A multi-agent system (MAS or "self-organized system") is a computerized system composed of multiple interacting [intelligent agents](https://en.wikipedia.org/wiki/Intelligent_agent).

At the same time, multi-agent system can solve problems that are difficult or impossible for an individual agent or a monolithic system to solve, and the intelligence may include methodic, functional, procedural approaches, algorithmic search or reinforcement learning.

In this special lecture, the speaker talked about the purposive of multi-agent systems. From the usable multi-agent to the useful multi-agent, finally, to the used multi-agent. The presentation given by the professor Yves Demazeau was willing to bridge the gap between methodology and practice of used multi-agent systems. It first discussed the VOWELS MAS paradigm introduced for design purpose in the 90’s, in this part, the presentation gave us several principles and it also decompositied the VOWELS into 4 categories.

This special lecture also showed how it has evolved from design to programming towards multi-agent oriented programming. Such a traditional way of design and programming multi-agent systems has been highly success and we illustrate this with different examples including cartographic generalization, luggage handling, geomediatic news analysis and bio-robotics. And then the speaker argued that the design of used MAS can be very different depending of the application domain, which requires a better attention to the end-user and grounds on limited elements of the theory. It discussed the role of the end-user within the VOWELS paradigm and we exemplify it in the domain of interactive games. Then professor Yves Demazeau also illustrated it through several examples including decentralized assistants, intelligent playgrounds, artistic creation, and health informatics. Playing with the vowels and including the end-user is not only an intellectual exercise; it also contributes to the evolution of computing towards creativity concerns, and more generally to the service to the person. This line of thought is driving our agenda of research work for the next years as well as it ethically drives the MAS community towards practical applications.

It is my pleasure to attend the special lecture hold by professor Yves Demazeau, who is one of the founders in the Multi-Agent Systems (MAS) area. In his presentation, he first introduces the challenges of Multi-agent systems (MAS), as we know, the Multi-agent systems (MAS) have now existed for more than 25 years. In the first 10 years, the community was asked to build usable Multi-agent systems (MAS), in the following 10 years, it was asked to build useful Multi-agent systems (MAS). At present, we are in the period of building the useful Multi-agent system (MAS). During the period, we may meet many challenges and difficulties, the professor Yves Demazeau discussed three grand challenges. The first one is that, it is difficult to develop a user centred adaptive ICT systems. In my opinion, although with the development of science and technology, we are developing the machine learning and deep learning, the agents become more smarter and more intelligent than before. However, it is still difficult for machine to think as a real human. The agent always misses some things which is unfriendly for user.

Meanwhile, from production tools to creation tools is also another challenge, in this situation, I will use one of my examples to illustrate, during the daily life, we often be asked to think more good ideas or improve some products. However, people often rely heavily on the product itself, so innovation is a very difficult task for many people. I think the first goal to achieve the challenge is that, how to cultivate people's awareness of innovation.

The third and another important challenge is that the emergent real-time ICT usage, especially in the emergency situation, as we know, emergencies are unforeseen, unplanned, and unpredictable situations that threaten the property, health, and life of people. The ability to effectively handle an emergency situation can literally have life and death implications. In some developed countries, the ICTs are made use of times of emergencies in little hospital, but in the future, how to examine the role of ICTs in providing support for improvisation in emergency situations in a more general way and the limitation by selective use of the ways in which ICTs can support improvisation in emergency response, they still have long time to develop. And the speaker also provides several research themes in the lecture, for example, “the process and the economy of creation”, “Real-time user centred exploitation of data” and so on. I think we can through these research themes to evaluate properly multi-agent systems.

In the second section, the speaker divided the VOWELS into four parts and he used “A” to represent agents which is the internal architectures of the system processing entities. “B” describes the environment, which is domain-dependent elements for structuring external interactions between entities. “I” is to talk about the interactions, the interactions are the elements for structuring internal interactions between entities. “Organizations” are also another part of VOWELS, we simple it to “O”, which represents the elements for structuring sets of entities within the MAS.

And about the VOWELS oriented design, we can use three principles to describe:

The first one is The Declarative Principle: "MAS = A + E + I + O

The second one is The Functional Principle:

Function(MAS) = Function(entities)+ Emergence Function

The third one is The Recursive Principle: entity = basic entity | MAS

We can combine these rules to research in many domains, such as, in the robotics science and other social science. Or maybe we can also use the principles of MAS in life science and economic science, special in the economic science, we can use multi-agents to predict the market and the develop the economic in the future.

Meanwhile, with the develop of the technology, the users also become the very important decomposition in VOWELS, in which user are the internal architectures of the end-user processing entities.

Then we discussed the evolution of agents and Multi-Agent Systems, from the robotics agents we can consider the artificial intelligence and also from the user agents we can search the creative computing.

In the area of research agenda, which service to person, I think both the purpose of the user and the one of the domain have to be taken in parallel. Protecting personal data, managing multiple identity, towards cognitive trust. And about evaluation we need to evaluate MAS systems from a CS point of view and from a usage point of view.

In conclusion, from the usable multi-agent to the useful multi-agent, we discussed the vowels and the multi-agent oriented programming. And from the useful multi-agent to used multi-agent, we discussed the purpose of the domain. I think in the future, the MAS can be used in many AI area, and people should try to learn and accept the intelligence of MAS.