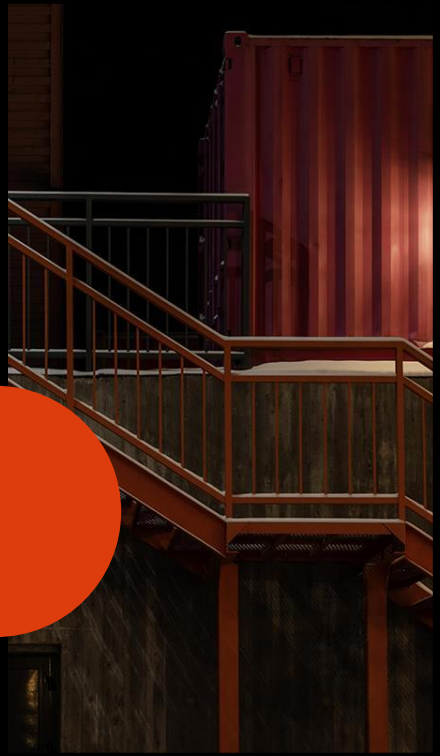
Analyzing the Building Information and Modeling Benefits and Improvements to Traditional Architecture

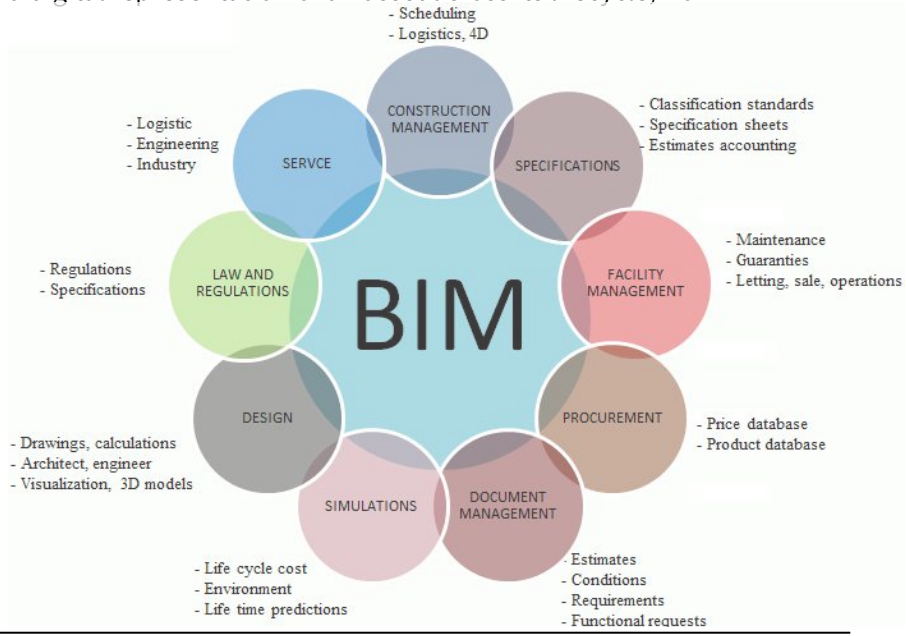


Brian Lee
Mentor: Richard Leitzinger

BIM

The complete **process** and **technique** of creating and managing information for a built object:

- Integrates structured, **multi-disciplinary data** to build a digital representation of an asset across its lifecycle, from planning and design to construction and operations
- Uses an intelligent model and a cloud platform
- Allows for the modeling of a construction project in **5D**
- Project modeling in **3D**
- Additional information kept track of:
  - Cost
  - Time
  - Manufacturing details
  - Sustainability
  - Maintenance
  - Environmental factors



Why We Need It

Efficiency

Overall increased productivity and communication within design and construction teams

Management

Enables the architectural team to save the data generated during the procedure for use in further operations and maintenance

Precision

Data precision and accuracy are increased, as well as the efficiency of flow in projects

Methodologies

01 Approach

Main inquiry approach:
Needs Assessment Research

02 Field Notes

Case studies of commercial buildings, the viability of BIM architecture design

03 Data

Collection of qualitative data through field notes analyzing the case studies surrounding BIM

04 SketchUp

Small, simple simulation using SketchUp

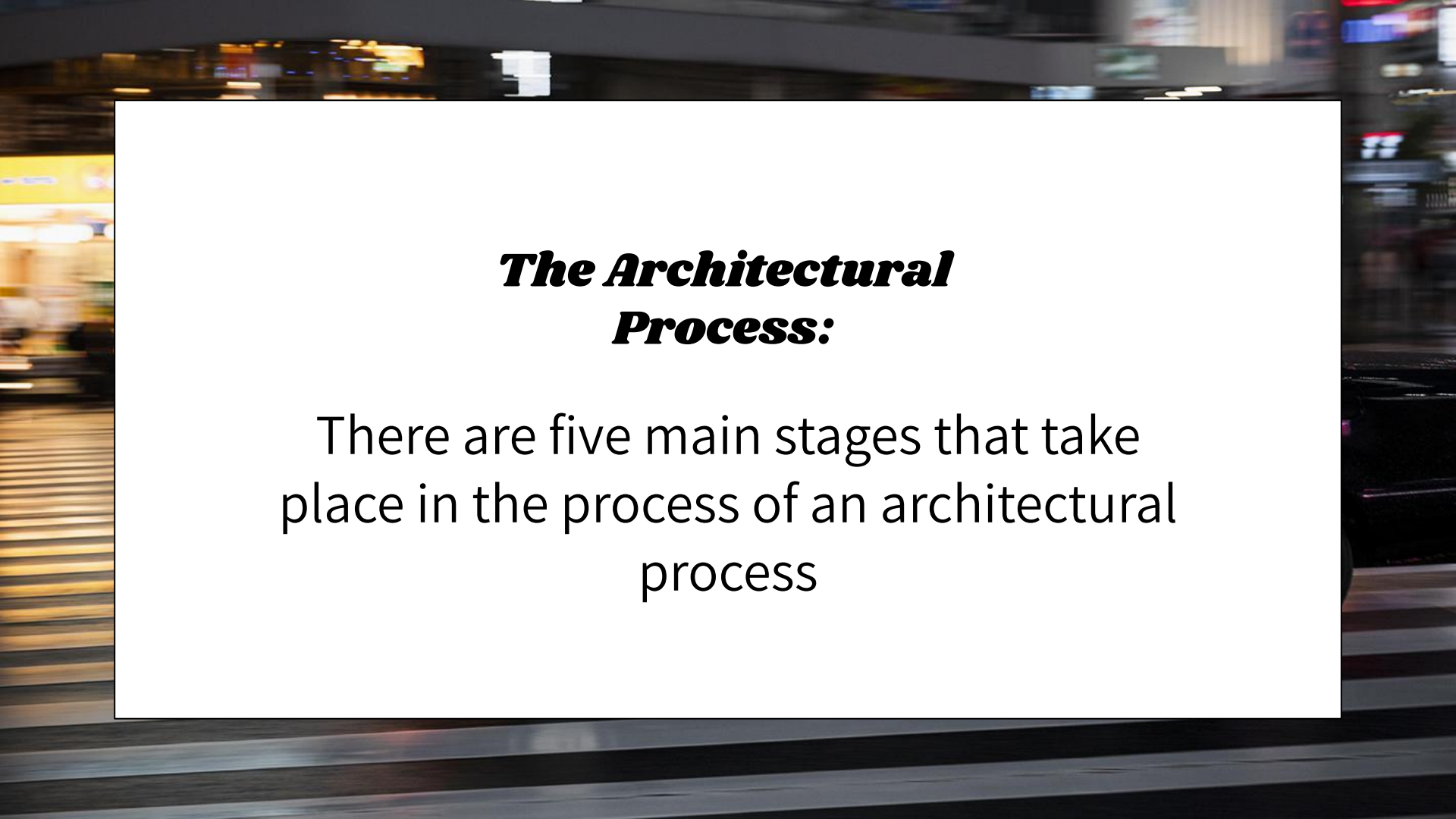
Meet

Travis and Samartha

Happily married for 93 years

The Problem

Their son, Justin Wou, recently dropped out of college and has returned to living with them. Travis and Samartha are both so disappointed that they decide to make him sleep outside. To provide shelter, they search for a cheap little shed for Justin to sleep in.



The Architectural Process:

There are five main stages that take place in the process of an architectural process

Step 1: Schematic Design

15% of the Architect’s work
and fees

Schematic Design (SD)

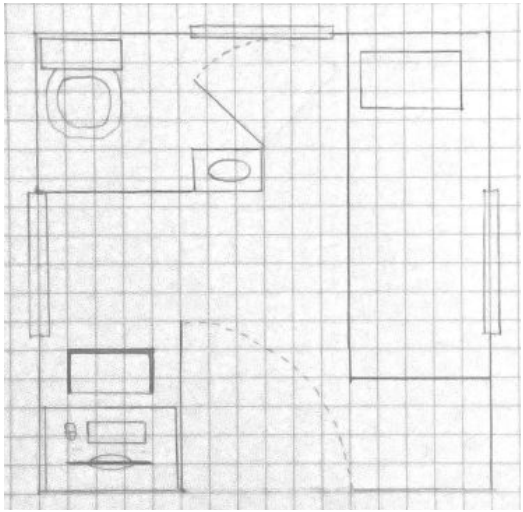
After hiring the best architect ever (me), Travis, Samartha, and I begin the architectural process.

Basic Collaboration

The schematic design process involves collaboration between the clients and architects

Floor Plan Foundation

A basic floor plan is designed and modified that will serve as the foundation for the construction project.



Basic floor plan of Justin's garden shed

Step 2:

Design Development Phase

Around 20% of the architect’s work and fees

Design Development Phase (DD)

Materials

Materials/appliances are decided and confirmed by both the client and architect

Detail

The drawings from the first step are revised and refurbished in greater detail

Finalization

Final designing step in the process; finalizes the layout and design of the project

Engineering

Engineering-related systems are put in place and carried out

Step 3: Construction Documents

40% of the architect's work and fees

Construction Docs (CD)

Technical Designs

All technical designs and engineering are finished

Material Selection

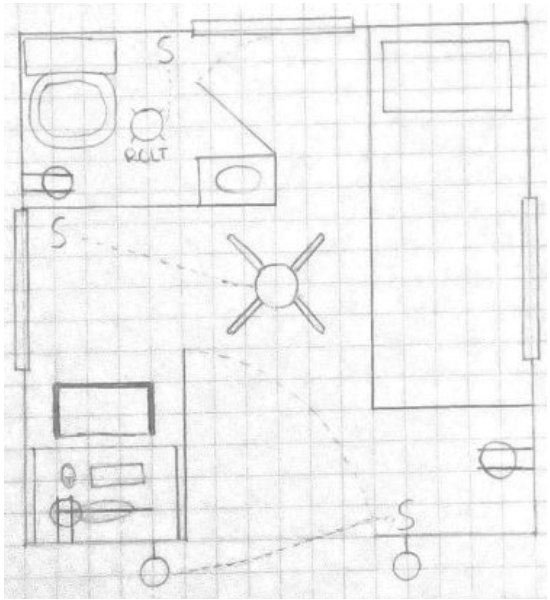
All materials and products selected and scheduled

Separate Contracts

Separate documents and drawings given to different contractors

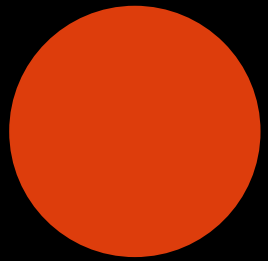
Approval

All of the drawing sets sent for approval from the Department of Buildings (DOB)



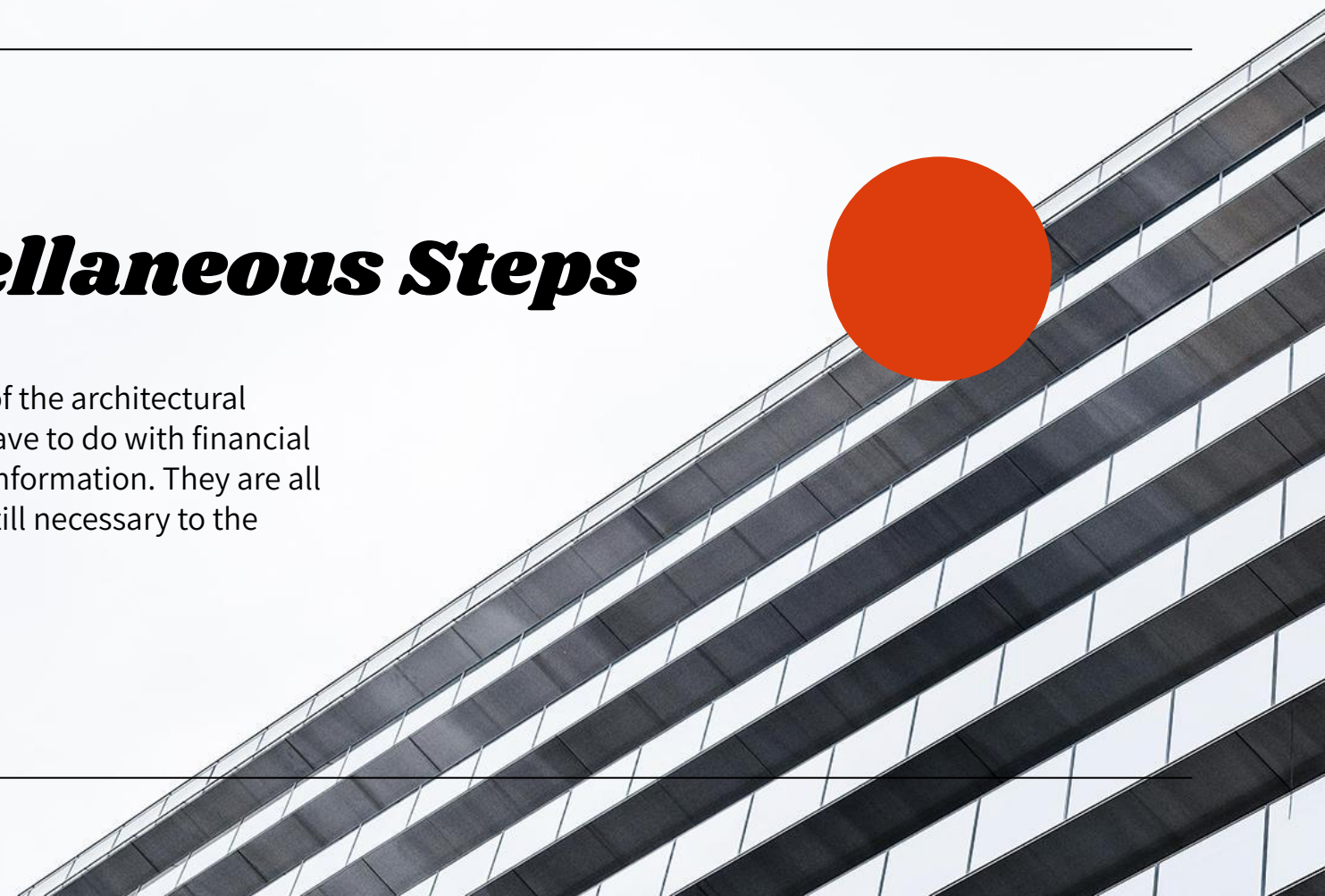
Sample electrician contractor's personalized floor plan

Appliance	Source	Price per Unit	Units	Total Price
wood (frame)	Home Depot	$11	9	$99
nails (galvanized)	Home Depot	$60	1	$60
wood (skid)	Home Depot	$18	1	$18
plywood sheet	Lowe's	$81	1	$81
deck screws	Home Depot	$30	1	$30
pressure boards	Home Depot	$48	46	$2,208
siding sheets	Home Depot	$46	8	$368
finishing nails	Home Depot	$6	1	$6
shingles	Home Depot	$60	2	$120
windows	Cottage Shop	$625	3	$1,875
roofing felt	Home Depot	$88	1	$88



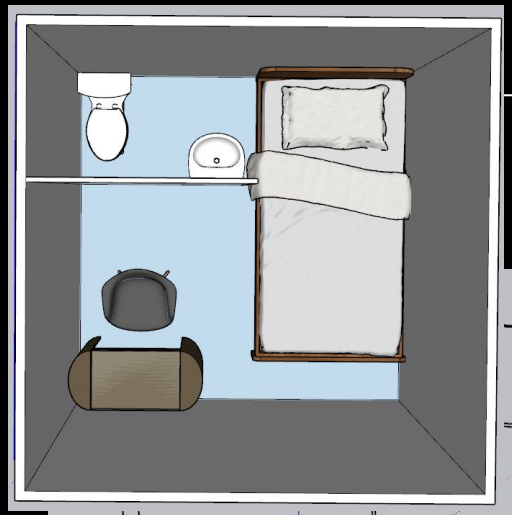
Miscellaneous Steps

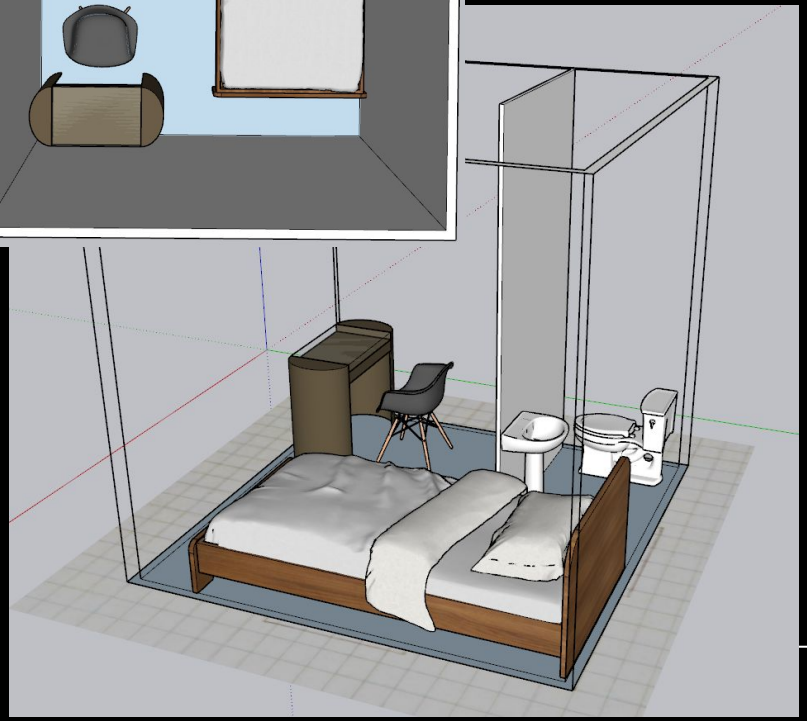
These few steps of the architectural process mostly have to do with financial and contracting information. They are all very boring but still necessary to the project.



Final Steps

The final few steps are mostly consisting of carrying out the construction of the project. This step is where BIM gets involved. With the help of the design Travis, Samartha, and I created, I was able to construct a 3D model of the shed using Sketchup.





Project Timeline

Design (SD & DD)

Week 1

4 hours

Cons. Documents

Weeks 2-3

~10 hours

Misc. Steps

Week 4

~2 hours

Final Steps + Construction

Weeks 5-7

~20 hours

Conclusions

Travis and Samartha are so disappointed in Justin that they are disgusted to have him living in the same house as them. With the added help of the BIM process, I completed construction of the shed in only (time), letting Travis and Samartha live in peace in their house without the weight of disappointment that is Justin. The BIM process I used was extremely simplified, so the efficiency and productivity is even more increased in the architectural industry, allowing for its use in much larger construction projects.

Thanks!

Questions?