

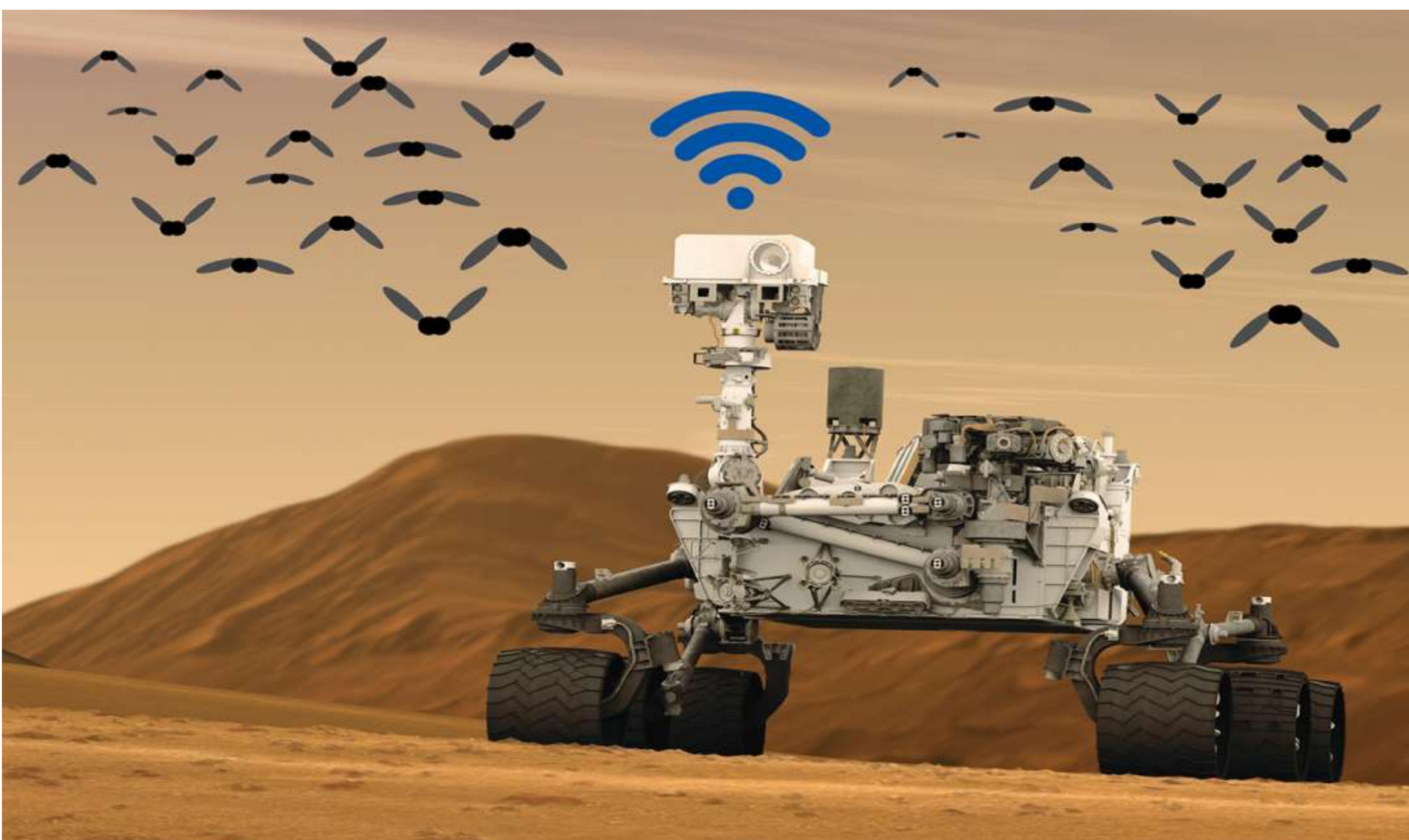
# Using Value Modeling and Design Structure Matrices for the NASA MarsBee Project

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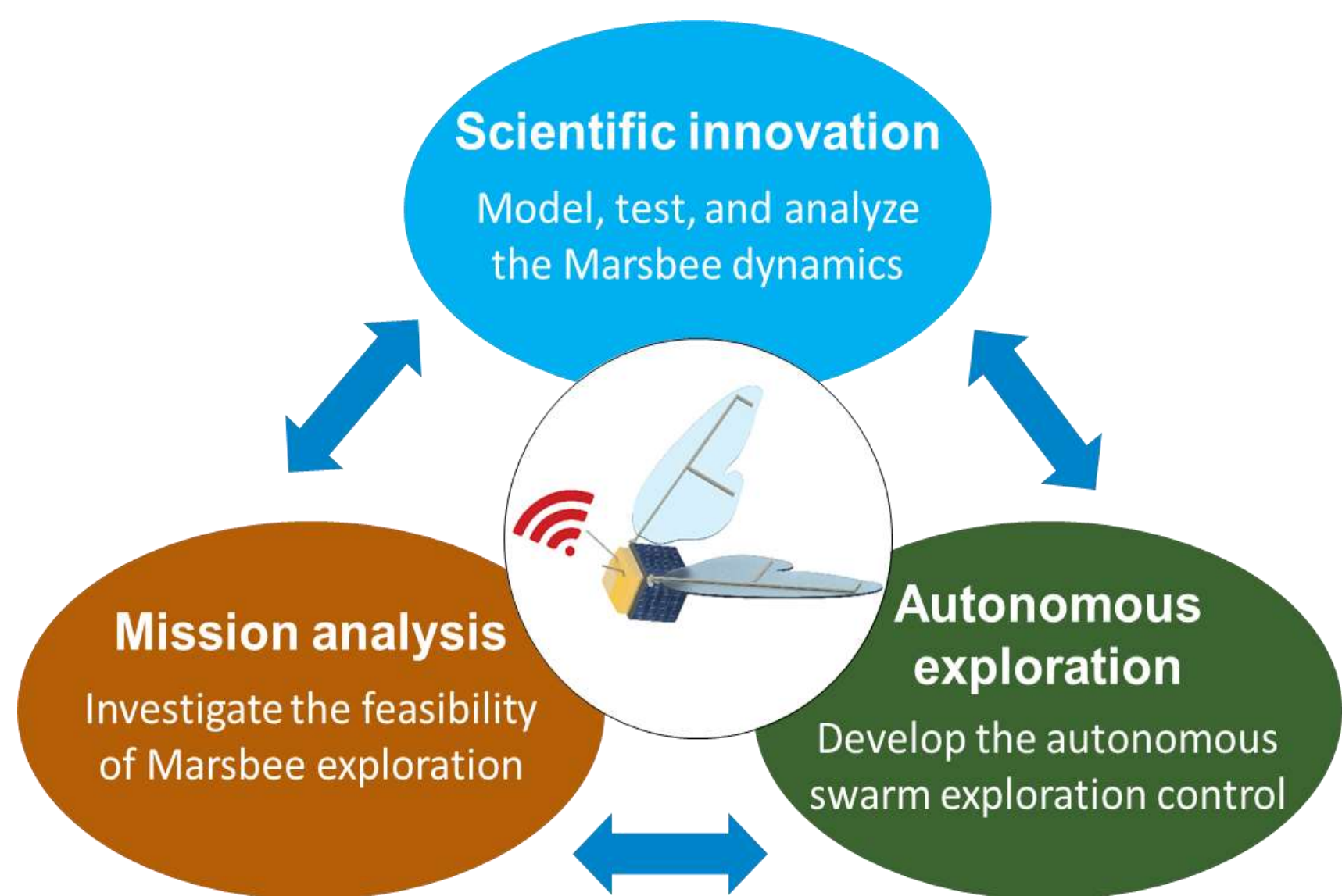
## Overview

The MarsBees mission will be to study and create a 3D topographic map of Mars using flapping wing Micro Air Vehicles (MAVs). A swarm of MAVs, aimed at replicating flight characteristics of bees, will be used for the mission. The system engineering team at UAH is tasked with representing the preferences of the stakeholders using value models and analyzing the couplings between the subsystems using Design Structure Matrices (DSMs).



## Methodology

- Create DSMs to identify system couplings
- Analyze couplings strengths to inform of important subsystem relationships
- Elicit stakeholder desires using surveys and interviews
- Identify key attributes and preferences of stakeholders
- Develop a value model to enable an optimized system



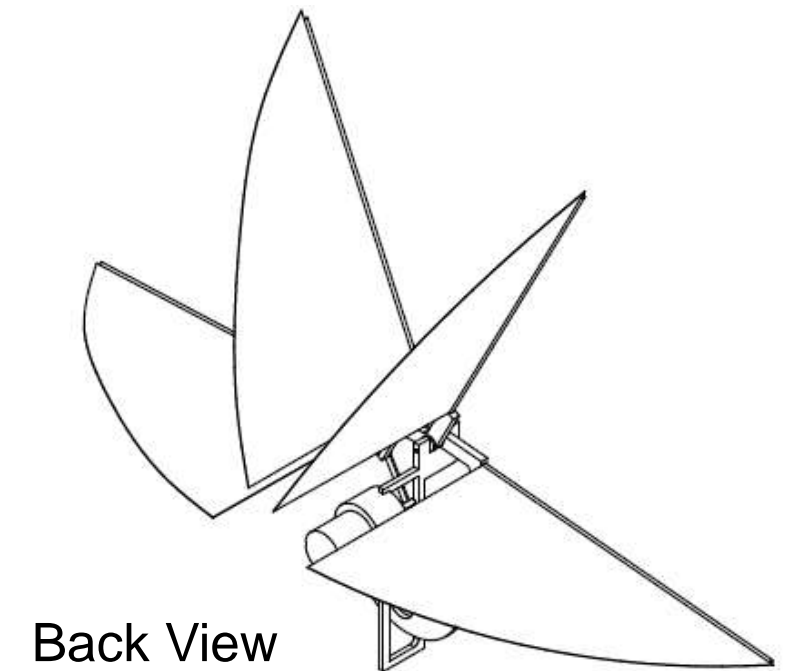
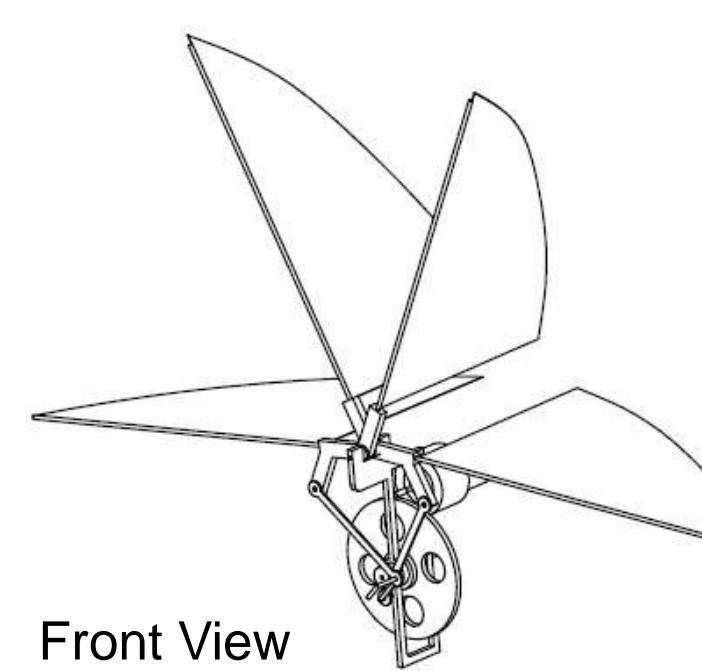
## Acknowledgements

This project would not have been possible without the help from Dr. Bryan Mesmer & funding provided by NASA through the Marsbee project.

## Intellectual Merit

A value model is a mathematical representation of stakeholder preference. The model will be used, instead of requirements, to enable consistent subsystem design decisions. DSMs will be used to identify subsystem interactions that have a large impact on the value, enabling proper resource allocation.

	Battery	Frame	Motor	Crankshaft	Flywheel	Connecting Rod	Rockers	Wing	Control System	Tail
Battery	■	X								
Frame		■	X	X	X	X	X			X
Motor	X	X	■							
Crankshaft			X	■						
Flywheel				X	■					
Connecting Rod					X	■				
Rockers						X	■			
Wing							X	■		X
Control System	X								■	
Tail								X		■



## Future Work

The mission aims to help enhance the scientific community's knowledge of Mars by overcoming technological shortcomings faced by the current on-going missions. The value model will be used to compare different missions and systems that perform similar functions as the MarsBee. The value model will then be compared to a broader NASA value model to study overall impact of the mission.