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► **To cite this version:**

Walid Younes, Françoise Adreit, Sylvie Trouilhet, Jean-Paul Arcangeli. User-centered online reinforcement learning for emergent composition of ambient applications. Plate-Forme Intelligence Artificielle (PFIA 2019), Jul 2019, Toulouse, France. . hal-03600426

**HAL Id: hal-03600426**

**<https://hal.science/hal-03600426>**

Submitted on 7 Mar 2022

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## User-centered online reinforcement learning for emergent composition of ambient applications

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### Opportunistic software composition



Connected objects in an ambient environment

#### User

Mobility  
Changing needs  
Unpredictability

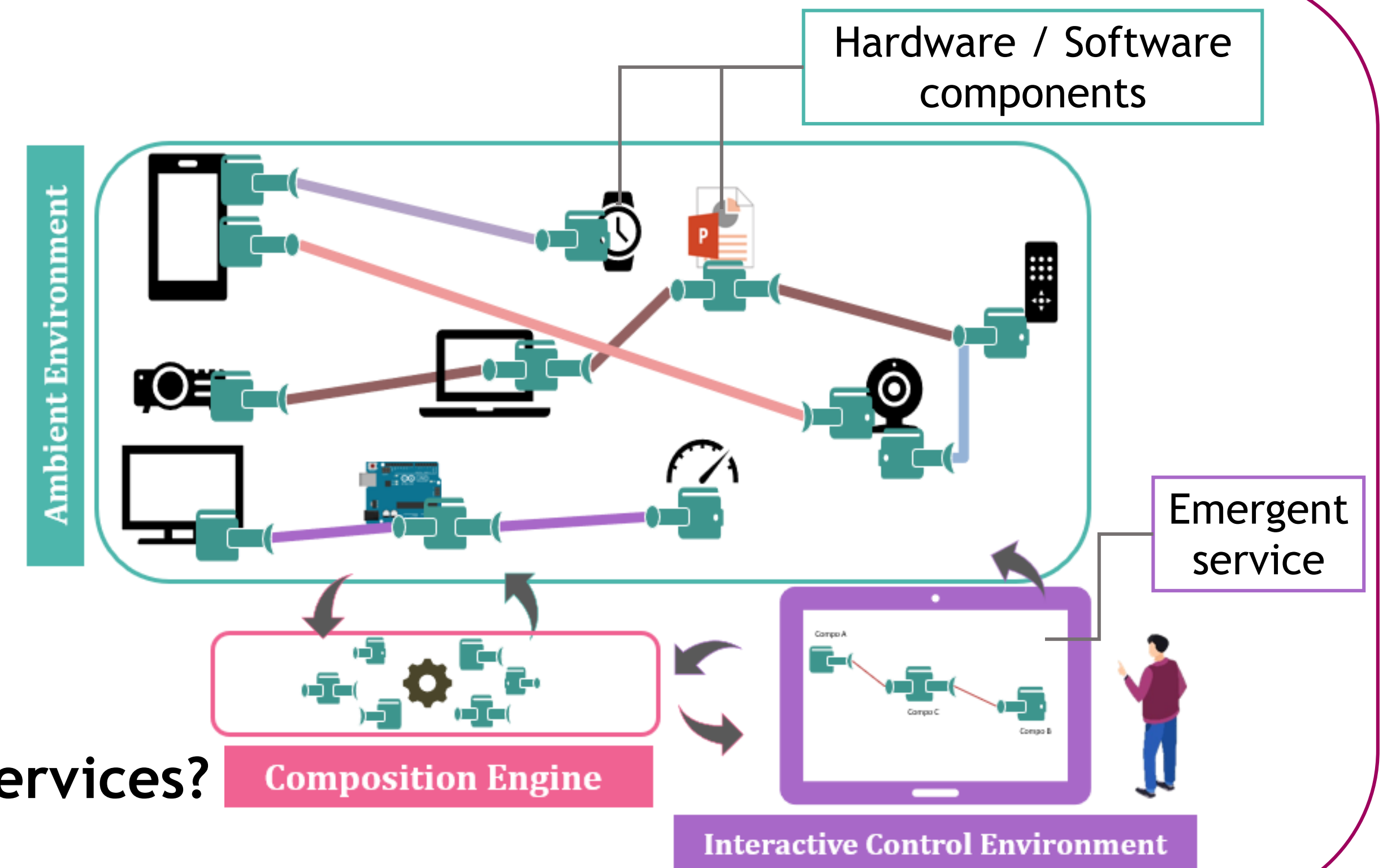
#### Environment

Uncertainty  
Instability

#### Components and services

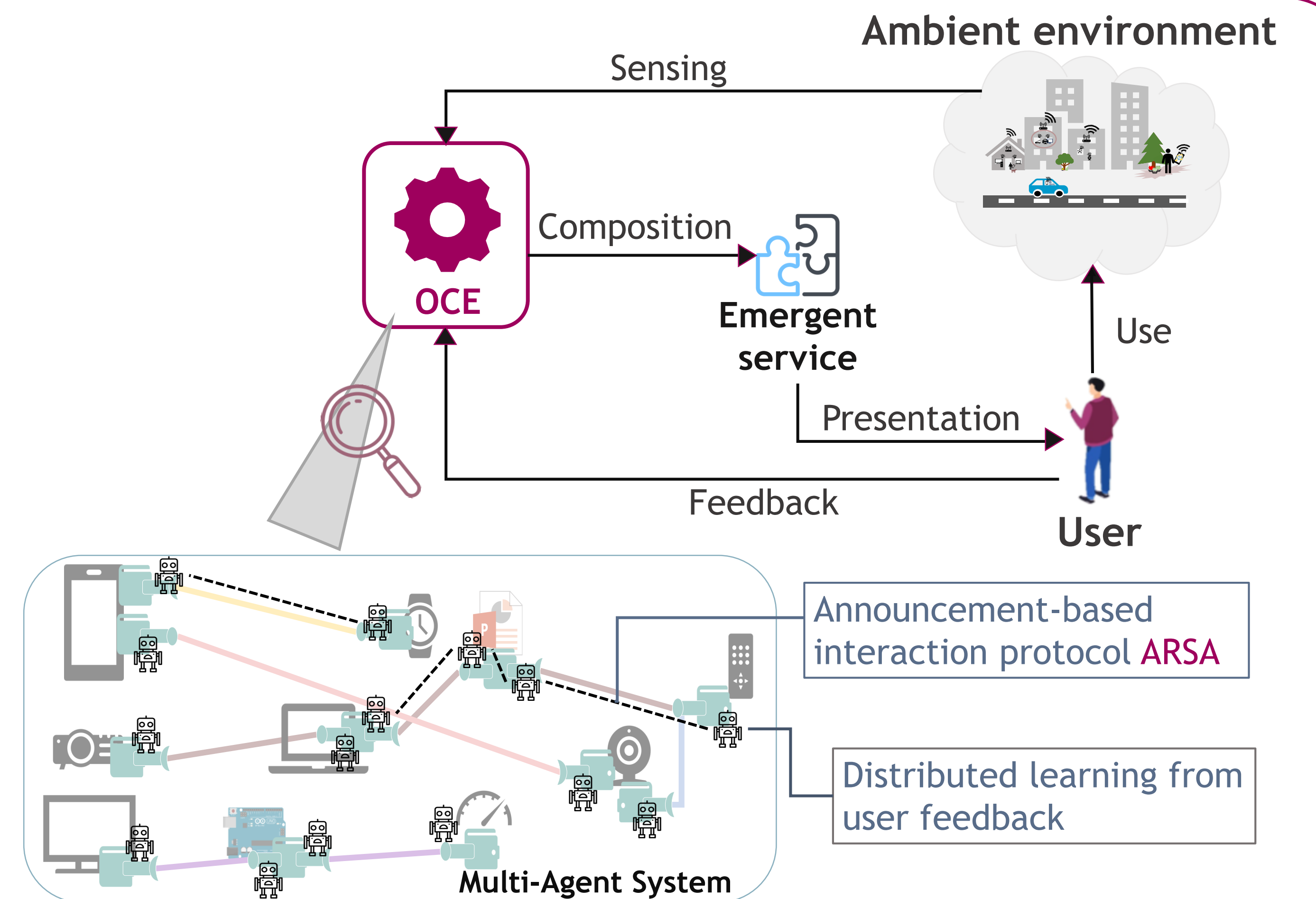
Composability  
Unpredictable availability

How to provide working and relevant composite services?



### Opportunistic Composition engine OCE

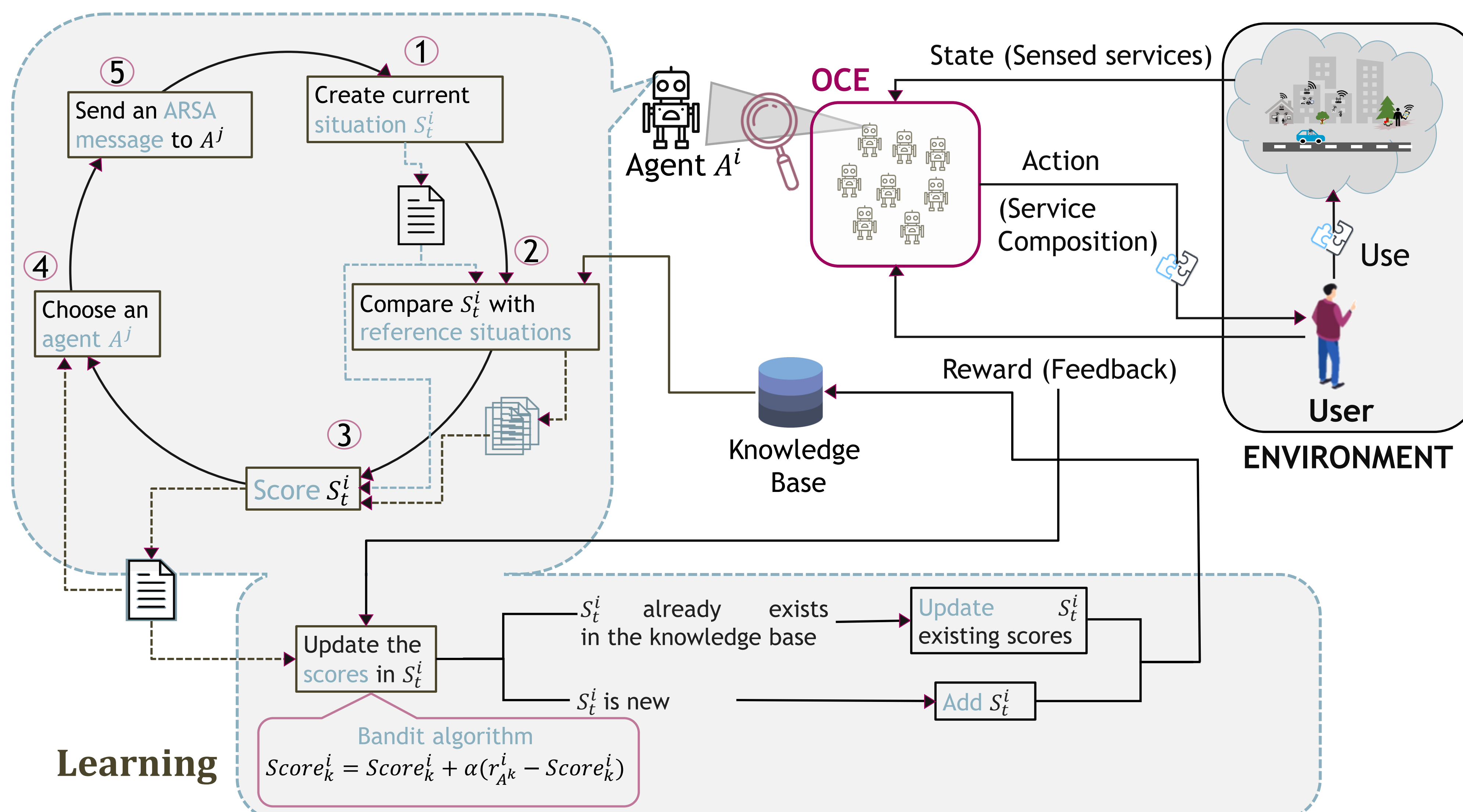
- Environment-directed automatic service composition
- Emergence of new composite services
- Dynamic and continuous adaptation to the context and the user
- Consideration of new appearing services
- Decentralized decision
- Online reinforcement distributed learning
- Domain independent



### OCE decision & learning

#### Decision

#### Online Reinforcement Learning



#### Current status

- On going implementation
- Experimentation & validation

#### Under discussion

- Which values for the learning parameters?
- Q-Learning (with a discount factor) instead of Bandit?
- How to manage the agent's knowledge in the long term (obsolescence)?

#### Perspectives

- Towards cooperative learning
- Towards diversification and enrichment of user feedback