ISDN lines fell slightly.<sup>18</sup>

Despite a high ICT penetration and an above average level of awareness of the Internet, use of electronic commerce services (e.g. on-line shopping) are not widespread in Switzerland. Nevertheless, e-commerce enjoys high growth rates. Major purchases include books, CDs and tickets – goods that are appropriate for

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<sup>11</sup> 3rd Report of the Information Society Co-ordination Group (ISCG) to the Federal Council, 30 April 2001, p. 22f.

<sup>12</sup> Quantitative data taken from a survey conducted on behalf of the OFCOM (Office of Communication) at the end of 2000. *ICT im öffentlichen Sektor in der Schweiz: Untersuchung zu Einsatz und Perspektiven von Informationstechnik, Internet und Electronic Government bei Kantonen und Gemeinden*, conducted by Prognos AG, [http://www.isps.ch/ger/stored\\_documents/WORD/1380.doc](http://www.isps.ch/ger/stored_documents/WORD/1380.doc) (visited on 19 December 2001).

<sup>13</sup> 3rd Report of the Information Society Co-ordination Group (ISCG) to the Federal Council, 30 April 2001

<sup>14</sup> 3rd Report of the Information Society Co-ordination Group (ISCG) to the Federal Council, 30 April 2001, p. 19.

<sup>15</sup> “Konsumenteninfo.ch, Berne Byte Bears GmbH”, available at <http://www.konsumenteninfo.ch/> or at <http://www.bbb.ch/>, TaxNews vom 20.01.2001 (visited on 19 December 2001)

<sup>16</sup> Sources: ITU, OFCOM, BFS calculations

<sup>17</sup> Integrated Services Digital Network

<sup>18</sup> See <http://www.bakom.ch/ger/subsubpage/document/283/1660>

mailing. Use of financial services is however comparatively widespread in Switzerland. In a world-wide comparison the per capita volume of e-commerce is high in absolute terms.<sup>19</sup>

Among the various sector, the financial sector has traditionally used electronic data interchange with each other and with large customers (B2B). In 2000, the volume of B2B e-trade was 2.5 billion EUROS. It is estimated that in 2002 this will increase to 4.2 billion EUROS. The projected growth rate for the years 2001 to 2004 is 130%.<sup>20</sup> With the widespread introduction of the Internet new areas of business have also initiated electronic business transactions with private customers (B2C). In 2000, B2C trade amounted to 0.5 billion EUROS, with approximately 1 million buyers – about 25 % of all Internet users. The projected growth rate for 2001-2004 is 120 %.<sup>21</sup>

### **Main ICT Regulatory and Legal Developments**

Switzerland made its first steps towards deregulation, with the deregulation of the data traffic market on 10 January 1996. In 1998 a new law of telecommunications LTC (Fernmeldegesetz) came into effect allowing the deregulation of the voice telecommunications, thereby breaking the legal monopoly of state owned Telecom PTT.<sup>22</sup> The telecommunications market has witnessed dynamic developments since this date. There were 161 licensed providers and 155 providers subject to registration in the year 2000. However SWISSCOM still dominates the market, with 70 % of mobile phone users. This figure is even higher for the fixed network.<sup>23</sup> The discussion regarding unbundling of the local loop (ULL) is still open in Switzerland.

The fostering of ICT access is a pivotal priority for Switzerland. In February 1998 the Federal Council published its “Strategy for the Information Society Switzerland”. The four governing principles include access to information for everyone; empowerment for everyone to use information technologies; freedom of development of the information society; and acceptance of new technologies.

To fulfil these goals, the Federal Council introduced a new law to implement the “Public-Private Partnership Initiative – Schools on the Net” in August 2001. Its aim is to connect approximately 4,000 schools to the Internet (at a cost of EUR 70 million) in co-operation with corporate sponsors and the

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<sup>19</sup> Consumer Trends in Online shopping, available at [http://www.ey.com/global/gcr.nsf/International/International\\_Home](http://www.ey.com/global/gcr.nsf/International/International_Home), figures not corrected in relation to purchasing power.

<sup>20</sup> Potenzial ohne Spektakel - die unentdeckte Seite des eCommerce, study conducted by accenture, autumn 2001, p. 23. See also: [http://www.netzwoche.ch/netzreport2\\_d\\_short.pdf](http://www.netzwoche.ch/netzreport2_d_short.pdf), p. 14.

<sup>21</sup> Potenzial ohne Spektakel - die unentdeckte Seite des eCommerce, study conducted by accenture, autumn 2001, p. 23. See also: Business-to-consumer e-commerce statistics; Consumers in the online marketplace – OECD Workshop on the guidelines: one year later (Berlin, 13-14 March 2001: [http://www1.oecd.org/dsti/sti/it/secur/act/Berlin/roomdoc\\_stats.pdf](http://www1.oecd.org/dsti/sti/it/secur/act/Berlin/roomdoc_stats.pdf)

<sup>22</sup> Telecommunications statistics, available at [http://www.num2002.ch/en/telekommunikation/grundlagen/statistik/allgemeine\\_informationen](http://www.num2002.ch/en/telekommunikation/grundlagen/statistik/allgemeine_informationen) (visited on 19 December 2001).

<sup>23</sup> 3rd Report of the Information Society, Co-ordination Group (ISCG) to the Federal Council, Berne/Switzerland, 30 April 2001

local authorities. It also aims to enhance teacher's qualifications to deal with ICT.<sup>24</sup> In addition, since 1997, Swiss "netdays" are organised each year to discuss different topics concerning "learning in the information society".<sup>25</sup>

There are also a number of other initiatives. The Law on Telecommunications (LTC) obliges the Federal Communications Commission (ComCom) to call for tenders concerning the licence for universal service in telecommunications and to award it based on a set of competitive criteria. The "Impulse Programme CH21" launched in early 2001 aims to bring together activities and programmes to support ICT over a 24 month period<sup>26</sup>. Finally, the Swiss Federal Office for Professional Education and Technology (OPET) has launched an Internet site (<http://www.softnet.ch>) to provide information about IT, the Internet and law, and with the aim to enhance initiatives for software "made in Switzerland".

With regard to e-government initiatives<sup>27</sup>, on 30 August 2000 an additional 18 million EUROS were included in the federal administrations budget for projects specifically in the e-government sphere. A further 15 million EUROS were offered for projects between the years 2002 to 2004. Three strategic lines for "Governance in the Swiss Information Society" have been defined for the next four years. These include creating the conditions (social, legal and technical) for a successful e-government scheme; service excellence; and electronic integration<sup>28</sup>.

The previously discussed strategy of the Federal Council about the Information Society Switzerland is now the basis for all government-led initiatives fostering electronic commerce. A number of initiatives have been implemented. Firstly, provision of certification services in Switzerland is again available following the break down of the government-supported Swisskey– a private-public key infrastructure service provider. The question concerning whether every citizen should be provided with a "digital identity" in the form of a digital certificate on a smart card or some other medium remains unanswered. The necessity of a unique and secure identifier for e-commerce and e-government is however widely accepted.

Secondly, in 2001, following public consultation via the Internet, the Federal Council recommended a new federal law regarding electronic signature to the Parliament. Use of a digital signature for e-government in the context of public law is not yet regulated and therefore not accepted.<sup>29</sup>

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<sup>24</sup> Press release: Der Bundesrat verabschiedet ein Gesetz zu "Public Privat Partnership – Schule im Netz", available at [http://www.admin.ch/cp/d/3b838427\\_1@fwsrvvg.bfi.admin.ch.html](http://www.admin.ch/cp/d/3b838427_1@fwsrvvg.bfi.admin.ch.html) (visited on 19 December 2001).

<sup>25</sup> Organisation for the integration of information technology ITC in education, available at <http://www.netdays.ch> (last visited on 19 December 2001).

<sup>26</sup> 3rd Report of the Information Society, Co-ordination Group (ISCG) to the Federal Council, Berne/Switzerland, 30 April 2001, p. 33.

<sup>27</sup> This section is derived from 3rd Report of the Information Society, Co-ordination Group (ISCG) to the Federal Council, 30 April 2001 and Governance in the Swiss Information Society – The e-government strategy of the Swiss Government, Draft 30 September 2001, available at <http://www.isb.admin.ch> (visited on 19 December 2001).

<sup>28</sup> Governance in the Swiss Information Society available at [http://www.isb.admin.ch/egov/engl/egov\\_strat\\_bv\\_en.pdf](http://www.isb.admin.ch/egov/engl/egov_strat_bv_en.pdf) (last visited on 19 December 2001).

<sup>29</sup> Botschaft zum Bundesgesetz über Zertifizierungsdienste im Bereich der elektronischen Signatur (ZertES) vom 3. Juli 2001, Bundesblatt vom 16.10.2001, Bern.

Thirdly, in 2000, an initiative known as “e-comtrust Switzerland” was launched. It is closely related to the international initiative “e-comtrust” and was mainly driven by the Swiss Consumers’ Federation and the Swiss Business Federation (economiesuisse). “E-comtrust Switzerland” provides secure on-line trade, thereby offering greater trust in this new field.<sup>30</sup>

A number of other legal initiatives have been implemented with the aim of fostering e-commerce. For example the copyright law (Urheberrechtsgesetz, URG) has been revised as well as the ratification of international agreements on copyright. Also, the Institute for Intellectual Property has commenced a trial operation of a system, allowing direct registration in the administration system, with the aim of simplifying the trade-mark registration.

One of the most interesting aspects of the way Switzerland has embraced ICT is its overall regulatory and legislative framework. It includes the Swiss Penal Law<sup>31</sup>; the Swiss National Economic Supply Law (protection of communication channels); the Telecommunication Law (as above); the law on data privacy (a revision is currently under discussion and covers privacy aspects with the aim of fostering trust for users of e-commerce services); the Federal Law on electronic signature (currently under discussion, see above); the Federal Law on e-commerce (currently under discussion); and the Ordinance on IT and telecommunication in the federal administration. In addition, in November 2001 the Federal Council has accepted the “Convention on Cybercrime of the Council of Europe”.<sup>32</sup> It should be noted, nevertheless, that the Swiss Penal Law is already in agreement with the corresponding international articles in relation to infringements of copyright, computer-related fraud, child pornography and offences connected with unauthorised intrusion in protected computer systems. However, problems in procedural law could exist. Moreover, a revision of the Law on Radio and Television is currently under discussion. The Federal Council’s main aims are to provide a stronger public service as well as more freedom for private radio and TV broadcasters. This will take into account the technical innovations and international developments such as convergence of different types of technologies (TV, PC and telecommunication). This revision is not expected to be finished before 2004.<sup>33</sup>

In Switzerland there are two bodies with regulatory duties: the COMCOM and the OFCOM. The COMCOM (Communication Commission) is an extra-parliamentary commission responsible for the assignment of telecommunication licenses and for the approval of national frequency and numbering plans on a strategic level.<sup>34</sup> The OFCOM (Office of Communication) is the main regulatory body in the field of telecommunications and ICT.

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<sup>30</sup> See Swiss Standardisation Association, available at <http://www.snv.ch> (visited on 29 January 2002).

<sup>31</sup> Although the Swiss Penal Law is current, to date only a few cases have been prosecuted. Switzerland’s legal principles against virus creation and the use of malicious software in general are broadly written. However, the legal structure in Switzerland makes prosecution difficult, due to the complexities of different laws (comprised of laws on both the federal and cantonal level) and law enforcement procedures.

<sup>32</sup> ISPS News, Press release: “Gemeinsam die Cyber-Kriminalität bekämpfen. Bundesrat genehmigt Konvention des Europarats”, available at <http://www.isps.ch/ger/news/news529.html> (last visited on 19 December 2001).

<sup>33</sup> Bundesamt für Kommunikation, available at <http://www.bakom.ch> (visited on 19 December 2001).

<sup>34</sup> <http://www.fedcomcom.ch/eng/welcome.html> (last visited on 19 December 2001).

### ***Assessment of Phenomena Undermining Dependability***

In Switzerland there is currently no comprehensive statistical data regarding phenomena undermining dependability for two reasons. Firstly, there are the complicated structures and shared responsibilities of national statistics and data collection. Secondly, there is the difficulty of differentiating between crimes committed using computers and other electronic devices and offences against the confidentiality, integrity and availability of computer and data.

The Swiss Criminal Judgement Statistics provides estimates on cyber-abuse and cyber-crime related offences. Other bodies in the public sector responsible for data collection include the Federal Office for Police (FOP); the Division for Information Security and Facility Protection (DISFP); the Swiss Federal Strategy Unit for Information Technology (FSUIT); and the Federal Office for Communication (OFCOM). The Swiss Federal Statistics Office is also involved and is amongst others responsible for the collection of national statistics of criminal offences including Internet-related offences<sup>35</sup>. The Swiss Criminal Judgement Statistics provides an overview of computer-related criminal activities with paragraph 143 and paragraph 143bis being the most relevant ones to cyber-crime. Paragraphs 147 and 150 are also relevant. Between 1995 and 1998, the biggest increase in the number of judgements per year was seen in cases of fraudulent use of data processing devices. These increased from 52 to 378. The number of judgements against obtaining a data processing unit by refrain of power also increased – from 59 to 131, as did those against data damaging and destruction – 14 to 21. The number of judgements against unauthorised data provision has remained around 2 per year<sup>36</sup>. It should be kept in mind there are several other criminal activities such as blackmail, pornography and money laundering which can also be committed using IT tools. Given these kind of criminal activities are not genuine computer crimes, they are not covered in this report.

<b><i>Computer-related criminal activities in Switzerland</i></b>	<i>Number of judgements per year</i>			
	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<i>Unauthorised appropriation of data (article 143)</i>	1	2	2	2
<i>Unauthorised access into a computing system (article 143bis)</i>	0	1	0	1
<i>Damage to data (article 144bis)</i>	14	18	131	21
<i>Fraudulent use of a computer (article 147)</i>	52	225	370	378
<i>Fraudulently obtaining a service (article 150)</i>	59	84	116	131

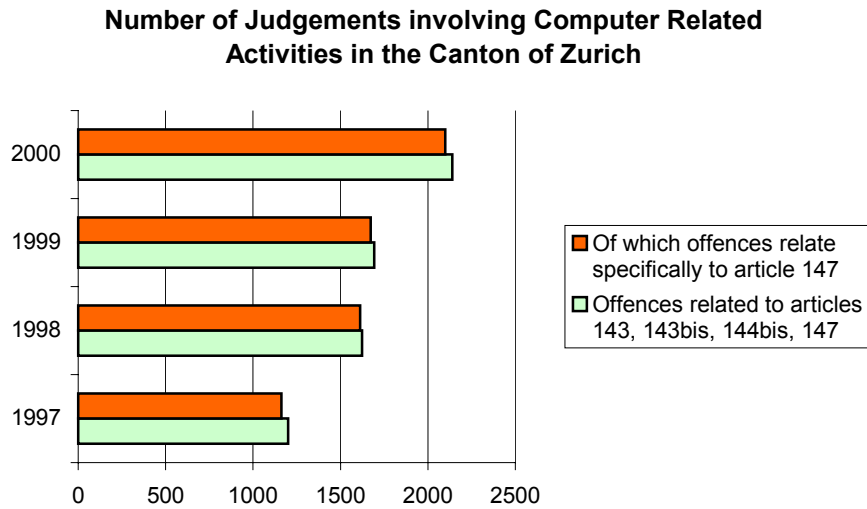
In Zurich, Switzerland's largest canton, between 1997 and 2000 the number of judgements per year on computer related activities increased from 1200 to 2140. Most of these related to paragraph 147, i.e. not directly related to the Internet. In 2000, of the total 2140, forty related to paragraphs 143, 143bis and

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<sup>35</sup> Bundesamt für Statistik, available at <http://www.statistik.admin.ch/eindex.htm> (visited on 19 December 2001).

<sup>36</sup> Bundesamt für Polizei, "Cyberkriminalität" – Die dunkle Seite der Informationsrevolution, Bern 2001, p. 12.

144bis. Given that about one quarter of all judgements in Switzerland are committed in the Canton of Zurich, it can be assumed that some 160 such offences were committed in Switzerland.<sup>37</sup>



Although law enforcement instruments against cyber-crimes exist, law enforcement of computer related criminal activities is very difficult to assess. A new analysis and co-ordination centre on a national level will be organised by the Federal Office for Police in early 2002. The Federal Office for Police has been analysing computer-related criminal activities for three to four years now and publishes its findings in its annual reports on Internal Security ("Staatsschutzbericht") as well as in a recent report on cyber-crime.<sup>38</sup>

Although the Swiss use of the Internet on a regular basis for e-commerce compared to other countries, trust in the protection of privacy is still very low, especially with regard to the use of electronic payments<sup>39</sup>. According to the 1999 ECATT-study "compared to the population of the ten EU countries, the public in Switzerland is considerably more critical where security problems are concerned"<sup>40</sup>. This applies as well to the use of new and unconventional payment methods, such as cyber-cash, according to the findings of the Federal Office for Consumer Questions<sup>41</sup>. According to a further survey, 60 out of 100 companies in Switzerland rank cybercrime as the highest risk over the next five years.<sup>42</sup>

<sup>37</sup> Bundesamt für Polizei, "Cyberkriminalität" – Die dunkle Seite der Informationsrevolution, Bern 2001, p. 12, available at <http://www.bap.admin.ch> (visited on 30 January 2002).

<sup>38</sup> See <http://www.bap.admin.ch> (visited on January 30, 2002).

<sup>39</sup> Report by PricewaterhouseCoopers of 17 January 2001 on a study by the British market research institute Simpson Carpenter: "Consumers feel uneasy on the internet", available at <http://www.pwcglobal.com/ch/ger/about/press-rm/2001/p170101.html> (visited on 19 December 2001).

<sup>40</sup> Introduction and Diffusion of Electronic Commerce – What is Switzerland's position in the International Comparison. Report on the International research project ECATT, available at <http://www.ecatt.com> (visited on 28 January 2002).

<sup>41</sup> The Federal Office of Consumer Affairs "Erste Bilanz über das Verhalten der Schweizer Konsumentinnen und Konsumenten im e-Commerce", April 2000, available at <http://www.konsum.admin.ch> (visited on 19 December 2001).

<sup>42</sup> PricewaterhouseCoopers, "Wirtschaftskriminalität in Europa. Die Resultate der Schweiz", June 2001.

### ***Government Initiatives Aimed at Tackling Cyber-Security***

The Strategic Leadership Exercise in 1997 (SFU 97) was a key milestone and indeed set the precedent for subsequent work in this field.<sup>43</sup> One of the results of the SFU 97 was the call for an independent organisation dealing with information security issues, leading to the build-up of the Foundation InfoSurance.<sup>44</sup> In 1998 the Federal Council defined its “Strategy for the Information Society Switzerland”. Security and availability are one of the strategy’s eight fields of activity.<sup>45</sup>

Two years later, the Swiss Federal Council released its new security policy. The report to the Federal Assembly on the Security Policy of Switzerland states that “users are increasingly reliant on the uninterrupted functioning of information systems and critical parts of the information and communications infrastructure. At the same time, systems are becoming more vulnerable to hostile interference”<sup>46</sup>. Emphasising the limits of dependability policies, the report states that “we must take adequate security measures, based on a sound analysis of the risks.” The Federal Council defines its objectives regarding dependability as follows: “The Federal Council's primary objective regarding the security of this infrastructure is to maintain Switzerland's ability to decide and to act, and to create the conditions to ensure the functioning of the Swiss 'information society'”.<sup>47</sup>

In this context, it is interesting to describe the Swiss approach to Y2K. The Swiss federal administration official activities to deal with the Y2K-issue started in early June 1998. A special delegate was elected and the Y2K Task Force was established. The main goals of these efforts were to raise awareness among people, exchange experiences and support Y2K executives. Particular attention was given to SMEs and critical information infrastructures. An ad-hoc Y2K Task Force was created with a staff of 10 experts and an annual budget of EUR 5 millions. Due to the early start of the federal activities and the important efforts made by the private sector, Switzerland dealt very well with the millennium transition. No remarkable incidents was registered. Instead, the millennium bug “worked” very well as a catalyst for a successful public private partnership concerning problems in information technology.

Following a successful Y2K roll-over, the key policy document “Concept Information Assurance”<sup>48</sup> was published. The Information Assurance policy has three pillars. Firstly, in order to foster command and control in crisis situations, the Federal Strategy Unit for Information Technology (FSUIT) has developed a concept for a crisis management system for incidents originating in the information infrastructures. It involves mainly two elements<sup>49</sup>.

As a first element, a “Permanent Analysis and Reporting Centre for Information Security” (CSIRT-type of organisation) is responsible for data gathering, permanent analysis of the situation as well as alert and early

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<sup>43</sup> Stategische Führungsausbildung, available at <http://www.sfa.admin.ch> (visited on 19 December 2001).

<sup>44</sup> Foundation for the Security of Information Infrastructures in Switzerland, available at <http://www.infosurance.org>.

<sup>45</sup> Strategy of the Federal Council for an Information Society in Switzerland, available at [http://www.isps.ch/eng/stored\\_documents/PDF/42.pdf](http://www.isps.ch/eng/stored_documents/PDF/42.pdf) (visited on 6 December 2001).

<sup>46</sup> Security through Co-operation - The report of the Federal Council to the Federal Assembly on the Security Policy of Switzerland, Bern, June 1999, p. 25.

<sup>47</sup> Security through Co-operation, p. 54f.

<sup>48</sup> See Koordinationsgruppe Informationsgesellschaft: Konzept “Information Assurance”, Bern, Mai 2000.

<sup>49</sup> The federal decree states the establishment of a “Task Force Information Assurance. See: Verordnung über die Informatik und Telekommunikation in der Bundesverwaltung (BinfV) vom 23. Februar 2000.

warning. This centre relies on a broad array of sensors to collect and analyse relevant information and requires well-established contacts to IT operators and the public administration.

In addition, a non-permanent "Task Force Information Assurance" has been established in 2001. The Task Force's primary task is to analyse a situation in order to support strategic decision making in crisis situations. In this regard it is considered an advisory board to the Federal Council and a co-ordination platform for critical infrastructure sectors in cases of crisis. The Task Force had an opportunity to gain first hand experience at the three-day exercise "INFORMO 2001" conducted by the Strategic Leadership Training Office. The goal of the exercise was to review the information assurance processes which were established after 1997 and especially those related to the "Task Force Information Assurance".<sup>50</sup> The second pillar of the Information Assurance policy is the unit "ICT infrastructure" which being part of the Federal Office for National Economic Supply (NES)<sup>51</sup> provides governmental support should the private sector be unable to resolve provisioning problems themselves. The InfoSurance foundation is the third pillar. InfoSurance's focus is to raise public awareness of security matters and to provide effective measures to prevent damage such as guidelines, best practise and an expert network.<sup>52</sup> This strategy, finally, was accompanied by a large number of parliamentary initiatives. Between 2000 and 2001, more than 30 initiatives dealing with the information society were raised. Three of these initiatives focused specifically on information security and information assurance.<sup>53</sup>

There are a number of bodies in the public sector dealing with information assurance and one of the great difficulties is to clearly differentiate their tasks. One of the main bodies is the Swiss Federal Strategy Unit for Information Technology (FSUIT). The FSUIT reports to the Swiss Federal Department of Finance (FDF) and is charged with producing instructions, methods, and procedures for the information security of the federal administration in normal times. It collects data on incidents within the Swiss Federal Government<sup>54</sup> and is responsible for the "Task Force Information Assurance". The Division for Information Security and Facility Protection (DISFP) reports to the Federal Department of Defence, Civil Protection and Sports. Its main tasks are to gather and to analyse information and to provide adequate IT security within the DDPS<sup>55</sup>. The Federal Office for Communication (OFCOM) is the regulating body for the telecommunication sector and deals with information society risks.<sup>56</sup> The Federal Office for Police (FOP) is part of the Federal Department of Justice and Police (DJP) and has a leading role in the field of cyber-crime in Switzerland<sup>57</sup>.

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<sup>50</sup> Stategische Führungsausbildung, available at <http://www.sfa.admin.ch> (visited on 19 December 2001).

<sup>51</sup> The main task of NES is to ensure the Swiss population is able to obtain at all times the goods and services which are considered vital. The NES is working in close co-operation with the private sector as well as cantonal and municipal authorities.

<sup>52</sup> See InfoSurance Website, available at <http://www.infosurance.ch> (visited on 19 December 2001).

<sup>53</sup> 3rd Report of the Information Society Co-ordination Group (ISCG) to the Federal Council, p. 28ff.

<sup>54</sup> Informatikstrategieorgan Bund ISB, available at <http://www.isb.admin.ch> (visited on 19 December 2001).

<sup>55</sup> Division for Information Security and Facility Protection (DISFP) available at <http://www.vbs.admin.ch/internet/GST/AIOS/e/index.htm> (visited on 19 December 2001).

<sup>56</sup> Bundesamt für Kommunikation, available at <http://www.bakom.ch/en/index.html> (visited on 19 December 2001).

<sup>57</sup> Bundesamt für Polizei, available at <http://www.bap.admin.ch/e/index.htm> (visited on 19 December 2001).

The Federal Office for National Economic Supply (NES), which includes the unit “ICT infrastructure” reports to the Swiss Federal Department of Economic Affairs (FDEA). It provides governmental support should the private sector be unable to resolve provisioning problems themselves. The Swiss Federal Office of Information Technology, Systems and Telecommunication (FOITT) reports to the Swiss Federal Department of Finance (FDF). Its responsibilities include security and emergency preparedness.<sup>58</sup> The Strategic Leadership Training Office (SLT) is part of the Federal Chancellery. The SLT is responsible for the periodic training of the federal decision-makers, in cases of incidents in information security.

In Switzerland the currently used tools to enhance the security of information and network systems are scenarios, threat analysis, and vulnerability analysis. All these tools are part of a common framework, known as the risk based approach. Still, in Switzerland, no schemes as yet have been implemented to assess threat. A warning and crisis management system for cyber-crime incidents is in the planning stage and already partly realised.<sup>59</sup> In addition, there are a number of other government schemes to assess threats that deal with dependability issues. These include the government-sponsored project ‘Comprehensive Risk Analysis Switzerland’.

This project records, evaluates and compares the various risks potentially jeopardising the vital security of Switzerland (existential risks). It provides a basis for a more efficient allocation of resources. The study recognises possible breakdowns of vital information infrastructures and cyber-war as essential security threats for Switzerland.<sup>60</sup> Furthermore a comparative study on best practices in protection of critical information infrastructures in different countries is currently conducted. The findings will be published in a handbook in Autumn 2002.<sup>61</sup> In addition, a study on ‘Switzerland's Security Interests in Broadcasting and Telecommunication Infrastructures in Crisis Situations’ finds “that the security of the critical infrastructures in extraordinary situations is substantially guaranteed – not least because of the measures which have already been taken. As the greatest security risks, the report cites dependence on the (mostly foreign) technologies employed, the problems with recruiting qualified personnel and a number of shortcomings in terms of organisation”. The study has been written by an interdepartmental working group, which was formed after political discussions in connection with the plans by Swisscom to sell the broadcast radio sector.<sup>62</sup>

In the field of warning and response capabilities, there have been two government-sponsored schemes initiated: SWITCH-CERT and CERN-CERT. SWITCH-CERT<sup>63</sup> is run by the ‘Swiss Academic & Research Network’ and uses an e-mail distribution list to inform its customers about important security-related events and activities. The same list is used to forward security alarms and other urgent information, like security advisories to its customers during office hours. The SWITCH foundation was established in 1987 by the Swiss Confederation together with eight cantons to promote modern methods of data transmission and to run an academic and research network in Switzerland. The CERN-CERT<sup>64</sup>, instead, is

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<sup>58</sup> The Federal Office of Information Technology, Systems and Telecommunication available at <http://www.efd.admin.ch/e/dasefd/aemter/bit.htm> (visited on 19 December 2001).

<sup>59</sup> Additionally, in a few companies there are CERTs.

<sup>60</sup> The project management was shifted to the ETH Zurich in the year 2000, available at [www.isn.ethz.ch/crn](http://www.isn.ethz.ch/crn).

<sup>61</sup> For a draft version see at [http://www.isn.ethz.ch/crn/extended/workshop\\_zh/ebp\\_cip\\_handbook.pdf](http://www.isn.ethz.ch/crn/extended/workshop_zh/ebp_cip_handbook.pdf).

<sup>62</sup> Report available at: [http://www.bakom.ch/imperia/md/content/deutsch/medieninformatio nen/sicherheitsbericht\\_d.pdf](http://www.bakom.ch/imperia/md/content/deutsch/medieninformatio nen/sicherheitsbericht_d.pdf).

<sup>63</sup> Swiss Academic and Research Network, available at <http://www.switch.ch> (visited on 19 December 2001).

<sup>64</sup> See <http://wwwinfo.cern.ch/hep/wg/security>.

part of the European Laboratory for Particle Physics in Geneva and maintains its own CERT and Computer Security helpdesk.

### ***Industry and Other Non-Government Activities Related to Dependability***

Several non-government organisations in Switzerland are dealing with aspects of information security that also include dependability. Often these organisations cannot be labelled as strictly non-governmental, since most of them include representatives from industry, education as well as from the government. The following is a (non-representative) selection of some of these organisations.

Nextra is a communication service provider (subsidiary of the Norwegian Telenor AS), maintains a CERT and is a member of FIRST<sup>65</sup>. The Swisscom IP-Plus CERT<sup>66</sup> focuses on incident handling and their prevention on the Internet. The team was established in 1997. Its constituency is customers of the IP-Plus Internet service and its goal is to provide support in case of an incident and to provide information about security issues. The Swiss Association for the Security of Information Systems (CLUSIS)<sup>67</sup> is an organisation that informs executives on all aspects of security of information systems. It has about 250 members and current activities include events, presentations and papers.

The Special Interest Group on Information Security (aka Fachgruppe Security, FGSec)<sup>68</sup> is a part of the Swiss Informatics Society. The group covers security relevant aspects of information technology and analyses their impact on society and politics. Membership fees sponsor the group. Activities include papers, working groups, and conferences (such as «Berner Tage für Informatiksicherheit»). The group also acts as an information exchange point for those seeking assistance in information security matters and information risk management.

The Security Group SGRP<sup>69</sup> is a closed group of alumni from the advanced training course for privacy protection and information security, held by the HSW Lucerne. Its main objective is to provide a network for the alumni to exchange experience. SGRP holds an annual meeting and is financed by membership fees and donations. SGRP also operates the Computer Security Incident Report System (CSIRT)<sup>70</sup> that provides information about alerts and security warnings.

The Swiss Association for Information and Communication Technology (SwissICT)<sup>71</sup>, with over 2,400 members, is by far the largest association of the sector's information and communication technologies. Current activities range from events, publications and working groups/sub-committees that focus on eBusiness, eGovernment, telecommunication and contracts. Finally, there is the Swiss Information and Communication Technology Association (SICTA)<sup>72</sup>, which represents the specific interests of the whole ICT branch. One of SICTAs working groups covers security aspects of the information infrastructure.

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<sup>65</sup> See <http://cert.nextra.ch/>

<sup>66</sup> See [http://www.ip-plus.net/technical/cert\\_team-en.shtml](http://www.ip-plus.net/technical/cert_team-en.shtml).

<sup>67</sup> Association suisse de la sécurité et des systèmes d'information, available at <http://www.clusis.ch> (visited on 19 December 2001).

<sup>68</sup> See <http://www.fgsec.ch> (visited on 12 December 2001).

<sup>69</sup> See <http://www.sgrp.ch> (visited on 11 December 2001).

<sup>70</sup> See <http://www.sgrp.ch/csirt/index.htm> (visited on 11 December 2001).

<sup>71</sup> Schweiz. Verband der Informations- und Kommunikationstechnologie available at <http://www.swissict.ch> (visited on 19 December 2001).

<sup>72</sup> See <http://www.sicta.ch> (visited on 28 January 2002).

In addition to the previous initiatives, issues related to information security are the topics of two major annual conferences: Bern Conference on Information Security and the Symposium on Privacy and Security. The Bernese conference on Information Security (Berner Tage für Informationssicherheit) is organised by Special Interest Group on Information Security and the Swiss Federal Strategy Unit for Information Technology. The event covers a specific topic each year, for example in 2001 it was 'public key infrastructures' and in 2000, 'man as an important security factor'. It offers various speeches and presentations. More than 200 executives take part in the event. The Symposium on Privacy and Security<sup>73</sup>, instead, aims to offer an international platform for the discussion of key themes of privacy and security in the fields of science, business, administration and politics. The annual event covers various aspects of privacy and security. The 2001 event topics were consumer control - consumer privacy; security infrastructures and solutions; areas of conflict between e-future and privacy; and surveillance.

### ***Public-Private Partnerships***

Switzerland has a long-standing tradition in Public-Private Partnership. Historically, it is due to the part-time duties in both the military and in politics. Moreover, certain Swiss institutions have never been managed by a fully professional staff. With regards to Information Infrastructure dependability three PPPs are considered the most important.

The most prominent example of a body promoting co-operation between industry and administration is the foundation "InfoSurance"<sup>74</sup>. The foundation is supported by leading industry companies as well as by the Swiss government. It wants to create a close partnership between organisational and structural conditions to recognise and analyse the risks for Switzerland and of its growing dependency on information technologies. It also aims to inform decision-makers as well as public and private IT users as to the risks and dangers of information technologies; and to collect technical and organisational prerequisites for the early detection and prevention of threats as well as the prevention and minimisation of damages.

The main task of the National Economic Supply (NES)<sup>75</sup> is to ensure the Swiss population is able to obtain at all times vital goods and services. The measures calculated to ensure national economic supply would only be applied if the system of free competition is seriously disrupted. NES is working in close co-operation with the private sector as well as with cantonal and municipal authorities. The Federal Government has requested the Office of National Economic Supply to create a new ICT-infrastructure unit to deal with all prolonged disruptions of the information and communications infrastructure affecting the whole of Switzerland.

The Commission for Technology and Innovation (CTI)<sup>76</sup> promotes co-operation between businesses, research institutes and educational institutions on projects involving R&D in the ICT field. The Commission for Technology and Innovation is part of the Office for Professional Education and Training (OPET) within the Swiss Federal Department of Economic Affairs. The OPET supports the transfer of

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<sup>73</sup> Symposium on Privacy and Security 2001, available at <http://www.privacy-security.ch> (visited on 19 December 2001).

<sup>74</sup> The Foundation for the Security of Information Infrastructures in Switzerland. See <http://www.infosurance.ch> (visited on 19 December 2001). See also Section 4

<sup>75</sup> National economic supply, available at <http://www.bwl.admin.ch> (visited on 19 December 2001).

<sup>76</sup> Federal Office for professional education and technology available at <http://www.admin.ch/bbt> (visited on 19 December 2001).

knowledge and technology between the field of research and economy. The OPET also launched the softNet<sup>77</sup> action-plan. Its main focus is the development of a strong software industry in Switzerland.

### ***Research and Development***

Switzerland is not a leading country regarding ICT innovations. Its ICT patents account for approximately 5% of total national patents.<sup>78</sup> Nevertheless the Swiss Research Community has undertaken research in the IT field. Dependability and information security R&D has until very recently, not been a primary subject in research and development. Based on the analysis of the activities of the major academic institutions, it seems evident that Switzerland has a strong academic presence in the field of cryptography and data secure transmission. In addition, there are many research activities in the areas of vulnerability analysis, anti-virus software and secure system architecture. In the following sections, we will present several of these institutions. This list, nevertheless, should not be perceived as comprehensive. As dependability-related concerns grows, it is possible to conceive that more research activities will be carried out in many dependability-related areas. These are some of these institutions:

The University of Zurich: Department of Computer Science, Information and Communication Management Research Group<sup>79</sup> (Prof. Dr. Kurt Bauknecht, 10 assistants and external PhD students). Their applied information technology approach concentrates on the application of Computer Science in enterprises, especially the problems of information processing within companies where security is an important issue. This is of course gaining more and more relevance in virtual enterprises. Secure transmission of data and secure access to Internet are thus some of their current research topics.

The Swiss Federal Institute of Technology, Zurich: Department of Computer Science, Institute of Theoretical Computer Science, Information Security and Cryptography (Prof. Dr. Ueli Maurer, 9 assistants). This group is very strong in theoretical cryptography. An additional position for a professor in computer science (Information security) will soon be made available.<sup>80</sup>

The Swiss Federal Institute of Technology/University of Zurich: The Centre for International Studies CIS (Prof. Dr. K. R. Spillmann and Prof. Dr. A. Wenger, about 4 researchers working on dependability) specialises in the field of national and international security studies and conflict analysis. Activities include research, teaching, and information services. The centre has developed and maintains two electronic information services - the International Relations and Security Network<sup>81</sup> and the Information Management System for Mine Action.<sup>82</sup>

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<sup>77</sup> See <http://www.softnet.ch/index.cfm> (visited on 12 December 2001).

<sup>78</sup> OECD STI Scoreboard, R&D in Selected ICT Industries and ICT Patents, available at: <http://www.OECD.ORG/publications/ebook>

<sup>79</sup> Information and Communication Management Research Group, available at <http://www.ifi.unizh.ch/ikm/research.html> : IKM and research activity (visited on 19 December 2001).

<sup>80</sup> Professur für Informatik (Informationssicherheit), available at <http://www.president.ethz.ch/prof/profinfosich.html> (visited on 19 December 2001).

<sup>81</sup> International Relations and Security Network, available at <http://www.isn.ethz.ch> (visited on 19 December 2001).

<sup>82</sup> Comprehensive Risk Analysis and Management Network, available at <http://www.isn.ethz.ch/crn> (visited on 19 December 2001).

The Swiss Federal Institute of Technology, Zurich: Laboratory for Safety Analysis: Working at this institute Dr. Gheorge developed a methodology for a quantitative vulnerability assessment that can be used to describe dependencies within critical infrastructure.

The Swiss Federal Institute of Technology, Lausanne: Department of Communication Systems (Prof. Serge Vaudenay, 5 assistants): The Security and Cryptography Laboratory was formed in the year 2000 and aims to promote research and education on communication and information system security. Various aspects are considered, e.g. critical security analysis, security strengthening methods, and fundamental research on security and cryptography.<sup>83</sup>

The University of Applied Sciences, Luzern, Department of Information Technology, Post-Graduate Diploma Information Security (Prof. Dr. Bernhard Hämmerli, 5 assistants): Technical IT security projects, product test as well as consulting and design of secure architectures of ICT systems are leading themes.<sup>84</sup>

The University of Applied Sciences, Rapperswil: Institute for Internet Technologies and Applications (Prof. Dr. P. Heinzmann) is a competence centre for Internet technology, which is also dealing with information assurance (well-known for their implementation of the encryption software Pretty Good Privacy).<sup>85</sup>

The IBM Research Lab at Rüschlikon (near Zurich): Their security research ranges from cryptographic foundations to the implementation of standards-based cryptographic algorithms.<sup>86</sup>

The Swiss Priority Programme Information and Communications Structures (SPP ICS, 1996-1999) is a scientific research programme in information technologies and telecommunications sponsored by the Swiss National Science Foundation. The main research themes of the SPP ICS are engineering of distributed applications and the associated networks in general as well as quality, security and management aspects. Security and management aspects include secure co-operation in distributed systems, secure use of on-line services, the Swiss Chambers of Commerce as trusted third parties in world-wide electronic markets and security services creation and management in a distributed processing environment.<sup>87</sup>

In addition to these institutions, leading companies like Siemens, Ascom and Swisscom as well as the DDPS (Federal Department of Defence, Civil Protection and Sports) undertake dependability-related R&D, mainly in a product-driven technical sense. The Swiss Dependability R&D Roadmap includes methodological aspects as crisis management policy implications, dependency and interdependency modelling as well as sociological aspects such as perception analysis.

Based on the analysis of the activities of the above-mentioned institutions and organisations, it seems evident that Switzerland has a strong academic presence in the field of cryptography and data secure

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<sup>83</sup> The Security and Cryptography Laboratory (LASEC) was formed in 2000 in the Department of Communication Systems (DSC) of EPFL. Various aspects are considered: critical security analysis, security strengthening methods and fundamental research on security and cryptography. Available at <http://lasecwww.epfl.ch> (visited on 19 December 2001).

<sup>84</sup> Institute for Internet Technologies and Applications (ITA), <http://www.ita.hsr.ch> (visited on 19 December 2001).

<sup>85</sup> See Homepage, available at <http://www.hta.fhz.ch> (visited on 19 December 2001).

<sup>86</sup> Source: IBM Research Laboratory, available at <http://www.zurich.ibm.com/csc/infosec/index.html> (visited on 19 December 2001).

<sup>87</sup> See [http://www.spp-ics.snf.ch/spp\\_ics/projlist.html](http://www.spp-ics.snf.ch/spp_ics/projlist.html). (visited on 28 January 2002).

transmission. In addition, there are many research activities in the areas of vulnerability analysis, anti-virus software and secure system architecture.