Runtime Discovery of Metadata

“Runtime”

- In the field?
  - firmware update?
- While turned on?
  - Restartless installation?
  - Plugins?
- Mid-execution?
  - Redirect?

“Discovery”

- Devices?
- Data items?
- Functionality?
- “Things”?

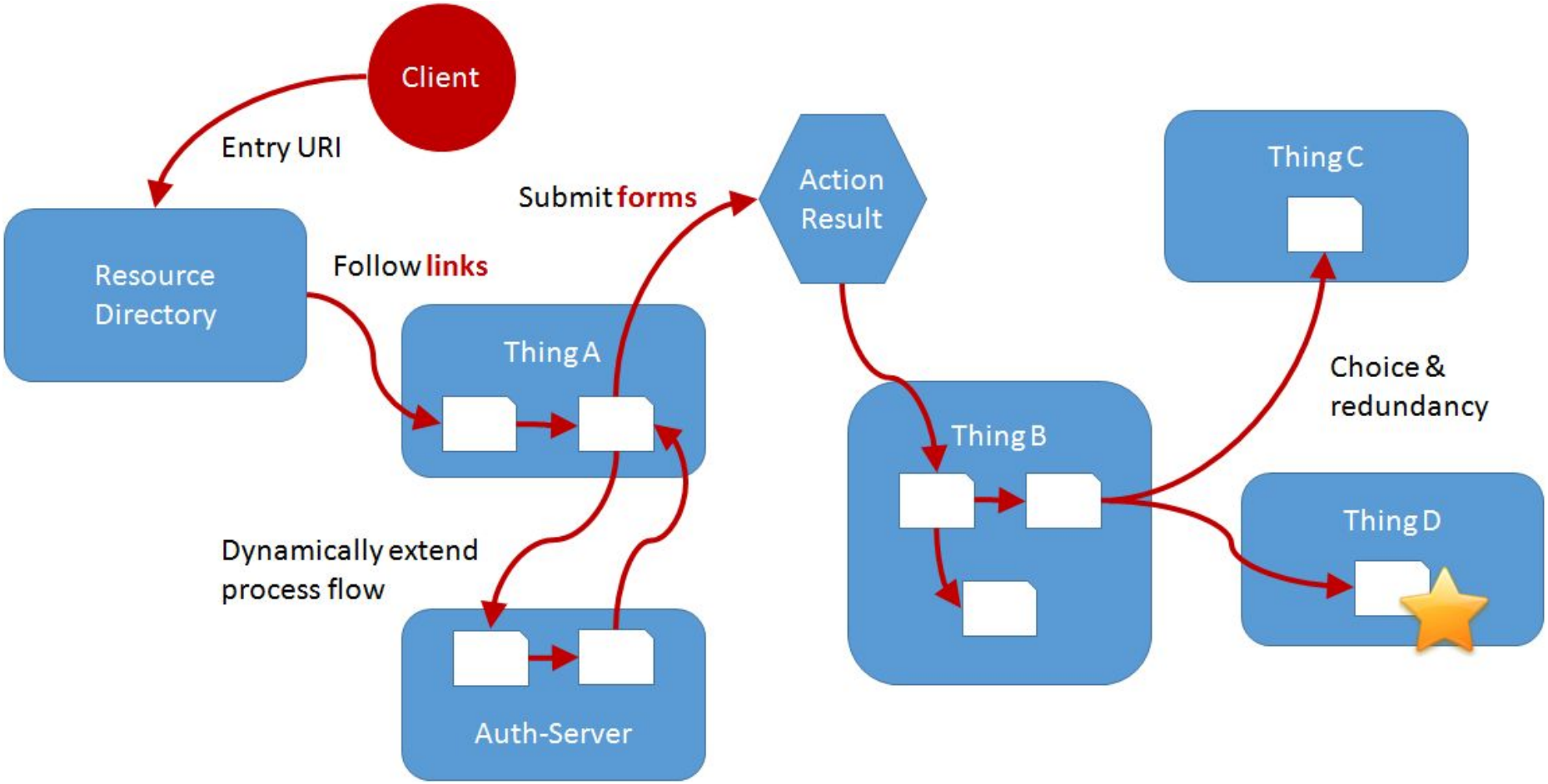
- How much known a priori about them?

“Metadata”

- Instance-specific metadata?
  - Location
- Model information?
  - RGB vs HSV?

- Where?
  - In-band?
  - On-device?
  - Repository?

HATEOAS


Client
Entry URI
Resource Directory
Follow links
Thing A
Submit forms
Action Result
Thing C
Thing B
Choice & redundancy
Thing D
Dynamically extend process flow
Auth-Server

Links and Forms (as HTML examples)

Links:

```
<a href="about.html">More information</a>
<link rel="stylesheet" href="style.css">
```

Templated Links:

```
<form method="get" action="search.php">
  <input id="query" type="text">
</form>
```

Embedded Links:

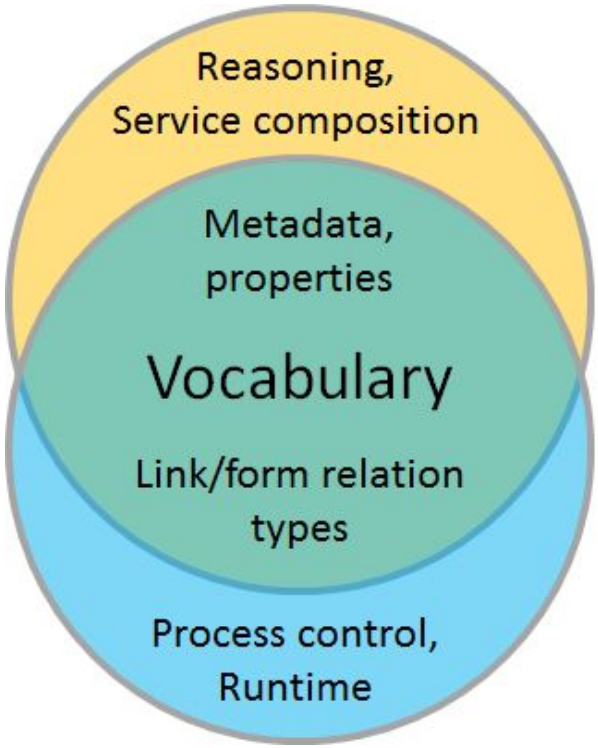
```
<img src="logo.png">
<audio src="audio.ogg">
<video src="video.mp4">
```

Forms:

```
<form method="post" action="">
  <input id="name" type="text">
  <input id="age" type="text">
  <input id="homepage" type="text">
</form>
```

The IoT needs the blue parts
in machine-understandable format

Vocabulary



Information model
(e.g., W3C Thing Description)

Interaction model
(HATEOAS)

Questions for Semantic Interoperability

- What needs to be nailed down and shared a priori?
- What can be shared/discovered at runtime?

Dave Thaler

- What form do you get it in:
  - Extracted from specification, or obtained directly in data model form?
- Where do you get it from:
  - A cloud repository? The vendor's site? A device itself?
- Does it all come in one piece or are there different pieces possibly from different places?
  - E.g., syntax vs end-user descriptions in language X vs developer-specific comments

Ravi Subramaniam

Michel Kohanim

- Share the fundamental parts a priori
- Units of measure (UOM) are well defined
  and most semantics can be inferred
  - What about absolute vs delta vs minimum vs maximum?
- Instead of a repository, a well defined base model with inference rules should prepare for change