## Appendix A

### Overview of Software Packages

<table>
<thead>
<tr>
<th>Software Package</th>
<th>Description</th>
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<tr>
<td><strong>ACT-R</strong></td>
<td>A cognitive architecture implementing a hybrid approach toward the modeling of cognition (Anderson and Lebiere, 1998). ACT-R constitutes a unified theory of cognition and is based on detailed findings concerning the functioning of human memory and of learning and problem-solving processes, see Section 2.3.2.</td>
</tr>
<tr>
<td><strong>AI-implant</strong></td>
<td>A commercial AI tool that can be used to simulate synthetic entities that make context specific decisions, and move in a realistic fashion within their environment. Its main use is simulating crowd behavior (Presagis, 2009).</td>
</tr>
<tr>
<td><strong>COGNET</strong></td>
<td>A framework for creating and exercising models of human operators engaged in primarily cognitive, as opposed to psychomotor tasks. COGNET’s original use was the development of user models for intelligent interfaces, but it has also been used to model operators and opponents in simulators. The primary assumption underlying COGNET is that humans perform multiple tasks in parallel (Zachary et al., 1992, 1996).</td>
</tr>
<tr>
<td><strong>CoJACK</strong></td>
<td>A recent cognitive architecture that is used in simulation systems to underpin virtual actors, and created by adding a cognitive modeling layer on top of JACK, see below. CoJACK models the structural properties of the human cognitive system and constrains the models that can be implemented therein by only allowing the definition of models that fit within its structural boundaries. It models variation in human behavior by supporting behavior moderators such as stress, morale and fear, each implemented as an overlay (Norling and Ritter, 2004; Evertsz et al., 2008a).</td>
</tr>
<tr>
<td><strong>CLARION</strong></td>
<td>A cognitive architecture that explicitly distinguishes implicit from explicit processes and focuses on capturing the interaction between these two types of processes. It consists of four distinct subsystems: the action-centered subsystem, the non-action-centered subsystem, the motivational subsystem, and the metacognitive subsystem. Each of these subsystems has a dual representational structure, so incorporates implicit as well as explicit representations (Sun, 2002a).</td>
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<tr>
<td><strong>D-Cog</strong></td>
<td>Distributed Cognition (D-Cog) is a theoretical framework that takes a distributed, socio-technical system rather than an individual mind as its primary unit of analysis. This framework is explicitly cognitive in that it is concerned with how information is represented and how representations are transformed and propagated in the performance of tasks (Hutchins, 1995; Perry, 2003).</td>
</tr>
<tr>
<td><strong>EPIC</strong></td>
<td>A symbolic cognitive architecture developed for modeling human multiple-task performance, with a focus on the provision of a detailed account of human perceptual and motor operations. A parsimonious production system is used as a cognitive processor, which is surrounded by separate sensory and motor processors. EPIC assumes that all capacity limitations are a result of limited structural resources, rather than a limited cognitive processor (Kieras and Meyer, 1997).</td>
</tr>
<tr>
<td><strong>JACK</strong></td>
<td>The JAVA Agent Compiler Kernel (JACK) is an extension to JAVA which implements a BDI architecture. It can be used to create a runnable JAVA program that instantiates a BDI agent. The agent’s beliefs are represented with a database, its desires as events that can trigger plans, with these plans representing its intentions (Busetta et al., 2000).</td>
</tr>
<tr>
<td><strong>Jason</strong></td>
<td>An interpreter for an extended version of AgentSpeak (Rao, 1996), a BDI agent-oriented logic programming language. Jason is implemented in Java (Bordini et al., 2007) and forms a BDI agent. The agent’s belief state is the current state of the agent, which is a model of itself, its environment, and other agents. The agent’s desires are the states that the agent wants to bring about based on its external or internal stimuli, while its intentions are active, partially instantiated, plans that the agent adopts in an attempt to achieve its desires.</td>
</tr>
<tr>
<td><strong>Java</strong></td>
<td>An object-oriented, structured, imperative programming language, released in 1995 and originally developed by Sun Microsystems. Java applications are typically compiled to byte code that can run on any Java virtual machine (JVM) regardless of computer architecture.</td>
</tr>
<tr>
<td><strong>Jess</strong></td>
<td>A rule engine and scripting environment written in Java. Using Jess, Java software can be build that has the capacity to ‘reason’, using knowledge in the form of declarative rules (Friedman-Hill, 2003).</td>
</tr>
<tr>
<td><strong>LeadsTo</strong></td>
<td>A language and software environment developed to model and simulate dynamic processes in terms of both qualitative and quantitative concepts. Dynamic processes are modeled by specifying the temporal dependencies between state properties in successive states. The LeadsTo language is a declarative order-sorted temporal language, extended with quantitative means. The software environment performs simulations of LeadsTo specifications, generates simulation traces for further analysis, and constructs visual representations of traces. (Bosse et al., 2007).</td>
</tr>
<tr>
<td><strong>PMFserv</strong></td>
<td>An agent-based architecture with the flexibility to act as meta-level emotional arbitrator for others’ cognitive architecture, or to provide a fully functional stand-alone system to simulate human decision-making. It provides a framework that permits examining the impacts of stress, culture, and emotion upon decision-making, and is mainly used to simulate crowd behavior (Silverman et al., 2006).</td>
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<tr>
<td><strong>Prolog</strong></td>
<td>A declarative, logic programming language, originally designed by Alain Colmerauer in 1972.</td>
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<td><strong>Soar</strong></td>
<td>A symbolic cognitive architecture based on a production system and proposed by Newell (1990) as ‘a candidate unified theory’. Soar implements goal-directed behavior as a search through a problem space, for which at each cycle first the current state is elaborated on, after which a decision is made which production rule (operator) may fire, see Section 2.3.2.</td>
</tr>
<tr>
<td><strong>VBS2</strong></td>
<td>Virtual Battlespace 2 is an interactive, three-dimensional training system providing a synthetic environment suitable for a wide range of military (or similar) training and experimentation purposes. VBS2 offers both virtual and constructive interfaces onto high-fidelity worlds and is used for mission rehearsal, tactical training and simulated combined arms exercises (Bohemia Interactive Australia, 2009).</td>
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Bibliography


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Dankwoord

Nu mijn proefschrift af is zijn er mensen die me geïnteresseerd de notoire vraag stellen: “Waar zie je jezelf over vijf jaar?” Als deze vraag me vijf jaar geleden gesteld was, dan had ik waarschijnlijk geantwoord met een beeld dat overeenkomt met mijn huidige situatie: gepromoveerd en aan het werk bij een leuk wetenschappelijk onderzoeksinstituut. Wat ik vijf jaar geleden niet had kunnen bedenken zijn de mensen, die ik in die periode zou ontmoeten en de inzichten, die ik op zou doen.

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<td>A Theoretical and Empirical Analysis of Approximation in Symbolic Problem Solving</td>
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<td>2004-04</td>
<td>Pierre Groot (VU)</td>
<td>Organizational Principles for Multi-Agent Architectures</td>
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<td>2004-05</td>
<td>Bart-Jan Hommes (TUD)</td>
<td>Knowledge discovery and monotonicity</td>
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<td>2004-07</td>
<td>Joop Verbeek (UM)</td>
<td>Voorbeeldig onderwijs; voorbeeldgestuurd onderwijs, een opstap naar abstract denken, vooral voor meisjes</td>
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<td>2004-08</td>
<td>Martin Caminada (VU)</td>
<td>For the Sake of the Argument; explorations into argument-based reasoning</td>
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<td>2004-09</td>
<td>Suzanne Kabel (UVA)</td>
<td>Knowledge-rich indexing of learning-objects</td>
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<td>Michel Klein (VU)</td>
<td>Change Management for Distributed Ontologies</td>
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<td>The Duy Bui (UT)</td>
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<td>Wojciech Jamroga (UT)</td>
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<td>Paul Harrenstein (UU)</td>
<td>Logic in Conflict. Logical Explorations in Strategic Equilibrium</td>
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<td>Arno Knobbe (EUR)</td>
<td>Multi-Relational Data Mining</td>
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<td>Federico Divina (VU)</td>
<td>Hybrid Genetic Relational Search for Inductive Learning</td>
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<td>Mark Winands (UM)</td>
<td>Informed Search in Complex Games</td>
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<td>Vania Bessa Machado (UvA)</td>
<td>Supporting the Construction of Qualitative Knowledge Models</td>
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<td>Thijs Westerveld (UT)</td>
<td>Using generative probabilistic models for multimedia retrieval</td>
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<td>Madelon Evers (Nyenrode)</td>
<td>Learning from Design: facilitating multidisciplinary design teams</td>
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<td>Floor Verdenius (UVA)</td>
<td>Methodological Aspects of Designing Induction-Based Applications</td>
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<td>2005-02</td>
<td>Erik van der Werf (UM)</td>
<td>AI techniques for the game of Go</td>
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<td>Franc Grootjen (RUN)</td>
<td>A Pragmatic Approach to the Conceptualisation of Language</td>
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<td>Nirvana Meratnia (UT)</td>
<td>Towards Database Support for Moving Object data</td>
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<td>Gabriel Infante-Lopez (UVA)</td>
<td>Two-Level Probabilistic Grammars for Natural Language Parsing</td>
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<td>Pieter Spronck (UM)</td>
<td>Adaptive Game AI</td>
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<td>Flavio Frasincar (TUE)</td>
<td>Hypermedia Presentation Generation for Semantic Web Information Systems</td>
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<td>Richard Vdovjak (TUE)</td>
<td>A Model-driven Approach for Building Distributed Ontology-based Web Applications</td>
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<td>Jeen Broekstra (VU)</td>
<td>Storage, Querying and Inferencing for Semantic Web Languages</td>
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<td>Anders Bouwer (UVA)</td>
<td>Explaining Behaviour: Using Qualitative Simulation in Interactive Learning Environments</td>
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<td>Elth Ogston (VU)</td>
<td>Agent Based Matchmaking and Clustering - A Decentralized Approach to Search</td>
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<td>Csaba Boer (EUR)</td>
<td>Distributed Simulation in Industry</td>
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<td>Fred Hamburg (UL)</td>
<td>Een Computermmodel voor het Ondersteunen van Euthanasiebeslissingen</td>
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<td>Boris Omelayenko (VU)</td>
<td>Web-Service configuration on the Semantic Web; Exploring how semantics meets pragmatics</td>
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<td>Software Specification Based on Re-usable Business Components</td>
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<td>Danielle Sent (UU)</td>
<td>Test-selection strategies for probabilistic networks</td>
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Designing Invisible Handcuffs. Formal investigations in
Institutions and Organizations for Multi-agent Systems
Reasoning with Dynamic Networks in Practice
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Intimate relationships with artificial partners
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