

Project Title	MAS@NS protocol generalization & benchmarking
Project Number	2010-01
Related Project(s)	MAS@NS Train Driver Rescheduling AgentScape RRD Project
Background / Motivation	D-CIS Lab, in close cooperation with Nederlandse Spoorwegen (Dutch national railway operator) have developed a multi-agent application to reschedule train driver duties in 'near real-time'. The results from this project could potentially be applied in other domains. Also analysis and comparison of the current protocols in place could lead to improvements.
Experience Required	<ul style="list-style-type: none"> <li>• Computer Science or AI background</li> <li>• Java programming experience</li> <li>• Master level student</li> </ul>
Project Description	<p>The following possible subtasks are recognized within this project.</p> <ol style="list-style-type: none"> <li>1. Investigate and generalize the protocol used between the agents in this rescheduling application (i.e. not specific to train driving tasks, but other resources), to determine if and how the protocol is applicable to other domains.</li> <li>2. Improve the protocol. Analyze the protocol and try to improve its performance.</li> <li>3. Set up a benchmarking environment to compare the performance of the protocol to other protocols (use existing benchmarking frameworks if available)</li> <li>4. Implement the protocol in AgentScape: Build agent templates and coordination mechanisms to support to use of the protocol in AgentScape applications.</li> </ol>
Intended Results	<ul style="list-style-type: none"> <li>• Demonstrator.</li> <li>• Research Report</li> </ul>
Validity	At least end 2010
Project Location	D-CIS Lab in conjunction with TUDelft
Supervisor	David Mobach
Links	<a href="http://publications.decis.nl">http://publications.decis.nl</a> , search for: "train driver rescheduling" <a href="http://www.agentscape.org">http://www.agentscape.org</a>

Project Title	Afstudeeropdracht of bedrijvenstage Affectieve Experimenteer Omgeving
Project Number	2010-02
Related Project(s)	Human Factors and Quality of Decision Making Processes
Background / Motivation	<p>This project requires a Dutch Native Speaker.</p> <p>In het kader van het onderzoek ‘Human factors and Decision Making in Critical Situations’ zijn wij op zoek naar <i>meerdere studenten</i> die willen gaan werken aan een zogenaamde affectieve experimenteer omgeving.</p> <p>Om te onderzoeken of menselijke en artificiële systemen effectief kunnen samenwerken, zal de menselijke kant ook apart moeten worden bekeken. Het is belangrijk om te weten welke factoren een rol spelen bij menselijk gedrag en hoe een systeem hierop kan insprijgen. Vooral in kritische situaties (denk bijvoorbeeld aan een ramp) is het belangrijk dat een mens een zo goed mogelijke beslissing neemt. Er zijn echter een aantal factoren die invloed hebben op hoe een mens beslissingen neemt: bijvoorbeeld emoties, de mate van stress of cognitieve controle. Deze factoren noemen we gemakshalve ‘human factors’.</p> <p>Wij gaan een omgeving ontwerpen waarin human factors worden gemeten en waarin kan worden onderzocht hoe deze human factors de menselijke besluitvorming beïnvloeden. Daarvoor zijn we op zoek naar ambitieuze studenten die aan deze uitdagende opdracht willen werken. Het doel van de stage of afstudeeropdracht is het werken aan verschillende aspecten van deze affectieve experimenteer omgeving. Voor meer informatie over de affectieve experimenteer omgeving, zie de flyer.</p>
Experience Required	<p>We zijn voor deze afstudeeropdracht op zoek naar meerdere studenten van verschillende studierichtingen die aan de opdracht gaan werken. Voor het maken van de affectieve experimenteeromgeving zijn wij op zoek naar bevlogen studenten met kennis en kunde met betrekking tot communicatie en multimedia design, technische informatica, informatica, bedrijfskundige informatica en grafimedia technologie. Studenten in de cognitieve psychologie of andere menswetenschappen die in deze affectieve experimenteeromgeving experimenten willen opzetten en uitvoeren zijn ook van harte welkom.</p> <p>Verder:</p> <ul style="list-style-type: none"> <li>• De student kan goed kan samenwerken en</li> </ul>

	<p>communiceren</p> <ul style="list-style-type: none"> <li>• De student durft een uitdagend onderwerp aan te pakken</li> <li>• De decision game en de feedback tool zullen in eerste instantie in het Nederlands worden vormgegeven. Later kan er ook een Engelse versie worden ontworpen. Uiteraard bestaat er de mogelijkheid om de afstudeerscriptie in beide gevallen in het Engels te schrijven.</li> </ul>
Project Description	<p>Er zal gedurende enkele maanden gewerkt worden aan een specifiek onderdeel van de affectieve experimenteer omgeving. De onderdelen waaraan kan worden gewerkt zijn:</p> <ul style="list-style-type: none"> <li>• het bouwen van een eerste prototype van de decision game (scenario, representatie, simulatie)</li> <li>• het bouwen van een eerste prototype van een feedback systeem (bemeten van de mens)</li> </ul> <p>See the “Flyer Affectieve Experimenteer Omgeving” for more details.</p>
Intended Results	<ul style="list-style-type: none"> <li>• Research Report</li> <li>• Demonstrator</li> </ul>
Validity	Ongoing
Project Location	D-CIS Lab
Supervisor	Eefje Rondeel
Links	Attached Flyer; <a href="http://publications.decis.nl/">http://publications.decis.nl/</a> “search using author Rondeel”

Project Title	Open Project / Student Defined Project
Project Number	2010-03
Related Project(s)	All
Background / Motivation	<p>The D-CIS Lab researchers are involved in a large variety of research areas and are open to project proposals from students. Please review the D-CIS Lab website (<a href="http://www.d-cis.nl">http://www.d-cis.nl</a>) and the publications database (<a href="http://publications.d-cis.nl">http://publications.d-cis.nl</a>) to determine if your interests align with ours.</p> <p>In the D-CIS Lab we combine pragmatic, applied research culminating in tangible demonstrators with fundamental research. Our research encompasses a wide range of topics and our researchers come from a wide range of backgrounds and experiences.</p>
Experience Required	Bachelors and Masters Students are welcome to apply. Students from technical backgrounds including Computer Science, Artificial Intelligence, Distributed Systems, Security, Computer/Electronic/Electrical/Aeronautical Engineering, as well as a range of Humanities disciplines such as Cognitive Psychology, sociology, cultural anthropology, organisational psychology, are welcome to apply. This is not an exhaustive list of disciplines!
Project Description	Project Proposals (at most one A4 page) should be sent to the student coordinator who will consult with relevant colleagues.
Intended Results	Research Report and demonstrator, depending on the topic.
Validity	Ongoing
Project Location	D-CIS Lab
Supervisor	Various depending on project proposals. Contact the Student Coordinator ( <a href="mailto:students@d-cis.nl">students@d-cis.nl</a> ).
Links	See <a href="http://publications.d-cis.nl">http://publications.d-cis.nl</a> for research publications in the D-CIS lab.

Project Title	AgentScape Mobile
Project Number	2010-04
Related Project(s)	AgentScape RRD
Background / Motivation	Mobile devices are traditionally unable to perform complex tasks or execute complex applications. However, recently, with the advent of such devices as Apple's iPhone, Google's Android technology and the widespread adoption of Windows mobile, the ability to execute complex applications is more readily available.
Experience Required	Both Bachelors and Masters Students will be considered. Strong Programming skills in Java are a must. Computer Science / Artificial Intelligence Background
Project Description	Investigate and develop an implementation of AgentScape for mobile devices. Initially it is proposed to develop a version of AgentScape for a simulator, but the goal is to have a running version on existing mobile hardware. An initial direction might be to develop a monitoring system for AgentScape, where Agents can be deployed to other locations and results returned to the mobile device. Later work will include porting a full version of AgentScape to the mobile device.
Intended Results	Other than the satisfaction of having built a working system, the student would have the chance to work with a fully functioning agent system. The student will gain an indepth understanding of AgentScape as well as honing their programming skills. <ul style="list-style-type: none"> <li>• Demonstrator.</li> <li>• Research Report</li> </ul>
Validity	Finish before mid 2011
Project Location	D-CIS Lab in conjunction with TUdelft
Supervisor	Thomas Quillinan / David Mobach
Links	<a href="http://www.agentscape.org">http://www.agentscape.org</a>

Project Title	AgentScape GRID / Cloud Gateway
Project Number	2010-05
Related Project(s)	AgentScape RRD
Background / Motivation	<p>AgentScape is an agent platform that provides the middleware infrastructure needed to support mobility, security, fault tolerance, distributed resource and service management, and services access, to agent applications. The multi-level AgentScape middleware infrastructure has been designed to be extensible.</p> <p>Grid Computing provides a means to share / consume compute resources where users see a single interface. This is analogous to the Electricity Grid, Current work in the area of Platform as a Service and more recently in the development of Cloud Computing has increased the demand for integration with the Grid / Clouds.</p>
Experience Required	<p>Both Bachelors and Masters Students will be considered. Strong Programming skills in Java are a must. Computer Science / Artificial Intelligence Background</p>
Project Description	<p>AgentScape has been designed as a multi-layered architecture with (1) a small middle- ware kernel, called the AgentScape Operating System (AOS) kernel, that implements basic mechanisms and (2) high-level middleware services that implement agent plat- form specific functionality and policies</p> <p>The Computational Grid consists of numbers of sites cooperating to share resources. These resources are heterogeneous in nature. These sites wish to share their resources and knowledge throughout the Grid. Grid middleware, such as Globus, facilitates the sharing of these resources.</p> <p>One of the advantages of the Agent paradigm is the ability to access resources that are not directly available to the owner of the agent. For example, while agents can be used to process sensitive information, such as medical records, to extract statistical trends, such as the average patient age, that are not themselves confidential. Extending this paradigm to the Grid has the obvious benefit that agents can access the computational power of the Grid, without requiring their owner needing to explicitly build a Grid aware application.</p> <p>Conversely, Grid applications may need to access sensitive information, while the owners of that information may not wish to export it to the Grid. If Grid applications could utilise</p>

	a software agent to access this information, the requirements of both stakeholders might be realised.
Intended Results	<p>The goal of this project is to implement a bi-directional Grid gateway in AgentScape. This Grid gateway will allow both agent access to the computational resources of the Grid and Grid applications to access AgentScape agents. Research will be required to determine how to integrate these two systems, particularly in the areas of scheduling of jobs and resource access.</p> <ul style="list-style-type: none"> <li>• Demonstrator.</li> <li>• Research Report</li> </ul>
Validity	End before Mid 2011
Project Location	D-CIS Lab in conjunction with TUDelft
Supervisor	Thomas Quillinan
Links	<a href="http://www.agentscape.org/">http://www.agentscape.org/</a>

Project Title	Volunteer Computing
Project Number	2010-06
Related Project(s)	AgentScape RRD
Background / Motivation	Volunteer Computing is a type of distributed computing where users provide access to their compute hardware, often in return for some benefit, but sometimes for altruistic purposes. Well known efforts include SETI@Home, Folding@Home and distributed.net.
Experience Required	Both Bachelors and Masters Students will be considered. Strong Programming skills in Java are a must. Computer Science / Artificial Intelligence Background
Project Description	In the D-CIS Lab, we are interested in the development of a secure open volunteer based architecture that will allow the deployment and execution of compute jobs across a network. This work will be integrated with the AgentScape platform  AgentScape is an agent platform that provides the middleware infrastructure needed to support mobility, security, fault tolerance, distributed resource and service management, and services access, to agent applications. The multi-level AgentScape middleware infrastructure has been designed to be extensible.
Intended Results	A Secure Deployment and execution environment that allows the pushing of compute jobs, such as agents or a multi-agent platform, to allow user contributed compute cycles to be exploited. Users should be able to select how aggressively their resources will be exploited and should be able to easily retract their services.  <ul style="list-style-type: none"> <li>• Demonstrator.</li> <li>• Research Report</li> </ul>
Validity	End 2011
Project Location	D-CIS Lab
Supervisor	Thomas Quillinan
Links	Xgrid; Charlotte; Cyclone; <a href="http://www.agentscape.org">http://www.agentscape.org</a>

Project Title	Agent-Based Websites Dependencies Management
Project Number	2010-07
Related Project(s)	Actor-agent teaming in general; Semantic technologies
Background / Motivation	Websites are becoming increasingly interdependent, with tools, such as youtube videos and embedded content widespread. Content Management systems (CMS) provide a means to manage this wide range of data types and the large amount of data. Automated management of this content is a goal that is yet to be exploited.
Experience Required	<ul style="list-style-type: none"> <li>• CS/AI</li> <li>• Semantic web technologies</li> <li>• Multi-agent systems</li> <li>• AgentScape (preferred, not required)</li> </ul>
Project Description	<p>This project is intended to explore how websites can become more ‘intelligent’ and actively cooperate to manage their dependencies. The current puzzle with dependencies between multiple websites (which often reside in different organisational domains and are ‘powered’ by different CMSs) is that they are only connected through hyperlinks (and sometimes scripts and RSS), which do not convey any meaning about the relationship. Furthermore, they cannot be automatically updated. By defining agents to be in charge of websites coherence, these dependencies can be (pro)actively managed. Security is an issue though: how to make the inter-agent agreements adhere to the security policies by each website, e.g. to prevent ‘copying all content’ from a website, or allowing malicious html-code to run on a website.</p> <p>One example of such a situation entails websites in research organizations, where multiple websites need to be orchestrated: an update of information on one website may entail changes on another website’s hyperlinks. The project must demonstrate such functionality with at least 3 agents (for 3 websites) that actively manage their interdependencies. For this purpose semantic web technologies need to be used (ontologies of course). The preferred agent platform for this project is AgentScape.</p> <p>It is possible to work on this project with 2 students: this will influence the scale of the expected demonstration.</p>
Intended Results	<ul style="list-style-type: none"> <li>• Prototype demonstration of agents maintaining website coherence.</li> <li>• Research Report</li> </ul>
Validity	Ongoing – Circa 6 month project

Project Location	D-CIS Lab
Supervisor	<ul style="list-style-type: none"><li>• Niek Wijngaards</li><li>• Eddy van der Heijden</li><li>• Thomas Quillinan</li></ul>
Links	<a href="http://www.agentscape.org/">http://www.agentscape.org/</a>

Project Title	Improved Agents for Actor-Agent Teaming
Project Number	2010-08
Related Project(s)	<ul style="list-style-type: none"> <li>• ICIS:SEAT</li> <li>• ICIS RESK tool</li> </ul>
Background / Motivation	<p>The ICIS research programme involves the SEAT project, in which actor-agent teaming is studied, in particular the impact of including agents (as team-members) on the performance of the team, as compared to actor-only teaming. For this purpose an actor-agent team has been developed and experimented with in 2008 and 2009, in which Machinetta, Cougaar and 2APL are used. The RESK experimentation tool is used for simulating the environment and conduct experiments with teams. See the links below for the publication database entries with information on the currently achieved results.</p>
Experience Required	<ul style="list-style-type: none"> <li>• Multi-agent systems / agent technology</li> <li>• Natural language processing / computational linguistics</li> </ul>
Project Description	<p>In this proposed project, the agents partaking in an actor-agent team need to be augmented, including their</p> <ul style="list-style-type: none"> <li>• Social skills: when to involve other team members, when to (not) ask questions, provide answers, etc.?</li> <li>• Cooperative work: when to assist with which task?</li> <li>• Natural language processing: how to better understand written language?</li> </ul> <p>The intent is to not (re)invent the wheel: if possible reuse existing research results to arrive at a practical demonstration of actor-agent teaming, including a small-scale indicative experiment to explore the differences in team performance when compared to an actor-only team (i.e., human-only team).</p> <p>This project can easily accommodate two students.</p>
Intended Results	<ul style="list-style-type: none"> <li>• Demonstration of improved actor-agent team functionality.</li> <li>• Experimentation illustrating performance differences between actor-only team and (new) actor-agent team.</li> <li>• Research Report</li> </ul>
Validity	Early 2010 start, finish Fall 2010
Project Location	D-CIS Lab
Supervisor	<ul style="list-style-type: none"> <li>• Rianne Gouman (requirements &amp; experimentation)</li> <li>• Niek Wijngaards (agent modeling)</li> <li>• Masja Kempen (natural language)</li> </ul>
Links	<ul style="list-style-type: none"> <li>• <a href="http://www.icis.nu">www.icis.nu</a></li> <li>• <a href="http://www.icis.decis.nl">www.icis.decis.nl</a></li> <li>• Publications.decis.nl (search for author Gouman)</li> </ul>

Project Title	MOSAIC: agent-based incident information structuring
Project Number	2010-09
Related Project(s)	ICIS:MOSAIC
Background Motivation	<p>The MOSAIC project started during the ICIS research programme as a cooperation by Thales research &amp; technology Netherlands, Delft Technical University and vts Politie Nederland. In MOSAIC we explore the use of agents to support multi-organisational first responders (in case of emergencies and incident management) to</p> <ul style="list-style-type: none"> <li>(a) Acquire improved situation awareness, e.g. by involving information available on the internet on the location, event, etc. of the emergency.</li> <li>(b) Personalize information for the first responder by only providing relevant information based on (static and dynamic context).</li> <li>(c) Explicitly exploit relationships between emergencies (e.g., transport routes, effect-area of a smoke cloud, ...) to further improve the situation awareness.</li> </ul> <p>In the past years, a skeleton multi-agent system has been devised together with a skeleton human-machine interface. Currently, a major challenge lies in the structuring of incident information, i.e.</p> <ul style="list-style-type: none"> <li>• Define ‘incident information space’ and manage the information therein.</li> <li>• Extract information from heterogeneous information sources into incident information spaces.</li> <li>• Discover relations between incident information spaces.</li> </ul>
Experience Required	<ul style="list-style-type: none"> <li>• Multi-agent systems</li> <li>• Human-machine interfaces</li> <li>• Data-mining / text-mining</li> <li>• Semantic web</li> <li>• Knowledge representation</li> <li>• Computational linguistics</li> </ul>
Project Description	<p>The intent is to arrive at a demonstrator, highlighting enriching the incident information spaces. In addition, the work is to be aligned with BeiBei Hu’s PhD work on information personalization and her scenario.</p> <p>This project can accommodate two students working together. For other students, note that more open challenges exist for MOSAIC, e.g. regarding enriching the agents’ intelligence, the cooperation strategies.</p>
Intended Results	<ul style="list-style-type: none"> <li>• Demonstrator.</li> <li>• Research Report</li> </ul>

Validity	Start early 2010; finish Fall 2010.
Project Location	D-CIS Lab
Supervisor	<ul style="list-style-type: none"><li>• Kees van der Meer (TU-Delft)</li><li>• Niek Wijngaards (TRT-NL)</li><li>• And others, as deemed useful.</li></ul>
Links	<ul style="list-style-type: none"><li>• <a href="http://www.icis.nu">www.icis.nu</a></li><li>• <a href="http://www.icis.decis.nl">www.icis.decis.nl</a></li></ul>

Project Title	Cognitive Agent Architecture Overview
Project Number	2010-10
Related Project(s)	Actor Agent Communities
Background / Motivation	If we wish to engineer an agent with a number of capabilities, including a form of self-awareness, social skills, specific tasks cq expertise, (pro)active behaviour, negotiation & cooperation skills, facilitating group-organisation, etc. – then what should we do? It is tempting to define our own architecture... but: many different agent architectures have been developed in the recent past: can these be reused? These architectures often differ, yet also resemble each other, yet may be designed for different purposes and are often expressed in different representations and formalisms.
Experience Required	Academic with background in agent technology
Project Description	In this project we need to arrive at a first overview of architectures for cognitive agents. A number of architectures are annotated, compared and a methodology is provided to extend this first overview. Depending on the approach, an as yet non-existing example cognitive agent can be analysed, delivering requirements on cognitive capabilities, which lead to criteria for a first comparison of cognitive architectures. If time permits, the 'best' (according to a defined metric) cognitive architecture can be implemented to demonstrate its appropriateness.
Intended Results	Research report and demonstration cognitive agent (if time permits).
Validity	Within 2010
Project Location	D-CIS Lab
Supervisor	Niek Wijngaards & other researchers as applicable.
Links	<a href="http://publications.decis.nl/">http://publications.decis.nl/</a> search for Actor Agent Communities

Project Title	A Negotiation Framework for AgentScape
Project Number	2010-11
Related Project(s)	AgentScape RRD
Background / Motivation	AgentScape utilises a WS-Agreement based negotiation framework to decide how to allocate resources to users. Negotiation is an active area of research, ranging from Game Theory to auctions. Determining a fair allocation of resources across multiple stakeholders requires both multi-round negotiation and renegotiation, strategies that are not supported in the current WS-Agreement standard
Experience Required	Both Bachelors and Masters Students will be considered. Strong Programming skills in Java are a must. Computer Science / Artificial Intelligence Background
Project Description	<p>AgentScape is an agent platform that provides the middleware infrastructure needed to support mobility, security, fault tolerance, distributed resource and service management, and services access, to agent applications. The multi-level AgentScape middleware infrastructure has been designed to be extensible.</p> <p>The current implementation of AgentScape uses WS-Agreement to support negotiation of leases for Agents executing within the Middleware. Due to the current limited standard, when a negotiation fails, or requirements change, it is not possible to modify an existing agreement. Instead, a new negotiation must be initiated, without any context from previous interactions.</p>
Intended Results	This project will investigate and develop a more advanced negotiation framework for AgentScape. This framework should support renegotiation and more advanced strategies for making agreements between two or more parties.
Validity	Must begin before the end of 2010
Project Location	D-CIS Lab.
Supervisor	Thomas Quillinan
Links	<a href="http://www.agentscape.org">http://www.agentscape.org</a> <a href="http://mmi.tudelft.nl/negotiation/index.php/Negotiation">http://mmi.tudelft.nl/negotiation/index.php/Negotiation</a>