A Computer-Supported Role-Playing Game for Participatory Management of Protected Areas: The SimParc Project

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Outline

Objectives: Computer-Mediated Participatory Management of Protected Areas

Role Playing Game

Computer Support Architecture

Scientific and Technological Challenges

Questions and Perspectives

SimParc Project Objectives

Development of an epistemic ludic tool (based on a role-playing game) for education and training in park management

Public/players targeted: parks managers, researchers from the domain (environmentalists, etc.), students…

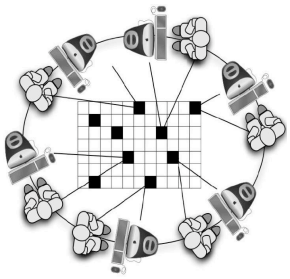
Objective: understand the multiplicity (various stakeholders) of conflicts and negotiation dynamics

Future support for decision making
Future support for modeling/simulation/evaluation

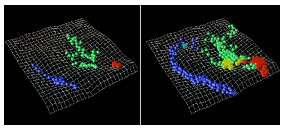
Informatics Research Objectives

Explore how computer mediation/support can help at participatory management (of protected areas)

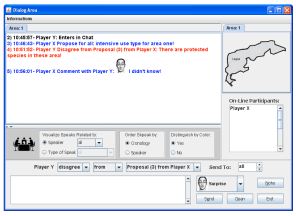
Distributed role playing games (RPG)



Multi-agent simulation (MAS)
Viability theory
Decision theory



Negotiation interface support

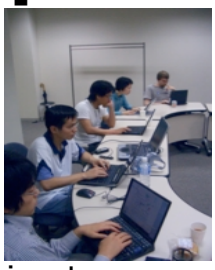


Artificial agents
- decision making manager
- *artificial players*
- *assistant agents*
- *expert agents*

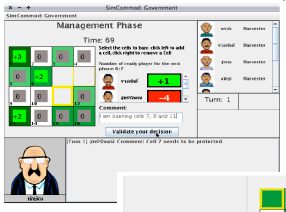
Automated analysis of players interaction/decision traces

Advantages (of role-playing games distributed support) [Guyot 06]

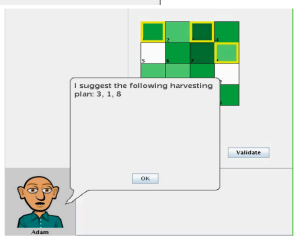
Participants do not have to stay in a room during experiment



Possibility of combining human participants and artificial participants



Assistant agents (to help/motivate participants)



All interactions/actions/decisions are recorded

-> maybe used for automatic analysis (offline or online)

SimParc Project Participants

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Isabelle Alvarez (Researcher, LIP6 & LISC/Cemagref)

Jean-Pierre Briot (Researcher, LIP6 & LES/DI/PUC-Rio) *(coordinator)*

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Altair Sancho (Prof., UFMG)

Vinícius Sebba Patto (PhD student, LIP6)

Alessandro Sordoni (PhD student, Paris 6)

José Eurico Vasconcelos (PhD student, SERG/DI/PUC-Rio)

SimParc Domain Challenges

Biodiversity conservation

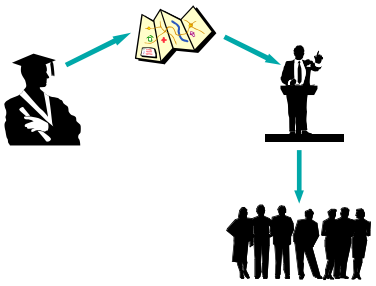
Sustainable development

Social inclusion

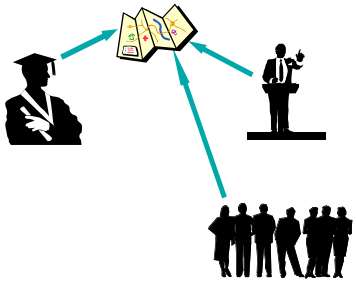
How to combine these objectives ?

Park Management Strategy

Technocratic



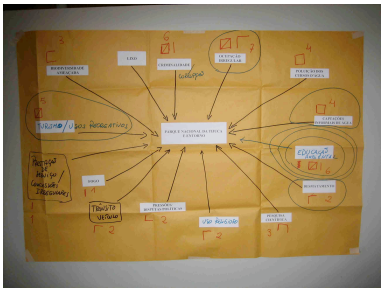
Participatory



Integration of social actors views and interests in biodiversity management
Shared understanding of conflicts
Joint exploration of strategies (to resolve conflicts)

National parks councils commitments
(SNUC Brazilian law, 2000)

Learning Case: National Tijuca Park



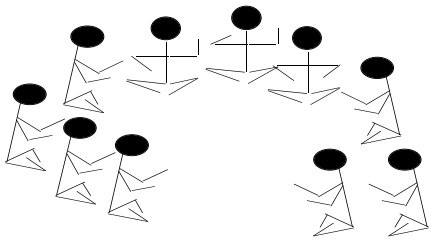
Emblematic protected area

Council formation and empowerment process

Role Playing Games (RPGs)

Used for:

- training
- understanding
- participatory decision making



Our inspiration: ComMod methodology for participatory management of renewable resources [ComMod]

Interaction between :

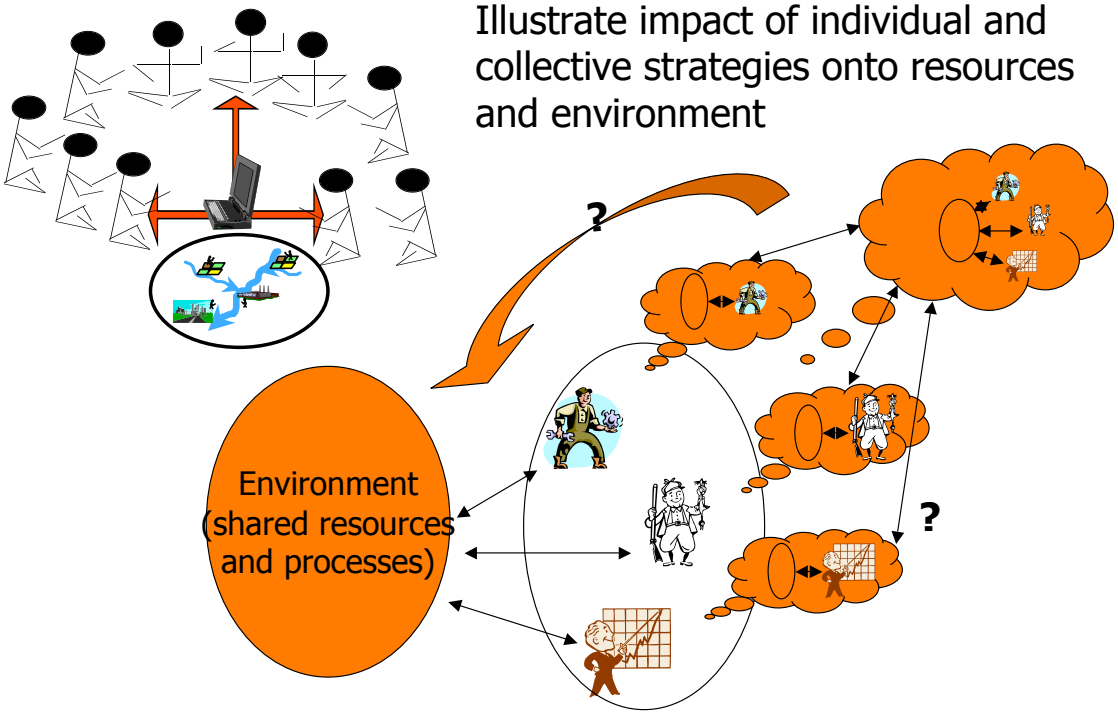
- *environmental dynamics*
- *social dynamics*

Stakeholders play their role or exchange their roles

Foster comprehension, exchange, sharing

RPG/MAS Coupling [Le Page 04]

Illustrate impact of individual and collective strategies onto resources and environment



SimParc Role Playing Game

"Zoning": Assign a type of conservation to each unit area (7 units) of the park

9 conservation types: from intangible to intensive use (incl. ex. temporary occupation)

9 players roles: ONG environmentalist, community, tourism operator, water public agency, city mayor…

1 park manager (arbiter, final decision)

(Imaginary) Park Characterization

Agricultura
Animais Silvestres
Cachoeira sem Visitação
Cachoeira com Visitação
Caranguejos
Caça de Animais
Centro Comercial
Centro de Observação de Pássaros
Coleta Caranguejos
Foco de Queimada
Gado
Hotel
Lixo
Mergulho
Montanhismo
Pesca Artesanal
Pesca Esportiva
Praia
Projeto Tartarugas Marinhas
Pássaros
Sitio Histórico/Antigo Engenho
Visitação Turística
Povoado - 20 Famílias
Comunidade - 10 Famílias
Limite de Unidade
Floresta Ombrófila Densa Primária
Floresta Ombrófila Densa Secundária
Mangue
Mata de Altitude
Praia
Restingas
Mata Ciliar
Hidrografia
Curvas de Nível
Rodovia
Trilha

"Objects of interest » (e.g., natural beauty spot, natural species...)

The 9 Types of Conservation Usage
(Brazilian Law [SNUC 2000])

Zonas de Nenhuma ou baixa intervenção

-(ZI) Zona Intangível (link caracterização e normas gerais de manejo)
-(ZP) Zona Primitiva (link caracterização e normas gerais de manejo)

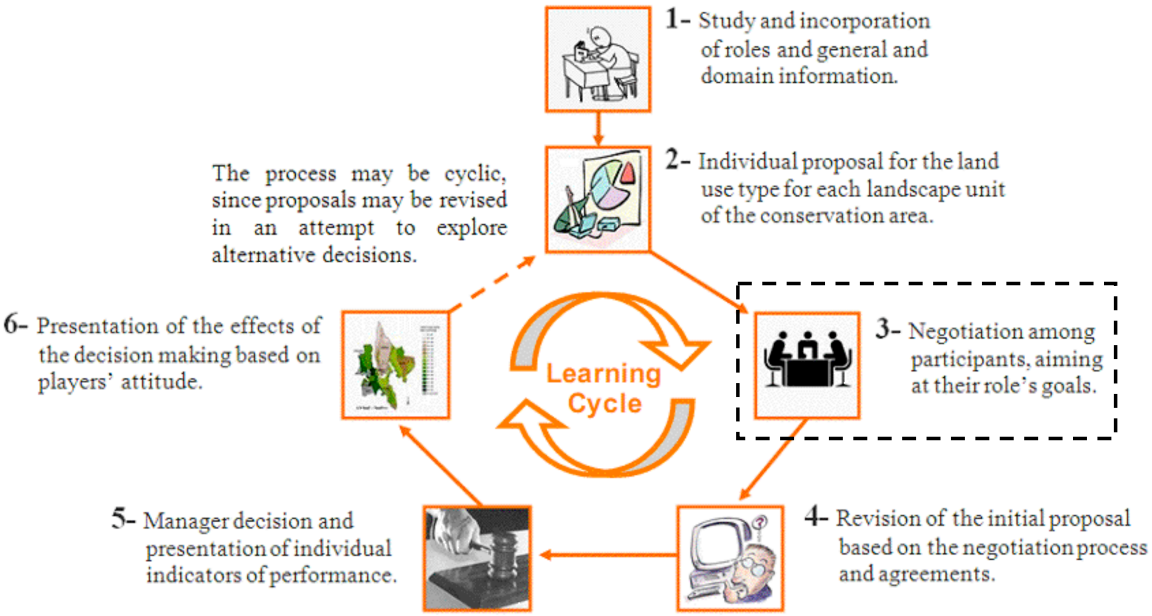
Zonas de Média intervenção

-(ZUE) Zona de Uso Extensivo (link caracterização e normas gerais de manejo)
-(ZHC) Zona Histórico Cultural (link caracterização e normas gerais de manejo)

Zonas de Alta intervenção

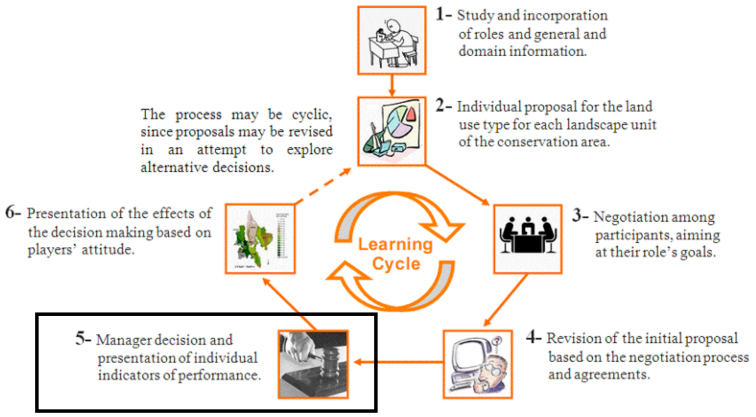
-(ZUI) Zona de Uso Intensivo (link caracterização e normas gerais de manejo)
-(ZUE) Zona Uso Especial (link caracterização e normas gerais de manejo)
-(ZR) Zona de Recuperação (link caracterização e normas gerais de manejo)
-(ZUC) Zona de Uso Conflitante (link caracterização e normas gerais de manejo)
-(ZUC) Zona de Ocupação Temporária (link caracterização e normas gerais de manejo)

Game Cycle



First game prototype test
(UFRJ, Sept. 07)

Closing the epistemic cycle

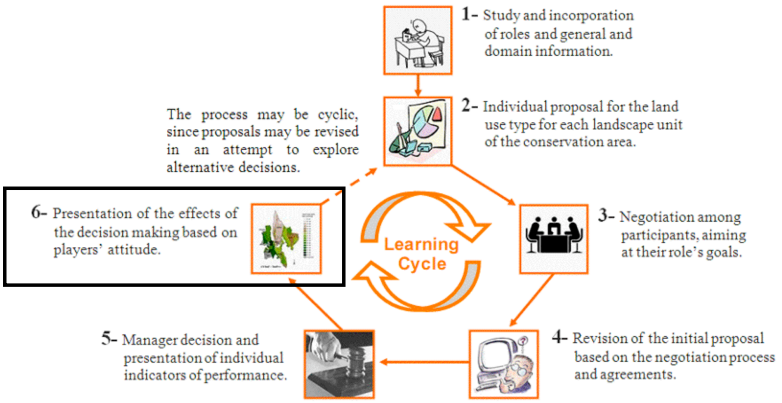


The manager explains his decision (rationales) on players request

human manager

artificial/automated manager (decision, explanation)

Closing the epistemic cycle



Feedback/validation of the decision:

- acceptance by players (accept, neutral, refuse, resist)
- *(technical) evaluation*

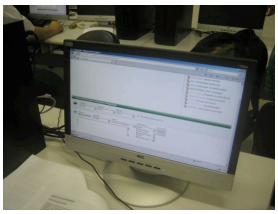
resources usage conflict modeling (e.g., endangered species vs tourism)

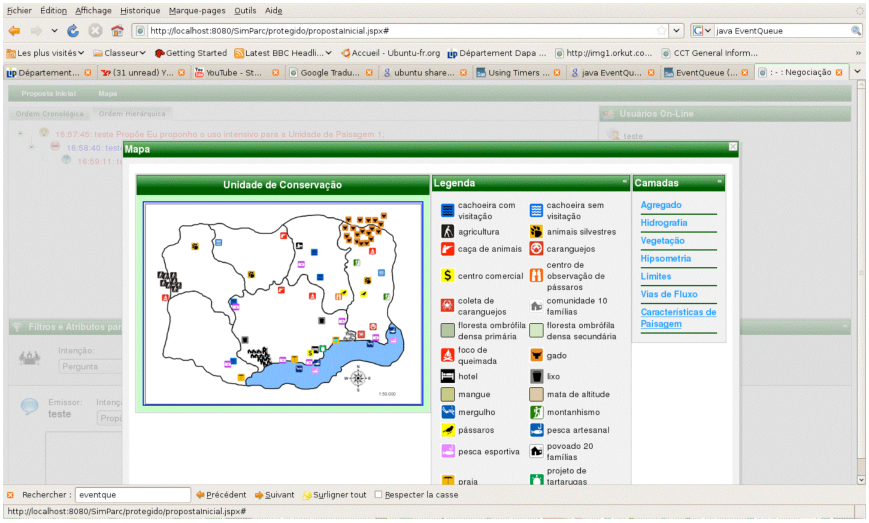
-- simulation vs agregated model

-- viability/resilience (viability theory)

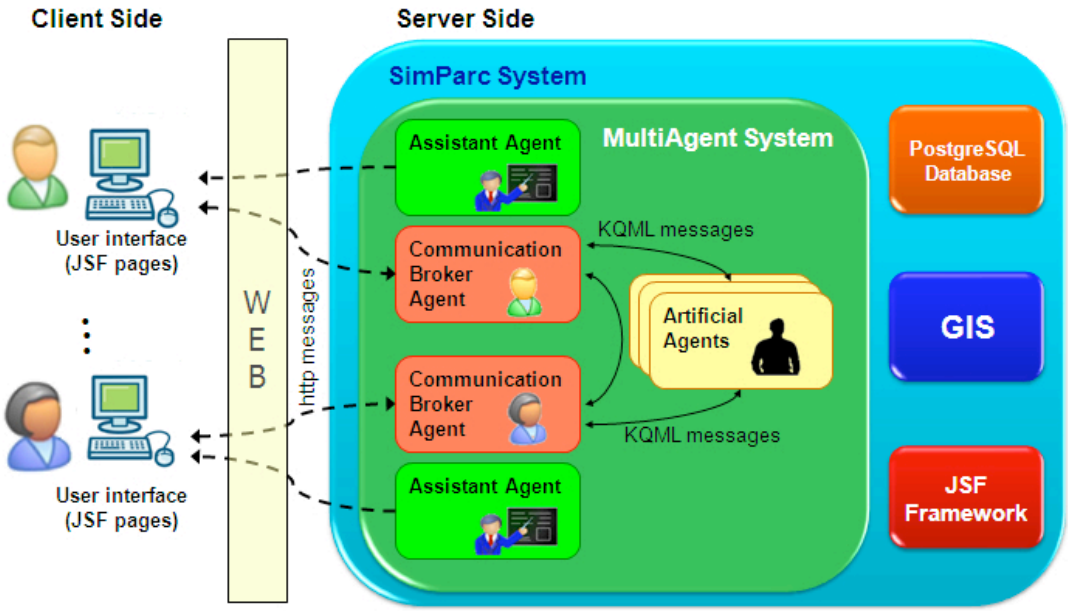
From a manual Role playing game…

…to a Computer supported SimParc prototype [Vasconcelos et al. 08]

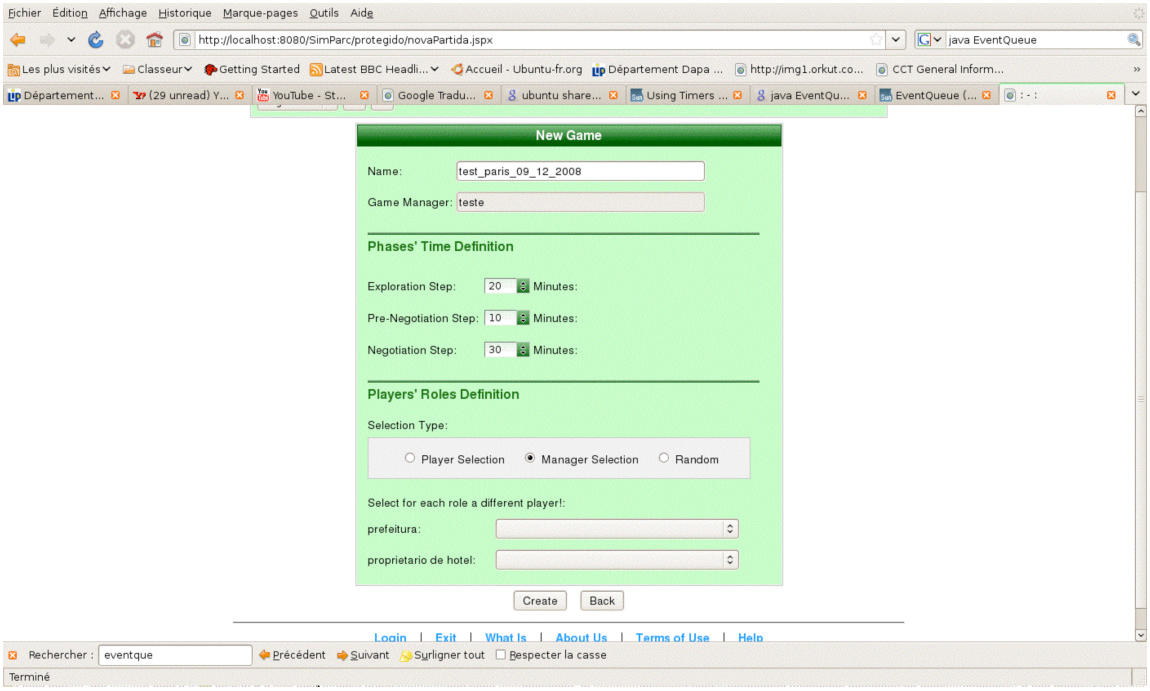




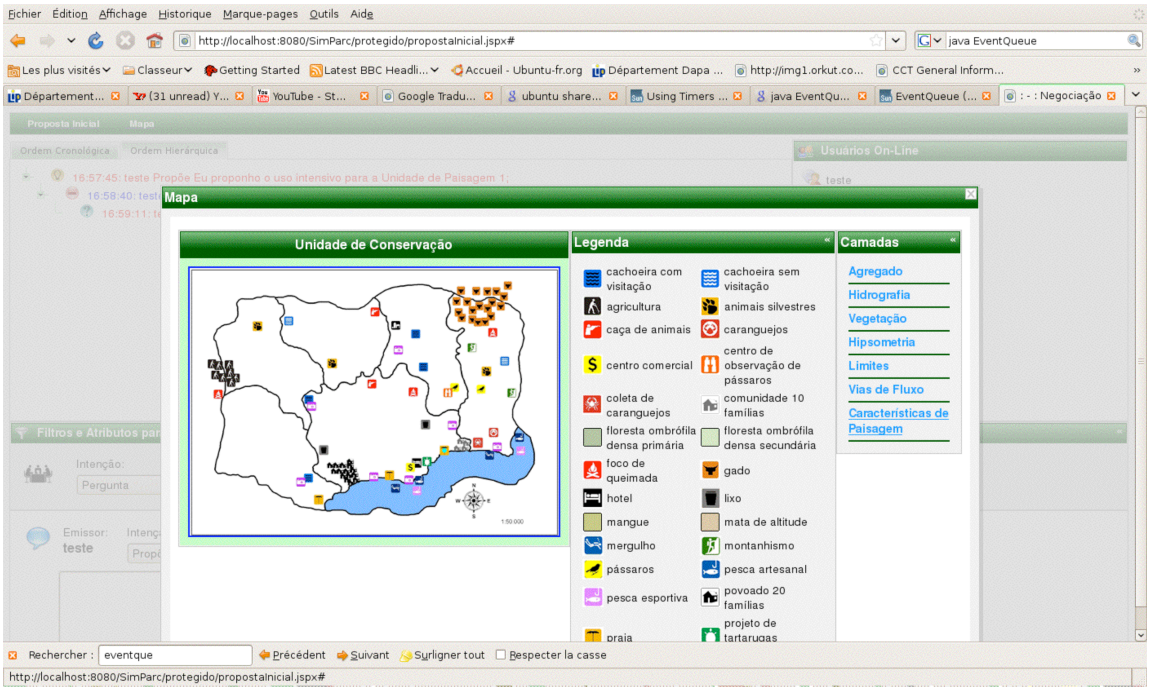
Second Prototype Architecture
Web-based system



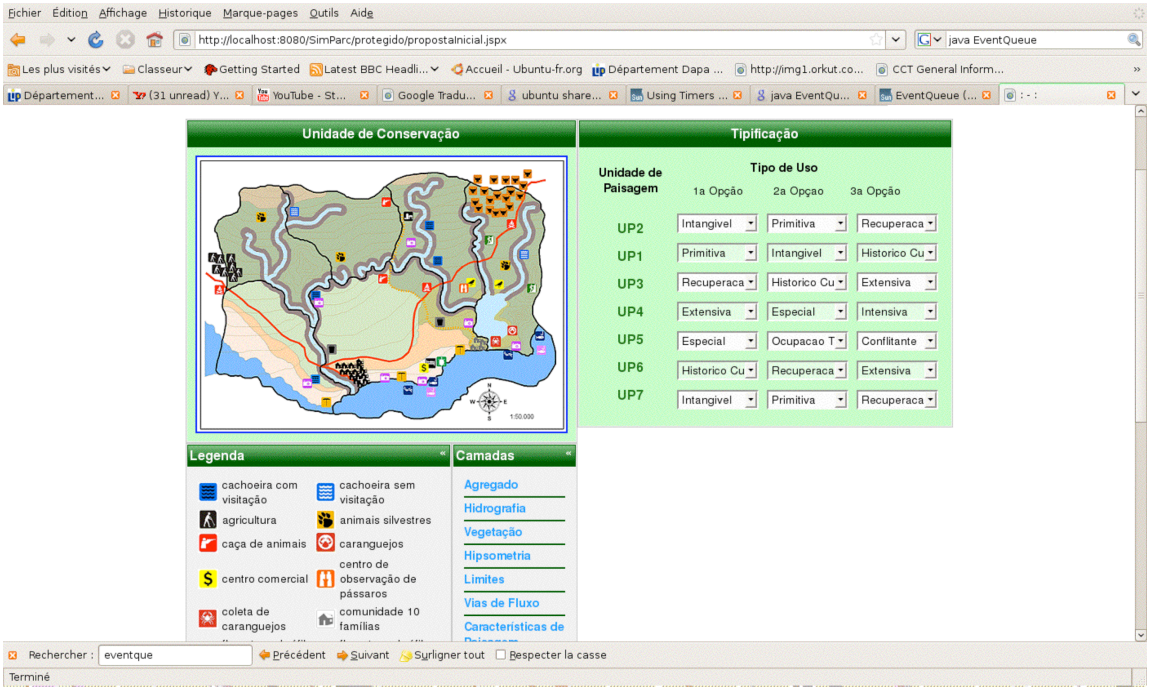
Game Configuration



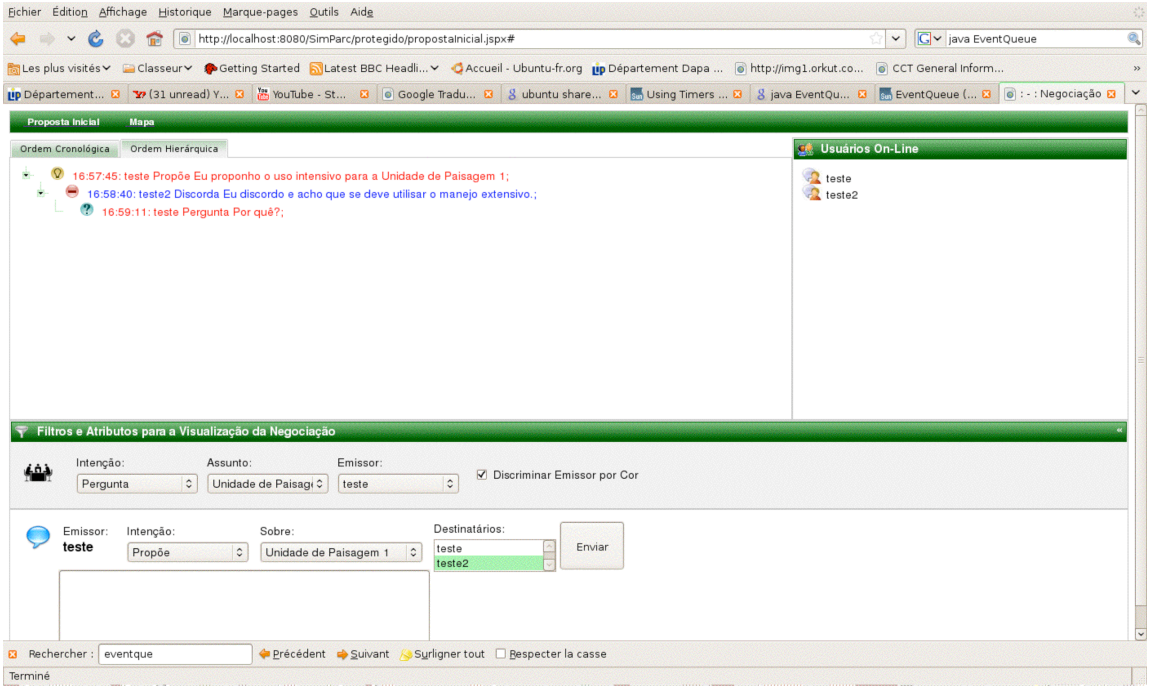
Negotiation/Analysis



Selecting Levels of Conservation



Dialogue and Negotiation



Some computer science challenges

Negotiation support (interface language)

Artificial park manager decision making and explanation

Artificial players (decision and negotiation)

Assistant agents

Expert assistants

Decision theory analysis (equity, dominance…)

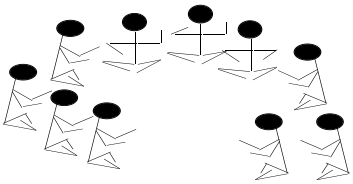
Viability modeling

Automatic analysis (of interaction traces/logs)

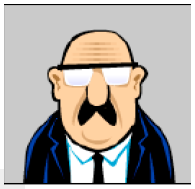
Artificial/Automated agents

Three types of artificial agents to allow/facilitate game execution:

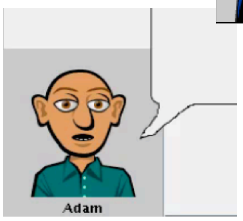
Players (negotiators)



Park Manager (arbitrator / decision maker)



Assistants (for human players)



Artificial Park Manager (Arbiter) (1/5)

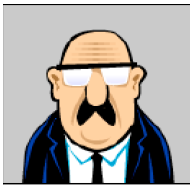
2 steps: **[Sordoni 2008]**

Inner model of decision

argumentation model

BDI/Jason

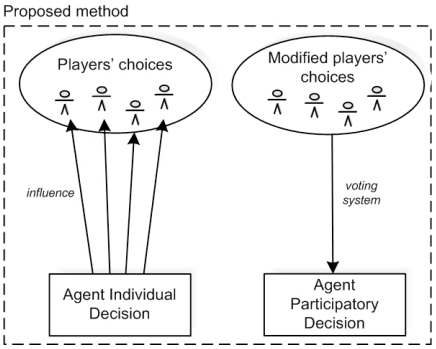
Arguments -> Explanation

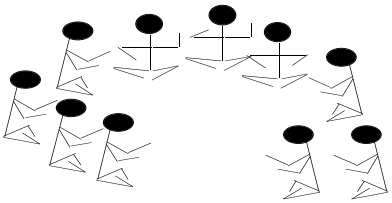


Injecting this decision

within players decision

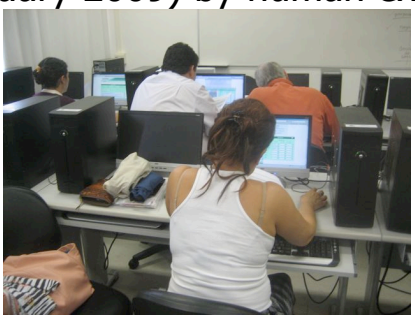
multi-criteria optimization

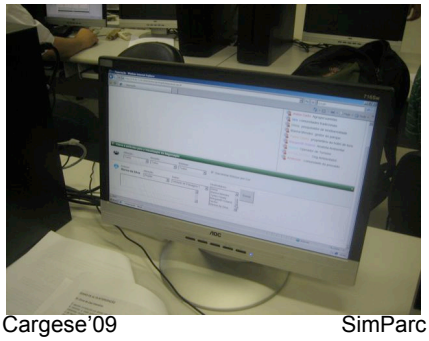




Current Status

Computer support 2nd prototype Game sessions tests (Rio, January 2009) by human experts





Prospects

Multi-agent simulation

Viability theory

Decision theory

Artificial players

Expert agents
- *Decision analysis (equity, dominance, distance...)*
- *Negotiation of decision models*

Automated analysis of players interaction/decision traces
- *offline inference of models*
- *online analysis (assistants)*

(some) Questions

Education/Epistemic vs Decision Support

Credibility vs Realism (Validation Issue)

Rational/technical decision vs Democracy/Participation (Technocratism vs Relativism)

Intrusiveness of assistants

Balance between human flexibility and artificial agents for interoperability

Observer/bias

Evaluation

Web

www-desir.lip6.fr/~briot/simparc