

Project Task

- The team created a Google Form for the GFR team to track data during their manufacturing processes.
- The Google Form has been designed so that the questions are modified to the needs of each GFR subteam.
  - This is to collect more accurate and meaningful data for each team.

Figure 1. Sub-team selection

- When submitted, the data is sent to a Google Sheet, seen below in Figure 2, where it is primed for analysis.
  - This includes the utilization of Pivot tables and utilized spaces for functions

Timestamp	What Sub-team?	1. Subassembly	2. Part Name	2. Part No	3. Quantity
2/13/2024 10:42:54	Suspension	XYZ	blahblah	12413516543	2000
2/29/2024 14:58:20	Powertrain				
3/3/2024 17:50:47	Suspension	Gearbox			11283
3/3/2024 17:52:36	Powertrain				
3/3/2024 17:53:27	Powertrain				
3/3/2024 17:54:54	Suspension	Spindle			1162656

4. Machine	6. Activity	5. Material	8. Source	6. Status of part	10. Operator
Lathe	Install	metal	somewhere	good	yes
Water Jet, FADAL 3+1 CNC Mill		80-55-06 Ductile		In-progress	
ErPath Programmable Lathe		AISI 4130 Steel		Manufactured	

Figure 2. Data submission example

# Data Collection Is Sexy

## Team and Sponsor overview

The MIME4.6 team is comprised of three senior industrial engineering majors. GFR (Global Formula Racing) is a student led organization with locations at Oregon State and Duale Hochschule Baden-Württemberg - Ravensburg in Germany. The goal is to build competitive racing vehicles to compete in races across the globe.

## Form Creation Methodology

The form uses as many pre-determined questions as possible to minimize the excursion of effort on behalf of the user and to ensure standardization of data. This will ensure the ease of use and error prevention in data.

The form has also been created with the goal of utilizing the data collected to calculate the manufacturing costs of the different subteams in GFR. Thus, the importance of accurate data must be ensured.

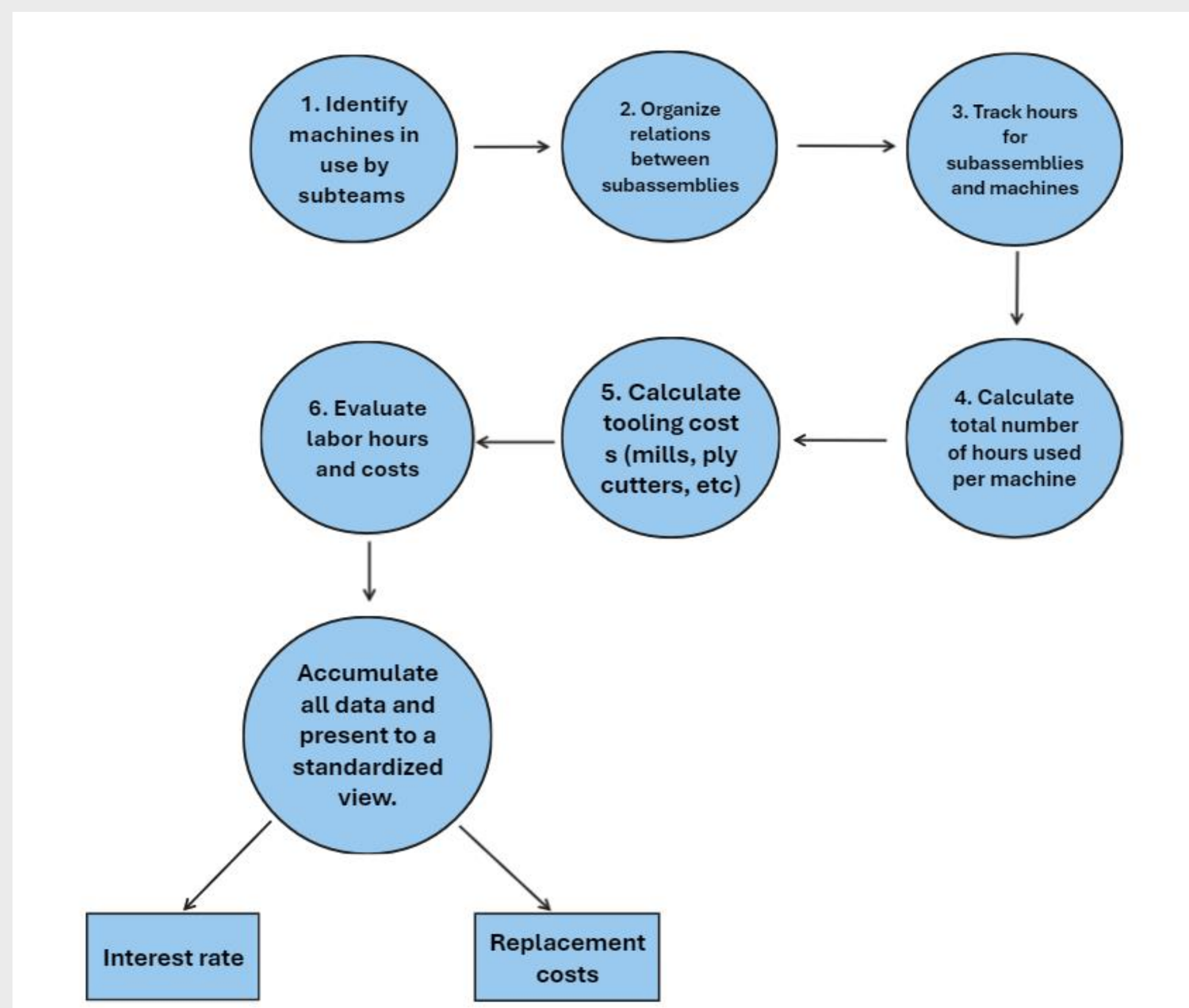


Figure 4. Data submission example

## Project Requirements

The team set out on the project with a set of requirements for the type of data to be collected and the output from the data. Figure 4 below outlines these requirements. This also displays the general steps to ensure proper questions are asked in the form.

The costs to manufacture are calculated with the data collected from the form and fixed data. This may include the acquisition cost of machines, hourly wage, etc. This is seen in Figure 6 below.

Category	Information
Machine Type	Water Jet
Acquisition Cost	\$130,000.00
Hours of utilization per year	1580
Total operating hours per year	1976
Performance Ratio	79.96%
Replacement Cost	\$179,206.44
Useful life expectancy (years)	13

Cost Overview			
Fixed Costs		Variable Costs	
Cost accounting depreciation	\$13,785.11	Maintenance and repair	-
Imputed interest	\$5,200.00	Power	\$4,796.00
Interest rate %	8.00%	Tool costs	\$6,000.00
Maintenance and repair	\$5.67	Other variable costs	\$23,700.00
Maintenance rate	5.00%	Cost of labour	\$66,612.00
Occupancy expenses	\$1,554.00		
Power	\$85.97		
Other fixed costs	\$80.00		
SUM	\$20,710.75	SUM	\$101,108.00
Cost per Hour	\$18.72	Cost per Hour	\$63.92
		Machine Hour Rate	\$82.64

Figure 6. Cost Table Calculation

## Analysis From Data

- The data collected is used to calculate costs and time for each subteam.
- This data is used for required annual reports, displaying the cost and time for each subteam to complete their respective tasks of the vehicle.

Figure 3. Financial cost analysis

## Improvements For The Future

- There is still plenty of room for improvement to make the data and collection process better and more standardized.
- Utilizing Power Query would allow for better manipulation and cleaning of data, making it more standardized.
  - This would also get rid of the need for people to clean the data by hand, saving valuable engineering time.
- Using a different form system (i.e. utilizing c#, HTML, etc.) would allow for a more robust and customizable form.
  - Would offer more freedom to the creators in the creation of the form to fit their unique needs.



### Team Members:

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