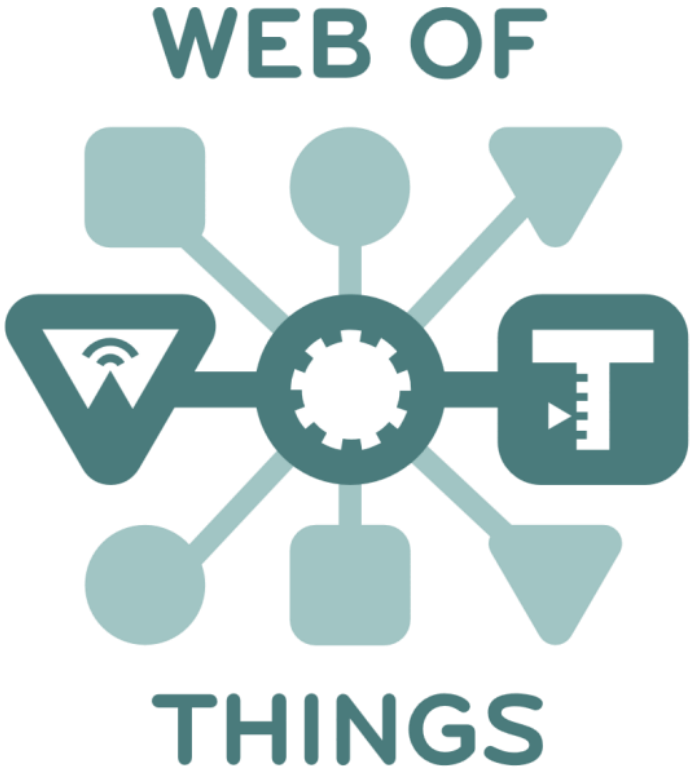


WoT Plugfest

TPAC 2019, Sept 2019

Michael McCool: Intel Principal Engineer / W3C WoT WG Co-chair

W3C Web of Things

Goal: Support IoT Interoperability via Open Standards

- **W3C WoT Interest Group (IG)**
  https://www.w3.org/2016/07/wot-ig-charter.html
  - Started spring 2015
  - ~200 participants
  - Informal work and outreach
  - "PlugFest" validation with running code
  - Exploration of new building blocks
  - "OpenDays" with external speakers
  - Liaisons and collaborations with other organizations and SDOs
  - ***Second Workshop on Web of Things held 3-5 June 2019 in Munich***
  - ***Charter renewal submitted Sept 2019***

- **W3C WoT Working Group (WG)**
  https://www.w3.org/2016/12/wot-wg-2016.html
  - Started end of 2016 (effectively Feb 2017)
  - ~100 participants
  - Normative work on specific deliverables
  - W3C Patent Policy for royalty-free standards
  - Only W3C Members and Invited Experts
  - ***Architecture and Thing Description were published as Candidate Recommendations on 16 May 2019***
  - ***Notes published on Protocol Bindings, Security, and Scripting API***
  - ***Charter renewal in progress; work items and deliverables under discussion***

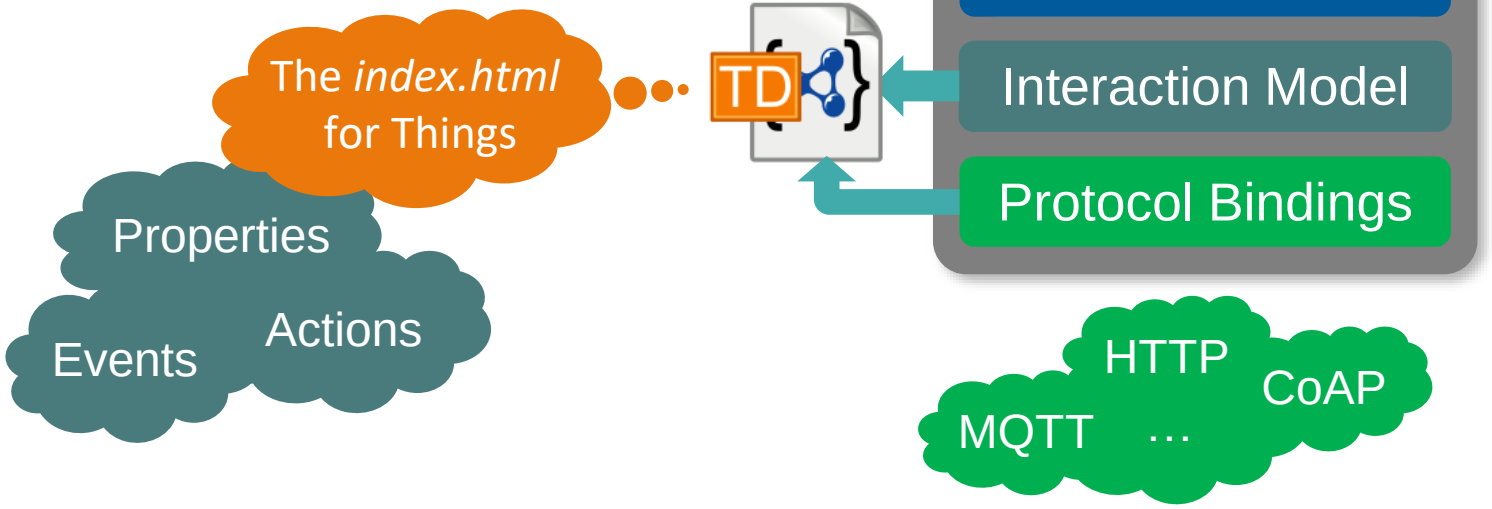
W3C Web of Things – Building Blocks

WoT Architecture

Overarching umbrella with architectural constraints and guidance on how to use and combine building blocks.

WoT Thing Description (TD)

JSON-LD representation format to describe Thing *instances* with **metadata**. Uses **formal interaction model** and **domain-specific vocabularies** to uniformly describe how to use Things, which enables semantic interoperability.



Security Guidelines

WoT Scripting API

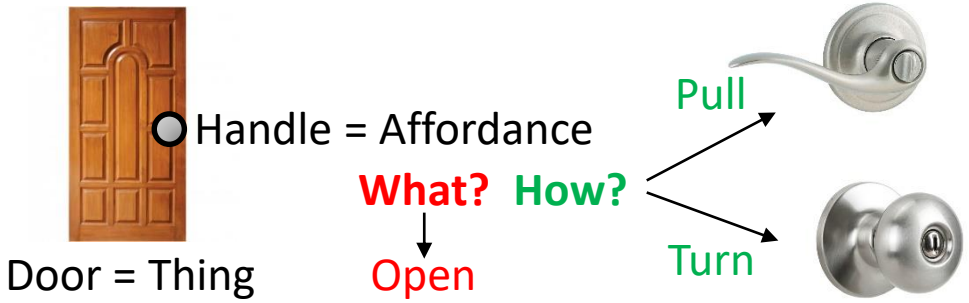
Standardized **JavaScript** object API for an IoT runtime system **similar to the Web browser**. Provides an interface between applications and Things to simplify IoT application development and enable **portable apps** across vendors, devices, edge, and cloud.

WoT Binding Templates

Capture how the **formal Interaction Model** is mapped to concrete protocol operations (e.g., CoAP) and platform features (e.g., OCF). These templates are re-used by concrete TDs.

Published Candidate Recommendations

- **WoT Architecture**
  - Constraints
    - Things must have TD (W3C WoT)
    - Must use hypermedia controls (general WoT)
      - URIs
      - Standard set of methods
      - Media Types
  - Interaction Affordances
    - Metadata of a Thing that shows and describes the possible choices (what) to Consumers, thereby suggesting how Consumers may interact with the Thing



- **WoT Thing Description (TD)**

```
{
  "@context": [
    "https://www.w3.org/2019/wot/td/v1",
    { "iot": "http://iotschema.org/" }
  ],
  "id": "urn:dev:org:32473:1234567890",
  "title": "MyLEDThing",
  "description": "RGB LED torchiere",
  "@type": ["Thing", "iot:Light"],
  "securityDefinitions": ["default": {
    "scheme": "bearer"
  }],
  "security": ["default"],
  "properties": {
    "brightness": {
      "@type": ["iot:Brightness"],
      "type": "integer",
      "minimum": 0,
      "maximum": 100,
      "forms": [ ... ]
    }
  },
  "actions": {
    "fadeIn": {
      ...
```

Plugfest, Use Cases, and Demos


48: [EM] {room:bri
49: [EM] {actorId:
50: [EM] {room:qu
51: [EM] {room:co
52: [EM] {room:de
Humidity
Air pressure
ORACLE IoT Digital Twin Simulator
CONTROLS
DATA-CHART
EVENTS
MOTOR FAILURE
SHORT CIRCUIT
NOT WORKING
ALERTS
FUJITSU
8.938
Mozilla
WebThings
Gateway
Smart
Bulb
WiFi
Sensor B
Panasonic Demo System C
Fukuoka
Client
WoT-API
·Property: HTTP
·Action: HTTP
·Event: HTTP,
WebSocket
1234
LED Display
Proprietary


Chromium Web Browser
Node-RED Dashboard - Chromium
Node-RED
Node-RED Dashboard
Industrial integration
WiFi sensor
Accel
Temperature
Humidity
Air pressure
ORACLE IoT Digital Twin Simulator
CONTROLS
EVENTS
PUMP ON!
OPEN VALVE!
CUSTOM DATA
tanklevel
plantstatus
DATA CHART
DEVICE MONITORING
STATUS
PUMPSTATUS
MOTOR FAILURE
SHORT CIRCUIT
NOT WORKING
ALERTS
SEND: Unable to connect to sensors
SEND: Security breach door opened
FUJITSU


Mozilla
WebThings
Gateway
WiFi
Sensor B

Car Charging

- (•) 0 kW
- ( ) 15 kW
- ( ) 50 kW

06:00
20 °C
4 Okta
0 mm/hour

1 h

back

Dynamics | Affordances | Models

eCarCharging

HOUSE_CONNECTOR

vel | Voltage angle | Total power output | Optional

Value 1	0 kW
Value 2	0 kW
Value 3	0 kW

Monitoring:

Power level violation

SIEMENS
Ingenuity for life

W3C WoT Resources

- W3C WoT Wiki
  - https://www.w3.org/WoT/IG/wiki
    (IG/WG organizational information)
- W3C WoT Interest Group
  - https://www.w3.org/2016/07/wot-ig-charter.html
    (charter)
  - https://lists.w3.org/Archives/Public/public-wot-ig/
    (mailing list)
  - https://github.com/w3c/wot
    (technical proposals)
- W3C WoT Working Group
  - https://www.w3.org/2016/12/wot-wg-2016.html
    (charter)
  - https://www.w3.org/WoT/WG/
    (dashboard)
- W3C WoT Candidate Recommendations
  - https://www.w3.org/TR/wot-architecture/
  - https://www.w3.org/TR/wot-thing-description/
- W3C WoT Working Drafts / Group Notes
  - https://www.w3.org/TR/wot-binding-templates/
  - https://www.w3.org/TR/wot-scripting-api/
  - https://www.w3.org/TR/wot-security/
- W3C WoT Editors' Drafts and Issue Tracker
  - https://github.com/w3c/wot-architecture/
  - https://github.com/w3c/wot-thing-description/
  - https://github.com/w3c/wot-binding-templates/
  - https://github.com/w3c/wot-scripting-api/
  - https://github.com/w3c/wot-security/
- Reference Implementation: node-wot
  - https://github.com/eclipse/thingweb.node-wot

Contacts

https://www.w3.org/WoT/WG/

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