

11 years of T2TRG

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11 years??

- CoAP approved by IESG **2013-07-11**
- We did the engineering — Now what?
- Making CoAP (and the other IETF IoT specs) work in reality: in part a research problem!

Why a Research Group now?

- First wave of IoT standards completed by the IETF
- IoT Consortia now forming to build infrastructure and industry agreements around those
- New requirements for research:
based on actual usage of the standards now available

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- **2015-02-12**: T2TRG started as a proposed RG, met @ IETF92 (Dallas), IETF93 (Prague), W3C TPAC, ...
- **2015-12-02**: T2TRG now Active RG; chairs: Ari Keränen, Carsten Bormann

Done so far

- RG documents:
RFC 8576 (IoT Security),
RFC 9556 (IoT Edge Challenges and Functions),
4 more getting ready for publication,
more “document a single concept/idea” I-Ds (45 “expired”)
- Information/Interaction modeling: meetings with W3C; IAB IoTSI/IoTSU;
E.g., Work on IoT Semantic/Hypermedia Interoperability (**WISHI**):
original workshop in 2017, 5 hackathons, ~40 virtual meetings
- Coordinating with **other SDOs** on IETF IoT technologies
(OCF, OMA SpecWorks, W3C, Bluetooth SIG; OneDM liaison)
- Explored range of topics:
hypermedia, semantic interop, edge computing & IoT,
co-existence, {automated, lightweight, next steps in} security

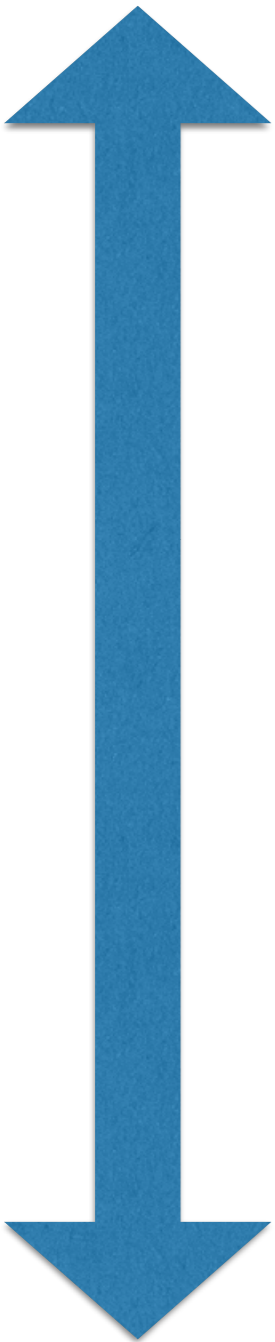
Impact

- Working across SDOs and communities working on common topics:
 - Bringing closer together:
 - SDOs (W3C, OCF, OMA, Bluetooth SIG, OneDM liaison group...)
 - Implementer communities (RIOT, Eclipse, ...)
- Working with IETF community
 - Good collaboration with many IETF WGs and RGs
 - ↑ Challenges beyond WG scope → research at the RG
 - ↓ Matured ideas from research → standards work at the WGs
 - Common RG topics

Work continues (1): **Information/Interaction Modeling**

- Started as “Work on IoT Semantic/Hypermedia Interoperability” (WISHI)
 - IETF Offshoot: ASDF WG;
interaction with YANG ecosystem
 - Interacting with One Data Model liaison group & relevant SDOs
- New: NIPC@ASDF, how does modeling/self-description help in gateway functions (here: non-IP)

4



Information Model

Semantic Level
Vocabulary
Taxonomy
Meaning
Ontology

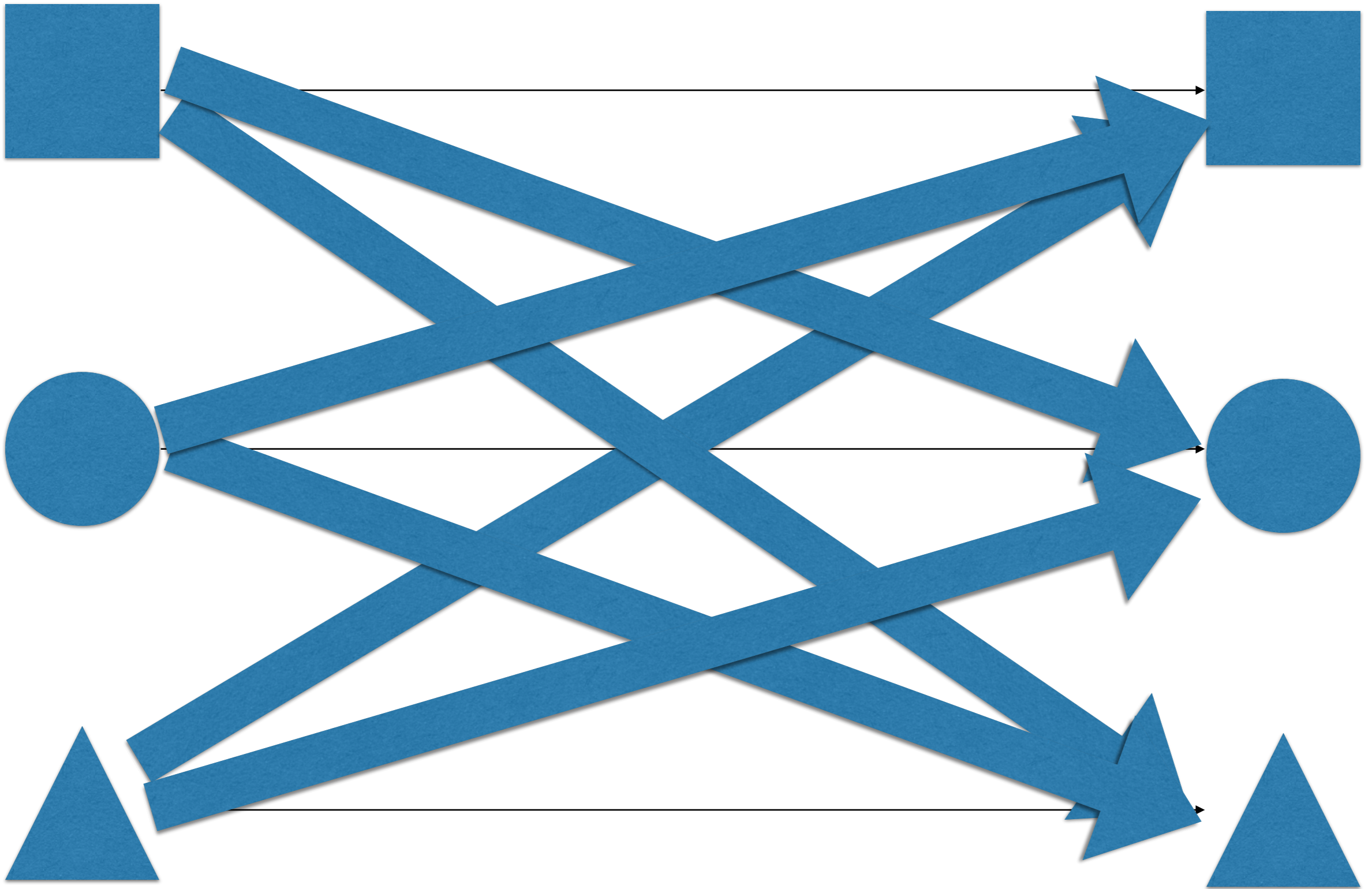
Data Model

Abstract
Syntax

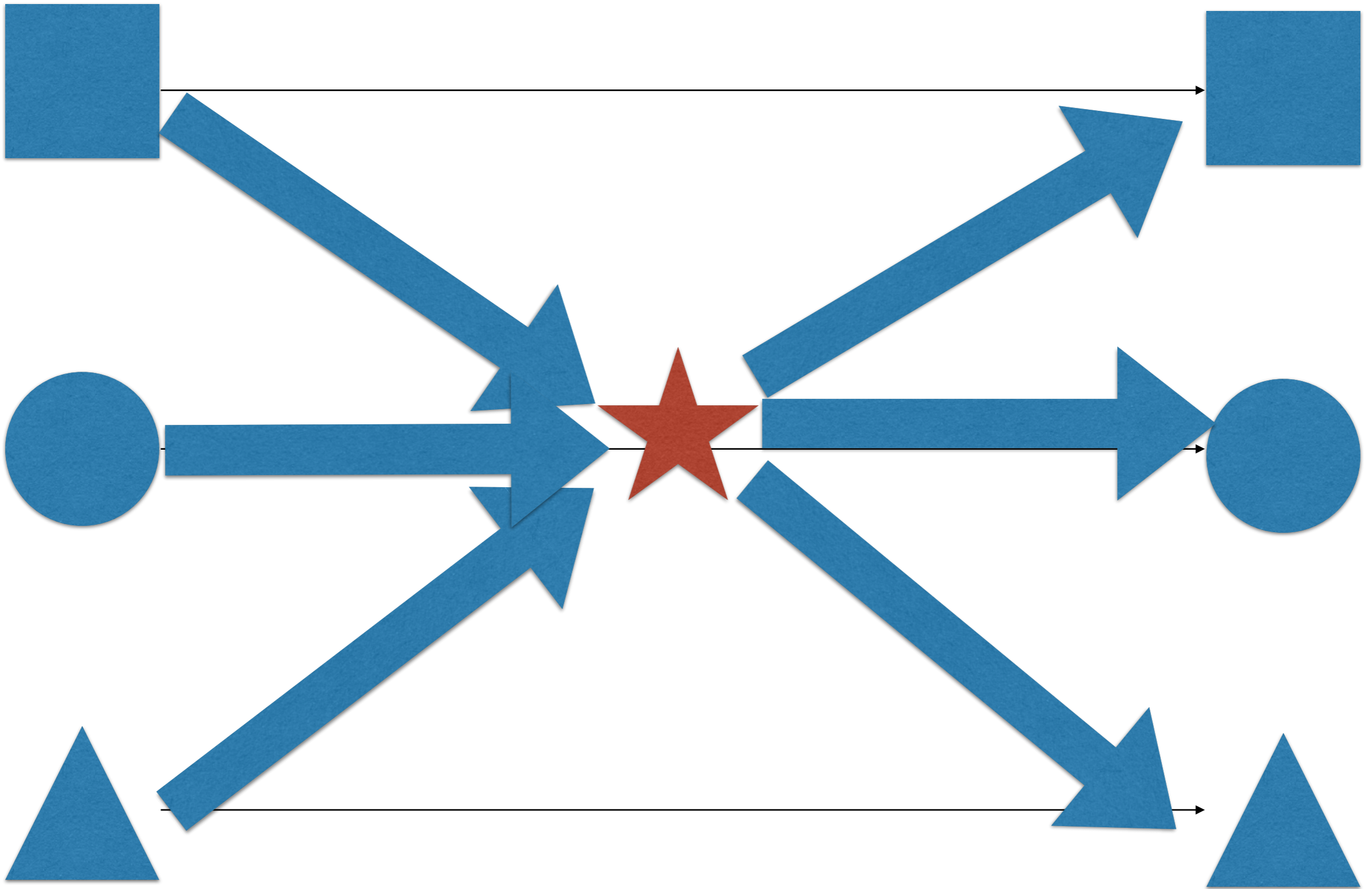
Serialization

Encoding
Message
Transport
Format
Marshaling
Scheme
Concrete
Syntax

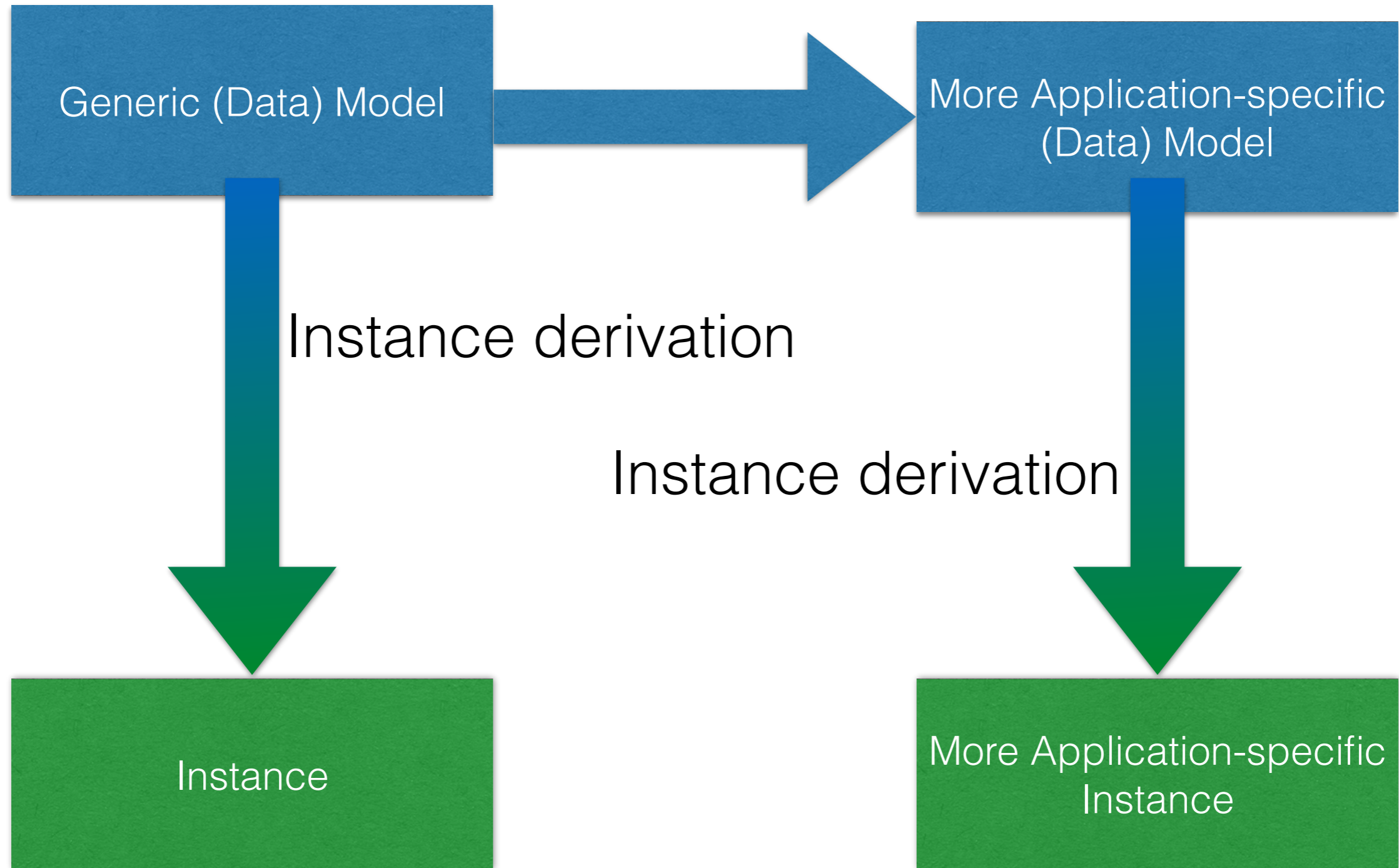
$$n^2 - n$$



$2n$



Model derivation



Where are we going (2): **Security**

- Approach from participant roles, objectives, beliefs
 - Continue survey-style activities
 - draft-irtf-t2trg-security-setup-iot-devices
 - draft-irtf-t2trg-taxonomy-manufacturer-anchors
 - draft-irtf-t2trg-amplification-attacks
- Develop statements of direction/architectures
 - *Overview of Architecture and Components for **Secure Group Communication** with CoAP*
 - *Building onion routing from CoRE building blocks*

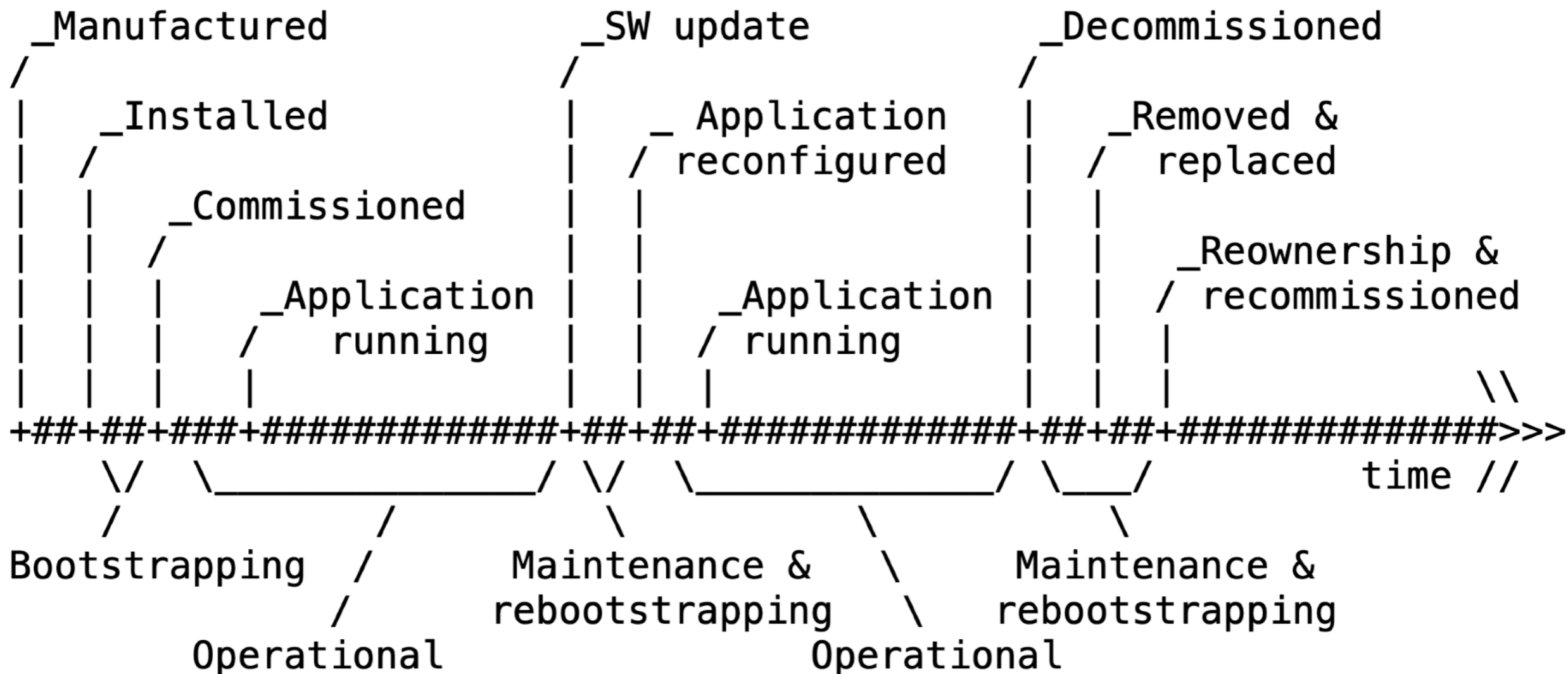


Figure 1: The Lifecycle of a Thing in the Internet of Things

Where are we going (3): **Sustainability**

- IETF IoT was *always* about power usage (RFC 7228 “Constrained Node” is low-resource)
- Wasting energy in the use phase? ✓ 💰
 - Now, look more at the *system* than just the low-resource “user equipment”
- Wasting embodied energy? ✓ (IoTSU → SUIIT)
 - Look more at lifecycles and “right to reuse” prerequisites
- Discuss sustainability with pRG SUSTAIN and others