Lesson Learnt Report

IDS-10 Lendlease Residential Aged Care – Lessons Learned Report

Project - IDS10

19 November 2021

University of Wollongong

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.
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Primary Project Partner

UNIVERSITY OF WOLLONGONG AUSTRALIA

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i-Hub Design Studio Lessons Learned Report

The IDS-10 Lendlease Residential Aged Care Integrated Design Studio investigated design innovations to reduce energy consumption of Lendlease's soon to be constructed residential aged care facility on the University of Wollongong's Health and Wellbeing Precinct. Over a 13-week period, a group of multidisciplinary students worked collaboratively to respond to environmental challenges faced by Lendlease's residential aged care facility, with a focus on how Lendlease can achieve their organisational commitment to move to absolute zero carbon by 2040.

This report explores the lessons learned from undertaking this Integrated Design Studio process, pulling relevant findings from the Studio Report (i-Hub IDS-10 Design Studio outcomes report_100%_v1). The lessons learned were developed through assessing the feedback provided by industry consultants, clients and studio tutors via one-on-one interviews, examining anonymous student survey responses, and through the observations of researchers made during the design studios.

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Important Note: The Integrated Design Studio (IDS10) ran in parallel with an additional studio (IDS11), with all studios occurring concurrently, utilising the same consultants, researchers and studio tutors, with differing clients. The lessons learned associated with IDS10 are similar to those associated with IDS11. To improve readability (for those reading multiple IDS reports), any information included within the report which is similar to information outlined within other IDS reports will be highlighted with a greyed-out background.

Lessons learnt

Lesson learnt #1	Integrated design has greater potential and relevance at project inception
Category	Technical

Describe what you learnt about this aspect of the Project.

Engineers and architects are completely capable of working collaboratively to develop holistic designs with the aim of developing a structure which marries both form and function. This is often an ideal, with architects and engineers willing to set aside predisposed biases to jointly design in a way that they consider to be more beneficial to all parties involved. However, integrated design must occur at project inception, before any significant structural bounds are placed on the design.

When integrated design is sought following design completion, many project parameters have already been set, limiting potential opportunities. Adjustments to the façade are possible, with superficial shading being integrated within the existing structure, but any substantial changes require evaluation by a structural engineer, which undermines the preliminary work already completed at great cost. Similarly, any engineered solutions must work around the existing structure, resulting in changes primarily being made to envelope materials or active systems (e.g. HVAC, lighting etc.). These solutions have very little overlap, resulting in minimal integrated design opportunities. While these are opportunities that can be explored at a later stage of the design process, integrated design has more potential opportunities available at earlier stages of the design process, particularly at project inception.

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

As integrated design has more opportunities at project inception, it is difficult to implement when a finalised design has already been attained. The structure is set, leaving little opportunities to be explored in the building as a whole. To maximise integrated design opportunities, projects should be selected which are closer to the inception phase, rather than the finalised stage. However, it is still possible to undertake integrated design on a finalised structure, though in a less holistic manner.

Some aspects of the building are more fluid and offer different opportunities. If participants were able to consider an occupant's room layout, then different strategies may be explorable. Rather than examining holistic building opportunities, this single unit's layout could be optimised to improve efficiency. While these savings would be smaller when compared against the building, similar strategies could be implemented across multiple units, multiplying an energy savings by the total number of units included within the overall design. This again offers integrated design opportunities, with a primary focus on internal and operational opportunities.

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

Integrated design is difficult to achieve when a finalised design already exists, but it is possible. Further examination of finalised design projects would be useful to determine if integrated design opportunities offer sufficient benefit when considered at a finalised design state in comparison to the potential opportunities explorable at project inception.

Please include any other information you feel is relevant or helpful in sharing the knowledge you learnt through this stage of the Project. This may be qualitative or quantitative and may include a graph, chart, infographic or table as appropriate.

Refer to Studio Report (i-Hub IDS-10 Design Studio outcomes report_100%_v1) for further exploration of this lesson.

Lesson learnt #2	Importance of feedback mechanisms and student/consultant interactions
Category	Social

Describe what you learnt about this aspect of the Project.

Feedback in any regard was found to be of benefit to students at most stages of the design, providing either reassurance that the correct design procedures had been undertaken with the design progressing in a beneficial manner, or providing correction/advise as to what may need further consideration. Client specific feedback (in regard to the return brief) highlighted any aspects which required further/additional consideration, gave greater context to the desires of the client, and provided further information which was omitted or unconsidered. The inter-disciplinary background of the consultants also led to important discussions and feedback on the suitability of the design solutions, for example, whether the outlined solution was feasible in terms of building performance while also complying with structural requirements.

It was found that greater discussions were facilitated within larger working groups (~8 students, two consultants and one academic) rather than smaller, group-based discussions. When in larger groups the students become aware of what designs and methods the other smaller groups are considering, and allows them to discuss their issues with peers, with everyone involved in the working group able to provide suggestions about how to overcome the current issues being faced.

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

Using larger working groups from the start of the IDS will allow students to have more open discussions and share ideas more freely. This also facilitates more insightful discussions with consultants, who are able to provide more beneficial advice to all students.

Having more opportunities for potential feedback was considered to be of greater benefit for students, however this also required greater initiative from the students in a learning environment which was unique and unfamiliar. This likely resulted in students being unaware that they were able to reach out to clients/consultants directly for feedback/advise outside of class. It would be better to outline this in early weeks and reinforce this information each week to make students more aware of the resources available to them. Additionally, as students did not take advantage of the consultant's consultation times, it may be better to assign each group time with consultants (outside of class) each week (approximately 10-15 mins). This would allow students to have a conversation specific to their project, but also set periodic work deadlines so that they have work completed and ready to present to the consultants.

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

Students respond positively to feedback, with greater outcomes being achieved when any type of feedback is provided. This feedback should be constructive, giving students direction on how to proceed. There are many options available for feedback to be provided, however it is unknown which method is best (e.g. in person, report comments, responses on forums). It could be beneficial for these (and other) feedback mechanisms to be explored to determine if students respond better to some specific forms of feedback.

Please include any other information you feel is relevant or helpful in sharing the knowledge you learnt through this stage of the Project. This may be qualitative or quantitative and may include a graph, chart, infographic or table as appropriate.

Refer to Studio Report (i-Hub IDS-10 Design Studio outcomes report_100%_v1) for further exploration of this lesson.

Lesson learnt #3	Evaluation matrices allow for simplified interdisciplinary design comparisons
Category	Technical

Describe what you learnt about this aspect of the Project.
Students across multiple disciplines do not always completely understand the technical aspects associated with other disciplines, with them finding it difficult to compare design solutions. The difficulty associated with this is that students understand design solutions relevant to their field and their associated positive and negative aspects. Through suggesting the use of an evaluation framework, students are able to break their design solutions down into relatable statistics (e.g. cost, feasibility, certification scheme ratings, etc.) so that an associated metric may be assigned. The associated metric gives students a manner in which to compare interdisciplinary design solutions. While further assessment is required following this process, it provides students with a tool to provide quantifiable justification for design decisions, with reasoning as to why other alternatives were discarded. Methods like this provide students with a method of communicating with other disciplines, which is not solely related to architecture and engineering.
Please describe what you would do differently next time and how this would help. What are the implications for future Projects?
These methods should be used again in the future, as they are beneficial to student development and interdisciplinary communication. Other methods such as this which foster further interdisciplinary communication should be sought and implemented in the future, as they appear to be of great benefit to progressing a project and identifying the most beneficial design solutions.
If your Project learnings have identified any knowledge gaps that need to be filled, please state it below.
Additional methods which nurture interdisciplinary communication should be sought and implemented within the projects.
Please include any other information you feel is relevant or helpful in sharing the knowledge you learnt through this stage of the Project. This may be qualitative or quantitative and may include a graph, chart, infographic or table as appropriate.
Refer to Studio Report (i-Hub IDS-10 Design Studio outcomes report_100%_v1) for further exploration of this lesson.

Lesson learnt #4	Design frameworks provide beneficial milestones for project development
Category	Technical

Describe what you learnt about this aspect of the Project.

It was commonly identified by both consultants and studio tutors that students (no matter their level of education) lacked design experience, with students being largely reliant on the experiences of the consultants to assist in guiding them through the design process. A design framework was established which directs students from one objective to another, building on their knowledge of previous work before undertaking more detailed designs. This framework was presented to the students in the form of assessments, with each subsequent assessment built on the work completed previously. This progression assuaged the overwhelming nature that design can have, and reinforced the development of constructive design principals, with a design progressing step-by-step with changes being made based on feedback.

This design framework is loosely based on design procedures practiced in industry, with clients receiving a return brief, before more detailed designs are undertaken. These milestones are presented to the client for feedback and variations (as was also undertaken within the design studio) to ensure all parties are happy before a finalised design is submitted. These frameworks educate students on a method of undertaking design in a subtle indirect manner, preparing them for their future careers.

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

These frameworks are beneficial to student educational development, while also assisting them the progressively developing designs by offering milestones to focus on. This focuses attention on smaller achievable tasks, while stepping them towards the final goal of providing a finalised design. Without these frameworks, students may feel overwhelmed and miss critical steps in the design process.

It may be more beneficial to include more stages within the process. The shorter period associated with the IDS's limits the design process (from conception to delivery) to a 13-week period, with students having commitments other than this subject. More frequent smaller assessments may improve engagement, and impel students to consistently improve and develop designs. However, this may also result in fewer students enrolling due to the high number of assessable items. The commitments of the studio tutors would also be greater, to mark and provide feedback on regular assessment submissions.

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

Establishing a clear design process/methodology would be more beneficial for students undertaking the IDS's in the future.

Please include any other information you feel is relevant or helpful in sharing the knowledge you learnt through this stage of the Project. This may be qualitative or quantitative and may include a graph, chart, infographic or table as appropriate.

Refer to Studio Report (i-Hub IDS-10 Design Studio outcomes report_100%_v1) for further exploration of this lesson.