Load.in

Using AI and Computer Vision
to give your move a game plan.

Team Yellow

Prototype Design Presentation

Old Dominion University

12/13/2020

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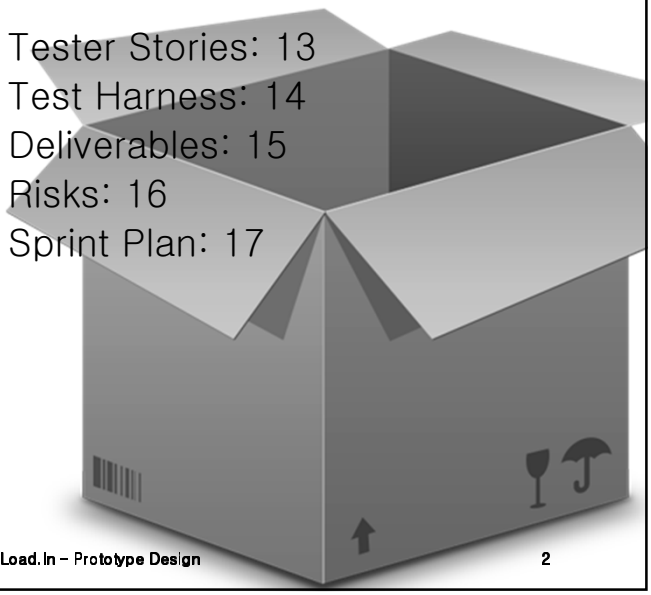
Contents



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Problem Statement

"Do It Yourself" movers lack the expert knowledge required to handle the logistics of their move.

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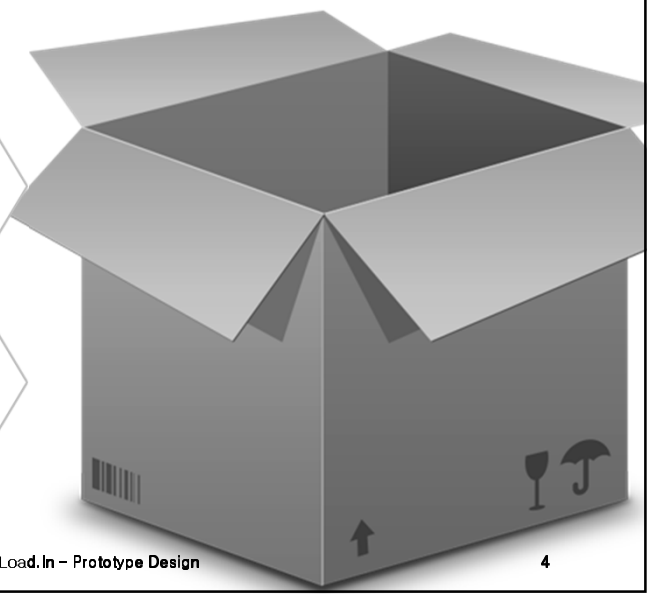
Problem Characteristics



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Load.In Gives Your Move a Game Plan

- Uses artificial intelligence and computer vision
- Provides
  - Expert-level instructions
  - Tips and tricks on moving day

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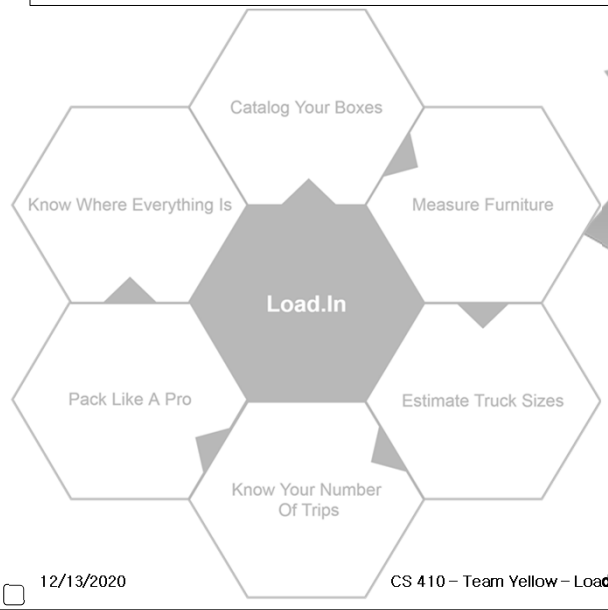
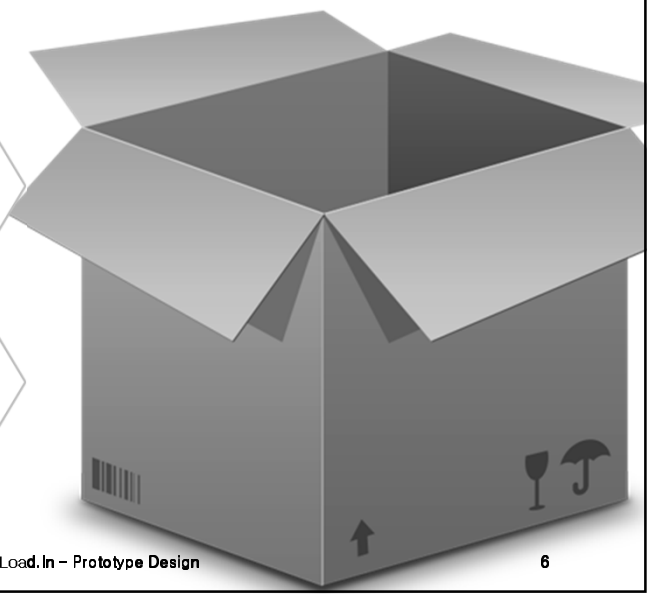
Solution Characteristics





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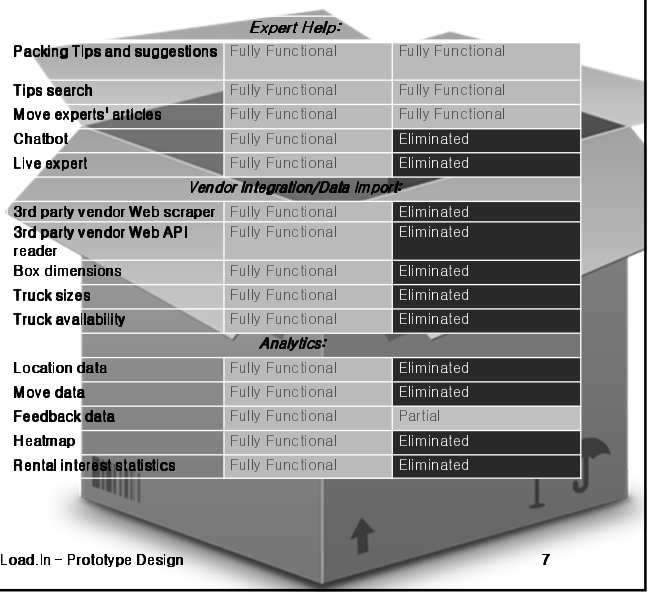
RWP vs. Prototype Feature Set

Feature	Real World Product	Prototype
	Move Inventory:	
Furniture/item measurement	Fully Functional	Partial
3D model generation	Fully Functional	Partial
Item weight	Fully Functional	Eliminated
Item fragility	Fully Functional	Eliminated
Box locator search feature	Fully Functional	Fully Functional
	Move Plan:	
Loan Plan	Fully Functional	Partial
Truck unloading instructions	Fully Functional	Eliminated
	Logistics Planning:	
Estimated number of trips	Fully Functional	Fully Functional
Estimated time to move	Fully Functional	Eliminated
Estimated rental truck costs	Fully Functional	Eliminated
	Expert Help:	
Packing Tips and suggestions	Fully Functional	Fully Functional
Tips search	Fully Functional	Fully Functional
Move experts' articles	Fully Functional	Fully Functional
Chatbot	Fully Functional	Eliminated
Live expert	Fully Functional	Eliminated
	Vendor Integration/Data Import:	
3rd party vendor Web scraper	Fully Functional	Eliminated
3rd party vendor Web API reader	Fully Functional	Eliminated
Box dimensions	Fully Functional	Eliminated
Truck sizes	Fully Functional	Eliminated
Truck availability	Fully Functional	Eliminated
	Analytics:	
Location data	Fully Functional	Eliminated
Move data	Fully Functional	Eliminated
Feedback data	Fully Functional	Partial
Heatmap	Fully Functional	Eliminated
Rental interest statistics	Fully Functional	Eliminated



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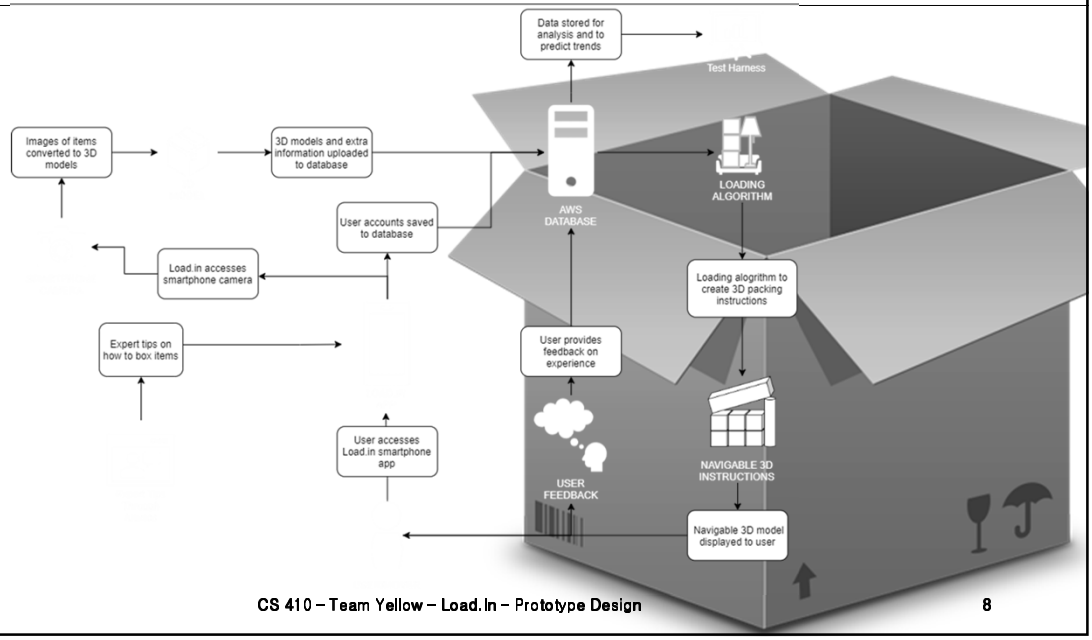
Prototype MFCD



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Prototype Hardware and Software Reqs.

Category	Android App	Web API
Version Control		GitLab
Issue Tracker		Trello
CI/CD		GitLab
Language		Java
Platform	Android Native App	Apache CFX on Amazon Elastic Beanstalk with Tomcat
Database		(or Aurora) on AWS RDS
IDEs	Android Studio	IntelliJ
Developer OS		Linux

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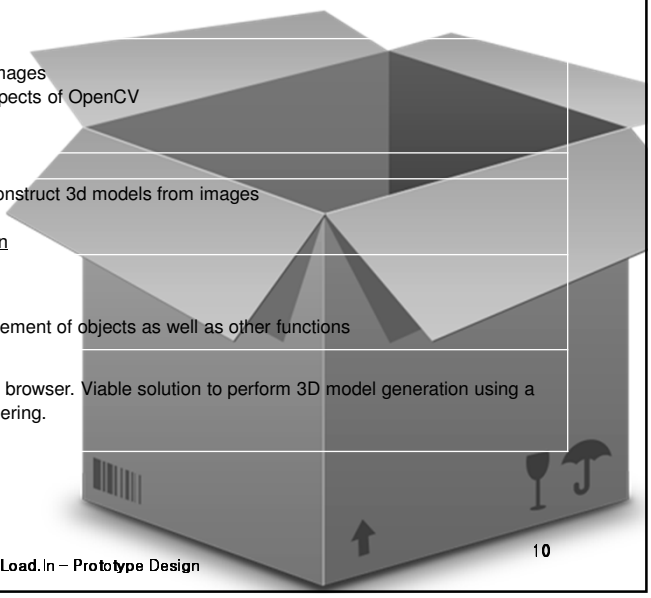
Third Party Libraries

Library	Purpose and Description
3Dorfi	3D model generation from a series of images Written in Java 8, JavaFX, and uses aspects of OpenCV https://github.com/jacordero/3Dorfi
Java 3D	Manipulation for 3D objects in java
AliceVision	3d photogrammetry library that can reconstruct 3d models from images downside is it is written in C++ https://github.com/alicevision/AliceVision
OpenCV	Stands for Open Computer Vision Open-source java development library Does 3D model generation and measurement of objects as well as other functions
Sumerian	Amazon solution for 3D modeling in the browser. Viable solution to perform 3D model generation using a web browser rather than hardware rendering.



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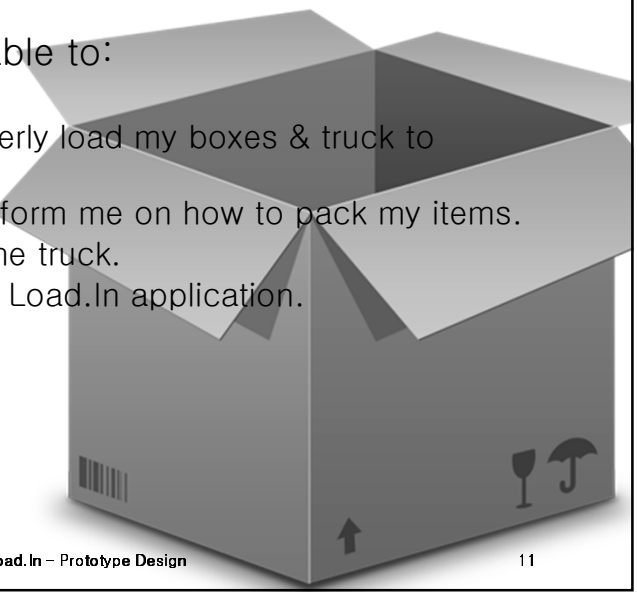
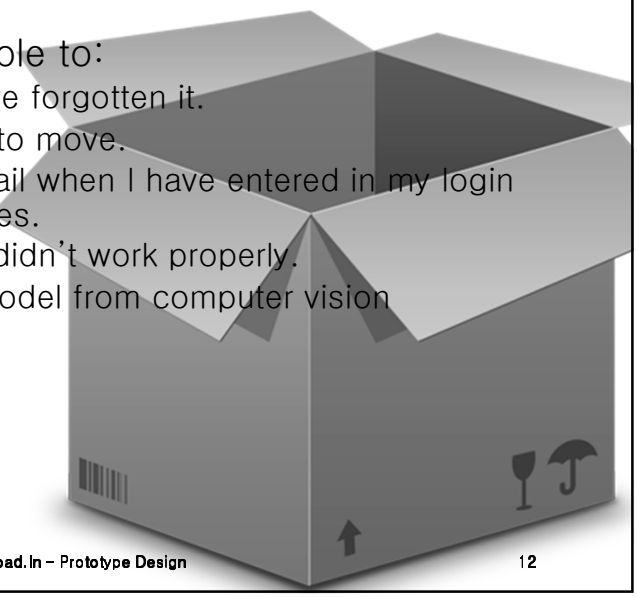
Prototype User Stories

- As a DIY Mover I need to be able to:
  - Input the dimension of my box.
  - Be given a plan on how to properly load my boxes & truck to maximize the use of space.
  - View expert level tips that will inform me on how to pack my items.
  - Be able to locate a box within the truck.
  - Create an account inside of the Load.In application.



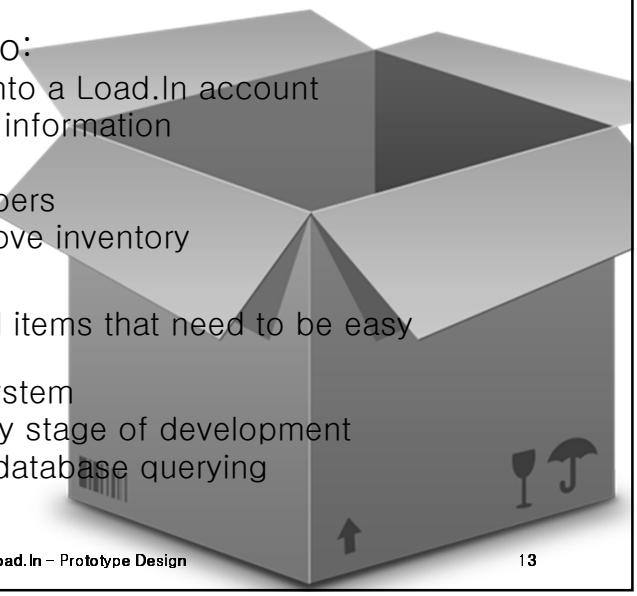
Prototype User Stories

- As a DIY Mover I wish to be able to:
  - Reset my own password if I have forgotten it.
  - Estimate the truck size needed to move.
  - Unlock my own account via email when I have entered in my login credentials wrong too many times.
  - Inform the app creator his app didn't work properly.
  - Measure items and create 3d model from computer vision



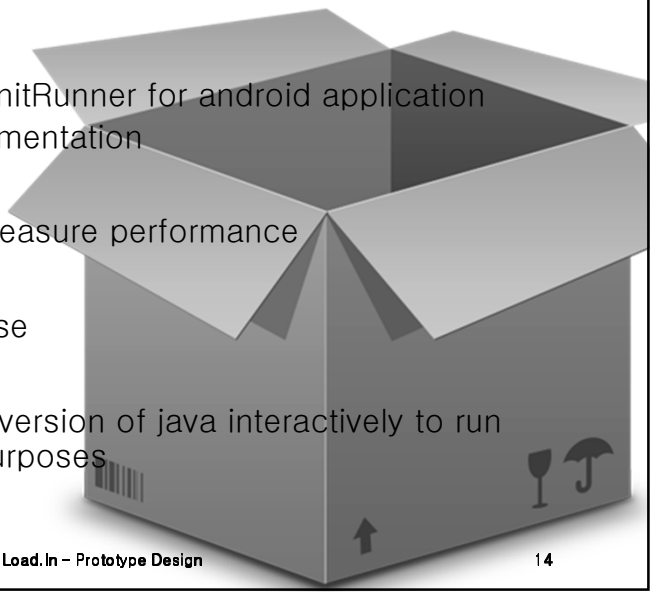
Tester User Stories

- As a tester I need to be able to:
  - Simulate creating and logging into a Load.In account
  - Simulate a load plan using fake information
  - Simulate recreating load plan
  - Provide feedback to the developers
  - Randomly add inventory to a move inventory
- As a tester I would like to:
  - Simulate having multiple special items that need to be easy to reach
  - Have a detailed error logging system
  - Have working unit tests for every stage of development
  - Have a tool for automating the database querying



Test Harness

- Unit testing
  - JUnit 4 powered by AndroidJUnitRunner for android application
  - JUnit 4 for java backend implementation
- UI Performance
  - Dumpsys command tools to measure performance
- Test Data
  - Load random data into database
- Java project
  - This project will run a console version of java interactively to run different routines for testing purposes



Deliverables

- Produce an android application
- Provide an APK file to end users
  - Used for distribution and installation of mobile apps, mobile games and middleware.
- Demo application via android SDK

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Risks

		PROBABILITY				
		Very Low	Low	Medium	High	Very High
SEVERITY	Very High					
	High					
	Medium			C-1		
	Low		S-1 S-2		C-2	
	Very Low					

Acceptable: Risk is acceptable level.
Permissible: Risk is okay for now and can be fixed at a later date.
Considerable: Risk is noted and will be fixed in the next iteration.
Catastrophic: Product is placed on hold until issue is fixed.

Customer

- C-1: End users are not satisfied with the recommendations of the application.
- C-1 Mitigation: Implement a customer feedback feature that allows the users to disclose his/her issues with the applications.
- C-2: End user doesn't follow the guidelines of the application.
- C-2 Mitigation: Implement a feature that allows the user to repeat certain steps in the application as they progress.

Security

- S-1: End user want to ensure the pictures taken of personal information doesn't fall into the wrong hands.
- S-1 Mitigation: For the prototype, all photos will be stored locally and not transmitted/stored in the cloud
- S-2: End user wants to ensure his/her data isn't being collected for nefarious purposes.
- S-2 Mitigation: For the prototype, the only information stored is given by the user for the purposes of the move inventory and can be deleted at any time.

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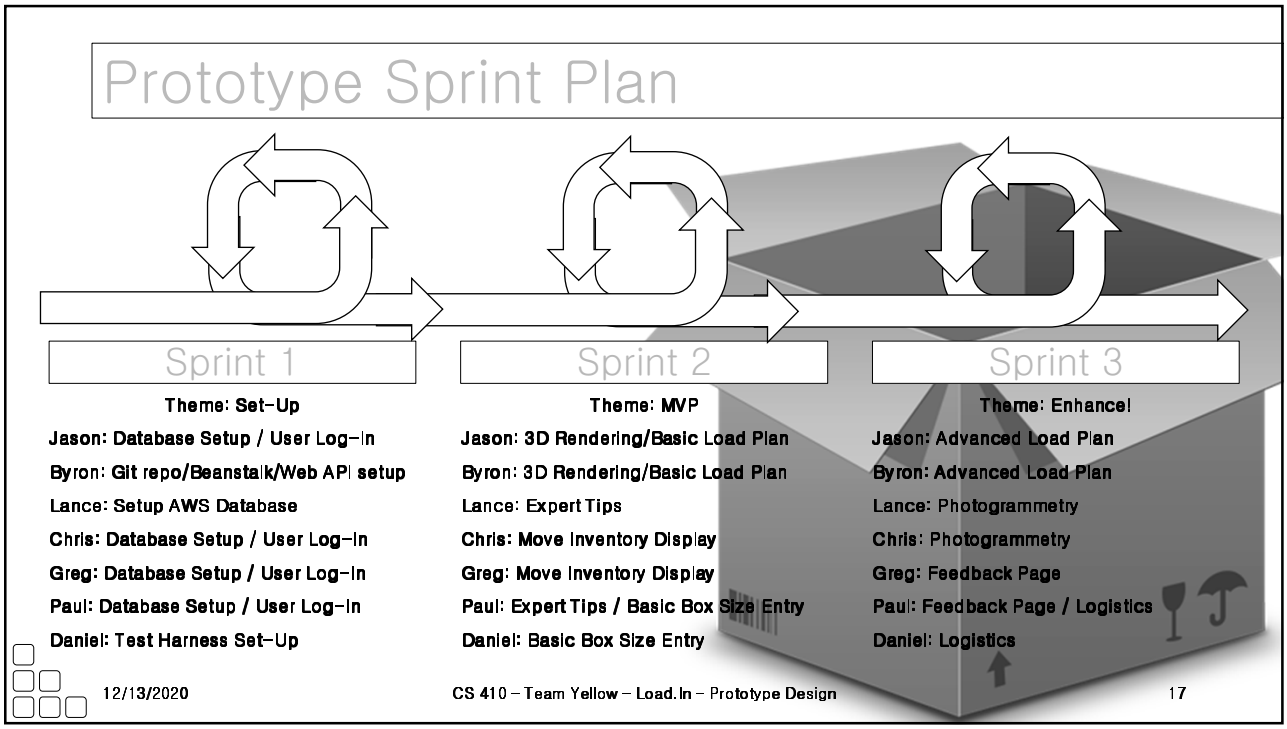
Prototype Sprint Plan
Sprint 1
Sprint 2
Sprint 3
Theme: Set-Up
Jason: Database Setup / User Log-In
Byron: Git repo/Beanstalk/Web API setup
Lance: Setup AWS Database
Chris: Database Setup / User Log-In
Greg: Database Setup / User Log-In
Paul: Database Setup / User Log-In
Daniel: Test Harness Set-Up
Theme: MVP
Jason: 3D Rendering/Basic Load Plan
Byron: 3D Rendering/Basic Load Plan
Lance: Expert Tips
Chris: Move Inventory Display
Greg: Move Inventory Display
Paul: Expert Tips / Basic Box Size Entry
Daniel: Basic Box Size Entry
Theme: Enhance!
Jason: Advanced Load Plan
Byron: Advanced Load Plan
Lance: Photogrammetry
Chris: Photogrammetry
Greg: Feedback Page
Paul: Feedback Page / Logistics
Daniel: Logistics
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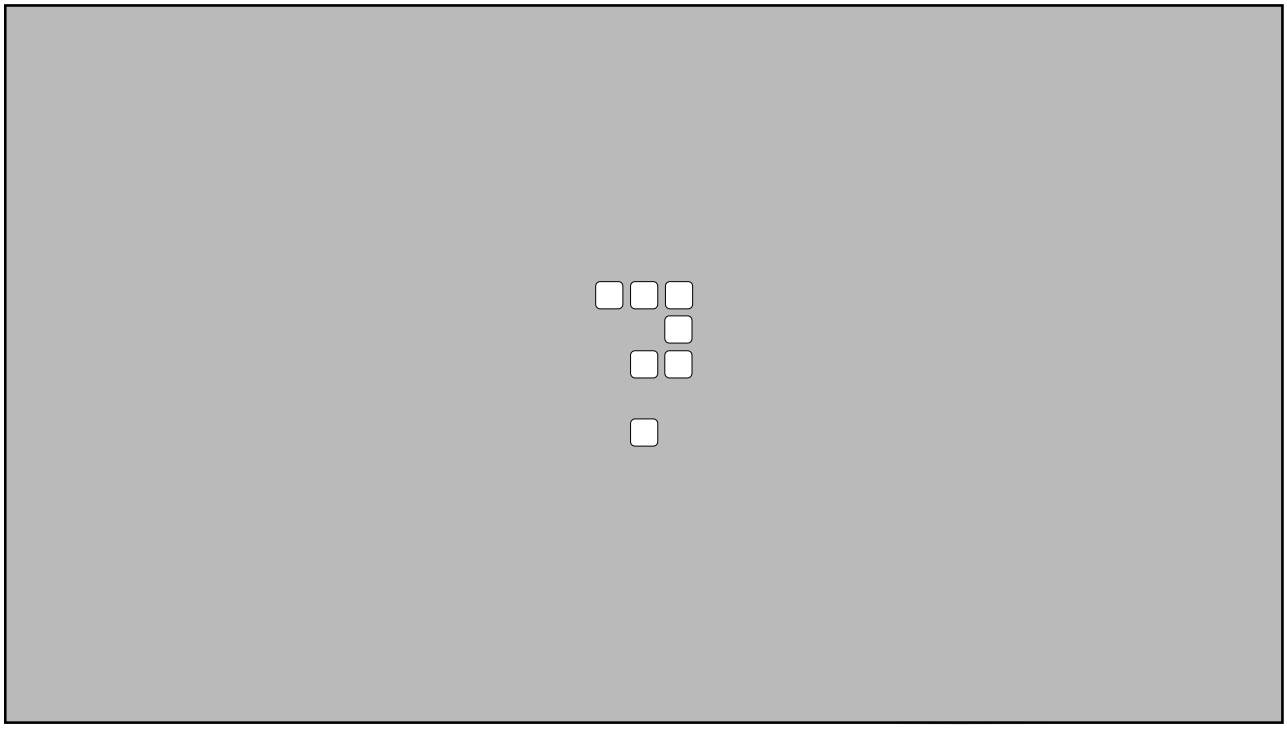

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