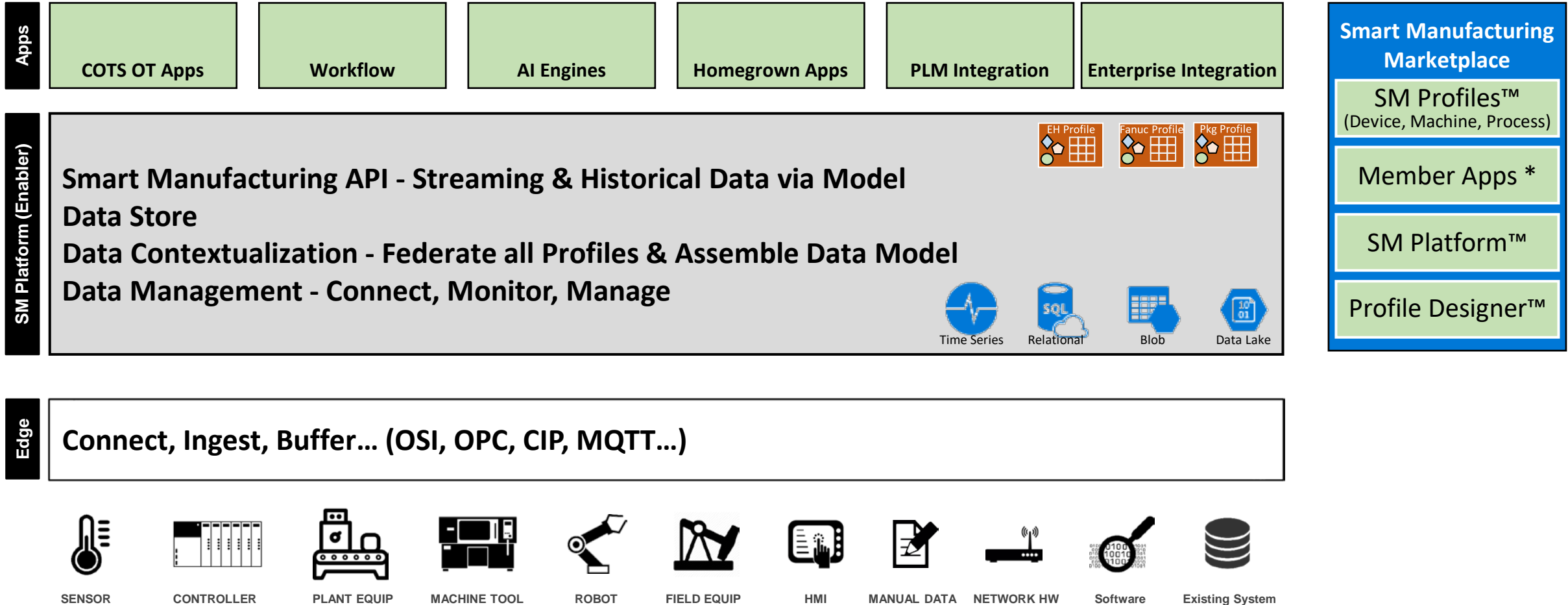


**Smart Manufacturing
Tech Overview**

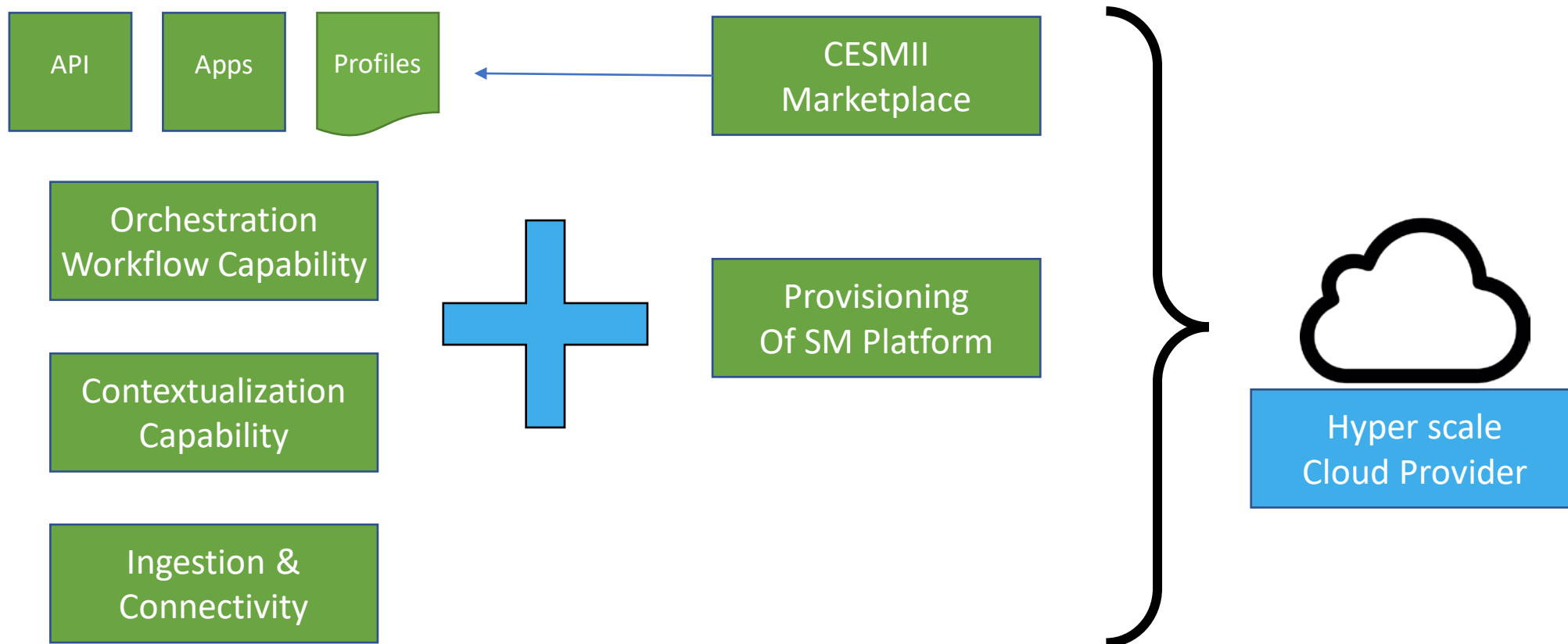
January 2020



CESMII SM Platform™ “Markitecture”

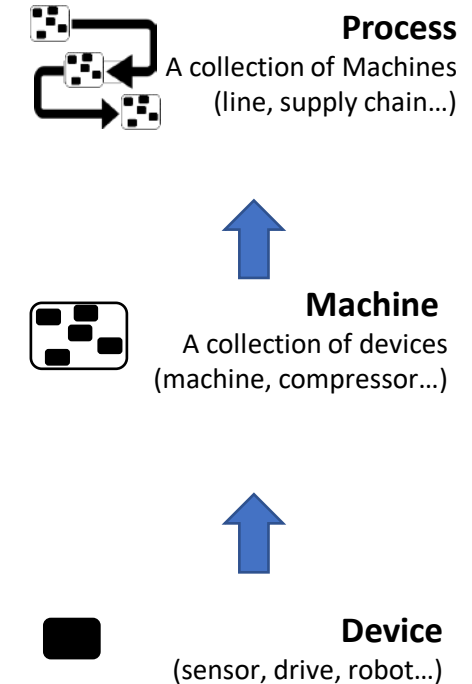
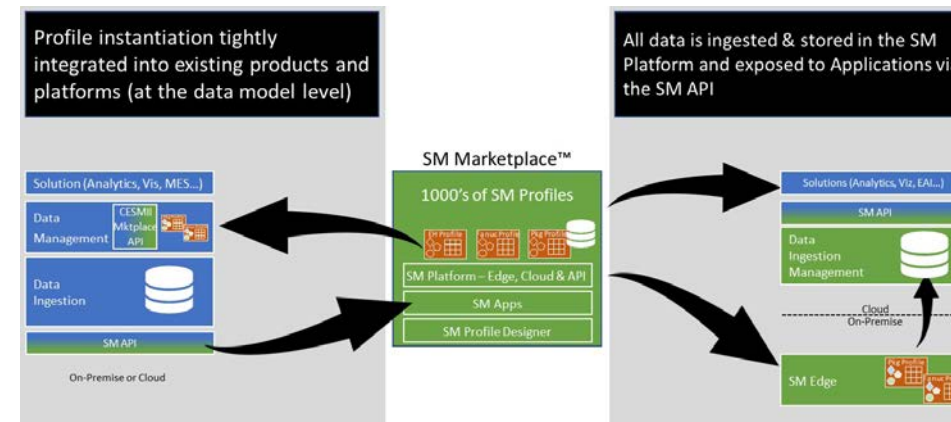
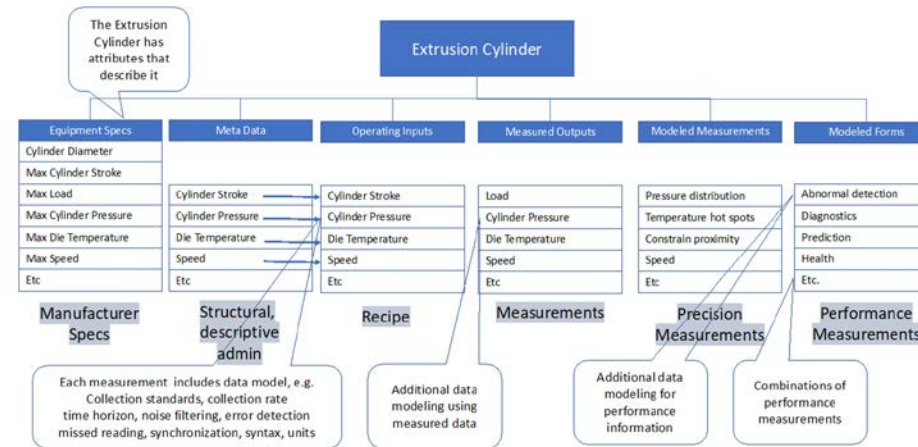


CESMII SM Platform™ Core Capabilities



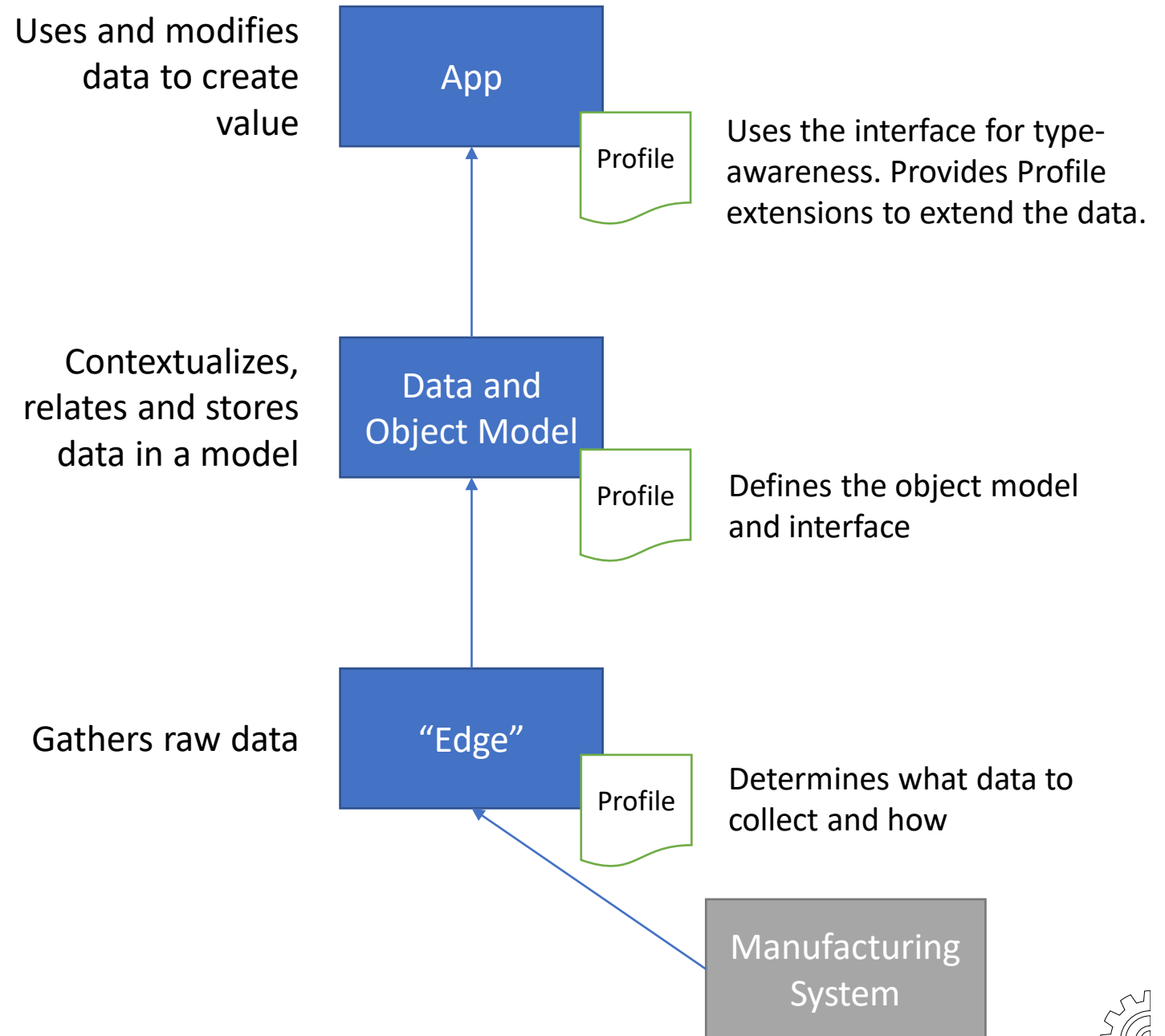
What is the CESMII SM Profile?

- SM Profiles will **capture the key attributes** of a device, asset, flow-path etc in a structured contextualized data model
- These profiles will be **collaboratively developed** by subject matter experts from CESMII membership
- The SM Profile will **enable** components and applications in the SM platform to **interoperate** and allow **information to flow freely** between them without losing context.
- The SM Platform, SM Profiles and SM Apps will all be **provisioned from the SM Marketplace** for use by CESMII's members.



SM PROFILES™ TYING IT ALL TOGETHER

SM Profiles are an extension to the OPC/UA Information Model that can be distributed to automate the creation of information value throughout a software architecture.



Profile Design Personas

Personas



Machine or Process Designer: this persona has significant knowledge about a specific machine or process, and the general class to which that entity belongs. In the case of a machine, this persona might be the machine builder or designer, deeply familiar with the particular machine and other similar types of machines. In the case of a manufacturing process, this persona will be well versed in the process, its behaviors, physics and commonly used data points.



Machine or Process Implementer/Integrator: this persona has knowledge about how a machine or process is implemented, including specific communication technologies for a given instance. They would likely be involved in the programming of the machine or process, specifically applying their knowledge to cause the machine or process to be useful in a given situation, or to integrate with other manufacturing systems



Application Developer or Data Scientist: this persona wants to work with the data produced by a machine or process – either extending that data or leveraging it to solve a problem – possibly both. This persona may not have instance-specific machine or process knowledge, rather domain knowledge around an application, algorithm or research effort that create new value on top of the existing Profile.

COMPARISONS WITH COMPLEMENTARY EFFORTS

OPC UA	MT Connect	CESMII Profile Effort
An XML based “language”	A specific XML based “interface” in the OPC UA language	(Probably) XML based class definitions and interfaces in the OPC UA language
General semantic for information modeling (can be used for anything)	Specific semantic for machine modeling (pre-defined models) initially focused on CNCs	Multi-part semantic for distribution, protocol binding and extensible object creation
Type-safe, infinitely extensible at design time	Type-safe, monolithic as defined at the time of specification	Type-safe, specific extensions and polymorphism at run-time
Primarily focused on making data flow generally upward (although can be used horizontally and bi-directionally) where the implementer selects the data set.	Primarily focused on machine-to-machine status and control (although can be used vertically) where the specification defines the data set.	Primarily focused on shifting the responsibility for selection of data and automating acquisition (take the burden off the customer)
Specification includes the behavior of the client and server (and publisher and subscriber). Type discovery implicit. Implementation and protocol translation are up to the vendor.	Specification defines an Agent that abstracts the machine to another layer that exposes data (and commands) on behalf of the machine. Type discovery via pre-definition. Translation up to the vendor.	Implementation will require member contributions to support protocol adaption. Reference implementations will be made available, but open for other vendor implementations. Type discovery through Profile distribution.