

Teaching Privacy as a Part of the Computer Science Curriculum

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Abstract

Computer scientists are responsible for a lawful and ethically acceptable system design and system administration. Privacy should therefore be an important topic of the computer science curriculum. In this article, an overview shall be given of privacy courses that are offered as a part of the computer science studies at German universities and Polytechnic Schools. A structure of lectures and courses for teaching the basics of privacy is suggested.

Keywords

Privacy, data protection, computer science curriculum, data protection officer, privacy-friendly system design

1 THE IMPORTANCE OF PRIVACY EDUCATION

Privacy as a social and legal issue has for a long time been a concern of social scientists, philosophers, and lawyers. With the arrival of the computer and increasing capabilities of modern IT-systems and communication networks individual privacy is more and more endangered. Great amount of personal data can now be easily collected and stored, transmitted over long distances, searched efficiently, merged, and combined to personal profiles if desired. On the way to a Global Information Infrastructure with different national programmes for the further development of data highways, there will be more and more risks to privacy.

In the information society, privacy is accepted as an important personal right needing protection. It can be defined, as it has been done by the German Constitutional Court in its Census Decision of 1983, by the term right of informational self-determination, meaning the right of an individual to determine about the disclosure and use of her/his personal data on principle at her/his discretion.

Privacy should be an important part of the education of computer scientists, because computer scientists are responsible for a lawful and ethically acceptable system design and system administration. IT systems usually introduce new threats to privacy or

sharpen privacy concerns. Many privacy problems could be prevented from the start, if privacy aspects were considered sufficiently from the beginning and during the system design process. For example, in contemporary data highways such as the Internet, it is hardly possible to guarantee anonymity of the users. Connection data are available at different sites and can be used to generate personal consumer and communication profiles. Such privacy threats could be prevented, if communication systems were designed according to David Chaum's approach (Chaum, 1985) to reach anonymity by the use of digital pseudonyms.

Unfortunately, the data subjects (persons about whom personal data are collected and processed) normally do not participate in the system design process and consequently their privacy interests are often neglected. Computer scientists should therefore represent the interests of the data subjects and be responsible for a privacy-friendly and privacy-acceptable system design. They should know, how to assess privacy risks of IT- and communication systems as well as how to technically enforce privacy requirements (see also (Nothdurft, 1994)).

Besides, for a lawful system administration and operation, the legal requirements of the data protection acts have to be fulfilled. In particular, most data protection acts require that appropriate technical and organisational security measures have to be taken to protect the confidentiality, integrity and availability of personal data (e.g. see also Art. 17 EU-Directive on Data Protection). Computer scientists should be familiar with the enforcement of such legal requirements for data protection.

Many German companies appoint computer scientists as data protection officers. According to the German data protection act, private bodies (e.g. companies) which process personal data automatically and regularly employ at least five permanent employees for this purpose, have to appoint a data protection officer. The data protection officer shall be responsible for ensuring that the data protection act and provisions are observed. Only persons who possess the specialised knowledge and demonstrate reliability shall be appointed as data protection officer. The EU-Directive on Data Protection also contains provisions for the appointment of data protection officers in companies and public authorities.

Furthermore, the education in privacy is important, because in daily life everybody is a data subject and should be aware of the impacts on his/ her privacy and be informed about his/her personal rights. Unfortunately, although privacy can be regarded as an important topic for the qualification of computer scientists, it is taught as a part of the computer science curriculum only at some universities in Germany. In the following of this article, an overview shall be given of privacy courses that are offered as a part of the computer science studies at some German universities and Polytechnic Schools. Then, a structure of lectures and courses for teaching the basics of privacy will be suggested.

PRIVACY COURSES FOR COMPUTER SCIENTISTS AT GERMAN UNIVERSITIES AND POLYTECHNIC SCHOOLS

A study based on a questionnaire done by German student organisations in 1992 (Haferkorn/Ahrens, 1992) has shown that only at some faculties for informatics of German universities, privacy is a topic of the educational system. On the other hand, the topic IT-security is being more and more integrated into the computer science curriculum of many German universities, because it is recognized that many organisations depend on the correct functioning of their IT-systems as well as on data confidentiality and integrity.

Only at the Technical University (TU) of Berlin and at the Universities of Bremen and of Hamburg there are teachers and research groups specialised on privacy. Only at these Universities and at the University of Oldenburg mandatory lectures and courses in privacy as a part of the education in the area of "Informatics and Society" and additional privacy seminars and projects on a voluntary basis are given.

At the University of Berlin a mandatory course on "Information Technology and Law" consisting of lectures (2 hours per week) and exercises (2 hours per week) is a mandatory part of the postgraduate studies. This course shall discuss the interrelation between application of IT, society and its values and norms. The emphasis of this course is on privacy and data security. For students who want to specialise in this field the course "Information Technology and Law II" (2 hours lectures + 2 hours exercises per week) as well as additional projects and seminars are offered.

At the University of Bremen, privacy is major part of the undergraduate studies. It is taught in the undergraduate courses on "Application and Implications of Informatics" (2 hours lectures + 2 hours exercises per week), "Informatics and Society" (4 hours lectures + 2 hours exercises per week) and on "Sociotechnical System Design" (2 hours lectures + 2 hours exercises per week). Further courses from the area of Applied Informatics, also covering privacy topics, are part of the postgraduate studies.

At the University of Hamburg, lectures on privacy are part of the undergraduate course on "Application and Implications of Informatics" (3 hours per week). Besides, a seminar on "Privacy and Computer Crime" (2 hours per week) is offered. For the postgraduate studies a 4-semester curriculum on "IT Security" is offered for students who want to specialise in computer security and privacy.

Some other universities, such as TU Braunschweig, TU München, University of Stuttgart, University of Rostock offer from time to time courses on privacy and computer security that can be taken on a voluntary basis. At some universities, e.g. at the University of Dortmund and the TH Darmstadt, the subject law with special lectures in Privacy and Information Technology Law can be chosen by computer science students as a minor subject.

A very good education in privacy is offered at the Polytechnic Schools (Fachhochschulen) in Ulm and in Munich. At the Polytechnic School in Ulm a 2-

semester curriculum for the education of qualified data protection officers is offered since 1987 in addition to the Computer Science Study (see (Kongehl, 1995)). Students who have already graduated in Computer Science at the Polytechnic School can also graduate in this curriculum to gain an official certificate with the degree of a data protection officer. This curriculum shall provide a better qualification for data protection officers that have to be appointed by organisations according to the German data protection act. The hope is that a qualified reliable data protection officer will be more accepted and will not only perform an “alibi role”. He/she could therefore create more awareness for privacy problems in his/her organisation. Besides, the curriculum shall teach computer science students more about social aspects of IT and social responsibility for computer scientists.

In the first semester of the curriculum courses called “Information Technology and Personal Self-Determination (Privacy I)”, “Data Protection, Computer and Labour Law” and on “Technology Assessment in Computer Science” have to be taken. Besides, students have to participate in practical courses and project work, where the practical development and realisation of privacy and data security plans is trained. Such project work can in particular be done in co-operation with projects at the University Hospital of Ulm. In the second semester the courses “Privacy II” and “Basics of IT-Security” are mandatory. Besides, further practical courses and project work have to be done. In the first and second semester the students have also to attend the “Privacy Colloquium”, which consists of weekly invited lectures given by privacy specialists from industry, administration or from universities.

The privacy curriculum of the Polytechnic School has so far been quite successful. Meanwhile most computer science students of the Polytechnic School in Ulm also participate in this curriculum and thereby seem to gain a better job qualification for industry. Since 1995 a similar curriculum for the qualification of a data protection officer is also offered at the Polytechnic School in Munich.

3 PRIVACY AS A CURRICULUM TOPIC

As discussed above, privacy is for many reasons an important curriculum topic. But unfortunately, at most universities in Germany even the fundamentals of privacy are not taught at all. Also at universities of other countries privacy as a curriculum topic seem to be often neglected. In this chapter, a structure of courses for teaching the basics of privacy will be suggested. Similar suggestions for a privacy education can be found in (Haferkorn/Ahrens, 1992), (Nothdurft, 1994).

The computer science curriculum should at least contain one mandatory course for undergraduate students where the basics of privacy are taught. This could be either a course that is exclusively teaching privacy or special privacy lectures (at least 6 hours) could be integrated into mandatory courses on “Informatics and Society”. This mandatory course should teach the following basics of privacy with that every computer scientists should be familiar:

- Concept, nature and history of privacy

- Definition of privacy
- Need of privacy protection
- Privacy as a part of computer ethics
- Legal foundations of privacy
 - Privacy as a fundamental or even constitutional right ?
 - Important legal judgements (e.g. census decision by German constitutional court) that discuss privacy rights
 - Data protection acts
 - Problem of transnational data flow and international privacy guidelines (OECD-Guideline, EU-Directive on Data Protection)
 - Data protection legislation in other countries
- Introduction to technical data protection
- Privacy problems in practice, case studies

In addition to such a course there should be at least one mandatory seminar on privacy, where case studies and practical privacy problems can be further discussed.

The following list names problem areas that could be discussed:

- Work place monitoring
- Police files, national and international intelligence networks
- Protection of sensitive medical data held by hospitals, physicians, public health registers, insurance companies or stored at medical chip cards
- Use of marketing data to create consumer profiles, use of credit /financial data by status inquiry agencies
- Communication profiles in telecommunication networks (ISDN, mobile telephone)
- Risks to privacy on data highways (e.g. Internet) / Privacy problems generated by National/Global Information Infrastructure Programmes

Data protection commissioners, data protection officers from industry, works councils or other privacy specialists that have to deal with privacy problems in practice should be invited as guest lecturers for this seminar.

This seminar should teach how to recognise and how to assess privacy risks. It shall show that there are many privacy problems in practice and that in daily life everybody is a data subject. Everybody's privacy can be easily affected. Besides, legal, technical and political means to deal with these privacy problems should be discussed.

For the postgraduate studies, there should be at least one course on IT-security. The topic security is not only important for the technical data protection. Many computer-related incidents have shown that computer insecurity can lead to great financial losses, the loss of reputation or even to a threat of human lives.

The IT-security course should give an introduction to IT-security law, computer-related risks, operating system security, database security, network security, risk analysis and contingency planning. In this course it should be shown how security controls, such as access control, encryption, organisational controls can help to protect

personal data from misuse. Security techniques for a privacy-friendly system design as well, e.g. security models for enforcing privacy requirements (see (Fischer-Hübner, 1994)), anonymous transaction systems (see (Chaum, 1985)).

It is important to show also interrelations between privacy, security and other computer science areas. For that reason, the topics privacy and computer security should not only be taught in extra courses, but it should as well be discussed in other courses. For example, in courses on Applied Informatics, the risks to privacy and other social implications of the application of IT systems should be analysed. Security topics should also be taught in courses on operating system principles, data base systems, computer networks, system design.

4 FINAL REMARKS

Teaching privacy as a part of the computer science curriculum can hopefully be one important way to reduce many privacy risks. Computer Scientists usually are performing an important role during the system design process and during system administration and operation. They should be responsible to consider and to realize privacy requirements at all these stages. Computer scientists must therefore be aware of privacy threats, be educated to feel social responsibility and be familiar with legal and technical data protection requirements as well as with methods for a privacy-friendly system design.

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6 BIOGRAPHY

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