The Innovation Hub

for Affordable Heating and Cooling

Lesson Learnt Report

IDS-09 Lightning Ridge LALC Multi-Purpose Building – Lessons Learned Report

Project – IDS09

25 May 2022

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.
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 Design Studio Lessons Learned Report

The IDS-09 Lightning Ridge LALC Multi-Purpose Building Integrated Design Studio investigates design innovation to reduce net energy consumption of a proposed multi-purpose community centre to be constructed in central Lightning Ridge, to be owned and operated by the Lightning Ridge Local Aboriginal Land Council (LRLALC). Over a 13-week period, a group of multidisciplinary students, consultants and academics worked collaboratively to develop several design proposals for the client (The Dr. Steve Burroughs Foundation) who is acting on behalf of the LRLALC.

This report explores the lessons that have been learned through the completion of these Integrated Design Studios, extracting relevant findings from the Studio Report (i-Hub IDS-09 Design Studio Outcomes Report 100%). These lessons learned were developed through evaluating the observations of studio tutors made during (and following) the studios, assessing the feedback from industry consultants and the partnering client through conducting one-on-one interviews, and from evaluating anonymous participant survey responses.

Lead organisation	University of Wollongong		
Sub-Project number	IDS09		
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Report date	25th May 2022		
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Important Note: The Integrated Design Studio (IDS09) ran in parallel with an additional studio (IDS12), with all studios occurring concurrently. Due to the similarities of these studios, there are some similarities in the associated lessons learned relating to IDS09 and IDS12. 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 (as shown here).

Lessons learnt

Lesson learnt #1	Unrestricted design opportunities can overwhelm inexperienced designers
Category	Technical

Describe what you learnt about this aspect of the Project.

The extent of pre-existing structural development has previously been found to impact integrated design opportunities (IDS11), with existing buildings limiting the impact that both engineers and architects can contribute to the design process. These imposed structural forms greatly inhibit the opportunities to utilise the buildings geometry to its maximum potential, limiting designers to mostly retrofitted solutions. To maximise the potential integrated design outcomes, removal of pre-defined structural form or utilising a greenfield site would appear to be more beneficial, however, for inexperienced designers, the abundance of design opportunities that this offers can be overwhelming.
Existing structural form bounds the floorplan, which assists in guiding the interior design and spatial layout, which in turn also limits building orientation and technological inclusions, providing designers with a scope to work within. When these factors are unbounded, designs become more complex, requiring additional time and collaboration to complete. For experienced designers, this is a more feasible undertaking, however for less experienced designers, these additional variables compound the complexity of the project. For successful integrated design outcomes to occur with a greenfield site, it is necessary to impose project bounds, particularly if inexperienced or junior designers are responsible for undertaking part of the design.
The project used the Renewable Energy Fraction (REF) as a target for design recommendation. This seems to be an unusual metric for designers despite its importance towards achieving actual net zero energy designs.

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

It is necessary to consider the experience of the designers, building typology and pre-existing structure when undertaking integrated design studios, tailoring the project based on the anticipated outcomes. For example, IDS09 required inexperienced student designers to develop a multi-level multi-purpose building from a greenfield site, a relatively complex undertaking. It is beneficial for student designers, clients and consultants if the anticipated scope is developed accordingly, so as to maximise the potential learnings for the emerging designers, while also improving the quality of the final design outcomes which are provided to the client.

Alternately, it is worth considering the duration of the design process. For the student designers, a 13-week period is a relatively short period of time to complete the design in question, however if this period of time were to be increased, a greater level of detail could be included within each design deliverable. Clients would have additional time to provide feedback to design teams, and consultants would be able to provide additional guidance and feedback on the designs being undertaken.

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

While integrated design has been found to be a beneficial skill to introduce, especially in a tertiary education, it is worth considering when this is undertaken. While introducing this concept to students earlier in their education is beneficial, the designs undertaken within the design studio are limited due to student inexperience. Introducing integrated design later in the tertiary education environment allows students to further develop their specialised skills, potentially improving final outcomes, however this may inadvertently result in more conflict between specialisations. It would be beneficial to ascertain when the introduction of integrated design yields the greatest impact.

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-09 Design Studio Outcomes Report 100%) for further exploration of this lesson.

Lesson learnt #2	Misconception of client responsibilities and perceived IDS outcomes
Category	Social

Describe what you learnt about this aspect of the Project.

Initial discussions with a client are critical for any project, outlining the primary brief which all designs must adhere to and ensuring the client is satisfied with the outcome. To achieve this, a continual ongoing dialogue between designer and client is imperative, with confirmation that the design achieves the clients wishes before it becomes finalised. However, while the integrated design studios aim to simulate this relationship between designer and client, outlining the details of this arrangement are necessary, given how there are many parties involved.

While the client may understand that they are entering into a partnership to participate in a design studio, it is necessary to define the many different interrelationships of all parties involved (i.e. student designers, client, consultants, studio tutors, researchers, etc.), and the responsibilities of those involved and their perceptions of the design studio. This is particularly important for the client, as the perceived expectations of their involvement may differ from what is expected by the design studio team. While the client is initially consulted regarding the development of a design brief, with some ongoing consultation and feedback, the student designers and consultants are the primary means of developing the design, with client involvement (following the preliminary consultation phase) being minimal.

An extension of this perceived responsibilities is the output at the design studio conclusion. Clients understand that the studio itself is a means by which they can explore sustainable design opportunities, with preliminary designs return briefs being produced, however, it is important to reiterate the limited skillset of the designers (i.e. tertiary students), which will limit the final design outputs. Clients may assume that with the involvement of academic institutions and external consultants, that the final outputs will be of a quality to be immediately implemented on site, while in reality this is incorrect. Reinforcing this understanding with the client early within the engagement process is imperative, to manage any final expectations, and mitigate any potential issues.

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

Communication with the client is key, with preliminary and follow-up conversations being necessary to explain the setup and ongoing coordination of design studios, particularly the responsibilities of those involved. These conversations should also outline the skill set of the participants, the anticipated outcomes, and the additional documentation of the IDS process and what will be delivered to the client at the conclusion of the studio. These expectations can also be reiterated in contractual agreements, so as to mitigate any potential fallout if project outputs do not meet anticipated expectations.

While this detail is specific for the IDS, it is also critical for any project, with dialogue between the client, the designers and project managers required to be ongoing, with expectations and deliverables to be clear. While it is important for this information the be outlined and reiterated to the client, it is also important for the management team to ensure that this information is understood.

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

N/A

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-09 Design Studio Outcomes Report 100%) for further exploration of this lesson.

Lesson learnt #3	Online working environments are less effective than in person design development sessions
Category	Social

Describe what you learnt about this aspect of the Project.

In the years following the advent of Covid-19, an unprecedented number of workplaces have been required to transition into an online working environment, a position which many employers and employees previously believed to be impractical. Work previously believed to be unachievable in an isolated environment is now achieved on a daily basis by many of the world's available workforce. While some have found this online working environment to be more productive and beneficial, this practice does not hold true for all professions, especially those requiring ongoing creative interdisciplinary collaboration.

Online working environments can for some professions be conducted in an efficient manner while operating in isolation, however for integrated design, this environment has been found to impede in a multitude of differing aspects. Communication was identified as the primary variable impacted by isolation, with conferencing applications and other communication methods being insufficient to replicate a face-to-face design environment. While different tools exist to facilitate some gaps (e.g. Miro), these cannot truly replicate or replace an in-person design studio, particularly in an interdisciplinary setting. Shared workspace tools are capable of achieving desired outputs when a team of individuals of similar backgrounds work in unison, however for a diverse team to work collaboratively, face-to-face communication is of great benefit if not necessary.

To exemplify this, online working environments replicate a traditional style of interaction between different disciplines, with designers working in isolation from one another, sharing designs once they have been developed rather than collaboratively working on a singular design together. While integrated design is achievable in some form in a virtual environment (as evidenced by the IDS's), true integrated design needs to occur where individuals are able to interact and engage with one another.

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

Integrated Design Studios should (where possible) be operated completely face-to-face. While this was an impossibility for IDS09 (due to Covid-19 risks and restrictions), it afforded the opportunity to better understand if IDS is possible in a virtual environment. While achievable, opportunities and outputs are greater when participants are able to engage in-person.

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

While it was generally identified that integrated design is better achieved in a face-to-face environment, this may not necessarily be true for all aspects of the design process. For example, it is unknown as to whether developing a finalised design can be conducted in isolation and achieve similar outputs to finalised designs completed in person. Separate aspects of the design process would need to be further investigated to better understand if only some aspects of design yield better outputs when undertaken in person.

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-09 Design Studio Outcomes Report 100%) for further exploration of this lesson.