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SILO: A composable protocol framework as a GENI experimenter tool

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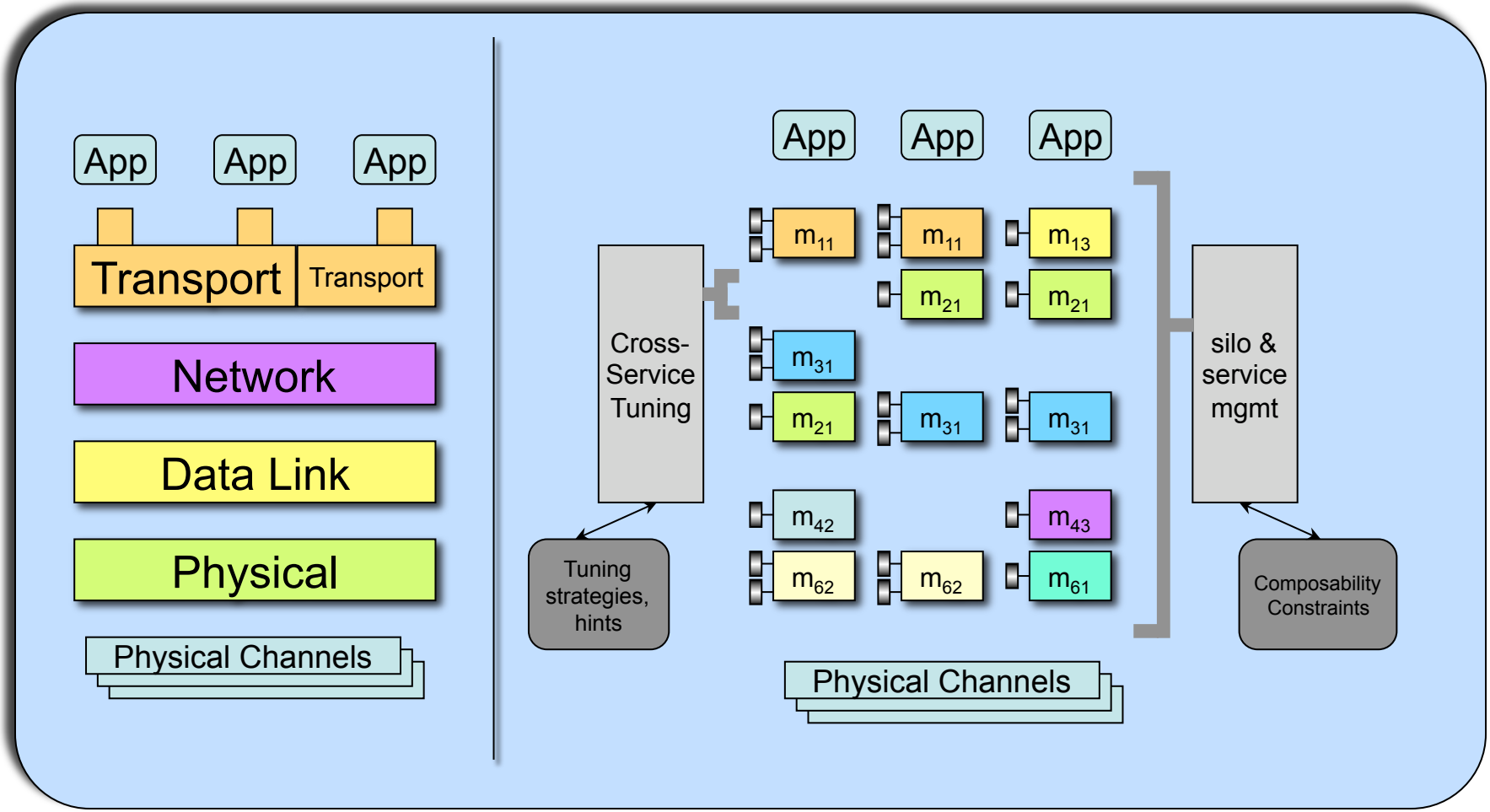
Traditional and SILO network stacks



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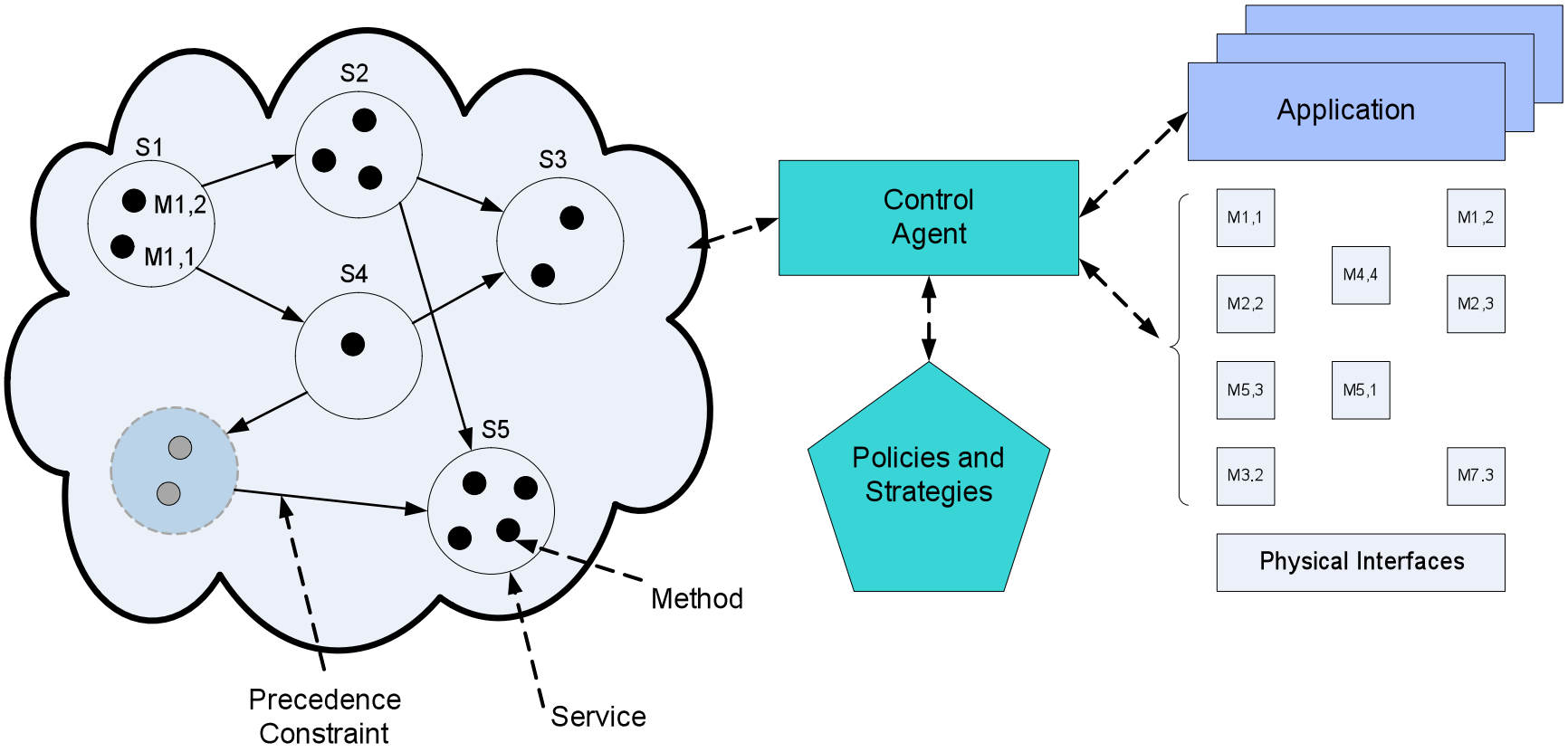
SILO architecture high-level view



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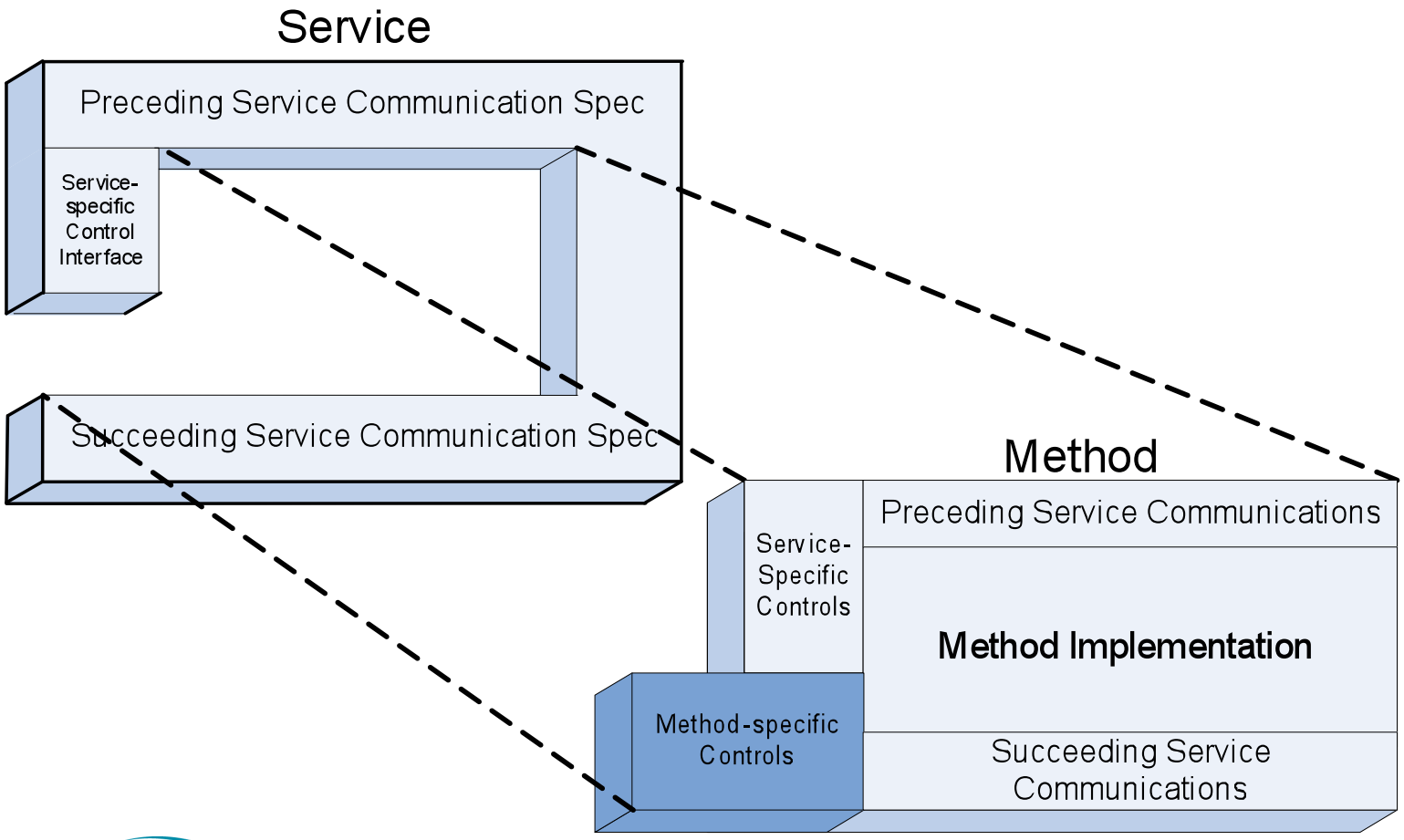
Service/Method Paradigm



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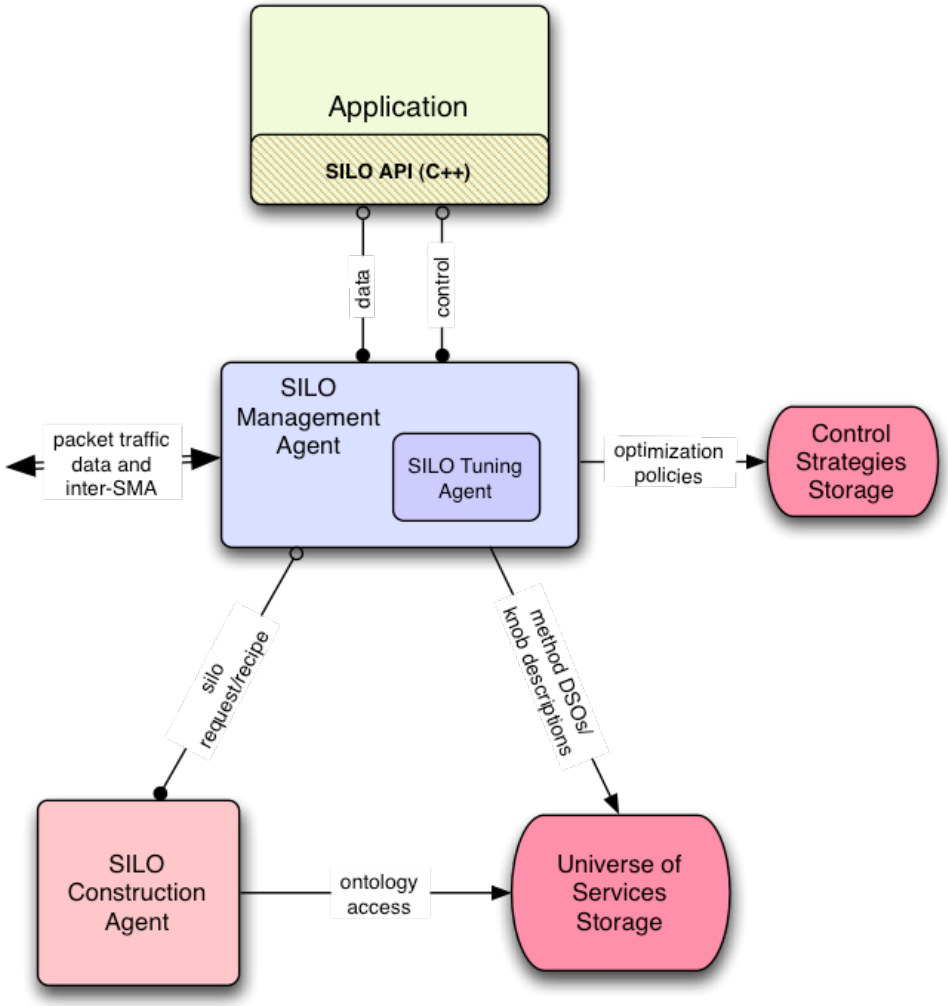
Silo Prototype

- **User-space open framework**
  - **C++ and Python**
- **Methods are DLLs with a well-defined interface**
- ***Silo construction agent* uses ontology to create an XML "recipe" for a silo**
- ***Silo Management Agent***
  - **Loads and executes the code for silos based on packet events**
  - **Maintains silo state**
- ***Silo Tuning Agent* is a container for tuning algorithms/strategies associated with services**
- ***Universe of Services* contains the ontology and dynamically loadable code implementing methods**



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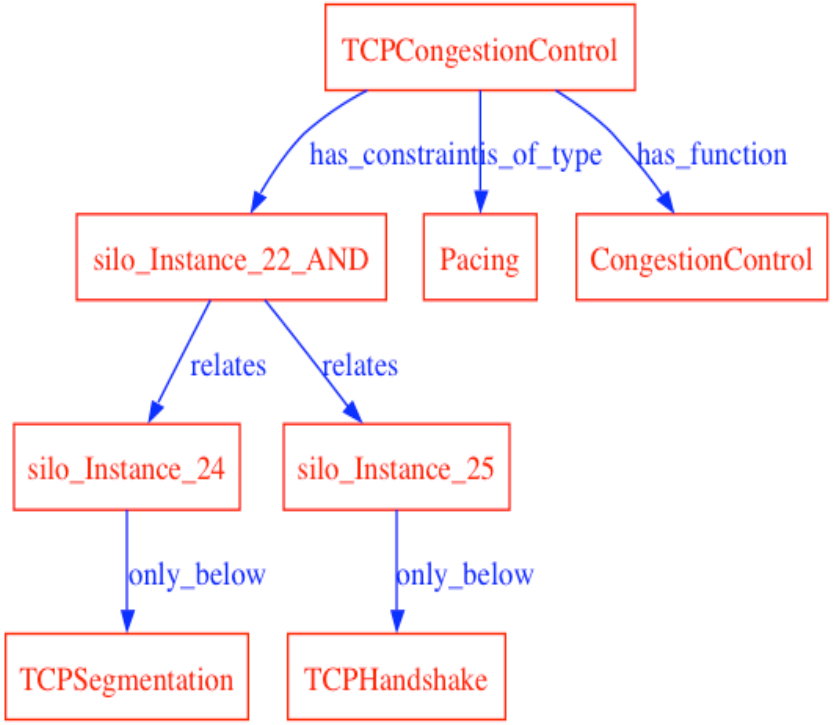
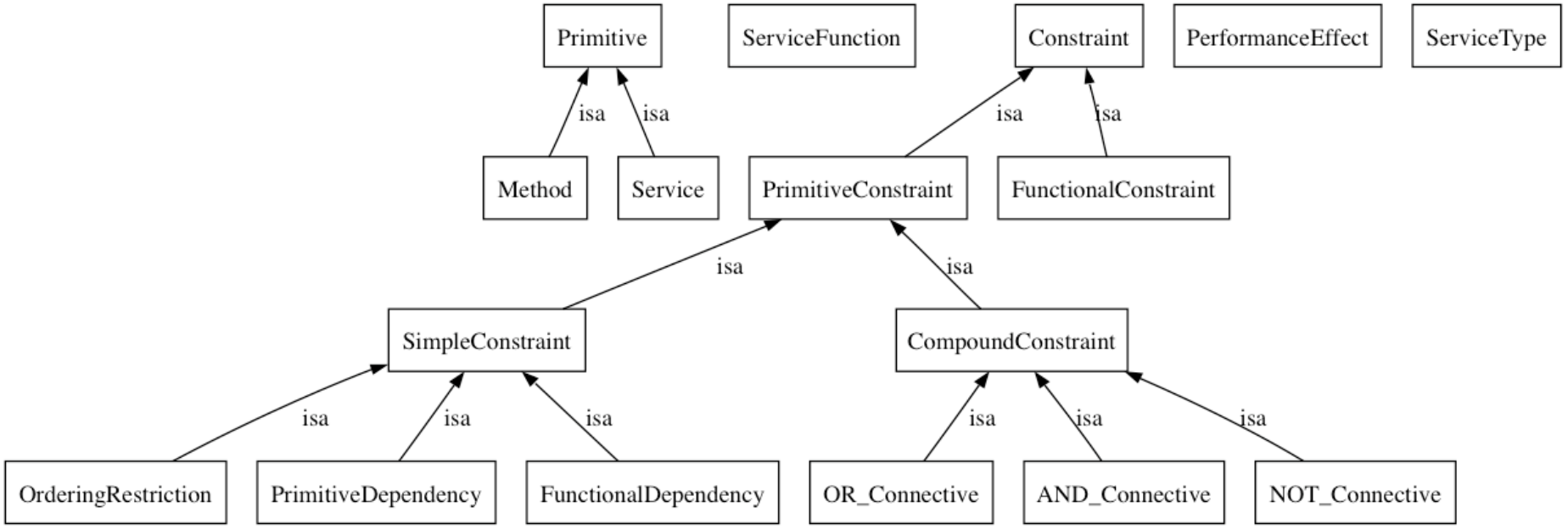
SILO Ontology

- **Encodes knowledge on relations between services and methods**
- **Written using Protégé in RDF**
- **Work in progress**

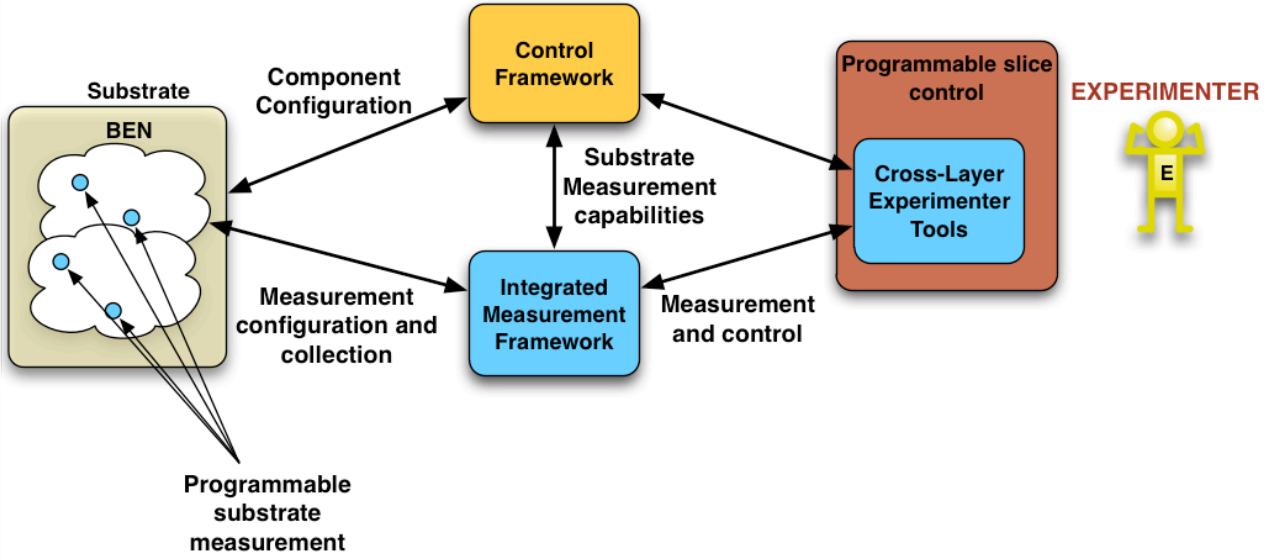


Ontology Classes



SILO as a research tool

- **Framework deploys into a slice**
- **Researcher brings**
  - **Custom services**
  - **Tuning algorithms**
  - **Ontology updates**
- **Can connect to a measurement framework to provide a *cross-layer* protocol experimentation tool**



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Wireless example: adaptive transport

- **Goal: design a set of services and cross-layer tuning algorithm to maximize goodput across a wireless network**
  - **Adaptive FEC service**
  - **Adaptive MTU service**
  - **Adaptive window management service**
  - **Tuning algorithm to manage the knobs**

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Optical example: impairment-aware routing

- **Goal: design an optical-impairment-aware routing protocol that maximizes network utilization**
  - **In-substrate distributed impairment measurement capabilities (e.g. PMD)**
  - **Routing service capable of using the information**

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Needed infrastructure

- **SILO infrastructure deployed into the slice**
  - **Most likely in-kernel**
- **SILO universe accessible from the slice**
  - **Ontology, service library, tuning algorithms**
- **Ability to include custom services, ontology updates, tuning algorithms**
  - **Through a slice manager**
- **Ability to deploy a specialized recipe into slices**
  - **Through custom applications**
- **Measurements**
  - **Services will have 'gauges' defined that may be included in the experiment data collection**
  - **Interface with a measurement framework if present**
- **For repeatability, slice recipes must be preserved**
  - **Core and edge**

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