A Semantic Definition Format (ASDF) for Data and Interactions of Things

ASDF BOF @ IETF 108
July 28, 2020

Note Well

- You will be recorded
- Be nice, and be professional
- The IPR guidelines of the IETF apply:
  see **http://ietf.org/ipr** for details.

Repo: https://github.com/one-data-model/ietf108
Notes: https://codimd.ietf.org/notes-ietf-108-asdf

Agenda

(10) Tool Wastage

- (30) Intro; brief introduction into OneDM, SDF (Proponents); clarifying questions
- (20) Views of contributing ecosystems (Bluetooth, OCF, OMA [LwM2M], Zigbee) and a few interested vendors (…); clarifying questions
- (30) Discussion (beyond clarifying questions)
- (10) Calling the questions

The problem

- IoT: Many different devices
- Standards for these are being developed in different ecosystems
- “temperature sensor” in ecosystem A ≠ “temperature sensor” in B
- There is no point in this diversity, and immense resources are wasted
- Harmonize device data models ➔ **One Data Model**
  (well, there are hundreds, for **different** kinds of devices)

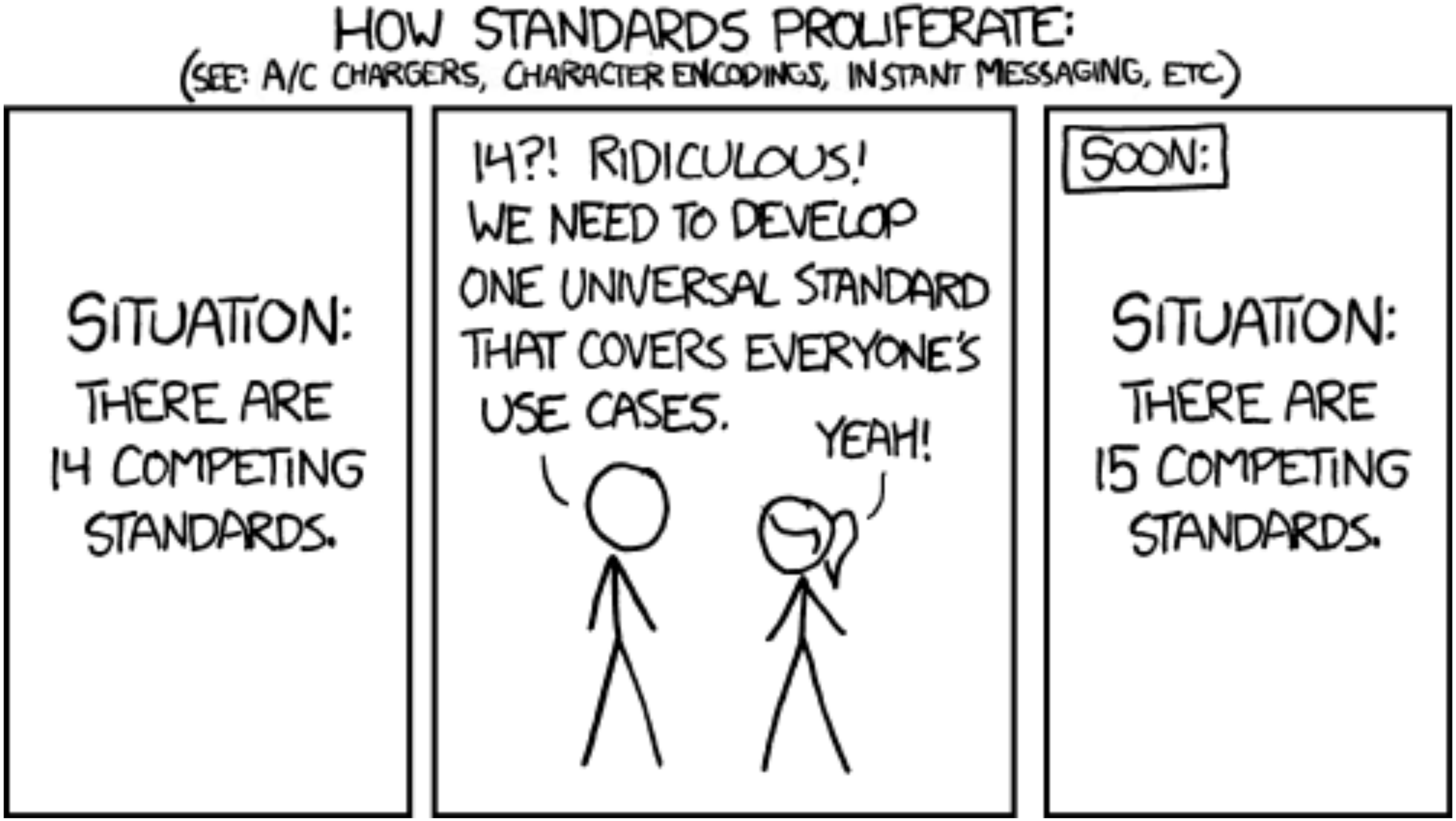
We don’t need another wire format

- OneDM “data models” really are information models [RFC 3444], plus (Internet-side) interaction models
- Wire formats, protocol details: come up as “protocol bindings” that can be attached to these models
- Language needs to foster modeling **at the right level of abstraction**
- OneDM: not a replacement for existing wire formats or the modeling techniques specific to them

Wait, we already have…

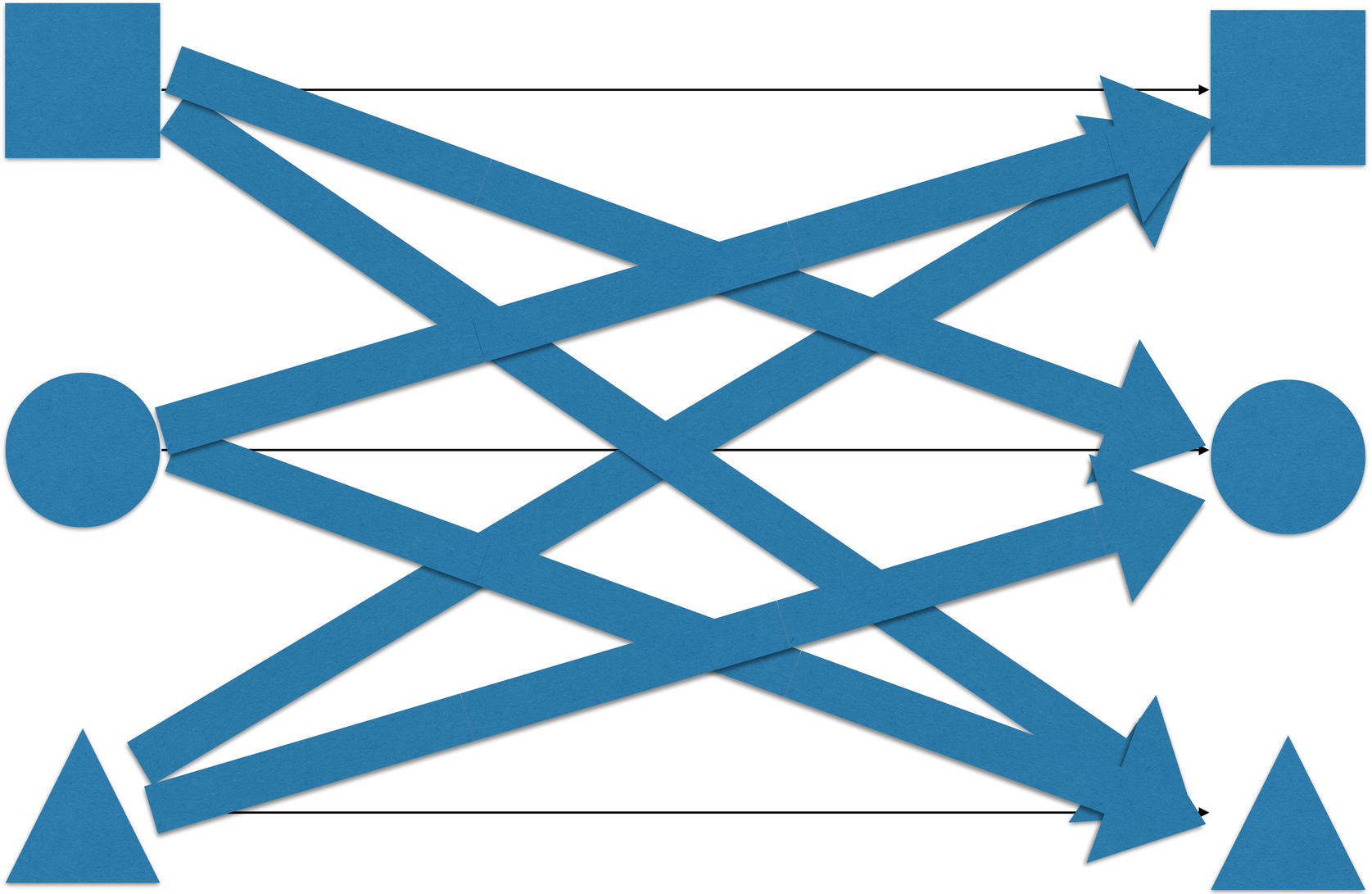
- SenML (RFC 8428): Defines an overall data model (wire format) for data from (and to) all kinds of devices — doesn't know what a temperature sensor is
- CDDL (RFC 8610): Can be used to define actual **data models** — we were cheating a bit, this is actually about **data and interaction models**
- W3C Thing Descriptions: Define a single device (Thing) with its affordances, data models, and protocol bindings (network perspective) — **RDF**-based (JSON-LD) hypermedia format ("HTML pages for IoT devices")
- [insert other activities here, YANG, …]
- ASDF objective: really **help** in **harmonizing** data models for large sets of devices with enough similarities [and use the above in the process]

What not to do

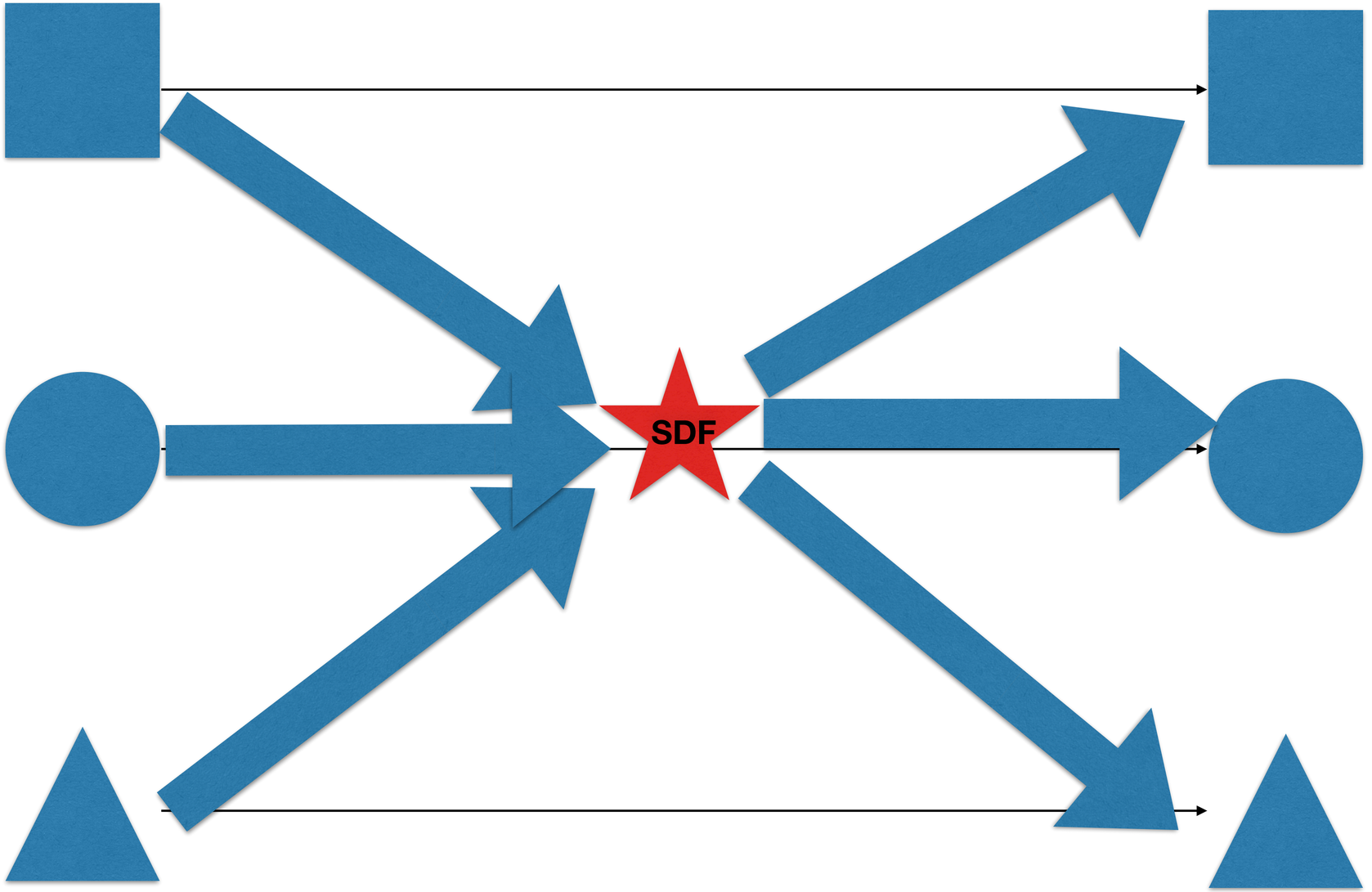


XKCD 927

$n^2 - n$



2n



Ecosystem models: Bluetooth, OCF, OMA, Zigbee

W3C TD template annotations

Implementation specific models, API annotations

OneDM coming-out 2020-07-13

- OneDM — “One Data Model” (https://onedm.org)
  was started as a **liaison** process 2018, after ZigBee “hive” meeting
- Liaison: Not xkcd 927, but a forum for SDOs (and large vendors) to cooperate about harmonization
  - SDOs often operate under NDAs
- OneDM ran under NDAs for a year
- 2020-07-13: OneDM decides to have its coming out

What has OneDM achieved so far?

- Agreement on a **legal model**:
  - Like the IETF did for a long time, OneDM doesn't exist as an organization (OCF did help occasionally where that was inconvenient)
  - contributions and output are BSD-3-clause **open-source** licensed: Liberal copyright license; everyone keeps their trademarks and patents
- Agreement on a basic common **specification format**: **SDF** 1.0
  - **This** is what this BOF is about
- Collected a couple hundred contributed **data models** in SDF from 4 SDOs (BlueTooth, OCF, OMA, ZigBee; other SDOs in the pipeline)

SDF as a “red star”

- SDF is a **format** for collaboration between different SDOs
- It avoids having to convert models between the local languages of all SDOs
- Eventually, many SDOs will use SDF as (part of) their native toolchain (some are already doing that now, informally)

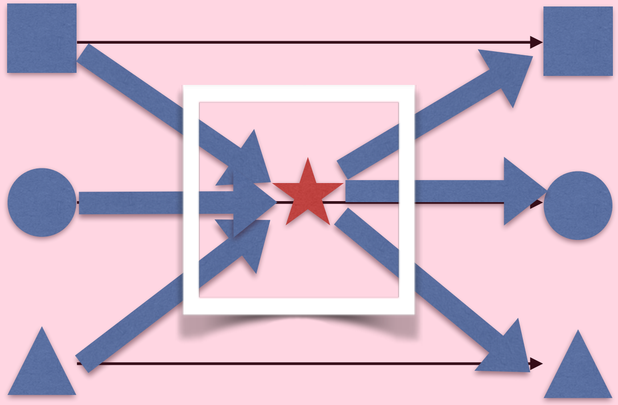
Basic Design of SDF

- SDF is a DSL (domain-specific language) represented in JSON
  - Syntax currently defined in CDDL and json-schema.org format
- SDF defines **data** models inspired by json-schema.org, augmented by some IoT considerations
- SDF's **interaction** model is based on three types of **affordances**: Property, Action, Event
  - Each affordance is characterized by input and output data models

SDF

Standardized by

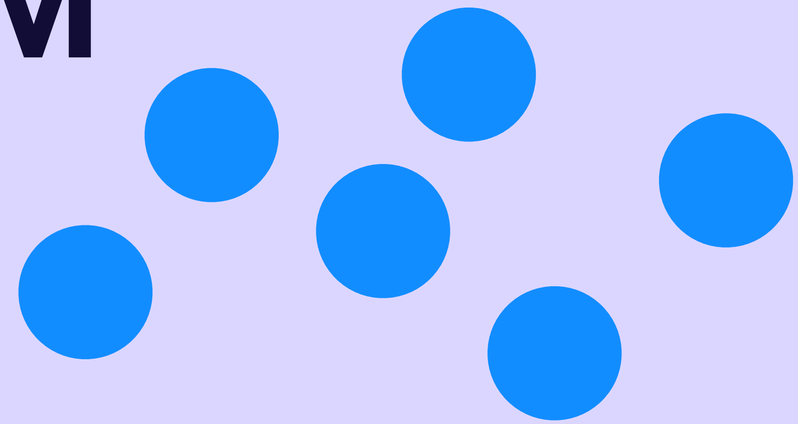
SDF RFC-to-be
(the red star)



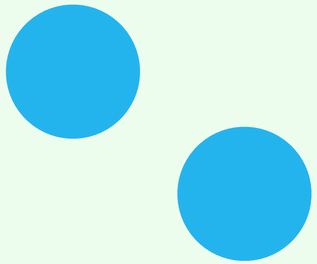
IETF

OneDM

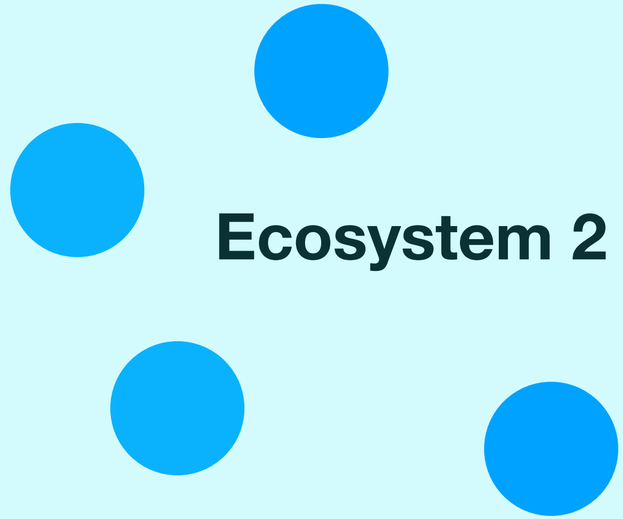
Harmonized
Data
Models



Ecosystem 1



Ecosystem 2



Compare: YANG

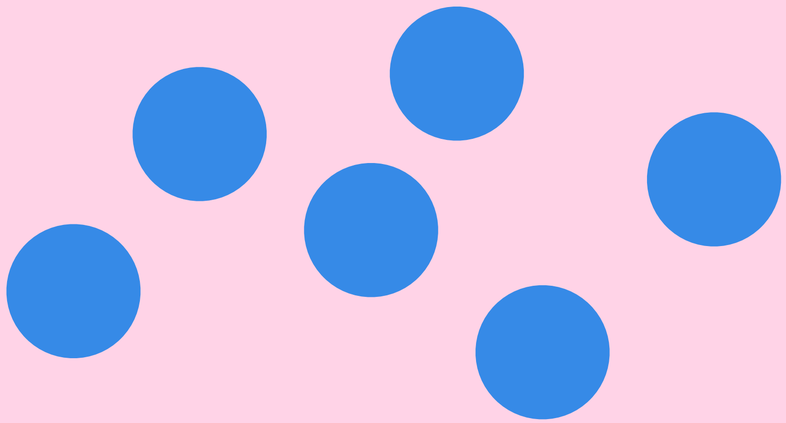
Standardized by

RFC 7950: YANG 1.1

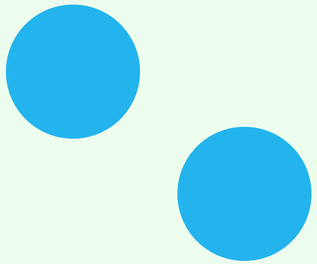
IETF

IETF

YANG
Model
RFCs



Vendor 2



Vendor 2

Standardizing SDF in IETF

- Start from SDF 1.0 (draft-onedm-t2trg-sdf-00)
- Make sure the specification leads to interoperable implementations
- Identify gaps in:
  - Functionality (e.g., more complex data models)
  - Stability of normative references
  - Usability (from both OneDM process and implementers' point of view)
- Profit

So why standardize this now?

- OneDM completed a usable input document (SDF 1.0, Good enough to attract ~ 200 model submissions)
- OneDM is willing to transfer change control to IETF
- Missing features will need to be added, within months.
- *Models not yet cast in stone, we can still change SDF!*

Why standardize at all?

- OneDM contributors need stable, well-defined format specification
- OneDM needs stable basis for its model harmonization efforts
- Tools implementers need a stable, well-defined format specification

Why standardize in IETF

- IETF has a vendor-neutral process
  that tends to result in high-quality specifications
- Ecosystem SDOs are used to base their work on IETF specifications;
  they really trust the IETF to do the job right
- IETF has some experience with domain specific data modeling
  (area-of-application oriented)

What would an ASDF WG do

- Focus on SDF specification (only deliverable)
- Ensure that normative dependencies are stable,
  or customize them for inclusion in SDF specification
- Work with OneDM, IoT data model SDOs, and IoT vendors
- Deliver SDF format specification RFC (standards-track)

Clarifying questions

Notes from the ecosystems

Zigbee

example.org (template slide)

Mona Lisa, secretary general of slide-making

(who is speaking, role in SDO/Vendor;

Please replace photo :-)

OMA (DMSE, IPSO)

Alan Soloway, [insert role in SDO]

LIAISON STATEMENT

Title:	Endorsement of work in OneDM liaison group	☒ Public ☐ Confidential LS[1]
Date:	17 June 2020	
To:	OCF – One Data Model Liaison Group	
Source:	DMSE WG & IPSO WG of the Open Mobile Alliance	
Send Replies to:	OMA-LIAISON@mail.openmobilealliance.org	
Contact(s):	Hannes Tschofenig (DMSE Chair) Travis Shanahan (DMSE Vice-Chair) Bahadir Danisik (DMSE Vice-Chair) Matthew Gillmore (IPSO Chair) Scott Potter (IPSO Vice-Chair) Jaime Jimenez (IPSO Vice-Chair)	
Attachments:	n/a	

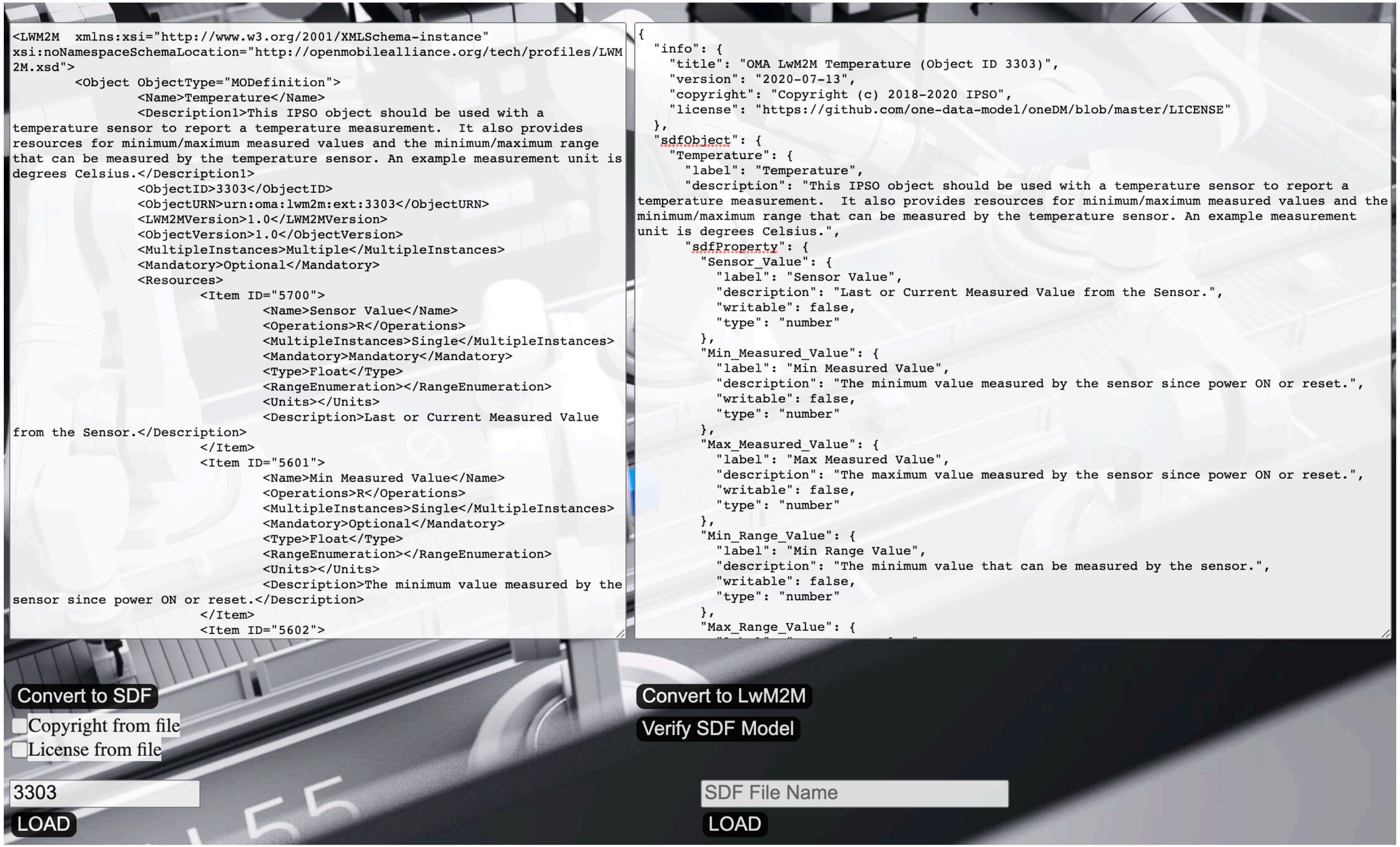
1 Statement

OMA SpecWorks acknowledges that achieving interoperability across ecosystems is key for accelerating the adoption and deployment of successful IoT solutions and endorses the work done in the One Data Model liaison group to address the challenges for interoperability. OMA SpecWorks has already contributed all the objects created in the IPSO Working Group to the OneDM experimental playground and plans to submit future versions of the IPSO objects as stable OneDM definitions. We are looking forward to continue working with the OneDM liaison group to further facilitate interoperability of OMA SpecWorks technologies with other IoT ecosystems

2 Requested Action(s)

- “OMA SpecWorks acknowledges that achieving interoperability across ecosystems is **key for accelerating the adoption** and deployment of successful IoT solutions and endorses the work done in the One Data Model liaison group to address the challenges for interoperability. OMA SpecWorks **has already contributed** all the objects created in the IPSO Working Group to the OneDM experimental playground and plans to submit future versions of the IPSO objects as stable OneDM definitions. We are looking forward to **continue working** with the OneDM liaison group to further facilitate interoperability of OMA SpecWorks technologies with other IoT ecosystems.”

- Note that OMA SpecWorks has adopted the BSD 3-clause license for this.



http://wishi.nomadiclab.com:8084/odm

OCF

Liaison Statement	
Title/Subject:	Endorsement of work in OneDM liaison group
Date:	14 July 2020
To:	onedm@iotliaison.org
Copy to:	N/A
In response to:	N/A
Send replies to:	staff@openconnectivity.org
List of attachments:	N/A

Dear OneDM group,

The Open Connectivity Foundation acknowledges that achieving interoperability across ecosystems is key for accelerating the adoption and deployment of successful IoT solutions and hereby endorses the work done in the One Data Model liaison group to address the challenges for interoperability on data modeling work.

Sincerely,
David McCall
President, Open Connectivity Foundation

- “The Open Connectivity Foundation acknowledges that achieving interoperability across ecosystems is key for accelerating the adoption and deployment of successful IoT solutions and hereby endorses the work done in the One Data Model liaison group to address the challenges for interoperability on data modeling work.”

- OCF has adopted the BSD 3-clause license for this.

Bluetooth

Vendor view: Smartthings

Michael Koster, _____

Vendor view: Ericsson

Ari Keränen, _____

Clarifying questions

the questions will be…

- DO WE HAVE AGREEMENT about the PLAN?
- DO WE HAVE ENERGY TO DO THIS?
- SHOULD THE IETF DO THIS?

Discussion

- Open Mic

Charter text

- (We are a non-WG-forming BOF, so **we don’t discuss** this here today.)
- Will be in https://github.com/one-data-model/ietf108/blob/master/charter.md

Calling the questions

- DO WE HAVE AGREEMENT about the PLAN?
- DO WE HAVE ENERGY TO DO THIS?
- SHOULD THE IETF DO THIS?