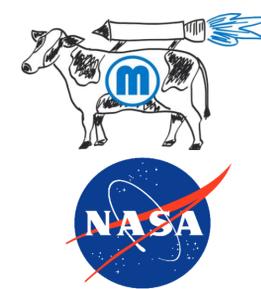


Non-Financial Aspects of Affordability Improvement at NASA

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ABSTRACT

Affordability within industry has grown in interest over the years as organizations strive to balance performance and cost effectiveness in projects. The desire to produce high quality outputs while adhering to budgetary and schedule limitations has led to a shift in focus that emphasizes improving affordability through organizational changes and practices. There are often variations in perceptions of applications and best practices regarding affordability improvement. These variations may lead to misunderstandings between individuals, teams, and organizations when implementing a strategy to improve affordability. The purpose of the current study is to ascertain how individuals within the National Aeronautics and Space Administration's Marshall Space Flight Center perceive non-financial aspects of improving affordability. Participants (N=173) were asked to respond to a survey regarding their approaches to the concept of affordability. Both financial and non-financial aspects were mentioned in participant responses, however, this poster presents the results of the thematic analysis performed on the perceived approaches to improving affordability through non-financial aspects. The responses were categorized into 5 non-financial themes of *Process* (including *design and technology*), *People*, *External Environments*, *Attributes*, and *Other*. Responses were further broken down into lower-level themes. Responses were limited to categorization within a single category and subcategory by researchers. The findings from this survey may help researchers understand perceptions of affordability improvement through non-financial aspects within the aerospace industry.

LITERATURE REVIEW

Affordability

- Analysis of affordability allows for better understanding of investments and payoffs such as return on investments across variety of industries
- Indication of affordability formula in defense industry comprised of account budget, lifecycle cost, and spending ability
- Aerospace industry has previously analyzed affordability as a measure of system feasibility and viability
- Affordability often seen as best value rather than cheapest option

Affordability Improvement

- Defense industry has suggested affordability improvement through capability evaluation, quantity evaluation, and time evaluation
- Medical industry suggests affordability improvements by way of technology innovation and process improvement
- Previous research shows a clear separation between research, design, and development as to not waste resources and in turn improve affordability

HYPOTHESIS

H₁: Respondents will give a variety of differing themes when prompted how to improve affordability

NASA Respondent Career Levels

Establishment	Advancement	Maintenance
≤2 years	>2 to ≤10 years	>10 years
8.6% respondents	16.2% respondents	74.6% respondents

MATERIALS & METHODS

Participants
National Aeronautic and Space Administration employees (N=173) from the Marshall Space Flight Center

Women, 19.6%; men, 79.1%; other, 1.2%;

Respondents included engineers, engineer managers, and project managers

Preference Survey
Designed using questions adapted from Organizational Climate Measure as well as questions generated regarding affordability

Comprised of 4 open-ended questions, X closed-ended questions, lifecycle ranking questions, and demographics

Closed-ended questions Measured on a 7-point Likert scale, from (1) Strongly Disagree to (7) Strongly Agree

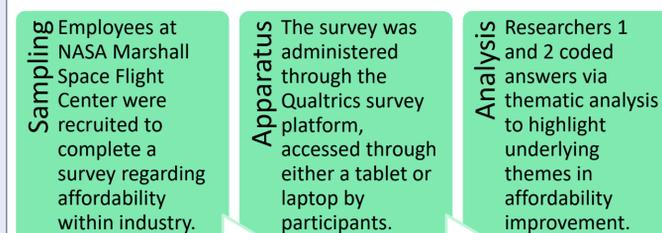
Qualitative Data Coding
Analysis of open-ended questions followed open coding process: de-contextualization, recontextualization, identification of categories, and compilation of categories

Responses regarding non-financial aspects of affordability improvement were categorized into 5 higher-level codes then further broken down into more specific lower-level themes

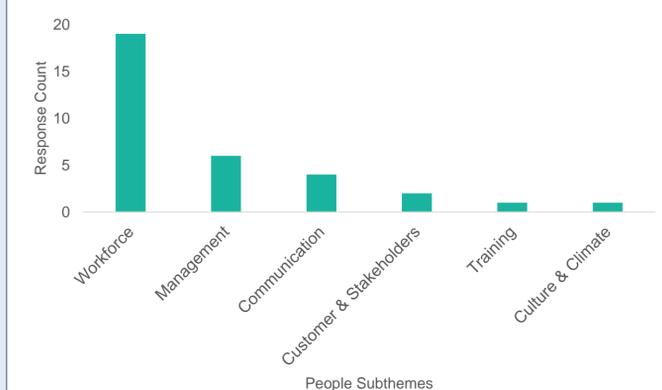
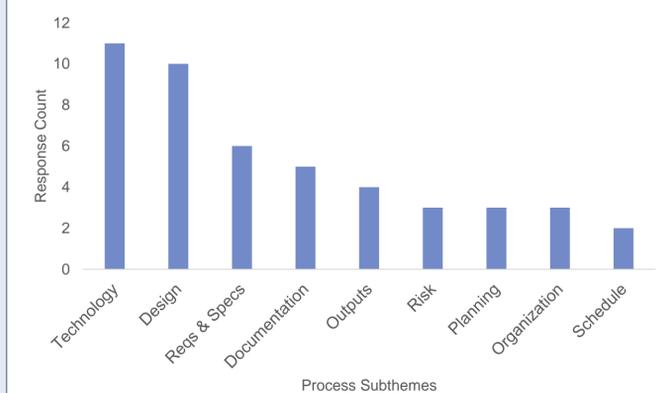
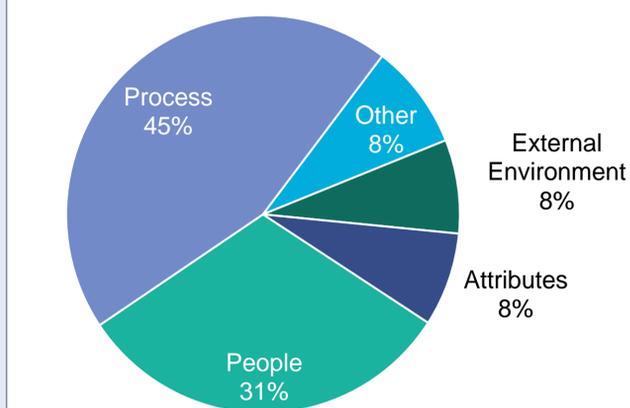
Questionnaire Development
Process: (1) conceptualization of survey, (2) design and obtain Institutional Review Board (IRB) approval, (3) Testing, (4) Revision, (5) Data collection, and (6) Data monitoring and evaluation

Questionnaire ultimately contained close-ended scale questions, open-ended questions intended to better elicit beliefs regarding both affordability definitions and affordability improvement

PROCEDURE



RESULTS



DISCUSSION

Discussion

- Majority of respondents felt affordability could be improved through *Process* related changes
- *Technology* improvements could be implemented to modernize business practices
- *People* related changes in the theme of *Workforce* could be done by reducing duplication of effort as well as communication improvement and task delegation

Limitations

- Responses only from NASA's Marshall Space Flight Center employees
- Responses predominately male and in a later stage of career

Future Research

- Further research into how responses by NASA compare to those within other industries, included but not limited to aerospace
- Further research into what non-financial aspects of affordability can be associated with a culture of affordability

Conclusions

- A variety of themes emerged when evaluating affordability improvement responses
- Process changes most frequently suggested higher-level theme to improve affordability
- Workforce changes the most frequently suggested lower-level theme to improve affordability

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