

Visualizing Engineering Design Decisions

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Abstract

There was a strong interest in analyzing specific decision points and their level of influence in the design journey. This idea led to a series of hypothesis that were tested by creating a scatter plot visualization.

The software, R, was the foundation for the data analysis portion of the design decisions. The extracted dataset was imported into R and 4 scatter plots were built. Results indicate that each engineer had an influential point in their design journey that either led them to the optimal design or put them in position to find it.

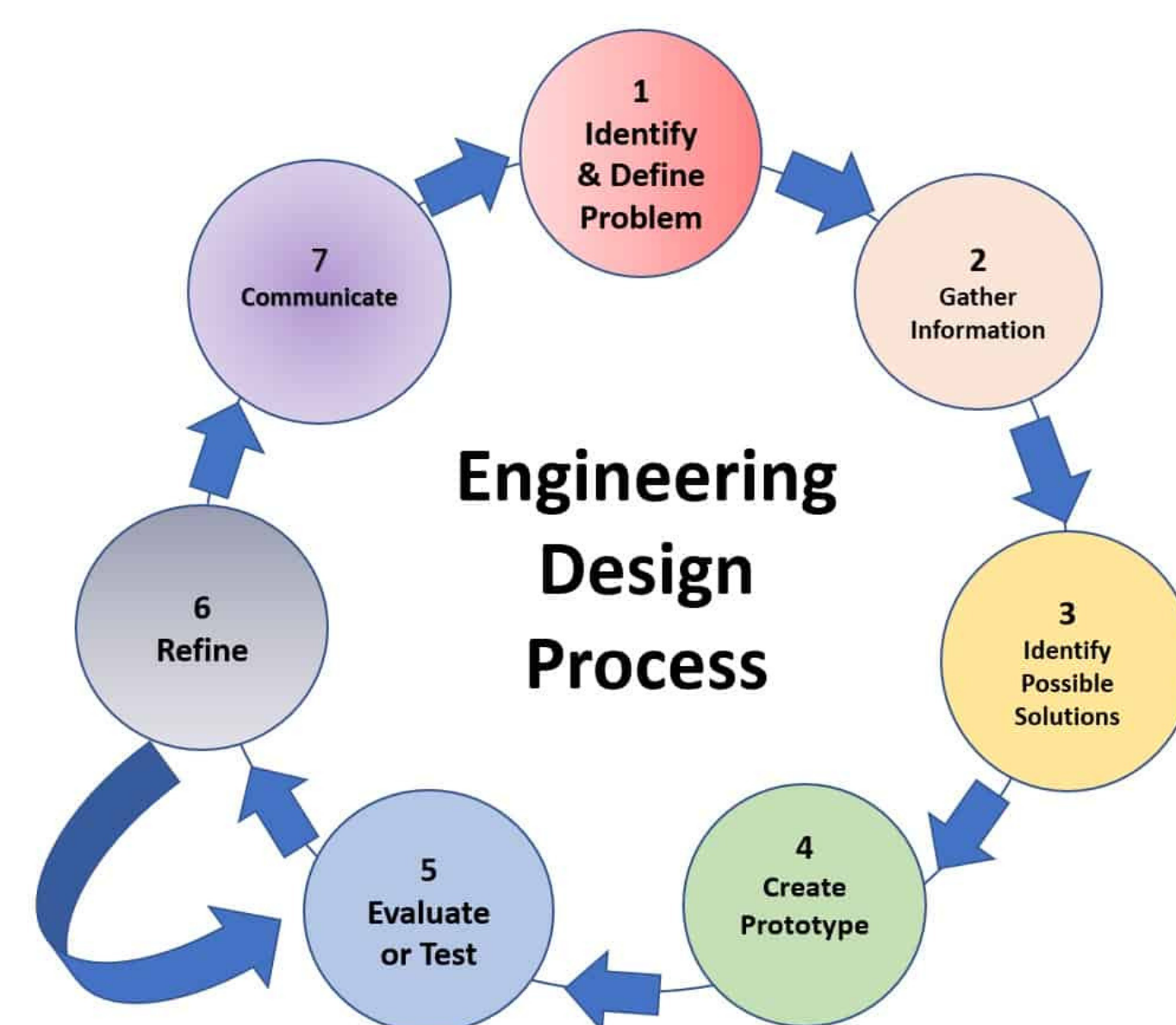


Figure 1: Example of the iterative design process that occurs in this research

Introduction

Visualizations are graphical representations of data that hold information regarding their subject. Accurate interpretations of visualizations can lead to innovative designs, discoveries and acquired knowledge in the field. In this research, we aim to visualize the decisions engineers took when prompted to create a design for a robotic arm. For this visualization it was best to utilize a scatter plot as this form will be most suitable to analyze the engineering design process

Methods

A research carried out in 2020 by Goucher-Lambert's lab made strides in the field of engineering design. The data they produced from their design task was used in developing the dataset for this research. Four participants who submitted the optimal design were randomly selected from the design task dataset. The data from these four were extracted and separated into 4 different files then it was cleaned in order to isolate two variables- Design name and Success rate.

Finally, the extracted datasets were imported into R and 4 scatter plot visualizations were created

Discussion

As we observe this visualization we can point to decisions 1-4 as a moment in this engineer's journey where they went through the engineering design process. The movement around these three designs display the iterative nature of the design process which was key in leading the engineer to the optimal design.

Each design action was critical as they culminated in the optimal design. However, within this design journey is an influential point that played a big role in achieving the optimal design

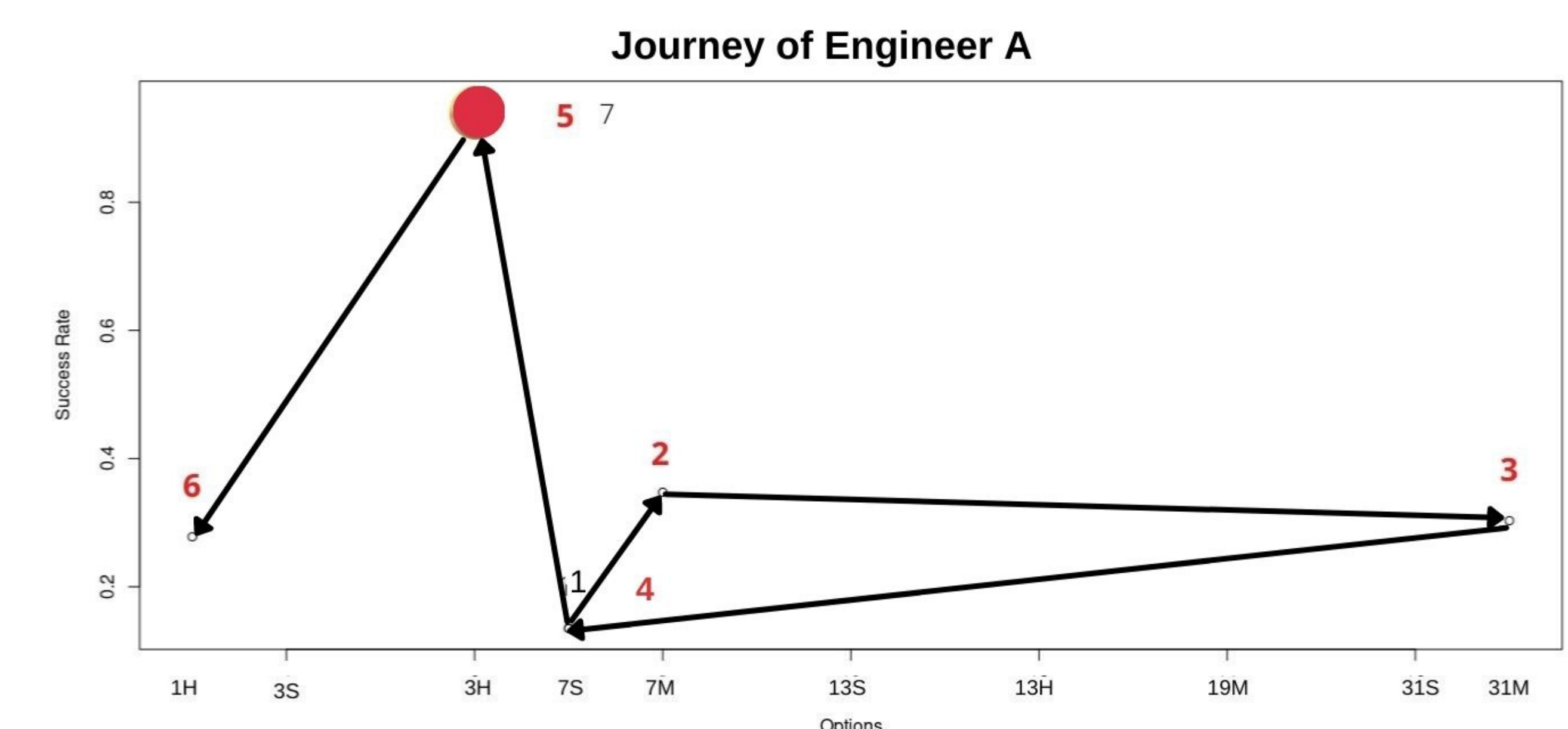


Figure 2: Design journey of an engineer

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