

# Methods for Team Integration & Collaboration on Construction Projects

**PROJECT III**  
MICHELLE SANTOS



## **THE PROBLEM**

### **COMMUNICATION & COLLABORATION**

**Inter-disciplinary project teams struggle with communication and staying on the same page. Teams often become segmented and work efforts can diverge from original project goals. INNOVATION, or the introduction of new methods, can transform construction projects. By collaborating, teams can improve communication, empathy, and progress. These improvements have the potential to save money and time. Which methods can change the way homes are built? How can they do this?**

#### **OPPORTUNITY 1**

##### **SUSTAINABLE DECISION MAKING**

Design decisions in home building are usually reserved for the Client (Owner) to determine and the Designer (Architect) to execute. This can cause a lack of connection between decisions and other team members like the Builder (Contractor) additional Design Consultants (Engineers), and Sub-Contractors (Tradespeople). Sustainable Decision Making values and fosters input from all team members.

#### **OPPORTUNITY 2**

##### **SCHEDULE SYNCHRONIZATION**

Home design relies heavily on a structured and hierarchical sequence of events. These events center around work: decisions, project deliverables, and written and visual communications which are geared to provide the information necessary to complete the construction processes. Clients typically do not have schedules but monitor the often disjointed schedules of the Designers and Builder and disjoints can cause serious delays.

#### **OPPORTUNITY 3**

##### **INCREASING EMPATHY**

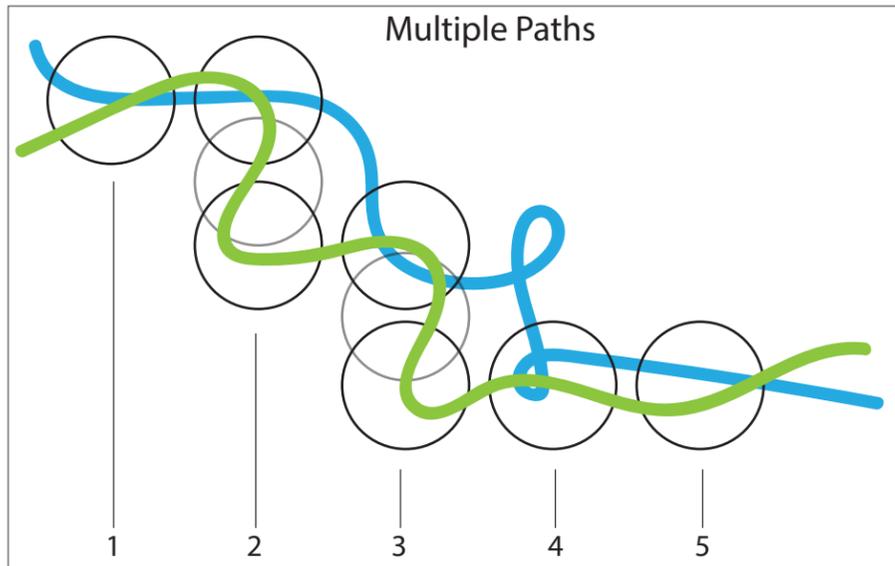
Many issues in home building arise from a lack of communication, clarity, and shared objectives. Some team members can become disconnected and consumed with the day to day of running their business. It is easy for team members to lose sight of Client-driven project priorities and goals. There is a chance to experiment with several forms of collaboration in order to increase empathy, so that all team members understand one another's needs.

# THE OPPORTUNITIES MAKING CONNECTIONS

## 1. SUSTAINABLE DECISION MAKING

Initial Owner decisions generate the earliest design concepts. Design decisions are traditionally made in the earliest event phase known as Pre-Design (preliminary design). Owner decisions are continually made as needed but not necessarily scheduled or managed.

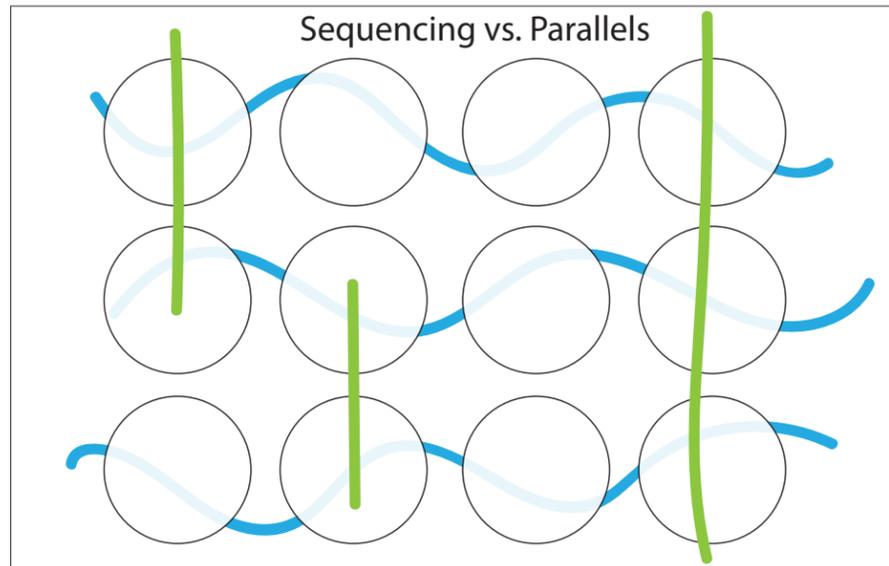
Owner decisions are very rarely integrated into other decisions and work. They are typically obtained by an approval process, and this process may see several versions when the Owner's preferences are not consulted first.



## 2. SCHEDULE SYNCHRONIZATION

The design schedule and construction schedule are not created with one another in mind. If they were, it could be argued that they would contain at minimum workflow sequences and look for the opportunity of parallels.

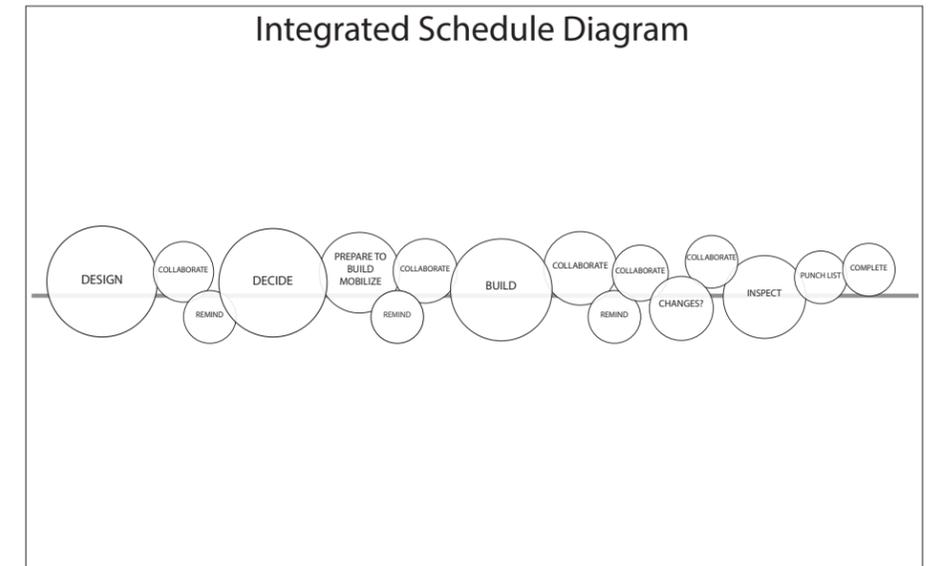
Sequencing is the order in which events occur. Parallels are pathways that connect related events or events that can benefit from a connection. Sequencing determines priority and responsibility, while parallels can offer the opportunity to connect and collaborate.



## 3. INCREASING EMPATHY

Synchronization can be further ensured with periodic check-ins. Unlike status or progress meetings, these sessions could be strategically planned to maintain the integrated project schedule, confirm Owner decisions, and increase understanding of team objectives.

By managing and scheduling Owner decisions risk, delays, and litigation can be mitigated, the success of the project can be ensured, and opportunities for collaboration can be leveraged. Collaboration can lead to empathy, and empathy can help the project succeed.

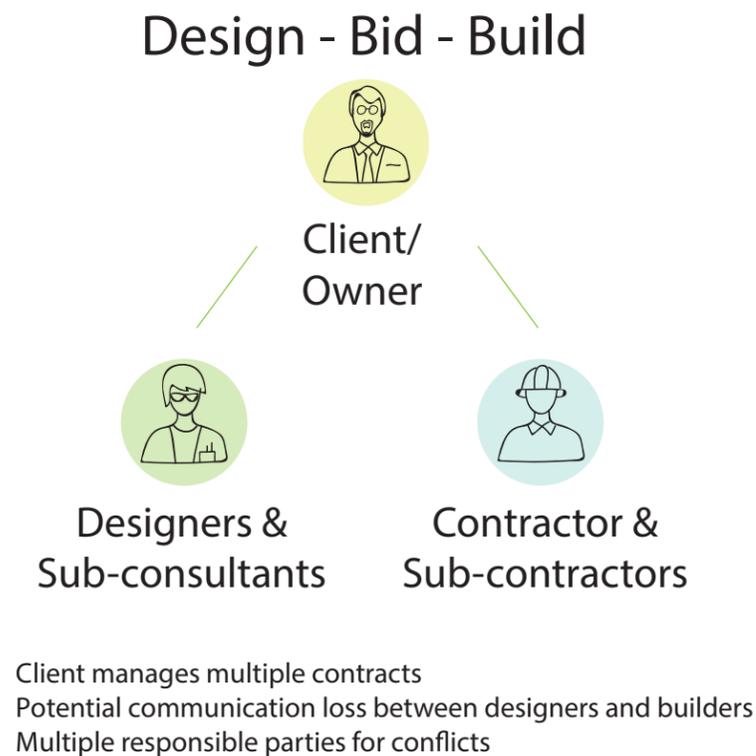


# OPPORTUNITY 1

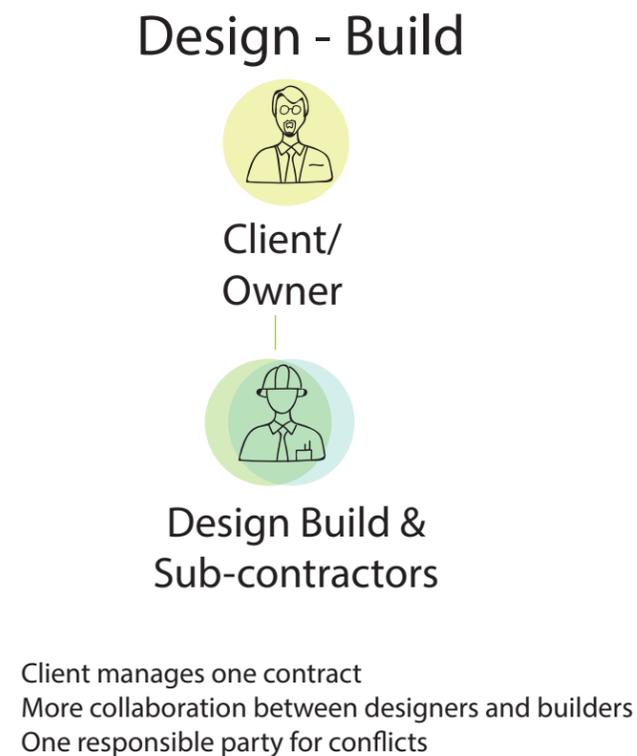
## SUSTAINABLE DECISION MAKING

### CONSTRUCTION PROJECT TEAM SUMMARY

Two forms of Project Delivery are typical to home design and building. They include Design - Bid - Build and Design - Build. The diagrams below summarize these project delivery methods and team members.



Project Delivery Methods



<b>Client / Owner</b>	<b>Designer</b>	<b>Design Consultant</b>	<b>General Contractor</b>	<b>Sub-Contractor</b>
Responsible for decisions which govern overall project objectives including the budget, schedule and contracts.	Responsible for executing all design decisions, delivering design to builder, and recommending or selecting the builder.	Responsible for sub-discipline and / or specialty design execution such as interior design, lighting design, structural engineering, and mechanical engineering.	Responsible for managing the construction budget, schedule, and related deliverables, and delivering the construction project on time.	Responsible for sub-discipline and / or specialty construction and fabrication such as concrete, structural steel, framing, doors, windows and plumbing.

Project Team Members

# SUSTAINABLE DECISION MAKING OVERVIEW

## CLIENT DESIGN DECISION EVENT

- a. Under Slab Foundation Coordination
- b. Basement Slab Foundation Coordination
- c. Exterior Door Hardware
- d. Exterior Details
- e. Landscape Pricing Set
- f. Design Development Drawings / Pricing Set
- g. Coordinated Reflected Ceiling Plans
- h. Plumbing Specs / Appliance Specs
- i. Framing Coordination
- j. Final Interior Construction Drawing Set
- k. Furniture, Fixtures & Equipment

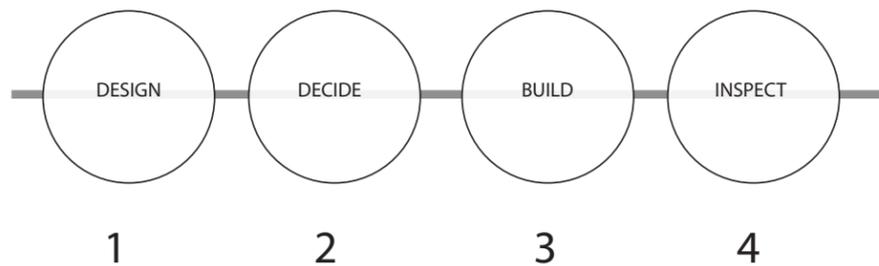
## IMPACTED TEAM MEMBERS

Client, Designer and Builder schedules are impacted by all decisions

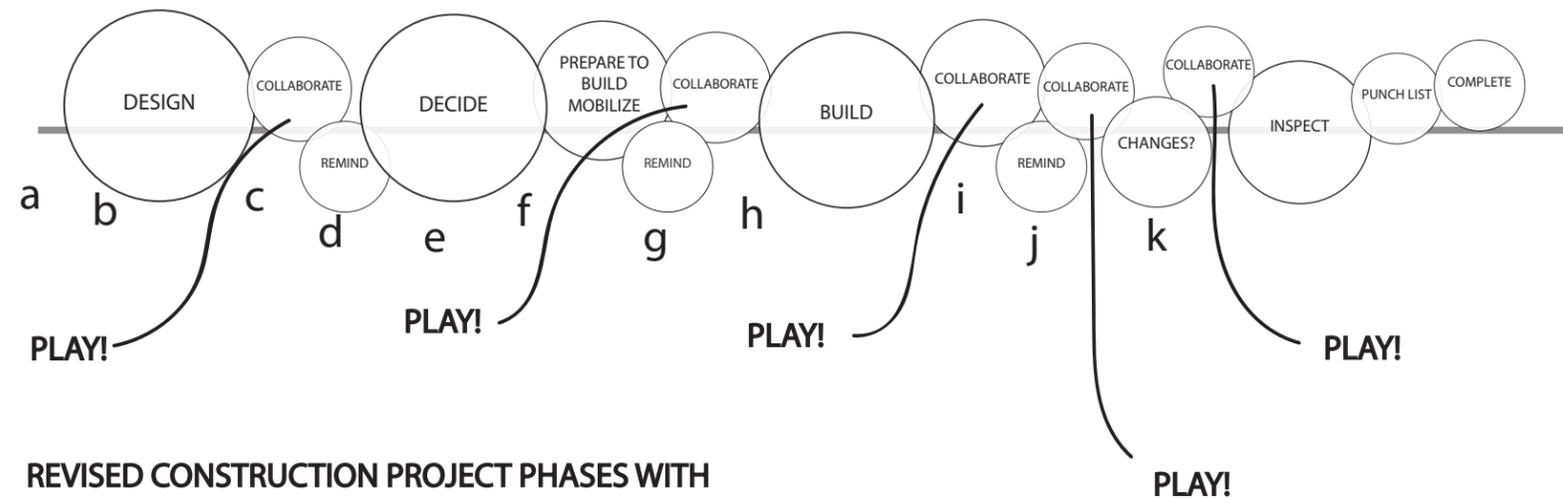
- Plumber, Interior Designer
- Electrician, Architect
- Door Sub-Contractor, Builder, Architect
- Roofer, Carpentry Sub-Contractor, Stonemason
- Landscape Designer, Stonemason, Landscaper
- Cabinet & Stair Sub-Contractors, Architect, HVAC Sub, Lighting Designer, Electrician, Framers
- Plumber, Interior Designer
- Framer, Plumber, Electrician, Interior Designer
- Stone and Tile Sub-Contractor, Interior Designer, Suppliers, Vendors, Installers

## IMPACTED SCHEDULES

- Design, Interiors, Construction
- Design, Construction
- Design, Interiors, Construction
- Design, Construction
- Design, Construction
- Design, Interiors, Construction



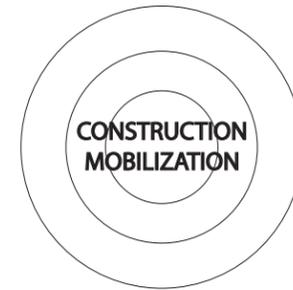
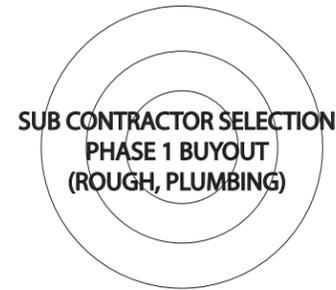
MAIN CONSTRUCTION PROJECT PHASES



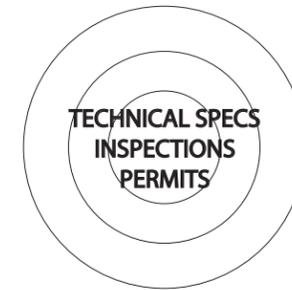
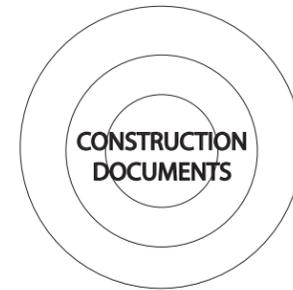
REVISED CONSTRUCTION PROJECT PHASES WITH COLLABORATION & DECISIONS INTEGRATED.

# OPPORTUNITY 2

## SCHEDULE SYNCHRONIZATION



BUILDER

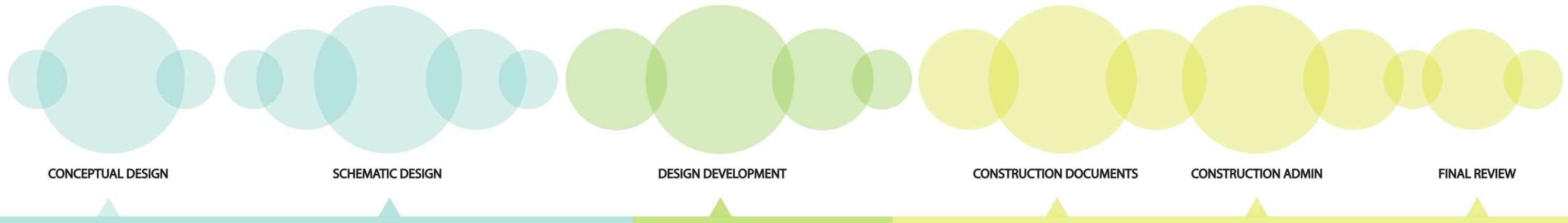


DESIGNER



CLIENT

# PROPOSAL SCHEDULE SYNCHRONIZATION



CONCEPTUAL DESIGN

SCHEMATIC DESIGN

DESIGN DEVELOPMENT

CONSTRUCTION DOCUMENTS

CONSTRUCTION ADMIN

FINAL REVIEW

## CONCEPTUAL DESIGN

- Reeseearch
- Zoning
- Budget Analysis
- Programming
- Design Concepts
- Client Questionnaire
- Inspiration Images
- Client Approval

## SCHEMATIC DESIGN

- Prelim Floor Plans
- Prelim Massing Models
- Contractor Selection
- Interior Inspiration & Concept
- Prelim Pricing Drawing Set
- Prelim Mechanical, Electrical & Plumbing (MEP) Design
- Prelim Cost Estimate
- Client Approval

## DESIGN DEVELOPMENT

- Revised Pricing Drawing Set
- Refined Floor Plans
- Technical Specifications
- Reflected Ceiling Plans
- Prelim Lighting Design
- Prelim AV / IT Design
- Prelim Landscaping Design
- Prelim Finishes, Fixtures & Equipment Selection
- Plumbing Fixture Schedule
- Finish Schedule

## CONSTRUCTION DOCUMENTS

- Interior Elevations
- Cabinetry Selection
- Final Lighting Design
- Final AV / IT Design
- Final Landscaping Design
- Final Finishes, Fixtures & Equipment Selection
- Hardware Schedule
- Mechanical, Electrical & Plumbing (MEP) Coordination

## CONSTRUCTION ADMINISTRATION

- Respond to Requests for Information
- Site Meetings, Observation, Inspection
- Refine, Revise Drawings
- Review Sub Contractor Shop Drawings
- Final Finish Selections
- Punch List

**“Many ideas grow better when transplanted into another mind than the one where they sprang up.”**

– Oliver Wendell Holmes

**THE PLAN  
OVERVIEW**



## OPPORTUNITY 2 INCREASING EMPATHY

### PROBLEM

WORKING WITH PEOPLE IS HARD.

Designers are creative people. Builders are also creative problem-solvers. Creative people like to have fun, learn, and feel challenged. Creatives also like to experiment, take chances, and do unconventional things. Repetition creates boredom. New problems need new solutions.

### OPPORTUNITY

WORKING WITH PEOPLE CAN BE FUN?

“When you work with people whom you like and you admire because they’re so good at what they do, it doesn’t feel like work. It’s like you’re playing.”

-Stan Lee

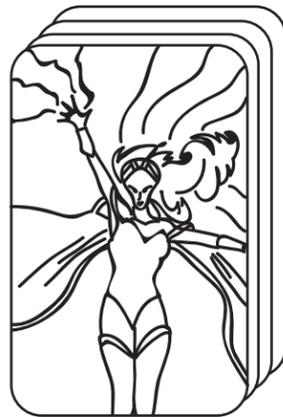
### PROPOSAL

PLAYING WITH PEOPLE IS FUN!

Playing feels safe, less serious and less costly than working. It engages different parts of the brain and can allow for more unique problem-solving. Designing is problem-oriented, and building is full of unknown problems. These problems can become excellent opportunities for play.

#### TYPES OF DECKS

Character Deck  
Mini Games  
Fill in the Blank  
Blank



#### CHARACTER TYPES (CLASSES)

Owner  
Designer  
Builder  
Consultant

#### GAME PROGRESSION

How to Use the Mini Games to create a series of tools that can help solve your Design Problem

## EMPATHY & COLLABORATION WHY THEY MATTER

**“Understanding the feelings of others is good behavior, but empathy particularly pays off when companies—that is the people who work for companies—understand what their customers are feeling.”**

-Evan Rosen

The sustainability challenges that we face can be better overcome with organized systems, processes and people. This organization should stem from cooperation and coordination.

By sharing resources across teams, we can mimic the abundance of nature. Cooperation and competition have played a significant role in evolution. Both are equally valuable in evolution and potentially in problem solving.

If teams can admit that all members have value, and allow all members to express that value, we can all become more connected to one another. These connections foster understanding and that moves projects forward.

**“You want to understand a person’s thoughts, emotions, and motivations, so that you can determine how to innovate for him or her. By understanding the choices that person makes and the behaviors that person engages in, you can identify their needs, and design to meet those needs.”**

-Stanford d.school

# FINDING SOLUTIONS

## TRIZ AT A GLANCE

### TRIZ DEFINITION

TRIZ, or Theory of Inventive Problem Solving, is an innovation method used for solving problems. It is comprised of 40 tools, 4 of which will be used to explore additional solutions to the communication and collaboration problem in the construction of buildings.

### LEVERAGE POINTS

The team and events on a construction project are mandatory and the steps required to build a home are static. However, there are moments in the project where new methods can be safely introduced.

### TRIZ PRINCIPLE 1

ASYMMETRY in action could be change the shape of an object from symmetrical to asymmetrical or making an asymmetrical object even more asymmetrical. Hierarchy can be seen as a form of asymmetry.

What are the teams (players) from the integrated schedule and how can they be ranked to be more asymmetrical?

1. Owner
2. Designer
3. Contractor
4. Consultant

### TRIZ PRINCIPLE 2

MERGING in action could be bringing closer together (or merge) identical or similar objects, or by assembling similar parts to perform parallel operations.

Which events from the integrated schedule are rushed, or occur later in the project? How can these events be given equal value? How can events in the schedule be merged to allow for opportunities to collaborate at parallels?

1. Merge Design with Decision
2. Merge Bidding with Design Development
3. Merge Mobilization with Collaboration
4. Merge Building with Inspection

### TRIZ PRINCIPLE 3

ANTI-ACTION is a principle that states that if an action must happen but has harmful and / or undesired reactions, this action should be replaced with anti-actions to control these harmful effects. Preliminary Anti-Action can be seen in action in environmental risk assessments and the building permitting process.

The most leverage would be found by deploying risk mitigation measures before and in between critical events or milestones.

# FINDING SOLUTIONS

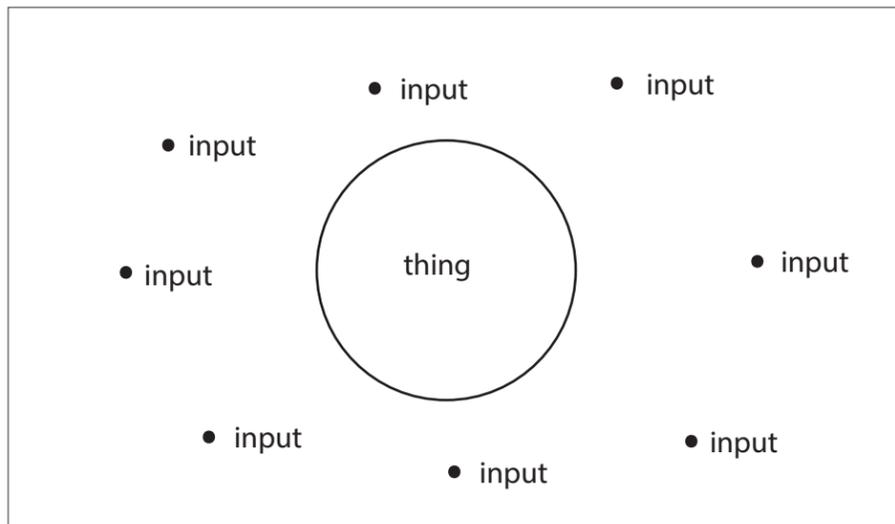
## TRIZ IN DEPTH - NESTED DOLL

### PRINCIPLE STRATEGY

NESTING is when things are nested into other things. A nested doll is the culmination of many related or unrelated things or ideas. Nesting is accumulation. Nesting is also organization.

NESTING ideas can help generate more powerful ideas.

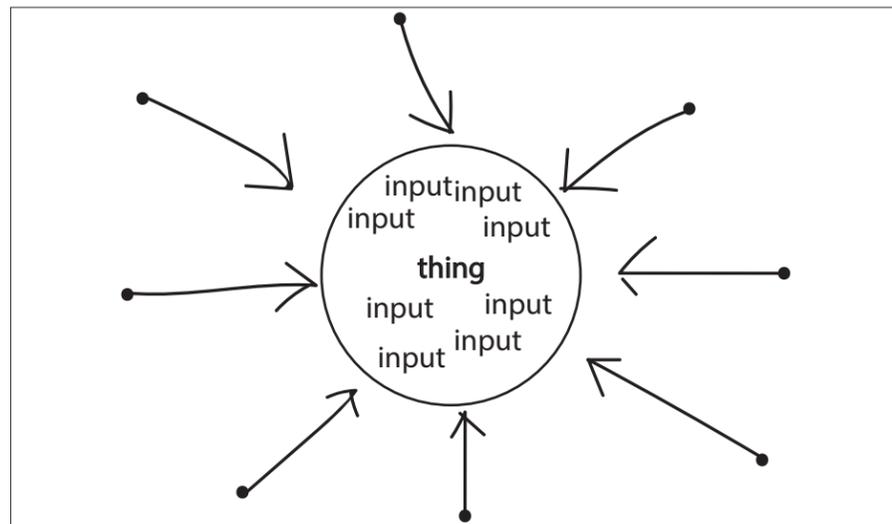
NESTING tools can make a designer's toolkit more powerful as well.



### PRINCIPLE DEPLOYMENT

By pulling together all of the strongest tools in creative problem solving and design thinking, a new nested doll of parts can be used to quickly and efficiently solve problems and help to generate and answer questions.

By building a deck of tools, we can see how these tools act independently to provide a compendium of design tools. By suffling the deck of cards, we have a new, experimental opportunity to reorder and renest the tools.

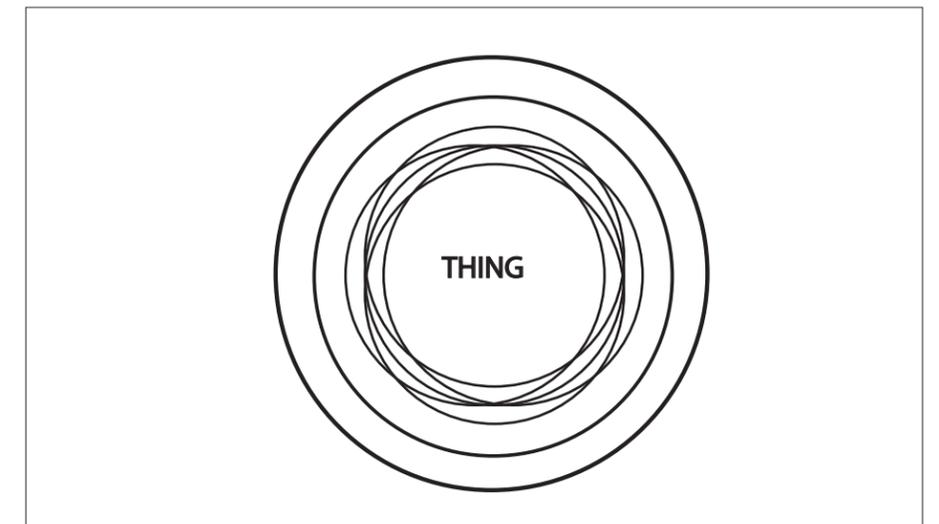


### PRINCIPLE IMPLICATIONS

NESTING can offer a comprehensive kit of parts for creative problem solvers.

NESTING can help players to order and schedule lay sessions for their problem solving needs. Whenever there is a hurdle in a project or a moment of being stuck in a creative endeavor, the play can assemble a game and use it for work or play.

As new tools become available, new cards are created and inserted into the deck.

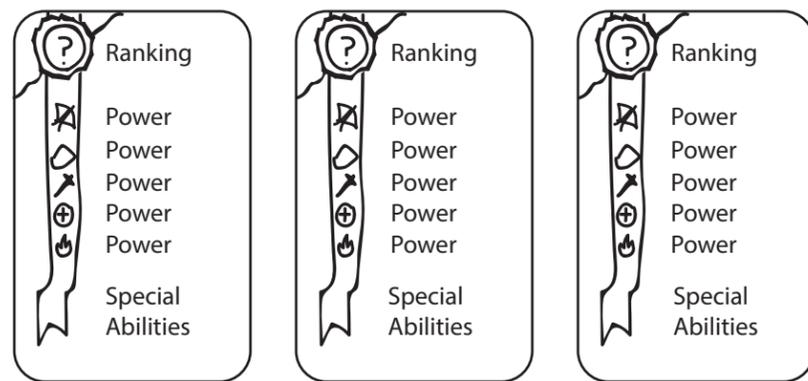
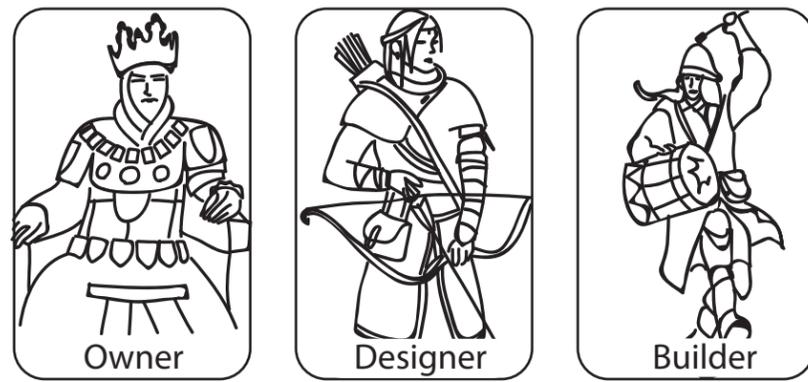


# DESIGN DECISION CARD GAME

## HOW TO PLAY

### CHOOSE YOUR CHARACTER

Build Empathy. Understand Teams.



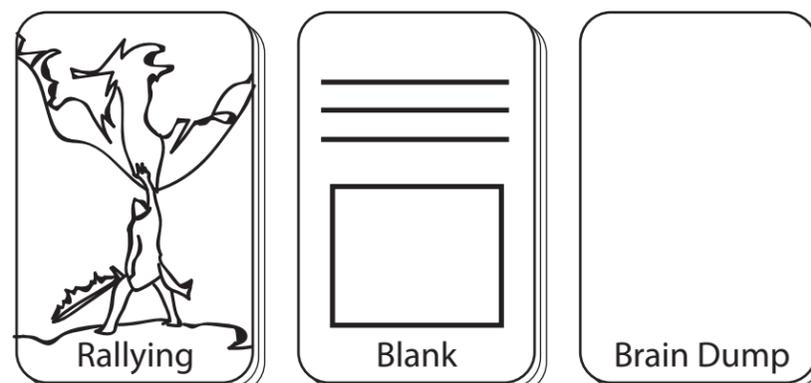
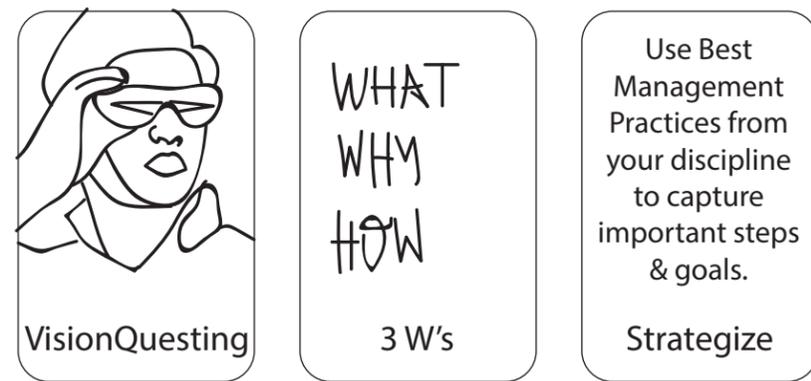
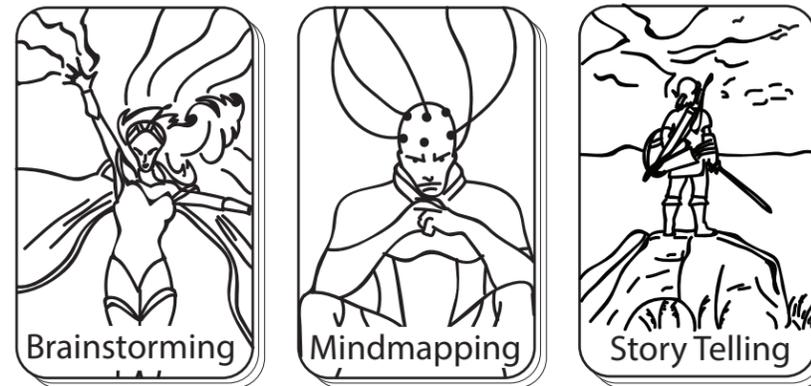
Stats

Stats

Stats

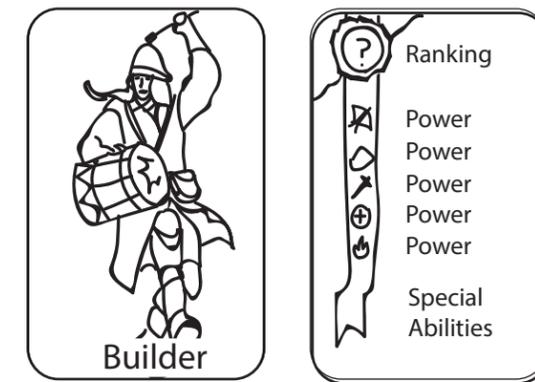
### CHOOSE YOUR MINI GAMES

Solve Problems. Have Fun.

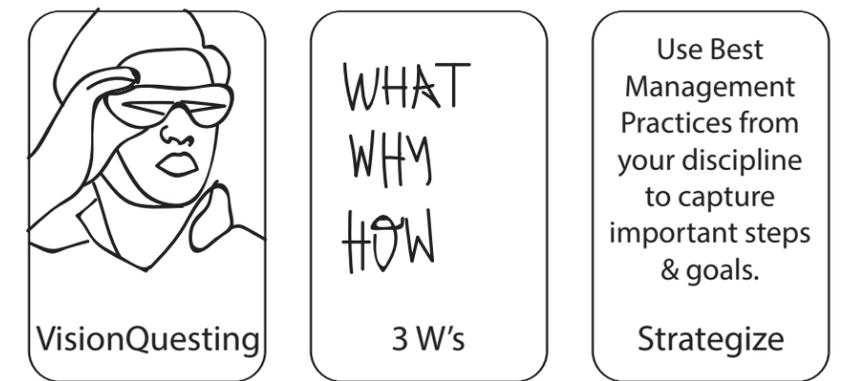


### ORDER YOUR MINI GAMES

Solve Design Problems.



Choose Your Character



Choose Your Mini Games



Record Your Results

Share, Reflect, & Play Again!

# DESIGN DECISION CARD GAME

## SOLVE A PROBLEM

**Problem: Client Wants Plans. Designer Does Not Know Where to Start.**  
**Solution: Designer Needs to Get All of the Answers.**

### Create Game from Mini Games

Mini Games can be comprised of Design Thinking exercises or any other tools that are used to solve design problems. Their order should follow Design Thinking stages.

Selected Mini Games:

Client Interview, 3 W's, Strategic Planning (or Vision Questing), User Studies, Brain Dump and Client's Choice (anything goes fill in the blank).

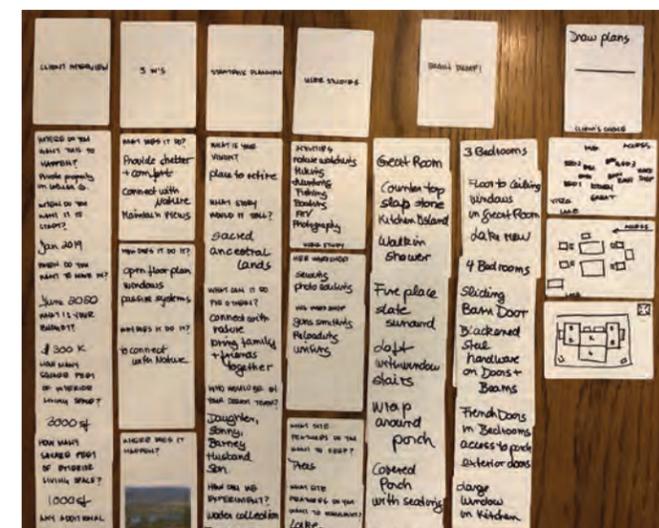
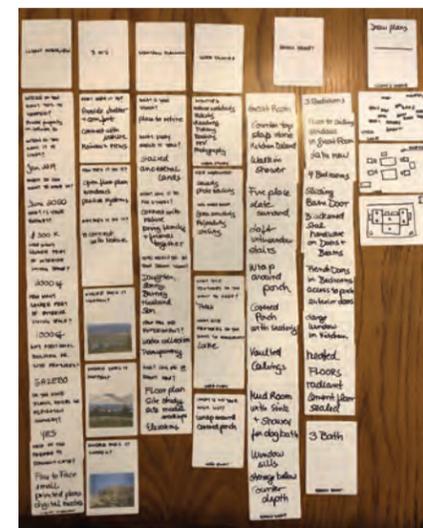
### Play Game

Mini Games were created by hand for the prototype. They can be used for two rounds of play by using the front and back. The back can also be used for next steps or notes.

This game was played by the Designer and Client. The idea of Client's Choice Mini Game allowed the Client to direct some of the questioning which generated sketches.

### Use Findings

The work generated by the chosen mini-games will be used to confirm design decisions and move the preliminary design forward. The same mini games can be used later in the design phase to see if Client goals have changed.



## DESIGN DECISION CARD GAME GAME DELIVERY OPTIONS

### OPTION 1 CLOUD-BASED GAME

The cloud-based online version of the game would allow players to play from anywhere. Developers and designers could fully customize the game to suit their needs.



**GWENT ONLINE CARD GAME**

### OPTION 2 MOBILE GAME

The mobile game would allow for quick playing anywhere. While not as robust as the tools offered in the cloud version, the mobile version could offer quick mini-games and toggle between turn-based and real-time modes of play. It could be a physical card game or a smartphone application.



**75 TOOLS FOR CREATIVE THINKING**

### OPTION 3 BOARD GAME

The board game would be a kit of parts that players could quickly assemble for workshops and meetings. The board would allow for players to quickly move through an ordered system of mini-games geared for in-person collaboration.



**IMPACT BOARD GAME BY FORESIGHT**

# STAKEHOLDER FEEDBACK SUMMARY

## CLIENT FEEDBACK

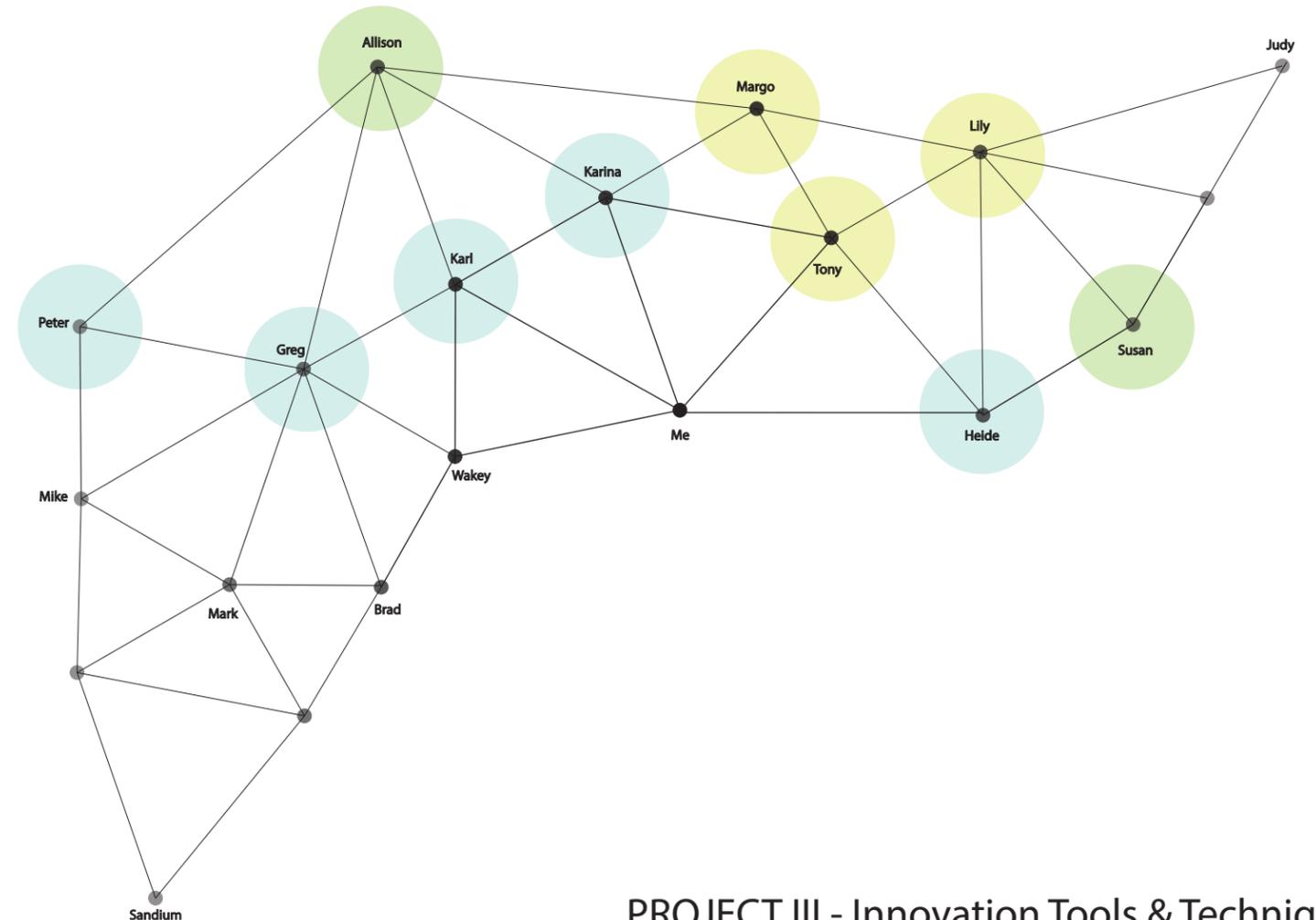
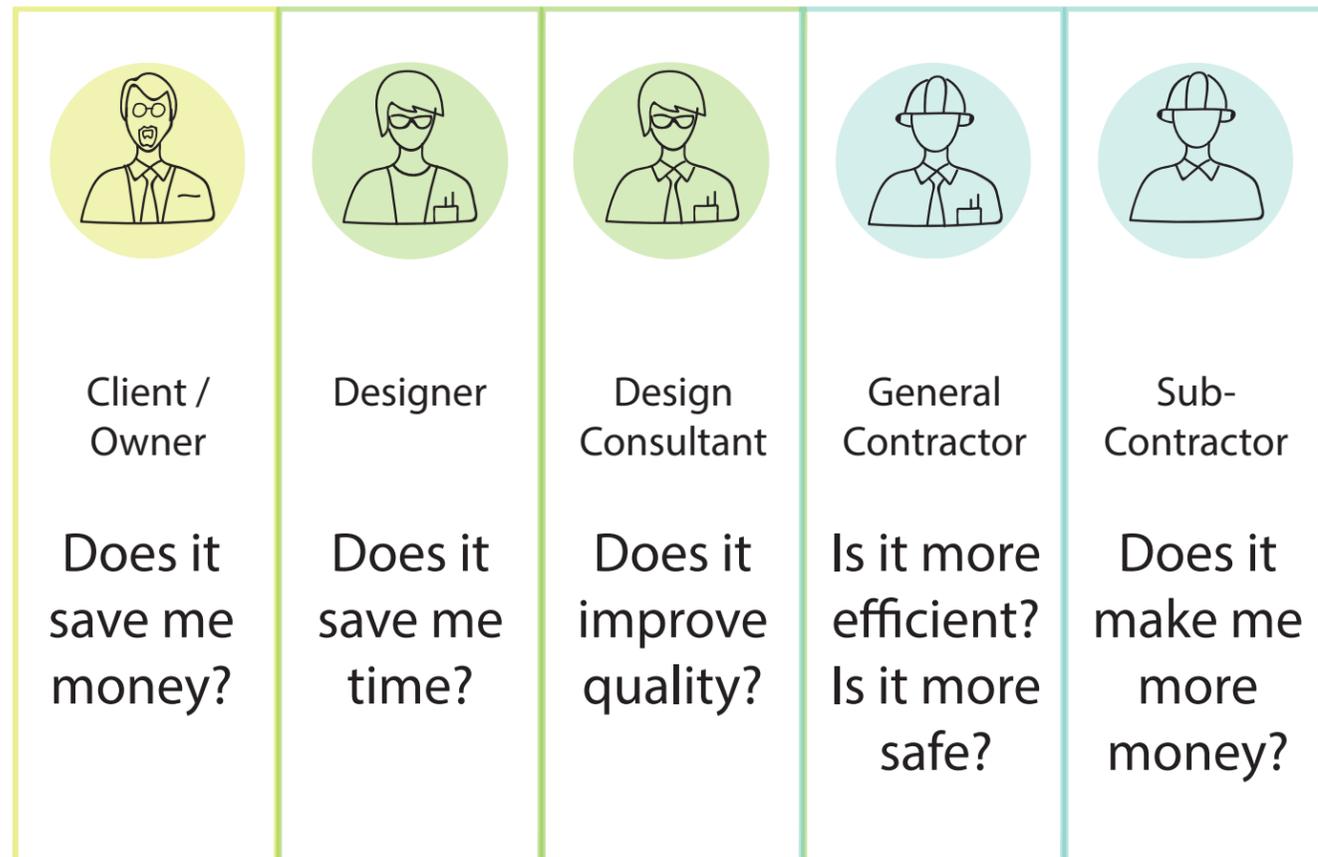
I'm not paying you play cards.  
 How is this billable? Who pays for this?  
 How long does it take? How many sessions per project? When does it happen? Why do you need to do this type of "work?" What is the benefit? Is it optional? What is the value?

## INVESTOR FEEDBACK

Who is your target audience / demographic?  
 How do you market this?  
 Have you thought about social media integrations? How do you incentivize players or monetize features? Pay to play? Add-ons? Advertisements?

## DEVELOPER FEEDBACK

Who builds this? Who maintains it?  
 Who programs / develops it and debugs it? Who sells the physical version? Who makes it? Where? How much does it cost to produce 1 unit and what does it retail for?



## **FUTURE PLANS**

### **TRANSPARENCY & SECURITY**

#### **PRIVACY**

CLIENT CONFIDENTIALITY is a huge challenge in home design as there is a notion of vulnerability in sharing details about large or high end homes. Maintaining Client privacy is a sensitive challenge.

#### **AUGMENTED DESIGN**

I'd like to explore the potential for augmented reality and other app plugins to integrate with the design thinking process. By abstracting some of the sensitive information, we could overcome client concerns about privacy.

#### **WHAT TO SHARE**

OPEN SOURCE is a notion that implies freedom of code information with the assumption that all who access, modify and share it will do so ethically and respectfully.

#### **OPEN WORLD COLLABORATION**

There is also a potential for collaborating at a much larger scale via mobile applications, the cloud, and the internet in general. It is more easy than ever to find target audiences, invite them and connect with them. This global team could greatly enrich the design process and design project.

#### **HOW TO SHARE IT**

I'd like to share the design process as it unfolds with social media audiences and document it in real time. This live design would be something myself and the team could benefit from. Viewers could also contribute, and access live data.

#### **MONETIZATION**

There could be an audience for live designer seminars, sessions, or remote internships / project experience from a professional and educational benefit. Perhaps we could invite others who would pay to play with our design project. This would be another path to explore.

## REFLECTING

### WHAT WORKED & WHAT DIDN'T

I am very happy with the progress and cohesion of assignments from Project I II & III. Breaking large projects down into smaller parts is an intelligent and manageable way to tackle something seemingly big and daunting. I will definitely use this approach and the tools learned in the course to further develop and refine my thesis. The KanBan and Action Methods really helped me to lay out the known steps needed to complete the project goals. These methods are useful for all deliverables from large to small and be scaled as needed throughout a project. Creating my own assignments from readings, as one would do when creating a course, is something I'll also take away and begin to use on my own.

#### THE PLAN

The plan was genius. It helped make something complex both fun and organized. I was surprised how early on in the project I was able to iron out the preliminary schedules and budget. The planning tools and readings are so helpful for a designer just starting out on his or her own.

#### THE TEAM

I think finding, and teaching, the right team members - who are passionate about the project - can be more important than finding experts or people who have experience in certain areas. My preliminary team was huge and experienced but not as helpful as the 4-5 close colleagues I had on my team towards the end.

#### CHALLENGES

The main challenge for me was finding and taking the time to really dive into the readings and work, making decisions, and keeping up with all of the pieces we were juggling. The sequence of assignments was well thought out, but I could see how re-ordering them would also work.

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