Referent 1

Title: *Agents and Virtual Environments in DLP*
Code: *600.065.120.02N01*
PI: *Dr. A. Eliëns*

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1. What is your opinion about the scientific merits of the proposed research?
Excellent proposal, well documented and planned.

2. Does the proposal have a clear scientific goal?
Yes, the clear goal is to combine agent and knowledge technologies with multi-media (VRML and Java3d). This is new, promissing and has interesting applications - in particular in online education.

3. Does the research open up new grounds by generating new concepts, a deeper understanding or new methods?
Yes, the research introduces a number of new architectural concepts.

4. What is your opinion about the research team?
Very good team, nice past achievments.

5. Do you have remarks about the direction of research as laid out in the proposal? Is the schedule realistic?
The schedul is realistic. I would suggest considering covering the new XML format for VRML - if budget permits.

6. Are the personnel and equipment requested in this proposal justified? (please note that OiO is equivalent to PhD-student).
The personnel and equipment are justified.

7. Please comment on the overall quality and urgency of the research laid out in this proposal.
Excellent proposal, incorporating a number of promising research fields in one project. I expect a lot of practical applications. I recommend funding the proposal.

8. Do you have special remarks about the proposal?
No, the previous points cover it all.

Referent 2

Title: *Agents and Virtual Environments in DLP*
Code: *600.065.120.02N01*
PI: *Dr. A. Eliëns*

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1. What is your opinion about the scientific merits of the proposed research?
The proposed work aims at integration of agent technology with virtual environment for multimedia applications based on DLP (Distributed Logic Programming Language). I view this work is essentially an engineering project whose end product would be some kind of prototype system to demonstrate the integration. Since no new concept or paradigm was proposed or expected, the merit of this work would primarily be practical with limited far reaching impact to the science of either agent research or virtual reality.

2. Does the proposal have a clear scientific goal?
The proposal provides clearly stated engineering goal and technical approaches to reaching the goal (namely the build an integrated system that connects agents with virtual environment). However, the proposal does not provide clear argument on the key issue of scientific importance, namely WHY it is important to introduce software agents into the virtual environment in which multimedia objects are created and presented, and WHAT conceptual and theoretical issues such integration raises.

3. Does the research open up new grounds by generating new concepts, a deeper understanding or new methods?
No, as I mentioned above, the proposed work is essentially an engineering project, and it is too narrowly focused on one language (DLP).

4. What is your opinion about the research team?
The research team, consisting of two PhD, two Professors (as promoters of two PhD students), is adequate in terms of technical qualification and experience to successfully conduct the proposed work. The PI and other senior members of the team have strong publication record, and they have all worked on previous projects which are closely related to the proposed work. The team will also involve two PhD students and one programmer.

5. Do you have remarks about the direction of research as laid out in the proposal? Is the schedule realistic?
The schedule is realistic for the proposed work.

6. Are the personnel and equipment requested in this proposal justified? (please note that OiO is equivalent to PhD-student).
Yes.

Referent 2

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7. Please comment on the overall quality and urgency of the research laid out in this proposal.
The proposal clearly states what they want to do and how they plan to do it. However, overall, I would say the proposal is weak. In particular, it does not provide a strong argument for the motive and need for this research. Also, some important technical issues are overlooked or discussed very briefly. For example, they propose to extend some agent communication language (ACL) for the integration, but do not identify which ACL they intend to extend (there are a couple of standard ACL such as KQML and FIPA ACL, and numerous native ACLs whose extensions do not have much value beyond a small local community). Also, agent coordination is a key issue in building mutl-agent systems, but the proposal does not describe how is issue will be dealt with, except mentioning some very limited experience they had on agent communication in their previous projects.

8. Do you have special remarks about the proposal?
I am not familiar with NWO and completely ignorant about what types of research projects you typically support. My review comments are based on criteria I used to review funding proposals for US National Science Foundation and other government funding agencies here. So please keep this in mind when reading my comments.

Referent 3

Title: *Agents and Virtual Environments in DLP*
Code: *600.065.120.02N01*
PI: *Dr. A. Eliëns*

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1. What is your opinion about the scientific merits of the proposed research?
This is an exciting research topic: the utilisation of agent-based ideas/techniques within the increasingly important area of 3D virtual, networked environments. There are many issues that need exploring, with potential benefits that will affect many of us in the near future.

However, I have reservations about this particular proposal, both in the choice of development technologies, and the lack of detail about the problems and research questions.

2. Does the proposal have a clear scientific goal?
There appear to be four main goals:

1. The development of a Web agent framework based around DLP, the BDI cognitive model, and (probably) VRML;
2. The development of an agent communication language, which seems to be influenced by KQML and FIPA ACL, along with DLP's existing support for message passing and event processing;
3. A framework for multi-user, networked virtual environments, probably based on the authors existing work and the Living Worlds Working Group concepts
4. An application using these ideas.

The proposal is vague about the details of these goals, and my understanding is mostly based on familiarity with the authors published work.

My main concern is that these goals have already been achieved in some sense by the authors existing work. It is unclear to me how this planned research will differ from, and build upon, their current results.

3. Does the research open up new grounds by generating new concepts, a deeper understanding or new methods?
It may do, although there is some lack of clarity in the authors intentions, as I stated in my answer to Q.2.

For instance, the authors present work already refers to the BDI model, but uses it only as a form of condition-action system. My understanding of BDI is that it allows agents to use higher-order logic to construct plans based on their own aims and those of other agents. Typically, logics which lay claim to the BDI model use modal, temporal, or higher order notions. DLP is a first-order LP language without such features. It would be very interesting to see it extended to more directly support BDI notions. However, I suspect that this is not planned. In summary, the authors have not clearly stated what new concepts and new methods they will be developing *in addition* to their current work.

4. What is your opinion about the research team?
The research team have published widely in this area in the last few years. Their background is well suited to the proposed research.

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5. Do you have remarks about the direction of research as laid out in the proposal? Is the schedule realistic?
I have already commented on the authors use of BDI. Another problem is the authors reliance on VRML and its EAI interface to Java. My own view is that VRML will be supplanted by X3d over the next few years, with its superior extension mechanism, and (probable) improvements to its EAI (e.g. the possibility of using DOM). However, I would suggest not using VRML *or* X3d; instead the authors should employ Java3D. This is due to the likely need for a very rich communication model which combines shared objects, complex event monitoring and communication forms such as broadcasting or multicasting.

VRML and X3d are principally 3D scene graph languages with programmable behaviour added as an extra, while Java3D is one component of a fully fledged programming language and library. It seems quite likely that Java3D's (Java's) capabilities in the areas of event manipulation, network communication, and scene graph control will be very important to this research.

The accuracy of the schedule is hard to judge because of the lack of detail in the research agenda. For example, if the authors utilise their existing tools and techniques, then the schedule is probably too generous. But if some of my suggested changes are included then the schedule
may be too short.

6. Are the personnel and equipment requested in this proposal justified? (please note that OiO is equivalent to PhD-student).
The time allocated to Eliëns and Huang may be a bit short (1 day/week) bearing in mind the complexity of some of these research goals. The majority of the load will be borne by a Ph.D student, which suggests that he/she have a strong background in these areas. This seems possible if a student is recruited from within the department after they have completed the multimedia syllabus.

7. Please comment on the overall quality and urgency of the research laid out in this proposal.
The intended aims and goals are exciting and relevant. Unfortunately, there is too little detail supplied in this proposal about how the authors will carry out this work. The authors need to be more explicit about how their plans build upon their existing (very interesting) research.

8. Do you have special remarks about the proposal?
I would like to see more background information on the BDI model and current approaches to virtual environments using agents.

Referent 4

Title: *Agents and Virtual Environments in DLP*
Code: *600.065.120.02N01*
PI: *Dr. A. Eliëns*

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1. What is your opinion about the scientific merits of the proposed research?
The development of a uniform framework for advanced media representations on the web that features intelligent behavior is an important research topic. However, there is already a number of projects that provide (at least partial) solutions for intelligent agents for 3D virtual environments (eg Lester's Intellimedia initiative, work of Perlin, Rickel,Doerner...,) See also Workshops "Communicative Agents in Intelligent Virtual Environments"/Agents2000, "Workshop on Intelligent Virtual Agents",1999 in the UK, and also work on intelligent virtual 3D characters (Blumberg, Bates,...). A new project should clearly built on existing results to prevent a reinvention of the wheel. The related work section is a bit weak in this area.

2. Does the proposal have a clear scientific goal?
From the proposal, I understand that a major goal is to combine the VRML languagewith the concurrent logic language DLP to build 3D BDI agents for distributed Ves.

3. Does the research open up new grounds by generating new concepts, a deeper understanding or new methods?
Not sure. It will provide a better understandig if DLP is suited for 3D Agents based on VRML but the proposal does not convince me that this combination will significantly improve the state of the art in 3D agent based virtual worlds. It looks like much work has to be done to reach the current state of the art using DLP and VRML. I may be wrong but I couldn't find an answer in the proposal.

4. What is your opinion about the research team?
Sounds good. The members seem to be experts in what they do and are well known in the Web3D community and the Logic Programming world.

5. Do you have remarks about the direction of research as laid out in the proposal? Is the schedule realistic?
Why do you use DLP? What are the clear benefits of this idea (beneath the long tradition of using it?). There already exist approaches that implement a BDI agent architecture and that use guarded commands for specifying agent behaviour. For example JAM has been used for BDI agent architectures, SOAR is an option, etc. The use of a logic programming language for all aspects of distributed agentbased VE's is, in my opinion, not the very best way. A multi-paradigm language like DFKI's Mozart Oz (which also has been combined with DIVE) showed a better way (although it could not compete with Java in a practical way). For a 4 year project there is the danger that the technologies DLP and VRML may become outdated (ie with the expected "crash" of blaxxun VRML another Web3D company will disappear soon). What precautions will be taken to avoid this? In such a proposal I would also expect a detailed workplan.

6. Are the personnel and equipment requested in this proposal justified? (please note that OiO is equivalent to PhD-student).
A bit unclear to me because I am not sure if the research team plans to build a new VE agent architecture from scratch or will reuse existing work in this area. In the latter case, I think the ressources are justified.

Referent 4

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7. Please comment on the overall quality and urgency of the research laid out in this proposal.
The proposal is not fully convincing but I may have missed the point. While the motivation and the overall goal is very good I doubt the way and the technologies. I also missed details how the framework will look like, what BDI architecture will be designed and what actions for validation/"exploitation" will be taken (assuming that this is applied research). This may result from a short "description of proposed research" (1 page) in the proposal. A good example from a convincing application domain may also be helpful for a reviewer to fully recognize the merits of this idea.

8. Do you have special remarks about the proposal?
I tried to include them in the statements above.