Scenario: An Adaptive Social Network API

Adaptation mechanisms:
- Detect API-related integration mismatches; correspondingly deploy service mediators between clients and servers.
- Goal: guarantee robust interoperability.

Possible conflicts:
Mediators that modify server-side data to solve the mismatches of an application may negatively affect the behavior of other applications.

Example:
Gadget App1 uses the URL activity field. The adaptation mechanism detects a mismatch if this field is not supported by a server; it deploys a service mediator that stores URLs in a supported field and restores the URL field during retrieving.

However, gadget App2 is using the activity field too. App2 ignores the existence of the service mediator triggered by App1, thus ending up with retrieving inconsistent data.

Scenario: An Autonomic Data Center

Provided adaptation mechanisms:
- Exploit dynamically discovery and integration of third-party services.
- Manage/infer inter-/inter-system incompatibilities.
- Afford dynamic/unpredictable/fail-prone/reconfigurable environments and scarcely available resources.
- Exhibit unforeseen global and local behaviors due to side effects and unanticipated interactions.

Applications for: domestic, automotive, communication, entertainment, health/military support environment monitoring, transportation, energy production and management, ...

The coexistence of multiple adaptations may generate conflicts between mechanisms with different scopes or under the control of different components/applications.

Ad-hoc controllers need coordination to avoid conflicts.

Deeph adaptability:
Ability to adapt both as individuals and collectively, integrating adaptation mechanisms across devices, systems, and architectural layers.

Our idea: A reference architecture for deep adaptability
1. Exploit mature management technologies to manage system status information.
2. Represent plans as change sets over the management base.
3. Use content-management publish/subscribe infrastructure to distribute relevant information and allow for conflict resolution.

The path ahead (research agenda)
Investigate the suitability of application management technologies:
- Ability of storing both adaptation and application state information.
- Representing time dimensions of adaptation plans: scheduled time, duration, status (in-progress, committed, ...)
- Are ontologies and ontology research players?

Investigate relationships with mature management technologies from other fields:
- Network management, operating system management, ...

Investigate distributed conflict resolution strategies:
- Local/deterministic handling of conflicts (e.g., syntactic local merges).
- Context-dependence, negotiation requirements.

Enrich evidence: more and more scenarios and case studies.