

# Team 511: Intrepid

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# Intrepid Powerboats Redesigned Hardtop Team 511



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Academic Advisor  
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FAMU-FSU  
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Senior Design Coordinator  
Dr. Shayne McConomy

John Karamitsanis

# Project Scope



Description



Objective



Assumptions



Key Goals






Markets

John Karamitsanis

# Project Scope Description




-  Intrepid wants to improve their vessel performance
-  Current Intrepid hardtops are heavier than desired
-  Improving the hardtop can solve Intrepid's problem

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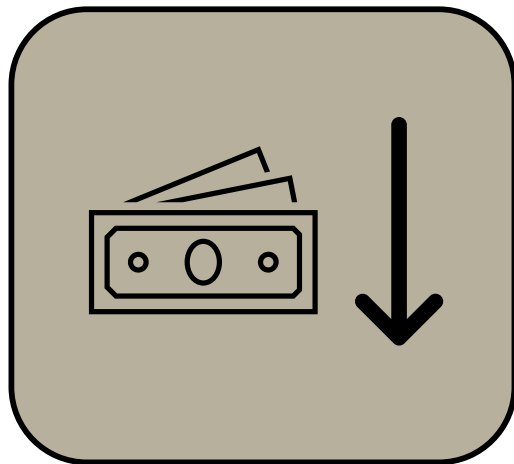
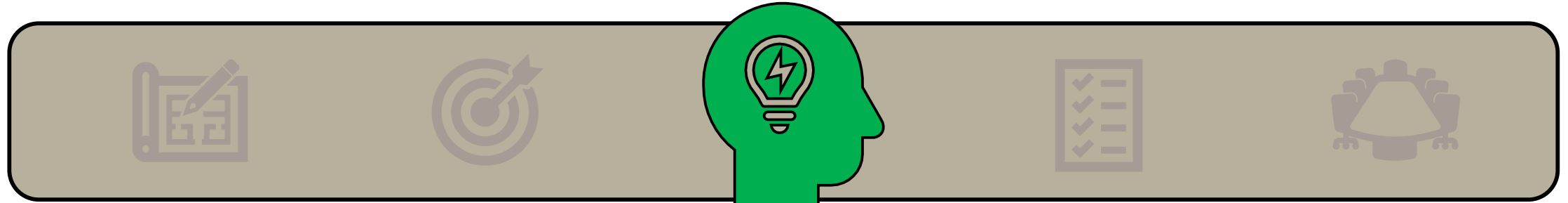
# Project Scope Objective



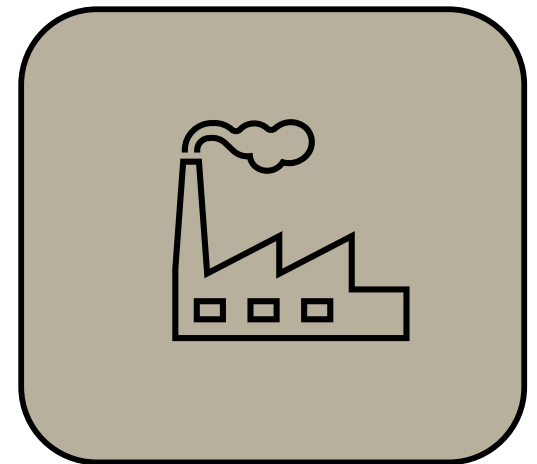
 To improve on water performance of the 409 Valor

John Karamitsanis

# Project Scope Assumptions

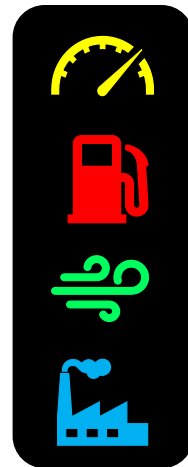


- The changes to the hardtop will still use current mounting points
- Our changes will only be applied to the hardtop and no other parts of the vessel
- We are assuming we will not be physically producing the hardtop



John Karamitsanis

# Project Scope Key Goals



Improve boat on water performance

Improve fuel efficiency

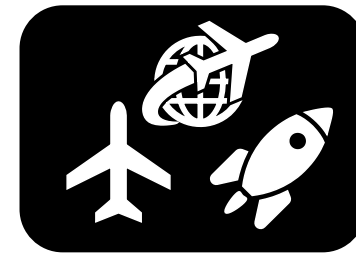
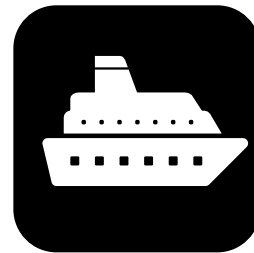
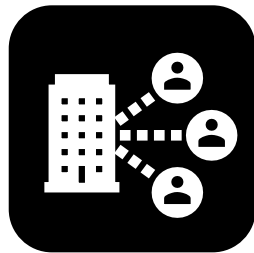
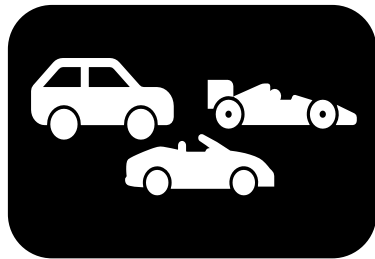
Analyze and enhance aerodynamics

Keep the design manufacturable

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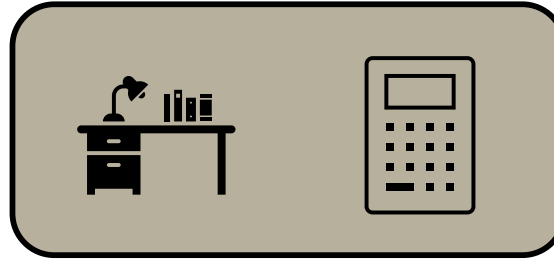


# Project Scope Markets



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# Project Background



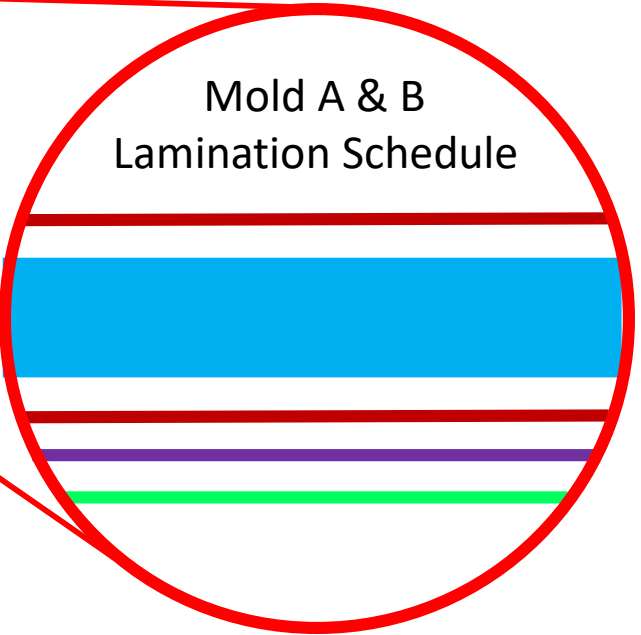
Mold Study   Calculations

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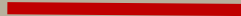




# Project Background Mold Study



Intrepid 409 Valor

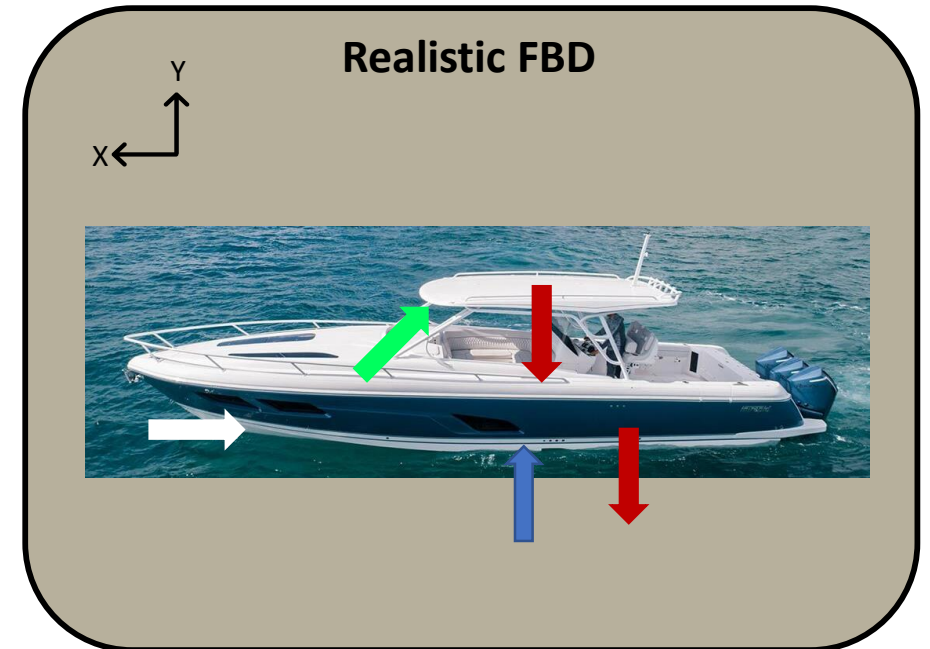
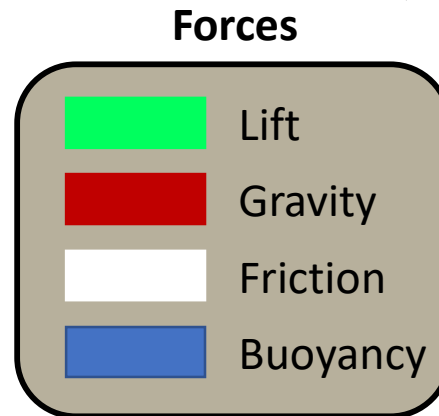
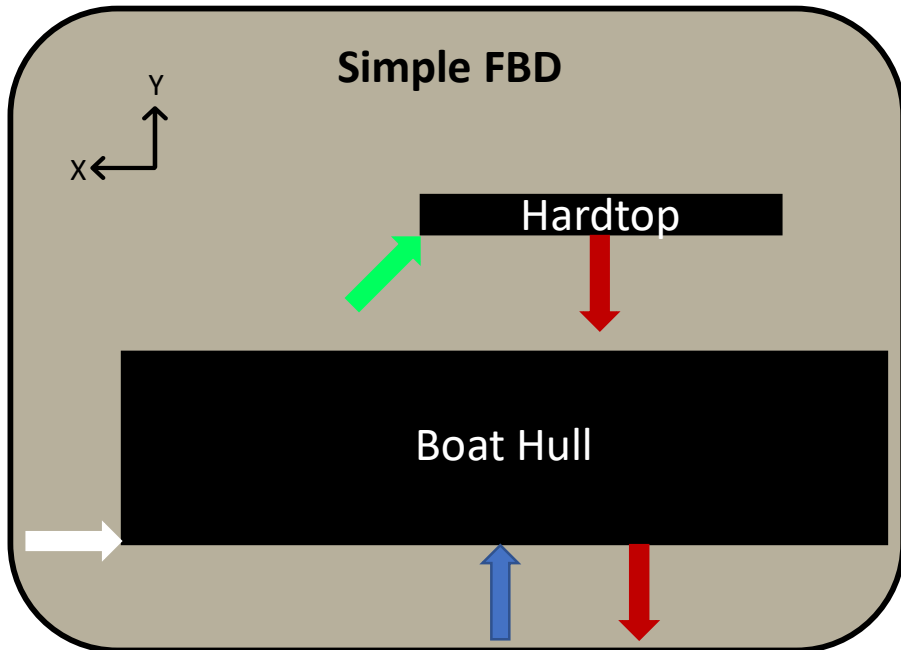
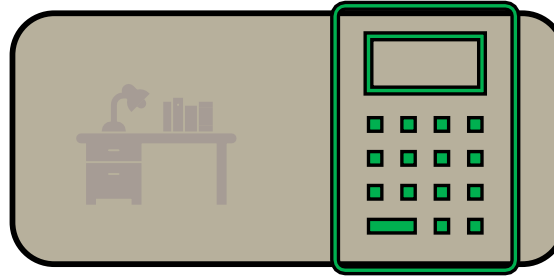


## LEGEND

Material	Layer Order & Color
1708	
1.5" Core	
1708	
1.5 oz CSM	
Gelcoat	

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# Project Background Calculations



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# Customer Needs



Sponsor statements and responses to questions were synthesized into needs



Cory Stanley



# Customer Needs



Question

What materials need to be considered?



Interpreted Need

Incorporate materials used within Intrepid

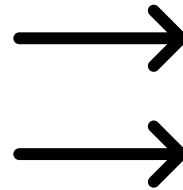
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# Customer Needs



Question

What materials need to be considered?  
Parameters of the current hardtop?



Interpreted Need

Incorporate materials used within Intrepid  
Similar dimensions retained

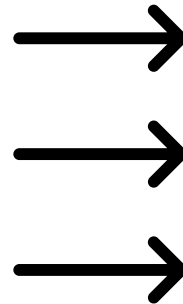
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# Customer Needs



Question

What materials need to be considered?  
Parameters of the current hardtop?  
Can we alter wire/chase tube layout?



Interpreted Need

Incorporate materials used within Intrepid  
Similar dimensions retained  
Exit points must stay the same

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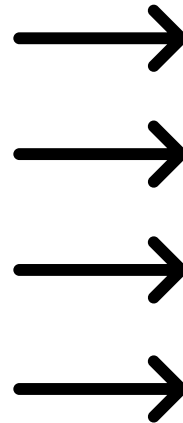


# Customer Needs



Question

What materials need to be considered?  
Parameters of the current hardtop?  
Can we alter wire/chase tube layout?  
Is there a certain weight the hardtop needs to withstand?

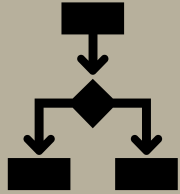
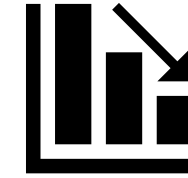


Interpreted Need

Incorporate materials used within Intrepid  
Similar dimensions retained  
Exit points must stay the same  
Design withstands all nominal loads and running conditions

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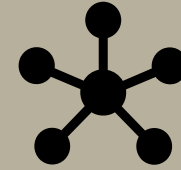
# Functional Decomposition



Flow Chart



Smart Integration

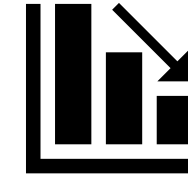


Connection to Systems

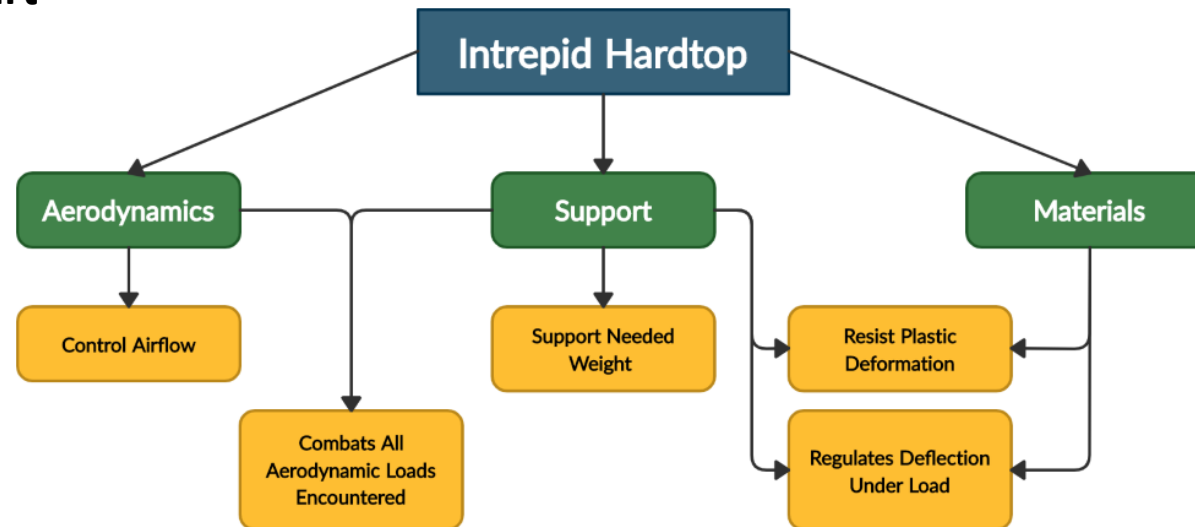
Cory Stanley



# Functional Decomposition

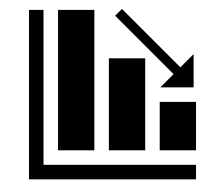


Flow Chart

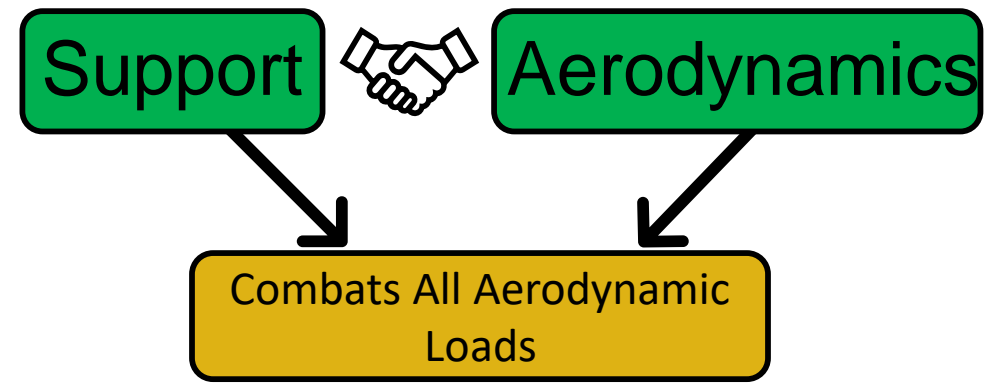
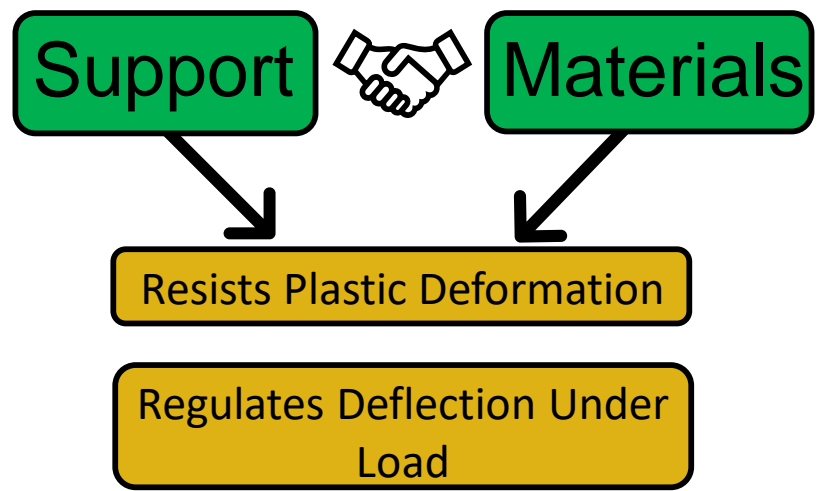


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# Functional Decomposition

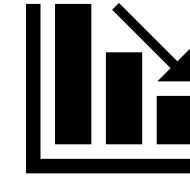


Smart Integration

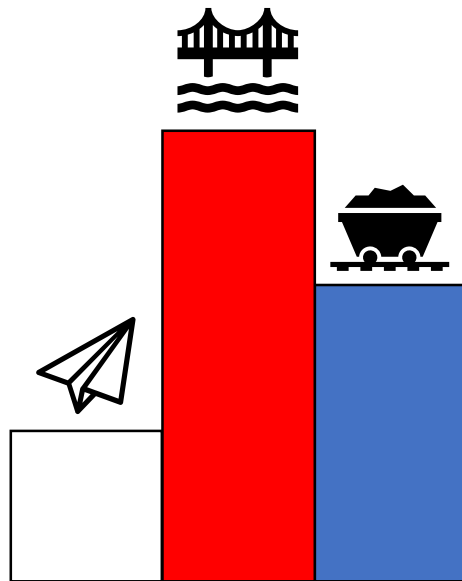


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# Functional Decomposition



Connection to Systems



Highest number of functions  
Highest number of cross system functions



Most shared functions with support system



Least shared functions across systems

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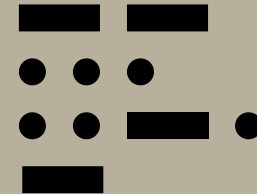
# Future Work



Targets & Metrics



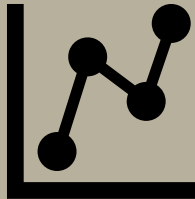
Concept Selection



MATLAB Code



Concept Generation

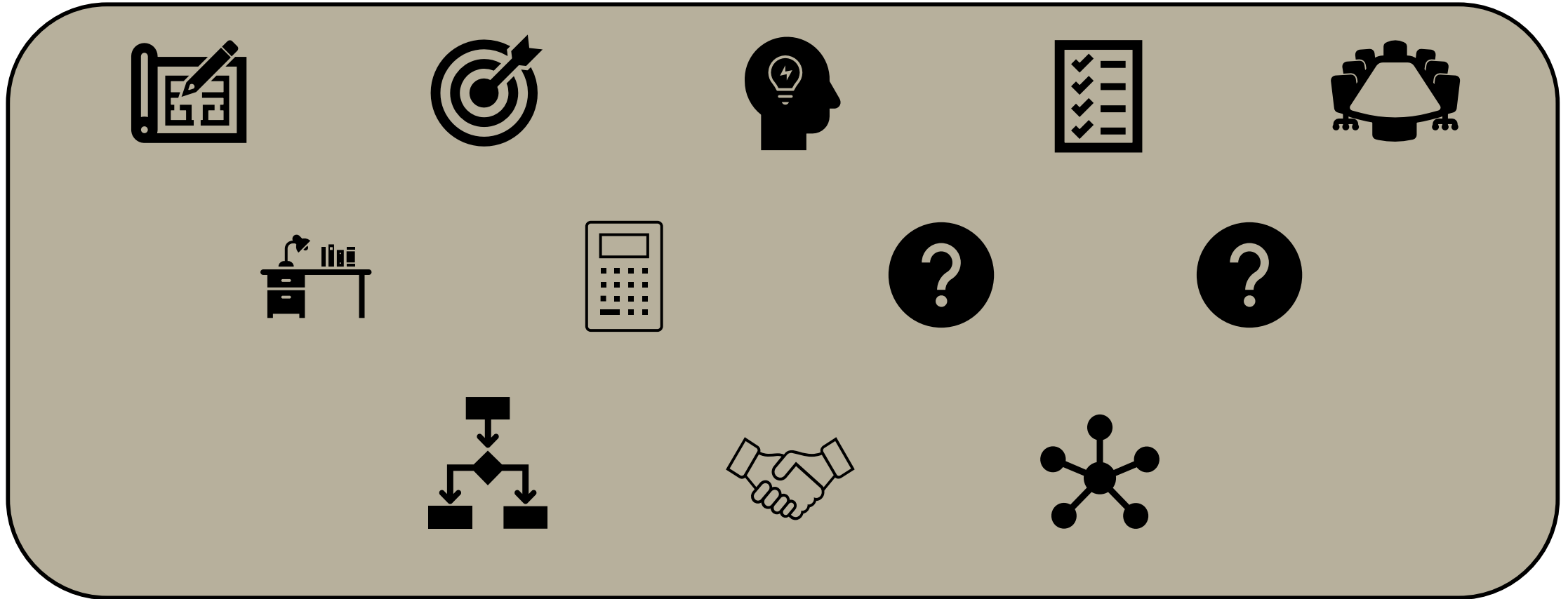


CFD Analysis



Further Physical Analysis

# Questions?



# References

409 Valor. (n.d.). Retrieved October 15, 2020, from <https://www.intrepidpowerboats.com/boats/409-valor/>

McConomy, S. (2020, October 6). Retrieved October 15, 2020, from [https://famu-fsu-eng.instructure.com/courses/4476/discussion\\_topics/18526](https://famu-fsu-eng.instructure.com/courses/4476/discussion_topics/18526)



# Backup Slides



# Customer Needs: Statement

QUESTION	CUSTOMER STATEMENT
What are your objectives for this project?	Weight reduction for hardtop assembly and improvements on shape and aerodynamics.
What materials need to be considered?	Consider materials currently used by Intrepid.
What are the parameters of the current hardtop models in use?	Current parameters can be considered through further analysis of the cad model and software highlighted.
What else besides weight would you like to improve?	Consider shape, space, aerodynamics, and how they affect the running performance of the boat. Also, find how lift or drag affects the vessel stability, performance, and friction of the hull within the water.
Do you want a generic hardtop, or a design for a specific boat?	Use Intrepid 409 Valor hardtop as reference, it is very large and is the best supported hardtop we have. Use it to derive a new design.
Is there a certain weight that the hardtop needs to be able to with stand?	The weight/force of all the aerodynamic forces and support service techs who stand on top.

# Customer Needs: Interpreted Need

QUESTION	INTERPRETED NEED
What are your objectives for this project?	The new hardtop will improve boat performance.
What materials need to be considered?	The improved hardtop will incorporate materials used within Intrepid's manufacturing constraints.
What are the parameters of the current hardtop models in use?	The improved hardtop dimensions will be similar to the current hardtop dimensions.
What else besides weight would you like to improve?	The improved hardtop will advance the boat performance.
Do you want a generic hardtop, or a design for a specific boat?	The improved design will be made for the Intrepid 409 Valor.
Is there a certain weight that the hardtop needs to be able to withstand?	The improved design will withstand nominal running conditions and loading conditions including a factor of safety.

# Functional Decomposition

Functions	Supports Needed Weight	Resists Plastic Deformation	Regulates Deflection Under Load	Combats All Aerodynamic Loads Encountered	Controls Airflow
<b>Systems</b>					
Support	X	X	X	X	
Aerodynamics				X	X
Materials		X	X		