Stephen Wilson – digital innovator

Stephen Wilson is an accomplished innovator, researcher, analyst, consultant and R&D manager dedicated to digital identity and privacy. He has an outstanding track record in creative, original and penetrating security research, analysis and software product development.

Narrative summary

BSc 1983; BE Eng (Hons) 1986; majors in physics, Comp. Sci. & digital electronics ♦ 1985 **CSIRO Radiophysics Vacation Scholarship** in radio astronomy & image processing ♦ 1987-88 **CSIRO Division of Wool Technology** researching textile image analysis ♦ 1988-1995 with medical device pioneer **Telectronics Pacing Systems** in embedded software engineering and R&D management ◊ developed world's most reliable real time software ◊ three years in the USA ◊ transformed under-performing software department ◊ awarded three US patents for implantable defibrillator technology ♦ 1995 moved into cyber security with PKI pioneer **Security Domain**, managing product development ◊ introduced Object Oriented methods ◊ developed corporate quality system ◊ project-managed first Gatekeeper accredited CA ♦ 1997 to 2003 Principal Consultant roles at **KPMG**, **PricewaterhouseCoopers** and **SecureNet** ◊ created world's first "evergreen" SSL site certificates vetted against regulator databases, now industry standard ◊ created the audit-based model for international PKI ◊ ministerial appointment to National E-Authentication Council ◊ elected Chair three years running, Certification Forum of Australasia ◊ APEC eSecurity Task Group ♦ 2004 founded **Lockstep Consulting** ◊ consulted on PKI in Malaysia, Hong Kong, Singapore, New Zealand, Macau, Indonesia, Kazakhstan ◊ Chair, OASIS PKI Adoption Technical Committee ◊ created new probabilistic security ROI model, adopted by US Dept of Defence ♦ 2006 spun off **Lockstep Technologies** ◊ nine patents for digital identity & privacy protection ◊ AusIndustry COMET R&D grant to develop anonymous e-health, e-voting, social networking & payment solutions ♦ 2013 appointed Principal Analyst **Constellation Research**

Career summary

2013-now   Constellation Research – Vice President and Principal Analyst
2004-now   Lockstep Group – Managing Director and Principal Consultant
2001-2003   SecureNet – Chief Security Specialist & Professional Services Manager
1999-2001   PricewaterhouseCoopers beTRUSTed – Director of Strategy & Policy
1997-1999   KPMG Consulting – Associate Director, Certification Authority
1995-1997   Security Domain – Software Development Manager
1993-1995   Telectronics (USA) – Head of Software Engineering
1992-1993   Telectronics (USA) – International Strategic Product Marketing Manager
1987-1992   Telectronics – Senior Software Engineer, Team Leader, Section Head
1986-1987   CSIRO Division of Wool Technology – Experimental Scientist.

Career highlights

Formulated Constellation Research's *Big Privacy* compact, presented to *Computers Freedom Privacy* Washington DC 2014 ♦ Citizen Authentication Framework for Victorian Government 2014 ♦ Discovered the memetic basis for digital identity, presented to Cloud Identity Summit 2014 ♦ Led the first privacy evaluation at NSTIC 2013 ♦ Victorian Smart meter PIA 2011, one of the world's first major smart grid PIAs ♦ South Australia Health PKI strategy, policy & ceremony 2008-11 ♦ Australia Post Trust & Privacy Framework 2008

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Career highlights cont.

♦ Macau Government Cross recognition framework 2008 ♦ Department of Justice Privacy Engineering Guidelines 2007 ♦ National healthcare provider PKI Business Case 2007-08 ♦ Australian National Smartcard Framework 2006-08 ♦ Westpac Trust Centre smartcard strategy 2006-07 ♦ Kazakhstan National PKI 2006 ♦ Singapore Government National Authentication Framework 2006 ♦ World Bank SE Asia security & smartcard landscape scan 2006 ♦ Australian Govt Gatekeeper PKI Reform 2004-06 ♦ Medicare Australia PKI 2001-06 ♦ Internet Industry Association Two Factor Authentication Scheme 2005 ♦ OASIS (US) PKI library 2005 ♦ OASIS (US) PKI Return on Investment model 2004 ♦ eASEAN harmonised authentication legal infrastructure 2004-05 ♦ NSW Government Security ROI model 2003-04 adopted by US DOD 2008 ♦ Indonesian National CA 2002 ♦ Standard Chartered Bank Singapore e-signature review 2001 ♦ New Zealand Cabinet PKI position 2000-01 ♦ Hong Kong CA Recognition Office 1999.

Academic qualifications

- Bachelor of Science (Physics, Comp Sci. majors) University of Queensland 1982
- Bachelor of Electrical Engineering Honours (Digital Electronics major) Uni of Qld 1986

- MBA *incomplete* (GPA = 3.86 out of 4.00) Macquarie University
- Global Security Essentials Certificate (GSEC) SANS Institute 2002.

Patents

Cyber security

- US 8,608,065 *Authenticating electronic financial transactions* (2014)
- US 8,347,101 *System and method for anonymously indexing electronic record systems* (2013)
- US 8,286,865 *Authenticating electronic financial transactions* (2012)
- AU 2012101460 *Verified anonymous code signing* (2012)
- NZ 589160 *Authenticating electronic financial transactions* (2012)
- AU 2005220988 *System and method for anonymously indexing electronic record systems* (2005)
- AU 2004100268 *[Using] cryptographic devices to combat online institution identity theft* (2004)
- AU 2004201058 *[Issuing] Anonymous Public Key Certificates for indexing e-record systems* (2004)
- AU 743570 *Means and method of registering new users in a system of registered users* (2002).

Pending

- EU EP09732423 *Authenticating electronic financial transactions*
- EU EP05714237 *System and method for anonymously indexing electronic record systems*
- AU 2013900620 *Decoupling identity from devices in the Internet of Things*
- HK 7106215.9 *System and method for anonymously indexing electronic record systems.*

Biomedical technology

- US 5,292,339 *Device and Method Incorporating Multiple Bradycardia Pacing Rates* (1994)
- US 5,251,625 *Controlling Tachyarrhythmia Confirmation in Response to Patient History* (1993)
- US 5,144,947 *Apparatus and Method for Antitachycardia Pacing* (1992).

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Lockstep Technologies awards

- Asian SESAMES Smartcard Awards Finalist 2010
- Anthill Magazine *Smart 100 Awards* (voted No. 25) 2009
- Tech 23 Innovation Island 2009
- Finextra (UK) Innovation Showcase 2009
- ABC TV *The New Inventors* program 19 November 2008
- Global Security Challenge, Asian Top Five semi-finalist 2008
- Australian Technology Showcase 2008
- AusIndustry COMET R&D grant 2007
- Anthill Cool Companies Award (Innovation category) Top Three, 2007
- Secrets of Australian ICT Innovation (Security category) 3rd place, 2006.

Committees

- US National Strategy for Trusted Identities in Cyberspace Privacy Committee 2012-now
- Gatekeeper PKI Advisory Committee 2004-now
- Standards Australia Information Security Committee IT 12-4 2004-now

- National IT Testing Accreditation Advisory Committee 2005-2013
- Australian Law Reform Commission Developing Technologies Sub-Committee 2007-08
- OASIS PKI Adoption Technical Committee (Chair) 2007-08
- Asia PKI Forum (OASIS Liaison Representative) 2005-08
- Smartcards and Information Security Australia (Co-chair) 2005-07
- Certification Forum of Australasia (Chair) 1998-2001
- National Electronic Authentication Council NEAC 1998-2001
- APEC e-Authentication Task Group 1998-2001
- American Bar Association Information Security Committee 1999-2002
- Federal Privacy Commissioner's PKI Reference Group 2001.

Selected publications & presentations   See also www.lockstep.com.au/library

Book chapter

- *Facebook and Personal Information*, in Encyclopedia of Social Network Analysis and Mining, Rokne & Alhajj editors.

Academic papers

- *The collision between Big Data and privacy law*, Australian Journal of Telecommunications and the Digital Economy, Vol 2.3, Oct 2014
- *Applying Information Privacy Norms to Re-Identification Demonstrations*, Symposium on the Law, Ethics and Science of Re-Identification Demonstrations, Harvard Law School Petrie-Flom Centre, May 2013
- *Legal Limits to Data Re-Identification* Science 8 February 2013: Vol. 339 no. 6120 pp. 647
- *Cyber law & e-authentication in Australia*, International Seminar on Cyber Law, Bali, Indonesia, January 2013
- *Calling for a Uniform Approach to Card Fraud Offline and On* Journal of Internet Banking and Commerce, Dec 2012, vol. 17, no. 3

Academic papers continued

- *Privacy Compliance Risks for Facebook*, A. Johnston & S. Wilson, IEEE Technology and Society Magazine, V31.2 (Summer 2012)
- *Identity Evolves: Why Federated Identity is easier said than done*, AusCERT 2011 Security Conference, Gold Coast, May 2011
- *A bigger threat to patient privacy when doctors use Facebook* E-Letter to Journal of Medical Ethics, 20 Dec 2010 http://jme.bmj.com/content/early/2010/11/07/ jme.2010.036293/reply#medethics_el_3625
- *More trouble with Facebook* S. Wilson & A. Johnston, Privacy Law Bulletin, Oct 2010
- *Anonymity & Pseudonymity in eResearch via smartcards and Public Key Infrastructure*, eResearch Australasia 2009, Sydney, 2009 http://www.eresearch.edu.au/wilson2009
- *An easily validated security model for e-voting based on anonymous public key certificates*, AusCERT2008 Security Conference Academic Stream, Gold Coast, 2008
- *Public Key Superstructure,* NIST IDtrust Workshop, Maryland USA, 2008
- *A new manifesto for smartcards as national information infrastructure*, 5th Homeland Security Conference Canberra, 2006
- *A novel application of PKI smartcards to anonymise Health Identifiers* AusCERT2005 Security Conference Academic Stream, Gold Coast, 2005
- *Patient Privacy and Security – Not a zero sum game!* Wilson, Connolly and Denney-Wilson, Journal of the Australian Epidemiology Association V12.1, 2005
- *Ozdocsonline - A Case Study in Security & Privacy for a Doctor-patient Web-based Communication Tool* HIC/RACGP Computing Conference, Sydney, 2003
- *Mapping Privacy requirements onto the IT function* Privacy Law & Policy Reporter, July 2003
- *Comparison of Authentication Technologies in E-business* Asia Business Law Review, July 2001
- *Demystifying international cross-recognition of PKI: we've been barking up the wrong tree* International Security Solutions Europe Conference, London, 2001
- *Some limitations of web of trust models* Information Management & Computer Security, Vol. 7, No. 2, 1999
- *New models for the management of public key infrastructure and root certification authorities*. Proceedings of 7th IFIP Conference Info Security, Amsterdam 1999
- *Privacy positive aspects of PKI* Privacy Law & Policy Reporter, Vol 5.10, 1999
- *Some limitations of web of trust models* Information Management & Computer Security, Vol. 6, No. 5, 1998 (Highly Commended Award winner)
- *Certificates and trust in electronic commerce* Information Management & Computer Security, Vol. 5, No. 5, 1997
- *The galactic radio sources G5.4-1.2 and G5.27-0.90* Caswell, Kesteven, Komesaroff, Milne, Haynes, Stewart & Wilson, Monthly Notices of Royal Astronomical Soc, V225.329 1987.

Selected technical papers & presentations

- *The FIDO Alliance*, Biometrics Institute Showcase, Canberra 18 November 2014
- *Customer authentication Panel*, Biometrics Institute Showcase, Canberra 18 November 2014
- *The future of identity assurance in government*, 26th annual Security in Government conference, Canberra, 2 Sept 2014
- *The Authentication Family Tree,* Cloud Identity Summit, Monterey California 22 July 2014

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Selected technical papers & presentations continued

- *Big Privacy: Rising to the challenge of Big Data* Computers, Freedom, and Privacy Conference 2014, Washington DC, 9 June 2014
- *Technology myths shattered: Privacy in the digital age* Global Privacy Enforcement Network – Asia Pacific, 7 May 2014
- *What Happened to Privacy?* Australasian Science, December 2013
- *Tackling breaches and data transfers* iapp ANZ Annual Conference, Sydney, Nov 2013
- *Fractional Identity: An alternative to NSTIC and Federated Identity Models* G. Peabody & S. Wilson, Re:ID Magazine, Summer 2013 http://issuu.com/regardingid/docs/reid_summer_13
- *Re-engineering Digital Identity* Cloud Identity Summit, Napa USA, 2013
- *Designing Privacy By Design: A hybrid Privacy & Security Risk Assessment* AusCERT 2013
- *Fractionating Identity: The ecology of Digital Identity* MIT Media Labs Legal Hackathon, 2013, http://lockstep.com.au/library/identity_authentication/fractionating-identity
- *How can technologists relate to privacy?* Privacy Trade-offs in the Information Age seminar, Swinburne University of Technology, Melbourne, 2013
- *Public yet Private, and other paradoxes when privacy law meets cyberspace*, Australian Institute of Professional Intelligence officers, Annual Conference, Canberra, 2013
- *Calling for a uniform approach to card fraud offline and on*, Journal of Internet Banking and Commerce, Vol. 17, no. 3, 2012
- *The false allure of Federated Identity*, Cyber Security Summit, Sydney, 2012
- *Kiss Identity 2.0 goodbye! Why federated identity is easier said than done*, Cards & Payments Digital ID World, Sydney, 2012
- *Integrating Chip & PIN with 3D Secure to improve CNP fraud prevention*, Cards & Payments Innovation Seminar, Sydney, 2012
- *A Fresh Look at 'Balancing' Patient Privacy & Clinical Safety*, Managing Patient Confidentiality and Information Governance, Melbourne, 2011
- *Smart Ticketing: The Move to Open-Loop Transit*, Mercator Advisory research paper, 2011
- *Electronic Verification: The new benchmark for customer identity*, Veda Whitepaper, 2011 www.veda.com.au/dotAsset/530515.pdf
- *When worlds collide: Managing privacy in joined-up service & payment environments*, Human Services Delivery & Payment Reform Summit, Canberra, 2010
- *Ounce of prevention or pound of audit?* PCI-DSS Compliance Conference, Sydney, 2009
- *Smartcards, digital identity & black holes* 5th Annual Smartcards Summit Canberra, 2009
- *Virtual Identities; Real Threats* 4th Annual ID & Access Summit Sydney, 2009
- *Reflections on technology and privacy* Inaugural iappANZ Privacy Conference, Sydney, 2008
- *Re-thinking Identity & Privacy* 3rd Annual ID & Access Summit Sydney, 2008
- *A Practical Guide to Authentication* (tutorial) AusCERT Security Conference Gold Coast, 2007
- *Embedded PKI state of the art* 6th International Asia PKI Symposium, Chengdu, China, 2006
- *The importance of PKI today* China Communications, Dec 2005 http://www.china-cic.org.cn/english/digital%20library/200512/3.pdf
- *Relationship Certificates* 5th International Asia PKI Symposium, Beijing, 2005
- *Guidelines on how to determine Return on Investment in PKI* OASIS White Paper June 2005 http://idtrust.xml.org/guidelines-how-determine-return-investment-pki
- *PKI lessons from Australia* Asia PKI Forum Expectations for the Network Age, Tokyo, 2005

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Selected technical papers & presentations continued

- *PKI State of Play* Argus Foundation Forum, Canberra, 2004
  www.lockstep.com.au/library/ehealth/pki_state_of_play/argus_forum_pki.pdf
- *Secure web-based services linking patients and GPs* AFR Health Congress, Sydney, 2004
- *PKI without Tears* Voice & Data Vol 2 No. 9, 2003
- *Rethinking PKI – the electronic business card* SC Magazine, June 2003
- *PKI lessons from Australia* Global eBusiness Forum, Geneva 2003
- *Re-thinking PKI* Hong Kong PKI Forum Hong Kong, 2003
- *Electronic medical documentation of the future* 8th Annual Malaysian National Healthcare Conference, Kuala Lumpur, 2000
- *The international rise of PKI* Information Security New Zealand Wellington, 2000
- *Electronic Authentication – Issues relating to its selection and use* (contributor) APEC Business Facilitation Steering Group eSecurity Task Group, 2002
- *A Critical Review of PKI* RSA Conference, San Jose, 2002
- *Application-driven cross-recognition* RSA Conference, San Jose, 2002
- *Trust in Online Healthcare* ISSA World Market Series Business Briefing on InfoSec, 2001
- *Leveraging external accreditation to achieve cross-recognition* Attorney Generals Privacy & Security conference, Melbourne, 2001
- *PKI and the Acceleration of B2B* European-American Business Journal, Spring 2001
- *Will Biometrics Obsolete PKI?* American Bar Assoc. Bulletin of Law, Science & Tech, June 2001
- *A private sector perspective on PKI* Health Informatics HIC2001, Canberra, 2001
- *Current issues in the rollout of a National Authentication Framework* Information Industry Outlook Conference, Canberra 1998
- *Dictionary of Cardiac Pacing, Electrophysiology and Arrhythmias* (major contributor) edited by Hayes et al, Peritus 1993.

Selected non-technical papers & presentations

- *Consumer Authentication Panel*, Biometrics Institute Showcase, Canberra 18 November 2014
- *The Right to Be Forgotten*, IEEE Live Expert Panel Discussion, 30 Sept 2014
- *How to Protect Your Customers' Digital Identity and Personal Data* (Privacy Master Class), Social Media Week Sydney, 26 September 2014
- *Privacy Priorities Revealed in Apple's Payments and Health Initiatives*, iapp ANZ Privacy Unbound, September 2014 (awarded 2nd prize in annual iappANZ Writing Competition)
- *Technology myths shattered: Privacy in the digital age* Global Privacy Enforcement Network – Asia Pacific, 7 May 2014
- *What Happened to Privacy?* Australasian Science, December 2013
- *Tackling breaches and data transfers* iapp ANZ Annual Conference, Sydney, Nov 2013
- *Trace Recordings: Surveillance and identity in the 21st century* University of Technology Sydney, October 2013
- *Public yet Private, and other paradoxes when privacy law meets cyberspace*, Australian Institute Professional Intelligence officers, Annual Conference, Canberra, July 2013
- *A hybrid Privacy Security Risk Assessment,* AusCERT May 2013
- *How can technologists relate to privacy?* Privacy Trade-offs in the Information Age seminar, Swinburne University of Technology, Melbourne, May 2013

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Selected non-technical papers & presentations continued

- *Big Data, Big Privacy* Australian Privacy Week Launch, Sydney, 29 April 2013
- *Google, wifi and the gulf between IT and privacy*, International Association of Privacy Professionals, Aus-NZ Chapter (iappANZ) Member Bulletin No. 12, May 2010
- *Patient privacy: polarising or possible?* iappANZ Member Bulletin No. 10, March 2010
- *An uphill battle for online privacy* Sydney Morning Herald, Opinion column, 17 Feb 2010 http://smh.com.au/opinion/society-and-culture-o8rp.html
- *Give PCI The Bullet* Online Banking Review, June 2009
- *Biometric Banking?* Online Banking Review, April 2009
- *Me Myself and I* Online Banking Review, December 2007
- *Clear Heads Needed for Federated ID* Online Banking Review, December 2005
- *Identity theft IS a technology issue!* Online Banking Review, June 2004
- *Privacy takes IT by surprise* Online Banking Review, April 2004
- *Position Statement on PKI of the Australian Security Industry* Aus IT Security Forum, 2003.

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Employment history

Constellation Research   www.constellationr.com

In 2013 Stephen was appointed a Principal Analyst at San Francisco based Constellation Research, where he leads the business theme Digital Safety and Privacy.

Vice President & Principal Analyst   **2013 to now**

Published original research on

- The future role of the CISO
- Big Data Privacy
- Consumerization of Identity, and
- Independent coverage of FIDO Alliance, Yubico, Salesforce and other vendors.

Lockstep Group   www.lockstep.com.au

In 2004 Stephen established the independent Lockstep Consulting, now one of Australia's leading specialist advisory firms dedicated to digital identity and privacy. Sister company Lockstep Technologies researches and develops novel privacy and identity theft solutions.

Managing Director & Principal Consultant   **2004 to now**

Major consulting clients include:

- Dept of Health, Victoria – Privacy Impact Assessment (PIA) of Cloud Computing, 2014
- Dept of Health, Victoria – PIA of redeveloped consumer health portal, 2014
- Dept of State Devt & Business Innovation, Victoria – Citizen Authn Framework, 2013-14
- Dept of Finance – PIAs of five major federal government websites; amongst the first PIAs to be conducted under the new *Australian Privacy Principles*
- Dept of Industry – PIA of the B2G authentication broker system "VANguard", 2014
- US ID Ecosystem Steering Group – led the first privacy evaluation in the US National Strategy for Trusted Identities in Cyberspace (NSTIC), 2012-13
- National eHealth Transition Authority (NEHTA) – Acting PKI Manager, 2011-12
- Victoria Advanced Metering Infrastructure Program – Smart meter PIA, 2011
- Victorian Department of Health – Health*SMART* program PIAs, 2009, 2011
- NeHTA – Threat & Risk Assessment for clinical eSignatures, 2011
- Queensland Health – Privacy tools development for multiple e-health programs, 2010
- South Australia Health – Enterprise PKI strategy, operations documents, 2008-2010
- Dept of Foreign Affairs & Trade – Online Passports Privacy Impact Assessment, 2010
- Australia Post – Trust & privacy framework, PIAs, Security Assessments 2008-10
- Macau Bureau of Telecomms Regulation – PKI cross recognition strategy, 2008
- Victorian Department of Justice – Privacy Engineering Guidelines, 2007
- NeHTA – business case for National Authentication Service for Health (NASH), 2007
- AGIMO – strategic reform & implementation of Gatekeeper PKI framework, 2004-06
- AGIMO – drafted the Australian National Smartcard Framework, 2005-06
- Westpac Trust Centre – smartcard product strategy, 2006-07
- Kazakhstan Ministry of Internal Affairs 2006 – national multi-purpose PKI, 2006

Employment history – Lockstep cont.

- Singapore Infocomm Devt Authority – National Authentication Framework, 2006
- Medicare Australia – innovative *Known Customer* healthcare PKI, 2006
- NSW Office of ICT – entirely new statistical ROSI model, adopted by US DOD, 2004
- OASIS (US) – created new PKI Return on Investment model, 2004
- eASEAN – harmonised authentication legal infrastructure across SE Asia, 2004-05.

Lockstep Technologies researches and develops novel uses of PKI in smart authentication devices to enhance privacy and identity security. Applications include fraud prevention, anonymous e-health records, e-voting and proof of age, and protection of online social networking profiles and avatars against theft. See *Patents* and *Prizes and recognition* above.

SecureNet

SecureNet Limited was Australia's leading provider of managed security services.

Chief Security Specialist & Professional Services Manager   2001 to 2003

Led a national department of consultants and engineers. Consulted to selected clients on IdM strategy, policy and architecture, especially in managed service environments.

- Led a 60-strong prof-services team through the SecureNet-Baltimore Technologies merger
- Principal Consultant and Account Manager for Medicare's Health eSignature Authority
- developed the Indonesian National CA strategy, business case and architecture.

PricewaterhouseCoopers beTRUSTed

beTRUSTed was PricewaterhouseCoopers' biggest single investment in e-business, and the most sophisticated managed PKI service in the world at the time.

Director of Strategy & Policy   1999 to 2001

Reported to the global CEO. Responsible for early business strategy, global cryptographic product management, and major strategic and regulatory consulting engagements.

- Key member of the 20 person global management team overseeing the build of the world's most sophisticated managed PKI operation, based in Baltimore USA and London
- led the research & development of the Identrus *Starterpak* system
- led the Asia Pacific chapter of the PwC Cryptographic Centre of Excellence, the world's largest private sector cryptography think tank
- for Standard Chartered Bank Singapore, undertook a survey and impact analysis of e-signature laws and regulations across 20 countries.

Other clients included Cybersign Malaysia, and the New Zealand Bankers Association.

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Employment history – Lockstep cont.

KPMG Consulting

KPMG was the first Big Five services firm to set up a commercial Certification Authority.

Associate Director   **1998 to 1999**
Senior Manager   **1997**

A senior member of KPMG Australia's start-up Certification Authority business.

- Initiated the *Enshrine* SSL CA business, the first with automatic vetting against company registries, and two-year evergreen certificates – now standard worldwide
- led the international consulting team engaged by the Hong Kong government to establish the Certification Authority Recognition Office
- elected unopposed as founding chair of the Certification Forum of Australasia
- appointed by the federal Minister for Communications, IT & the Arts to the National Electronic Authentication Council (NEAC).

Other clients included the Australian Medical Association and the ASX.

Security Domain

Security Domain was a world pioneer in public key security systems and PKI services.

Software Development Manager   1995 to 1997

Line manager for 15 software engineers working on cryptographic security products. Introduced Object Oriented methods, 4th generation programming languages, and new software development processes. Responsible for a new product development quality management system. Managed the start-up of Australia's first commercial Certification Authority, Certificates Australia Pty Ltd (aka "CAPL").

Telectronics Pacing Systems   Denver, USA

Telectronics Pacing Systems, the flagship of the Nucleus biomedical group, was the world's third biggest manufacturer of cardiac pacemakers, and a pioneer in implantable defibrillators. The firm employed over 100 R&D engineers at its two main sites, Sydney and Denver, Colorado.

Head of Software R&D   **1993 to 1995**

Internally headhunted after transferring to the US headquarters to turn around what was an under-performing software department. Line manager responsible for 17 engineers working on embedded pacemaker software and related test systems. Also responsible for ISO-9001 and US FDA regulatory compliance. Member of the company's international World Class Product Development Steering Committee.

- Brought all projects on or ahead of budget within 18 months of starting the role
- project managed the port of a medical instrument software to a 'Wintel' OEM platform
- led a cross-functional Product Development Process reengineering team
- optimised the company's software design processes and testing standards.

Telectronics Pacing Systems   Sydney

Section Head, Implantable Software R&D   1991 to 1992

Directed nine engineers; responsible for budgeting, staff development, internal coding standards, and technical consulting to clinical, regulatory and intellectual property departments.

Team Leader, Implantable Defibrillator Software   1989 to 1992

Led a team of five, writing embedded software for a new implantable defibrillator, model 4211.

- Specially responsible for the System Functional Specification
- wrote the software system architecture
- acted as Project Manager from time to time, directing a multi-disciplined team of 20
- awarded three US patents for cardiac implant technology.

Senior Software Engineer   1987 to 1989

In a team of seven, writing the world's first implantable defibrillator software for model 4210.
- Personally developed 6,000 lines of real-time C code, proven fault-free after >1000 run time years (the most reliable real-time software in the world at the time).

CSIRO Division of Wool Technology   Sydney

Experimental Scientist   1986 to 1987

Developed image analysis software and hardware to automate raw wool appraisal, including novel algorithm development and digital signal processing.