Week 4: Asynchronous Design Studio

3D Printed Housing Ethical Considerations

Overview

The purpose of this activity is to reflect on the ethical and social complexities of housing. In particular, you are asked to think about *unintended consequences*. For a general introduction to this topic, watch the 2PX3 video on ethics and unintended consequences. [5-Design Studios→Week 4→Wk-4 - Ethical Consideration Video]

Ethical decisions and designs in engineering in the real world is more than diligence and following codes and laws. With the emerging complexity of engineering systems and applications, we are not able to predict longer term outcomes and even with best efforts, harm can come to people and communities because of our engineering decisions. All of the projects for 2PX3 represent such complex situations and your task is to thoughtfully reflect and discuss your decisions to mitigate potential unintended harm.

A safe and affordable place to live is one of the most fundamental needs for people. For most it will be the largest expense in their lives and in many communities housing access have become one of the greatest challenges for governments, business, and residents. Read the following CBC article about the current challenges in Canadian housing: Can Canada solve its housing crisis without making climate change worse . As the article suggests Canada (and may regions around the world) now face conflicting priorities when it comes to housing. Of course, we know how to build good houses but can we do it so that a broad cross-section of people can afford them and how can we build them without causing harm to the environment.

Whenever you have conflicting priorities, and whenever you need to make choices in a state of uncertainty and vagueness, you will encounter the possibility of harmful unintended consequences and ethical challenges.

1. What are the key issues or considerations for the 3D Printed housing development that will have the greatest direct on people and communities? Where do you think you need to put extra thought and deliberation to mitigate potential harmful consequences?

Some things that will affect the people and communities the most are the appeal of the houses and the environmental effects. A house surrounded by 3D printed houses that are not considered appealing by society will have its value decreased. This will negatively impact existing houses and homeowners that are having 3D printed houses built near them. Another thing is the environmental effect. In a town like Langford, pollution is not tolerated because of the surrounding farmland and greenspace. To mitigate these harmful consequences, we need to ensure that the houses have an appearance that is appealing to consumers and that the printing process produces minimal water and air pollution.

2. What are some of the possible unintended consequences from the specific design decisions of material, construction technology, and neighbourhood layout? What are some ways that things could go wrong in the neighbourhood and community?

Possible unintended consequences from choice of material, construction technology, and neighbourhood layout are again related to pollution. The production and use of concrete in the printing process would produce more waste than a more eco-friendly alternative. However, it is probably more cost effective. Also, the construction technology would greatly affect the carbon footprint of the solution. Mass producing in a factory would be detrimental in this sense, as it would require more transportation infrastructure to deliver parts to the construction site, as well as more land to build said factory on top of. However, printing on site promises more noise pollution in neighbourhoods, which does not affect carbon footprint but does affect the appeal of the residents of the neighbourhood.

3. Reflect on some of the design decisions you have already considered. Are there any that you think you need to revisit or discuss further?

I think the team should revisit the material choice and construction method. These seem to be the elements of the solution that have the greatest effect on cost, public appeal, and carbon footprint. So, to optimize our 3D printed housing solution, I think we should re-evaluate these two decisions and re-focus our efforts into finding the optimal material to print with, as well as use surveys to gather public opinion on mass-produced 3D-printed housing, and do a carbon footprint analysis on mass produced 3D-printed housing versus on-site printing.

4. Going forward, how will your team continue to responsibly consider the ethical consideration for future design decision in a way that still allows you to make clear, on-time decisions?

Going forward, me team will continue to prioritise public opinion and environmental effect of our solution when making decisions. This will be done by continuously surveying the residents of the community we are building in, conducting carbon footprint analyses, and research on the technology available. Ideally, these methods are not time consuming and will allow us to stick to our schedule in terms of decision making and development of the solution.

Submission Instructions

1. Upload a *.**PDF** copy of the Wk-4 - Asynchronous Design Studio 4 Worksheet to the Avenue Dropbox titled **Asynchronous Design Studio Week 4** by Friday, Feb 4th, end of day (5:30pm)
    - Use the following naming convention: **macID_AsynchDS4.pdf**