

**Texas Tech University**  
**Department of Computer Science**

**Course Name:** Special Topics in Software Engineering      **Number:** CS5332/ CS4331      **Semester:** Fall 2017  
**Class Room:** ENGCTR 205      **Class Hours:** 9:30-10:50 (Tuesday/Thursday)

**Instructor:** Sepideh Ghanavati      **Office:** EC306A      **Email:** sepideh.ghanavati@ttu.edu  
**Instructor Office Hours:** Tuesday/Thursday 11:00AM – 12:00PM or by email

**Catalogue Listing:** Introduces theory and practice for software engineering, privacy and compliance. Topics include: Requirements Engineering, User Requirements Notation, Information Privacy and Multi-Jurisdictional Privacy Compliance, Privacy Governance Frameworks, Privacy Engineering Lifecycle Methodology, Privacy by Design, Usable Privacy, Privacy in Internet of Things, Anonymity and Data Privacy.

**Reading Material:** A reading list is provided at the end of the document. The instructor will include the required reading material from the list, at the end of each lecture slides.

**Course objectives:** This course covers the methods and tools needed to learn privacy concepts as well as to design systems for privacy with a specific focus on the requirements and design stages of the software development lifecycle.

**Learning objectives:**

- Learn the details of privacy concepts and challenges in privacy compliance
- Integrate privacy into the software engineering lifecycle phases
- Collect, analyze and reconcile system requirements in a privacy-sensitive ecosystem
- Evaluate software designs based on privacy principles and privacy requirements

**Activities and Evaluation:**

Students' performance will be evaluated based on class participation, assignments, group projects and a final exam.

- **Lectures** – There will be 3 hours of lectures every week, Tuesday and Thursday, in which students will learn about the privacy concepts and challenges and how to address some of these challenges with software and requirements engineering methodologies.
- **Readings** – Students will be assigned readings from the course textbook or academic papers to learn establish methods based on a strong engineering foundation. Additional readings will be selected and developed by the course instructor to include privacy theories that will be implemented using these methods.
- **Class Participation, Forum and Short Reports (10%)** – Students reflect on reading materials, discussions and reports in the class as well as on the forum. This part is an individual assessment. There are 15 discussions or reports which 5 of them are optional. We discuss the results in class and the participation is required.
- **Assignments (45%)** – Students have 3 take-home assignments during the semester whereby students apply methods taught in class to sample problems. Assignment 1 and 2 are group assignments. The groups have maximum 2 students and must be different from the project groups. Assignment 3 is an individual assignment.
- **Project (45%)** – Students will work in a group of maximum 3 students on a project from the topics given by the instructor. The detail of the topics and relevant papers must be approved by the instructor in the first month. The aim of these projects is to understand the privacy challenges and the potential solutions, analyze the current state of the art and identify new solutions to an existing problem, highlight privacy across different types of systems, e.g., personal vs. multi-stakeholder systems, or mobile vs. online systems, and across different domains, e.g., social networking, retail, health and travel. The students will give a presentation of the result of their project at the end of the semester in the time slot booked by them and must write a term paper on the topic. The paper must be original and discuss their own solutions, proposal or ideas.
- **Attendance** – Students are allowed to have 5 free absences (excused or not). More than 5 absences will be penalized. The 6<sup>th</sup> missed will have 2 marks deduction of the overall final grade. After that, each absence is 1 mark deduction of the overall final grade. More details are given in the section, Class Attendance, below.
- **Bonus Marks (5%)** – Throughout the semester, the instructor will give several tasks as optional which will count as extra mark towards the final mark.

### Grading Policy:

- The usual grading scale will be used for the final marks: A (90-100), B (80-89), C (70-79), D (60-69), F (0-59). This scale may be curved to raise student grades at the instructor's discretion. The detail of the scale is as followed:

Letter Grades	Numerical Range
A+	97 – 100
A	94 - 96.99
A-	90 - 93.99
B+	87 - 89.99
B	84 - 86.99
B-	80 - 83.99
C+	77 - 79.99
C	74 - 76.99
C-	70 - 73.99
D+	67 - 69.99
D	64 - 66.99
D-	60 - 63.99
F	0 - 59.99

- Submitted work is due when specified. With the instructor's permission, you may be able to submit 1-3 days late (with a penalty). For every 12 hours of late submission, 5% marks will be deducted. That is, if you are late by 3 full days, 30% mark will be deducted. After the 3<sup>rd</sup> full day, your assignment, project and reports will be marked as 0, **with no exception.**
- Every submission has to be done through Blackboard in a digital format, either in Word or PDF. Submissions via email or in person (in paper format) will be marked as 0. If you encounter any problems with Blackboard, it is your own duty to inform the instructor **in a timely manner, before the due date.** Blackboard problems can't be used as an excuse for late submission.

### Academic Integrity:

It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and high standard of integrity. The attempt of students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension.

Academic dishonesty includes, but it not limited to, cheating, plagiarism, collusion, falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student (such as, but not limited to, submission of essentially the same written assignment for two courses without the prior permission of the instructor) or the attempt to commit such an act. Students are expected to know and understand the definitions of cheating, plagiarism, collusion, falsifying academic records and misrepresenting facts found in OP34.12. (<http://www.depts.ttu.edu/opmanual/OP34.12.pdf>).

Academic dishonesty of any kind, if discovered, will result in one or more of the following sanctions:

- a grade of 0 for the corresponding graded item,
- a grade of "F" in the course,
- and further action according to the TTU operating procedures found in OP34.12. (<http://www.depts.ttu.edu/opmanual/OP34.12.pdf>).

### Classroom Civility:

All violations of classroom civility will be reported to the Student Judicial Programs. The Texas Tech University Catalog states: "Students are expected to assist in maintaining a classroom environment that is conducive to learning." In order to ensure that all students gain from time spent in class, **students are prohibited from engaging in any form of distraction**, e.g., reading newspapers (or other articles), working on other courses, and using cell-phones or laptops for calls or messages. If you indulge in any such inappropriate behavior (without explicit consent of the instructor), you will (at the very least) be asked to leave the classroom.

**Student with Disabilities:**

Any student who, because of a disability, may require special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office at 335 West Hall or 806-742-2405. Students requiring assistance should contact the instructor during the first week of class for pre-existing disabilities or as soon as the students receives verification from Student Disability Services. <http://www.depts.ttu.edu/opmanual/OP34.22.pdf>

**Center for Campus Life:**

The Center for Campus Life can assist in notifying the campus community of student illnesses, immediate family deaths and/or student death. Generally, in cases of student illness or immediate family deaths, the notification to the appropriate campus community members occur when a student is absent from class for four consecutive days with appropriate verification. It is the student's responsibility for missed class assignments and/or course work during their absence.

**Class Attendance:**

The student is responsible to inform the instructor, ahead of time if possible, of any absence and the reason. Make-up work due to absence(s) may be allowed on a case-by-case basis with a possible penalty only with instructor permission and with reference to TTU operating procedures. Make-up work should be submitted preferably before the next class period after the absence(s).

- Student Absence for Observance of Religious Holy Day, <http://www.depts.ttu.edu/opmanual/OP34.19.pdf>
- Sponsorship of Student Activities and Off-campus Trips, <http://www.depts.ttu.edu/opmanual/OP34.06.pdf>
- Class Attendance, <http://www.depts.ttu.edu/opmanual/OP34.04.pdf>

**Resolving Student Issues:**

Should a student encounter an issue in the course, the following chain of authority should be followed and not circumvented:

- Students should first discuss the issue with the instructor of the course in an attempt to resolve the issue;
- If the issue is not resolved, or the issue is of a matter that the student is not comfortable discussing with the instructor, the student should contact the Department Chair.
- Under no circumstances should the students start a resolution process with the Chair or Deans office without having discussions with the course instructor if possible.

Alternatively, The Ombuds for Students is available to assist students with any conflict or problem that has to do with being a student at Texas Tech University. You may visit the Ombuds in 024 East Basement Student Union Building or call 742.SAFE.

**TTU Resources for Discrimination, Harassment, and Sexual Violence:**

Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other Title IX violations are not tolerated by the University. Report any incidents to the Office for Student Rights & Resolution, (806)-742-SAFE (7233) or file a report online at [titleix.ttu.edu/students](http://titleix.ttu.edu/students). Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are: TTU Student Counseling Center, 806-742-3674, <https://www.depts.ttu.edu/scc/> (Provides confidential support on campus.) TTU Student Counseling Center 24-hour Helpline, 806-742-5555, (Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.) Voice of Hope Lubbock Rape Crisis Center, 806-763-7273, [voiceofhopelubbock.org](http://voiceofhopelubbock.org) (24-hour hotline that provides support for survivors of sexual violence.) The Risk, Intervention, Safety and Education (RISE) Office, 806-742-2110, [rise.ttu.edu](http://rise.ttu.edu) (Provides a range of resources and support options focused on prevention education and student wellness.) Texas Tech Police Department, 806-742-3931, <http://www.depts.ttu.edu/ttupd/> (To report criminal activity that occurs on or near Texas Tech campus.)

**Emergency Procedures:**

In the unlikely event of an emergency, students and faculty should follow the guidance provided at the website below. There is a possibility that this may include evacuation of the building or seeking shelter within the building. [http://www.depts.ttu.edu/hs/emergency\\_planning/index.php](http://www.depts.ttu.edu/hs/emergency_planning/index.php), <http://www.depts.ttu.edu/communications/emergency/>

**Course Schedule:** The table (below) provides the initial distribution of topics discussed over the weeks in the semester. **This schedule is tentative and subject to change during the semester at the instruction discretion.** All changes will be announced in class or on the course website (Blackboard). Students are responsible for making sure they are informed about announcements.

Week	Class (TR)	Activity	Material
1	08/29 08/31	L0 L1	Syllabus, Introduction and Academic Paper Writing Introduction to Information Privacy & Privacy Engineering
2	09/05 09/07	L2 – No Class L3 – No Class	Introduction to Requirements Engineering ( <b>Video Recorded</b> ) (Privacy and Legal) Requirements Specification ( <b>Video Recorded</b> )
3	09/12 09/14 <b>09/16</b>	L4 L5 -	Privacy and Regulatory Compliance Conceptual Frameworks for Privacy <b>Group Selection and Project Topics (Due Date)</b>
4	09/19 09/21	L6 L7	Introduction to User Requirements Notation (URN) Goal-oriented Requirements Language (GRL) and Use Case Maps (UCM) – <b>Assignment 1 (Posted) - Group</b>
5	09/26 09/28	L8 L9	LEGAL-URN Framework – <b>Projects Proposal (Due Date)</b> LEGAL-URN Framework
6	10/03 10/05	L10 L11	Introduction to jUCMNav and LEGAL – URN Privacy by Design
7	10/10 10/12	L12 L13	Privacy by Design – <b>Assignment 1 (Due Date)</b> Usable Privacy Policies –Notice & Choice – <b>Assignment 2 (Posted)</b>
8	10/17 10/19 <b>10/20</b>	L14 L15 -	Design and Development of Privacy Policies Privacy Engineering Lifecycle Methodology (Architecture & Methods) <b>Project – First Draft (Due Date)</b>
9	10/24 10/26	L16 L17	Privacy Engineering Lifecycle Methodology (Stage 1, 2 & 3) Privacy Engineering Lifecycle Methodology (Stage 4, 5 & 6)
10	10/31 11/02	L18 L19	Privacy and Social Network – <b>Assignment 2 (Due Date)</b> Introduction to Internet of Things
11	11/07 11/09	L20 L21	IoT and Privacy Challenges – <b>Assignment 3 (Posted)</b> Privacy and Cloud Computing
12	11/14 <b>11/15</b> 11/16	L22 - L23	Anonymity and Identity – Anonymization Techniques <b>Project – Second Draft (Due Date) and Implementation V0.1</b> Anonymization Techniques and Differential Privacy
13	11/21 <b>11/22</b> 11/23	L24 - L25	Placeholder for Presentations or an Additional Lecture (If Necessary) <b>Assignment 3 (Due Date)</b> Thanksgiving – Holiday
14	11/28 11/30	P1 P2	Presentations Presentations
15	12/05 <b>12/07</b>	P3 <b>Final Project</b>	Presentations <b>Project – Final Draft (Due Date) and Final Implementation</b>

## Reading Materials – This list will be updated during the semester.

### Textbooks:

- Dennedy, Michelle Finneran, Jonathan Fox, and Thomas Finneran. The Privacy Engineer's Manifesto: Getting from Policy to Code to QA to Value. Apress, 2014.
- Oliver, Dr Ian. Privacy engineering: A dataflow and ontological approach. CreateSpace Independent Publishing Platform, 2014.
- Bowman, Courtney, et al. The Architecture of Privacy: On Engineering Technologies that Can Deliver Trustworthy Safeguards. " O'Reilly Media, Inc.", 2015.
- Axel van Lamsweerde (2009). Requirements Engineering: From System Goals to UML Models to Software Specifications, New Jersey: John Wiley & Sons, Inc.
- Ian K. Bray: An Introduction to Requirements Engineering, Addison Wesley, 2002

### Reading Materials:

- Overview Article in Stanford Encyclopedia of Philosophy: <https://plato.stanford.edu/entries/privacy/>
- Daniel Solove, "I've Got Nothing to Hide' and Other Misunderstandings of Privacy", San Diego Law Review, Vol. 44, 2007.
- Daniel Solove, A Taxonomy of Privacy, University of Pennsylvania Law Review, Vol. 154, No. 3, p. 477, January 2006.
- Calo, M. Ryan, The Boundaries of Privacy Harm. Indiana Law Journal, Vol. 86, No. 3, 2011.
- Nissenbaum, H., A Contextual Approach to Privacy Online. Daedalus 140(4), Fall 2011:32-48.S.
- B. A. Nuseibeh and S. M. Easterbrook, Requirements Engineering: A Roadmap. In A. C. W. Finkelstein (ed) The Future of Software Engineering, ACM Press, 2000 <http://www.cs.toronto.edu/~sme/papers/2000/ICSE2000.pdf>
- Amyot, D. and Mussbacher, G. (2011) [User Requirements Notation: The First Ten Years, The Next Ten Years](#). Invited paper, *Journal of Software (JSW)*, Vol. 6, No. 5, Academy Publisher, May 2011, 747-768.
- Amyot, D., Ghanavati, S., Horkoff, J., Mussbacher, G., Peyton, L. and Yu, E. (2010) Evaluating Goal Models within the Goal-oriented Requirement Language. *International Journal of Intelligent Systems (IJIS)*, Vol. 25, Issue 8, August 2010, 841-877.
- Michael Jackson, The World and the Machine; a Keynote Address at ICSE-17; Proceedings of ICSE-17; ACM Press, 1995.
- Pamela Zave and Michael Jackson, Four Dark Corners of Requirements Engineering; ACM Transactions on Software Engineering and Methodology, Volume 6 Number 1 pages 1-30, 1996.
- R. Snijders, F. Dalpiaz, S. Brinkkemper, M. Hosseini, R. Ali, A. Ozum, "REfine: A gamified platform for participatory requirements engineering", CROWDRE, IEEE 1st International Workshop on Crowd-Based Requirements Engineering (CrowdRE), 2015 pp. 1-6.
- M. Hosseini, A. Shahri, K. Phalp, J. Taylor, R. Ali and F. Dalpiaz, "Configuring crowdsourcing for requirements elicitation," 2015 IEEE 9th Int. Conf. on Research Challenges in Information Science (RCIS), Athens, 2015, pp. 133-138.
- S. Lim, D. Damian, and A. Finkelstein, "StakeSource2.0: Using Social Networks of Stakeholders to Identify and Prioritise Requirements," in Proc. of ICSE, 2011, pp. 1022–1024.
- Amyot, D. (2003) Introduction to the User Requirements Notation: Learning by Example. *Computer Networks*, 42(3), 285-301, 21 June 2003
- M. Weiss and D. Amyot, Business Process Modeling with URN, *International Journal of E-Business Research*, July 2005, p. 63-90.
- Amyot, D. and Mussbacher, G. (2011) User Requirements Notation: The First Ten Years, The Next Ten Years. Invited paper, *Journal of Software (JSW)*, Vol. 6, No. 5, Academy Publisher, May 2011, 747-768.
- Weiss, M. and Amyot, D. (2005) Designing and Evolving Business Models with URN. Montreal Conference on eTechnologies (MCeTech), Montréal, Canada, January 2005, 149-162. (Best Paper Award)
- Amyot, D., Ghanavati, S., Horkoff, J., Mussbacher, G., Peyton, L. and Yu, E. (2010) Evaluating Goal Models within the Goal-oriented Requirement Language. *International Journal of Intelligent Systems (IJIS)*, Vol. 25, Issue 8, August 2010, 841-877.

- Amyot, D. (2015) Goal Modeling Education with GRL: Experience Report. 8th Int. i\* Workshop (iStar@RE 2015), Ottawa, Canada, August. CEUR-WS 1402, 1-6.
- Amyot, D., Mussbacher, G., Ghanavati, S., Kealey, J. (2011) GRL Modeling and Analysis with jUCMNav. 5th International i\* Workshop (iStar 2011), Trento, Italy, August. CEUR-WS, Vol-766, 160-162.
- J. Horkoff, E. Yu. Comparison and Evaluation of Goal-Oriented Satisfaction Analysis Techniques. Requirements Engineering Journal (REJ). pages 1-24. January 2012, Springer.
- Kealey, J. and Amyot, D. (2006) Towards the Automated Conversion of Natural-Language Use Cases to Graphical Use Case Maps. 2006 IEEE Canadian Conference on Electrical and Computer Engineering (CCECE06), Ottawa, Canada, May. 2377-2380.
- Amyot, D., Gray, T., Liscano, R., Logrippo, L, and Sincennes, J. (2005) Interactive Conflict Detection and Resolution for Personalized Features. Journal of Communications and Networks, Vol. 7, No. 3, 353-366, September 2005.
- Fred H. Cate, "The Failure of Fair Information Practice Principles", Consumer Protection in the Age of the Information Economy (2006), Indiana University
- Lorrie Faith Cranor, I Didn't Buy it for Myself, in Designing Personalized User Experiences in eCommerce, 2004.
- European privacy requests for search removals: <https://www.google.com/transparencyreport/removals/europeprivacy/?hl=en>
- Google Transparency Report: <https://www.google.com/transparencyreport/removals/europeprivacy/faq/?hl=en>
- Google accidentally reveals data on 'right to be forgotten' requests: <https://www.theguardian.com/technology/2015/jul/14/google-accidentally-reveals-right-to-be-forgotten-requests>
- Peter Fleischer, Foggy Thinking About the Right to Oblivion, (Google's Global Privacy Counsel)
- S. Ingolfo, J. Mylopoulos, A. Perini, A. Siena, A. Susi. Nòmos: from Strategic Dependencies to Obligations. 5th International i\* Workshop. 29-30 August 2011. Trento, Italy.
- A. Siena, I. Jureta, S. Ingolfo, A. Susi, A. Perini, J. Mylopoulos. Capturing Variability of Law with Nòmos 2. ER 2012: 383-396.
- David G. Gordon, Travis D. Breaux. Reconciling Multi-Jurisdictional Requirements: A Case Study in Requirements Water Marking, (Nominated for Best Paper) IEEE International Requirements Engineering Conference (RE'12), Chicago, Illinois, pp. 91-100, Sep. 2012.
- Ghanavati, Sepideh, et al. "Goal-oriented compliance with multiple regulations." Requirements Engineering Conference (RE), 2014 IEEE 22nd International. IEEE, 2014.
- Ghanavati, Sepideh, Daniel Amyot, and André Rifaut. "Legal goal-oriented requirement language (legal GRL) for modeling regulations." Proceedings of the 6th international workshop on modeling in software engineering. ACM, 2014.
- Ghanavati, Sepideh, Daniel Amyot, and Liam Peyton. "Towards a framework for tracking legal compliance in healthcare." International Conference on Advanced Information Systems Engineering. Springer Berlin Heidelberg, 2007.
- Ghanavati, Sepideh, Daniel Amyot, and Liam Peyton. "Compliance analysis based on a goal-oriented requirement language evaluation methodology." Requirements Engineering Conference, 2009. RE'09. 17th IEEE International. IEEE, 2009.
- M. Colesky, J. Hoepman, and C. Hillen, "A Critical Analysis of Privacy Design Strategies," in IWPE, 2016.
- A. Cavoukian, "Privacy by Design The 7 Foundational Principles Implementation and Mapping of Fair Information Practices," Information and Privacy Commissioner of Ontario, Canada, 2009.
- Ann Cavoukian, Ph.D. and Marilyn Prosch, Ph.D., Privacy by ReDesign: Building a Better Legacy. (May 2011) <http://privacybydesign.ca/content/uploads/2010/11/PbRD.pdf>
- Privacy and Data Protection by Design – from policy to engineering, European Union Agency for Network and Information Security, December 2014.
- J.-H. Hoepman, "Privacy Design Strategies," IFIP SEC 2014, pp. 446– 459, 2014.
- Florian Schaub, Rebecca Balebako, Adam Durity, Lorrie Cranor. A Design Space for Effective Privacy Notices. SOUPS 2015.
- Lorrie Faith Cranor. "Necessary but not sufficient: Standardized mechanisms for privacy notice and choice." In: Journal on Telecomm. & High Tech. 10 (2012), p. 273.

- Patrick Gage Kelley, Lucian Cesca, Joanna Bresee, and Lorrie Faith Cranor. Standardizing Privacy Notices: An Online Study of the Nutrition Label Approach. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 2010. (CHI '10).
- [http://cylab.cmu.edu/news\\_events/news/2017/many-apps-fail-to-disclose-the-collection-and-sharing-of-sensitive-data.html](http://cylab.cmu.edu/news_events/news/2017/many-apps-fail-to-disclose-the-collection-and-sharing-of-sensitive-data.html)
- Lecture 20: Introduction to Differential Privacy: <https://people.eecs.berkeley.edu/~stephentu/writeups/6885-lec20-b.pdf>
- Sweeney. Achieving k-anonymity privacy protection using generalization and suppression. IJUFKS. 2002
- Li, Ninghui, Tiancheng Li, and Suresh Venkatasubramanian. "t-closeness: Privacy beyond k-anonymity and l-diversity." Data Engineering, 2007. ICDE 2007. IEEE 23rd International Conference on. IEEE, 2007.
- Machanavajjhala, Ashwin, et al. "l-diversity: Privacy beyond k-anonymity." ACM Transactions on Knowledge Discovery from Data (TKDD) 1.1 (2007): 3.
- Pedro G. Leon, Blase Ur, Rebecca Balebako, Lorrie Faith Cranor, Richard Shay, and Yang Wang. Why Johnny Can't Opt Out: A Usability Evaluation of Tools to Limit Online Behavioral Advertising. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 2012. (CHI '12)
- Database Privacy, November 24, 2003, Sergey Yekhanin and Cynthia Dwork.
- Data breaches through wearables put target squarely on IoT in 2017: <http://www.csoonline.com/article/3150881/internet-of-things/data-breaches-through-wearables-put-target-squarely-on-iot-in-2017.html>
- The 10 Most Terrifying IoT Security Breaches you aren't aware of (so far): <https://www.linkedin.com/pulse/10-most-terrifying-iot-security-breaches-so-far-you-arent-montgomery>
- "Stutzman, F., A. Acquisiti, and R. Gross. 2012. Silent listeners: The evolution of privacy and disclosure on Facebook. J of Privacy and Confidentiality. "
- J. H. Ziegeldorf, O. Garcia Morchon, and K. Wehrle. "Privacy in the Internet of Things: threats and challenges." Security and Communication Networks 7.12 (2014): 2728-2742.

#### Web Resources:

- jUCMNav - <http://jucmnav.softwareengineering.ca/ucm/bin/view/ProjetSEG/WebHome>
- Arduino - <https://www.arduino.cc/>
- Requirements Tools: <http://www.volere.co.uk/tools.htm>