SMART PLACES: MULTI-AGENT BASED VIRTUAL COMMUNITY MANAGEMENT SYSTEM

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OUTLINES

- Introduction
- Multi-Agent Oriented View
  - Multi-Agent based Virtual Community
  - JaCaMo for MAS Development
- Virtual Community Management System
  - Architecture
  - Silent Features
  - Demonstration
- Conclusion and Future Directions
Virtual Community (also called “Online Community”)
- is the gathering of people, in an online space
- designed to be agnostic of spatio-temporal constraints.
- ad-hoc spatio-temporal constraints in the physical environment.
- offer online spaces for users to communicate

thanks to the
- Advent of pervasive computing
- Mobile and ambient computing
INTRODUCTION

- Our challenges
  - Decentralization of the community management
  - Personalized automatic management and discovery of communities
  - Flexibility so that any agent can create its own community
  - Separation of concerns
    - Creation of VCs
    - Management of VCs
    - Organization of VCs
To tackle with such needs, we turn to multi-agent technologies

Using a Multi-Agent approach for VCs,
- agents act as a personal assistant
- it perceives knowledge for individual interests
- It acts upon to meet their design goals.

Thus, agents bring the appropriate people having common goals or interests together and to share their knowledge with each other.

Realization - JaCaMo
JACAMO for MAS development

- Use three open source technologies;
  - Jason, Cartago and Moise
- Each of these programming technologies has been used for building multi-agent applications successfully
- It covers all levels of abstractions that are required for the development of sophisticated multi-agent system
MULTI-AGENT ORIENTED VIEW

JACAMO approach for MAS development
JACAMO FOR MAS DEVELOPMENT

- **Jason**
  - used for programming autonomous agents
  - implements the operational semantics of a variant of AgentSpeak
  - provides many user-customizable features for the development of MAS

- **CArtAgO**
  - used for programming environment artifacts
  - agents dynamically create and use artifacts as a fundamental building block for achieving their activities

- **Moise**
  - provides infrastructure for programming multi-agent organizations
Virtual communities are realized by means of a set of Jason agents encapsulating the user profile and the logic and control of the specific operations involved in the community pack.

Agents dynamically create and use artifacts as a fundamental building block.

Artifact is the functional-oriented and stateful entity comprise of controllable and observable properties.

Agents lookup the artifacts in the different workspaces affected to each community and exploit the operations offered by each of the artifacts to achieve their desired tasks.

Roles of VCs users, such as owner, member, participant, etc. are handled as organization...
VIRTUAL COMMUNITY MANAGEMENT SYSTEM - VCMS

1. Introduction
2. Multi-Agent Oriented View
3. VCMS
4. Conclusion

Smart Places
VCs as artifacts are treated as first-class entities representing resources and tools that agents can dynamically instantiate, share and use for their desired objectives.
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Virtual Community Management System - VCMS

Moise
Jason
CArtAgo
Investigation of approach
- Smart Cities

Server - desktop application
- The smart city is equipped with community servers situated at different places or buildings of the city.

Client - Android client
- Inhabitants of smart city access VCs by smart devices
Community Servers
- manage different communities and services to users
- allow inhabitants to create communities on the fly
- associated to a physical area defined by geographical coordinates
- servers can be situated at various places of the city. For instance,
  - in a Fashion Show, Theater, Bar, Train Stations, etc.

Community Clients
- functionalities of community servers are available only to users situated in a given neighborhood of the server
- A user situated in the right area can interact with the community server via his/her community assistant that is installed on his/her smart device
- community services are not feasible when the user leaves the area
- users may delegate to the smart device the management of these different actions according to the topics that he/she is interested in.
Community Tools for VCMS

- **MailBox**
  - any member of the community send/receive messages
  - example: “Catwalk” on a Fashion Show

- **InformationDispatcher**
  - only the owner can disseminate information
  - example: “Catwalk Schedule” on a Fashion Show

- **Forum or Private Box**
  - allows registered members to participate over the bounded community
  - example: “Contest Board” on a Fashion Show

- **Personal-Box**
  - only the registered members can disseminate and share information
  - example: “Model of the Month” on a Fashion Show
VIRTUAL COMMUNITY MANAGEMENT SYSTEM - VCMS

DEMONSTRATION
Alice, Jim and Bob are friends. Bob lives in Paris. Alice and Jim are coming from China to Paris for participating in a conference. They are excited for participating in the conference and also for exploring the beauty of Paris.

But, they have only three days and in this limited time they asked their friend Bob to help them. Unfortunately, when they arrived, Bob told them about his busy schedule.

But, he told them that Paris is a “SMART CITY” and they can access all the information from their “SMART DEVICES” once having “SMART COMMUNITY ASSISTANT”. He wished to join them later on in Versailles.
Alice is an expert of cultural exchanges between France and China during the XVII Century.

She has some information (dates, facts, texts) stored on her smart device. She has intention to share this with other.

Alice and Jim arrive at “Château de Versailles”.
**SCENARIO [BACKGROUND]**

**VIRTUAL COMMUNITIES AT CHÂTEAU DE VERSAILLES**

Château de Versailles. Workspace

Hall of Mirrors  Jardins à la française  Friends of Paris

- opr1
- opr2

- opr1
- opr2

- opr1
- opr2

1. Introduction  2. Multi-Agent Oriented View  3. VCMS  4. Conclusion
SCENARIO [BACKGROUND]

Group of people enjoying Virtual communities

Château de Versailles. Workspace

Hall of Mirrors  Jardins à la française  Friends of Paris

- Opr1
- Opr2

- Opr1
- Opr2

- Opr1
- Opr2
John is a Guide at Château de Versailles and he regularly posts his schedule for the visitors on community « Jardins à la française »
Alice, reaches “Château de Versailles” and installs SMART COMMUNITY ASSISTANT on her Android device.
**SCENARIO [BACKGROUND]**

Join workspace

Château de Versailles. Workspace

Hall of Mirrors  Jardins à la française  Friends of Paris

- Opr1
- Opr2
- Opr1
- Opr2
- Opr1
- Opr2
Alice creates her profile
Her agent becomes active

Alice’s Agent

Searches for recommendations

Château de Versailles. Workspace

Hall of Mirrors

Jardins à la française

Friends of Paris

- Opr1
- Opr2

- Opr1
- Opr2

- Opr1
- Opr2
She receives many recommendations.

Alice receives recommendations from her agent.

- **Hall of Mirrors**
  - Opr1
  - Opr2

- **Jardins à la française**
  - Opr1
  - Opr2

- **Friends of Paris**
  - Opr1
  - Opr2
Alice's Agent

She receives many recommendations

My Recommendations (click to join community)

- Friends of Paris:: with topic=china, matches your interest
- Jardins à la française:: with topic=Garden, matches your interest
Alice posts some messages on « Jardins à la française »

Post Message

Subject

hi

Message

I want some friends :)

Opr1
Opr2

Jardins à la française
John posts his schedule on « Jardins à la française »
Alice receives notifications about Guided Schedule

My Notifications

update: new message is available in ::Jardins à la française
Topic:GuideSchedule
TextMsg:Today's guided trip starts at 10am from Hall 2.
from
John Michel

OK
Alice searches communities by topic

Alice searches communities by topic.
Alice creates a new community

Select one of Community Type
- MailBox
- Information Dispatcher
- PersonalBox
- PrivateBox

Create Community
Enter Community name and description
- Cultural Exchange
- China and France

Create Topic
Enter Topic
culture

Yes  No
Ok  Cancel
Ok  Cancel
Alice posts on her new community « Cultural Exchanges »

- **Alice**
- **Post msg**
- **Culture Exchange**

**Post Message from File**

Subject:

Chinese culture

Message:

Important components of Chinese culture includes literature, music, visual arts; cuisine, etc.

- **Opr1**
- **Opr2**
P. Maret and J. Calmet
- developed a bottom-up agent-based approach for the knowledge management using virtual communities.
- Prototype: Virtual Knowledge Communities based on the Jade system

Z. Zhao et al.
- developed an agent based SymposiumPlanner system to promote topic-oriented collaboration between the distributed members of a virtual community.
- SymposiumPlanner supports the RuleML Symposia by coordinating personal agents that assist the symposium chairs, intelligently answering questions from people interested in the symposium.

A. Sorici et al.
- developed an adaptive room governance application in the context of smart co-working.
- they focused on MAS organizations based on Moise framework (within JaCaMo platform) to establish a precise and efficient level of management for the room allocation.

C. Toledo et al.
- used JaCaMo platform to develop a concrete agent-based architecture to proactively supply knowledge to knowledge-intensive work flows by integrating the BPM and KM infrastructures.
CONCLUSION

- We present Virtual Community Management System that is built by using the JaCaMo platform.
- It implements a customizable approach to the creation of different communities, with different possible functions and modes of exchanges.
- It enables VC to be a place where agents can meet and share knowledge with other agents who share a similar domain of interest.
- We find JaCaMo as a power technology for building complex multi agent system encapsulating three different technologies.
CONCLUSION

- JaCaMo covers all levels of abstractions that are required for the development of sophisticated multi-agent system, such as, Virtual Community Management System.

- In addition, the approach offers many advantages, such as:
  - Decentralization of the community management,
  - Personalized automatic management and discovery of communities,
  - Flexibility so that any agent can create its own community.
Organization of different communities and authorizations to agents with Moise framework

Another is to test and deploy our VCMS on android based smart device using JaCa-Android platform.

We also plan to provide an ontology of topics to the system and improve Semantic Recommendations
REFERENCES

- A. Sorici, O. Boissier, G. Picard, A. Santi, Exploiting the JaCaMo Framework for Realising an Adaptive Room Governance Application, ACM Workshop (AGERE’11)
- C. Toledo, R. H. Bordini, O. Chiotti, and M. R. Galli, Developing a Knowledge Management Multi-Agent System Using JaCaMo, Workshop ProMAS, AAMAS 2011
THANKS!

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QUESTIONS?

SMART PLACES: MULTI-AGENT BASED VIRTUAL COMMUNITY MANAGEMENT SYSTEM