The Innovation Hub

for Affordable Heating and Cooling

M6 Interim Lesson Learnt Report

Improving the accuracy of PV analytics and energy analytics in buildings using open asset standards and data platform integration

DCH7

19 November, 2021

VBIS, CSIRO, PrediQ

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

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	VBIS		
Sub-Project number	DCH 7		
Sub-Project commencement date	06/05/2021	Completion date	30/06/2021
Report date	19 November 2021		
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Lessons learnt

Lesson learnt #1	Communication of workflow / value of DCH to application providers					
Category	Commercial					
Choose from:	*Technical*	*Commercial*	*Social*	*Regulatory*	*Logistical*	*Other (specify)*
Describe what you learnt about this aspect of the Project.						
The proposed model for data accessing building data via DCH through the use of BRICK modelling schematics is a new approach. The impact of this is that few people understand how the models should be queried in order to obtain information the required asset equipment information or point information required to retrieve the time series data from SENAPS. As the system is still being developed, currently very limited documentation for application developers on DCH infrastructure. This makes it difficult for application developers to understand how to best make use of the BRICK model queries.						
Please describe what you would do differently next time and how this would help. What are the implications for future Projects?						
While the DCH infrastructure is still being developed, any lessons and instruction sets from previous DCH deployed projects should be documented and made available. Understanding at project inception that new methods to query the model will be required, development of the required documentation of model query methods could have been scheduled as a parallel activity with building on-boarding and made available to application developers prior to application development. This would also assist in the communication of DCH value in the application development process.						
If your Project learnings have identified any knowledge gaps that need to be filled, please state it below.						
Within industry, there are currently experts each traditional industry. For example, BMS contractors who understand buildings, application developers who can build applications to make use of available data. The current industry trend appears to rely on the BMS contractor to start to understand how to build semantic models which can be used by models such as DCH. As BMS contractors, these emerging specialists will have a good knowledge of building services systems however may have knowledge gaps in other aspects of a building which is required to develop a full building model that can be used for all asset management activities. With limited specialists who understand how to develop and update semantic models, significant support will be required from CSIRO to support DCH adoption until sufficient people understand the model to turn it into a self service system.						

Lesson learnt #2	Data quality and availability					
Category	Technical					
Choose from:	*Technical*	*Commercial*	*Social*	*Regulatory*	*Logistical*	*Other (specify)*

Describe what you learnt about this aspect of the Project.

For DCH 7, the project assumed that for the 5 sites which would be connected, sufficient site documentation would be available, and all data points would be made available via the BMS through a BACNet high level interface. Similarly for PV/Solar data, each system API would provide all datapoints available within the online dashboards. The availability of data however was less than the team had expected while the variance of quality of available site data was greater between each site.

Data related issues experienced to date include:

- Site information availability – documentation available and detail varied significantly depending on the age of the installation and the contractor engaged to undertake the works.
- Network Issues – Site teams may not know how the network is linked especially when multiple systems are involved.
- Limitation of data points available via PV/Solar APIs. While data can be viewed on app, it is not available to be shared to third party applications.
- History / trend log data available varies by site. Some sites have limitations (such as 600 data points only) or requires individual data point extraction. Some systems also utilise COV instead of time series data which requires further manipulation or cleaning either in DCH or prior to or post data from DCH.
- On-going maintenance and upkeep of data. Have had instances where equipment has been changed (i.e. micro inverters) which changed the inverter ID, causing SENAPS to loose data.
- Metering data not available for third party ingestion or current meter layout is not appropriate for energy analytics.
- Some meters on site do not provide sufficient levels of granularity for detailed analytics.
- Weather data required resides in various BOM locations. Locating the correct BOM record has been difficult.

All these items contributed significant increases in onboarding and deployment time.

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

Assessment of all required site information should be considered prior to system on-boarding. To over-come limited data availability for this project, the team had to commit additional resources to provide work around solutions (such as data scraping from web portals as APIs could not provide sufficient information for data modelling). With existing buildings, it would be prudent to assume the granular data that is required may not be available and plan works accordingly.

Development of a building model requires knowledge of multiple systems that are supported by multiple contractors. These resources need to be identified during the planning phase and made available to resolve any issues encountered on site. Should site data not be available, appropriate resources should be made available to investigate and create necessary records for on-going operation. With each system typically operating in a silo. This makes it difficult to resolve issues on site. For example, providers of the solar panel system utilise network infrastructure provided by the IT system provider, and which may contain interfaces into the BMS provider. Should data not flow, all parties should be available to fault find and diagnose.

If your Project learnings have identified any knowledge gaps that need to be filled, please state it below.
As the data generated by equipment starts to converge onto a common platform (i.e. DCH), operational procedures will need to be reviewed and updated to ensure any repairs and upgrades takes into account possible changes in equipment identification which could impact the data model. This will include unique identifiers such as with the microinverter ID. Processes will also need to be developed to allow for feedback and on-going maintenance of the BRCK model within DCH should data points change or equipment is not a like-for-like replacement.