Bibliography

- [AA87] P.A. Adler and P. Adler. Membership roles in field research. SAGE Publications, 1987.
- [ABCY94] V. D. Adzhiev, W. M. Beynon, A. J. Cartwright, and Y. P. Yung. A computational model for multi-agent interaction in concurrent engineering. In *Proc. CEEDA* '94, pp.227-232, Bournemouth University, 1994.
- [ABH86] D. Angier, T. Bissell, and S. Hunt. DoNaLD: a line drawing notation based on definitive principles. Research report RR-86, Department of Computer Science, University of Warwick, 1986.
- [AC98] C. Avgerou and A. Cornford. Developing information systems: concepts, issues and practice. 2nd edition, Macmillan Press, 1998.
- [AF95] D. E. Avison and G. Fitzgerald. *Information system development:*methodologies, techniques and tools. 2nd edition, McGraw-Hill, 1995.
- [Agr95] P. E. Agre. Computational research on interaction and agency. In P.E. Agre and S.J. Rosenschein (eds.), *Computational theories of interaction and agency*, pp.1-52, The MIT Press, 1995. Also in *Artificial Intelligence*, 72(1): 1-52, 1995.
- [AL89] P. M. Allen and M. J. Lesser. Evolution: travelling in an imaginary landscape. In J. D. Becker et al (eds.), Workshop on Evolutionary Modells and Strategies, pp.420-441, Neubiberg, Germany, March 1989.
- [Alt96] S. Alter. *Information systems: a management perspective*. 2nd edition, The Benjamin/Cummings Publishing Company, 1996.
- [And+90] N. Andersen, F. Kensing, J. Lundin, L. Mathiassen, A. Munk-Madsen, M. Rasbech, and P. Sorgaard. Professional systems development: experience, ideas and action. Prentice-Hill, 1990.
- [And94] S. F. Andriole. Fast, cheap requirements: prototype, or else. *IEEE Software*, 11(2):85-87, 1994.
- [Awa88] E. M. Awad. Management information systems: concepts, structure and applications. The Benjamin/Cummings Publishing Company, 1988.

- [Aye95] S. Ayer. Object-oriented client/server application development. Mcgraw-Hill, 1995.
- [Azm88] M. Azmoodeh. Abstract data types and algorithms. MacMillan Education Ltd, 1988.
- [Bac93] J. Bacon. Concurrent systems: an integrated approach to operating systems, database, and distributed systems. Addison-Wesley, 1993.
- [BBY92] W. M. Beynon, I. Bridge, and Y.P. Yung. Agent-oriented modelling for a vehicle cruise control system. In *Proc. ESDA '92*, pp.159-165, 1992.
- [BCDS93] A. J. C. Blyth, J. Chudge, J. E. Dobson, and M. R. Strens. ORDIT: a new methodology to assist in the process of eliciting and modelling organisation requirements. Technical report No.456, Department of Computer Science, University of Newcastle upon Tyne, 1993.
- [BCRS98] W. M. Beynon, R. I. Cartwright, J. Rungrattanaubol, and P. H. Sun. Interactive situation model for system development. Research report RR-353, Department of Computer Science, University of Warwick, 1998
- [BCSW99] W. M. Beynon, R. Cartwright, P. H. Sun, and A. Ward. Interactive situation models for information system development. In *Proc. of 5th Inter. Conf. on Information Systems, Analysis and Synthesis*, pp. 9-16, 1999.
- [BD93] C. Britton and J. Doake. Software system development: a gentle introduction. Mcgraw-Hill, 1993.
- [BE94] T. Bryant and A. Evans. OO oversold: those objects of obscure desire.

 *Information and Software Technology, 36(1):35-42, 1994.
- [Ber94] J. Bergin. *Data abstraction: the object-oriented approach using c++*. McGraw-Hill, 1994.
- [Bey+89] W. M. Beynon, M. T. Norris, S. B. Russ, M. D. Slade, Y. P. Yung, and Y. W. Yung. Software construction using definitions: an illustrative example. Research report RR-147, Department of Computer Science, University of Warwick, 1989.
- [Bey86] W. M. Beynon. The LSD notation for communication systems. Research report RR-87, Department of Computer Sciences, University of Warwick, 1986.

- [Bey94] W. M. Beynon. Agent-oriented modelling and the explanation of behaviour. In *Proc. Inter. workshop on shape modelling parallelism, interactivity and applications*, pp.54-63, University of Aizu, Japan, 1994.
- [Bey97] W. M. Beynon. Empirical Modelling for educational technology. In *Proc. of Cognitive Technology* 1997, pp.54-68, university of Aizu, Japan, 1997.
- [Bey98] W. M. Beynon. Empirical Modelling and the foundation of artificial intelligence. In C. Nehaniv (ed), Pro. Inter. Workshop on Computation, Metaphor, Analogy and Agents, University of Aizu, Japan, April 1998.
- [BeyMsc] W. M. Beynon. Lecture notes on the MSc module "Empirical Modelling for Concurrent Systems", Department of Computer Science, University of Warwick, 1997.
- [BG96] R. Buck-Emden and J. Galimow. SAPR/3 system: a client/server technology. Addison-Wesley, 1996.
- [BL98] D. M. Berry and B. Lawrence. Requirements engineering. *IEEE Software* 15(2):26-29, 1998.
- [Blu93] B. I. Blum. Representing open requirements with a fragment-based specification. *IEEE trans. on Systems, Man, and Cybernetics*, 23(3):724-736, 1994.
- [Blu94a] B. I. Blum. Characterizing the software process. *Information and decision technologies*, 19:215-232, 1994.
- [Blu94b] B. I. Blum. A taxonomy of software development methods. *Communications of the ACM*, 37(11):82-94, 1994.
- [BNOS90] W. M. Beynon, M. T. Norris, R. A. Orr and M.D. Slade. Definitive specification of concurrent systems. In *Proc. UKIT1990*, *IEE Conf. Publications* 316, pp.52-57, 1990.
- [Boe88] B. W. Boehm. A spiral model of software development and enhancement. *IEEE Computer*, 21(5):61-72, 1988.
- [Boo94] G. Booch. *Object-oriented analysis and design with application*. Benjamic/Cummings, 1994.

- [Bos89] R. P. Bostrom. Successful application of communication techniques to improve the systems development process. *Information & management*, 16:279-295, 1989.
- [BR94] W. M. Beynon and S. Russ. Empirical Modelling of requirements. Research report RR-277, Department of Computer Science, University of Warwick, 1994.
- [Bro87] F. P. Brooks. Jr. No silver bullet: essence and accidents of software engineering. *IEEE Computer*, 20(4):10-19, 1987.
- [Brö95] P. Brödner. The two cultures in engineering. In B. Göranzon (ed.), Skill, technology and enlightenment: on practical philosophy, pp.249-260, Springer-Verlag, 1995.
- [BRSW98] W. M. Beynon, J. Rungrattanaubol, P. H. Sun, and A. E. M. Wright. Explanatory models for open-ended human computer interaction. Research report RR-346, Department of Computer Science, University of Warwick, 1998.
- [BS98] W. M. Beynon and P. H. Sun. Interactive situation model for program comprehension. Research report RR-352, Department of Computer Science, University of Warwick, 1998.
- [BS99] W. M. Beynon and P. H. Sun. Computer-mediated communication: a distributed Empirical Modelling perspective. In *Proc. of the 3rd Inter. Conf. of Cognition Technology (CT'99)*, pp.115-132, 1999.
- [BT94] R. I. Brafman and M. Tennenholtz. Ascribing beliefs. Technical Report CS-TN-94-6, Department of Computer Science, Stanford University, 1994.
- [Bub95] J. A. Bubenko Jr. Challenges in requirements engineering. In *Proc. of the 2nd Inter. Sym. on Requirements Engineering*, pp.160-162, 1995.
- [Bur91] P. Burnard. Experiential learning in action. Academic Publishing Group, 1991.
- [Car98] R. I. Cartwright. Geometric aspects of empirical modelling: issues in design and implementation. PhD thesis, Department of Computer Science, University of Warwick, September 1998.

- [CCH80] G. A. Champine, R. D. Coop, and R. C. Heinselman. *Distributed computer systems: impact on management, design and analysis*. North-Holland Publishing, 1980.
- [CDK94] G. Coulouris, J. Dollimore, and I. Kindberg. *Distributed system: concepts and design*. Addison-Wesley, 1994.
- [CGC96] M. Christensen, N. Grumman, and C. Chang. Blueprint for the ideal requirements engineer. *IEEE software*, 13(2):12, March 1996.
- [Che76] P. Chen. The entity relationship model toward a unified view of data. *ACM Trans. on Data Base Systems*, 1(1):6-36, 1976.
- [Cla97] W. J. Clancey. Situated cognition: on human knowledge and computer representations. Cambridge University Press, 1997.
- [Clar90] A. Clark. Connectionism, competence and explanation. In M. A. Boden (ed.), The philosophy of artificial intelligence, pp.281-308, Oxford University Press, 1990.
- [Cle86] J. C. Cleaveland. *An introduction to data types*. AT&T Bell laboratory, 1986.
- [Cou95] A. Coulon. Ethnomethodology, translated from French by J. Coulon and J. Katz, SAGE Publications, 1995.
- [Cro94] C. Crook. Computers and the collaborative experience of learning.Routledge, London, 1994.
- [CS90] P. Checkland and J. Scholes. *Soft system methodology in action*. John Wiley and Sons, 1990.
- [CWG93] E. Carmel, R. D. Whitaker, and J. F. George. PD and joint application design: a transatlantic comparison. *Communications of the ACM*, 36(4):40-48, June 1993.
- [CY90] B. J. Cox and E. Yourdon. *Object-oriented analysis*. Prentice-Hall, 1990.
- [Dav93] A. Davis. Software requirements: objects, functions and states. Prentice-Hill, 1993.
- [DBP93a] E. Dubois, P.D. Bois, and M. Petit. O-O requirements analysis: an agent perspective. In O. M. Nierstrasz (ed.), 7th European Conf. in Object-oriented Programming, ECOOP'93, pp.458-481, Germany, 1993.

- [DBP93b] E. Dubois, P. D. Bois, and M. Petit. Elicitating and formalising requirements for C.I.M. information systems. In C. Rolland et al (eds.), 5rd Inter. Conf. on Advanced Information System Engineering CAiSE '93, pp.252-274, Paris, France, 1993,.
- [DDH72] O. Dahl, E. Dijkstra and C.A.R. Hoare. Structured programming,, Academic Press, London, 1972.
- [Den87] D. C. Dennett. The intentional stance. The MIT Press, 1987.
- [Dep92] Department of Computer Science, University of Warwick. *Technical Document for the Scout system*. October 1992.
- [DF98] W. Dzida and R. Freitag. Making use of scenarios for validating analysis and design. *IEEE trans. on Software Engineering*, 24(12):1182-1196, 1998.
- [diS88] A. diSessa. Knowledge in pieces. In G. Forman and P. Pufall (eds.),

 Constructivism in the computer age. Lawrence Erlbaum Associates, pp. 4970, 1988.
- [DL91] L. Davies and P. Ledington. Information in action: soft system methodology.MacMillan Education Ltd, 1991.
- [Dor98] H. P. D'ornellas. Agent-oriented modelling for collaborative group learning. Master thesis, Department of Computer Science, University of Warwick, 1998.
- [Dow87] M. Dowson. Iteration in the software process. In *Proc. 9th Int. Conf. Software Engineering*, pp.36-39, San Francisco, Ca, 1987.
- [Dre79] H. L. Dreyfus. From micro-worlds to knowledge representation: AI at an impasse. In J. Haugeland (ed.), *Mind design II: philosophy, psychology, artificial intelligence*. The MIT Press, 1997.
- [DS94] A. M. Davis and P. Sitaram. A concurrent process model of software development. *ACM Software Engineering Notes*, 19(2):38-51, 1994.
- [DS97] S. E. Donaldson and S. G. Siegel. *Cultivating successful software development: a practioner's view.* Prentice Hall, 1997.
- [DW96] N. Dale and H. M.Walker. *Abstract data type: specification, implementation and application*. D.C. Heath and Company, 1996.

- [Eas93] S. Easterbrook. Domain modelling with hierarchies of alternative viewpoints. In S. Fickas and A. Finkelstein (eds.), *Proc. of the 1st Inter. Sym. on Requirements Engineering*, pp.65-72, 1993.
- [Edw87] D. Edwards and N. Mercer. Common knowledge. Methuen, London, 1987.
- [EM95] K. E. Eman and N. H. Madhavji. A field study of requirements engineering practice in information systems development. In *Proc. of the 2nd Inter. Sym. on Requirements Engineering*, pp.68-80, 1995.
- [EQM96] K. E. Emam, S. Quintin, and N. H. Madhavji. User participation in the requirements engineering process: an empirical study. *Requirements engineering*, 1(1):4-26, 1996.
- [Fai96] J. Fairclough. Software engineering guides. Prentice-Hall, 1996.
- [FC96] M. Fayad and M. P. Cline. Aspects of software adaptability. Communications of the ACM, 39(10):58-59, 1996.
- [Fey75] P. Feyerabend. Against method. NLB, 1975.
- [FHW94] B. Fields, M. Harrison, and P. Wright. From informal requirements to agent-based specification. *SIGCHI Bulletin*, 26(2), April 1994.
- [Fin94] A. Finkelstein. Requirements Engineering: a review and research agenda. In Proc. 1st Asian & Pacific Software Engineering Conf., pp.10-19, IEEE Press, 1994.
- [Fis91] G. Fischer. The importance of models in making complex systems comprehensible. In M.J. Tauber and D. Ackermann (eds.), *Mental models and human-computer interaction 2*, pp.3-36, North-Holland, 1991.
- [Fis93] G. Fischer. Shared knowledge in cooperative problem-solving Systems integrating adaptive and adaptable components. In M. Schneider-Hufschmidt et all (eds), Adaptive User Interfaces: Principles and Practice, pp.49-68, North-Holland, 1993.
- [Fit96] B. Fitzgerald. Formalised system development methodologies: a critical perspective. *Information System Journal*, 6:3-23, 1996.
- [Flo87] C. Floyd. Outline of a paradigm change in software engineering. In G.
 Bjerkness, P. Ehn, and M. Kyng (eds), Computer and democracy: a
 Scandinavian challenge, pp.191-212, Avebury, Aldershot, 1987.

- [Flo95] C. Floyd. Theory and practice of software development. In P. D. Mosses, M. Nielsen, and M. I. Schwartzbach (eds.), TAPSOFT'95: theory and practice of software development, Lecture Notes in Computer Science, 915:25-41, 1995.
- [FP88] G. Forman and P. Pufall. Constructivism in the Computer Age. Lawrence Erlbaum Associates, 1988.
- [FS96] A. Finkelstein and I. Sommerville. The viewpoints FAQ. Software Engineering Journal, 11(1):2-4, 1996.
- [FSCSF88] G. G. Fein, E.K. Scholnick, P.F. Campbell, S.S. Schwartz, and R. Frank. Computing space: a conceptual and developmental analysis of LOGO. In G. Forman and P. Pufall (eds.), Constructivism in the Computer Age. Lawrence Erlbaum Associates, 1988.
- [Gar67] H. Garfinkel. Studies in ethnomethodology. Prentice-Hall, 1967.
- [GHJV95] E. Gamma, R. Helm, R. Johnson, and J. Vlissides. *Design patterns: elements of reusable object-oriented software*. Addison-Wesley, 1995.
- [Gib94] W. W. Gibbs. Software's chronic crisis. Scientific American, pp.72-84, September 1994.
- [GK94] J. Galegher and R. E. Kraut. Computer-mediated communication for intellectual teamwork: an experiment in group writing. *Information Systems Research*, 5(2):110-138, 1994.
- [GKM93] K. Grønbaek, M. Kyng, and P. Mogensen. CSCW challenges: cooperative design in engineering projects. *Communications of the ACM*, 36(4):67-77, June 1993.
- [Gog94] J. A. Goguen. Requirements engineering as the reconciliation of technical and social Issues. In M. Jirotka and J. Goguen (eds), *Requirements Engineering: Social and Technical Issues*, pp.165-200, Academic, 1994.
- [Gog96] J. A. Goguen. Formality and informality in requirements engineering. In *Proc. 2nd Inter. Conf. on Requirements Engineering*, pp.102-108, 1996.
- [Gog97] J. A. Goguen. Toward a social, ethical theory of information. In G. C. Bowker et al (eds.), Social science, technical systems and cooperative work: beyond the great divide, pp.27-56, Lawrence Erlbaum Associates, 1997.

- [Goo90] D. Gooding. Experiment and the making of meaning. Kluwer Academic Publishers, 1990.
- [GS70] H. Garfinkle and H. Sacks. On formal structures of practical action. In J. C. Mckinney & E. A. Tiryakian (eds.), *Theoretical sociology*, pp.338-366, Appleton-Century-Crofts, 1970.
- [GYCBC96]D. K. Gehring, Y. P. Yung, R. I. Cartwright, W. M. Beynon, and A. J. Cartwright. Higher-order constructs for interactive graphics. In *Proc. Eurographics UK Chapter*, 14th Annual Conf., pp.179-192, 1996.
- [Hal89] M. I. Hale. *The mind: Its origin, evolution, structure and functioning*. Halevan Ruth, Pittsburgh, 1989.
- [Haml78] D. W. Hamlyn. Experience and the growth of understanding. Routledge & Kegan Paul, 1978.
- [Hau97] J. Haugeland. What is mind design. In J. Haugeland (ed.), *Mind design II:* philosophy, psychology, artificial intelligence. The MIT press, 1997.
- [HED93] S. D. P. Harker, K. D. Eason, and J. E. Dobson. The change and evolution of requirements as a challenge to the practice of software engineering. In S. Fickas and A. Finkelstein (eds.), Proc. of the 1st Inter. Sym. on Requirements Engineering, pp.266-270, 1993.
- [Hen96] H. Hendriks-Jansen. Catching ourselves in the act. The MIT Press, 1996.
- [Her84] J. Heritage. Garfinkel and ethnomethodology. Polity Press, 1984.
- [HJ89] I. J. Hayes and C. B. Jones. Specification are not (necessarily) executable. Software Engineering Journal, pp.330-338, November 1989.
- [HKL95] R. Hirschheim, H. K. Klein, and K. Lyytinen. *Information systems development and data modeling: conceptual and philosophical foundations*.Cambridge University Press, 1995.
- [HKN91] R. Hirschheim, H. K. Klein, and M. Newman. Information systems development as social action: theoretical perspective and practice. *OMEGA*, 19(6): 587-608, 1991.
- [Hol90] C. H. Holbrook III. A scenario-based methodology for conducting requirements elicitation. *Software Engineering Notes*, 15(1):95-104, 1990.

- [HORRS95] J. Hughes, J. O'Brien, T. Rodden, M. Rouncefield, and I. Sommerville.

 Presenting ethnography in the requirements process. In *Proc. of the 2nd Inter.*Sym. on Requirements Engineering, pp.27-34, 1995.
- [Hug97] L. Hughes. *Introduction to data communication*. Jones and Bartlett, 1997.
- [Hut95] E. Hutchins. Cognition in the Wild. MIT Press, 1995.
- [IEEE90] IEEE-Std. '610'. *IEEE standard Glossary of Software Engineering Terminology*. Institute of Electrical Electronics Engineers, New York.
- [ITC98] Defence system never worked. *The IT Newspaper:Computing*, 26 November 1998.
- [Jac92] I. Jacobson. *Object-oriented software engineering: a use case driven approach*. Addison-Wesley, 1992.
- [Jal97] P. Jalote. *An integrated approach to software engineering*. 2nd edition. Springer-Verlag, New York, 1997.
- [Jam96] W. James. Essays in radical empiricism. Bison books, 1996.
- [JCJO92] I. Jacobson, M. Christerson, P. Jonsson, and G. Övergaard. *Object-oriented software engineering*. Addison-Wesley, 1992.
- [Joh94] G. J. Johnson. Of metaphor and the difficulty of computer discourse. Communications of the ACM, 37(12):97-102, 1994.
- [JP93] M. Jarke and K. Pohl. Establishing Vision in Context: Towards a model of Requirements Processes. The 14th Inter. Conf. on Information Systems, USA, 1993. Also in NATURE Project Report NATURE-93-10.
- [JP94] M. Jarke and K. Pohl. Requirements Engineering in the Year 2001: On (Virtually) Managing a Changing Reality. *Software Engineering Journal*, 9(6):257-266, 1994.
- [JPRS94] M. Jarke, K. Pohl, C. Rolland, and J. Schmitt. Experience-based method evaluation and improvement: a process modelling approach. *IFIP trans. Computer Science and Technology*, 55:1-27, 1994.
- [Kir91] D. Kirsh. Foundation of AI: the big issues. *Artificial Intelligence*, 47(1):3-30, 1991.
- [KJ98] M. Knapik and J. Johnson. Developing intelligent agents for distributed systems. McGraw-Hill, 1998.

- [KS98] G. Kotonya and I. Sommerville. *Requirements engineering: processes and techniques*. John Wiley & Sons Ltd., 1998.
- [Kuw93] E. Kuwana and J. D. Herbsleb. Representing knowledge in requirements engineering: an empirical study of what software engineers need to know. In S. Fickas and A. Finkelstein (eds.), *Proc. of the 1st Inter. Sym. on Requirements Engineering*, pp.273-276, 1993.
- [Kyn91] M. Kyng. Designing for cooperation: cooperating in design.

 Communications of the ACM, 34(12):65-73, 1991.
- [Lan87] F. Land. Adapting to changing user requirements. In R. Galliers (ed.),

 *Information analysis: selected readings, pp.203-221, Addison Wesley, 1987.
- [Law98] B. Lawrence. Designers must do the modelling. *IEEE Software*, 15(2):31-33, 1998.
- [LdI95] M. Luck and M. d'Inverno. A formal framework for agency and autonomy. In Proc. of 1st Inter. Conf. on Multi-Agent Systems, pp.254-260, AAAI Press, 1995.
- [Leh94a] M. M. Lehman. Introduction to FEAST. 1st FEAST workshop, pp.6-10, 1994.
- [Leh94b] M. M. Lehman. Some characteristics of S-type and E-type software. 2nd FEAST workshop, pp.11-26, 1994.
- [Leh97] M. M. Lehman. Process models where next? In *Proc. ICSE 19*, pp.549-552, Boston, 1997.
- [Leh98] M. M. Lehman. Software's future: managing evolution. *IEEE Software*, 15(1):40-44, 1998.
- [Leh98a] M. M. Lehman. Feedback, evolution and software technology the human dimension. ICSE 20 Workshop on Human Dimensions in Successful Software Development, Japan, 1998.
- [LG97] M. Lea and R. Giordano. Representations of the group and group processes in CSCW research: a case of premature closure? In G. C. Bowker et al (eds.), Social science, technical systems and cooperative work: beyond the great divide, pp.5-25, Lawrence Erlbaum Associates, 1997.

- [LH94] N. G. Leveson and M.P. Heimdahl. Requirements specification for process-control systems. *IEEE trans. on Software Engineering*, 20(9):684-707, September 1994.
- [Liv87] E. Livingston. *Making sense of ethnomethodology*. Routledge &Kegan Paul, 1987.
- [LK95] P. Loucopoulos and V. Karakostas. System requirements engineering. McGraw-Hill, 1995.
- [LL94] V. Lalioti and P. Loucopoulos. Visualisation of conceptual specifications. *Information systems*, 19(3):291-309, 1994.
- [Lou94] P. Loucopoulos. The F3 (from fuzzy to formal) view of requirements engineering. *Journal of Ingénierie des systèmes d'information*, 2(6):639-655, 1994.
- [LR91] Luqi and W. Royce. Status report: computer-aided prototyping. *IEEE Software*, 8(6):77-81, 1991.
- [LR98] M. M. Lehman and J.J. Ramil. Feedback, evolution and software technology
 some results from the FEAST/1 project. In Proc. of 11th Inter. Conf. on
 Software Engineering and its Application, Paris, 1998.
- [Luq93] Luqi. How to use prototyping for requirements engineering. In S. Fickas and A. Finkelstein (eds.), *Proc. of the 1st Inter. Sym. on Requirements Engineering*, pp.229, 1993.
- [LW91] J. Lave and E. Wenger. Situated learning: legitimate peripheral participation. Cambridge University Press, 1991.
- [Mar91] J. Martin. Rapid application development. Macmillan, 1991.
- [Mat80] H. R. Maturana. Biology of cognition. In H. R. Maturana and F. J. Varela (eds), *Autopoiesis and cognition: the realization of living*, pp.2-62, Reidel, 1980.
- [McC78] J. McCarthy. Ascribing mental qualities to machines. Technical report. AI Lab., Stanford University, 1978.
- [McD90] D. C. McDermid. Software engineering for information systems. Blackwell Scientific Publications, 1990.

- [McG92] S. McGinnes. How objective is object-oriented analysis?. In P. Loucopoulos (ed.), 4rd Inter. Conf. on Advanced Information System Engineering CaiSE' 92, pp.1-16, Manchester, UK, 1992.
- [MGP60] G. A. Miller, E. Galanter, and K.H. Pribram. *Plans and the structure of behavior*. Holt, Rinehart and Winston, 1960.
- [Min74] M. Minsky. A framework for representing knowledge. In J. Haugeland (ed.), Mind design II: philosophy, psychology, artificial intelligence. The MIT press, 1997.
- [Min88] M. Minsky. The society of mind. Picador, 1988.
- [Mum95] E. Mumford. Effective system design and requirements analysis: the ETHICS approach. Macmillan Press Ltd, 1995.
- [Nar93] B. A. Nardi. A small matter of programming: perspectives on end user computing. The MIT Press, 1993.
- [Nau95] P. Naur. Knowing and the mystique of logic and rules. Kluwer Academic Publishers, 1995.
- [Nes97] P. E. Ness. Creative software development -- An Empirical Modelling framework. PhD thesis, Department of Computer Science, University of Warwick, 1997.
- [NJJZH96] H. W. Nissen, M. A. Jeusfeld, M. Jarke, G. V. Zemanek, and H. Huber. Managing multiple requirements perspectives with metamodels. *IEEE Software*, 13(2):37-47, March 1996.
- [Nor83] D. A. Norman. Some observations on mental models. In D. Gentner and A.L. Stevens (eds.), Mental Models, pp.7-14, Lawrence Erlbaum Associate Inc, 1983.
- [OS93] A. L. Opdahl and G. Sindre. Concepts for real-world modelling. In C. Rolland et al (eds.), 5rd Inter. Conf. on Advanced Information System Engineering CAiSE'93, pp.309-327, Paris, France, 1993.
- [Ous98] J. K. Ousterhout. Scripting: higher-level programming for the 21st century. *IEEE Computer*, 31(3):23-30, 1998.
- [Oxf89] The Oxford English Dictionary, pp.248, 2nd edition, Oxford University Press, 1989.

- [Pau97] J. S. Poulin. Measuring software reuse: principles, practices and economic models. Addison-Wesley, 1997.
- [PF87] R. Prieto-Diaz and P. Freeman. Classifying software for reusability. *IEEE Software*, 4(1):6-16, January 1987.
- [Poh93] K. Pohl. The three dimensions of requirements engineering. In C. Rolland et al (eds.), 5rd Inter. Conf. on Advanced Information System Engineering CAiSE'93, pp.275-292, Paris, France, 1993.
- [Pot93] C. Potts. Software engineering research revisited. *IEEE Software*, 10(5):19-28, September 1993.
- [Pot93a] C. Potts. Panel: 'I never knew my requirements were object-oriented until I talked to my analyst'. In S. Fickas and A. Finkelstein (eds.), *Proc. of the 1st Inter. Sym. on Requirements Engineering*, pp.226, 1993.
- [PR95] V. Plihon and C. Rolland. Modelling ways of working. CAiSE'95, Finland, 1995. Also in *NATURE* Project Report NATURE-95-09.
- [Pre97] R. S. Pressman. *Software engineering: a practitioner's approach*. 4th edition, McGraw-Hill, 1997.
- [Pri93] R. Prieto-Diaz. Status report: software reusability. *IEEE software*, 10(3):61-66, May 1993.
- [Puf88] P. B. Pufall. Function in Piaget's system: some notes for constructors of microworlds. In G. Forman and P. Pufall (eds.), Constructivism in the Computer Age, pp.15-35, Lawrence Erlbaum Associates, 1988.
- [Rac95] L. B. S. Raccoon. The chaos model and the chaos life cycle. *Software Engineering Notes*, 20(1):55-66, 1995.
- [Rac97] L. B. S. Raccoon. Fifty years of progress in software engineering. *Software Engineering Notes*, 22(1): 88-104, 1997.
- [Rao94] A. S. Rao. Agent-oriented programming: an approach to developing distributed real-time systems. In *TOOLS Pacific '94*, 1994.
- [RB74] J. Radford and A. Burton. *Thinking: its nature and development*, John Wiley& Sons, New York, 1974.
- [Rei65] W. R. Reitman. Cognition and thought: an information-processing approach. John Wiley & Sons, New York, 1965.

- [Rei92] B. Reinhard. Prototyping, an approach to evolutionary system development.Springer-verlag, 1992.
- [Rei97] D. Reisberg. Cognition: exploring the science of the mind. W.W. Norton, 1997.
- [RHHR98] H. Robinson, P. Hall, F. Hovenden, and J. Rachel. Postmodern software development. *The Computer Journal*, 41(6):363-375, 1998.
- [RK95] S. J. Rosenschein and L. P. Kaelbling. A situated view of representation and control. In P. E. Agre and S. J. Rosenschein (eds.), Computational theories of interaction and agency, pp.1-52, The MIT Press, 1995. Also in Artificial Intelligence, 73:149-173, 1995.
- [RL93] B. Ramesh and Luqi. Process knowledge based rapid prototyping for requirements engineering. In S. Fickas and A. Finkelstein (eds.), Proc. of the 1st Inter. Sym. on Requirements Engineering, , pp.248-255, 1993.
- [Rob99] P. N. Robillard. The role of knowledge in software development. Communications of the ACM, 42(1):87-92, 1999.
- [Rog83] M. F. Rogers. Sociology, ethnomethodology, and experience: a phenomenological critique. Cambridge University Press, 1983.
- [Rol93] C. Rolland. Modelling the requirements engineering process. In 3rd Europen-Japanese seminar on information modelling and knowledge bases. Budapest, Hungary, June 1993.
- [Rol94] C. Rolland. A contextual approach for the requirements engineering process. In Proc. 6th Inter. Conf. on Software Engineering and Knowledge Engineering, 1994.
- [Rolt82] L. T. C. Rolt. Red for danger. Pan Books, 4th edition, 1982.
- [RSB98] C. Rolland, C. Souveyet, and C. BenAchour. Guiding goal modelling using scenarios. *IEEE trans. on Software Engineering*, 24(12):1055-1071, 1998.
- [Rus97] S. Russ. Empirical Modelling: the computer as a modelling medium. Computer Bulletin, pp20-22, April 1997.
- [Rya95] K. Ryan. Let's have more experimentation in requirements engineering. In *Proc. of the 2nd Inter. Sym. on Requirements Engineering*, pp.66, 1995.

- [SAGSZ97] M. Stytz, T. Adams, B. Garcia, S. M. Sheasby, and B. Zurita. Rapid prototyping for distributed virtual environments. *IEEE Software*, 14(5):83-92, 1997.
- [Sal87] G. Salaway. An organizational learning approach to information systems development. *MIS Quarterly*, 11(2):245-264, 1987.
- [SB82] W. Swartout and R. Balzer. On the inevitable intertwining of specification and design. *Communication of ACM*, 25(7):438-440, July 1982.
- [SB91] W. Sharrock and G. Button. The social actor: social action in real time. In G. Button (ed.), Ethnomethodology and the human science. Cambridge University Press, 1991.
- [SB98] P. H. Sun and W. M. Beynon. Empirical Modelling: a new approach for understanding requirements. In *Proc. of 11th Inter. Conf. on Software Engineering and its Application*, Paris, 1998.
- [Sch90] S. Schach. Software engineering. Aksen, Homewood, 1990.
- [SCRB99] P.H. Sun, Y. C. Chen, S. B. Russ, and W. M. Beynon. Cultivating requirements in a situated requirements engineering process. Research report RR-357, Department of Computer Science, University of Warwick, 1999.
- [SDV96] S. Some, R. Dssouli and J. Vaucher. Toward an automation of requirements engineering using scenarios. *Journal of Computing and Information*, 2(1): 1110-1132, 1996.
- [SH96] R. Silverstone and L. Haddon. Design and the domestication of information and communication technologies: technical change and everyday life. In R. mansell and R. Silverstone (eds), *Communication by design*, pp.44-74, Oxford University Press, 1996.
- [She98] C. R. Sheth. An investigation into the application of the distributed definitive programming paradigm in a teaching environment: the development of virtual electrical laboratory. Master thesis, Department of Computer Science, University of Warwick, 1998.
- [Sho90] Y. Shoham. Agent-oriented programming. Technical report STAN-CS-1335-90, Computer Science Department, Stanford University, 1990.
- [Sho93] Y. Shoham. Agent-oriented programming. *Artificial Intelligence*, 60(1):51-92, 1993.

- [Sid94] J. Siddiqi. Challenging universal truths of requirements engineering. *IEEE Software*, 11(2), 1994.
- [SKVS95] I. Sommerville, G. Kotonya, S. Viller, and P. Sawyer. Process viewpoints. In W. Schäfer (ed.), Software Process Technology: Proc. of 4th European Workshop, EWSPT'95, pp.2-8, The Netherlands, April 1995.
- [Sla90] M. Slade. Definitive parallel programming. Master thesis, Department of Computer Science, University of Warwick, 1990.
- [Slo90] A. Sloman. Must intelligent systems be scruffy? In J.E. Tiles, G.T. McKee, and G. C. Dean (eds), *Evolving knowledge in natural science and artificial intelligence*, Pitman Publishing, 1990.
- [Smi97] A. Smith. Human computer factor: a study of users and information systems.

 McGraw-Hill, 1997.
- [Som92] I. Sommerville. Software engineering. 4th edition, Addison-Wesley, 1992.
- [Som95] I. Sommerville. *Software engineering*. 5th edition, Addison-Wesley, 1995.
- [Son93] D. H. Sonnenwald. Communication in Design. PhD thesis, The State University of New Jersey, May 1993.
- [Son95] D. H. Sonnenwald. Contested collaboration: a descriptive model of intergroup communication in information system design. *Information* processing & management, 31(6):859-877, 1995.
- [Son96] D. H. Sonnenwald. Communication roles that support collaboration during the design process. *Design studies*, 17:277-301, 1996.
- [SS95] J. Salasin and H. Shrobe. Evolutionary design of complex software (EDCS), Software Engineering Notes, 20(5):18-22, 1995.
- [SS96] J. Siddiqi and M. C. Shekaran. Requirements engineering: the emerging wisdom. *IEEE Software*, 13(2):15-19, March 1996.
- [SS97] I. Sommerville and P. Sawyer. *Requirements engineering: A good practice guide*. John Wiley and Sons, 1997.
- [Ste94] D. E. Stevenson. Science, computational science, and computer science: at a crossroads. Communications of the ACM, 37(12):85-96, 1994.
- [STM95] P. Sallis, G. Tate, and S. MacDonell. Software engineering: practice, management, and improvement. Addison-Wesley, 1995.

- [Suc87] L. A. Suchman. *Plans and situated actions: the problem of human-machine communication*. Cambridge University Press, 1987.
- [Sut96] A. Sutcliffe. A conceptual framework for requirements engineering. Requirements engineering, 1(3):170-189, 1996.
- [Tri85] R. Trigg. Understanding social science: a philosophical introduction to the social science. Blackwell Publishers, 1985.
- [Tul88] C. Tully. Representing and enacting the software process. In *Proc.* 4th Inter. Software Process Workshop, UK, May 1988. Reprinted as ACM SIGSOFT software Engineering Notes, 14(4):3-4, 1989.
- [Tul95] C. Tully. The software process and the modelling of complex systems. In W. Schäfer (ed.), Software Process Technology: Proc. of 4th European Workshop, EWSPT'95, pp.2-8, The Netherlands, April 1995.
- [VF87] J. R. Valusek and D. G. Fryback. Information requirements determination: obstacles within, among and between participants. In R. Galliers (ed.), *Information analysis: selected readings*, pp.139-151, Addison Wesley, 1987.
- [Vli93] H. V. Vliet. Software engineering: principles & practice. John Wiley & Sons Ltd. 1993.
- [VPC98] S. Valenti, M. Panti, and A. Cucchiarelli. Overcoming communication obstacles in user-analyst interaction for functional requirements elicitation, ACM Software Engineering Notes, 23(1):50-55, 1998.
- [WDP88] R. Watson, G. DeSanctis, and M. S. Poole. Using a GDSS to facilitate group consensus: some intended and unintended consequences. MIS quarterly, 12(3):463-478, 1988.
- [Web61] Webster's 3rd New International Dictionary, pp.40, G. & C. Merriam Co., 1961.
- [Weg97] P. Wegner. Why interaction is more powerful than algorithms.

 *Communications of the ACM, 40(5):80-91, 1997.
- [Wei99] M. A. Weiss. Data structures & algorithms analysis in Java. Addison-Wesley, 1999.
- [Wel97] B. B. Welch. *Practical programming in Tcl and Tk*. 2nd edition, Prentice-Hall, 1997.

- [WF86] T. Winograd and F. Flores. *Understanding computers and cognition*.

 Addison-Wesley, 1986.
- [Win84] P. H. Winston. Artificial intelligence. Addison-Wesley, Reading, MA, 1984
- [WJ95] M. Wooldridge and N.R. Jennings. Intelligent agents: theory and practice, *The Knowledge Engineering Review*, 10(2):115-152, 1995.
- [WPJH98] K. Weidenhaupt, K. Pohl, M. Jarke, and P. Haumer. Scenarios in system development: current practice. *IEEE Software*, 15(2):34-45, 1998.
- [XIA98] F. XIA. What's wrong with software engineering research methodology.

 ACM Software Engineering Notes, 23(1):62-65, 1998
- [Yeh90] R. T. Yeh. An alternative paradigm for software evolution. In P.A. Ng and R. T. Yeh (eds.), Modern software engineering: foundations and current perspectives, pp.7-22, Van Nostrand Reinhold, New York, 1990.
- [Yeh92] R. T. Yeh. Notes on concurrent engineering. *IEEE trans. On Knowledge and Data Engineering*, 4(5):407-414, 1992
- [You83] R. M. Young. Surrogates and mappings: two kinds of conceptual models for interactive devices. In D. Gentner and A.L. Stevens (eds.), *Mental Models*, pp.7-14, Lawrence Erlbaum Associate Inc, 1983.
- [You98] E. Yourdon. A tale of two futures. IEEE Software, 15(1):23-29, 1998.
- [Yun90] Y. W. Yung. EDEN: an engine for definitive notations. Master thesis,Department of Computer Sciences, University of Warwick, September 1990.
- [Yun92] Y. P. Yung. Definitive programming: a paradigm for exploratory programming. PhD thesis, Department of Computer Science, University of Warwick, 1992.
- [YY88] Y. P. Yung and Y. W. Yung. *The EDEN handbook*. Department of Computer Sciences, University of Warwick, 1988. Updated in 1996.
- [Zav95] P. Zave. Classification of research efforts in requirements engineering. In Proc. of the 2nd Inter. Sym. on Requirements Engineering, pp.214-216, 1995.
- [Zuc93] L. Zucconi. 'I never realized my requirements were object-oriented until I talked to my analyst'. In S. Fickas and A. Finkelstein (eds.), *Proc. of the 1st Inter. Sym. on Requirements Engineering*, pp. 230, 1993.

Glossary

ADM (Abstract Definitive Machine): a tool that is used to animate an LSD account 3'
ADTs (abstract data types): a programmer-defined data type whose logical behaviour
is defined by a set of values and a set of operations on those values 16
agency: an attributed responsibility (or privilege) for a state change to an agent
agent: an instigator of change to observables and dependencies
a-modeller: the modeller in the E-modelling who performs modelling activity from the
perspective of the component agent
A-modeller: the modeller in the I-modelling who performs modelling activity from the
perspective of the component agent9
A-node: the points of the star-type logical configuration in dtkeden that are occupied
by the A-modellers
being-participant-observer: the person who participates in pretend play9
broadcast mode: an interaction mode that allows each arriving message to be
propagated to all A-modellers as if all A-modellers are in a meeting 14
client-server communication: a technique of network communication
construal: a means of interpreting unfamiliar experience and communicating one's
trial interpretation
definitive notation: a simple programming notation for formulating definitions27,39
definitive script: a set of definitions
dependency: an empirically established relationship between observables2
distributed cognition: cognition for a group activity as a process socially distributed
between individuals and artefacts [Hut95]8
dtkeden: a tool that is developed to support the distributed perspective on EM 12
E-modelling: an approach to modelling in which each modeller is an external observer
8
ethnomethodology: the empirical investigation of the methods people use to make
sense of and at the same time accomplish communication, decision making,
reasonableness, and action in everyday life
E-type software: software such that the software system itself and its operational
domain are conceptually unbounded and continually change

evolutionary strategy: a strategy that develops a software system by treating it as an
evolving system whose behaviour is adapted to its rapidly changing
environment in a situated manner
experimental strategy: a strategy that develops a software system through
experiments in order to provide the developer with experiential information
about how the system will behave
experimentation: the modeller's exploratory interaction with the computer-based model
or the referent in the real world
external observer: the modeller who focuses on attributing state change to a particular
agent
external process: a process that is invoked by a human agent to change the state of
his/her external environment
generalisation: a process that identifies certain observables with the same
characteristics and leads the modeller to create a GO
GO (generic observable): an observable that is created to correspond to the modeller's
experience, which is inside the modeller's mind and emerges from repeated
description of certain observables with the same characteristics
Gruber and Sehl's shadow-box experiment: an experiment that indicates the features
of construal
I-modelling: an approach to modelling in which modellers are internal observers 90
intentional strategy: a strategy for design that is informed by an intentional stance, in
which an object is treated as a rational agent with beliefs, desires and other
mental states exhibiting intentionality
interaction mode: the distributed environment that is provided to support the
interpersonal communication between A-modellers
interference mode: an interaction mode that allows the S-modeller to intervene in the
interaction between A-modellers
internal observer : a modeller who models the agency of agents from the perspective of a
participating agent
internal process: a process that is invoked by a human agent to change his/her mental
model
ISM (interactive situated model): a computer-based model that enables participants to
collaborate interactively in order to cultivate requirements in an incremental
fashion 232
knowledge construction: a process of capturing or constructing knowledge

knowledge representation: a process of recording knowledge by means of
representational media60
localisation: a process that associates a given definition with a particular virtual agent
context
LSD (language for specification & description): an open-ended notation used to
describe the modeller's observation of the referent in the real world36
LSDagent: a system agent that is implemented in dtkeden for dealing with access
privilege to observables
normal mode: an interaction mode in which the interaction between A-modellers is
mediated by the computer with reference to specified privileges of A-
modellers to access observables
observable: a characteristic of a subject to which an identity can be attributed
observation: the activity that is associated with identifying, monitoring and classifying
features of the referent in a particular situation
ODM (open development model): a model that supports open development for software
system development53, 69
particularisation: a process that reuses the definitive pattern of a GO
pretend play: an A-modeller pretends to be an agent within the application by enacting
the ordinary interaction with other agents91
private mode: an interaction mode that allows each A-modeller to interact with the S-
modeller individually
REP (requirements engineering process): a process of developing requirements 222
requirements cultivation: a central activity in the SPORE framework in which
participants can collaboratively interact with each other and with their
environment to develop requirements
requirements: a condition or capability that must be met or possessed by a system to
satisfy the condition or capacity needed by a user to solve a problem or
achieve an objective
S1-modelling: a modelling activity that is centred around an external observer who can
examine the system behaviour
S2-modelling: a modelling activity that is performed by human agents from the
perspectives of the component agent of a system
situated activity: a coherent sequence of situated actions 19

situated structural coupling: a structural change to the relationships amongst
observables effected by coupling a new definitive script with the current
structure through dependency maintenance 63
s-modeller: the modeller in E-modelling who performs modelling activity from the
perspective of the whole system86
S-modeller: the modeller in I-modelling who performs modelling activity from the
perspective of the whole system96
S-node: the centre of the star-type logical configuration in dtkeden that is occupied by
the S-modeller
SPORE (situated process of requirements engineering): a human-centred framework
whereby requirements as solutions to the identified problems in the
application domain are developed in an open-ended and situated manner
star-type logical network configuration: a logical configuration for the network
communication that is used to represent the logical interconnection between
software components
S-type software: a software system that is completely defined by a fixed specification
66
tkeden : a tool that is used to support the concepts and principles of Empirical Modelling
virtual agent: a mechanism that generates definitions in a context as if they were being
generated by an agent in a similar fashion