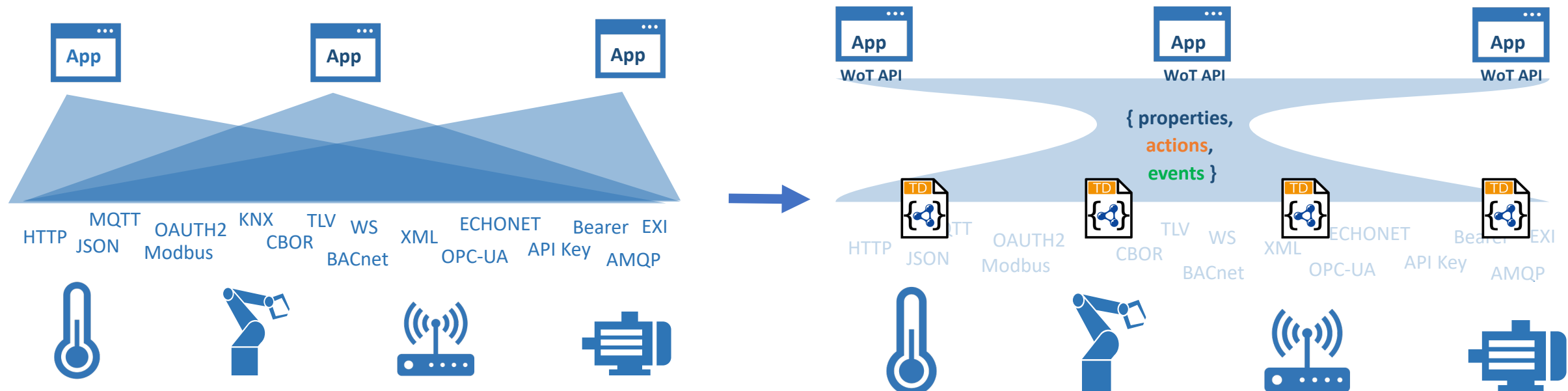# W3C Web of Things

Talk for "Nordic Smart Cities/WoT CG"

Sebastian Kaebisch

27 November 2023
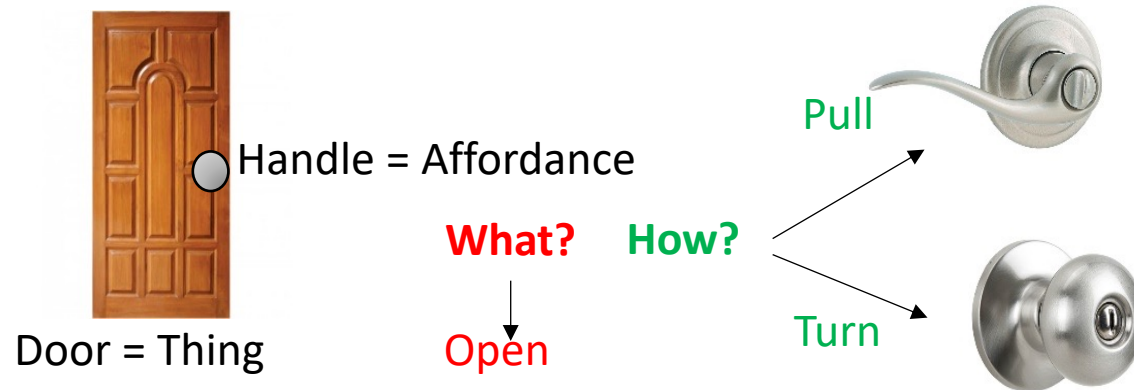
W3C Web of Things (WoT)

- W3C Working Group goal: Adapting web technologies to IoT
- Already published: Thing Description (TD) metadata format
  - TD describes the available interactions (network API) of a Thing
- New deliverables in progress, including Discovery
  - How does a potential user obtain the TD for a Thing?

Descriptive Interoperability: TDs

WEB OF
WoT
THINGS

WoT Architecture

- Constraints
  - "Things" must have a TD
  - Must use URIs, IANA media types, etc.
- Thing Description Affordances
  - Describes WHAT the possible choices are
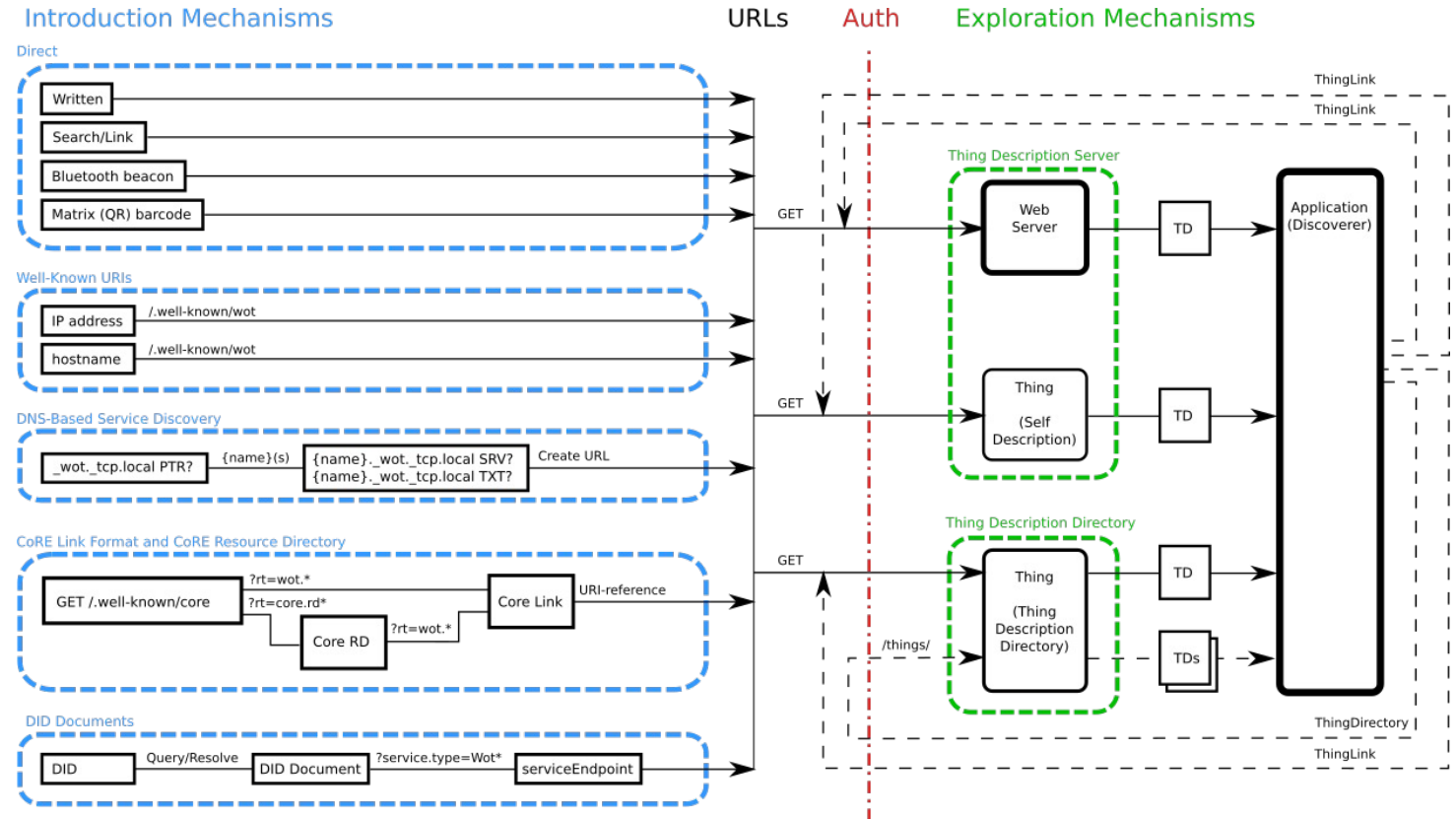 - Describes HOW to interact with the Thing

Handle = Affordance

What? **How?**

Pull

Turn

Open

Door = Thing

WoT Thing Description (TD)

```json
{
  "@context": [
    "https://www.w3.org/2022/wot/td/v1.1",
    { "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": {
      ...
```
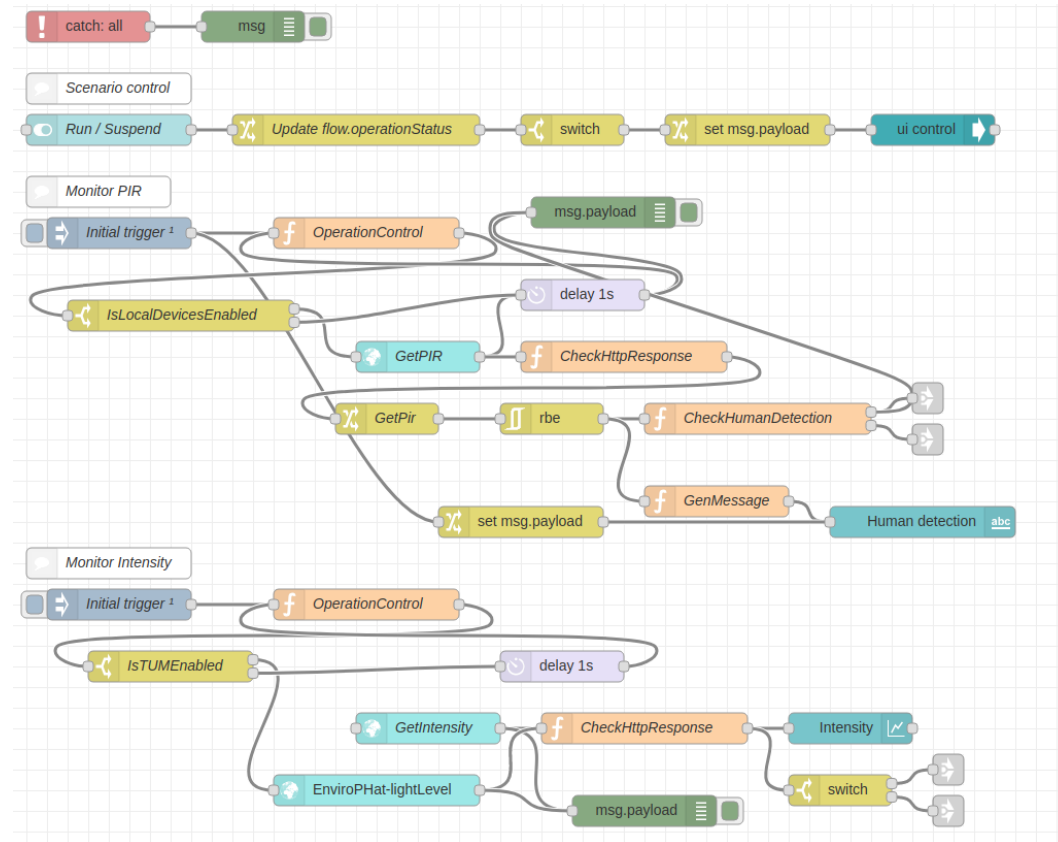
Discovery

Goal: Obtain TD of interest

- Not limited to local network
- Scalable to many TDs
- Need to preserve privacy
- Phased access:
    1. Introduction: open
    2. Exploration: controlled
- Searchable via JSON Path, XPath, or SPARQL

- Future work:
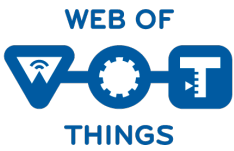   - Find "nearby" Things using geospatial data

Orchestration

node-wot/Scripting API

Node-RED/node-gen

(Node-RED flow diagram with nodes: catch: all, msg, Scenario control, Run / Suspend, Update flow.operationStatus, switch, set msg.payload, ui control, Monitor PIR, Initial trigger ¹, OperationControl, msg.payload, IsLocalDevicesEnabled, delay 1s, GetPIR, CheckHttpResponse, GetPir, rbe, CheckHumanDetection, set msg.payload, GenMessage, Human detection, Monitor Intensity, Initial trigger ¹, OperationControl, IsTUMEnabled, delay 1s, GetIntensity, CheckHttpResponse, Intensity, EnviroPHat-lightLevel, msg.payload, switch)

```javascript
WoTHelpers.fetch( "coap://localhost:5683/counter" ).then( async (td) => {
  // using await for serial execution (note 'async' in then() of fetch())
  try {
    const thing = await WoT.consume(td);
    console.info( "=== TD ===" );
    console.info(td);
    console.info( "==========" );

    // read property #1
    const read1 = await thing.readProperty( "count" );
    console.info( "count value is" , await read1.value());

    // increment property #1 (without step)
    await thing.invokeAction( "increment" );
    const inc1 = await thing.readProperty( "count" );
    console.info( "count value after increment #1 is" , await inc1.value());

    // increment property #2 (with step)
    await thing.invokeAction( "increment" , {'step' : 3});
    const inc2 = await thing.readProperty( "count" );
    console.info( "count value after increment #2 (w/ step 3) is" , await inc2.value());

    // decrement property
    await thing.invokeAction( "decrement", undefined, {
      formIndex: getFormIndexForDecrementWithCoAP(thing);
    } );
    const dec1 = await thing.readProperty( "count" );
    console.info( "count value after decrement is" , await dec1.value());

  } catch(err) {
    console.error( "Script error:", err);
  }

}).catch( (err) => { console.error( "Fetch error:", err); });
```

THINGWEB

WoT New Deliverables

REC Track:

- WoT Architecture 1.1
- WoT Thing Description 1.1
- WoT Discovery

→ Passed AC PR voting

→ Releasing RECs end Nov

Note Track:

- Updated WoT Scripting API
- Updated WoT Binding Template

Deliverables

New/Updated Normative Documents:

- Architecture 1.1: https://github.com/w3c/wot-architecture

- Thing Description 1.1: https://github.com/w3c/wot-thing-description

- Discovery: https://github.com/w3c/wot-discovery

- Profiles: https://github.com/w3c/wot-profile

New/Updated Informative Documents:

- Binding Templates: https://github.com/w3c/wot-binding-templates

- Scripting API: https://github.com/w3c/wot-scripting-api

- Use Cases and Requirements: https://github.com/w3c/wot-usecases

Community Resources:

- Web Site: https://www.w3.org/WoT/

"WoT 2.0" Just Started

- **→ a good time to join the WG and become part of the WoT family**

- More details:
  https://www.w3.org/2023/08/wot-wg-2023-draft.html

Applications

Takenaka Corporation

- CGLL Platform - BIM

Siemens

- Desigo CC – BIM

- Say WoT!

Netzo

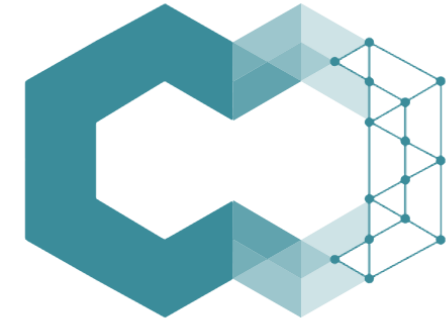- IoT Data Hub

- Dashboards

Bosch

- Eclipse Ditto - Digital twin

SDO Adoption or Under Consideration

ECHONET

Conexxus

OPC Foundation
(OPC UA Web-of-Things Connectivity)

IPA Digital Architecture Design Center

Industrial Digital Twin Association
(Asset Interfaces Description)

Resources and Contacts

https://www.w3.org/WoT

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