Lesson Learnt Report

CSIRO Senaps data platform demonstration and development

DCH1

Oct 2020

CSIRO

About i-Hub

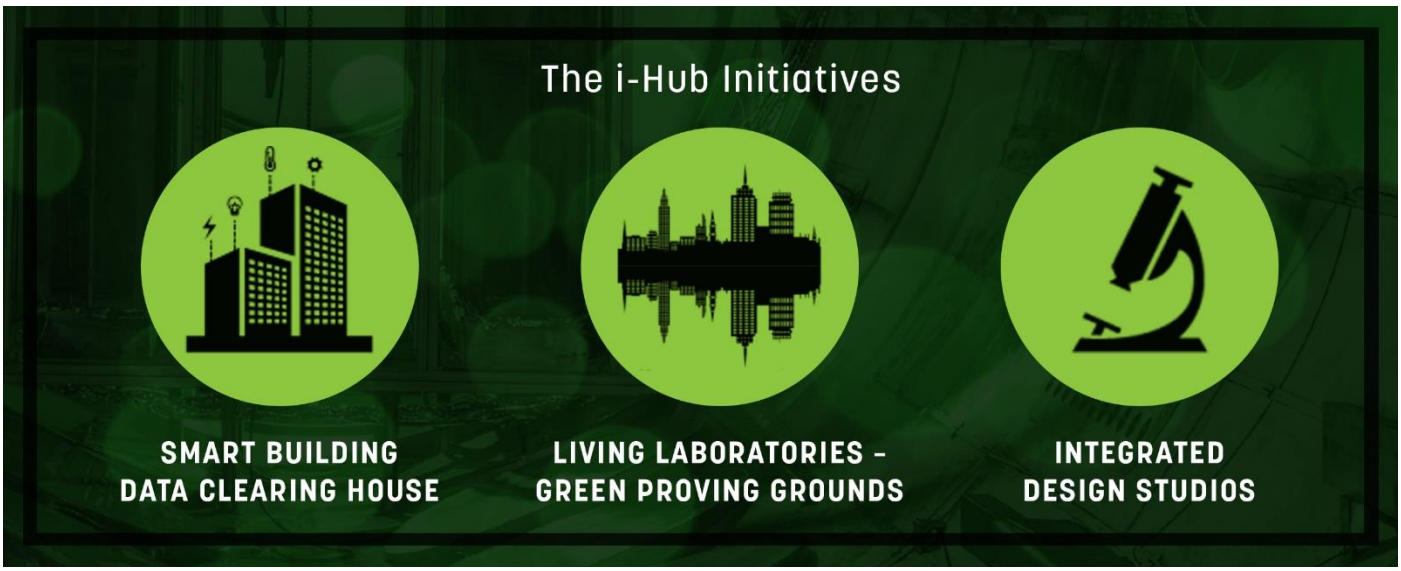
The Innovation Hub for Affordable Heating and Cooling (i-Hub) is an initiative led by the Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) in conjunction with CSIRO, Queensland University of Technology (QUT), the University of Melbourne and the University of Wollongong and supported by Australian Renewable Energy Agency (ARENA) to facilitate the heating, ventilation, air conditioning and refrigeration (HVAC&R) industry's transition to a low emissions future, stimulate jobs growth, and showcase HVAC&R innovation in buildings.

The objective of i-Hub is to support the broader HVAC&R industry with knowledge dissemination, skills-development and capacity-building. By facilitating a collaborative approach to innovation, i-Hub brings together leading universities, researchers, consultants, building owners and equipment manufacturers to create a connected research and development community in Australia.

This Project received funding from ARENA as part of ARENA's Advancing Renewables Program.
The views expressed herein are not necessarily the views of the Australian Government, and the Australian Government does not accept responsibility for any information or advice contained herein.

Primary Project Partner

[logo]



i-Hub Lessons Learnt Report

Guidance notes for completion of the Lessons Learnt Report:

- This report is intended to be made public.
- Please use plain English, minimise jargon or unnecessary technical terms.
- Please use your organisation's branding for the report.
- The report should meet your organisation's publishing standards.
- Please use one template per each major lesson learnt and include as many as are relevant for your sub-Project. If what you learnt is more technical, this is the section to include technical information.
- The content of these Lessons Learnt Reports can be compiled (and updated, where necessary) for inclusion in the (public) Project Knowledge Sharing Report, for submission at the completion of your sub-Project.

Lead organisation	CSIRO		
Sub-Project number	DCH1		
Sub-Project commencement date	July 2019	Completion date	June 2022
Report date	23/10/2020		
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Lessons learnt

Lesson learnt #1	Lack of electrical energy metering related classes in Brick schema					
Category	technical					
Choose from:	*Technical*	*Commercial*	*Social*	*Regulatory*	*Logistical*	*Other (specify)*

Describe what you learnt about this aspect of the Project.

Challenges of incorporating energy meters and submeters using Brick schema: Semantic model development in DCH is based on Brick schema (https://brickschema.org/).

Brick schema uses common vocabularies to define building assets and their relationships between them. While Brick schema has standard vocabulary for many systems and sub systems in a building (e.g. HVAC, lighting), current version of Brick (version 1.1) has limited ways to represent energy metering, onsite generation and storage details. This limitation was identified while estimating energy use change using the Measurement and Verification (M&V) application for CSIRO pilot sites.

Please describe what you would do differently next time and how this would help. What are the implications for future Projects?

Brick schema contains an extensible dictionary of terms and relationships. Brick schema can be extended by reasoning to capture new applications/models. We will define a set of DCH extensions to Brick schema and where appropriate feed those suggestions back into the community for consideration for inclusion in any future base versions of the schema.

If your Project learnings have identified any knowledge gaps that need to be filled, please state it below.

DCH team have identified current limitations of using Brick schema for energy metering related applications (e.g. M&V) and have identified Brick extensions (classes/properties/relationships) are needed to capture concepts like, generation Vs consumption, total energy meter Vs sub meter, representation of 'net' metering.

By interacting with Brick developers in the Brick forum, the team are proposing extensions to Brick schema.

Lesson learnt #2	Data ownership expectations from data providers					
Category	Technical/commercial/					
Choose from:	*Technical*	*Commercial*	*Social*	*Regulatory*	*Logistical*	*Other (specify)*

Describe what you learnt about this aspect of the Project.

As part of creation of business case for DCH, powerful insights have been gathered around various operational governance features of DCH. For example, data owners expect to have full control over the data. As a result, data owners need to have complete discretion over providing the data to third parties while providing data to a central platform such as DCH. Data access provisions of DCH should address this feature.

Detailed stakeholder engagement report captures further details.

Please describe what you would do differently next time and how this would help. What are the implications for future Projects?

These inputs will help in developing technology and design features of the DCH platform

If your Project learnings have identified any knowledge gaps that need to be filled, please state it below.

none

Lesson learnt #3 Handling of large streams of real time data in Tridium gateways						
Category	Technical					
Choose from:	*Technical*	*Commercial*	*Social*	*Regulatory*	*Logistical*	*Other (specify)*

Describe what you learnt about this aspect of the Project.

DCH pilot site onboarding uses a pre-built JSON schema template for gathering metadata related to points. JSON Schema output can be triggered via Change of Value (COV) for each data point, or periodically for connected data points using an external periodic timer.
While COV is preferred approach while gathering large volume of data, data quality check tools often can't identify issues with data if COV method of data collection is used. If periodic sampling is used, it will result in large volume of points are being generated in quick succession via the Tridium JSON Schema. In order to support this, messaging queue settings in the gateway needs to appropriately tuned to ensure all messages are processed and published to the DCH via the chosen transport protocol (e.g. MQTT). Otherwise, this can lead to data quality issues.

Please describe what you would do differently next time and how this would help. What are the implications for future Projects?

Develop best practice guidelines for gateway settings based on data points, data collection frequency and use it future projects

If your Project learnings have identified any knowledge gaps that need to be filled, please state it below.

As above