

# Travis D. Breaux, Ph.D.

Institute for Software Research  
Carnegie Mellon University  
5000 Forbes Avenue  
Pittsburgh, PA 15217 USA

breaux@cs.cmu.edu  
<http://www.cs.cmu.edu/~breaux>

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## Education

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- NORTH CAROLINA STATE UNIVERSITY** 05/2009  
Doctorate of Philosophy in Computer Science
- UNIVERSITY OF OREGON** 12/2003  
Bachelors of Science in Computer and Information Science  
Awarded Departmental Honors
- UNIVERSITY OF HOUSTON** 05/1999  
Bachelors of Arts in Anthropology

## Research and Teaching Experience

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### CARNEGIE MELLON UNIVERSITY

Institute for Software Research  
Pittsburgh, Pennsylvania

(08/2010–Present) Assistant Professor: Conducting research and teaching on requirements, software-engineering, and legal compliance-related topics

### INSTITUTE FOR DEFENSE ANALYSES

Information Technology and Systems Division  
Alexandria, Virginia

(06/2009–8/2010) Research Staff Member: Multiple projects funded under the Office of the Secretary of Defense, include Defense Research and Engineering (DDR&E)

### NORTH CAROLINA STATE UNIVERSITY

College of Engineering, Department of Computer Science  
Raleigh, North Carolina

(09/2004–05/2009) Research Assistant to Dr. Annie I. Antón: Developed systematic, formal methods to acquire and model legal security and privacy requirements for trustworthy and dependable information systems. Project funded by the IBM PhD Fellowship awarded by the IBM Center for Advanced Studies, Research Triangle Park, NC

### PURDUE UNIVERSITY

Center for Education and Research in Information Assurance and Security  
West Lafayette, Indiana

(05/2006–8/2006) Research Assistant to Dr. Annie I. Antón, Dr. Eugene H. Spafford: Analyzed U.S. Federal regulations to acquire privacy and security access requirements to manage ambiguity, conflicts and complex exceptions. Project funded by NSF ITR CyberTrust *Policy-Driven Framework for Online Privacy Protection* (NSF 043-0166)

**IBM THOMAS J. WATSON RESEARCH CENTER**

Department of Privacy Enabling Technology  
Hawthorne, New York

- (05/2005–08/2005) Research Assistant to Dr. Claire-Marie Karat: Analyzed organizational security policies from several large organizations and security standards (ISO 27000 series, NIST SP 800 series, etc.) Evaluated existing policy languages (EPAL, P3P, XACML) for mapping between human- and machine-readable policies.

**OAK RIDGE NATIONAL LABORATORY**

Applied Software Engineering Research Group  
Oak Ridge, Tennessee

- (04/2004–08/2004) Research Assistant to Dr. Robert Patton: Researched terrorist attack scenario prediction techniques from sparse, open source intelligence; developed methods and interactive tools to reduce polysemy in place-name geo-location.
- (06/2003–08/2003) Research Assistant to Dr. Thomas E. Potok: Applied ontology to hierarchical clustering on semi-structured data for information retrieval from document repositories.

**Awards and Honors**

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- (2006-2009) IBM Ph.D. Fellowship: The fellowship program is an annual, worldwide competitive program that honors exceptional Ph.D. students in a variety of focus areas including computer science. The 2006-2007 competition cycle had over 500 student nominations and only 52 award recipients.
- (2008-2009) Preparing the Professoriate: The program is an annual, university-wide competition that pairs PhD students with a distinguished faculty mentor, combining hands-on teaching and evaluation with nine seminars on teaching, mentoring and academic career-related topics.
- (2006-2007) Walter H. Wilkinson Research Ethics Fellowship: The fellowship is a university-wide competition that requires fellows to conduct an in-depth study of research ethics for one academic year, exploring guidelines for professional conduct and ethical decision-making.
- (2005-2006) CISCO Systems Information Assurance Scholarship: The scholarship is awarded to students who make a significant contribution to information security and assurance.
- (2004-2005) President of the Computer Science Graduate Student Association: Elected President for the academic year 2004-2005; in that year, the association represented the interests of 384 graduates students (127 Doctoral, 257 Masters) in the Department of Computer Science at NCSU.
- (2003-2004) Computer Science, Engineering and Mathematics Scholars: CSEM scholars are funded by the National Science Foundation, receive mentoring from faculty and participate in a regular lecture series.
- (2000-2001) Peace Corps Volunteer Representative: Elected in August 2000; in that year, eight representatives represented the interests of 81 volunteers from across Mongolia to the local Peace Corps administration.

**Professional Memberships**

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Member of the U.S. Public Policy Committee of the ACM, since June 2006  
Member of the U.S. Public Policy Council of the ACM, for 1-year 2011 term  
Member of the IBM Data Governance Council, February 2005–2006  
Member of the Privacy Place, a CERIAS Affiliate, since September 2004  
Member of Institute for Electrical and Electronics Engineers (IEEE), since January 2004  
Member of the IEEE Computer Society, since January 2006  
Member of Association for Computing Machinery (ACM), since August 2003  
Member of the ACM Special Interest Group on Software Engineering (SIGSOFT), since August 2006

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## Steering, Organizing and Program Committees

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- Program Committee Member, *Foundations on Software Engineering, New Ideas (FSE'10)*, Szeged, Hungary, September 2011.
- Program Committee Member, *19<sup>th</sup> International Requirements Engineering Conference (RE'11)*, Trento, Italy, September 2011.
- Tutorials Co-Chair, *19<sup>th</sup> International Requirements Engineering Conference (RE'11)*, Trento, Italy, September 2011.
- Program Committee Member, *1<sup>st</sup> Workshop on the Web and Requirements Engineering (WeRE)*, Sydney, Australia, September 2010.
- Program Committee Member, *18<sup>th</sup> International Requirements Engineering Conference (RE'10)*, Sydney, Australia, September 2010.
- Publications Chair, *18<sup>th</sup> International Requirements Engineering Conference (RE'10)*, Sydney, Australia, September 2010.
- Guest Editor, *Requirements Engineering Journal, Special Issue on Digital Privacy: Theories, Policies and Technologies*, Springer, 2010.
- Program Committee Co-chair, *2<sup>nd</sup> International Workshop on Requirements Engineering and Law (RELAW'09)*, co-located with RE'09, Atlanta, Georgia, September 8<sup>th</sup>, 2009.
- Program Committee Member, *Workshop on Information Security and Privacy in a De-Perimeterised World (DISP-09)*, co-located with PASSAT'09, Vancouver, Canada, August 29-30, 2009.
- Program Committee Member, *6<sup>th</sup> International Conference on Trust, Privacy and Security (TrustBus '09)*, Linz, Austria, August 31-September 4, 2009.
- Program Committee Member, *IEEE 6<sup>th</sup> International Conference on Information Technology (ITNG'09)*, Software Compliance Track, Las Vegas, Nevada, USA, April 27-29, 2009.
- Program Committee Co-chair, *1<sup>st</sup> International Workshop on Requirements Engineering and Law (RELAW'08)*, co-located with RE'08, Barcelona, Spain, September 8<sup>th</sup>, 2008.
- Student Volunteer, *ACM/IEEE 30<sup>th</sup> International Conference on Software Engineering (ICSE'08)*, Leipzig, Germany, May 10<sup>th</sup>-18<sup>th</sup>, 2008.
- Program Committee Member, *Workshop on Security and Privacy in Wireless Mobility*, co-located with *IEEE WiMob*, Avignon, France, October 12<sup>th</sup> 2008.
- Program Committee Member, *Symposium on Requirements Engineering for Information Security (SREIS'08)*, co-located with *ARES'08*, Barcelona, Spain, March 4-7<sup>th</sup> 2008.
- Organizing Committee Member, *Preparing the Faculty Candidate: Recruiter and New Faculty Perspectives*, North Carolina State University, Raleigh, NC, November 13<sup>th</sup> 2007.
- Steering Committee Member, *Land Grant University Research Ethics Program*, North Carolina State University, Raleigh, North Carolina, USA, 2006–2007.
- Student Volunteer, *ACM/SIGSOFT 14<sup>th</sup> Symposium on Foundations of Software Engineering (FSE-14)*, Portland, Oregon, USA, November 5<sup>th</sup>-11<sup>th</sup>, 2006.
- Student Volunteer, *IEEE 13<sup>th</sup> International Conference on Requirements Engineering*, Monterrey, California, USA, September 8<sup>th</sup>-12<sup>th</sup>, 2003.

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## Invited Referee and Reviewer Participation

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- Reviewer, *Automated Software Engineering Journal*, since 2010.
- Reviewer, *ACM Transactions on the Web*, since 2010.

Reviewer, Enterprise Information Systems, since 2010.  
Reviewer, IEEE Security & Privacy, since 2009.  
Reviewer, Requirements Engineering Journal, since 2008.  
Reviewer, Communications of the ACM, since 2008.  
Reviewer, Elsevier Computer Standards and Interfaces, since 2008.  
Reviewer, IEEE Transactions on Knowledge and Data Engineering, since 2007.  
Reviewer, Elsevier Computers and Security, since 2007.  
Reviewer, Grace Hopper Celebration of Women in Computing Conference, 2006.  
Reviewer, IEEE Transactions on Software Engineering, since 2005.

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## Refereed Journal Publications

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### **Legally “Reasonable” Security Requirements: A 10-year FTC Retrospective**

Travis D. Breaux, David L. Baumer. (In Press) *Computers and Security (COSE)*, November 2010.

### **A Requirements Model for Conducting Worldwide Technology Assessments: A Case Study in International Export Control**

Travis D. Breaux, Robert Leheny, Robert Rolfe. (In Preparation) *IEEE Transactions on Knowledge and Data Engineering*

### **A Distributed Requirements Management Framework for Compliance and Accountability**

Travis D. Breaux, Annie I. Antón, Eugene H. Spafford. *Computers and Security (COSE)*, 28(1-2): 8-17, February/March 2009.

### **Semantic Parameterization: A Conceptual Modeling Process for Domain Descriptions**

Travis D. Breaux, Annie I. Antón, Jon Doyle. *ACM Transactions on Software Engineering Methodology (ACM TOSEM)*, 18(2): 5, November 2008.

### **Analyzing Regulatory Rules for Privacy and Security Requirements**

Travis D. Breaux, Annie I. Antón. *IEEE Transactions on Software Engineering (IEEE TSE)*, Special Issue on Software Engineering in Secure Systems, 34(1): 5-20, January/February 2008.

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## Refereed Conference Proceedings

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### **Exercising Due Diligence in Legal Requirements Acquisition**

Travis D. Breaux. In Proc. *17<sup>th</sup> International Requirements Engineering Conference (RE'09)*, Atlanta, Georgia, September 2009, pp. 225-230.

### **Early Studies in Acquiring Evidentiary, Reusable Business Process Models for Legal Compliance**

Travis D. Breaux, Calvin Powers. In Proc. *6<sup>th</sup> International Conference on Information Technology: New Generations (ITNG'09)*, Las Vegas, NV, April 2009, pp. 272-277.

### **Automating the Extraction of Rights and Obligations for Regulatory Compliance**

Nadzeya Kiyavitskaya, Nicola Zeni, Travis D. Breaux, Annie I. Antón, James R. Cordy, Luisa Mich, John Mylopoulos. In Proc. *27<sup>th</sup> International Conference on Conceptual Modelling (ER'08)*, Barcelona, Spain, October 2008, pp. 154-168.

### **Legal Requirements, Compliance and Practice: An Industry Case Study in Accessibility**

Travis D. Breaux, Annie I. Antón, Kent Boucher, Merlin Dorfman. In Proc. *IEEE 16<sup>th</sup> International Requirements Engineering Conference (RE'08)*, Barcelona, Catalonia, Spain, September 2008, pp. 43-52.

### **Extracting Rights and Obligations from Regulations: Towards a Tool-Supported Process**

Nadzeya Kiyavitskaya, Nicola Zeni, Luisa Mich, Travis D. Breaux, Annie I. Antón, John Mylopoulos. In Proc. *IEEE/ACM 22nd International Conference Automated Software Engineering (ASE'07)*, Atlanta, Georgia, November 2007, pp. 429-432.

### **Towards Compliance: Extracting Rights and Obligations to Align Requirements with Regulations**

Travis D. Breaux, Matthew W. Vail, Annie I. Antón. In Proc. *IEEE 14<sup>th</sup> International Requirements Engineering Conference (RE'06)*, Minneapolis, MN, USA, September 2006, pp. 49-58.

**Analyzing Goal Semantics for Rights, Permissions and Obligations**

Travis D. Breaux, Annie I. Antón. In Proc. *13<sup>th</sup> IEEE International Requirements Engineering Conference (RE'05)*, Paris, France, August 2005, pp. 177–186.

**Hierarchical Information Clustering Using Ontology Languages**

Travis D. Breaux and Joel Reed. In Proc. *38<sup>th</sup> Hawaii International Conference on System Sciences (HICSS-38)*, Honolulu, Hawaii, January 2005, p. 112b.

**Refereed Symposia and Workshop Proceedings**

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**A Method to Acquire Compliance Monitors from Regulations**

Travis D. Breaux. In Proc. *3<sup>rd</sup> IEEE International Workshop on Requirements Engineering and Law (RELAW'10)*, Sydney, Australia, September 2010, pp. 17-26.

**Identifying Vulnerabilities and Critical Requirements using Criminal Court Proceedings**

Travis D. Breaux, Jonathan D. Lewis, Paul N. H. Otto, Annie I. Antón. In Proc. *ACM Symposium on Applied Computing (ACM SAC'09)*, Honolulu, Hawaii, August 2008, pp. 355-359.

**A Systematic Method for Acquiring Regulatory Requirements: A Frame-based Approach**

Travis D. Breaux, Annie I. Antón. In Proc. *6<sup>th</sup> International Workshop on Requirements for High Assurance Systems (RHAS-6)*, Delhi, India, October 2007.

**Compliance Engineering: Aligning Software Requirements with Policies and Regulations**

Travis D. Breaux. *ACM/SIGSOFT 14<sup>th</sup> Symposium on Foundations of Software Engineering (FSE-14), Doctoral Symposium*, Portland, OR, USA, November 2006.

**Enforceability vs. Accountability in Electronic Policies**

Travis D. Breaux, Annie I. Antón, Clare-Marie Karat, John Karat. In Proc. *IEEE 7<sup>th</sup> International Workshop on Policies for Distributed Systems and Networks (POLICY'06)*, London, ON, Canada, June 2006, pp. 227–230.

**Mining Rule Semantics for Understanding Legislative Compliance**

Travis D. Breaux, Annie I. Antón. In Proc. *ACM Workshop on Privacy in the Electronic Society (WPES'05)*, Alexandria, VA, USA, November 2005, pp. 51–54.

**Deriving Semantic Models from Privacy Policy Goals**

Travis D. Breaux, Annie I. Antón. In Proc. *IEEE 6<sup>th</sup> International Workshop on Policies for Distributed Systems and Networks (POLICY'05)*, Stockholm, Sweden, June 2005, pp. 67–76.

**Dissertation, Technical Reports and Thesis**

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**Legal Requirements Acquisition for the Specification of Legally Compliance Information Systems**

Travis D. Breaux, Ph.D. Dissertation, North Carolina State University, April 22<sup>nd</sup> 2009.

**Acquiring Software Compliance Artifacts from Policies and Regulations**

Travis D. Breaux, Annie I. Antón, Technical Report #TR-2006-27, North Carolina State University, Department of Computer Science, September 8<sup>th</sup> 2006.

**Policy-Parametric Software**

Travis D. Breaux, Technical Report #TR-2004-30, North Carolina State University, Department of Computer Science, November 17<sup>th</sup> 2004.

**BABEL: The Semantic Web in Open Systems**

Travis D. Breaux, Undergraduate Honors Thesis, Advisor Dr. Stephen Fickas, University of Oregon, Department of Computer and Information Science, December 6<sup>th</sup> 2003.

**Invited Panels**

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Panelist, “Technology: Transforming the Regulatory Endeavor,” *15<sup>th</sup> Annual Berkeley Center for Law and Technology Symposium*, Berkeley, California, March 3, 2011

Panelist, *International Privacy Day*, Carnegie Mellon University, Pittsburgh, PA January 26, 2011

Ph.D. Student Panelist, "Inspiration Program," *ACM/SIGSOFT 14th Symposium on the Foundations of Software Engineering (FSE-14)*, Portland, OR, USA, November 5th 2006

## Invited Presentations

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### **What should Software Developers Know about Developing Legally Compliant Software?**

Travis D. Breaux, *University of Queensland*, Brisbane, Australia, October 6, 2010.

### **Exercising Due Diligence: Legal Requirements Acquisition and Formalization**

Travis D. Breaux, *Institute for Defense Analyses*, Alexandria, Virginia, April 15<sup>th</sup> 2009.

### **Exercising Due Diligence: Legal Requirements Acquisition and Formalization**

Travis D. Breaux, *Carnegie Mellon University*, Pittsburgh, Pennsylvania, May 26<sup>th</sup> 2009.

### **Aligning Information Systems with Policies and Laws**

Travis D. Breaux, *Science and Technology Policy Institute*, Washington, DC, April 9<sup>th</sup> 2009.

### **Exercising Due Diligence: Legal Requirements Acquisition and Formalization**

Travis D. Breaux, *RAND Corporation*, Arlington, Virginia, March 23<sup>rd</sup> 2009.

### **Requirements Acquisition for Legal Compliance**

Travis D. Breaux, *University of Texas at San Antonio*, San Antonio, Texas, March 6<sup>th</sup> 2009.

### **Requirements Acquisition for Legal Compliance**

Travis D. Breaux, *DePaul University*, Chicago, Illinois, March 2<sup>nd</sup> 2009.

### **Legal Requirements: Theory and Practice for Specifying Legally Compliant Information Systems**

Travis D. Breaux, *University of Nebraska*, Lincoln, Nebraska, February 26<sup>th</sup> 2009.

### **Legal Requirements: A Research Perspective from Theory to Practice**

Travis D. Breaux, *IFIP WG 2.9 on Requirements Engineering*, Salvador, Brazil, February 28<sup>th</sup> 2008.

### **Beliefs, Determinations and Agreements: Contextualizing Privacy in Practice**

Travis D. Breaux, *Carolina Privacy Officials Network*, Raleigh, NC, January 29<sup>th</sup> 2008.

### **Ethics in Computer Science: Technologists and Value-free Technology**

Travis D. Breaux, *Annual NCSU Computer Science Fall Seminar Series*, Raleigh, NC, December 8<sup>th</sup> 2006.

### **What do Organizational Security Policies Say about Security?**

Travis D. Breaux, *IBM Thomas J. Watson Research Laboratory*, Hawthorne, New York, July 28<sup>th</sup> 2005.

### **Information Analysis Techniques using Upper Ontology Languages**

Travis D. Breaux, *Oak Ridge National Laboratory*, Oak Ridge, Tennessee, August 6<sup>th</sup> 2003.

## Academic Paper Presentations

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### **A Method to Acquire Compliance Monitors from Regulations**

Travis D. Breaux. 3<sup>rd</sup> *IEEE International Workshop on Requirements Engineering and Law (RELAW'10)*, Sydney, Australia, September 28<sup>th</sup>, 2010.

### **Exercising Due Diligence in Legal Requirements Acquisition**

Travis D. Breaux. 17<sup>th</sup> *International Requirements Engineering Conference (RE'09)*, Atlanta, Georgia, September 2<sup>nd</sup>, 2009.

### **Early Studies in Acquiring Evidentiary, Reusable Business Process Models for Legal Compliance**

Travis D. Breaux, 6<sup>th</sup> *International Conference on Information Technology: New Generations (ITNG'09)*, Las Vegas, NV, April 27<sup>th</sup> 2009.

### **Legal Requirements Acquisition for the Specification of Legally Compliance Information Systems**

Travis D. Breaux, *Doctoral Thesis Defense*, North Carolina State University, Raleigh, North Carolina, February 2<sup>nd</sup> 2009.

**Legal Requirements, Compliance and Practice: An Industry Case Study in Accessibility**

Travis D. Breaux, *IEEE 16<sup>th</sup> International Requirements Engineering Conference (RE'08)*, Barcelona, Catalonia, Spain, September 10<sup>th</sup> 2008.

**A Systematic Method for Acquiring Regulatory Requirements: A Frame-based Approach**

Travis D. Breaux, *6<sup>th</sup> International Workshop on Requirements for High Assurance Systems (RHAS-6)*, Delhi, India, October 15<sup>th</sup> 2007.

**The Frame-Based Requirements Analysis Method (FBRAM)**

Travis D. Breaux, *Doctoral Thesis Proposal*, North Carolina State University, Raleigh, NC, USA, August 17<sup>th</sup> 2007.

**Compliance Engineering: Aligning Software Requirements with Policies and Regulations**

Travis D. Breaux, *ACM/SIGSOFT 14<sup>th</sup> Symposium on Foundations of Software Engineering (FSE-14), Doctoral Symposium*, Portland, OR, USA, November 6<sup>th</sup> 2006.

**Towards Compliance: Extracting Rights and Obligations to Align Requirements with Regulations**

Travis D. Breaux, *IEEE 14<sup>th</sup> International Requirements Engineering Conference (RE'06)*, Minneapolis, MN, USA, September 13<sup>th</sup> 2006.

**Enforceability vs. Accountability in Electronic Policies**

Travis D. Breaux, *IEEE 7<sup>th</sup> International Workshop on Policies for Distributed Systems and Networks*, London, Ontario, June 8<sup>th</sup> 2006.

**Mining Rule Semantics for Understanding Legislative Compliance**

Travis D. Breaux, *2005 ACM Workshop on Privacy in Electronic Society*, Alexandria, Virginia, November 7<sup>th</sup> 2005.

**Analyzing Goal Semantics for Rights, Permissions and Obligations**

Travis D. Breaux, *13<sup>th</sup> IEEE Requirements Engineering Conference*, Paris, France, September 1<sup>st</sup> 2005.

**Deriving Semantic Models from Privacy Policies**

Travis D. Breaux, *IEEE 6<sup>th</sup> International Workshop on Policies for Distributed Systems and Networks*, Stockholm, Sweden, June 6<sup>th</sup> 2005.

**Rights, Obligations and Suggestions: Encoding Rules from Privacy Law**

Travis D. Breaux, *The PrivacyPlace Spring 2005 Workshop*, Department of Computer Science, North Carolina State University, Raleigh, North Carolina, March 14<sup>th</sup> 2005.

**Semantic Parameterization of Privacy Goals**

Travis D. Breaux, *The Privacy Place Fall 2004 Workshop*, Department of Computer Science, North Carolina State University, Raleigh, North Carolina, October 19<sup>th</sup> 2004.

**Information Analysis Techniques Using Upper Ontology Languages**

Travis D. Breaux, Oak Ridge National Laboratory, Oak Ridge, Tennessee, August 6<sup>th</sup> 2003.

**Academic Poster Presentations**

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**The Effect of Ambiguity on Legal Conformance in Information Systems**

Travis D. Breaux, *19<sup>th</sup> Conference on Computers, Freedom and Privacy*, Washington, DC, June 2<sup>nd</sup> 2009.

**The Effect of Ambiguity on Legal Conformance in Information Systems**

Travis D. Breaux, *3<sup>rd</sup> Annual Graduate Student Research Symposium*, North Carolina State University, Raleigh, NC, March 19<sup>th</sup> 2008.

**IT Governance, Risk and Compliance: Aligning Software Systems with Regulatory Models**

Travis D. Breaux, *IBM University Day*, Research Triangle Park, NC, October 27<sup>th</sup> 2006.

**Open Seminar: Open Courseware in Privacy and Security**

Travis D. Breaux, *CERIAS 6<sup>th</sup> Annual Information Security Symposium*, Purdue University, West Lafayette, IN, March 23<sup>rd</sup> 2005.