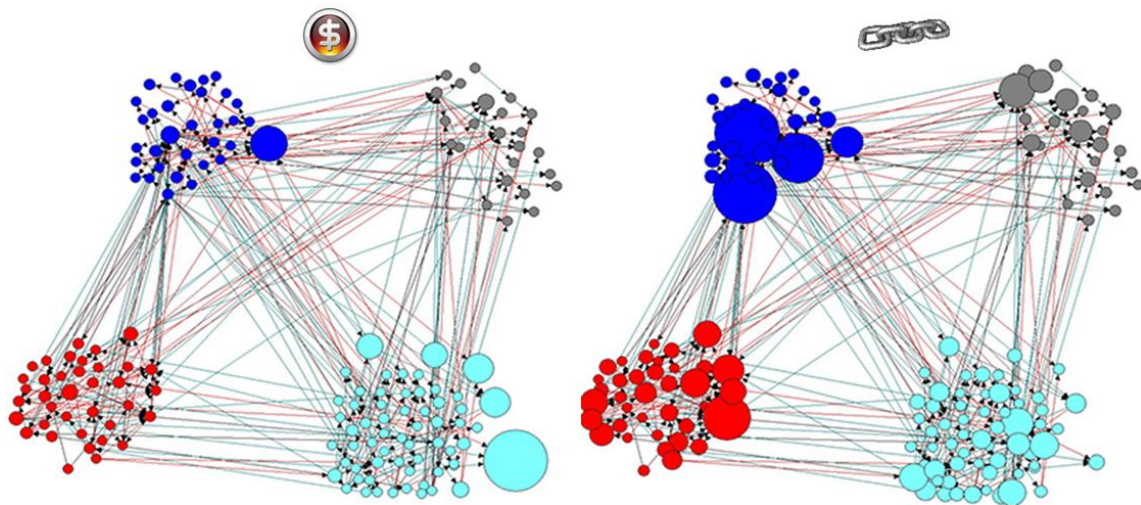


# Network Project Management

Visualising Collective Knowledge to Better Understand and Model a Project-Portfolio



by

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This thesis is submitted in fulfilment of the requirements  
of the degree of Doctor of Philosophy at the University of Canberra.

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## Statement of Original Authorship

Except where clearly acknowledged in footnotes, quotations and the bibliography, I certify that I am the sole author of this thesis submitted today entitled *Network project management: Visualising collective knowledge to better understand and model a project-portfolio*.

I further certify that, to the best of my knowledge, this thesis contains no material previously published or written by another person except where due reference is made in the text of the thesis.

The material in this thesis has not been the basis of an award of any other degree or diploma except where due reference is made in the text of the thesis.

This thesis complies with University requirements for a thesis as set out in [http://www.canberra.edu.au/research-students/attachments/pdf/Gold-Book-Part-7\\_HDR-Examinations.pdf](http://www.canberra.edu.au/research-students/attachments/pdf/Gold-Book-Part-7_HDR-Examinations.pdf).

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27<sup>th</sup> of January 2012

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27<sup>th</sup> of January 2012

# Acknowledgements

*I would maintain that thanks are the highest form of thought, and that gratitude is happiness doubled by wonder.*

Gilbert Chesterton, English Writer and Philosopher, 1917.

Doing a doctorate as a part-time external candidate is extraordinarily challenging – I would not recommend it to anyone. There are many distractions, not the least of which is work demands, and the process seems to have no end in sight. Accordingly, I would like to recognise the people and organisations whose backing made this research possible but more importantly, helped me succeed.

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I must also single out Associate Professor Monica Kennedy and Doctor Joelle Vandermensbrugge, both of whom provided support through the learning journey. Monica encouraged me to get involved on the conference circuit as an active participant rather than a passive listener. Joelle encouraged me to run seminars for undergraduates and graduates on the basis that teaching my methods will result in greater understanding – she was right.

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I thank my former business partner Patrick Byrne of *HolisTech® Pty Ltd*. He has been a constant source of inspiration and has helped flesh out many of the ideas presented herein. He also helped me draw some of my ideas. Patrick's pragmatic business approach ensured the outcome of this research could be used, and indeed is being used.

I especially thank Michael Schlatter of *CSC Australia*, and a former Colonel in Capability Systems Division, who read this thesis from cover to cover on more than one occasion. Michael is a very good friend who also brought a pragmatic business mind to the discussion, as well as correcting the occasional error of fact. Michael encouraged me to develop my ideas further and commercialise them. The realisation of his encouragement is my new business *HyperEdge Pty Ltd*, which is already a successful commercial reality (thanks to Ralph Shreeve), and which has served as just one of many distractions. I hope that one day Michael will work in *HyperEdge Pty Ltd* as he understands my ideas better than most.

I must thank my parents, Ron and Brenda Law, who instilled in me an inquisitive nature and the value of lifelong learning. I know they will be proud to have a doctor in the family.

Finally, but most importantly, I thank my wife Peta for her unstinting encouragement and patience. She has listened to half-baked ideas, sat through rehearsals, read my papers and drafts, been a ‘conference and research widow’, and helped me through the depths of despondency. She alone helped me keep my eye on the prize when I was ready to give up. I don’t have the words to express my gratitude, other than to say – THANK YOU!

# Conference Presentations and Publications

*In seeking wisdom, the first step is silence, the second is listening, the third remembering, the fourth practicing, the fifth – teaching others.*

Solomon ibn-Gabirol, Rabbi and Philosopher, 1021-1058.

I enrolled in this doctoral program in January 2005, although ethics approval to proceed was not obtained until January 2007. Along the way, I presented ideas resulting from this research to a number of national and international conferences and doctoral consortiums – these are shown in the table below. Such opportunities were important to the progression of the thesis as they provided opportunities to test ideas and receive feedback on the research approach and the developing arguments.

**Table 1: Conferences and presentations**

Date	Organisation or Conference	Presentation Title
27 October 2005	actKM 2005 Conference, Research Forum Stream, Canberra, Australia	A Knowledge Management Research Approach?
09 December 2005	ACKMIDS 2005 Conference, Melbourne, Australia	TARDIS: An Australian Case Study in Applied Knowledge Management
05 September 2006	actKM Community of Interest, Canberra, Australia	A Network Analysis of the actKM Community of Interest
19 October 2006	Queensland Knowledge Management Forum	A Network Analysis of actKM
26 October 2006	actKM 2006 Conference, Research Forum Stream, Canberra, Australia	Knowledge Management Models or Models of Knowledge? A Critical Review of the Literature
10 November 2006	KM Singapore 2006 Conference	Corporate Amnesia, Discipline and Knowledge Management
08 December 2006	STEP Doctoral Consortium Canberra, Australia	A Knowledge Productivity Model for the Public Sector
03 July 2007	PACIS 2007 Doctoral Consortium, Auckland, New Zealand	A Knowledge Productivity Model for the Public Sector
24 July 2007	7th International Conference on Knowledge, Culture and Change in Organisations, Singapore	Knowledge Productivity in a Project-focused Government Department: What Works and What Doesn't
26 July 2007	Singapore Knowledge Management Society	How to Do a Business Network Analysis
15 August 2007	National Institute for Governance, Canberra, Australia	Social, Organisational, and Business Network Analysis as Research Techniques
17 November 2007	Ark Group Culture of Knowledge in the Public Sector Conference, Sydney, Australia	Developing an Integrated IT, IM and KM Strategy: Managing the Continuum of Government Business Knowledge



Date	Organisation or Conference	Presentation Title
30 January 2008	Inter-University Research Workshop Program, Canberra, Australia	Introducing Network Analysis as a Research Technique
14 May 2008	Canberra Chapter of the Project Management Institute	Understanding the Complexity of Program Management
12 June 2008	Sydney Chapter of the Project Management Institute	Understanding the Complexity of Program Management
04 July 2008	Inter-University Research Workshop Program, Canberra, Australia	Introducing Network Analysis as a Research Technique
04 July 2008	Inter-University Research Workshop Program, Canberra, Australia	Introducing UCINET and NetDraw
27 August 2008	Melbourne Knowledge Management Roundtable	Business Network Analysis™: A Department of Defence Case Study
12 September 2008	Defence Operations Research 2008 Symposium, Sydney, Australia	Visualising Collective Knowledge to Understand a Portfolio of Projects
09 October 2008	KM Singapore 2008 Conference	Applying the RAAAKERS™ Framework in a Government Knowledge Management Project
10 October 2008	KM Singapore 2008 Conference	Using Business Network Analysis Techniques in Project Management
14 October 2008	actKM 2008 Conference, Canberra, Australia	Business Network Analysis™: A Knowledge Cartography Methodology
17 October 2008	17th Annual Australian Military Medicine Association Conference, Hobart, Australia	Applying the RAAAKERS™ Framework in an Analysis of the Command and Control Arrangements of the ADF Garrison Health Support
06 February 2009	Inter-University Research Workshop Program, Canberra, Australia	Introducing Network Analysis as a Research Technique
18 February 2009	National Institute for Governance, Canberra, Australia	Visualising Collective Knowledge to Manage a Portfolio of Projects
02 July 2009	New Zealand Knowledge Management Society	Visual Project Knowledge Management
26 October 2009	Asia Pacific Expert Forum, Sydney, Australia	Managing Project Interdependencies: Exploring New Approaches
15 November 2010	Australian Defence Force Academy, Canberra, Australia	Policy Development, Power, and the Shadow Organisation
29 January 2010	Inter-University Research Workshop Program, Canberra, Australia	Introducing Network Analysis as a Research Technique
17 March 2010	RAC Leaders Forum, Sydney, Australia	Using Social Network Analysis to Enhance Project Outcomes
06 May 2010	Defence Science and Technology Workshop, Canberra, Australia	Towards a Relationship Project-Program and Project-Portfolio Knowledge Model
28 June 2010	Army Knowledge Management Conference, Puckapunyal, Australia	Applying Network Analysis and Project Management Techniques to Lead Through Complexity
28 September 2010	Project Portfolio Management Special Interest Group, University of Technology, Sydney, Australia	Network Project Management: Visualising Collective Knowledge to Better Understand and Model a Project-Portfolio
13 October 2010	Defence Operations Research 2010 Symposium, Edinburgh, Australia	Towards a Relationship Project-Program and Project-Portfolio Knowledge Model

As is normal, I also sought to publish papers in peer-reviewed journals. A list of peer-reviewed publications resulting from this research is presented below in chronological order.

Durant-Law, G 2005, 'Soft systems methodology and grounded theory combined – a knowledge management research approach?', *actKM Online Journal of Knowledge Management*, vol. 2, no. 1, pp. 13-23.

Durant-Law, G & Byrne, P 2005, 'TARDIS: An Australian case study in applied knowledge management. A paper focusing on non-technological implementation issues', paper presented to *The Australian Conference on Knowledge Management and Intelligent Decision Support*, Melbourne.

Durant-Law, G & Byrne, P 2007, 'Knowledge productivity in a project-focused government department. What works? What doesn't?', *The International Journal of Knowledge, Culture and Change Management*, vol. 7, no. 4, pp. 33-41.

Durant-Law, G & Byrne, P 2007, *The TARDIS knowledge productivity system*, Defence Publishing Service.

Durant-Law, G, Byrne, P & Blackburn, M 2007, 'Disciplined knowledge management', *Inside Knowledge*, vol. 10 no. 9, pp. 24-9.

Burnett, S & Durant-Law, G 2008, 'Applying the RAAAKERS framework in an analysis of the command and control arrangements of the ADF garrison health support', *Journal of Military and Veterans Health*, vol. 17, no. 1, pp. 19-26.

Killen, K, Krumbeck, B, Kjaer, K & Durant-Law, G 2009, 'Managing Project Interdependencies: Exploring New Approaches', paper presented to the *Asia Pacific Expert Forum*, Sydney, Australia.

Burnett, S, Clifford, K, & Durant-Law, G 2010, 'Use of system dynamics techniques in the Garrison health modelling tool', *Technical Report DSTO-TN-0988*, Defence Science and Technology Organisation, Canberra, Australia.

Durant-Law, G 2010, 'Dollars or Links?', *The Journal of Social Structure*.  
<http://www.cmu.edu/joss/content/issues/vizsymposium.html>

# Awards

*To refuse awards is another way of accepting them with more noise than is normal!*

Sir Peter Ustinov, English Actor and Writer, 1996

Two awards resulted from the direct application of the methodology described in this research. On Australia Day 2011, I was awarded a Conspicuous Service Cross within the Australian Honours System. The citation reads in part:

*... for outstanding achievement in project management, strategic reform agenda implementation, and the development and acquisition of an e-health system for Defence.*

I used the Business Network Analysis™ methodology described in this thesis as my project management approach, and in particular, for the e-health system development. I also used the methodology in the Joint Health Command strategic reform agenda implementation.

On a lesser note but just as importantly, I was recognised by my peers when I was awarded a prize for stakeholder management in the Australian Project Management Institute's 2010 Project Manager of the Year Awards. The citation reads in part:

*... for outstanding efforts as a stakeholder and organisational change management champion, and for the development of an effective health record management system for ADF personnel from recruitment to discharge.*

Again, I used the Business Network Analysis™ methodology described in this thesis as my primary project management approach.

# Abstract

*Whatever we do must be in accord with human nature. We cannot drive people; we must direct their development ... the general policy of the past has been to drive; but the era of force must give way to the era of knowledge, and the policy of the future will be to teach and lead, to the advantage of all concerned.*

Henry L Gantt, American Engineer and Inventor of the Gantt Chart, 1919.

This research contributes to the bodies of knowledge in the general management, knowledge management, project management, network analysis, and system dynamics disciplines. The primary contribution is the proof of a holistic business methodology that elicits the capacity of an organisation to engage effectively in its activities, particularly within project-program and project-portfolio environments. The methodology, which I have called Business Network Analysis™, bridges the instrumental and social action management discourses to help managers mobilise and leverage knowledge assets, and to understand their knowledge landscape. It provides any combination of quantitative, qualitative, and graphical answers across the ‘*know-how, know-what, know-why, know-who, know-where, know-when, and know-how-much*’ business knowledge components.

In project-program and project-portfolio environments the methodology can be used at the level of artefacts, processes, individuals, teams, departments, or organisations to:

- assess project-program and project-portfolio operations by mapping the formal and informal process flows of an organisation;
- identify and then integrate current actual practice across core processes;
- understand inter-departmental document relationships;
- assess project-program and project-portfolio operations by plotting the communication path and time taken for a decision to propagate through an organisation;
- identify and accelerate the flow of information and knowledge across functional, project-program, and organisational boundaries by detecting and correcting information bottlenecks, and identifying where increased knowledge flow will have the most impact;

- improve decision making in project-program and project-portfolio manager networks by mapping inter- and intra-organisational dependencies;
- improve decision making in project-program and project-portfolio manager networks by identifying and correcting structural holes (Burt 1995, 2004) in personal networks;
- improve decision making in project and project-program manager networks by plotting project dependencies;
- support project and project-program manager collaboration by identifying potential partnerships and connecting people to people to ensure effective knowledge creation and sharing;
- assess the state of social capital by identifying individuals and project teams playing central roles, such as key knowledge brokers;
- assess the state of individual and project team social capital by identifying trust, support, and advice networks;
- support collaboration by raising the awareness of the importance of informal networks, and weaving communities of practice;
- simulate the effect of unknown dependencies on project rework; and
- determine an optimal number of projects for a project-program or project-portfolio.

Business Network Analysis™ is therefore both a management audit methodology and a project-program or project-portfolio knowledge management methodology. Hargie and Tourish (2009) stress the requirement for organisations to develop and implement auditing techniques that measure organisational climate in the same way they audit financial statements. Similarly, Edvinsson and Malone (1997) and Huff and Jenkins (2002) stress the need for the firm to map routinely strategic knowledge, but note the difficulty in identifying knowledge assets, and more importantly, in presenting visually the outcome. Business Network Analysis™ satisfies both requirements and therefore bridges the gap between theory and practice. At the same time, it is a diagnostic bottom-up methodology that gives an emancipatory voice, in keeping with Ulrich's (1998, 2003) critical systems approach, to all participants in the organisation. It also helps connect existing management disciplines in trans-disciplinary ways as opposed to multi-disciplinary ways.

The final proof of the value of the Business Network Analysis™ methodology is the fact that the Australian Defence Force's Capability Development Group is using it, and will continue to do so. Furthermore, the methodology has been adopted in other areas of Defence, and is the cornerstone of an already successful business venture called *HyperEdge Pty Ltd*.

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# Abbreviations

The use of abbreviations has been limited deliberately in this thesis; however, the literature is replete with them. A list of abbreviations that have been used, either in the text or more usually in the quotations, is presented in the table below. Key definitions are presented in the text as they arise, and at Appendix 1.

**Table 2: List of abbreviations**

Abbreviation	Meaning
ABC	Acquisition business case
actKM	Australian Capital Territory Knowledge Management
ADF	Australian Defence Force
APS	Australian Public Service
ARA	Australia Regular Army
AUSTEO	Australian eyes only
BNA®	Business Network Analysis™
BOK	Body of knowledge
C2	Command and control
C3I	Command, control, communications, and intelligence
CATWOE	Customers, actors, transformation, weltanschauung, owners, environment
CCDG	Commander Capability Development Group
CD Theory	Codification and Diffusion Theory
CDB	Capability Development Board
CDG	Capability Development Group
COD	Capability options document
CoP	Community of practice
CSDiv	Capability Systems Division
DCC	Defence Capability Committee
DCP	Defence Capability Plan
DMO	Defence Materiel Organisation
DSTO	Defence Science and Technology Organisation
FASCIR	First Assistant Secretary Capability Investment and Review

Abbreviation	Meaning
FIC	Fundamental inputs to capability
FPS	Functional performance specification
HCS	Head Capability Systems
IBC	Initial business case
IT	Information technology
JP	Joint project
KM	Knowledge management
KMS	Knowledge management system
LD	Land development
MD	Maritime development
MSP®	Managing Successful Programmes
MRO	Military response option
NSC	National Security Committee
OCD	Operational concept document
OGC	Office of Government Commerce
ONA	Organisational network analysis
Op	Operational
ORC	Options Review Committee
P3O®	Portfolio, Programme and Project Offices
PCOD	Preliminary capabilities options document
PDF	Project development funds
PM	Project management
PMBOK®	Project Management Body of Knowledge
PMI	Project Management Institute
POCD	Preliminary operational concept document
PPM	Project-program or project-portfolio management
PRINCE2™	Projects in Controlled Environments (Version 2)
PROMPT	Project Resource Organisation Management Planning Technique
PSP	Professional service provider
RAAF	Royal Australian Air Force
RAN	Royal Australian Navy
RFP	Request for proposal
RFT	Request for tender

<b>Abbreviation</b>	<b>Meaning</b>
RPDE	Rapid prototype development and evaluation
SCMILE	Sensing, Command and Control, Mobility, Information, Logistics and Engagement
SECI	Socialisation, externalisation, combination, internalisation
SNA	Social network analysis
TARDIS	The ADF Requirements Development Information System
TCD	Test concept document
VNA	Value network analysis
*	When used in a formula * means multiply
/	When used in a formula / means divide