Load.in

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

Team Yellow
Feasibility Presentation
Old Dominion University
10/14/2020

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Who is Team Yellow?

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

Do it Yourself Moving

- Professional movers reduces the time but increases cost
- DIY reduces the cost but decreases efficiency

This is where Load.in Comes in

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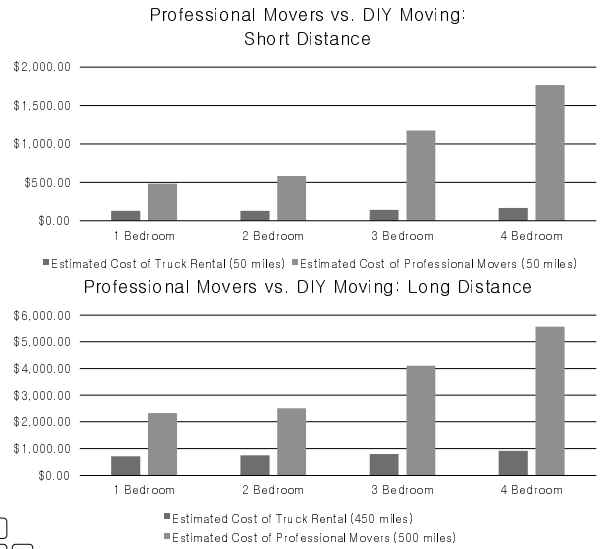
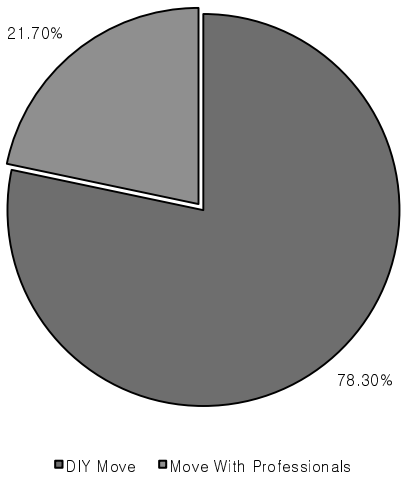
Professional Movers Are Costly





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Loading can be a major issue

- Poor loading can cause
  - Property damage
  - Car accidents
- An estimated **50,000** accidents related to trailer towing occur each year.

Hayesbc.com

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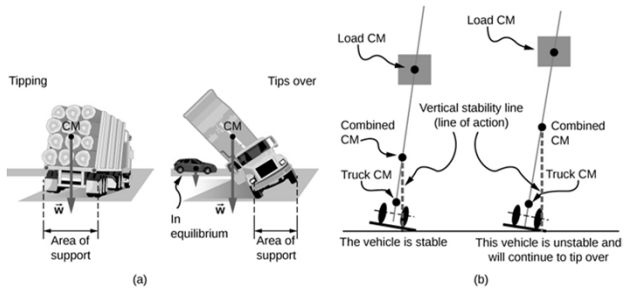
Major Truck Loading Considerations

Weight distribution



Protecting fragile items

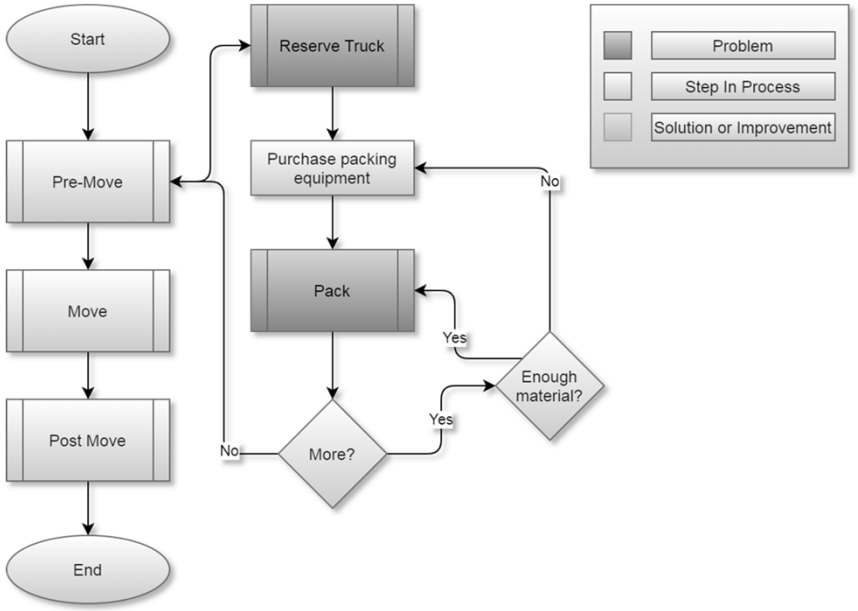
PenskeTruckRental.com

Figuring out what to rent is hard!

- *Accurately* determining
  - How big of a truck to get
  - How many trips a move will take
  …is difficult.
- Rental Truck companies base their business model on this!

wtkr.com

Current Process



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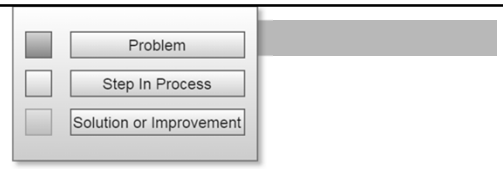

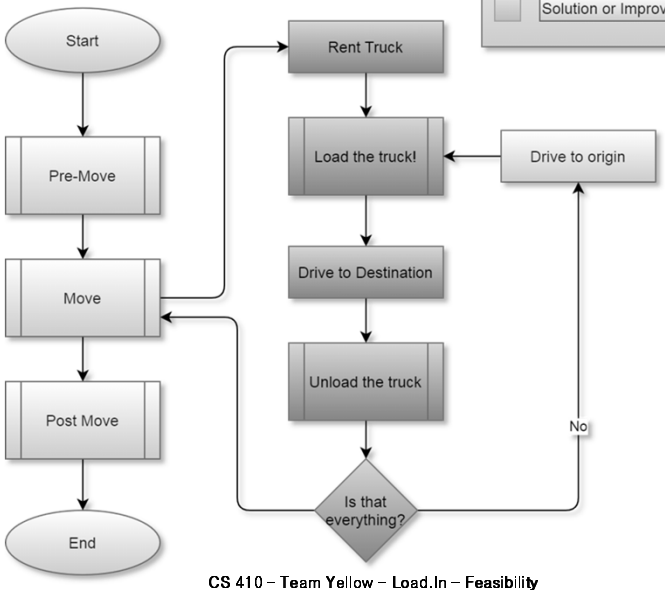

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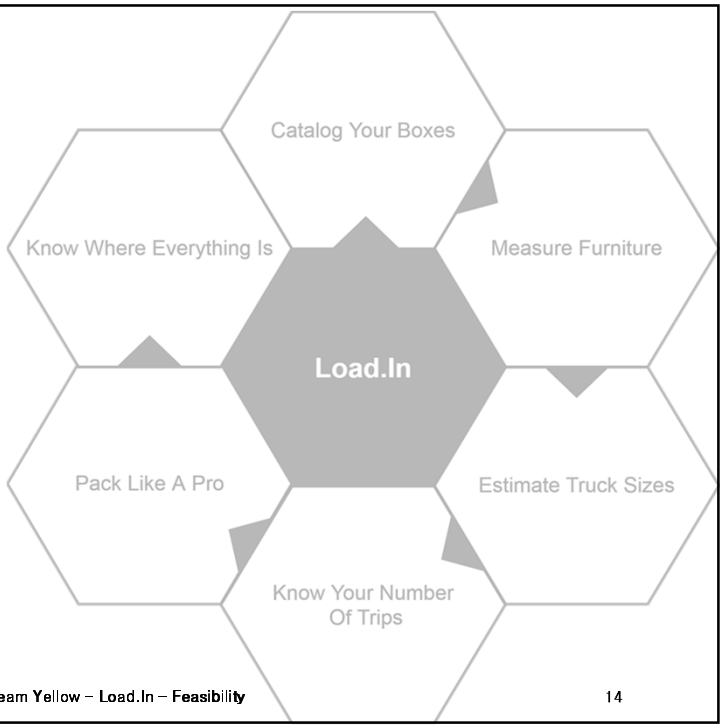
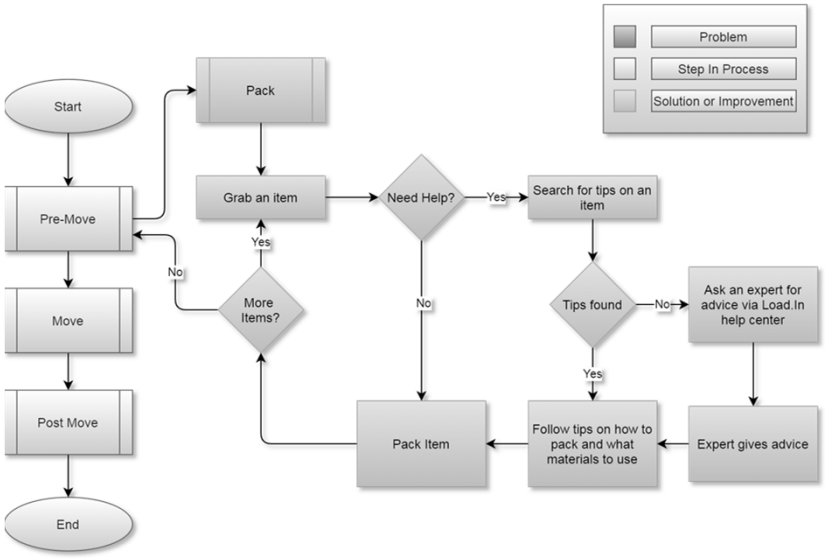
Load.In gives your move a game plan

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

What Can Load.In Do For You?



How will the solution help?



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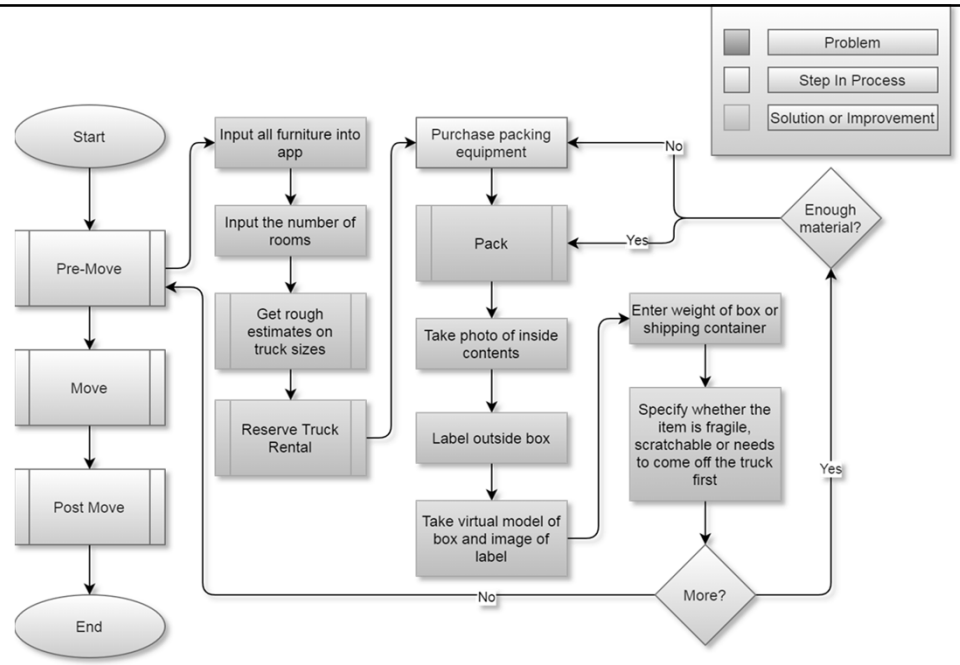

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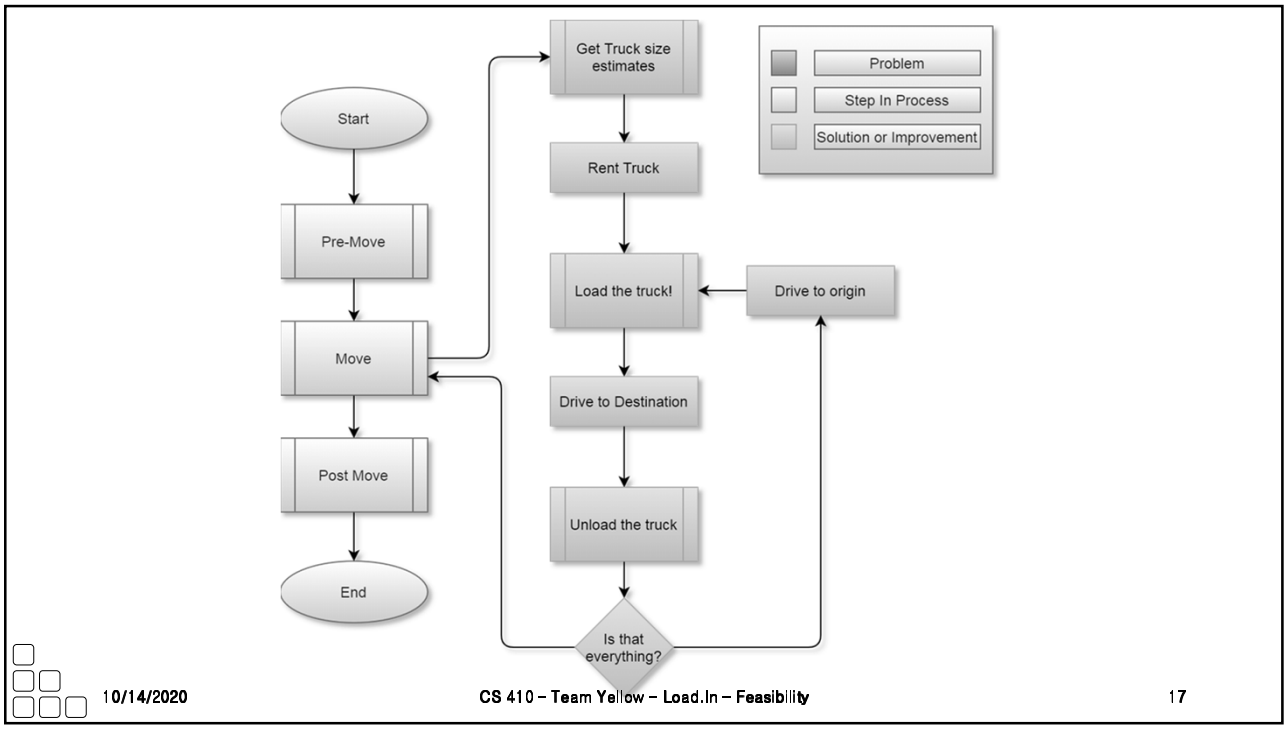
Start
Pre-Move
Move
Post Move
End
Get Truck size estimates
Rent Truck
Load the truck!
Drive to Destination
Unload the truck
Is that everything?
Drive to origin
Problem
Step In Process
Solution or Improvement
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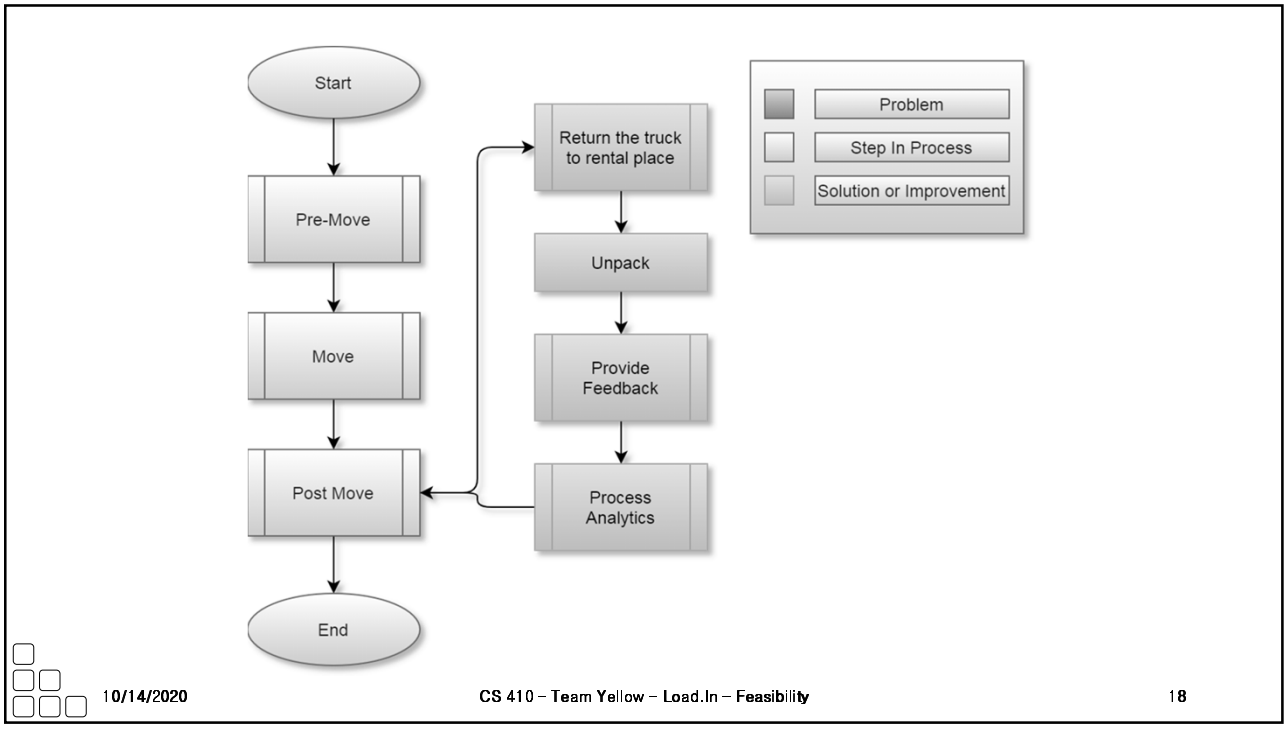
Start
Pre-Move
Move
Post Move
End
Return the truck to rental place
Unpack
Provide Feedback
Process Analytics
Problem
Step In Process
Solution or Improvement
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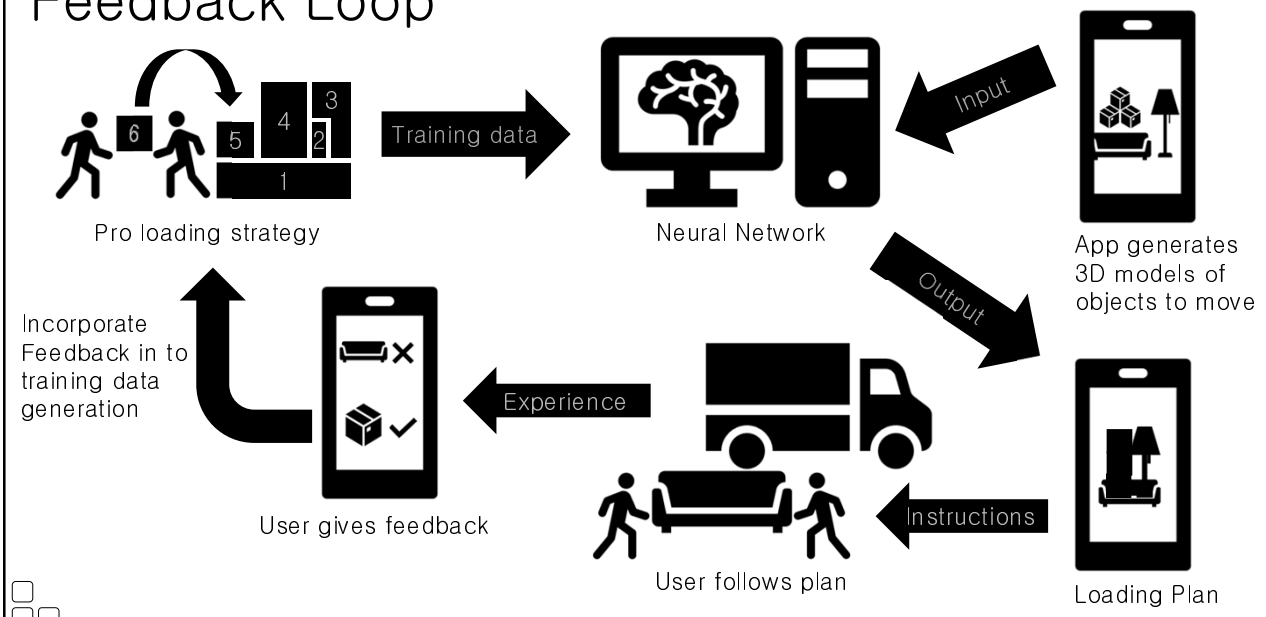
Feedback Loop



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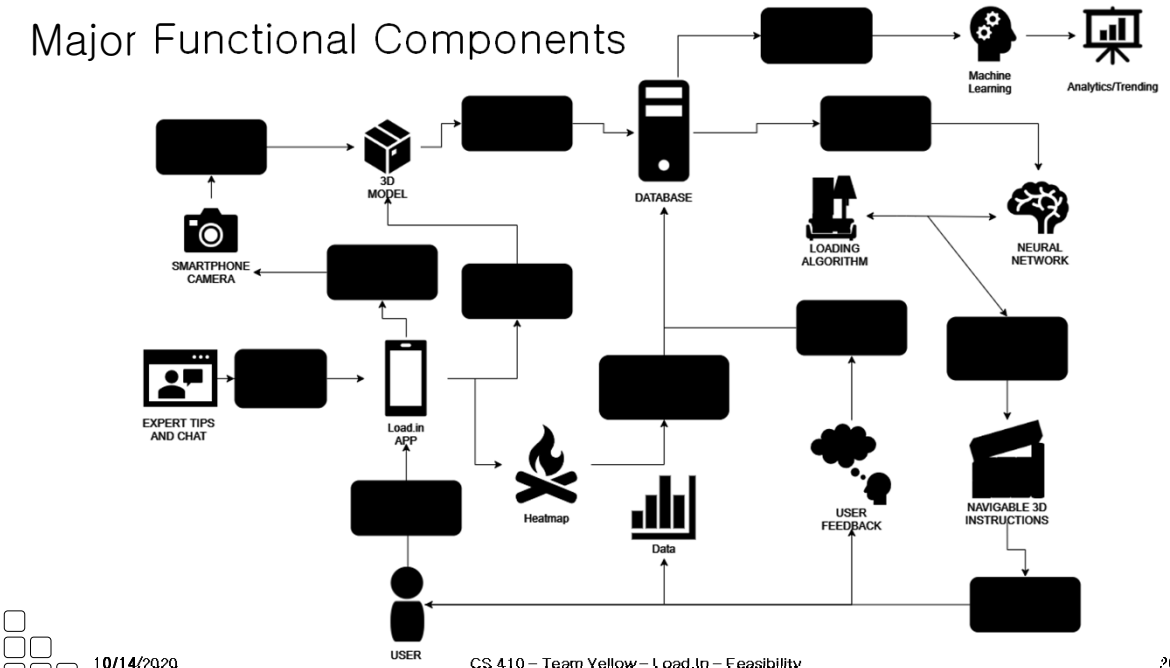
Major Functional Components



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What Load.In Will Do

- **Assist in the packing process with expert advice**
- **Catalog with photos all boxes, furniture, and other items that are going to be placed in the truck**
- **Generate instructions for properly loading the truck based on weight distribution, item safety, best fit space utilization, and item(s) priority**
- **Use photos taken to Create a 3D model of how everything should be expertly packed in the truck**
- **Will provide location information for different boxes and items within the truck using 3D model and cataloging**
- **Give estimate for appropriate rental truck size and number of trips dependent on truck size**

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What Load.In Won't Do

- **Pack boxes**
- **Load or unload truck**
- **Assist in the driving process**

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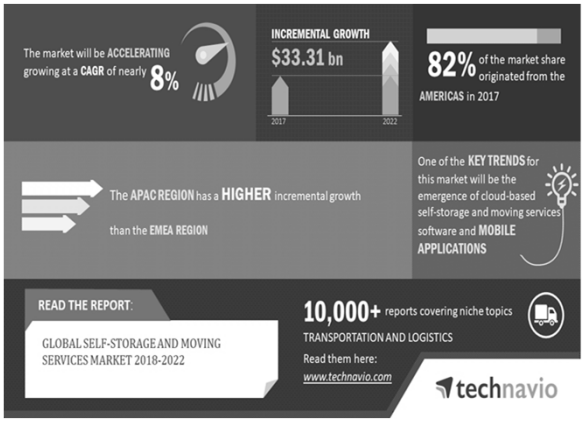
The Moving Industry Market

- Nearly all moving companies are either all inclusive or DIY
- However the all-inclusive services are often very expensive
- All the DIY services provide no assistance or guidance and lead to confusion and wasted money
- The market is shifting towards software being utilized to increase efficiency and decrease costs



Benefits to the Customer

- Being shown how to
  - Pack boxes for increased organization.
  - Properly load their truck for increased efficiency.
- Being provided with a database of useful tips from professional movers.
- Saving of money and time due to the entire moving process being made more efficient.
- Peace of mind about fragile items safely transported

Technical Risks

		PROBABILITY				
		Very Low	Low	Medium	High	Very High
SEVERITY	Very High					T-1
	High				T-2	
	Medium			T-3		
	Low					
	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.

- T-1: Current technology involving computer vision is a challenge.
- T-1 Mitigation: Conduct a prototype to mitigate risk of critical errors upon release.

- T-2: Artificial Intelligence prone to error due to insufficient training data.
- T-2 Mitigation: Implementing a feedback loopback in the beta phase with test users.

- T-3: Challenge to obtain accurate and timely feedback.
- T-3 Mitigation: Implement a feature for users to give feedback if the application operated correctly after completing a move.

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Customer Risks

		PROBABILITY				
		Very Low	Low	Medium	High	Very High
SEVERITY	Very High					
	High		C-1			
	Medium		C-2	C-3		
	Low				C-4	
	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.

- C-1: End user is inexperienced with the application.
- C-1 Mitigation: Implement a tutorial on how to use the application and provide a help feature.

- C-2: End user finds UI challenging to operate.
- C-2: Mitigation: Implement analytics for tracking when a user stop using the application.

- C-3: End users are not satisfied with the recommendations of the application.
- C-3 Mitigation: Implement a customer feedback feature that allows the users to disclose his/her issues with the applications.

- C-4: End user doesn't follow the guidelines of the application.
- C-4 Mitigation: Implement a feature that allows the user to repeat/reset certain steps in the application as they progress.

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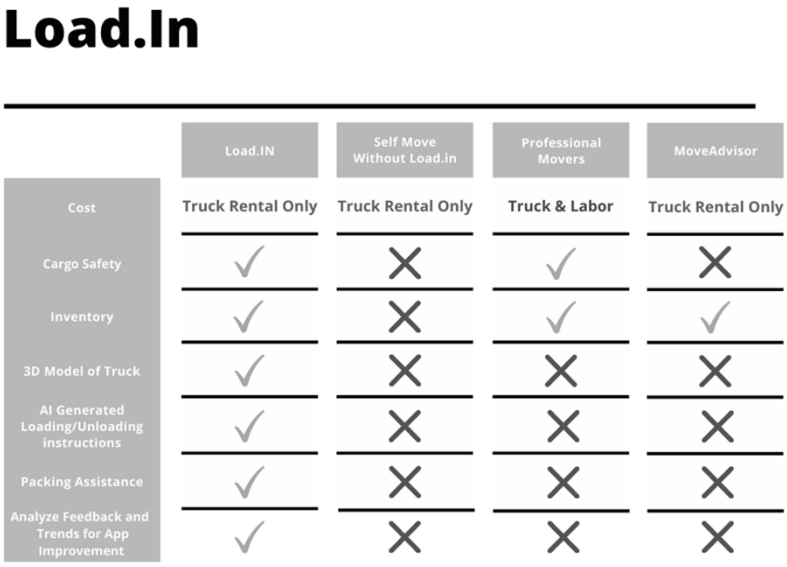
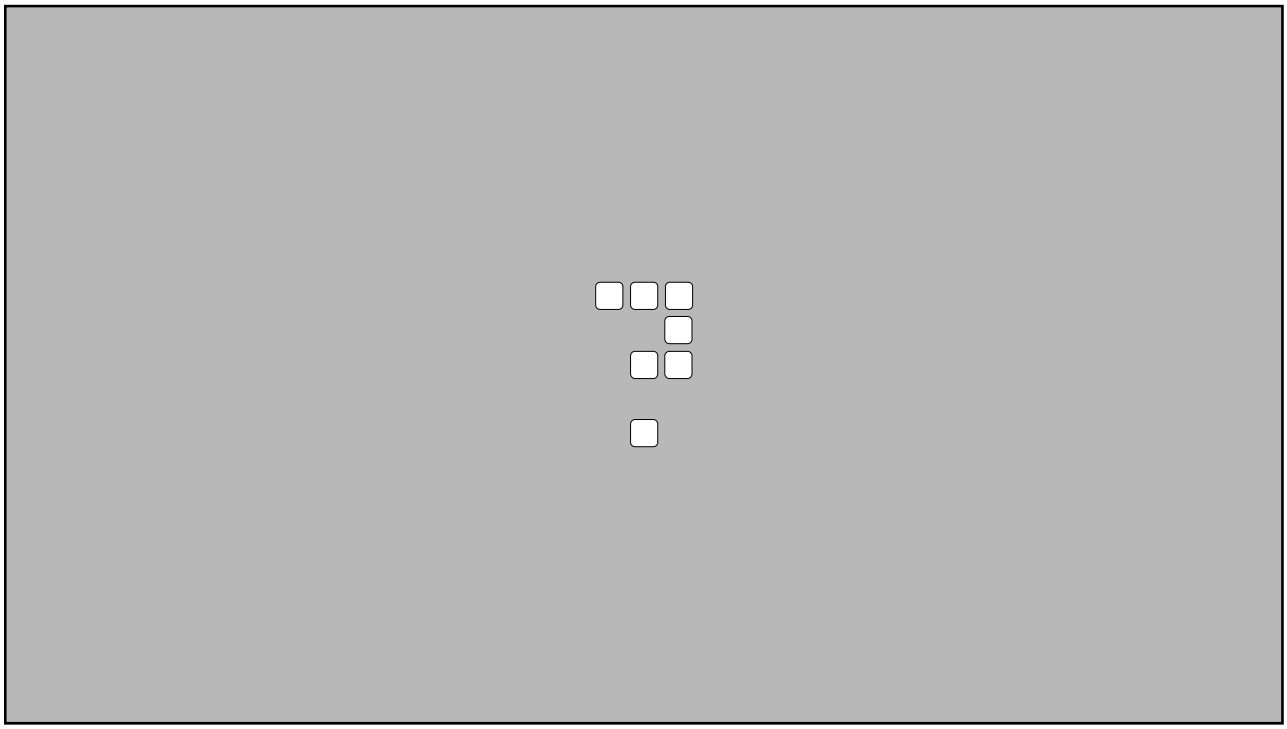
The Competition



Conclusion

- DIY Movers are faced with many logistical difficulties
  - Properly loading truck
  - Protecting valuables
  - Finding the best deal
  - Keeping track of every box
  - All during an already stressful life event!
- Load.In will provide customized expert instructions
  - Truck loading instructions based on photogrammetry
  - Cost minimization based on input data
  - Map of truck available to assist in finding boxes
  - Provide unique insights to moves due to captured analytics



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Sources:

- The Top 5 Moving Mistakes Across America. (2019, August 13). Article. https://www.article.com/blog/top-5-moving-mistakes/
- Economy Moving & Storage, LLC. (2015, January 4). How to properly pack and load a moving truck- Movers Cincinnati. YouTube. https://www.youtube.com/watch?v=rjmofUZOdwo&feature=youtu.be
- CADCode Systems. (n.d.). Optimizing & Machining | CADCode Systems. CADCode.Com. Retrieved September 20, 2020, from https://www.cadcode.com/category/categories/optimizing-machining
- Dube, E. (2020, September 20). OPTIMIZING THREE-DIMENSIONAL BIN PACKING THROUGH SIMULATION. Semantics Scholar. https://www.semanticscholar.org/paper/OPTIMIZING-THREE-DIMENSIONAL-BIN-PACKING-THROUGH-Dube/bb9986af2f26f7726fcef1bc684eac8239c9b853#references
- Knoblauch, M. (2019, May 8). One in ten Americans would prefer a week in jail over moving. New York Post. https://nypost.com/2019/05/08/one-in-ten-americans-would-prefer-a-week-in-jail-over-moving/
- The American Institute of Stress. (n.d.). The Holmes-Rahe Stress Inventory PDF. Retrieved September 20, 2020, from https://www.stress.org/wp-content/uploads/2019/04/stress-inventory-1.pdf
- Wood, T. (2020, January 6). Moving Industry Statistics. MoveBuddha. https://www.movebuddha.com/blog/moving-industry-statistics/
- Nat and Friends. (2017, April 18). Google Earth's Incredible 3D Imagery, Explained. YouTube. https://www.youtube.com/watch?v=suo_aUTUpps&feature=youtu.be
- Collins, T. (2018, April 20). A Look Into Photogrammetry and Video Games - Tiger Collins. Medium. https://medium.com/@homicidalnacho/a-look-into-photogrammetry-and-video-games-71d602f51c31

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Glossary:

*All definitions are sourced from Wikipedia

Photogrammetry
Photogrammetry is the science and technology of obtaining reliable information about physical objects and the environment through the process of recording, measuring and interpreting photographic images and patterns of electromagnetic radiant imagery and other phenomena.

Algorithm
A finite sequence of well-defined, computer-implementable instructions, typically to solve a class of problems or to perform a computation.

Professional movers
Professionals who move all your belongings for you from one place to another.

Packing problems
Are a class of optimization problems in mathematics that involve attempting to pack objects together into containers. The goal is to either pack a single container as densely as possible or pack all objects using as few containers as possible.