Services for Context Prediction and Proactive Adaptation in Ad-Hoc Environments

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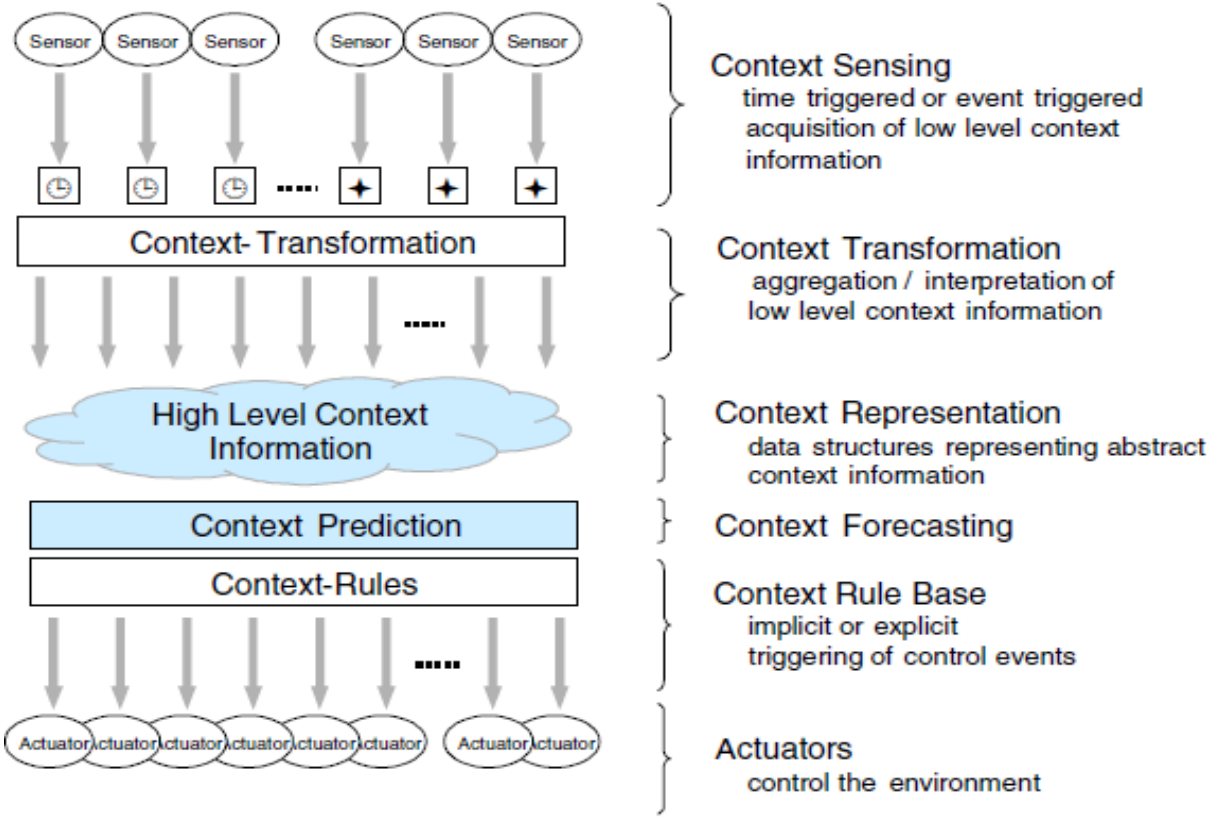
- Context prediction
- Act-Ahead-Adaptation
- Architecture
- Research challenges

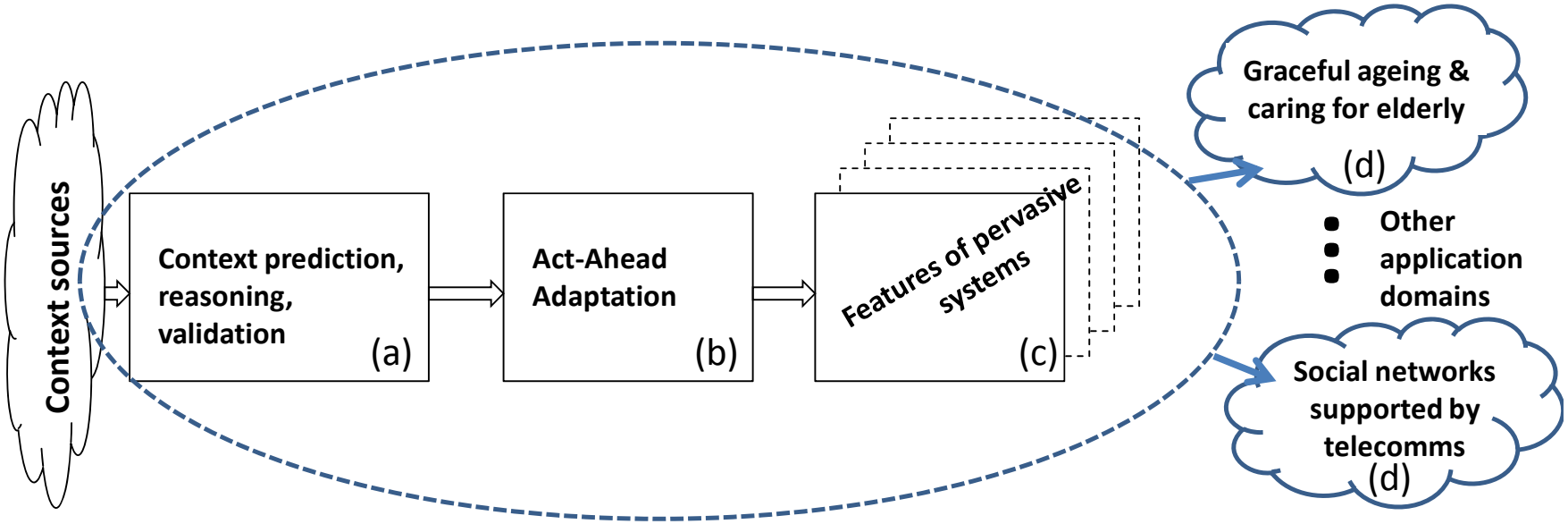
AFRL W/S "*Research Directions in Situational-aware Self-managed Proactive Computing in Wireless Adhoc Networks*", Kansas City, 23 May, 2010

Context prediction

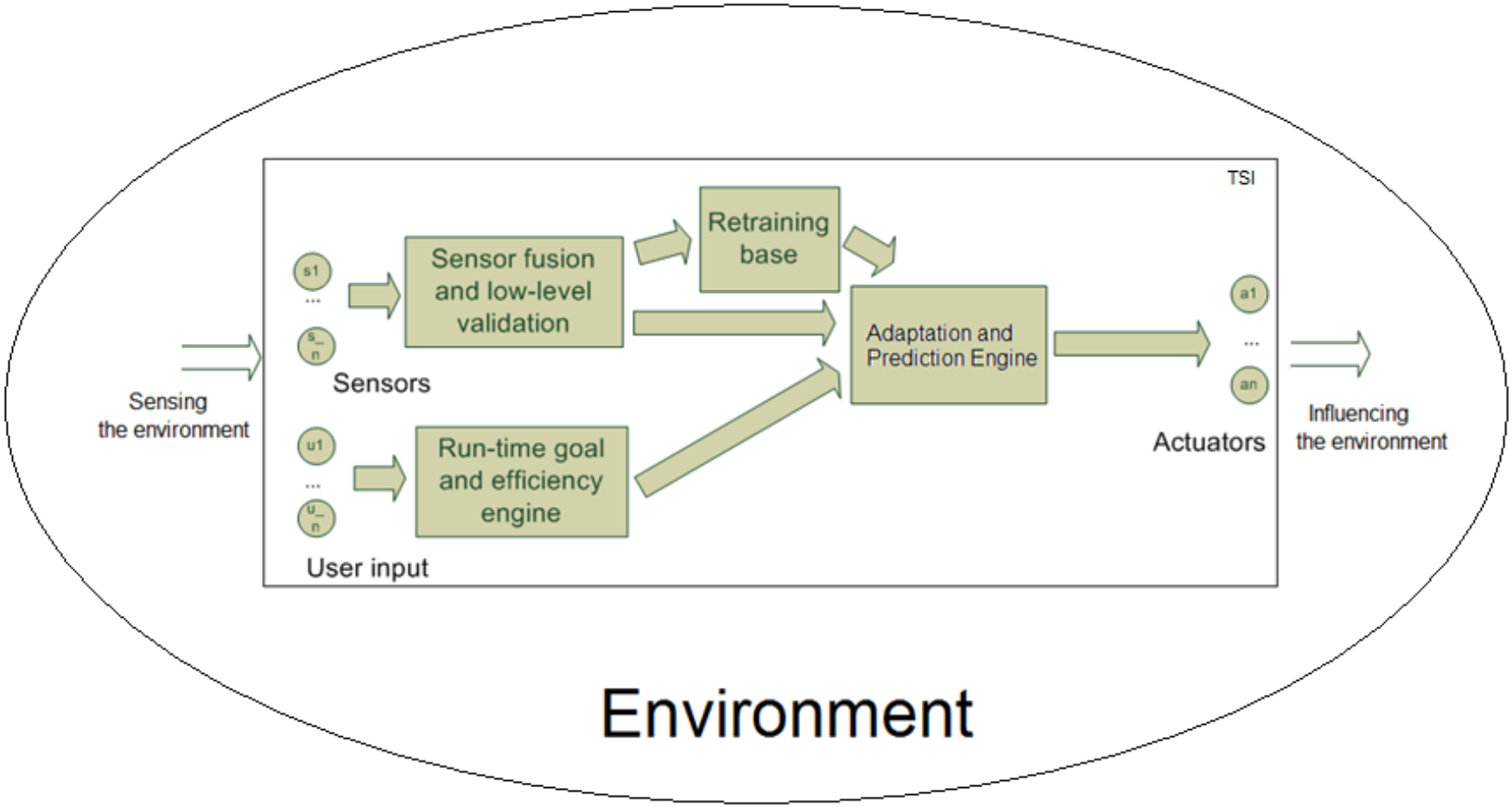
- Sequence prediction
- Markov chains
- Bayesian networks
- Neural networks
- Branch prediction
- Trajectory prolongation
- Expert systems



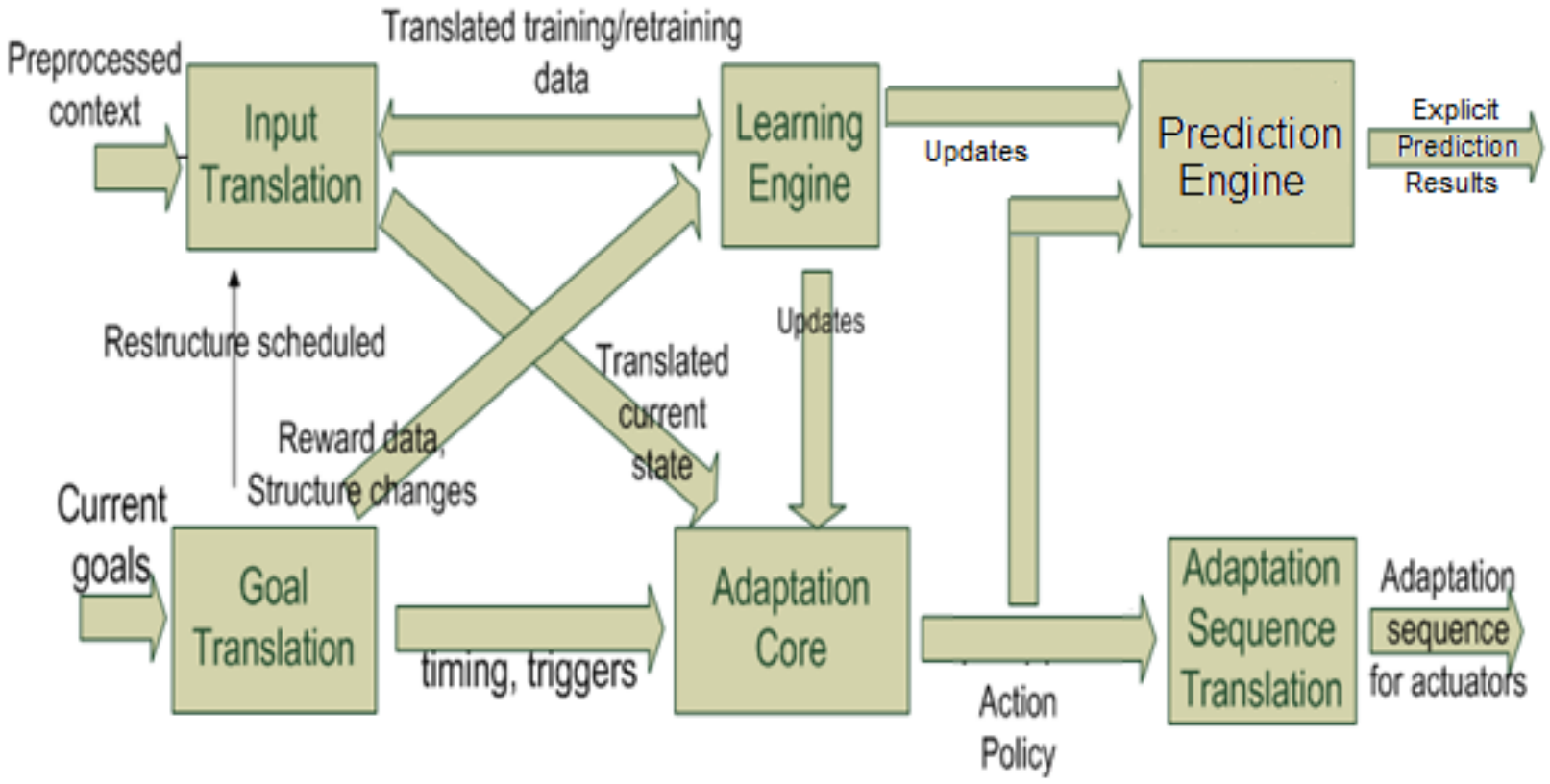
Context prediction & proactive adaptation



CALCHAS Architecture



Adaptation Engine



Features & Challenges of Proactive Adaptation

- Uncertainty & dealing with probabilities
- Continuous action spaces
- Continuous state spaces
- Mobility of nodes
- High dimensionality of context
- Lack of context quality metrics
- High heterogeneity of data
- Lack of ability to incorporate prior knowledge
- The need for explicit prediction result & above the threshold
- Limited exploration capabilities
- Limited time for decision making
- User objectives change ad hoc and require meaningful prompt support