

Reusable Cryogenic Connector

Juan Valencia | Josh Leary | Jackson Herrod | Mika Kuschnitzky



Marshall Space
Flight Center

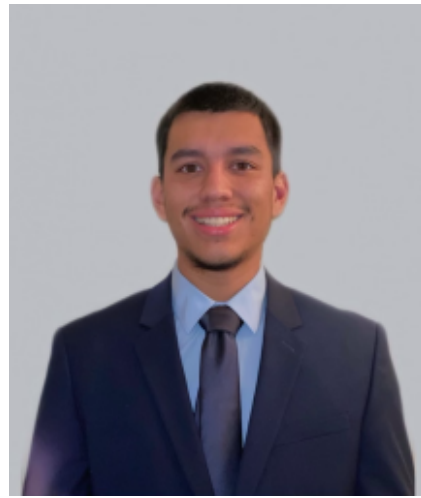


FAMU-FSU
College of Engineering

Team 513



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*Systems
Engineer*



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Test Engineer



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Sponsor and Advisor



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Joshua Leary

Objective



To design, build, and test a cryogenic connector interface and conduct life cycle testing with a focus on the seal/joint design.

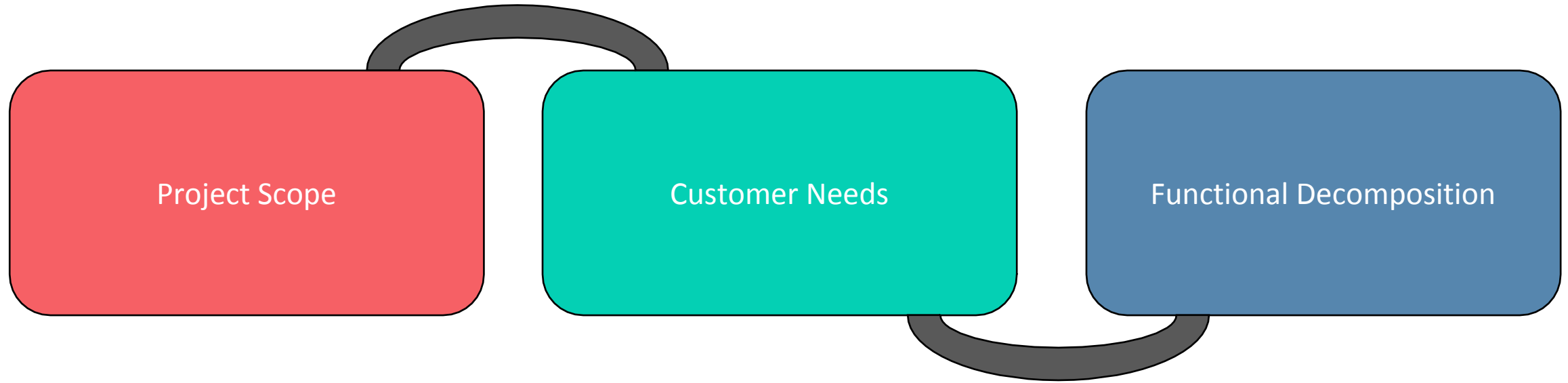
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Project Background

Josh Leary and Mika Kuschnitzky

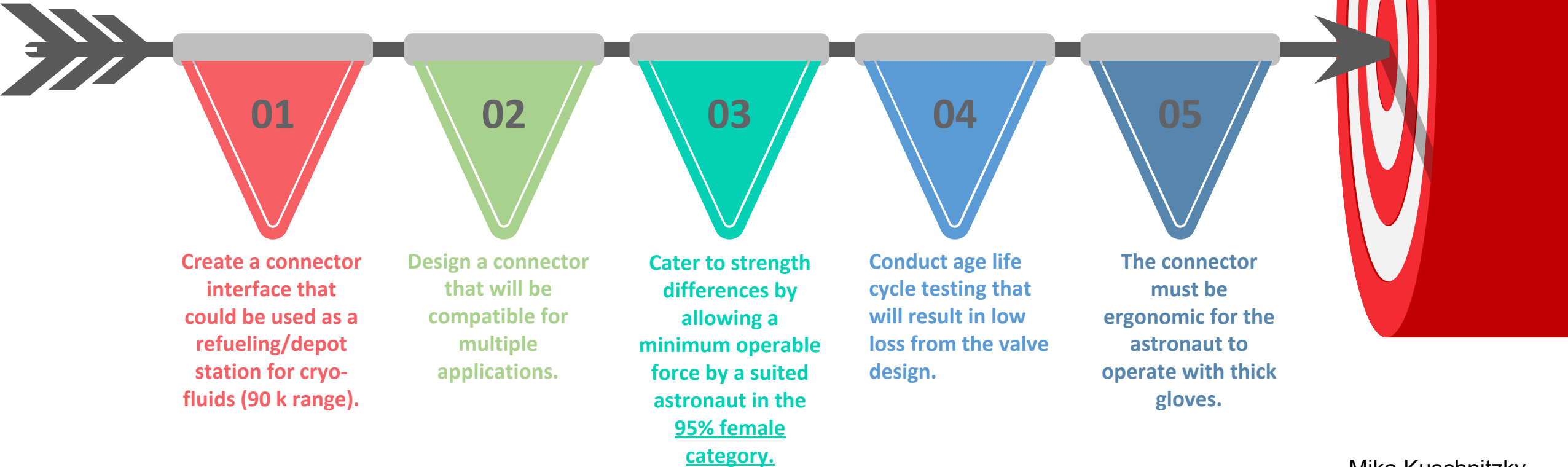


Progress



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Key Goals



Mika Kuschnitzky

Markets



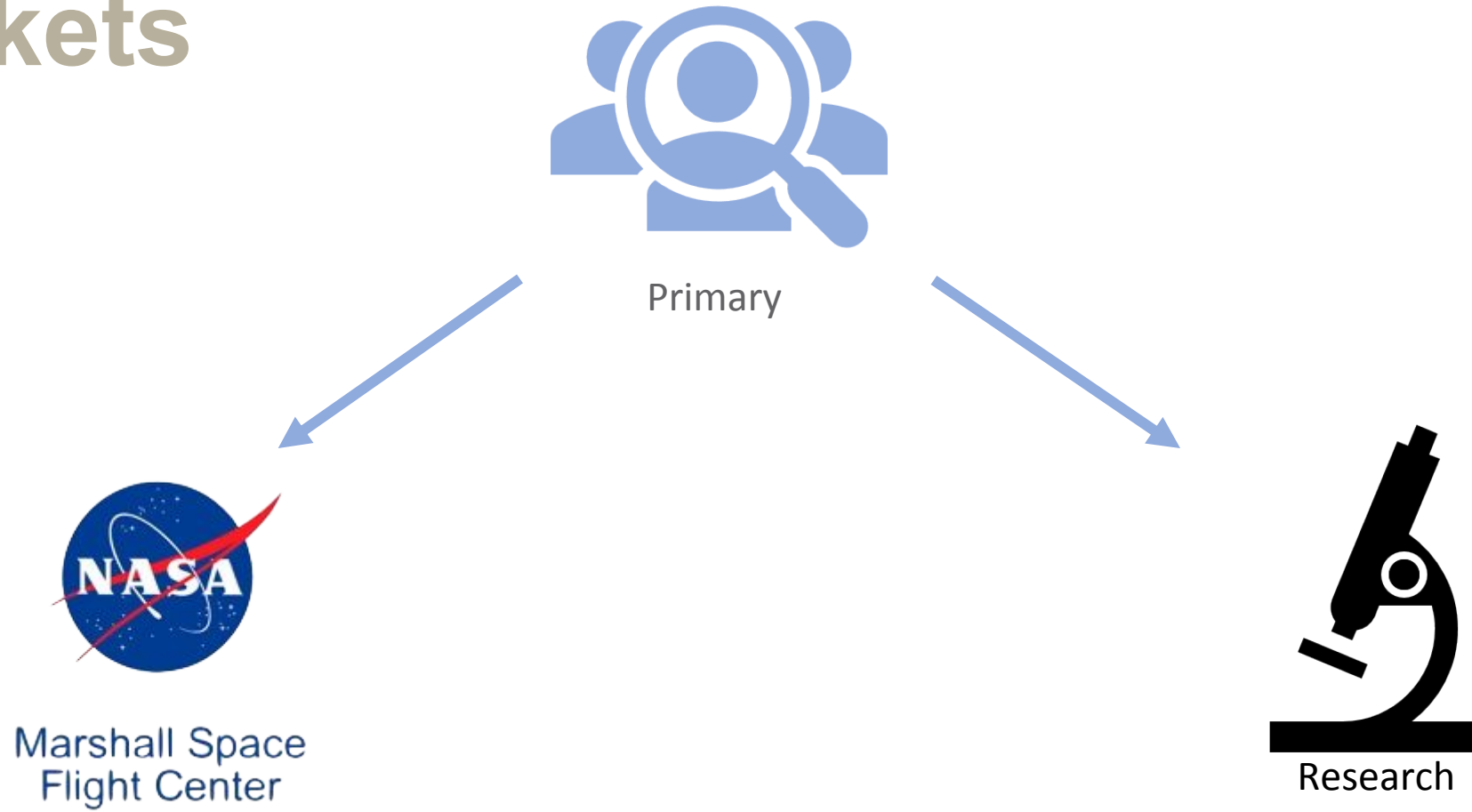
Primary



Secondary

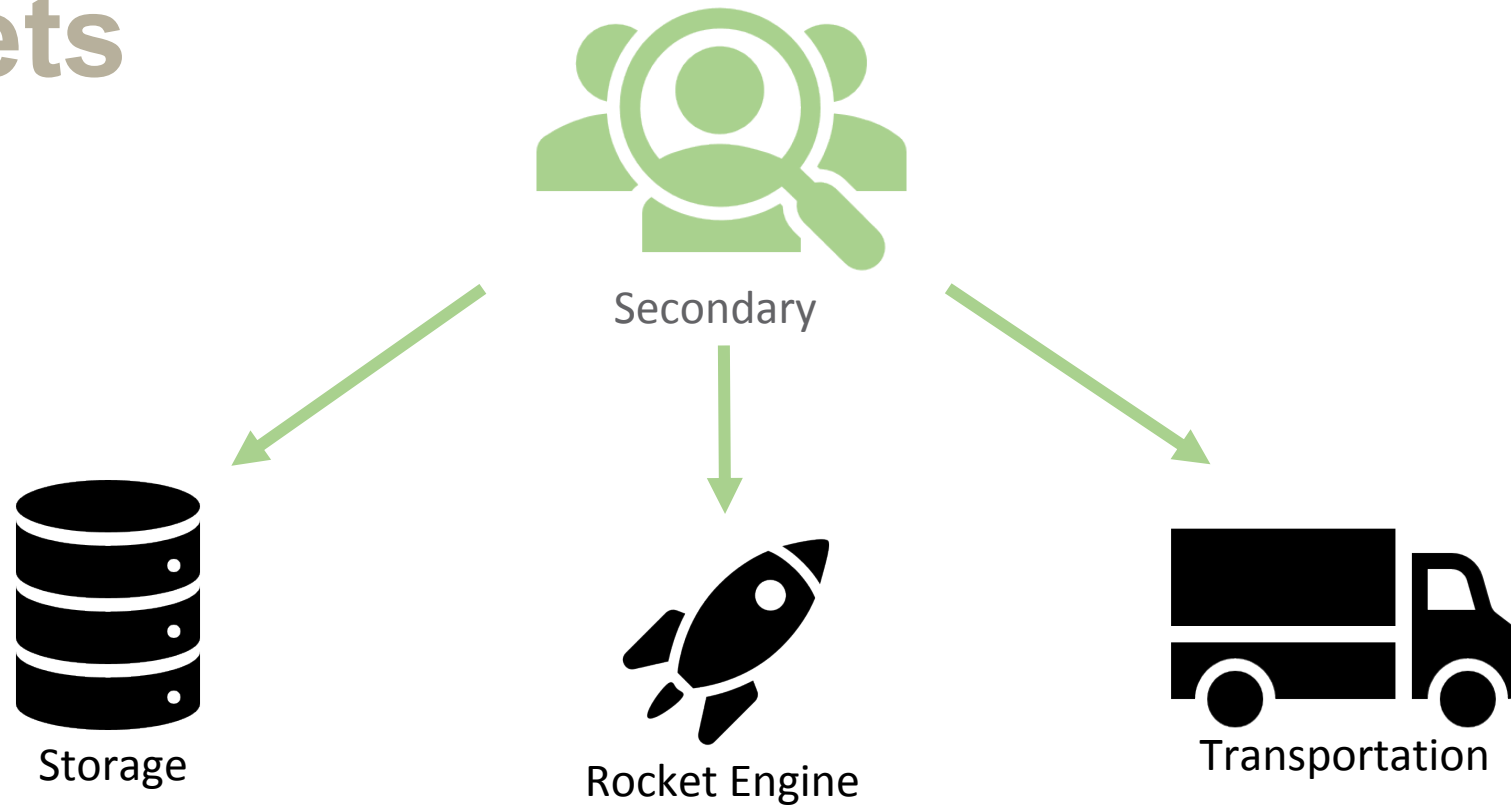
Mika Kuschnitzky

Markets



Mika Kuschnitzky

Markets



Mika Kuschnitzky

Assumptions



The system is isothermal.



Hose line length of 6 feet for testing.



Hose diameter is same as connector.



Connecting hoses will handle 50 PSI without blistering.



Astronaut has knowledge of quick release and locking mechanisms.

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Customer Needs

What metals are suitable for cryogenic temperatures?



The metal used needs to maintain its mechanical properties, specifically its ductility, at cryogenic temperature.

What is the biggest issue with current sealing designs?



Design a seal that will limit fluid loss through the connection.

What is the pressure of the fluid that will pass through the connector?



The connector design needs to withstand a pressure of 50 psi.

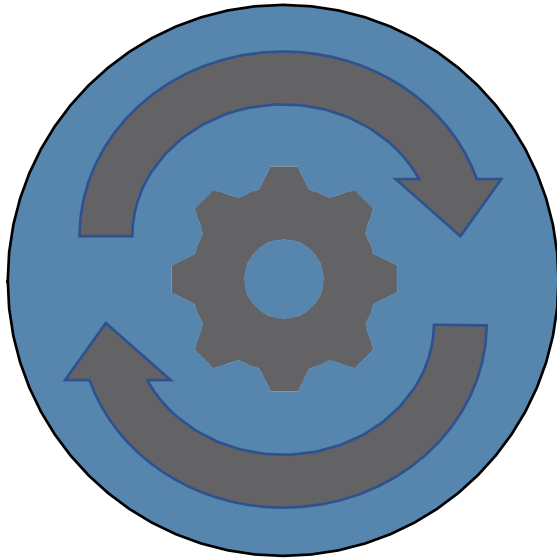
What are the dimensions that are required for this connector?



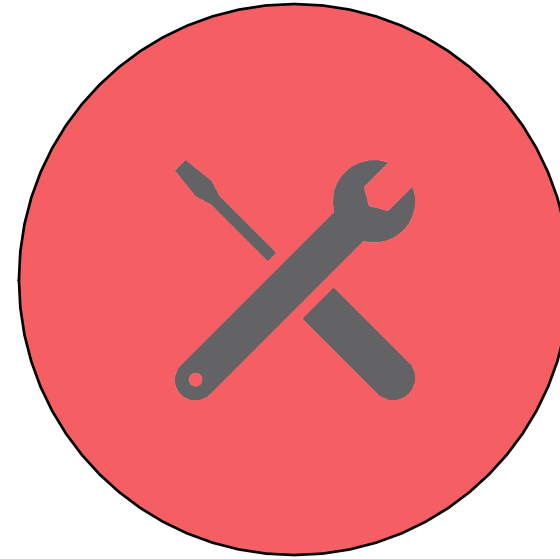
The design will have a range of 1-3 cm as the inner diameter.

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Functional Decomposition



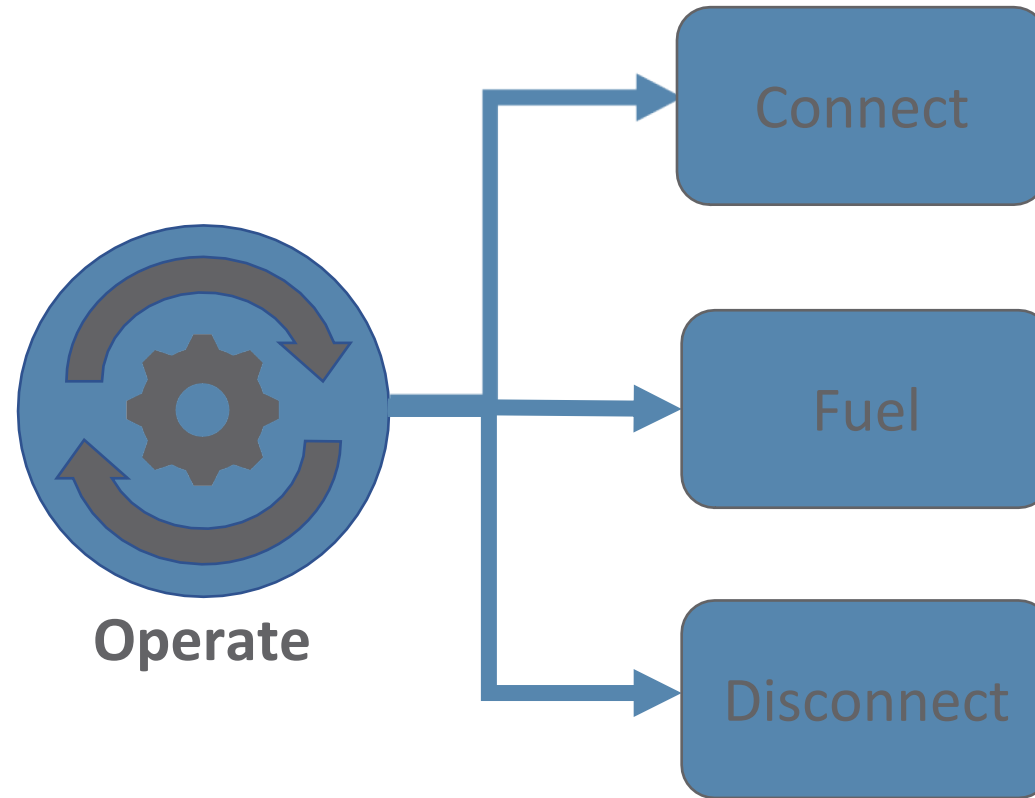
Operate



Maintain

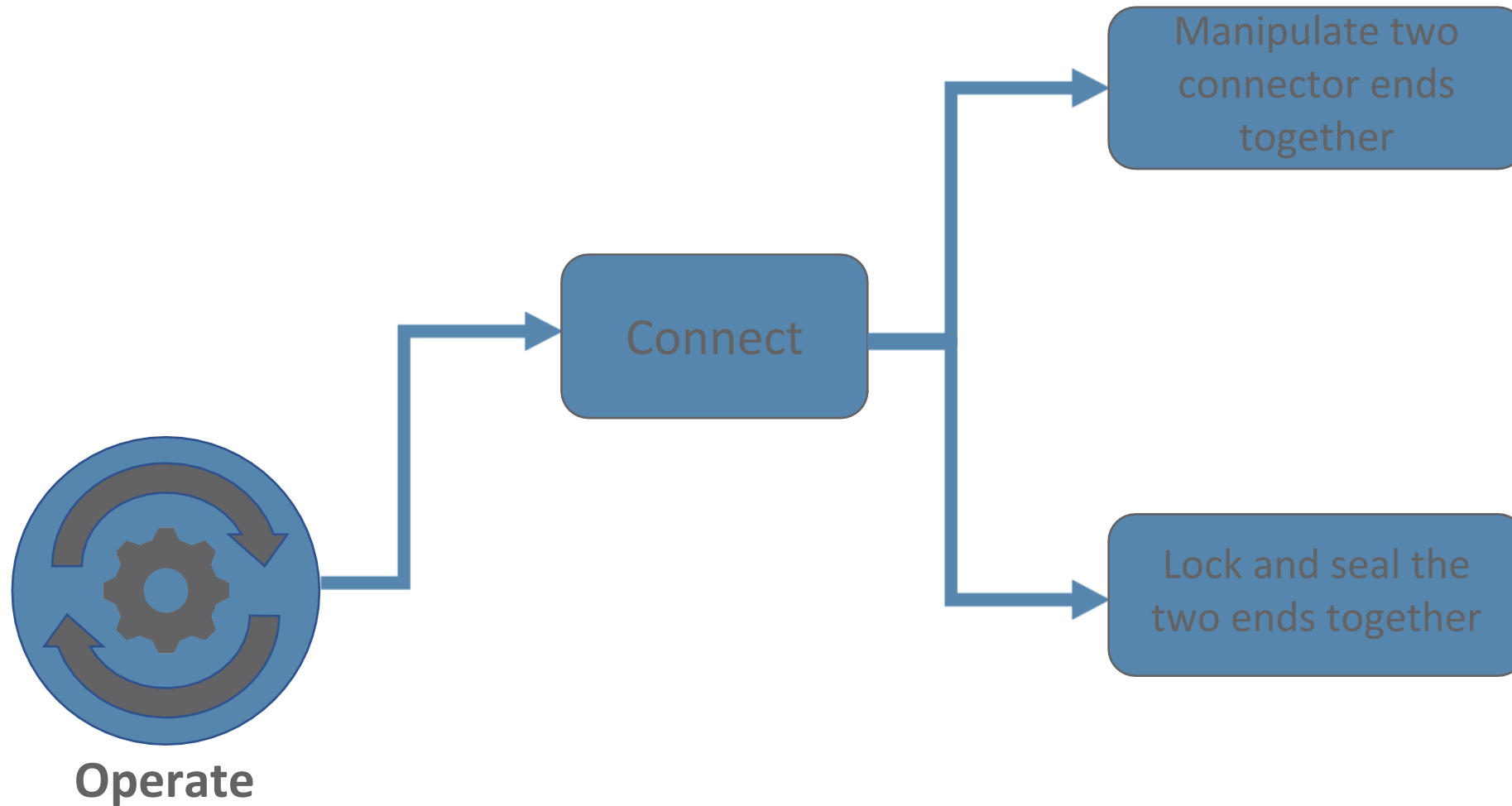
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Functional Decomposition



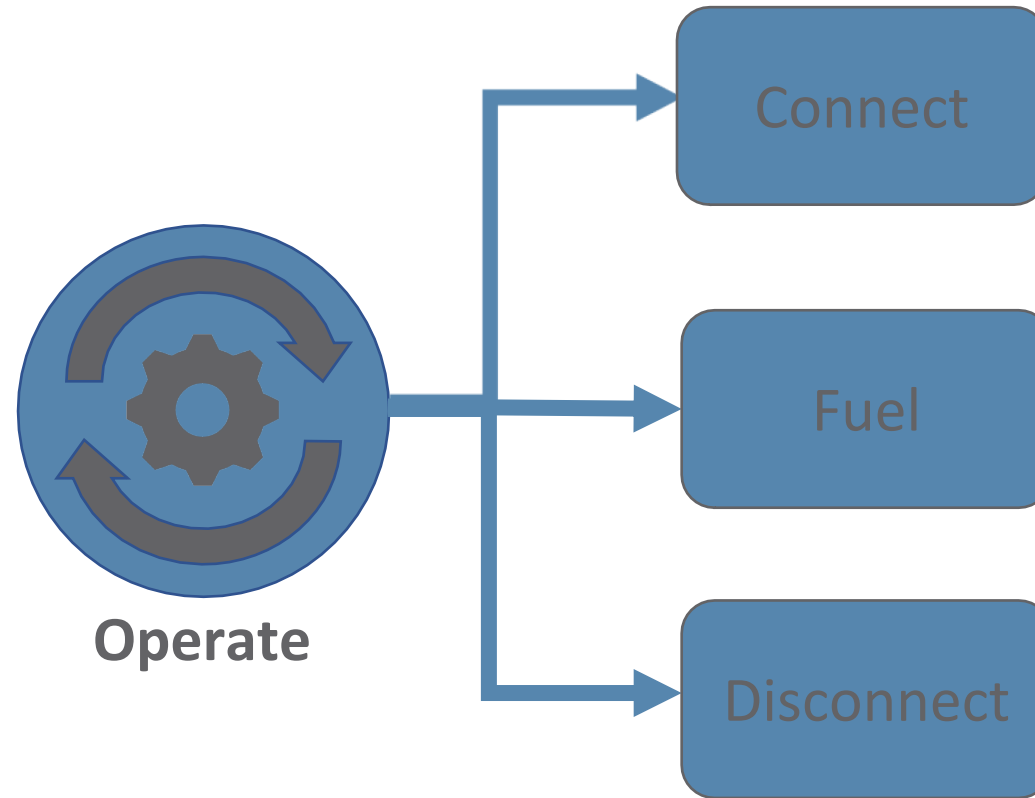
Mika Kuschnitzky

Functional Decomposition



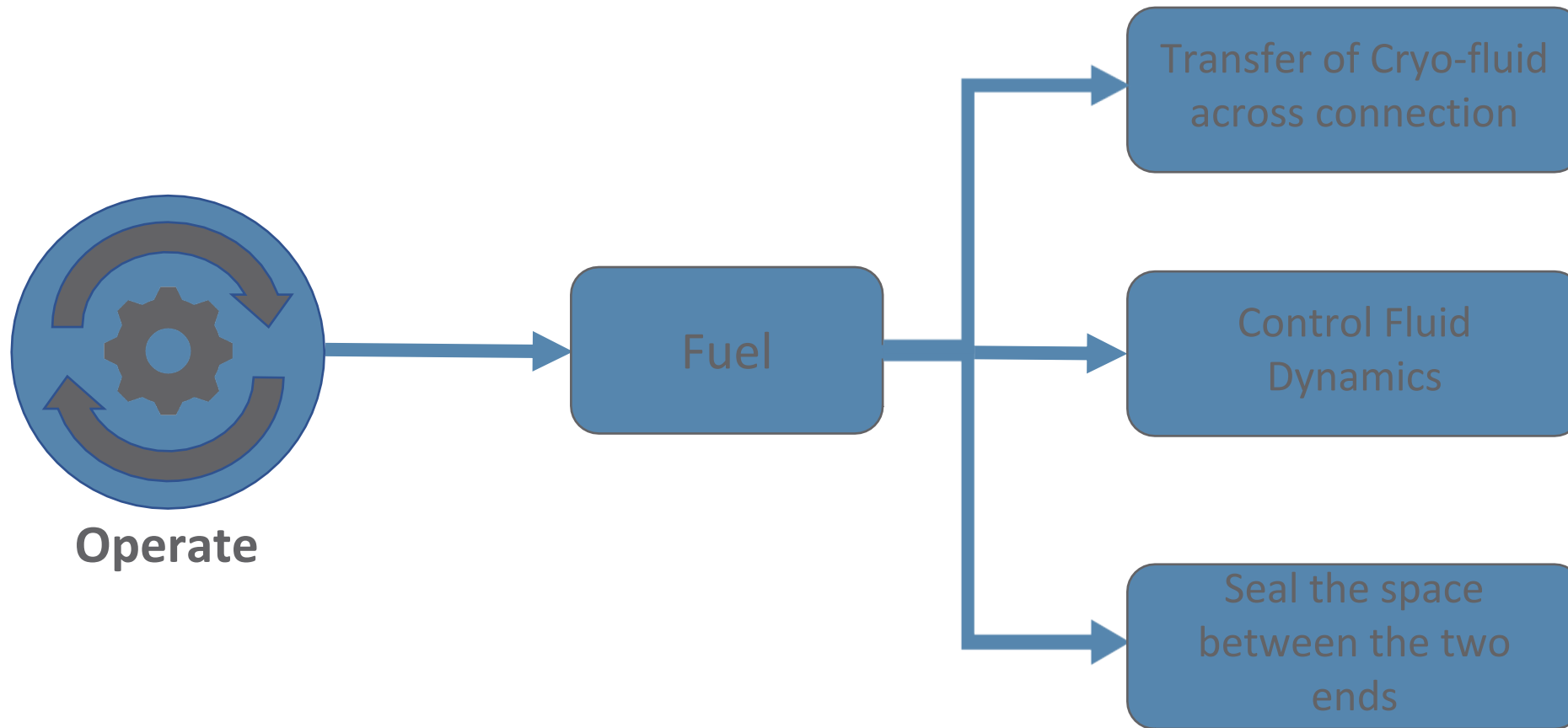
Mika Kuschnitzky

Functional Decomposition



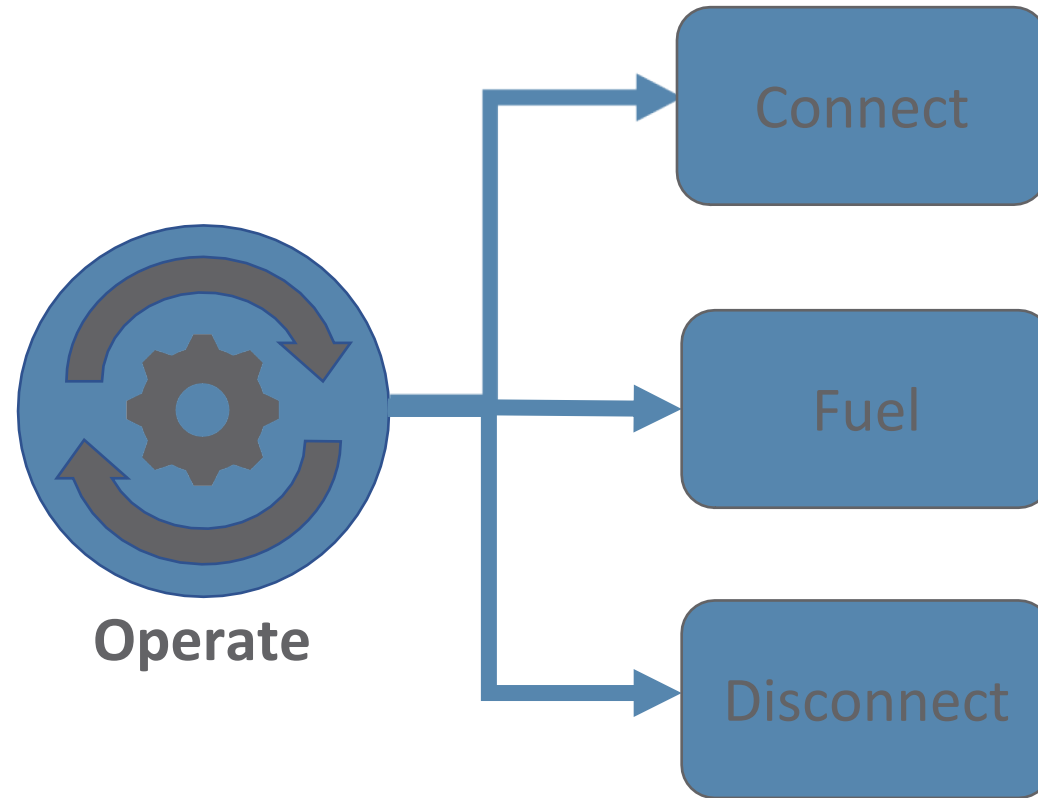
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Functional Decomposition



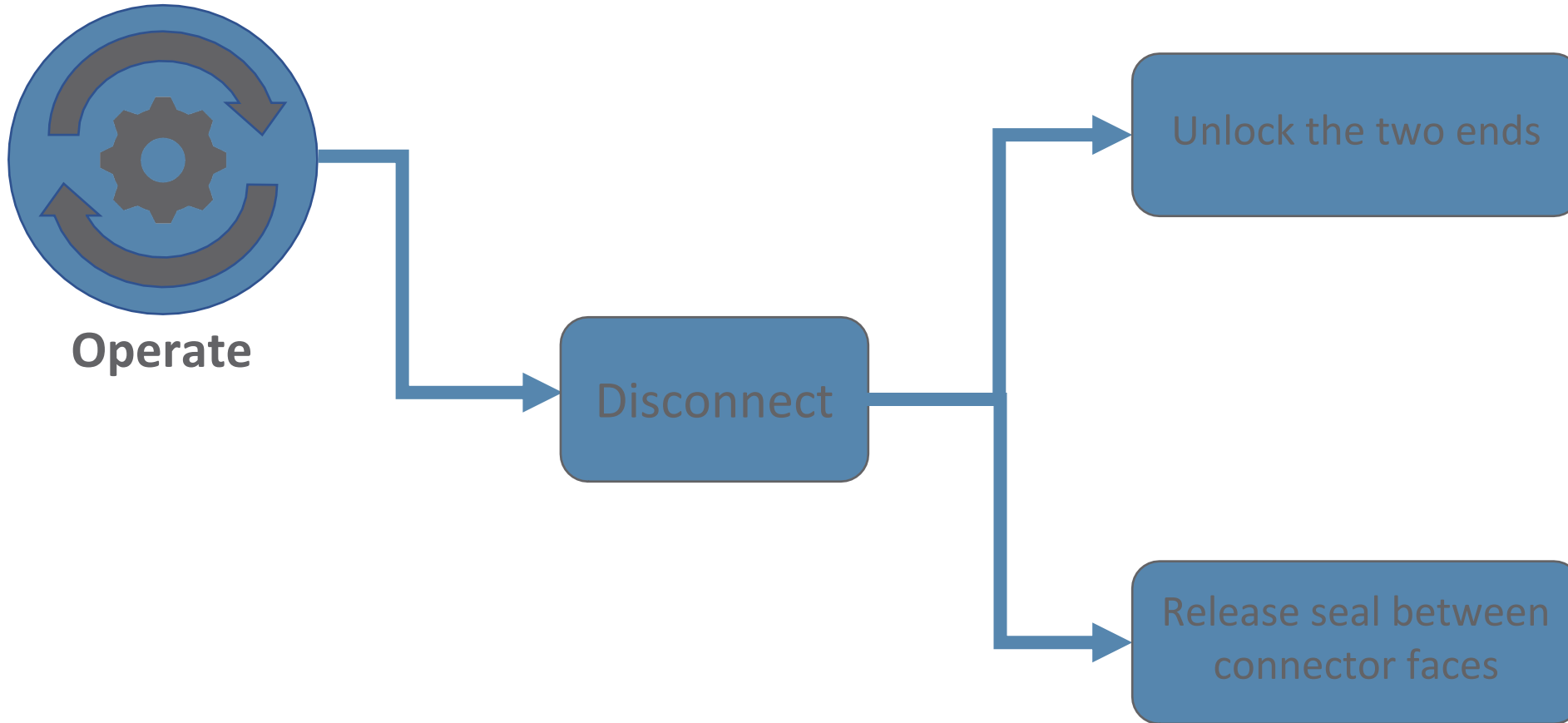
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Functional Decomposition



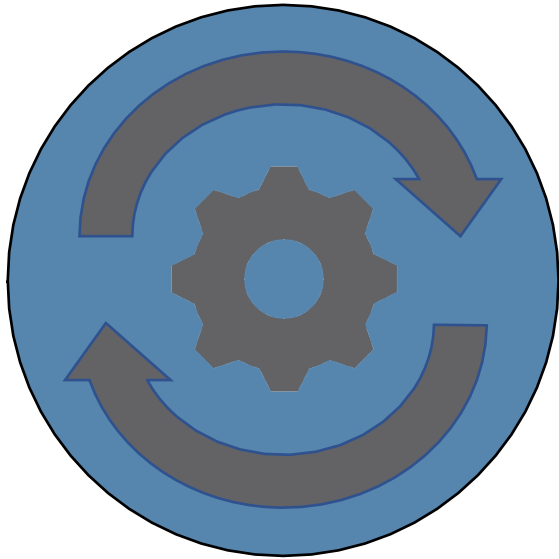
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Functional Decomposition

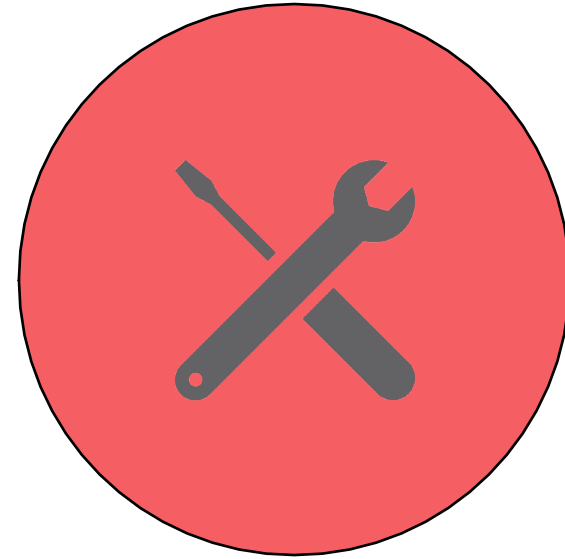


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Functional Decomposition



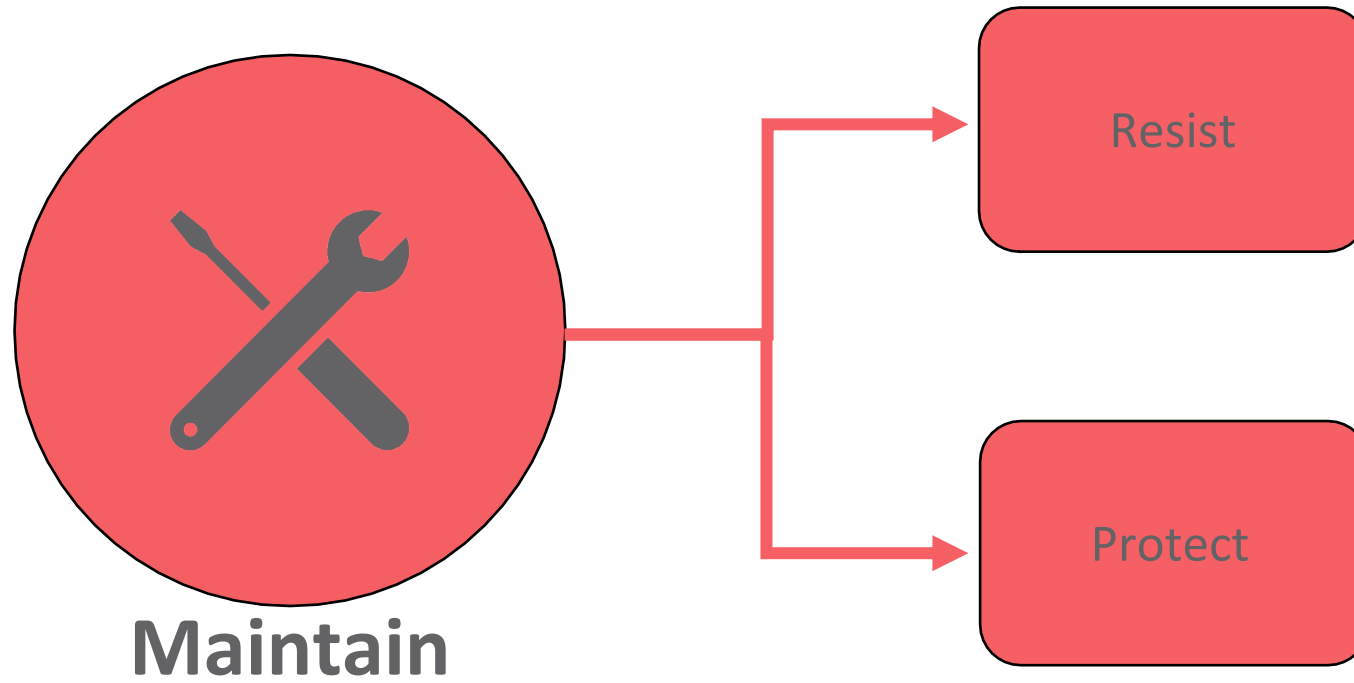
Operate



Maintain

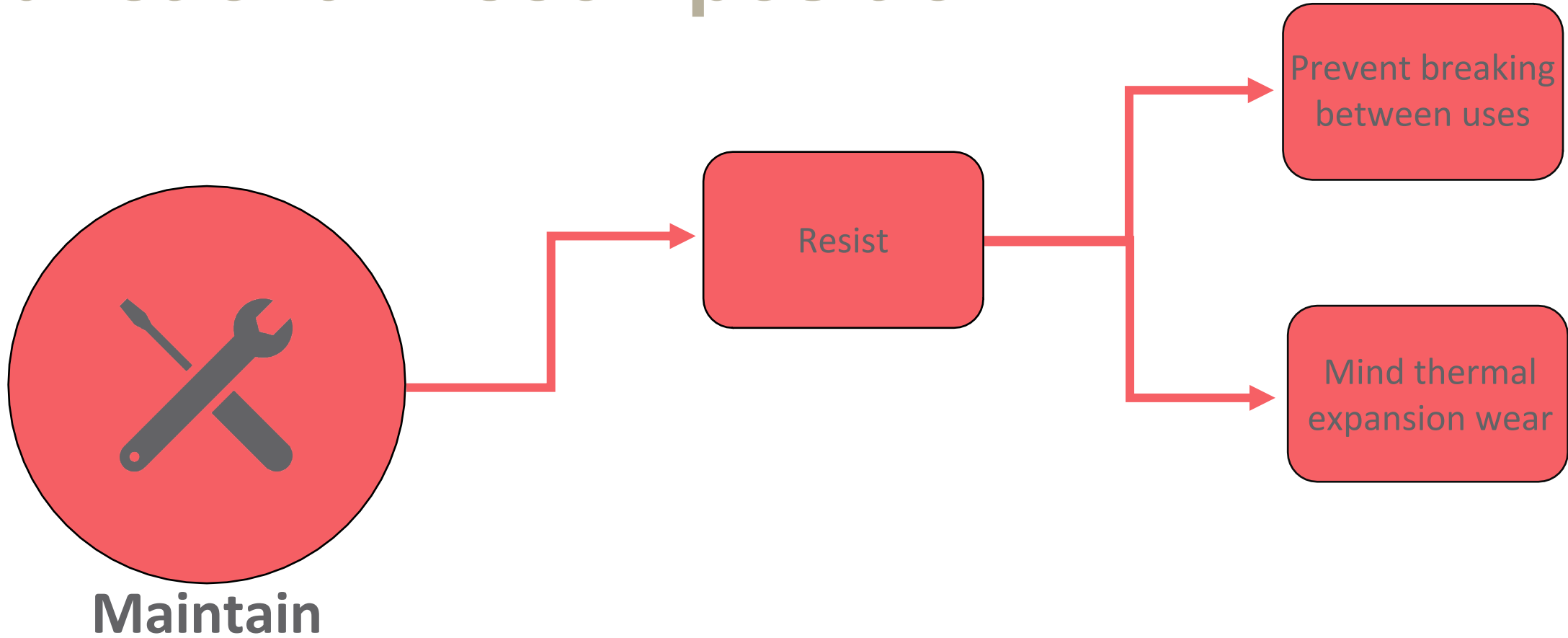
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Functional Decomposition



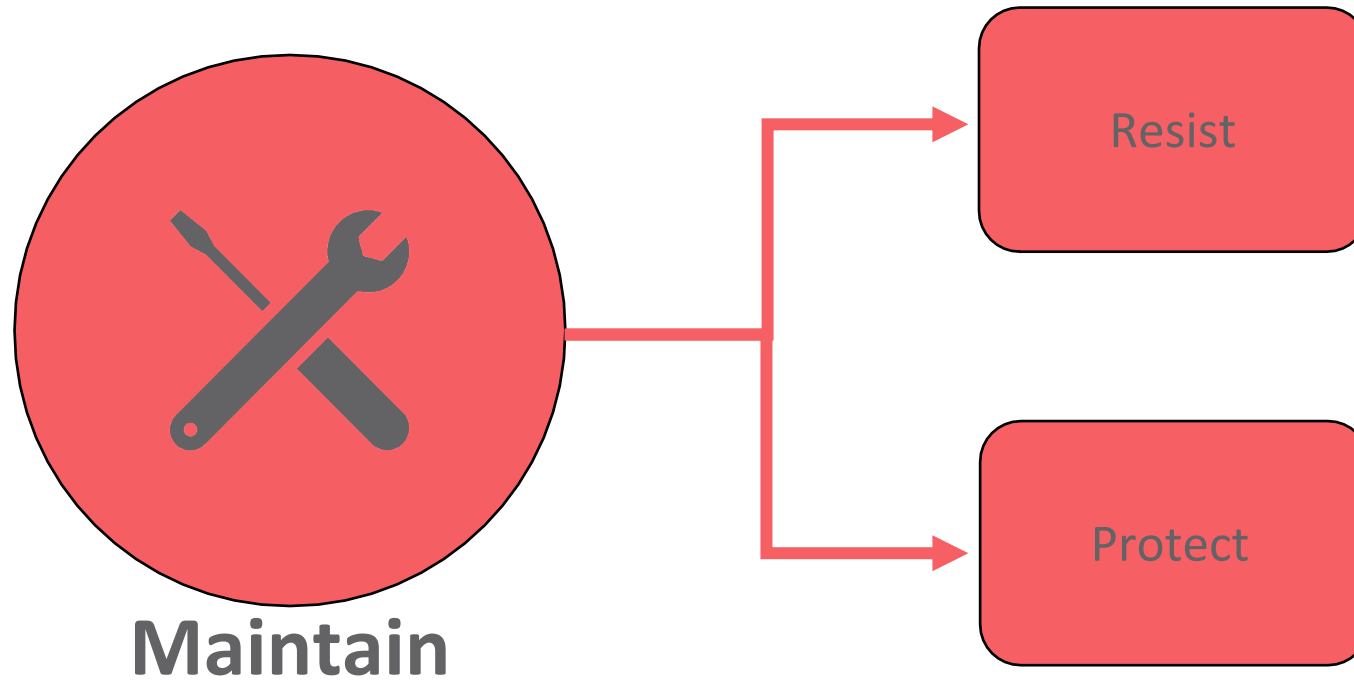
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Functional Decomposition



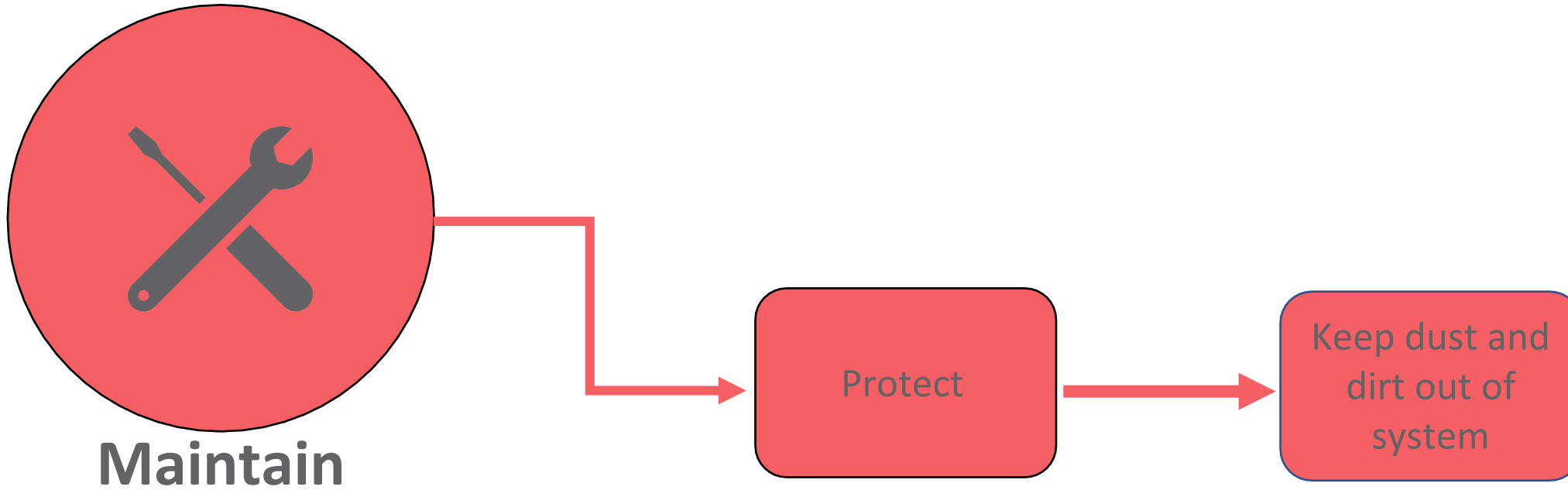
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Functional Decomposition



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Functional Decomposition



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Next Steps



	October														November														December																						
Task	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7
Targets	█																																																		
Concept Generation	█																																																		
Concept Selection															█																																				
Design Review 2															█																																				
Risk Assessment															█																																				
Bill of Materials																													█																						
Design Review 3																													█																						
Build and Test																													█																						

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Anthropometry

Human Engineering Design Data for 95th Percentile Female

Biometric	Measure
Weight	74.5 Kg
Height	178.7 cm
Functional Reach	79.0 cm

Action	Peak Force
Standing Two Handed Pull (38 cm)	888.3 N
Standing Two Handed Pull (50 cm)	905.2 N
Standing Two Handed Pull (100 cm)	493.3 N

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