KADS

A PRINCIPLED APPROACH TO KNOWLEDGE-BASED SYSTEM DEVELOPMENT

KNOWLEDGE-BASED SYSTEMS

edited by g. schreiber, b. wielinga & j. breuker

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KADS

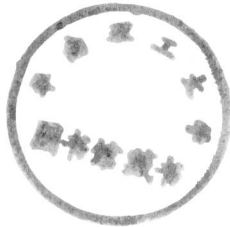## A Principled Approach to Knowledge-Based System Development

Knowledge-Based Systems
Volume 11

edited by

Guus Schreiber
Bob Wielinga
Joost Breuker

Department of Social Science Informatics,
University of Amsterdam
The Netherlands

E9460098

Preface

Historical Background

KADS is the name of a structured methodology for the development of knowledge based systems that is now in practical use in many places in Europe and elsewhere. The history of KADS is a long and complicated one. As early as 1982, Annie Brooking of the Polytechnic of the South Bank (United Kingdom) saw the need for a more structured development process for knowledge-based systems than the rapid prototyping approaches that were prevailing at the time. Together with a team at the University of Amsterdam (The Netherlands) she submitted a proposal for the very first round of the ESPRIT programme. A pilot project (Project 12) was launched in mid-1983. The goals were ambitious: a comprehensive methodology was to be developed, based on sound engineering techniques and supported by tools and techniques.

The main outcomes of the one-year project were limited, but they set the scene for further developments. P12 resulted in a systematic analysis of knowledge elicitation techniques [Breuker & Wielinga, 1983; Breuker & Wielinga, 1984], a first attempt towards modelling expertise at the knowledge level [Wielinga & Breuker, 1984], a number of case studies, and a computerized system that supported the analysis and documentation of knowledge (hence the name KADS[1]). Each of these results was far from being suitable for use in a commercial context. There was even less that could go under the name of *methodology*.

The results of P12 were further explored in a short project (P314) where a number of commercial partners joined the two academic institutions. The potential of the ideas developed in P12 was recognized, and a new and far larger project (P1098) was proposed and accepted in 1985. This five-year project encompassed some 80 person years of effort and involved six partners. The goals were essentially the same as those for P12, but much better explicated. The work was divided into three streams: theory development, tools development, and experimental testing of the emerging methodology through practical case studies. The emphasis on knowledge acquisition that was predominant in the earlier projects was replaced by a broader view in which issues such as life-cycle models, system-user interaction and system design and implementation had their appropriate place. In the course of the P1098 project, a partial methodology for knowledge-based system development emerged.

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[1] "Knowledge Analysis and Documentation System". Later, other interpretations were given to this acronym, such as "Knowledge Analysis and Design Support". Currently, most people use it as a proper noun.

Although the emerging methodology was a moving target in the sense that ideas, terminology and tools were constantly changing, some of the more stable results of the KADS-I project (as it is now commonly referred to) found their way to an audience outside the KADS consortium. The methods for modelling expertise were the basis of a commercially developed Structured Knowledge Engineering (SKE) method, and served as starting point for many investigations along similar lines.

In spite of its success in many respects, the KADS-I project had not fully reached its original goals. The KADS methodology in 1989 lacked a degree of formality which hampered its understanding and that stood in the way of further development, such as automated support for the knowledge engineering process. In a small collaborative project between the University of Amsterdam and the Netherlands Energy Research Foundation (ECN), a framework for the formal specification of knowledge-level models of expertise was developed [Wielinga et al., 1989; Akkermans et al., 1992]. This framework now forms the basis of several efforts concerned with formalization of reasoning at the knowledge level.

Not only were many of the concepts in KADS-I underspecified, but the methodology did not cover the full life cycle of knowledge-based system development. In addition, the world of software engineering had not stood still: better insights in the role of prototyping, the role of incremental and risk driven software development and the importance of socio-organizational aspects of information system development had since become clear.

This resulted in the formation of a new consortium that submitted the KADS-II project to the CEC. In autumn 1990 the KADS-II (P5248) project started for a period of three and a half years planning to spend a total of 80 person years. The goals of the KADS-II project are (still) to develop a comprehensive methodology for the development of knowledge-based systems, but qualified to become the commercial standard at least in Europe.

Acknowledgements

plc. (UK), Polytechnic of the South Bank, (UK), Touche Ross MC (UK), SCS GmbH (Germany), NTE NeuTech (Germany), Cap Gemini Innovation (France), and the University of Amsterdam (The Netherlands).

The partners in the P3178 project (REFLECT) were the University of Amsterdam (The Netherlands), the German National Research Institute for Computer-Science GMD (Germany), the Netherlands Energy Research Foundation ECN (The Netherlands), and BSR-Consulting (Germany).

The partners in the P5248 project are Cap Gemini Innovation (France), Cap Gemini Logic (Sweden), Netherlands Energy Research Foundation ECN (The Netherlands), ENTEL SA (Spain), IBM France (France), Lloyd's Register (UK), the Swedish Institute of Computer Science (Sweden), Siemens AG (Germany), Touche Ross MC (UK), the University of Amsterdam (The Netherlands) and the Free University of Brussels (Belgium).

This book reflects the opinions of the authors and not necessarily those of the consortia.

Contributors

A. A. (ANJO) ANJEWIERDEN

Anjo Anjewierden (1957) holds a BSc in Computer Science (1979). Since 1980 he works as a research scientist at the University of Amsterdam. He originated PCE, an object-oriented user interface management system and continues to work together with Jan Wielemaker on further development of this system. He acted as technical coordinator of the work on knowledge-acquisition workbenches using PCE in both the KADS-I project and in the Acknowledge project. His research interests include knowledge acquisition, architectures of knowledge-acquisition workbenches, user interfaces, and the design of interactive software systems.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: anjo@swi.psy.uva.nl .

J. M. (HANS) AKKERMANS

Hans Akkermans (1952) received his master's and PhD degrees in 1979 and 1982, respectively, in nuclear physics (cum laude) at the University of Groningen, The Netherlands. He then went on to work for the Netherlands Ministry of Education and Science as a senior policy officer in the fields of science policy and research management. In 1986 he joined the Netherlands Energy Research Foundation ECN, located at Petten, The Netherlands, where he is/has been project manager of computer science and physics projects, among them various European Esprit projects. His current research interests are in computational and theoretical physics, knowledge-based systems and qualitative modelling and reasoning, especially in their applications to physics and engineering. Hans Akkermans is the head of the Software Engineering & Research Department of ECN and holds a professorship at the University of Twente in the field of Information Systems for Science and Engineering.

Address: Netherlands Energy Research Foundation (ECN), Software Engineering & Research Department. P.O.. Box 1, NL-1755 ZG Petten, The Netherlands. Electronic mail: akkermans@ecn.nl . University of Twente, Faculty of Computer Science, Information Systems Department, P.O. Box 217, 7500 AE Enschedé. The Netherlands. Electronic mail: akkerman@cs.utwente.nl .

J. R. (JOHN) BALDER

John Balder (1949) started in science as an experimental physicist. After his PhD in Nuclear Physics he switched to computer science. While working as an analyst for conventional software he started work on Knowledge Based Systems in 1985 at the Netherlands Energy Research Foundation ECN. This was followed by a participation in several ESPRIT projects. His main topic of interest was in formalizing (part of) the KADS methodology. He also build an environment for constructing formal knowledge models (TheME). Besides working on the theoretical foundation of the methodology, he is also involved in "practical" projects where actual knowledge models are built.

Address: Netherlands Energy Research Foundation (ECN), Software Engineering & Research Department. P.O.. Box 1, NL-1755 ZG Petten, The Netherlands. Electronic mail: balder@ecn.nl

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B. (BART) BENUS

Bart Benus (1962) studied Social Sciences at the University of Amsterdam, where he graduated in 1988, specialising in Social Science Informatics, in particular the KADS methodology. After graduation he worked as a knowledge engineer for Inter Access Consultancy BV. In 1990 he joined the research group of Prof. Wielinga at the Department of Social Science Informatics to work on the KADS-II project, where he is involved in the work on task features and organizational analysis. In 1991 he participated in the development of a methodology for application selection for the European Space Agency (ESA). His current line of research focusses on the selection of appropriate (KBS) technology in applications, based on organizational and task analysis and the exploitation of task features.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: bart@swi.psy.uva.nl .

B. (BERT) BREDEWEG

Bert Bredeweg (1959) studied Psychology at the University of Amsterdam, where he graduated in 1986, specialising in Cognitive Psychology and Artificial Intelligence. After graduation he joined the research group of Prof. Wielinga at the Department of Social Science Informatics (University of Amsterdam) to work on the KADS-I project. He also participated in the Dutch SKBS research project on diagnosis, the REFLECT project on reflective systems and the KADS-II project. In 1992 Bredeweg was awarded a PhD for his work on applying the KADS methodology as a method for unifying different techniques for qualitative reasoning. One of the articles that he published (together with B. J. Wielinga) on this subject received the ECAI best paper award in 1988. He is now a lecturer in the field of intelligent teaching systems. His current line of research focuses primarily on how model-based reasoning techniques can be applied to the construction of teaching systems.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: bert@swi.psy.uva.nl .

J. A. (JOOST) BREUKER

Joost Breuker studied cognitive psychology at the University of Amsterdam. He obtained his PhD in 1981 at the same University on a dissertation entitled "Availability of Knowledge". He works since 1967 as a researcher at various institutes of the University of Amsterdam (1967-1974: Institute for Cognitive Research, 1975-1982: Centre for Research in Higher Education). From 1982 he works at the department of Social Science Informatics which he combines with his current position as a professor in Computer Science and Law. His major areas of research are in text understanding, and artificial intelligence, in particular intelligent tutoring systems, knowledge engineering and AI & law. He is member of the board of several international journals on AI. He received international awards for research in knowledge engineering and in intelligent teaching systems.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: breuker@swi.psy.uva.nl .

H. P. (PAUL) DE GREEF

Paul de Greef received an MSc degree in psychology from the University of Amsterdam in 1984. He worked at the Department of Social Science Informatics as a researcher in various European projects, notably the KADS-I project and its precursor ESPRIT project P12. Between 1989 and 1991 he was a lecturer at Leiden University, after which he returned to the University of Amsterdam. Currently he is involved in the ESPRIT project IMAGINE which aims at an environment for building multi-agent applications.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: degreef@swi.psy.uva.nl .

R. (ROBERT) DE HOOG

Robert de Hoog PhD is a senior lecturer of Social Science Informatics at the University of Amsterdam, Faculty of Psychology. His main research interests are in knowledge based systems and decision support systems. He was and is involved in several international research projects sponsored by the European Community: the PIMS project (Project Management Support System), KADS and KADS-II (Methodology for Knowledge Based Systems), ACKnowledge (Workbench for Knowledge Acquisition/Engineering), SAFE (the SIMULATE and SMART subprojects), SMISLE (Intelligent Simulation Teaching Environment). He has also carried out several studies in the field of knowledge based systems for government agencies and the European Space

Agency. He has published over 50 papers in these fields and also co-authored a book on project management.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: dehoog@swi.psy.uva.nl

F. (FRANK) VAN HARMELEN

Frank van Harmelen (1960) studied mathematics and computer science in Amsterdam, He was awarded a PhD from the Department of AI in Edinburgh for his research on meta-level reasoning. While in Edinburgh, he worked with Dr. Peter Jackson on Socrates, a logic-based toolkit for expert systems, and with Prof. Alan Bundy on proof planning for inductive theorem proving. After his PhD research, he moved back to Amsterdam where he is currently working with Prof. Wielinga's group, and was involved in the REFLECT project on the use of reflection in expert systems. His current interests include formal specification languages for knowledge-based systems and reflection and meta-reasoning. He is author of a book on meta-level reasoning, editor of a book on knowledge-based systems, and has published over 30 research papers.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: frankh@swi.psy.uva.nl .

W. (WERNER) KARBACH

Werner Karbach studied computer science at the University of Kaiserslautern and wrote his Diploma thesis on model-based knowledge acquisition. At GMD's AI research division he participated in the WEREX project and in the REFLECT project. His main research interests are the operationalization of conceptual models and meta-level reasoning. He has given several courses on the KADS methodology. Together with Marc Linster he published a book on knowledge acquisition. In 1992, he was co-organizer of the 2nd KADS User Meeting. At the European Conference on Artificial Intelligence 1990, Angi Voß and Werner Karbach were awarded with the Digital European AI Research Paper Award for their contribution "Competence Assessment in Configuration Tasks".

Address: German National Research Centre, for Computer Science (GMD), AI Research Division. P.O. Box 1316, Schloß Birlinghoven, D-5205 Sankt Augustin 1, Germany. Electronic mail: karbach@gmdzi.gmd.de .

J. (JONATHAN) KILLIN

Jonathan Killin is a Managing Consultant in the Knowledge-Based Systems Centre at Touche Ross Management Consultants. He has been involved with the development of

knowledge-based systems since July 1983, and since that date has occasionally managed both the KADS methodology projects for the CEC and the GEMINI KBS methodology projects for the UK Government. He has developed KBS for Tidal Analysis, KBS Application Surfacing, Marketing Planning, and Credit Card Fraud Identification. He has worked principally with Barclays Bank plc, Barclaycard, CCTA, CEC, Delft Hydraulics Institute, Department of Employment, DTI, HM Customs and Excise and The Training Agency. He is an internationally recognized speaker on knowledge-based system technology and presented the 32 "Knowledge at Work" workshops for the DTI. He has an honours degree in philosophy and is the co-author of "Analysis for Knowledge-Based Systems: A Practical Guide to the KADS Methodology".

Address: Touche Ross Management Consultants, The Knowledge Based Systems Centre. Peterborough Court, 133 Fleet Street, London EC4A 2TR, United Kingdom. Fax: +44 71 583 1198

M. (MARC) LINSTER

Marc Linster (1961) was born in Luxembourg and received a University Diploma in computer science from the University of Kaiserslautern (Germany). From 1987 to 1992 Linster worked as a researcher at the GMD in the AI Research Division of the Institute for Applied Informatics. His work has been concentrating on automated knowledge acquisition tools, knowledge representation environments and the coupling of hypermedia with symbolic inferencing systems. In 1992 he was awarded a PhD at the University of Kaiserslautern for a dissertation entitled "Knowledge acquisition based on explicit methods of problem solving". Since 1992, he is with the AI research group of Digital Equipment Corporation in Marlboro, Massachusetts. He was co-organizer of the European Knowledge Acquisition Workshops EKAW'88 and EKAW'92. Since 1989 he is a member of the editorial board of the Knowledge Acquisition Journal.

Address: AI Research Group, Digital Equipment Corporation, 111 Locke Drive, Marlboro, MA 01752, USA. Electronic mail: linster@airg.dec.com .

M. A. (MARK) MUSEN

Mark A. Musen is Assistant Professor of Medicine and Computer Science at Stanford University, Stanford, California, USA. He received ScB and MD degrees from Brown University in 1977 and 1980, respectively, and the PhD degree from Stanford University in 1988. His current research concentrates on the design of automated tools that help developers to construct and maintain large knowledge bases from libraries of reusable ontologies and problem- solving methods. Dr. Musen received the Young Investigator Award for Research in Medical Knowledge Systems from the American Association for Medical Systems and Informatics in 1989, and a National Science Foundation Young Investigator Award in 1992. He is author of the book Automated Generation of Model-Based Knowledge-Acquisition Tools (Pitman, 1989) and of many publications in the areas of knowledge-acquisition, human-computer interaction, and

medical artificial intelligence.

Address: Stanford University School of Medicine, Knowledge Systems Laboratory, Medical Computer Science Group. Stanford, California. 94305-5479, USA. Electronic mail: musen@camis.stanford.edu

A. Th. (Guus) Schreiber

Guus Schreiber (1956) studied medicine at the University of Utrecht (The Netherlands). From 1984 to 1986 he worked at the Department of Medical Informatics of the University of Leiden on the development of decision-support tools for medical practice. In 1986 he joined the group of Prof. Wielinga at the University of Amsterdam. He has been involved in a number of ESPRIT projects on methodologies for knowledge-based system development and reflective reasoning. He is currently project manager for UvA in an EC-sponsored project on the foundations of medical knowledge-based systems. In 1988 he was co-organizer of the first Dutch AI Conference (NAIC'88). He was also co-organizer of the European Knowledge Acquisition Workshop EKAW-90. In 1992 he was awarded a PhD on a thesis entitled "Pragmatics of the Knowledge Level". His research interests are mainly in the area of methodological issues concerning knowledge-based system development with a special interest for medical applications.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: schreiber@swi.psy.uva.nl .

B. R. (Rob) van der Spek

Rob van der Spek studied Social Computer Science at the University of Amsterdam (1985 - 1988). Since 1988 he has been consultancy manager at the Centre for Knowledge Technology, Utrecht. He is responsible for projects in the areas of knowledge management and knowledge-based systems, which were mainly carried out in government institutions and the financial sector. He has developed courses in knowledge modelling and methodological aspects of the development of knowledge-based systems that are part of the MSc course in Knowledge Engineering at the Centre for Knowledge Technology. Since 1990 he has been a member of the advisory board on the Knowledge Management Network, a cooperation of universities and companies for the development of commercial projects in the area of knowledge management. He edited the proceedings of the Dutch AI-applications conference (1991) and is chairman of the program committee of 'Kennistechnologie '92', the Dutch congress on applications of Knowledge Technology.

Address: Centrum voor Kennistechnologie. Lange Viestraat 2, Utrecht, The Netherlands. Fax: +31 30 328 195 .

C. (CATHERINE) TOUSSAINT

Catherine Toussaint (1963) studied computer science at the National Institute of Applied Sciences in Lyon, where she graduated in 1986. From 1986 to 1989, she worked as an engineer in telecommunication at Cap Sesa Telecom. In 1989, she joined Cap Gemini Innovation, the R&D company of Cap Gemini Sogeti group, to work on the KADS-I project. She participated in the development of a knowledge acquisition workbench. In 1990, she developed a knowledge-based system for a French insurance company by applying the KADS methodology. This system provides support for diagnosing social problems and risks in a company and is now in operational use. Since the end of 1990, she works on the KADS-II project that consolidates, extends and standardises the original KADS methodology. She is leader of the tools and techniques work package, of which the aim is to develop a knowledge engineering workbench supporting the new KADS methodology. Her main fields of interest are knowledge engineering and software engineering in general.

Address: Cap Gemini Innovation. 118 rue de Tocqueville, 75017 Paris, France. Electronic mail: toussain@crp.capsogeti.fr

A. (ANGI) VOSS

Angi Voß studied computer science at the University of Bonn, and received her PhD at the University of Kaiserslautern with a thesis on algebraic software development methods. In 1986, she joined the expert systems group at GMD. Here she was responsible first for WEREX and then for the REFLECT project. She is now head of the knowledge modeling subdivision of the AI research division at GMD and main coordinator of the joint venture FABEL, a project on case-based reasoning partially funded by the German government. Since 1989, she has been speaker of the special interest group on knowledge engineering of the German association of computer scientists (GI). She is co-editor of the German AI journal "KI".

Address: German National Research Centre, for Computer Science (GMD), AI Research Division. P.O. Box 1316, Schloß Birlinghoven, D-5205 Sankt Augustin 1, Germany. Electronic mail: avoss@gmdzi.gmd.de .

J. (JAN) WIELEMAKER

Jan Wielemaker (1960) graduated in 1985 from the Technical University Eindhoven. He then joined the group of Prof. Wielinga to work on the software infra-structure for AI research projects. For the KADS-I project he developed a KL-ONE-based knowledge representation system. He worked together with Anjo Anjewierden on the development of PCE, an object-oriented user interface management system. PCE has been and is being used as the basis for several knowledge engineering work benches, including KADS-I, ACKNOWLEDGE and KADS-II. He also developed the SWI-PROLOG system. His research interests lie in the area of architectures for large interactive

software systems.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: jan@swi.psy.uva.nl .

B. J. (Bob) Wielinga

Wielinga (1945) studied physics at the university of Amsterdam, where he was awarded a Ph.D. degree cum laude in 1972 for a thesis in nuclear physics. Subsequently, Wielinga was responsible for the design and construction of a large computer control system for a linear accelerator at the Institute for Nuclear Physics in Amsterdam. In 1974, Wielinga became senior research officer at the Department of Computer Science of the University of Essex. Until 1977, he was involved there in research in Artificial Intelligence, in particular in the area of knowledge representation for a computer vision system. In 1977, Wielinga was appointed senior lecturer at the Department of Psychology of the University of Amsterdam. Since 1983, Wielinga has performed research on the methodology of knowledge-based system design and knowledge acquisition. In 1986, Wielinga was appointed full professor of Social Science Informatics in the Faculty of Psychology. In this capacity Wielinga was and is team leader of several research projects, including KADS, ACKnowledge, REFLECT and KADS-II. He was one of the main contributors to the development of the KADS methodology for knowledge based system development.

Address: University of Amsterdam, Department of Social Science Informatics. Roetersstraat 15, NL-1018 WB Amsterdam, The Netherlands. Electronic mail: wielinga@swi.psy.uva.nl .

R. G. F. (Radboud) Winkels

Radboud Winkels (1959) studied psychology at the University of Amsterdam in the Netherlands. In April 1987 he received his Master Degree (cum laude) in Cognitive Psychology with specialisation Artificial Intelligence. Since then he has been working as a full–time AI–researcher at the University of Amsterdam, first at the department of Social Science Informatics, and since March 1989 at the department of Computer Science & Law. In March 1991 he was appointed lecturer at the same department. His main interest is in the field of AI & education. In 1992 he received his PhD in this area on a thesis entitled: "Explorations in Intelligent Tutoring and Help".

Address: University of Amsterdam, Department of Computer Science and Law. Kloveniersburgwal 72, NL-1012 CZ Amsterdam, The Netherlands. Electronic mail: winkels@lri.jur.uva.nl .

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