Cognitive Architecture for Future Internet Core Platform

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Future Internet key entities and their rationale

- **Actors**: entities (e.g. users, providers, prosumers, developers...) whose needs fulfillment is the goal of the Future Internet.
- **Resources**: entities (e.g. networks, services, contents, devices...) which can be exploited for fulfilling Actors' needs.
- **Applications**: used by the Actors to fulfill their needs.

The goal of the Future Internet Core Platform is to allow Applications to transparently, efficiently and flexibly exploit the available Resources.

The Future Internet Core Platform includes:

- **Semantic Virtualization Enablers** virtualizing heterogeneous Actors, Resources and Applications, by describing them using dynamic, homogeneous, context-aware, semantic, multi-layer, multi-network, aggregated metadata.

- **Cognitive Enablers**: set of independent, modular, technology-independent enablers which, on the basis of the aggregated metadata provided by the Semantic Virtualization Enablers, take multi-layer, multi-network, control & management decisions to exploit the available Resources.
High-level Future Internet Core Platform Architecture

Resources:
- Cloud
- Services
- Terminals
- Computational
- Storage
- Contents
- Devices
- Networks

Actors:
- Developers
- Users
- Service Providers
- Prosumers
- Content Providers
- Network Providers

Semantic Virtualization Enablers

Cognitive Enablers:
- Resource Adaptation & Composition
- Connectivity
- Preferences, Profiling, Context
- Identity, Privacy, Confidentiality
- Multimedia Content Analysis and Delivery
- Generic Enabler X
- Generic Enabler Y
- Generic Enabler Z

Future Internet – Core Platform
Key underlying concepts

- **Semantic Virtualization of Actors, Resources and Applications**
  - Semantic Virtualization Enablers generate dynamic, homogeneous, context-aware, semantic, multi-layer, multi-network, aggregated metadata, i.e. a very "rich" information tailored on the specific scenario, which is used as valuable input for the Cognitive Enablers.
  - Natural interoperation among all the existing (and future), available and heterogeneous Resources, Actors and Applications.

- **Full Cognitivity**
  - The "richness" of the input information, coupled with proper Cognitive Enabler algorithms should allow to achieve cross-layer and cross-network optimization.
  - Technology independence and multi-layer nature of the Cognitive Enablers allow the use of advanced multi-object control and optimization methodologies for Cognitive Enabler algorithm design.

- **Architecture Modularity and Adaptability**
  - The Core Platform can exploit one or more of the Cognitive Enablers in a dynamic fashion, depending on the specific scenario.
  - New or updated Cognitive Enablers can be easily added.
  - New Actors, Resources, Applications can be dynamically interfaced with the Core Platform through standard interfaces.
  - The input information required by the Cognitive Enablers can be tailored on the specific scenario.