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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

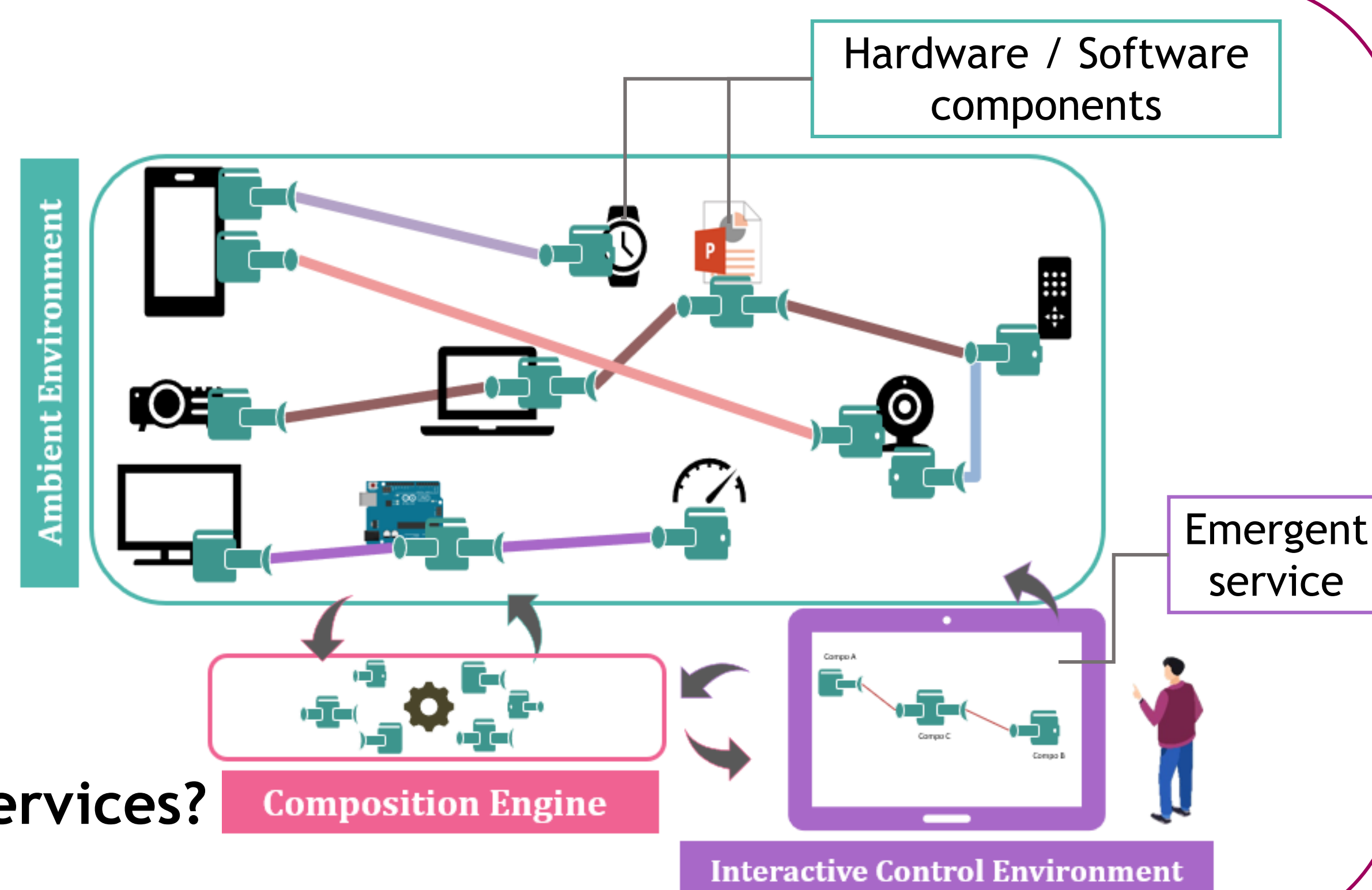
Environment

Uncertainty
 Instability

Components and services

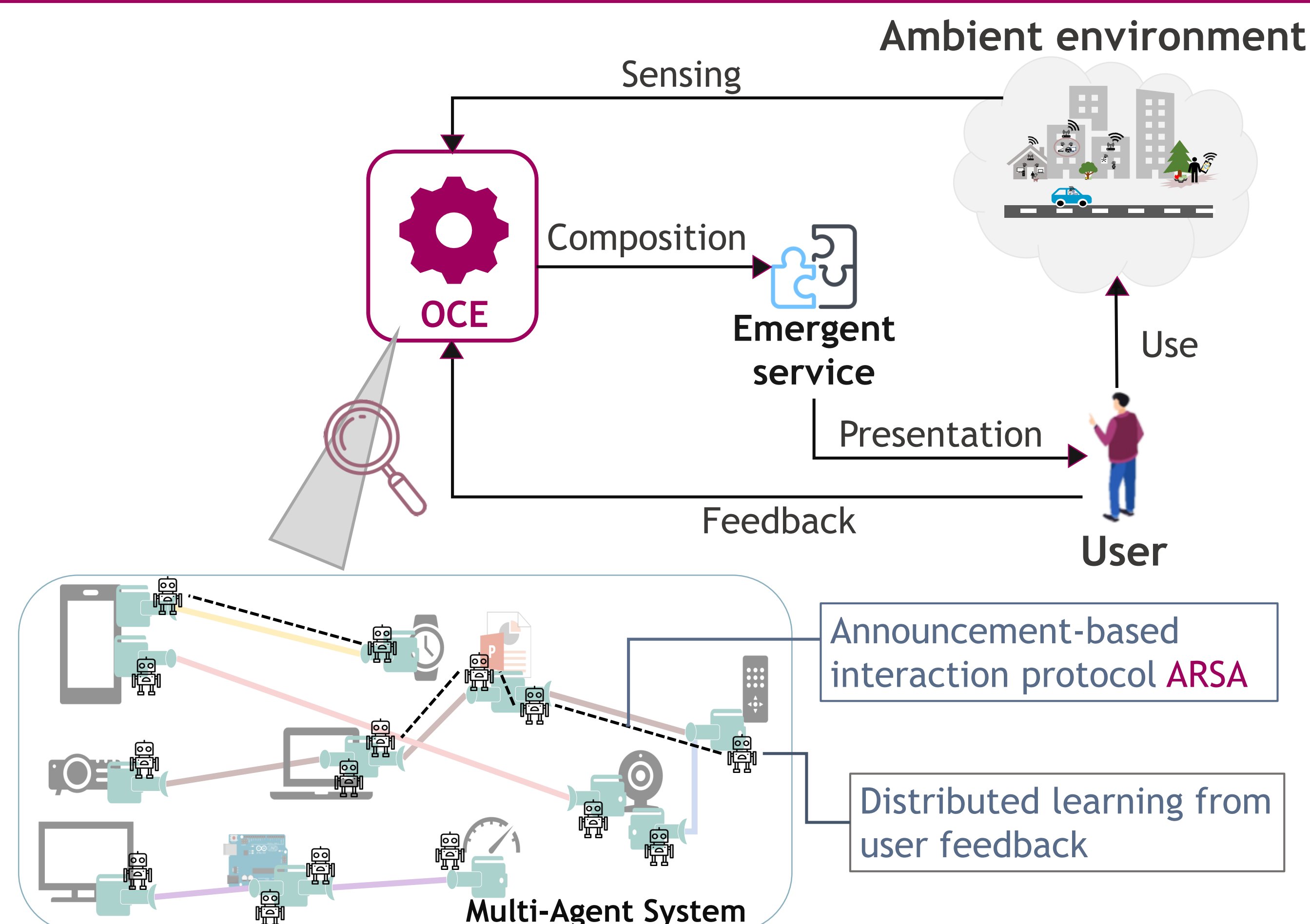
Composability
 Unpredictable availability

How to provide working and relevant composite services?



Opportunistic Composition engine OCE

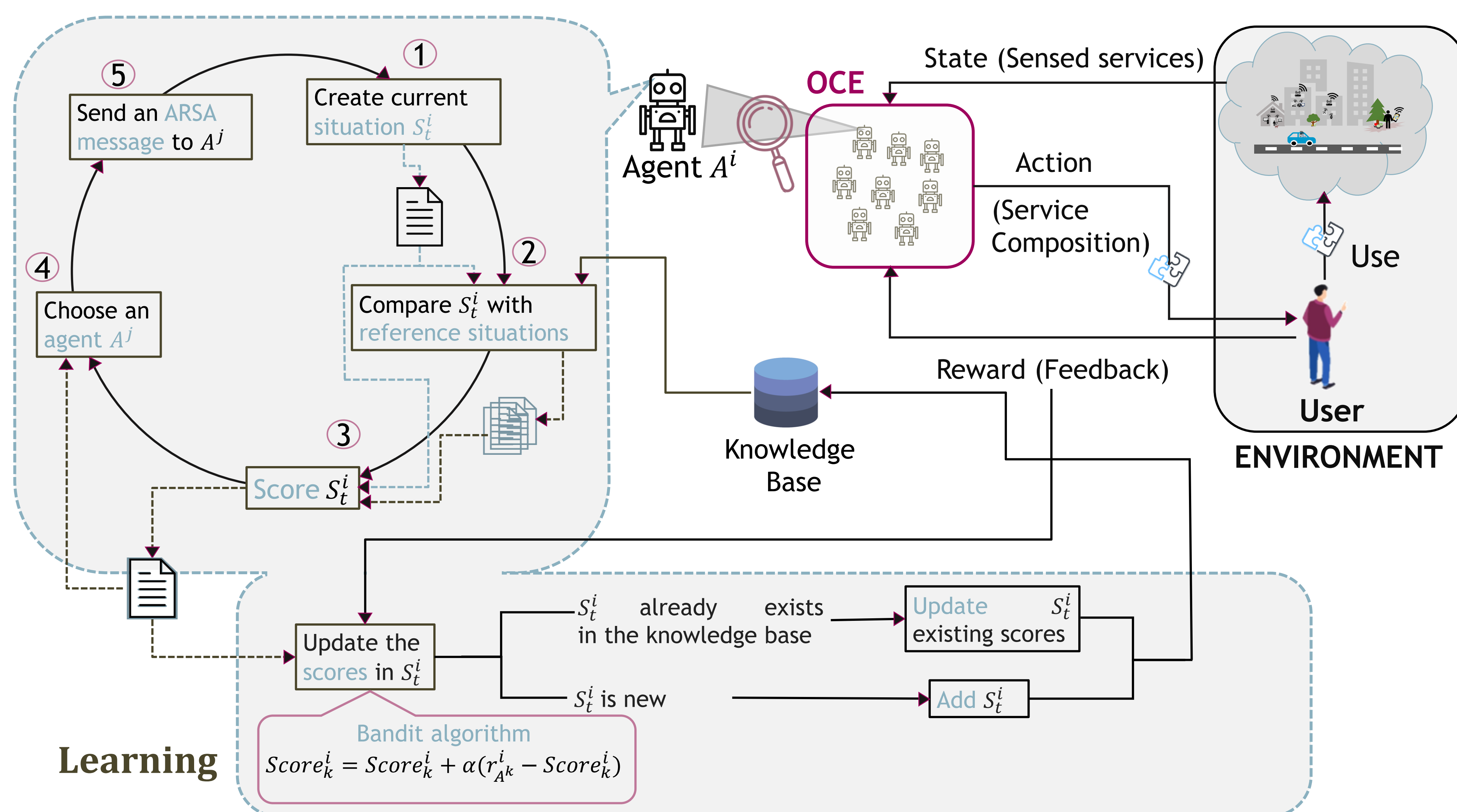
- Environment-directed automatic service composition
- Emergence of new composite services
- Dynamic and continuous adaptation to the context and the user
- Consideration of new appearing services
- Decentralized decision
- Online reinforcement distributed learning
- Domain independent



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