Software-defined IoT Units for Cyber-physical Systems

1. Software-defined IoT units
   - Virtualizing and pooling IoT cloud resources and capabilities of IoT infrastructure.
   - Encapsulating fine-grained IoT resources and IoT capabilities in well-defined API.
   - Providing an ecosystem for software-defined IoT cloud to support multitude of involved stakeholders.
   - Automating provisioning and governance of IoT cloud systems.
   - Enabling new types of cross-domain applications in future smart cities.

2. Software-defined IoT gateway
   - Enabling flexible customization of IoT resources and end-devices (e.g., gateways).
   - Run-time modifications (e.g., of communication protocols).
   - Code distribution.
   - Location-agnostic operations.
   - Encompassing end-devices with reliability, availability, data quality, etc., aspects.
   - Fine-grained configuration of IoT capabilities.

3. Provisioning and governance
   - Automated IoT unit deployment based on TOSCA and SALSA.
   - Automated IoT unit composition.
   - Managed configuration based on Chef recipes.
   - Provisioning with late-bound policies.
   - Runtime governance.
   - Elastic operations and DevOps principles.
   - Enforcement of non-functional properties (e.g., reliability, availability, etc.) with plug-in controllers.

4. Application development support
   - Scalability of programming enabled by Scopes.
   - Efficient development with an intuitive Intent-based approach.
   - Abstracting low-level processes with Domain libraries.
   - Environment agnostic applications based on Origins and Actions.
   - Reusable applications.
   - Loose coupling due to runtime binding of Entities with physical environments.
   - Support for multitude of developers (e.g., domain experts and high-level programmers).

5. IoT market
   - IoT cloud infrastructure and platforms.
   - Marketplace for software-defined IoT units.
   - User interface for searching, testing, and licensing the IoT artifacts.
   - Software-defined IoT gateway that enables cloud connectivity, exposes data/control points, and provides an execution environment for IoT units.
   - A tool-suit for provisioning and runtime governance of software-defined IoT cloud systems.

References