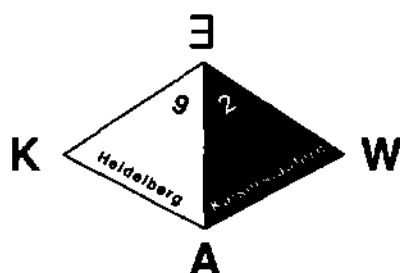


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Preface

Methodological knowledge acquisition and knowledge engineering have achieved increasing attention over the last years due to both active research projects and successful practical applications. Both aspects have over the years been reflected in the structure of the *European Knowledge Acquisition Workshops* (EKAW), where a users' forum has always been combined with a scientific workshop.

Knowledge acquisition workshops also take place annually in North America (the "Banff" workshops) and Asia or Australia. Intense interaction between these communities, reflected in international conference attendance, shared authorship from different continents, and international program committees guarantees fast exchange and critical review of results, whereas the participation of practitioners in the scientific exchange and of scientists in practical projects enhances technology transfer.

All these elements can be found in this volume. Therefore it seems worthwhile not merely to distribute it as selected collection of isolated papers but to provide at least a rough and partly subjective map of the field as it can be presented in March 1992 on the basis of the texts included.

First of all we find a clear segmentation into extended abstracts of the invited speakers of the users' forum and into full papers to be presented at the scientific workshop. This distinction on the one hand reflects the "research notes" character of the Lecture Notes in Artificial Intelligence: the main purpose of fast communication of original research is captured by these full papers. On the other hand the strongly application oriented character of the field of knowledge acquisition qualifies short analyses about the need and impact of knowledge acquisition (KA) in high-tech industries (Allard¹), project management for KA projects (Killin), the European marketplace for methodological KA (Georges), and an assessment of the industrial use of machine learning (Morik) as highly valuable supporting and directing evidence to be published together with front end research results.

As far as research contributions are concerned the European map is increasingly dotted with *general modelling approaches* which make up the second section of the book and to a considerable extent are also present in contributions in other sections (Jonker, Neubert, Dieng, Allemang, Porter). Their common underlying

¹ In the preface, contributions are indicated only by first author's name for the sake of readability.

principle is to be based on an explicit abstract humanly perceivable model of the expertise to be captured for a knowledge based system. The most influential modelling approach presently is KADS, which also plays a role in several of the papers included.

Eriksson generalizes Musen's work of generating domain-specific knowledge acquisition tools. Greboval presents a method of compiling efficient code from KADS conceptual models. Linster complements the KADS paradigm of starting analysis with the problem solving behavior by using tools that equally support the static relations of a domain as starting point for modelling. Gappa provides an in-depth comparison of two strategically different approaches to modelling that have both been pursued over the years: strong modelling approaches (such as her own expansions of Puppe's work) require close correspondence between a model of the domain and of the problem solving behavior and allow fast transition to operational representations whereas weak modelling (such as KADS) assumes the applicability of problem solving models to deliberate domain structures. In the latter case the type of connection has to be specified as part of the modelling process. The contributions of Schreiber and van Heijst specify two aspects within the KADS research program: Schreiber provides a detailed analysis of two similar diagnostic problem solving methods and how formal representation allows one to clearly identify distinctions. Van Heijst describes details and theory based tool support for the process of further specifying roughly specified models of problem solving ("interpretation models"). Finally, Geelen uses formal models as an objective basis for deriving problem solving models from expert protocols.

The section on *knowledge formalization and automated methods* starts with two of the three full papers in this book about machine learning. Tsujino has enhanced the mechanical induction of decision trees by methods of quality assessment of resulting trees. Nedellec has closely coupled manual acquisition with automated learning in such a way that the validation and maintenance activities based on new cases become a genuine part of the architecture. Schweiger presents a tool based on a logical theory of configuration which allows automated generation of knowledge based systems for the respective subclass of applications. Jonker and Neubert treat special aspects of KADS based modelling. Jonker's formal language for KADS conceptual models emphasizes the aspect of domain signatures that correspond to the models of problem solving and hence comes close to providing a bridge between the above weak and strong modelling approaches. Neubert provides a detailed specification of the activities required to achieve KADS conceptual models.

Elicitation and diagnosis of human knowledge ranges from foundations in theory of science to practical guidelines and tools for knowledge acquisition activities. Nwana provides a possible rationale for the stepwise justified transition from manifestations of expertise towards models in a wider sense than discussed above.

Portman demonstrates productive use of the metaphor of thinking for getting access to those facets of knowledge that are hard to elicit by methods that emphasize a question-response rather than a resolution of conflict view. Larichev differentiates among several settings in the process of eliciting expert classification knowledge. The next two approaches involve tools for elicitation activities. Dieng suggests an architecture where the so far neglected aspects of dealing with multiple experts and of laying the ground for explanation at the beginning of building a system are taken into account. Charlet introduces the additional guidance that can be made use of when a domain is known to be determined by causal relations.

Practice and experiences of knowledge acquisition starts with the subjects of knowledge base maintenance and consistency checking which form important requirements to be met by systems in practice. Accordingly, Maurer describes an extension of Althoff's MOLTKE workbench of which several aspects have already been introduced during the previous EKAWs. Allemang reports on an evaluatory study about how one of the early model based approaches – Chandrasekaran's generic tasks – is applied by practicing knowledge engineers. Porter reports practical experiences in applying KADS elements in similar large scale financial applications. Through his large-scale experiences with machine learning projects, Manago has arrived at the reported enhanced description of cases in order to improve the efficiency of inductive learning as well as to overcome some of its deficiencies by case based reasoning. Schmalhofer's hypermedia based support system unifies the two practical needs of providing easy access to existing industrial case bases and of using them in the development of knowledge based systems. Finally, Bradshaw contributes a large in-house application of modelling business processes for the purpose of better capture of the processes themselves and for computerized support of selected functions.

A total of 65 persons from around the world have done a great job in serving as the program committee. Their recommendations and partly very detailed comments have helped both workshop organizers and individual authors a great deal to achieve the quality that we hope the reader will notice. Their fast and reliable responses have allowed us to hold to the planned schedule in almost every detail. Therefore all the organizers of the conference would like to express their great gratitude to the colleagues listed below.

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Heidelberg
March 1992

Thomas Wetter
on behalf of the editors

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