



FORM 100
Personal Data Form
PART I

Date

2013/06/15

Family name Biddle	Given name Robert	Initial(s) of all given names L	Personal identification no. (PIN) Valid 290528
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☐ I hold a faculty position at an eligible Canadian college
(complete Appendices B1 and C)

☐ I do not or will not hold an academic appointment at a
Canadian postsecondary institution

Place of employment other than a Canadian postsecondary
Institution (give address in Appendix A)

APPOINTMENT AT A POSTSECONDARY INSTITUTION

Title of position Professor	Tenured or tenure-track academic appointment Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Department Computer Science, School of	Part-time appointment <input type="checkbox"/> Full-time appointment <input checked="" type="checkbox"/>
Campus	
Canadian postsecondary institution Carleton	<ul style="list-style-type: none">For all non-tenured or non tenure-track academic appointment and Emeritus Professors, complete Appendices B & CFor life-time Emeritus Professor and part-time positions, complete Appendix C

ACADEMIC BACKGROUND

Degree	Name of discipline	Institution	Country	Date yyyy/mm
Bachelor's	Applied Analysis and Computer Science	Waterloo	CANADA	1977 / 04
Master's	Computer Science	Waterloo	CANADA	1979 / 08
Doctorate	Computer Science	University of Canterbury	NEW ZEALAND	1987 / 11
Dip Tchg	Secondary Education	University of Otago	NEW ZEALAND	1988 / 11

TRAINING OF HIGHLY QUALIFIED PERSONNEL

Indicate the number of students, fellows and other research personnel that you:

	Currently		Over the past six years (excluding the current year)		Total
	Supervised	Co-supervised	Supervised	Co-supervised	
Undergraduate	1		6	1	8
Master's	3	2	6	5	16
Doctoral	2	1		7	10
Postdoctoral	1		2		3
Others					
Total	7	3	14	13	37

ACADEMIC, RESEARCH AND INDUSTRIAL EXPERIENCE (use one additional page if necessary)

Position held (begin with current)	Organization	Department	Period (yyyy/mm to yyyy/mm)
Professor	Carleton	Computer Science, School of	2004/01
Professor	Carleton	Computer Science, School of	2004/01
Associate Professor	Victoria University of Wellington	Mathematical and Computing Sciences	2000/01 to 2003/12
Senior Lecturer	Victoria University of Wellington	Mathematical and Computing Sciences	1994/01 to 1999/12
Lecturer	Victoria University of Wellington	Computer Science	1990/02 to 1993/12
Lecturer	University of Canterbury	Computer Science	1982/03 to 1987/12
Teaching Assistant	University of Toronto	Computer Science	1980/09 to 1981/01
Research Associate	Bell Northern Research	Common Development Environment	1979/09 to 1980/08
Teaching Assistant	University of Waterloo	Computer Science	1977/09 to 1979/08
Technical Consultant	Systems Dimensions Limited	Technical Consulting	1974/05 to 1980/04

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ACADEMIC, RESEARCH AND INDUSTRIAL EXPERIENCE (use one additional page if necessary)			
Position held (begin with current)	Organization	Department	Period (yyyy/mm to yyyy/mm)
Programmer	Government of Canada	National Defence	1973/01 to 1973/12

Personal identification no. (PIN)

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Valid 290528

Biddle

RESEARCH SUPPORT

Family name and initial(s) of applicant	Title of proposal, funding source and program, and time commitment (hours/month)	Amount per year	Years of tenure (yyyy)
List all sources of support (including NSERC grants and university start-up funds) held as an applicant or a co-applicant: a) support held in the past four (4) years but now completed; b) support currently held, and c) support applied for. For group grants, indicate the percentage of the funding directly applicable to your research. Use additional pages as required.			
a) Support held in the past 4 years			
Robert Biddle	Object Collaboration and the Shape of Software NSERC Discovery 20 hours/month	23,500(100%) 23,500(100%) 23,500(100%) 23,500(100%) 23,500(100%)	2005 2006 2007 2008 2009
Robert Biddle	End-User Scripting for On-Line Immersive Training Ontario Research Development Fund ORNEC 10 hours/month	40,000(100%) 82,000(100%)	2006 2007
Robert Biddle	Identity Theft Ontario Research Development Fund ORNEC 5 hours/month	30,000(100%) 24,000(100%)	2006 2007
Claire Dormann	Understanding the impact of cultural differences on agile methodologies Agile Alliance Agile Research Grant 4 hours/month	9,000(100%)	2007

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Biddle

RESEARCH SUPPORTFamily name and initial(s)
of applicantTitle of proposal, funding source and program,
and time commitment (hours/month)Amount
per yearYears of
tenure
(yyyy)

List all sources of support (including NSERC grants and university start-up funds) held as an applicant or a co-applicant: a) support held in the past four (4) years but now completed; b) support currently held, and c) support applied for. For group grants, indicate the percentage of the funding directly applicable to your research. Use additional pages as required.

a) Support held in the past 4 years

Robert Biddle

Enterprise Communities of Practice
SAP Research
SAP Research Grant

4 hours/month

9,000 (100%)

2007

Claire Dormann

Affective Learning and Serious Games
SSHRC
Research Development Initiative

4 hours/month

18,526 (10%)

2008

18,525 (10%)

2009

Brian Greenspan

StoryTrek: a system for itinerant hypertext
SSHRC
Image Text Sound and Technology

4 hours/month

31,838 (20%)

2008

b) Support currently held

Paul van Oorschot

Internetworked Systems Security Network
NSERC
Strategic Network Grant

32 hours/month

1,000,000 (7%)

2008

1,000,000 (7%)

2009

1,000,000 (7%)

2010

1,000,000 (7%)

2011

1,000,000 (7%)

2012

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RESEARCH SUPPORT

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List all sources of support (including NSERC grants and university start-up funds) held as an applicant or a co-applicant: a) support held in the past four (4) years but now completed; b) support currently held, and c) support applied for. For group grants, indicate the percentage of the funding directly applicable to your research. Use additional pages as required.			
b) Support currently held			
Frank Maurer	Digital Surface Software Application Network	1,000,000 (8%)	2010
	NSERC	1,000,000 (8%)	2011
	Strategic Network Grant	1,000,000 (8%)	2012
	32 hours/month	1,000,000 (8%)	2013
		1,000,000 (8%)	2014
Kellogg S. Booth	GRAND: Graphics, Animation, and New Media	5,000,000 (2%)	2010
	Industry Canada	5,000,000 (2%)	2011
	NCE	5,000,000 (2%)	2012
	20 hours/month	5,000,000 (2%)	2013
		5,000,000 (2%)	2014
Robert Biddle	Software Design Beyond Usable Security	34,000(100%)	2010
	NSERC	34,000(100%)	2011
	Discovery	34,000(100%)	2012
	20 hours/month	34,000(100%)	2013
		34,000(100%)	2014
Sonia Chiasson	End-User Comprehension of Computer Security	50,000 (50%)	2011
	Threats and Defences	50,000 (50%)	2012
	United States National Institute of Standards and Technology Information Technology Laboratory Program 16 hours/month		

Highly Qualified Personnel (HQP)

Provide personal data about the HQP that you currently, or over the past six years, have supervised or co-supervised.

			Personal identification no. (PIN) Valid 290528	Family name Biddle
Name	Type of HQP Training and Status	Years Supervised or Co-supervised	Title of Project or Thesis	Present Position
Zhang, Leah	Master's (In Progress)	Co-supervised 2012 - 2012	Hyper-media support for security mental models	Full-time Masters student, Carleton University
Christopher Hack	Master's (In Progress)	Supervised 2011 - 2012	Evaluation of Collaborative Security Administration	Full-Time Masters Student, Carleton
Elizabeth Stobert	Doctoral (In Progress)	Supervised 2011 - 2012	Usable Security and Password Management	Full-Time PhD Student, Carleton
Hearn, William	Master's (In Progress)	Supervised 2011 - 2012	Mobile Usable Security	CS, Statistics Canada
Jeff Wilson	Undergraduate (In Progress)	Supervised 2011 - 2012	Infrastructure for Distributed Surface Applications	Full-Time BCS Student, Carleton
Stevenson Gossage	Master's (In Progress)	Supervised 2011 - 2012	Surface Applications for Distributed Collaboration	Full-Time Masters Student, Carleton
Bruna Freitas	Master's (In Progress)	Co-supervised 2010 - 2012	Usable Security and Social Network Software	Full-Time Masters Student, Carleton
Forget, Alain	Doctoral (Completed)	Co-supervised 2007 - 2012	A World with Many Authentication Schemes	Post-Doctoral Fellow, Carnegie-Mellon University
Wright, Nicholas	Master's (Completed)	Co-supervised 2008 - 2011	Applying recognition to text-based passwords	Public Servant, Govt of Canada
Chiasson, Sonia	Postdoctoral (Completed)	Supervised 2010 - 2010	Usable Security	Assistant Professor, Carleton
Eaket, Chris	Postdoctoral (Completed)	Co-supervised 2010 - 2010	Locative Hyper-Media	Assistant Professor, University of Georgia
Gossage, Stevenson	Undergraduate (Completed)	Supervised 2010 - 2010	A Collaborative Multitouch Card Wall System	Full Time MCS Student, Carleton
Hearn, William	Undergraduate (Completed)	Supervised 2010 - 2010	Narrative-Driven Geo-location Based iPhone Native App	Public Servant, Govt of Canada, Part Time MCS Student
Gilliland, Aaron	Undergraduate (Completed)	Co-supervised 2009 - 2010	Memory and Text Password Authentication	Full-Time Student, Carleton
LeBlanc, Daniel	Doctoral (In Progress)	Supervised 2009 - 2010	Fundamental Principles of Graphical Passwords	Full-Time PhD Student, Carleton
Stobert, Elizabeth	Master's (Completed)	Supervised 2009 - 2010	Graphical Password Field Study	Full-Time PhD Student, Carleton
Hlywa, Max	Master's (Completed)	Co-supervised 2008 - 2010	Influence and Authentication	Defence Scientist, Govt of Canada
Brown, Judith	Doctoral (Completed)	Co-supervised 2005 - 2010	Artifacts and Mediation in Software Development	Post-Doctoral Fellow, Carleton
Deschamps, Christopher	Undergraduate (Completed)	Supervised 2009 - 2009	Web Implementation of Graphical Authentication	Full-Time Student, Carleton
Khaled, Rilla	Postdoctoral (Completed)	Supervised 2008 - 2009	Multi-touch Collaborative Interaction	Assistant Professor, ITU Copenhagen

Highly Qualified Personnel (HQP)

Provide personal data about the HQP that you currently, or over the past six years, have supervised or co-supervised.

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Name	Type of HQP Training and Status	Years Supervised or Co-supervised	Title of Project or Thesis	Present Position
Stobert, Elizabeth	Undergraduate (Completed)	Supervised 2008 - 2009	Graphical Password Dimensions	Full-Time PhD Student, Carleton
Kauhanen, Marty	Master's (Completed)	Supervised 2006 - 2009	Narrative Scripting in Games	Program Manager, Microsoft, USA
Martin, Angela	Doctoral (Completed)	Co-supervised 2003 - 2009	Exploring the Role of Customers on eXtreme Programming	Lecturer, University of Waikato, NZ
LeBlanc, Daniel	Master's (Completed)	Supervised 2008 - 2008	Can Eye-Tracking Reveal Graphical Passwords	Full-Time PhD Student, Carleton
Wright, Nicholas	Undergraduate (Completed)	Supervised 2007 - 2008	Usability of a Text-to-Speech Website	Public Servant, Govt of Canada
Dormann, Claire	Postdoctoral (Completed)	Supervised 2006 - 2008	Serious Games	Assistant Professor, University of Ottawa
Tran, Minh	Master's (Completed)	Supervised 2006 - 2008	Influence of Socio-technical System on Collaboration	Full-Time PhD Student, Open University, UK
Chiasson, Sonia	Doctoral (Completed)	Co-supervised 2005 - 2008	Usable Authentication and Click Based Graphical Passwords	Assistant Professor, Carleton
Barr, Pippin	Doctoral (Completed)	Co-supervised 2004 - 2008	Values in Computer Games	External Lecturer, ITU Copenhagen
Khaled, Rilla	Doctoral (Completed)	Co-supervised 2004 - 2008	Cultural Usability and Persuasion	Assistant Professor, ITU Copenhagen
Anslow, Craig	Master's (Completed)	Co-supervised 2003 - 2008	Evaluating X3D for Program Trace Visualisation	Full-Time PhD Student, Victoria University of Wellington, NZ
Ferreira, Jennifer	Master's (Completed)	Co-supervised 2004 - 2007	User Interaction Design and Agile Development	Full-Time PhD Student, Open University, UK
Duignan, Matthew	Doctoral (Completed)	Co-supervised 2003 - 2007	User Interface Design for Electronic Music	Program Manager, Microsoft, USA
Potantin, Alex	Doctoral (Completed)	Co-supervised 2003 - 2007	Generic Ownership in Programming Languages	Lecturer, Victoria University of Wellington, NZ
Tran, Minh	Undergraduate (Completed)	Supervised 2005 - 2006	Wikis for Hypertext Authoring	Lecturer, Northumbria University
Hadziomerovi Aida	Master's (Completed)	Supervised 2004 - 2006	Engagement in Game Based Learning	Manager, Canadian Air Transport Security Authority
Whitworth, Elizabeth	Master's (Completed)	Supervised 2004 - 2006	Agile Experience: communication and collaboration	Usability Analyst, Nokia-Siemens, Germany
McGavin, Michael	Master's (Completed)	Co-supervised 2003 - 2006	A Generic Model for Navigation	Software Developer, The Treasury, Govt of NZ
Marshall, Stuart	Doctoral (Completed)	Co-supervised 2000 - 2006	Test Driving Reusable Components	Lecturer, Victoria University of Wellington, NZ

1 Most Significant Contributions to Research

Usable Security: e.g. Biddle, Chiasson, van Oorschot, Graphical passwords: Learning from the first twelve years. *ACM Computing Surveys* 2012. Chiasson, Stobert, Forget, Biddle, van Oorschot: Persuasive Cued Click-Points: Design, Implementation, and Evaluation of a Knowledge-Based Authentication Mechanism. *IEEE Transactions on Dependable and Secure Computing* 2012. Extensive review, design, implementation, and empirical studies of innovative password systems for better memorability and security. (Primary author is Chiasson, from PhD work supervised by myself and my colleague van Oorschot, with technical assistance by Forget, another of my PhD students, and experimental assistance by Stobert, an Honours (later Masters, and now PhD) student of mine.) Also see many related papers with Chiasson, Forget, Stobert, Hlywa, Mannan.

Collaborative Management: e.g. Angela Martin, James Noble, and Robert Biddle. An ideal customer: A grounded theory of requirements elicitation, communication and acceptance on agile projects. In Nils Brede Moe and Tore Dybå and Torgeir Dingsøy, editors, *Agile Software Development: Current Research and Future Directions*. Springer, 2010. First comprehensive treatment of how developer-customer collaboration actually works in practical Agile projects; the culmination of in-depth studies of a number of Agile teams and projects around the world, and shows the roles and practices adopted to make collaboration effective. (Primary author is Martin, and the work is based on her PhD studies, supervised by me and James Noble.) Also see many related papers with Martin, Ferreira, Whitworth, etc.. Newer work with Judith Brown (Morgan-Claypool, EICS, CSCW, NordiCHI) addresses other aspects of collaboration, especially leveraging surface computing, and is continuing.

Persuasive Technology: e.g. R. Khaled, P. Barr, J. Noble, R. Fisher, and R. Biddle. Game design strategies for collectivist persuasion. *ACM Transactions on Graphics (SIGGRAPH09)*, 2009. Shows that persuasive technology strategies based on culturally aligned principles are most effective, based on quantitative analysis of attitude change in two versions of an e-health game used by different cultural groups. (Primary author is Khaled, then a PhD student supervised by me, Noble, and Fisher, with assistance from Barr in analysis.) Also note crossover from this work to work on “persuasive” password systems with Chiasson and Forget.

Game HCI: e.g. Pippin Barr, James Noble, and Robert Biddle. Videogame values: Human-computer interaction and games. *Interacting with Computers*, 19(2):180–195, 2006. This paper, with a former and current student shows how the value system represented in videogames plays the same role as a task structure in traditional software. (Primary author was then PhD student Barr.) Also see related papers with Dormann, Khaled, Barr, and Greenspan.

OO Structure: e.g. Alex Potanin, James Noble, Marcus Frean, and Robert Biddle. Scale-free geometry in OO programs. *Commun. ACM*, 48(5):99-103, 2005. Key paper on our work with OO languages, showing aliasing is present in a way that suggests a power-law structure; led to extension to Generic Java to provide a practical kind of ownership types to allow protection against aliasing. (The practical work was carried out by Potanin, then a graduate student, co-supervised by Noble and me.) Also see other papers with Potanin and Noble.

2 Research Contributions and Practical Applications

2.1 Articles in refereed publications (selected, last 6 years):

- [1] **Judith M. Brown, Jeff Wilson, Stevenson Gossage, Chris Hack**, and Robert Biddle. *Surface Computing and Collaborative Analysis Work(Fund: SurfNet)*. Morgan and Claypool, Synthesis Lecture Series, To Appear, 122 pages, 2013.
- [2] **Craig Anslow**, Stuart Marshall, James Noble, and Robert Biddle. Sourcevis: Collaborative software visualization for co-located environments(*Fund: SurfNet*). In *Working Conference on Software Visualization (VISSOFT 2013)*, Eindhoven, Netherlands, 2013. IEEE.

- [3] **Judith M. Brown**, Steven Greenspan, and Robert Biddle. Complex activities in an operations center: A case study and model for engineering interaction. In *Engineering Interactive Computing Systems (EICS2013)(Fund: SurfNet)*, London, 2013. IEEE.
- [4] **Judith M. Brown**, Gitte Lindgaard, and Robert Biddle. Joint implicit alignment work of interaction designers and software developers(*Fund: SurfNet*). In *Proceedings of the 7th Nordic Conference on Human-Computer Interaction: Making Sense Through Design*, NordiCHI '12, pages 693–702, New York, NY, USA, 2012. ACM.
- [5] Robert Biddle, **Sonia Chiasson**, and P.C. Van Oorschot. Graphical passwords: Learning from the first twelve years(*Fund: ISSNet*). *ACM Comput. Surv.*, 44(4):19:1–19:41, September 2012.
- [6] **Sonia Chiasson**, **Elizabeth Stobert**, **Alain Forget**, Robert Biddle, and Paul C. van Oorschot. Persuasive cued click-points: Design, implementation, and evaluation of a knowledge-based authentication mechanism(*Fund: ISSNet*). *IEEE Transactions on Dependable and Secure Computing*, 9:222–235, 2012.
- [7] **Daniel LeBlanc** and Robert Biddle. Risk perception of internet-related activities(*Fund: ISSNet*). In *Proceedings on the International Conference on Privacy, Security and Trust (PST2012)*. IEEE, 2012.
- [8] S. Chiasson, C. Deschamps, E. Stobert, M. Hlywa, B. Freitas Machado, A. Forget, N. Wright, G. Chan, and R. Biddle(*Fund: ISSNet*). The mvp web-based authentication framework. In *Financial Cryptography and Data Security (FC)*, Heidelberg, Germany, 2012. Springer-Verlag.
- [9] **Nicholas Wright**, Andrew S. Patrick, and Robert Biddle. Do you see your password? applying recognition to textual password(*Fund: ISSNet*). In *SOUPS '12: Proceedings of the 8th Symposium on Usable privacy and security*, New York, NY, USA, 2012. ACM.
- [10] Sonia Chiasson, Elizabeth Stobert, Alain Forget, Robert Biddle, and Paul C. Van Oorschot. Persuasive cued click-points: Design, implementation, and evaluation of a knowledge-based authentication mechanism. *IEEE Trans. Dependable Secur. Comput.*, 9(2):222–235, March 2012.
- [11] Judith M. Brown, Gitte Lindgaard, and Robert Biddle. Interactional identity: designers and developers making joint work meaningful and effective. In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work*, CSCW '12, pages 1381–1390, New York, NY, USA, 2012. ACM.
- [12] Max Hlywa, Robert Biddle, and Andrew S. Patrick. Facing the facts about image type in recognition-based graphical passwords. In *Proceedings of the 27th Annual Computer Security Applications Conference*, ACSAC '11, pages 149–158, New York, NY, USA, 2011. ACM.
- [13] Judith M. Brown, Gitte Lindgaard, and Robert Biddle. Collaborative events and shared artefacts: Agile interaction designers and developers working toward common aims. In *IEEE Agile Software Development Conference*. IEEE, 2011.
- [14] Robert Biddle, **Mohammad Mannan**, Paul van Oorschot, and Tara Whalen. User study, analysis and usable security of passwords based on digital objects(*Fund: ISSNet*). *IEEE Transactions on Information Forensics & Security*, 2011.
- [15] **Elizabeth Stobert**, Sonia Chiasson, **Alain Forget**, Paul van Oorschot, and Robert Biddle. Usability effects of increasing security in click-based graphical passwords. In *Proceedings on the Annual Conference on Computer Security Applications(ACSAC2010)*. ACM, 2010.
- [16] Angela Martin, James Noble, and Robert Biddle. An ideal customer: A grounded theory of requirements elicitation, communication and acceptance on agile projects. In Nils Brede Moe, Tore Dybå, and Torgeir Dingsøy, editors, *Agile Software Development: Current Research and Future Directions*. Springer, 2010.
- [17] Matthew Duignan, James Noble, and Robert Biddle. Abstraction and activity in computer mediated music production. *Computer Music Journal*, 34(2), 2010.
- [18] **Daniel LeBlanc** and Robert Biddle. Usability effects of increasing security in click-based graphical passwords. In *Proceedings on the International Conference on Privacy, Security and Trust (PST2010)*. IEEE, 2010.
- [19] Alain Forget, Sonia Chiasson, and Robert Biddle. Shoulder-surfing resistance with eye-gaze entry in click-based graphical passwords. In *ACM SIGCHI Conference on Human Factors in Computing Systems*, Atlanta, 2010. ACM.

- [20] Claire Dormann, Jennifer Whitson, and Robert Biddle. Computer games for affective learning. In Patrick Felicia, editor, *Handbook of Research on Improving Learning and Motivation through Educational Games: Multidisciplinary Approaches*. IGI Global, 2010.
- [21] Minh Q. Tran and Robert Biddle. An ethnographic study of collaboration in a game development team. *Loading*, 3(5), 2009.
- [22] **Sonia Chiasson, Alain Forget, Elizabeth Stobert**, Paul van Oorschot, and Robert Biddle. Multiple password interference in text passwords and click-based graphical passwords(*Fund: ISSNet*). In *ACM Conference on Computer and Communications Security*, Chicago, USA, 2009. ACM.
- [23] Robert Biddle, P.C. van Oorschot, Andrew S. Patrick, Jennifer Sobey, and Tara Whalen. Browser interfaces and extended validation ssl certificates: An empirical study. In *ACM Cloud Computing Security Workshop (CCSW)*, Chicago, USA, 2009. ACM.
- [24] **Sonia Chiasson, Alain Forget**, Paul van Oorschot, and Robert Biddle. User interface design affects security: Patterns in click-based graphical passwords(*Fund: ISSNet*). *International Journal of Information Security*, 8(6), 2009.
- [25] **Rilla Khaled, Pippin Barr**, James Noble, Ronald Fisher, and Robert Biddle. Game design strategies for collectivist persuasion(*Fund: NSERC DG*). *ACM Transactions on Graphics (SIGGRAPH09)*, 2009.
- [26] Claire Dormann and Robert Biddle. Humor for computer games: Play, laugh and more(*Fund: SSHRC RDI*). *Simulation & Gaming*, 40(6):16 pages, 2009.
- [27] **Angela Martin**, James Noble, and Robert Biddle. XP customer practices: A grounded theory. In *Proceedings of the Agile Software Development Conference (Agile2009)*, Chicago, USA, 2009. IEEE.
- [28] **Angela Martin**, James Noble, and Robert Biddle. The XP customer team: A grounded theory. In *Proceedings of the Agile Software Development Conference (Agile2009)*, Chicago, USA, 2009. IEEE.
- [29] **Alain Forget, Sonia Chiasson**, P. C. van Oorschot, and Robert Biddle. Improving text passwords through persuasion(*Fund: ORNEC IDT*). In *SOUPS '08: Proceedings of the 4th symposium on Usable privacy and security*, pages 1–12, New York, NY, USA, 2008. ACM.
- [30] **Jennifer Sobey**, Robert Biddle, P. C. Oorschot, and Andrew S. Patrick. Exploring user reactions to new browser cues for extended validation certificates. In *ESORICS '08: Proceedings of the 13th European Symposium on Research in Computer Security*, pages 411–427, Berlin, Heidelberg, 2008. Springer-Verlag.
- [31] Claire Dormann and Robert Biddle. Understanding game design for affective learning(*Fund: SSHRC RDI*). In *International Academic Conference on the Future of Game Design and Technology*, Toronto, Canada, 2008. ACM.
- [32] **Judith Brown**, Gitte Lindgaard, and Robert Biddle. Stories, sketches, and lists: Developers and interaction designers interacting through artefacts, (*Fund: NSERC DG*). *Agile, 2008. AGILE '08. Conference*, pages 39–50, Aug. 2008.
- [33] **Sonia Chiasson**, Jay Srinivasan, Robert Biddle, and Paul C. van Oorschot. Centered discretization with application to graphical passwords(*Fund: ORNEC IDT*). In *Proceedings of Usability, Psychology, and Security 2008*, San Francisco, USA, 2008. Usenix Press.
- [34] **Alain Forget, Sonia Chiasson**, Paul van Oorschot, and Robert Biddle. Persuasion for stronger passwords(*Fund: ORNEC IDT*). In *Third International Conference on Persuasive Technology for Human Well-Being*, Oulu, Finland, 2008. Springer-Verlag.
- [35] **Rilla Khaled**, Ronald Fischer, James Noble, and Robert Biddle. A qualitative study of culture and persuasion in a smoking cessation game. In *Third International Conference on Persuasive Technology for Human Well-Being*, Oulu, Finland, 2008. Springer-Verlag.
- [36] **Sonia Chiasson, Alain Forget**, R. Biddle, and P.C. van Oorschot. Influencing users towards better passwords: Persuasive cued click-points(*Fund: ORNEC IDT*). In *Proceedings of Human-Computer Interaction 2008*. British Computer Society, 2008.
- [37] **Sonia Chiasson**, P. C. van Oorschot, and Robert Biddle. Graphical password authentication using Cued Click Points(*Fund: ORNEC IDT*). In *European Symposium On Research In Computer Security (ESORICS)*, LNCS 4734, pages 359–374, September 2007.

- [38] **Rilla Khaled, Pippin Barr**, James Noble, Robert Biddle, and Ronald Fischer. Fine tuning the persuasion in persuasive games. In *Second International Conference on Persuasive Technology for Human Well-Being (Persuasive07)*, Palo Alto California, 2007. LNCS, Springer Verlag.
- [39] **Sonia Chiasson**, Robert Biddle, and Paul van Oorschot. A second look at the usability of graphical passwords(*Fund: ORNEC IDT*). In *SOUPS '07: Proceedings of the second symposium on Usable privacy and security*, Pittsburgh, 2007. ACM Press.
- [40] **Jennifer Ferreira**, James Noble, and Robert Biddle. Agile development iterations and UI design. In *Proceedings of the Agile Software Development Conference*, Washington D.C., 2007. IEEE.
- [41] **Elizabeth Whitworth** and Robert Biddle. The social nature of agile teams(*Fund: AGILE*). In *Proceedings of the Agile Software Development Conferennce*, Washington D.C., 2007. IEEE.
- [42] **Jennifer Ferreira**, James Noble, and Robert Biddle. Up-front interaction design in agile development. In *Proceedings of the 8th International Conference on eXtreme Programming and Agile Processes in Software Engineering*, Como, Italy, 2007. Lecture Notes in Computer Science, Springer-Verlag.
- [43] **Elizabeth Whitworth** and Robert Biddle. Motivation and cohesion in agile teams(*Fund: AGILE*). In *Proceedings of the 8th International Conference on eXtreme Programming and Agile Processes in Software Engineering*, Como, Italy, 2007. Lecture Notes in Computer Science, Springer-Verlag.
- [44] **Pippin Barr**, James Noble, and Robert Biddle. Videogame values: Human-computer interaction and games. *Interacting with Computers*, 19(2), 2007.
- [45] **Pippin Barr, Judy Brown**, Robert Biddle, **Rilla Khaled**, and James Noble. Changing the virtual self: The avatar transformation activity in popular games. In *Joint International Conference on CyberGames and Interactive Entertainment*, Perth, Australia, 2006. ACM.
- [46] **Rilla Khaled, Pippin Barr**, Ronald Fischer, Robert Biddle, and James Noble. Factoring culture into the design of a persuasive game. In *Australian Computer-Human Interaction Conference*, Sydney, Australia, 2006. ACM.
- [47] **Aida Hadziomerovic** and Robert Biddle. Tracking engagement in a role play game(*Fund: NSERC DG*). In *International Academic Conference on the Future of Game Design and Technology*, London, Ontario, 2006.
- [48] **Pippin Barr, Rilla Khaled**, James Noble, and Robert Biddle. Get out of my way! exploring obstruction in popular video games. In *International Academic Conference on the Future of Game Design and Technology*, London, Ontario, 2006.
- [49] Claire Dormann, **Pippin Barr**, and Robert Biddle. Humour theory and videogames: Laughter in the slaughter (*Fund: ORNEC ELEARN*). In *ACM SIGGRAPH Videogame Symposium*, Boston, Massachusetts, 2006. ACM.
- [50] **Alex Potanin**, James Noble, Dave Clarke, and Robert Biddle. Generic ownership for Generic Java. In *Object-Oriented Programming, Languages, Systems, and Applications, OOPSLA 2006*, Portland, Oregon, 2006. ACM.
- [51] Claire Dormann and Robert Biddle. Semiotics of humour in hedonic e-commerce(*Fund: ORNEC ELEARN*). In *International Conference on Organisational Semiotics*, São Paulo, Brazil, 2006. INSTICC Press.
- [52] Claire Dormann and Robert Biddle. Humour in game-based learning. *Learning, Media, and Technology*, 31(4):411–424, 2006.
- [53] **Rilla Khaled**, Robert Biddle, James Noble, **Pippin Barr**, and Ronald Fischer. Persuasive interaction for collectivist cultures. In Wayne Piekarski, editor, *Seventh Australasian User Interface Conference (AUIC2006)*, volume 50 of *CRPIT*, pages 73–80, Hobart, Australia, 2006. ACS.
- [54] **Jennifer Ferreira**, James Noble, and Robert Biddle. A case for iconic icons. In Wayne Piekarski, editor, *Seventh Australasian User Interface Conference (AUIC2006)*, volume 50 of *CRPIT*, pages 97–100, Hobart, Australia, 2006. ACS.
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- [56] **Matthew Duignan**, James Noble, and Robert Biddle. Activity theory for design: From checklist to interview. In *Human Work Interaction Design: Designing For Human Work*, pages 1–25, Boston, USA, 2006. Springer.
 - [57] **Sonia Chiasson**, Robert Biddle, and Paul van Oorschot. A usability study and critique of two password managers. In *Usenix Security 2006*, Vancouver, Canada, 2006. Usenix.
 - [58] **Rilla Khaled**, **Pippin Barr**, James Noble, and Robert Biddle. Investigating social software as persuasive technology. In *First International Conference on Persuasive Technology for Human Well-Being (Persuasive06)*, Amsterdam, 2006. LNCS 3962, Springer Verlag.
 - [59] **Pippin Barr**, **Rilla Khaled**, James Noble, and Robert Biddle. Feeling strangely fine: The well-being economy in popular games. In *First International Conference on Persuasive Technology for Human Well-Being (Persuasive06)*, Amsterdam, 2006. LNCS 3962, Springer Verlag.
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 - [61] Claire Dormann, **Birgit Woods**, Sebastien Cacquard, and Robert Biddle. Cybercartography as a role playing game: From multiple perspectives to critical thinking (*Fund: NSERC DG*). *Cartographica*, 41(1), 2006.
 - [62] Brian Greenspan, Claire Dormann, **Christopher Eaket**, Sebastien Cacquard, and Robert Biddle. Live hypertext and cybercartography: You are here, now (*Fund: NSERC DG*). *Cartographica*, 41(1), 2006.
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 - [65] **Angela Martin**, Robert Biddle, and James Noble. When XP met outsourcing. In *Proceedings of the Fifth International Conference on eXtreme Programming and Agile Processes in Software Engineering, Jutta Eckstein (Ed.)*. Lecture Notes in Computer Science, Springer-Verlag, 2004.
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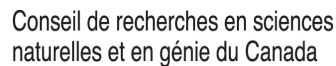
3 Other Evidence of Impact and Contributions

2012 Most Influential Paper, ACM Onward 2002; 2012 Honorable Mention Paper, ACM CSCW; 2007 Best Paper, ACM Symposium on Usable Privacy and Security; 2006 Top Ten Paper Worldwide in Game Studies, GDC; 2006 Invited Keynote Speaker, XP Day London; 2004 Invited Keynote Speaker, XP Agile Universe; 2001 Elected Fellow, New Zealand Computing Society; ACM OOP-SLA Onward Steering Committee Member; ACM WikiSym Steering Committee Member; Hillside Patterns Group Board of Directors; Editor, Elsevier Computers and Security.

4 Delays in Research Activity (None.)

5 Contributions to the Training of Highly Qualified Personnel

Since arriving at Carleton in 2004, I have built a research group on usable security, and collaborative software. I have supervised or co-supervised 9 PhD students and 10 Masters students to graduation, and currently have 3 PhD students and 4 Master students in progress, and 4 Post-Doctoral fellows, all now in tenure-track faculty positions; I am currently supervising one more. In all cases we work in strong collaboration, and the shared publications above show the success of this approach. I also led the creation of a new multi-disciplinary Masters degree in HCI at Carleton.




APPENDIX A

Personal Data (Form 100)

Date	2013/06/15
Personal identification no. (PIN)	Valid 290528

Family name	Given name	Initial(s) of all given names	Personal identification no. (PIN)
Biddle	Robert	L	Valid 290528
Position and complete mailing address if your primary place of employment is not a Canadian postsecondary institution or if your current mailing address is temporary			If address is temporary, indicate: Starting date Leaving date

Telephone number	Facsimile number	E-mail address
1 (613) 5202600 6317	(613) 5204334	robert_biddle@carleton.ca

Telephone number (alternate)	 Give an alternate telephone number only if you can be reached at that number during business hours.	Gender (completion optional)
1 (613) 2630577		<input checked="checked" type="checkbox"/> Male <input type="checkbox"/> Female

English	Read	<input checked="" type="checkbox"/>	Write	<input checked="" type="checkbox"/>	Speak	<input checked="" type="checkbox"/>
French	Read	<input type="checkbox"/>	Write	<input type="checkbox"/>	Speak	<input type="checkbox"/>
I wish to receive my correspondence:			in English	<input checked="" type="checkbox"/>	in French	<input type="checkbox"/>

<p>Provide a maximum of 10 key words that describe your area(s) of expertise. Use commas to separate them. If you have expertise with particular instruments and techniques, specify which one(s).</p> <p>Human Computer Interaction, Computer Security, Agile Software Development, Computer Game Design, User Interface Design, User Interface Evaluation, Object-Oriented Design, Software Visualization, Computer Science Education, Software Engineering</p>	<p>Research subject code(s)</p> <p>Primary</p> <p>2705</p>
	<p>Secondary</p> <p>2706</p>



Appendix D (Form 100) Consent to Provide Limited Personal Information About Highly Qualified Personnel (HQP) to NSERC

NSERC applicants are required to describe their contributions to the training or supervision of highly qualified personnel (HQP) by providing certain details about the individuals they have trained or supervised during the six years prior to their current application. HQP information must be entered on the Personal Data Form (Form 100). This information includes the trainee's name, type of HQP training (e.g., undergraduate, master's, technical etc.) and status (completed, in-progress, incomplete), years supervised or co-supervised, title of the project or thesis, and the individual's present position.

Based on the federal *Privacy Act* rules governing the collection of personal information, applicants are asked to obtain consent from the individuals they have supervised before providing personal data about them to NSERC. In seeking this consent, the NSERC applicant must inform these individuals what data will be supplied, and assure them that it will only be used by NSERC for the purpose of assessing the applicant's contribution to HQP training. To reduce seeking consent for multiple applications, applicants will only need to seek consent one time for a six-year period. If the trainee provides consent by e-mail, the response must include confirmation that they have read and agree to the text of the consent form.

When consent cannot be obtained, applicants are asked to not provide names, or other combinations of data, that would identify those supervised. However, they may still provide the type of HQP training and status, years supervised or co-supervised, a general description of the project or thesis, and a general indication of the individual's present position if known.

An example of entering HQP information on Form 100 (with and without consent):

Name	Type of HQP Training and Status	Years Supervised or Co-supervised	Title of Project or Thesis	Present Position
Consent Received from Marie Roy				
Roy, Marie	Undergraduate (Completed)	Supervised 1994 - 1997	Isotope geochemistry in petroleum engineering	V-P (Research), Earth Analytics Inc., Calgary, Alberta
Consent Not Obtained from Marie Roy				
(name withheld)	Undergraduate (Completed)	Supervised 1994 - 1997	Isotope geochemistry	research executive in petroleum industry - western Canada

Consent Form

Name of Trainee	
Applicant Information	
Name Biddle, Robert L	
Department Computer Science, School of	Postsecondary Institution Carleton
I hereby allow the above-named applicant to include limited personal data about me in grant applications submitted for consideration to NSERC for the next six years. This limited data will only include my name, type of HQP training and status, years supervised or co-supervised, title of the project or thesis and, to the best of the applicant's knowledge, my position title and company or organization at the time the application is submitted. I understand that NSERC will protect this data in accordance with the <i>Privacy Act</i> , and that it will only be used in processes that assess the applicant's contributions to the training of highly qualified personnel (HQP), including confidential peer review.	
Trainee's signature	Date
Note: This form must be retained by the applicant and made available to NSERC upon request.	

1 Most Significant Contributions to Research

Usable Security: e.g. Biddle, Chiasson, van Oorschot, Graphical passwords: Learning from the first twelve years. *ACM Computing Surveys* 2012. Chiasson, Stobert, Forget, Biddle, van Oorschot: Persuasive Cued Click-Points: Design, Implementation, and Evaluation of a Knowledge-Based Authentication Mechanism. *IEEE Transactions on Dependable and Secure Computing* 2012. Extensive review, design, implementation, and empirical studies of innovative password systems for better memorability and security. (Primary author is Chiasson, from PhD work supervised by myself and my colleague van Oorschot, with technical assistance by Forget, another of my PhD students, and experimental assistance by Stobert, an Honours (later Masters, and now PhD) student of mine.) Also see many related papers with Chiasson, Forget, Stobert, Hlywa, Mannan.

Collaborative Management: e.g. Angela Martin, James Noble, and Robert Biddle. An ideal customer: A grounded theory of requirements elicitation, communication and acceptance on agile projects. In Nils Brede Moe and Tore Dybå and Torgeir Dingsøy, editors, *Agile Software Development: Current Research and Future Directions*. Springer, 2010. First comprehensive treatment of how developer-customer collaboration actually works in practical Agile projects; the culmination of in-depth studies of a number of Agile teams and projects around the world, and shows the roles and practices adopted to make collaboration effective. (Primary author is Martin, and the work is based on her PhD studies, supervised by me and James Noble.) Also see many related papers with Martin, Ferreira, Whitworth, etc.. Newer work with Judith Brown (Morgan-Claypool, EICS, CSCW, NordiCHI) addresses other aspects of collaboration, especially leveraging surface computing, and is continuing.

Persuasive Technology: e.g. R. Khaled, P. Barr, J. Noble, R. Fisher, and R. Biddle. Game design strategies for collectivist persuasion. *ACM Transactions on Graphics (SIGGRAPH09)*, 2009. Shows that persuasive technology strategies based on culturally aligned principles are most effective, based on quantitative analysis of attitude change in two versions of an e-health game used by different cultural groups. (Primary author is Khaled, then a PhD student supervised by me, Noble, and Fisher, with assistance from Barr in analysis.) Also note crossover from this work to work on “persuasive” password systems with Chiasson and Forget.

Game HCI: e.g. Pippin Barr, James Noble, and Robert Biddle. Videogame values: Human-computer interaction and games. *Interacting with Computers*, 19(2):180–195, 2006. This paper, with a former and current student shows how the value system represented in videogames plays the same role as a task structure in traditional software. (Primary author was then PhD student Barr.) Also see related papers with Dormann, Khaled, Barr, and Greenspan.

OO Structure: e.g. Alex Potanin, James Noble, Marcus Frean, and Robert Biddle. Scale-free geometry in OO programs. *Commun. ACM*, 48(5):99-103, 2005. Key paper on our work with OO languages, showing aliasing is present in a way that suggests a power-law structure; led to extension to Generic Java to provide a practical kind of ownership types to allow protection against aliasing. (The practical work was carried out by Potanin, then a graduate student, co-supervised by Noble and me.) Also see other papers with Potanin and Noble.

2 Research Contributions and Practical Applications

2.1 Articles in refereed publications (selected, last 6 years):

- [1] **Judith M. Brown, Jeff Wilson, Stevenson Gossage, Chris Hack**, and Robert Biddle. *Surface Computing and Collaborative Analysis Work(Fund: SurfNet)*. Morgan and Claypool, Synthesis Lecture Series, To Appear, 122 pages, 2013.
- [2] **Craig Anslow**, Stuart Marshall, James Noble, and Robert Biddle. Sourcevis: Collaborative software visualization for co-located environments(*Fund: SurfNet*). In *Working Conference on Software Visualization (VISSOFT 2013)*, Eindhoven, Netherlands, 2013. IEEE.

- [3] **Judith M. Brown**, Steven Greenspan, and Robert Biddle. Complex activities in an operations center: A case study and model for engineering interaction. In *Engineering Interactive Computing Systems (EICS2013)(Fund: SurfNet)*, London, 2013. IEEE.
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- [5] Robert Biddle, **Sonia Chiasson**, and P.C. Van Oorschot. Graphical passwords: Learning from the first twelve years(*Fund: ISSNet*). *ACM Comput. Surv.*, 44(4):19:1–19:41, September 2012.
- [6] **Sonia Chiasson**, **Elizabeth Stobert**, **Alain Forget**, Robert Biddle, and Paul C. van Oorschot. Persuasive cued click-points: Design, implementation, and evaluation of a knowledge-based authentication mechanism(*Fund: ISSNet*). *IEEE Transactions on Dependable and Secure Computing*, 9:222–235, 2012.
- [7] **Daniel LeBlanc** and Robert Biddle. Risk perception of internet-related activities(*Fund: ISSNet*). In *Proceedings on the International Conference on Privacy, Security and Trust (PST2012)*. IEEE, 2012.
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- [12] Max Hlywa, Robert Biddle, and Andrew S. Patrick. Facing the facts about image type in recognition-based graphical passwords. In *Proceedings of the 27th Annual Computer Security Applications Conference, ACSAC '11*, pages 149–158, New York, NY, USA, 2011. ACM.
- [13] Judith M. Brown, Gitte Lindgaard, and Robert Biddle. Collaborative events and shared artefacts: Agile interaction designers and developers working toward common aims. In *IEEE Agile Software Development Conference*. IEEE, 2011.
- [14] Robert Biddle, **Mohammad Mannan**, Paul van Oorschot, and Tara Whalen. User study, analysis and usable security of passwords based on digital objects(*Fund: ISSNet*). *IEEE Transactions on Information Forensics & Security*, 2011.
- [15] **Elizabeth Stobert**, Sonia Chiasson, **Alain Forget**, Paul van Oorschot, and Robert Biddle. Usability effects of increasing security in click-based graphical passwords. In *Proceedings on the Annual Conference on Computer Security Applications(ACSAC2010)*. ACM, 2010.
- [16] Angela Martin, James Noble, and Robert Biddle. An ideal customer: A grounded theory of requirements elicitation, communication and acceptance on agile projects. In Nils Brede Moe, Tore Dybå, and Torgeir Dingsøy, editors, *Agile Software Development: Current Research and Future Directions*. Springer, 2010.
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- [50] **Alex Potanin**, James Noble, Dave Clarke, and Robert Biddle. Generic ownership for Generic Java. In *Object-Oriented Programming, Languages, Systems, and Applications, OOPSLA 2006*, Portland, Oregon, 2006. ACM.
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2006. ACS.
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3 Other Evidence of Impact and Contributions

2012 Most Influential Paper, ACM Onward 2002; 2012 Honorable Mention Paper, ACM CSCW; 2007 Best Paper, ACM Symposium on Usable Privacy and Security; 2006 Top Ten Paper Worldwide in Game Studies, GDC; 2006 Invited Keynote Speaker, XP Day London; 2004 Invited Keynote Speaker, XP Agile Universe; 2001 Elected Fellow, New Zealand Computing Society; ACM OOP-SLA Onward Steering Committee Member; ACM WikiSym Steering Committee Member; Hillside Patterns Group Board of Directors; Editor, Elsevier Computers and Security.

4 Delays in Research Activity (None.)

5 Contributions to the Training of Highly Qualified Personnel

Since arriving at Carleton in 2004, I have built a research group on usable security, and collaborative software. I have supervised or co-supervised 9 PhD students and 10 Masters students to graduation, and currently have 3 PhD students and 4 Master students in progress, and 4 Post-Doctoral fellows, all now in tenure-track faculty positions; I am currently supervising one more. In all cases we work in strong collaboration, and the shared publications above show the success of this approach. I also led the creation of a new multi-disciplinary Masters degree in HCI at Carleton.