5.1.4 Findings

There are many ontologies that are suited for sensor-based scientific observations and ontologies that allow for the description of sensor hardware are very complete. How- ever, in our research, we were unable to find a complete ontology that allowed for a sensor to be described as well as specifics of the observation. SSN and SUMO were the closest that we found for this, but SSN was still very hardware focused and aimed at a technical audience. SSN primarily describes the hardware of each node and their capabilities, whereas our requirements are for both hardware and sensed data to be represented in a single ontology.

While the SHO and SDO extensions of SUMO are classed as both observation- centric and sensor-centric ontologies, they are separate ontologies that model both sensor hardware and sensed data and, while the development of these ontologies did follow a similar approach to the one described in this chapter (combining ontologies) it is more focussed on retrieval of sensed data through queries constructed using both hardware details and properties of the sensed data and does not fulfil all of the require- ments we identified when developing K-HAS, such as representing users. However, an important feature is the Extension Plugin Ontologies (EPO), support for domain specific plugins to integrate with SUMO and integrate with the SHO and SDO and this would also be a useful feature for K-HAS.

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We found that many of these ontologies satisfied many subsections of K-HAS com- pletely, meaning that it would be unnecessary to reproduce these concepts. From these findings we have developed an aligning ontology that connects ontologies across mul- tiple domains to support our proposal of K-HAS, creating an ontology that is both sensor-centric and observation-centric.

The SSN ontology is a modular ontology created by combining concepts from existing, commonly used ontologies and allows for domain specific concepts to be imported. Some of the main uses cases for the SSN ontology are provenance and data discovery, which are also key within K-HAS. However, the tiered structure of K-HAS did not map directly to SSN and it proved difficult to represent the flow of knowledge through a network, as humans can also perform similar operations on ob- servations and the observations are enriched as they pass through the network. How- ever, while we did not use the ontology directly, many of the concepts can be mapped directly and it would be possible to modify K-HAS to leverage the modular nature of SSN and extend it.