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Improving Decision Support through Storytelling

Tarah E. Cotton

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IMPROVING DECISION SUPPORT THROUGH STORYTELLING

THESIS

Tarah E. Cotton, Captain, USAF

AFIT-ENV-MS-18-M-190

**DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY**

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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THESIS

Presented to the Faculty

Department of Systems and Engineering Management

Graduate School of Engineering and Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Cost Analysis

Tarah E. Cotton, BS

Captain, USAF

March 2018

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IMPROVING DECISION SUPPORT THROUGH STORYTELLING

Tarah E. Cotton, BS

Captain, USAF

Committee Membership:

R. David Fass, PhD
Chair

John J. Elshaw, PhD
Member

Lieutenant Colonel Brandon M. Lucas, PhD, USAF
Member

Abstract

The role of decision support has emerged in the Air Force, Department of Defense, and in the civilian sector. With information being more accessible than ever before, the ability to analyze, interpret, and communicate information effectively and efficiently has become essential. While extensive resources are expended on growing the strength of decision support and analytical capability, the skills involved in presenting the data to decision makers is under-developed.

Now more than ever, decision makers are being tasked with making huge decisions in short periods of time. With a shrinking workforce and greater reliance on automated systems, decision makers must use their limited time to rely on their trusted advisors to interpret and communicate all of this information accurately and objectively. While the analyst may understand the data, ultimately it is up to the decision maker to make an informed decision. If we incorporate storytelling into decision support presentations, we may improve the ability to request, defend, and justify resources within the Air Force and DoD.

Acknowledgments

The research conducted in this paper could not have been possible without the advisement, support, and patience of the primary research advisor, Dr. R. David Fass. As in all accomplishments, it truly takes a village so I would like to thank my mentors, Col Darnell Salley, and CMSgt Kendall Briscoe for seeing the potential in me that others did not and who initially taught me that stories remind us of not only who we serve, but why. Alas, nothing in my life would happen without the love and support of my wife, Alisha and my dad and stepmother who always cheer the loudest even if I find myself in last place. Finally, I would be remised not to mention the sacrifice of the individuals who walked the path ahead of me, creating opportunities like attending AFIT available to people like me. Thank you.

Tarah E. Cotton

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IMPROVING DECISION SUPPORT THROUGH STORYTELLING

I. Introduction

General Issue

“PowerPoint makes us stupid.” A powerful quote from former Marine and Joint Services Commander, General James Mattis, emphasized in the New York Times article, “We have Met the Enemy and He is PowerPoint” by Elisabeth Bumiller (2010). Her interviews expose a common sentiment among service members on the overuse and more often, misuse of Microsoft’s presentation software, PowerPoint. In a military environment where the demand to deliver analytically rigorous, actionable knowledge has outpaced the skills and tools to effectively communicate information, the occasional “death by PowerPoint” seems inevitable; however, when used effectively, PowerPoint can perform as a beautiful medium to visualize narratives derived from data sets.

As data collection and analysis has evolved, communication and presentation skills have stagnated, neglecting opportunities to create powerful presentations by capitalizing on the fusion of human connection and data visualization to persuade and influence (Duarte, 2010). The true problem is not the software, but the standardization of presentation techniques that eventually lead to misuse. Training decision support personnel in the art of storytelling with data, that is to transform data into visualized narratives (Knafllic, 2014), is essential to evolving antiquated briefing practices.

While there has been research to measure the effectiveness of storytelling and data visualizations in the realms of education, marketing, and advertisement, there is not much empirical research covering its effectiveness in decision support. The purpose of

this study is to test a model hypothesizing that information presented in a narrative context will prove to provide better decision support than traditional fact-based briefings. Additionally, the study will attempt to promote the use of storytelling in military briefings by quantifying its effect on an audience's perceptions. Specifically, the researchers will measure the believability, aesthetics, and usability of visualizations as well as the focused attention, believability, and the audience's willingness to rely on presentations to determine if in fact, storytelling improves decision support tools.

Research Objectives

Financial Management and Acquisition professionals are trained in the laws and rules governing the career field as well as the methods required to provide adequate analysis. The Air Force mission requires decision support leaders to effectively communicate data driven solutions. The aim of this study is to examine current decision support presentation practices to determine if storytelling improves the ability to provide decision support. Examining narrative structure provides context to understanding how visualizations can be leveraged to replace the ineffectual presentation techniques plaguing the DoD. Stories are dynamic, as the most powerful delivery tool for information (Duarte, 2015) they help audiences to visualize what is done or believed. People usually find it easier to understand information integrated into stories than information spelled out in bulleted lists (Gershon & Ward, 2001). Ultimately, the goal of the research is to determine if adding storytelling elements to a narrative and visuals effect specific qualities of presentations by answering the following research question:

RQ1: *Does information presented in a narrative context improve presentations as decision support tools?*

To answer the research question, the research team developed and tested the following three hypotheses:

Hypothesis 1:

- A. *Visualization charts with narrative attributes are more aesthetically pleasing than charts without them*
- B. *Visualization charts with narrative attributes have higher perceived usability than charts without them*

Hypothesis 2: *Information presented in a storytelling context will receive more focused attention from the audience than a fact-based presentation*

Hypothesis 3:

- A. *Information presented in a storytelling context will be less believable than a fact-based briefing*
- B. *Decision makers will be less willing to rely on information presented in a storytelling context than a fact-based briefing*

The results of this research will provide a framework to improving the way the Financial Management and Acquisition personnel currently provide decision support and measure the effect of narrative elements on audience's perceptions of a presentation, mitigating the number of "death by PowerPoints" committed every day.

Methodology

The analysis forthcoming is a product of research, experimentation, statistical models, and publicly available information regarding the use of storytelling and data visualization as a tool for decision support. Through investigation and exploration, we created a survey that tested the effect narratives have on both the visual and verbal aspects of a presentation. Specifically, we measured the audience's perceived believability, aesthetics, and usability of three different visualizations. For the verbal portion of presentations, the researchers measured the audience's focused attention, the believability of the narrative, and the audience's willingness to rely on information presented in a storytelling context.

Assumptions/Limitations

The survey was limited to students and faculty assigned to the Air Force Institute of Technology. This limitation created a sample population that is somewhat dissimilar from the Financial Management Career Field, due to the concentration of students and faculty with technical degrees and backgrounds that is expected at an engineering school. The platform used to create the survey presented some limitations. The presentations were pre-recorded and viewed as an embedded video within the survey, limiting the interaction between audience and speaker. The researchers also limited the length and subject matter of the presentations in order to make the survey more appealing to participants in an attempt to maximize completion rate. Seventy-five surveys were returned; an excellent sample size under the circumstances.

The findings from this research could be a catalyst to update the presentation standards and briefing techniques taught and implemented across the financial management career field. Improving upon the career field's ability to provide analytically rigorous actionable knowledge to decision makers improves the Air Force's ability to effectively defend and resource its various missions and requirements.

II. Literature Review

Chapter Summary

In order to improve communication in decision support, both the visual and verbal aspects of presentations need to be examined. The researchers began by exploring cognitive theory to understand how people learn. Relevant research on storytelling and data visualization is also covered in this chapter with a goal of understanding what attributes will make one presentation more effective than another. While there has been research to measure the effectiveness of storytelling and data visualizations in the realms of education, marketing, and advertisement, there is not much empirical research covering its effectiveness in decision support. Because education and marketing both seek to inform and persuade, research in these fields is relevant to decision support.

Data Visualization

Data visualization is a heavily researched topic, especially its ability to convey complex ideas or relationships (Tufté, 2011; Few 2006). In 1977 John Tukey introduced exploratory data analysis, a new statistical approach to making sense of quantitative data, which came to be known as data visualization (Yau, 2013). Although technology has transcended the computing power that John Tukey utilized, the principle remains, “The greatest value of a picture is when it forces us to notice what we never expected to see” (Tukey, 1977).

Since early research, data visualization principles defining appropriate use of graphical representation and presentation methodology have been comprehensively documented and generally accepted (Tufté, 1983; Few 2004; Knaflic 2015). Even the

Air Force's *Tongue and Quill* (2013) outlines specific strategies and procedures to designing presentations. Regarding visualizations, the handbook recommends using graphs to convey statistical analysis, specifically, bar graphs to compare values, line graphs to show trends over time, and pie charts to compare parts of a whole.

Regardless of the image or graph used, the goal is to translate abstract information into visual representations that can be easily, efficiently, accurately, and meaningfully decoded (Few, 2004). If the rules are so widely known and accepted, then why does the Department of Defense continue to generate notorious briefing charts like the one depicted in Figure 1? This infamous visual was so complicated it drove General Stanley McChrystal, former US and NATO commander in Afghanistan, to declare, "When we understand that slide, we'll have won the war." The spaghetti chart may not efficiently outline any specific strategy or plan, but it does tell a story. Presenters must ensure the graphs and charts they create are telling the story they intend to tell.

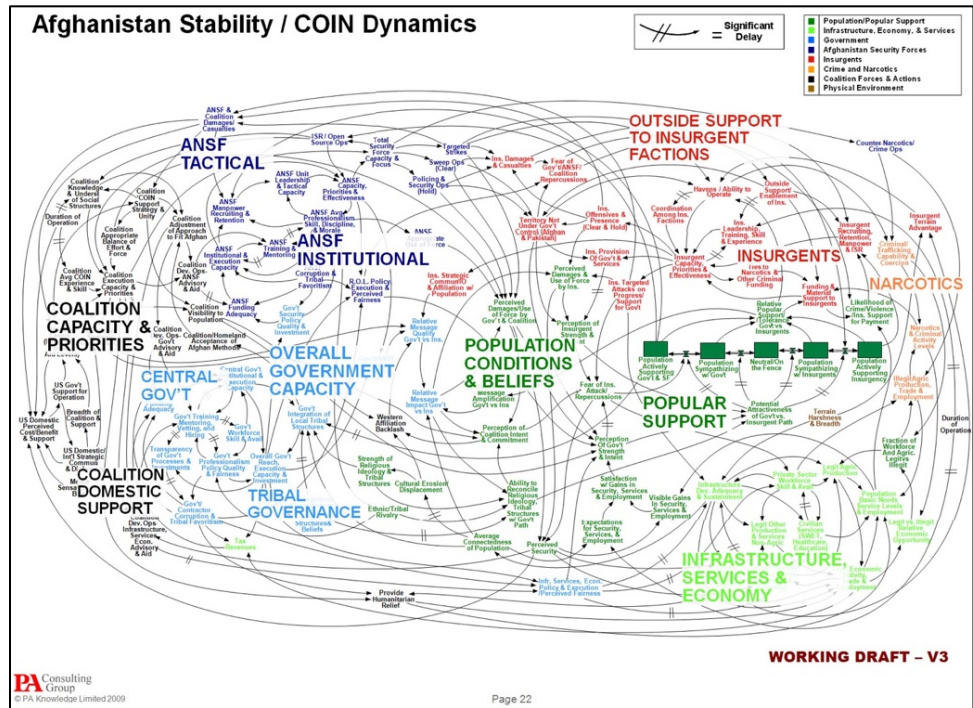


Figure 1: Microsoft PowerPoint slide shown to US commanders showing security, economic, and political conditions in Afghanistan (Bumiller, 2010)

The difference between a good or a bad visualization is the degree to which it encodes information that the eyes can differentiate and the brain can comprehend. Getting the balance right is much more an art than a science (Few, 2004; Yau, 2013; Knaflic, 2015). In a recent study, Wakeling et al. (2015) employed different visualizations to examine what they define as *graph literacy*, or the user's ability to understand visualizations, by measuring the accuracy, speed, and confidence with which participants were able to answer questions. A key takeaway from their research is that even perfectly optimized visualizations fail to be useful if the audience cannot understand the full story.

The manner in which information is presented visually is paramount to crafting an effective presentation. The more aesthetically pleasing a chart is, the more likely the viewer is to stay engaged and receive the information positively. Using preattentive attributes, or visual elements (such as the use of length versus area to highlight small differences, arrows, line increments, or markers), takes advantage of the brain's ability to process visual cues making comparisons faster (Tuft, 1983; Few, 2004; Yau, 2013; Knaflic, 2015). Furthermore, adding narrative elements such as annotations can transform a good chart into a visual story (McCandless, 2009; Knaflic, 2015).

Seo, Lee, Chung, and Park (2014) investigated user's experiences based on their perceptions and emotions. Specifically, they identified which factors influenced the emotional components involved in decision-making behavior and which factors affected user satisfaction. Through examining and measuring user satisfaction in web page interactions, they identified the most important factors as *usability* and *aesthetics*.

We propose that the same relationships exist between decision makers and the visual aspects of presentations. Aesthetics and perceived usability are directly related to user experiences and satisfaction, (O'Brien and Toms 2009; Seo et al 2014) ultimately influencing decision-making.

As mentioned previously, Wakeling et al. (2015) found that the audience must understand the story behind the data for high-quality visuals to be fully effective aids for decision-making. If even the best visuals can fail to elicit accurate responses, then improved data visualization alone is not the answer; in fact, it is just one piece of the puzzle. Recent research argues that while data visualization is heavily explored and defined, most studies fail to define what storytelling is, creating a gap in understanding

how to create synergy between the two concepts (Segel and Heer 2010; Lee et al. 2015). Data visualization is simply a storytelling medium (Duarte, 2010; Yau, 2013; Knaflic, 2015), which explains why graphic charts and tables alone often fail to convey an intended message. Visualizations with narrative elements are better decision support aids than data charts accompanied by bulleted lists as they more clearly highlight trends and directly identify the “so what” of the chart. We tested this theory with the following hypothesis:

Hypothesis 1:

- A. *Visualization charts with narrative elements are more aesthetically pleasing than charts without them*
- B. *Visualization charts with narrative elements have higher perceived usability than charts without them*

Storytelling

Stories are dynamic. As the most powerful delivery tool for information (Fryer, 2003; Duarte, 2010; Knaflic, 2015) they help audiences to visualize what the author has done or believes. People usually find it easier to understand information integrated into stories than information spelled out in bulleted lists (Gershon & Ward, 2001), which supports Mayer’s *modality principle* of multimedia design which posits that deeper learning occurs when words are presented as spoken narration rather than text (Mayer 2002).

In recent years, there has been a paradigm shift among consumers regarding how they make up their minds (O’Brien and Toms 2009). No longer do they solely consider

what is efficient and effective, rather they make decisions based on how the experiences make them feel (O'Brien and Toms 2009). A story requires the audience to decide how they feel about what happened rather than decide to believe or refute given points and facts presented during a briefing.

The core attributes that constitute engaging experiences include *focused attention*, *perceived usability*, and *aesthetics* (O'Brien and Toms 2009). Focused attention becomes increasingly important and is easily measurable within a decision support context. In Seo et al (2014), the meaning of engagement is limited to felt involvement with use of an application, which they strongly associated with perceived usability and aesthetics in O'Brien and Toms's study. In both studies, engaging experiences elicited more positive emotions in participants. Therefore, we expect the briefing style that is better at keeping a person's attention will be more effective. This idea led us to test the following hypothesis:

Hypothesis 2: *Information presented in a storytelling context will received more focused attention from the audience than a fact-based presentation*

All stories, ranging from myths to fairy tales, are a transformation from tragedy to comedy (Campbell, 1949) explaining how and why life changes (McKee, 1997). They begin with a separation or departure from the status quo, or "inciting incident" which upsets the balance in the protagonist's life (McKee, 1997: 189). The protagonist experiences a call to adventure in order to restore balance, but is met with what McKee describes in his interviews with Fryer, an "uncooperative objective reality" (Fryer, 2003: 6), as she crosses what Campbell (1949) describes the "threshold of adventure." This

metaphorical line separates the known from unknown, introducing uncertainty, risk, and the possibility of failure. Along the way, trials and victories call on the protagonist to “dig deeper, make difficult decisions and take actions despite risks” (Fryer, 2003: 6). The so-called “Hero’s Journey,” illustrated in Figure 2, concludes with a return or “reintegration with society” (Campbell, 1949: 29).

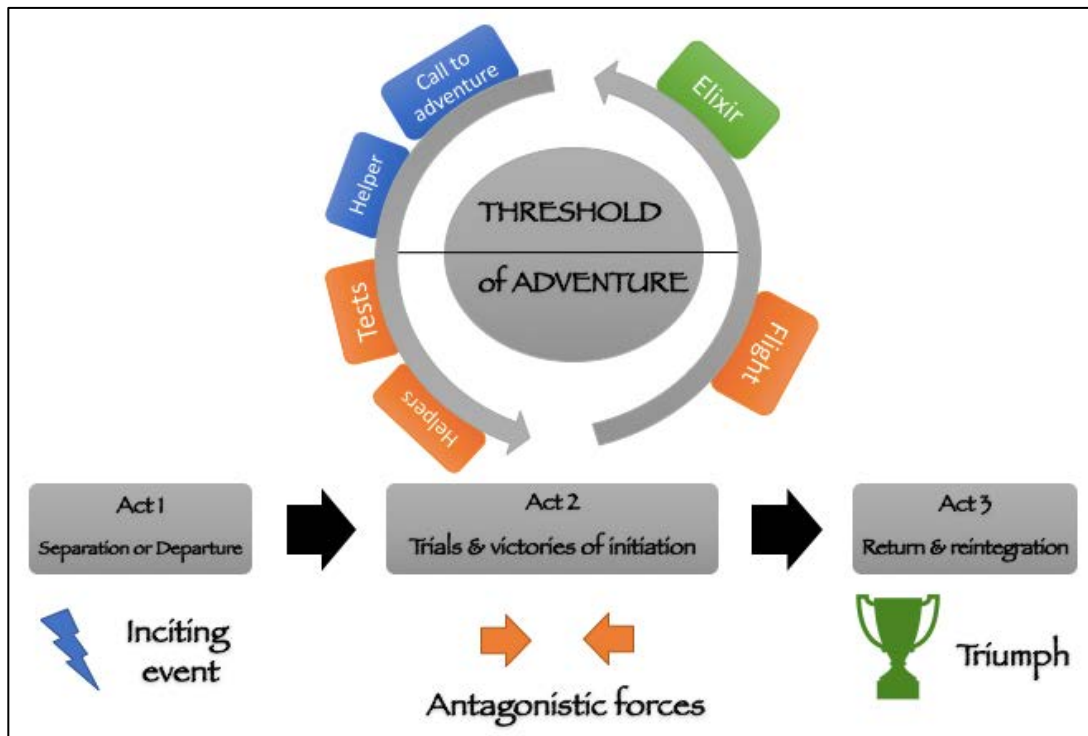


Figure 2: Adaptation of The Hero’s Journey (Campbell, 1949: 210)

The road to triumph or resolution is not perfect; often it is the struggle, conflict, and tension along the way that makes a story worthwhile. While it may be tempting to omit failures and missteps in professional presentations, it is that honesty that lies at the heart of effective storytelling (McKee, 1997; Duarte, 2010; Knaflic, 2015). The Air

Force teaches its decision support managers how to create fact-based briefings that cover only key points and often ignore the story that make the key points worthwhile.

According to Mayer's (2002) *personalization principle*, deeper learning occurs when words are presented in conversational rather than formal style.

In order to identify the story, McKee, in his 2003 interview with Fryer, suggests three questions the storyteller must answer:

1. What does the protagonist want in order to restore balance?
2. What is keeping the protagonist from achieving her desire?
3. How would the protagonist decide to act in order to achieve her desire in the face of these antagonistic forces?

Using those three questions, the military storyteller can begin to translate traditional informational or decision briefings into captivating narratives. A general example applying the three-act narrative structure to an acquisition requirement is depicted in Figure 3.

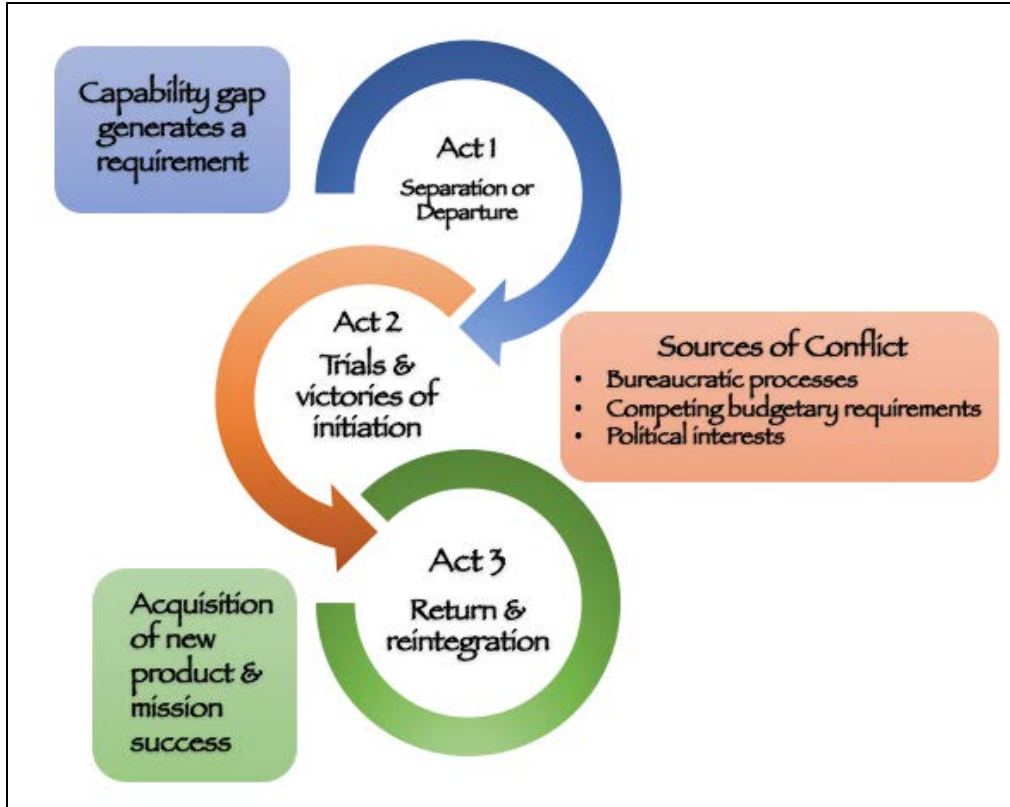


Figure 3: “New Requirement” storytelling example

Considering the basic example in Figure 3, we can examine how the three questions are effective in framing a story. The capability gap acts as an inciting event or call to adventure, requiring the storyteller to answer the first question: “What does the protagonist want to restore balance?” The second question, “What is keeping the protagonist from achieving her desire?” requires the storyteller to highlight possible sources of conflict and identify the help needed to fulfill the capability gap. At this point, the story has crossed the “threshold of adventure” and is defined by the unknown and unfamiliar. Within this realm, the storyteller must identify the sources of conflict and

decide “How to act in order to achieve the desire in the face of antagonistic forces?” to find the answer to question three.

Understanding the audience and the role they should play is an essential challenge for the storyteller. In a decision briefing, the presenter persuades the audience to choose a course of action, often against the status quo. Campbell (1949) states that at the conclusion of a story, the “familiar horizon has been outgrown; the old concepts, ideals, and emotional patterns no longer fit...” (Campbell, 1949:43). A hero, at the completion of her journey, has transformed in some way, never returning to what once was. An effective storyteller knows that people naturally resist change, and to overcome resistance, she must explain the transformation including all of the tests and perils that exist beyond the threshold of adventure. At the completion of the narrative, McKee suggests that a storyteller must ask, “Do I believe this story?” Once the audience feels and accepts those truths, they are often compelled to act; which is the true power of storytelling.

Trust and believability are recognized as important elements to all human relations and interactions. Anytime a presenter relies on storytelling, the audience has to determine if his efforts to engage the audience through an emotional appeal were honest and credible. Even though the Air Force’s core values demand integrity in all we do, that emotional appeal often draws skepticism and can negatively affect the story’s believability. When engaging in efforts to persuade, advertising research is particularly relevant. Educating consumers (decision makers) relies on the premise that they judge the information delivered as useful in their decision deliberations. There must be trust in the narratively conveyed information for the narrative to function effectively as an

information source. According to research conducted by Soh, Reid, and White (2009) trust in advertising is a multidimensional construct with four distinct factors: reliability, usefulness, affect, and willingness to rely on. They established and validated a reliable measure of trust in advertising named the ADTRUST scale. Using their scale, the researchers were able to measure if storytelling detracted from the overall believability of a presentation and ultimately its usefulness through whether or not a decision maker would be willing to rely on it. While the researchers understand the emotional appeal of storytelling can affect individuals in different ways, ultimately; we believe storytelling would not negatively affect the believability of a presentation. Nevertheless, to test the common perception within the Air Force that fact-based briefings are more believable than stories, the following hypotheses were developed to determine the effect storytelling has on believability:

Hypothesis 3:

- A. Information presented in a storytelling context will be less believable than a fact-based briefing*
- B. Decision makers will be less willing to rely on information presented in a storytelling context than a fact-based briefing*

Summary

Current briefing practices within the Air Force Financial Management community do not capitalize on the techniques and attributes that can make a briefing influential. In order to evolve presentation techniques, the military storyteller must understand how humans learn from pictures and words and translate traditional fact-based briefings into

captivating narratives that are influential enough to persuade and move decision makers to action.

III. Methodology

Chapter Overview

This chapter describes the development of the survey utilized to collect data. It will outline the manner in which the survey was developed, the design of the measures used in the survey, as well as outline the specific data collected by the survey. The chapter will also discuss how the data will be analyzed and why those methods were used. Finally, the chapter will explain the participants targeted by the research team as well as the procedures employed to collect the data.

Developing the Measurement Scale

In order to test the research hypotheses, the researchers designed a survey (Appendix A) using measures described in the research conducted by O'Brien and Toms (2009) and Seo et al (2014), and slightly adapted to fit the decision support context. The researchers decided to approach narratives and visuals separately in order to isolate the effect that a narrative element might have on effectiveness and user preference. Only the factor *believability* based on the ADTRUST scale developed by Soh et al (2009) was included in both scales.

Narrative Scale

A narrative is only effective as a decision support tool to the extent that it is perceived to be engaging, usable, and believable. O'Brien and Toms (2009) research created the framework for measuring engagement. Four items from the factor they designated *focused attention* in their Engagement scale were adapted to fit the decision support context. Questions that were initially worded in the context of the activity

described as online shopping were changed to the activity of watching a presentation. For example, item “Q133 I forgot about my immediate surroundings while shopping on this website” was changed to “I forgot about my immediate surroundings while watching the presentation.”

As explained in the previous chapter, both O’Brien and Toms (2009) and Seo et al (2014) identified *aesthetics* and *perceived usability* in their research as the most critical factors involved in creating positive user experiences; however, the context of online web interfaces does not directly translate to narrative presentations. In order to test if storytelling affected the decision makers’ perceived usability of the presentation, the researchers used *willingness to rely on* from the behavior dimension of the ADTRUST scale (Soh et al, 2009).

Visualization Scale

Creating the scale to measure visualizations was more straightforward than creating the scale to measure narrative engagement. The research team argued that a visual is effective to the degree that it is aesthetically pleasing, useful, and believable. Items measuring perceived usability and perceived aesthetics were adapted from Seo et al’s (2014) research. Items were chosen based on their high validity and reliability scores as well as their applicability to our research. Similar to the narrative engagement items, the wording of survey questions was changed slightly to fit the context of the research.

Measurement Methods

The 66 item online survey (Appendix B) assessed preferences related to briefing styles and visualizations. After a notice of informed consent, the survey included a storytelling section, a visualization section and a demographic section. The researchers decided a “within-subjects” or *repeated measures* design of experiment would be an effective method of collecting a suitable amount of data in a short amount of time. Essentially this methodology enables the research team to compare two sets of data from the same group of participants. Several advantages to implementing a *repeated measures* design include: eliminating the concern that any changes between groups could be attributed to something other than the treatment, as well as reducing the need for participants since all participants will contribute to the same sample population.

Storytelling Section

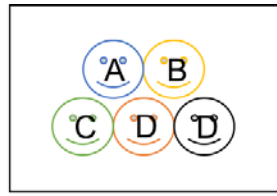
Each participant was shown two different videos, one depicting information presented in a storytelling context and the other using traditional fact-based presentation methods. A potential disadvantage of repeated measures design is that participation in the first treatment can influence performance in the second. In order to counterbalance this potential confounding, we randomized the order in which each participant watched the videos. The SurveyMonkey™ software was able to randomize the order. Each video was embedded as a prerecorded PowerPoint with a voiceover that ran less than five minutes. Narrative scripts that accompanied each video are included in Appendix C and the PowerPoint slides used in the videos can be found in Appendix D

Participants were asked to view the first video and then answers questions about each of the factors. They were then asked to repeat the procedure for a second video.

For the purpose of this report, we have designated video 1 as the storytelling presentation and video 2 as the traditional fact-based briefing. Narrative factors of *focused attention*, *believability*, and *willingness to rely on* were measured utilizing a 5-point Likert scale (1= Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree).

Measurement of Narration Scale

In order to determine if there is a difference between the treatment conditions for the sample populations, the researchers used a repeated measures or paired sample t-Test to compare means. Ultimately, we are testing whether there is a difference in the sample means between the treatment conditions illustrated in Figure 4. For example, the researchers will compare Participant A's focused attention score from treatment 1, to Participant A's focused attention score from treatment 2.



Sample Population A-D

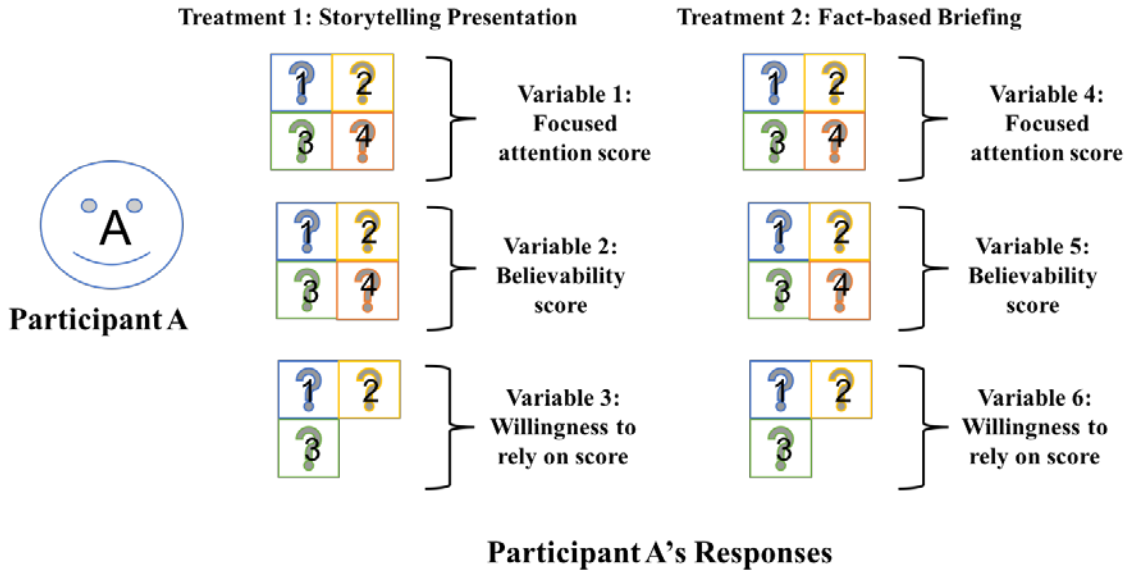


Figure 4. Storytelling survey design

Additionally, the survey specifically asked each participant to judge the memorability, believability and reliability of the fact-based briefing compared to the storytelling presentation. Again, a 5-point Likert scale (1 = Poor, 2 = Fair, 3 = typical, 4 = Very Good, 5 = Excellent) captured each subject's scores. Finally, participants were given the opportunity to provide specific observations or comments about the two briefings through an open response section.

Visualization Section

In the visualization portion of the survey, participants were shown three different charts all presenting the same information in different forms. Each chart was

accompanied by the same bulleted text to provide context. The first visualization (Figure 5) depicted the information in a table accompanied with bulleted text.

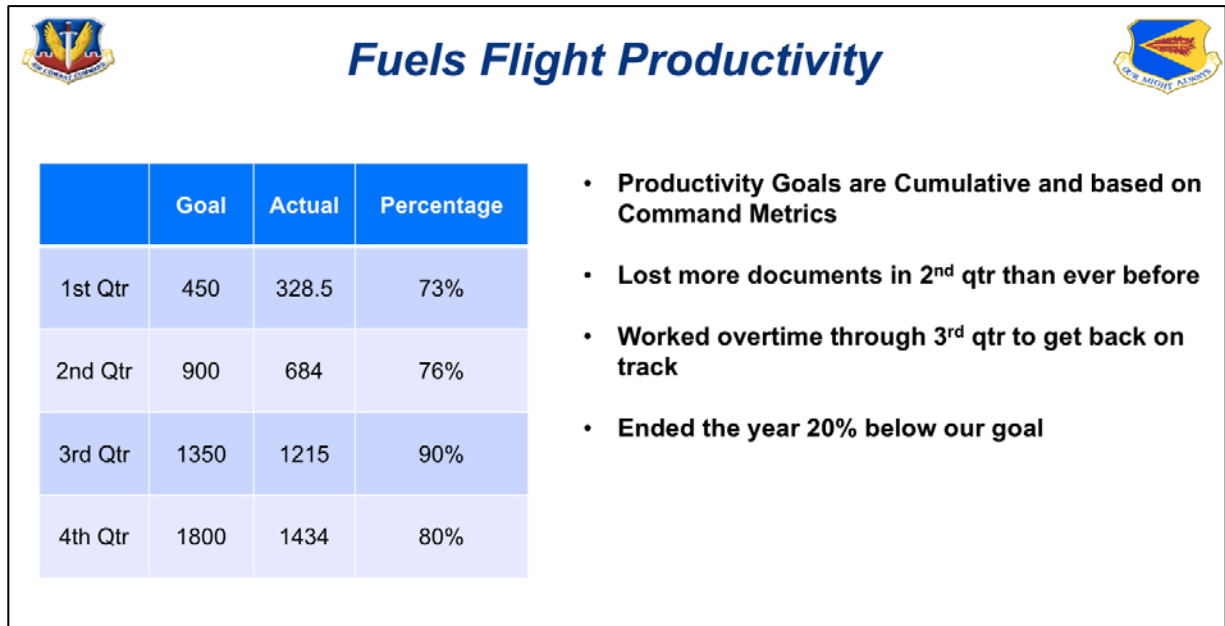


Figure 5. Visualization 1 in measured in survey

The second visualization (Figure 6) depicted the fictitious data in a bar chart accompanied by the same text in the first chart. A bar chart was chosen because it was the suggested chart when the information was entered into Excel. The researchers determined this default chart was the expected level of visualizations currently exhibited in military briefings.

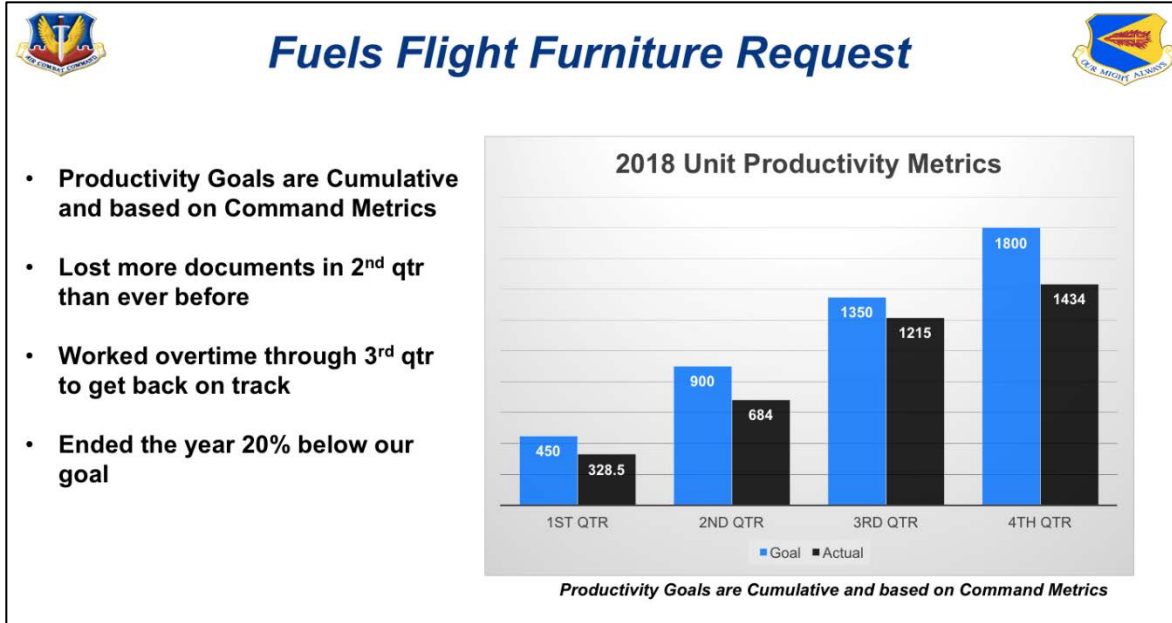


Figure 6. Visualization 2 measured in survey

The third and final visualization used in the survey was a line graph. The additions of preattentive attributes including red indicators and narrative annotations categorize this chart as a *narrative visual*. A line chart was selected because of its ability to clearly show trending productivity over time.

Factors of believability, perceived usability, and aesthetics were measured utilizing the same 5-point Likert scale described for narratives. After rating all three charts, participants were asked to rank visualizations 1-3 in order of preference. They were then given an open response section to indicate what they liked best about their number one choice.

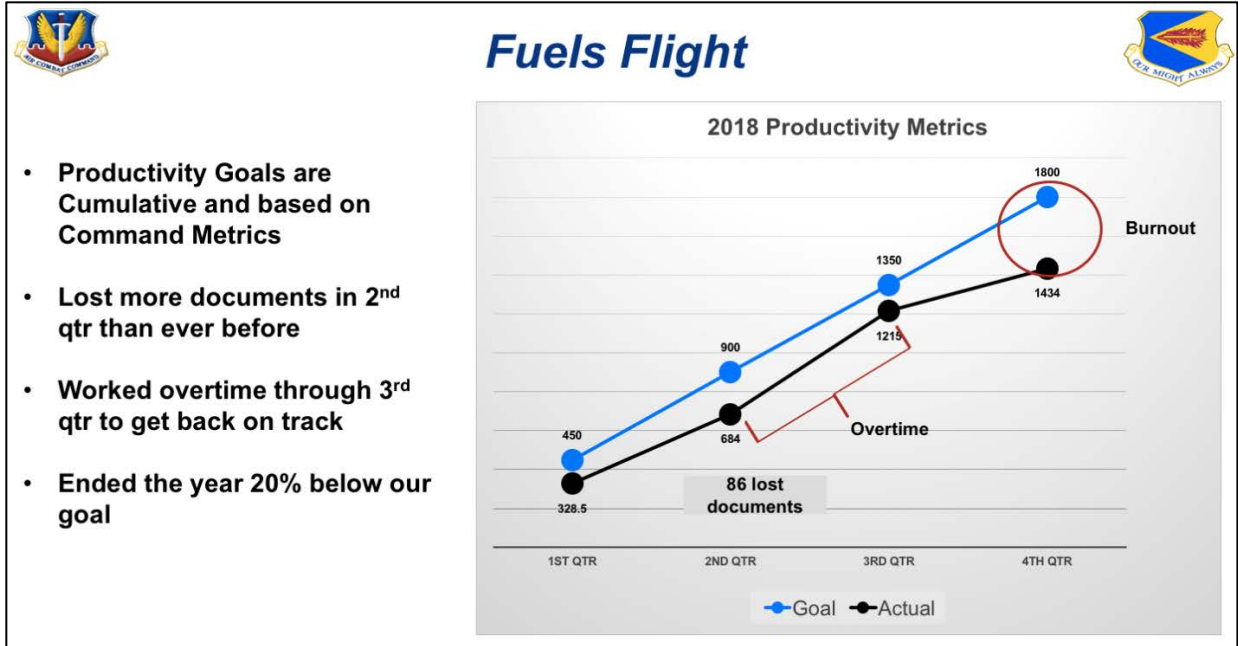


Figure 7. Visualization 3 measured in survey

Measurement of Visualization Scale

As in the storytelling scale, the researchers used paired sample t-Tests to compare means to determine if there was a difference between the treatment conditions for the sample populations. Figure 8 depicts the design of the visualization portion of the survey.

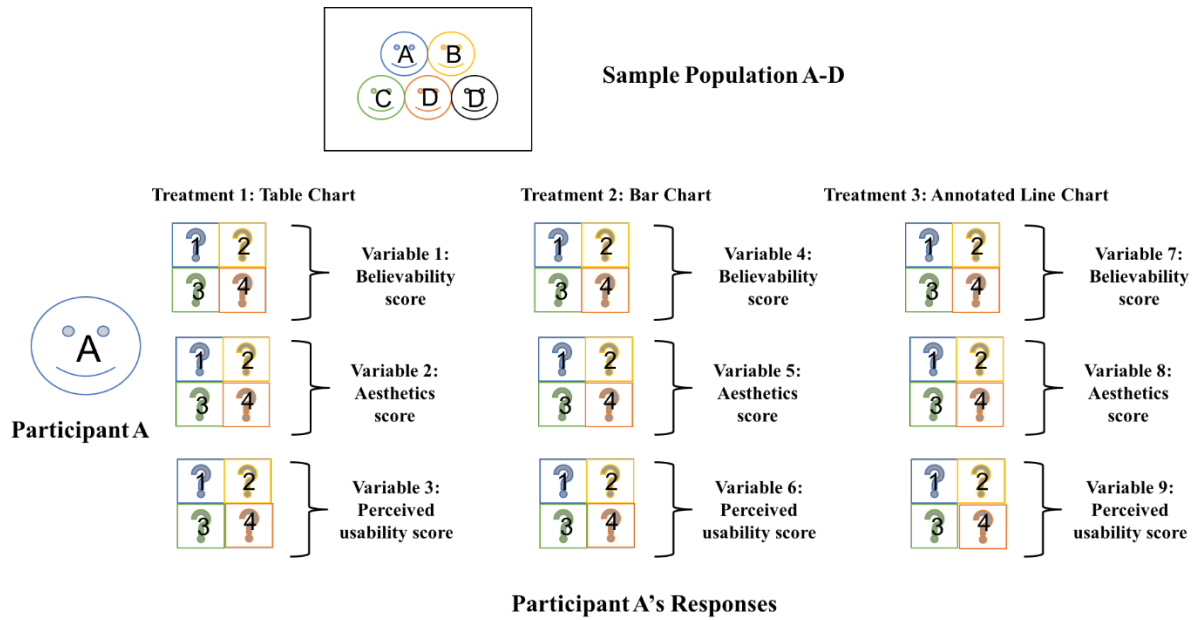


Figure 8. Visualization survey design

Specifically, the researchers compared each chart's variable scores against the others in pairs. For example, the researchers compared Participant A's believability score from treatment 1, to Participant A's focused attention score from treatment 2 and treatment 3. They then compared Participant A's believability score from treatment 2 to the believability score from treatment 3.

Demographics Section

After completion of both sections, the participants were asked to provide the following demographic information about themselves: gender, age, highest education completed, and occupation or career field. Due to limitations within the survey software, each of these questions were open ended as opposed to answers from a drop-down menu.

Participants

Due to time limitations, the researchers confined their search for participants to the Air Force Institute of Technology. The target population consisted of officers, enlisted, and DoD civilian personnel currently assigned to the Air Force Institute of Technology (AFIT) as students or faculty. The target population included military, civilian, and contracted employees varying in age, education, and occupation. No reward or incentive was offered for completion of the survey and all participation was completely voluntary.

Procedure

In order to distribute a survey within AFIT, the researchers were required to obtain approval from the Institutional Review Board (IRB). Because the study did not require respondents to give any personally identifiable information and posed no risk to the participants, the researchers were able to obtain a waiver exempting the study from the full process (Appendix A). Once the exemption was obtained, the survey instrument was distributed to the students and faculty through email.

The online survey instrument was created using a commercial platform called SurveyMonkey™. This platform maximized the ease of data collection as well as mitigated the risk of human error in collecting and recording responses. Additionally, the SurveyMonkey™ platform minimized both time and monetary resources required to distribute, complete, and analyze results. The survey was designed to take no more than

20 minutes and was available through a web link from January 8, 2018 until January 23, 2018.

IV. Analysis and Results

Chapter Overview

This chapter describes the analysis conducted on the dataset collected through the methodology described in Chapter III. First, the researchers identified the sample population represented by the dataset. Next, researchers performed a reliability analysis for each construct and then analyzed descriptive statistics to obtain an overview of the results. Finally, each individual hypothesis test was examined and post-hoc analysis described.

Sample Population

The web-based survey was accessed by 75 people and was completed by 66 equating to an 88% completion rate. Of the nine users who did not complete the entire survey, five of them only completed the storytelling section. The research team was unable to identify why the five participants were unable to complete the entire survey. The majority of the participants (75%) identified as male. While ages of participants ranged from 20 to 69, most participants (46%) fell into the category of 30 and under most often aged 27. Participants were also asked to indicate their highest level of education. It is no surprise the majority of participants (42%) indicated they had completed an undergraduate degree given that AFIT is made up primarily of Graduate students. Education levels of participants ranged from high school graduates to PhD. Breakouts of the demographics collected are shown in Figure 4.

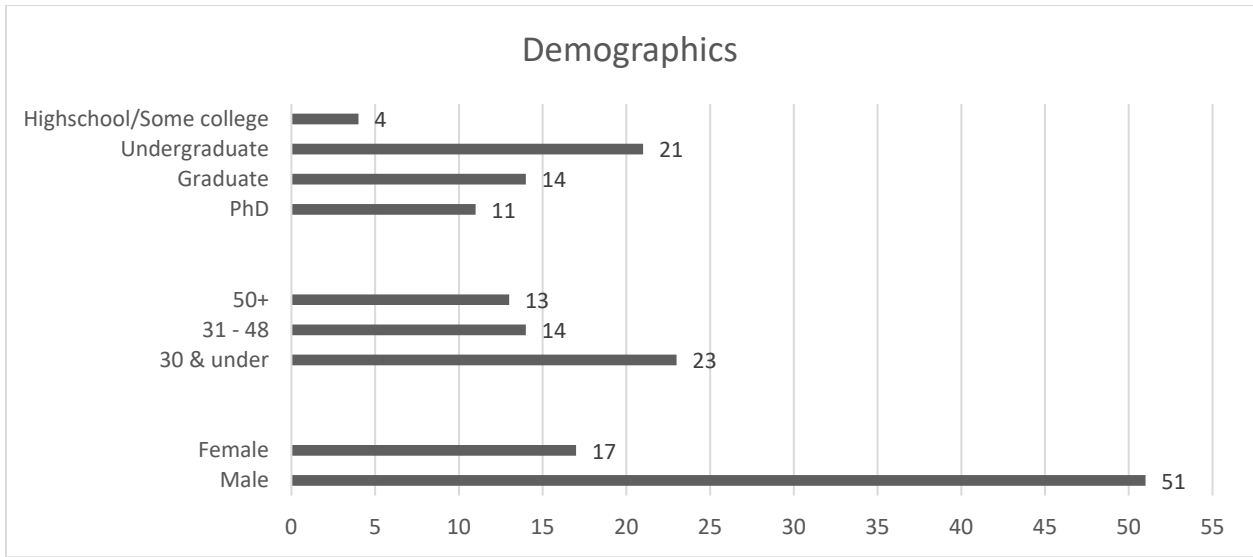


Figure 9: Demographics of survey participants who completed demographics section

Data Preparation

After closing the online survey, the researchers exported all survey results from the SurveyMonkey™ website to Microsoft Excel software. The research team needed aggregate scores for each construct in order to compare results. In order to aggregate each respondents score, the average score for each survey respondent was calculated for each individual construct.

$$\text{Average Focused Attention Score} = \frac{\text{Item 1} + \text{Item 2} + \text{Item 3} + \text{Item 4}}{\text{Total \# of Items in Contrcut}}$$

Item 1-4 = the values of the respondent's answer from the associated scale

Equation 1. Average Focused Attention Score Calculation for Individual Respondents

The data was then exported from the Excel software to SPSS software for analysis. The researchers began by examining the descriptive statistics listed in Table 1 and Table 2 to glean an overview of the results.

Table 1. Visualization Descriptive Statistics

Variable	Mean	Median	Mode	Std Dev	Variance
1. Believability1 (4Qs)	3.58	3.75	4.00	0.72	0.52
2. Usability1 (4Qs)	3.25	3.50	4.00	0.93	0.87
3. Aesthetics1 (4Qs)	2.86	3.00	2.50	0.87	0.76
4. Believability2 (4Qs)	3.69	4.00	4.00	0.67	0.45
5. Usability2 (4Qs)	3.64	4.00	4.00	0.82	0.67
6. Aesthetics2 (4Qs)	3.58	3.75	4.00	0.78	0.61
7. Believability3 (4Qs)	3.69	4.00	4.00	0.70	0.49
8. Usability3 (4Qs)	3.55	4.00	4.00	0.98	0.96
9. Aesthetics3 (4Qs)	3.56	3.75	4.00	0.93	0.87

Numbers indicate which visualization each variable was measuring

A cursory look at the visualization statistics in Table 1 showed that the means of the bar chart (visualization 2) outperformed both the table chart (visualization 1) and the annotated line chart (visualization 3) by a narrow margin. The mean aesthetic score for the bar chart was the worst performing variable at 2.86. The researchers were able to make similar observations about storytelling with the information listed in Table 2. Mean scores were equal for believability in the storytelling presentation as well as the fact-based briefing. At first glance, it seems the storytelling presentation (video 1) outperformed the fact-based briefing in both focused attention and willingness to rely on; however, willingness to rely on also had the largest variance of all variables measured.

Table 2. Storytelling Descriptive Statistics

Variable	Mean	Median	Mode	Std dev	Variance
1. Focused Attention1 (4Qs)	2.42	2.25	2.00	0.92	0.85
2. Believability1 (4Qs)	3.64	4.00	4.00	0.68	0.46
3. Willingness to rely on1 (3Qs)	3.10	3.33	4.00	1.01	1.02
4. Focused Attention2 (4Qs)	1.91	2.00	2.00	0.70	0.50
5. Believability2 (4Qs)	3.64	3.75	4.00	0.68	0.46
6. Willingness to rely on2 (3Qs)	2.12	3.00	4.00	0.86	0.75

Reliability and Correlations

A reliability analysis was performed on each construct in SPSS. The Cronbach's alpha describes how closely related a set of items are as a group by measuring the internal consistency. George and Mallery (2003) recommend values higher than 0.7 to be considered "acceptable." The Cronbach's alpha value was examined for each construct and as displayed in Table 3, all of the individual constructs achieved Cronbach's alpha values greater than 0.8 despite having no more than 4 items per construct.

Researchers also looked at the correlations of all of the variables to determine if any linear relationships were present among the variables. As expected, the highest correlations existed between believability and willingness to rely on, since they were both adapted from the ADTRUST scale. High correlations between aesthetics and perceived usability were also expected based on the results of O'Brien and Toms (2009) study.

Table 3: Visualization Correlations and Reliabilities

Variable	1	2	3	4	5	6	7	8	9
1. Believability1 (4Qs)	(0.92)								
2. Usability1 (4Qs)	0.49**	(0.88)							
3. Aesthetics1 (4Qs)	0.22	0.64**	(0.83)						
4. Believability2 (4Qs)	0.80**	0.32**	0.13	(0.95)					
5. Usability2 (4Qs)	0.30*	0.27*	0.08	0.49**	(0.91)				
6. Aesthetics2 (4Qs)	0.19	0.14	0.10	0.42**	0.81**	(0.89)			
7. Believability3 (4Qs)	0.63**	0.26*	0.02	0.83**	0.60**	0.53**	(0.92)		
8. Usability3 (4Qs)	0.24*	0.18	0.04	0.47**	0.49**	0.37**	0.64**	(0.93)	
9. Aesthetics3 (4Qs)	0.14	0.07	-0.02	0.32**	0.41*	0.36**	0.56**	0.90**	(0.93)

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

1 indicates variable was measured in chart 1 (table)

2 indicates variable was measured in chart 2 (bar chart)

3 indicates variable was measured in chart 3 (narrative chart)

Numbers in parentheses are Cronbach alpha coefficients

Table 4: Storytelling Correlations and Reliabilities

Variable	1	2	3	4	5	6
1. Focused Attention1 (4Qs)	(0.91)					
2. Believability1 (4Qs)	0.20	(0.92)				
3. Willingness to rely on1 (3Qs)	0.41**	0.51**	(0.91)			
4. Focused Attention2 (4Qs)	0.41*	-0.23*	0.02	(0.91)		
5. Believability2 (4Qs)	0.18	0.38**	0.11	0.04	(0.93)	
6. Willingness to rely on2 (3Qs)	0.24*	0.18	0.40**	0.29*	0.48**	(0.89)

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

1 indicates variable was measured in the storytelling presentation

2 indicates variable was measured in the fact-based presentation

Numbers in parentheses are Cronbach alpha coefficients

Hypothesis Tests

Hypothesis Test #1:

H1A: Visualizations with narrative elements are more aesthetically pleasing than charts without

H1B: Visualization charts with narrative elements have higher perceived usability than charts without

To test Hypothesis 1, the researchers utilized a *repeated measures* or ‘paired samples’ t-test because the design was within participants, meaning all participants contributed data for all of the conditions (i.e. all participants were shown all three versions of the visualization charts). The pairs tested and results are listed in Table 5.

Based on the results of the paired samples test, there was no significant difference in believability among the three sets of charts; however, there were differences in perceived usability and aesthetics. Specifically, perceived usability in the table chart (visualization 1) was lower than in the bar chart (visualization 2). Surprisingly, adding narrative indicators to the annotated bar chart (visualization 3) did not improve perceived usability. Both the bar chart (visualization 2) and the annotated line chart (visualization 3) generated significant results when compared to the table chart (visualization 1); however, there was no difference in means of the bar chart (visualization 2) and the annotated line chart (visualization 3). As a result, we reject both Hypothesis 1A and Hypothesis 1B because narrative elements were only added to the third chart.

Table 5: Visualization Paired Samples Test

Matched Pairs	Paired Differences				
	Mean	Std. Deviation	t-score	df	Sig.
Pair 1 Beliveability1 Beliveability2	-.114	.442	-2.165	69	.034
Pair 2 Beliveability1 Beliveability3	-.110	.613	-1.510	69	.136
Pair 3 Beliveability2 Beliveability3	.004	.405	.074	69	.941
Pair 4 Usability1 Usability2	-.389	1.061	-3.069	69	.003
Pair 5 Usability1 Usability3	-.294	1.225	-2.008	69	.049
Pair 6 Usability2 Usability3	.095	.920	.866	69	.389
Pair 7 Aesthetics1 Aesthetics2	-.710	1.113	-5.343	69	.000*
Pair 8 Aesthetics1 Aesthetics3	-.694	1.288	-4.508	69	.000*
Pair 9 Aesthetics2 Aesthetics3_	.017	.976	.143	69	.887

* Indicates significance at the .05 level

Hypothesis Test #2:

H2: Information presented in a storytelling context will receive more focused attention from the audience than a fact-based presentation

Hypothesis test 2 was conducted in the same manner as Hypothesis test 1 using a one-tailed t-test due to the directional hypothesis. Based on the significance indicated in Table 6, the briefing presented in a storytelling context (Attention1) proved to garner more focused attention than the fact-based presentation.

Hypothesis Test #3:

H3A: Information presented in a storytelling context is less believable than a fact-based briefing

H3B: Decision makers are less willing to rely on information presented in a storytelling context than a fact-based briefing

The researchers were also able to test Hypothesis 3 utilizing the same SPSS output. As depicted in Table 6, there was no difference in believability, or the decision maker’s “willingness to rely on” between the two styles of briefings so we failed to reject the null hypothesis (the means of the storytelling briefing are equal to or less than the means of the fact-based briefing) for both parts of hypothesis 3.

Table 6: Storytelling Paired Samples Test

		Paired Differences				
Matched Pairs		Mean	Std. Deviation	t score	df	Sig.
Pair 1	Attention1 & Attention2	.514	.899	4.955	74	.000*
Pair 2	Believability1 & Believability2	.000	.753	.000	74	1.000
Pair 3	Willingness1 & Willingness2	-.018	1.038	-.148	74	.883

* Indicates significance at the .05 level

Additional Findings

While there was no statistical significance between the means of the bar chart (visualization 2) and the annotated line chart (visualization 3), there were differences in the participant’s ranking. When asked to rank the three charts, almost 57% of participants selected the annotated line chart (visualization 3) as their number one choice. Of the 39 who selected chart 3, 14 were females, which equates to 82% of all females surveyed. Only 11 participants (16%) ranked the table chart (visualization 1) as their number 1 preference, and 19 (28%) selected the bar chart (visualization 2). After

reviewing these descriptive findings, researchers conducted a correlation analysis on each chart's measured variables and the user's preferences. All three factors of the table chart (visualization 1) (believability, usability, and aesthetics) were negatively correlated to "number one preference" with Pearson R values of -.134, -.112 and -.292 respectively. While positive correlations exist between "number one preference" and all three aspects of the bar chart (visualization 2), the largest correlations (.479 and .449) were found with the usability and aesthetics of the annotated line chart (visualization 3). This relationship indicates that the usability and aesthetics of the annotated line chart (visualization 3) were the most influential variables in relationship to the participant's number one preference. Usability and aesthetics of the annotated line chart (visualization 3) also had the largest negative correlation with the lowest ranked preference (-.602, and -.598).

Table 7: Visualization Preference Correlation Table

Variables		Visualization #1 Preference	Visualization #2 Preference	Visualization #3 Preference
Beliveability1	Pearson Correlation	-.134	.021	.101
	Sig. (2-tailed)	.273	.864	.407
	N	69	69	69
Usability1	Pearson Correlation	-.112	.057	.053
	Sig. (2-tailed)	.358	.643	.666
	N	69	69	69
Aesthetics1	Pearson Correlation	-.292*	.049	.219
	Sig. (2-tailed)	.015	.689	.071
	N	69	69	69
Beliveability2	Pearson Correlation	.118	.050	-.146
	Sig. (2-tailed)	.333	.684	.232
	N	69	69	69
Usability2	Pearson Correlation	.386**	-.170	-.203
	Sig. (2-tailed)	.001	.163	.095
	N	69	69	69
Aesthetics2	Pearson Correlation	.230	-.059	-.156
	Sig. (2-tailed)	.057	.632	.201
	N	69	69	69
Beliveability3	Pearson Correlation	.283*	.054	-.296*
	Sig. (2-tailed)	.018	.660	.014
	N	69	69	69
Usability3	Pearson Correlation	.479**	.216	-.602**
	Sig. (2-tailed)	.000	.074	.000
	N	69	69	69
Aesthetics3	Pearson Correlation	.449**	.244*	-.598**
	Sig. (2-tailed)	.000	.044	.000
	N	69	69	69

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

V. Conclusions and Recommendations

Chapter Overview

This chapter will answer the study's research question as well as identify key takeaways from the research effort. Specific findings as well as the research team's interpretations and conclusions are also included in the chapter.

Research Findings

Research Question: *Does information presented in a narrative context improve presentations as decision support tools?*

Visualization Findings

Although the researchers were unable to determine that adding narrative elements to visual charts positively affected the perceived aesthetics, usability, or believability of a visualization, the findings did support the notion that tables are the least efficient visualizations. Both the bar chart (visualization 2) and annotated line chart (visualization 3) outperformed the table chart (visualization 1) in every measured category. Even though the difference in means of the bar chart (visualization 2) and the annotated line chart (visualization 3) lacked significance, when asked to rank all three charts, 56.5% of participants selected the annotated bar chart (visualization 3) as their number one preference. The researchers were able to make some inferences from participant's feedback. Specifically, the participants commented that the annotated chart (visualization 3) "visually told the story" "highlighted the personal mission impacts" and was the "easiest and quickly comprehend".

Storytelling Findings

The researchers were also able to determine storytelling positively affected the effectiveness of a decision support brief by increasing the audience's focused attention. We were also able to defend the use of storytelling against the assumption that storytelling detracts from the credibility of a presentation. When asked to rate the videos independently of each other there was no significant difference in the recorded means of believability and willingness to rely. Additionally, when asked to compare the memorability of the fact-based briefing to the storytelling briefing, on average, participants scored the fact-based briefing a 2 or "fair". Interestingly, even in negative feedback about the storytelling briefing, the participants were able to recall specific details indicating that whether they preferred the presentation or not, they did remember it.

Conclusions of Research

Officers within the Secretary of the Air Force's office of Financial Management and Budget, the Operations branch (SAF/FMBO) widely known as the *Engine Room*, are storytellers for the Air Force financial management community. A large part of these officers' responsibility is interpreting the results of Major Command (MAJCOM) analysts, combining budgetary information from every reporting unit falling under their purview, and creating a story explaining the Air Force's situation. Much more than "Power Point Rangers" quibbling over the appropriate shade of blue, the briefing support they provide becomes strategic Air Force communications used to support and defend budgetary requests. SAF/FMBO is not the only office in which airmen simultaneously fill the role as of analyst, scripter, editor, and--at the lowest level of the Air Force

corporate structure--presenters. Due to time constraints, it forces them to create what Knafllic (2015) refers to as a “Slideuments” or single documents that attempt to combine the requirements of live presentation and written communication. These documents are dangerous because the author loses control of the intended message and they fail both at being a clear written report and at being an effective presentation. Often the result is what is known as “Death by PowerPoint.”

While previous studies have examined the effectiveness of using business analytics to drive decision-making (Brynjolfsson, Hitt, & Kim, 2011 & Moore, 2017) none have simultaneously examined the effect of storytelling in military communication. Comments and feedback from the presentation indicated that adding a storytelling element touched on the human element of the fictional situation rather than numbers and requirements. Invoking the human element “put a face on the need” and arguably created an additional sense of duty to act. The criticism of the storytelling presentation called into question credibility and ethics of using a story to persuade. One participant commented that the presentation seemed “pandering” and others felt like the fictitious SSgt was being used. The researchers believe those suspicions could be partially due to the manner in which the presentations were shown. A prerecorded narrated PowerPoint loses the human contact and specific nuances necessary to express the level of sincerity that only face-to-face interactions can evoke. Additionally, each visualization included the same bulleted text ensuring the same information could be clearly understood. The overwhelmingly positive feedback for the annotated line chart’s ability to “easily compare and contrast” (visualization 3) hints that the bulleted text was not needed. Garnering additional support for the use of narrative attributes in visualizations.

In essence, decision support briefings are a call to action, whether it be for resourcing requirements or implementing policy. If storytelling can enhance the decision maker's focused attention, then the presentation is more powerful and ultimately more effective.

Recommendations for Future Research

The researchers believe limitations due to the manner in which the data was collected plays a large role in the outcome of the study. Particularly, the use of a prerecorded video limits the audience's involvement in the presentation. Future research could be conducted to determine how much physical presence impacts focused attention, and whether the speaker is able to make stronger connections with the audience possibly affecting the presentation's believability, and the audience's willingness to rely on the presentation. This research would be extremely relevant to the Air Force given so much crucial training is completed via computer-based training. Additional research could also support recommended changes in the way formal school houses train financial management officers to speak and present information in decision support contexts. Even if every financial manager cannot become a world-class storyteller, understanding the elements that create a story is easily translated to drafting and presenting information.

Appendix A. IRB Survey Approval



DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE OHIO

19 Dec 2017

MEMORANDUM FOR Dr. David Fass (AFIT/ENV)

FROM: Brett J. Borghetti, Ph.D.
AFIT IRB Exempt Determination Official
2950 Hobson Way
Wright-Patterson AFB, OH 45433-7765

SUBJECT: Determination on exemption request from human experimentation requirements (32 CFR 219, DoDD 3216.2 and AFI 40-402) for "Decision Support Communication Techniques Questionnaire", dated 28 Nov 2017.

1. Your request was for exemption based on the Code of Federal Regulations, title 32, part 219, section 101, paragraph (b) (2) Research activities that involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior unless: (i) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) Any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.
2. Your study **qualifies for this exemption** because you are not collecting identifying information or answers to questions which, if the responses were disclosed, could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation. If you make any changes to the list of questions which could result in collecting information leading to the possible identification of participants, please consult with me for a review of the revised questions before continuing your interaction with human subjects.
3. Note that since you intend to survey up to 64 participants **your survey cannot be approved locally at AFIT** (which has an local approval authority limit of 20 participants). Please coordinate with the AFIT/ENR human subjects team to determine how obtain approval to conduct your survey with more than 20 participants.
4. This determination pertains only to the Federal, Department of Defense, and Air Force regulations that govern the use of human subjects in research. This determination is only for the research outlined in the exemption request letter.

12/19/2017

X

Signed by: BORGHETTI,BRETT.J.1009082820
BRETT J. BORGHETTI, Ph.D.
AFIT Exempt Determination Official

Appendix B. Online Survey Instrument

Attachment 1: Informed Consent

Decision Support Communication Design
AFIT Thesis Research

Introductory Statement:

You have been asked to participate in a research study conducted by researchers from the Air Force Institute of Technology (AFIT), Graduate School of Engineering and Management, Department of Systems Engineering and Management. The main objective of this project is to measure the effect of storytelling in decision support communications

The results of this study may be included in research publications. You should read the following information below before continuing with the survey:

IAW AFI 38-501, para 2.2, your participation in this survey is encouraged but voluntary. Strict confidentiality concerning any identifiers of individual survey respondents is maintained and data collection is anonymous. Your feedback is critical to academic program improvement and greatly appreciated.

This survey is voluntary. You have the right not to answer any question, and to stop the survey at any time or for any reason. We expect that the survey will take 20-25 minutes.

There is no compensation for completing this survey.

Your responses shall remain confidential. All survey results will be presented at an aggregate level.

All research will be completed by March 2018. Survey responses will be kept for one year.

Please contact ~~Capt~~ Cotton with any questions or concerns at Tarah.Cotton@afit.edu.

Proceeding to the questions will be viewed as your informed consent.

Attachment 2: Storytelling Section

Section 1: Storytelling

1. Please watch the following video. (Video is a narrated version of storytelling PowerPoint)
Considering the briefing presented in this video (video 1), how much do you agree with the following statements?

Scale: 1-Strongly Disagree, 2-Disagree, 3- Neither 4-Agree, 5-Strongly Agree

Survey Item	Focused Attention	Reliability	Willingness to rely on
I forgot about my immediate surroundings while watching the presentation	X		
I was so involved in the presentation that I ignore everything around me	X		
I lost myself in the presentation	X		
I was so involved in the presentation that I lost track of time	X		
Information in the presentation was honest		X	
Information in the presentation was truthful		X	
Information in the presentation was credible		X	
Information in the presentation was reliable		X	
I am willing to rely on this presentation to make a decision			X
I am willing to make important decisions based on presentations similar to the one in this video			X
I am willing to consider presentations similar to this video when making decisions			X

2. Please watch the following video. (Video is a narrated version of fact-based PowerPoint) Considering the briefing presented in this video (video 2), how much do you agree with the following statements?

Scale: 1-Strongly Disagree, 2-Disagree, 3- Neither agree nor disagree 4-Agree, 5-Strongly Agree

Survey Item	Focused Attention	Believability	Willingness to rely on
I forgot about my immediate surroundings while watching the presentation	X		
I was so involved in the presentation that I ignore everything around me	X		
I lost myself in the presentation	X		
I was so involved in the presentation that I lost track of time	X		
Information in the presentation was honest		X	
Information in the presentation was truthful		X	
Information in the presentation was credible		X	
Information in the presentation was reliable		X	
I am willing to rely on this presentation to make a decision			X
I am willing to make important decisions based on presentations similar to the one in this video			X
I am willing to consider presentations similar to this video when making decisions			X

3. Compared to the video about SSgt Xenia (video 1), how would you rate the following attributes of the other video (video 2)?

Scale: 1-Poor, 2-Fair, 3-Typical, 4-Very Good, 5-Excellent

Survey Item	Focused Attention	Believability	Reliability
Memorability	X		
Believability		X	
Reliability			X

4. Are there any specific observations or comments you would like to share about either of the two briefings?

Attachment 3: Data Visualization & Demographic Sections

Section 2: Data visualization

Figure 1



Fuels Flight Productivity



	Goal	Actual	Percentage
1st Qtr	450	328.5	73%
2nd Qtr	900	684	76%
3rd Qtr	1350	1215	90%
4th Qtr	1800	1434	80%

- Productivity Goals are Cumulative and based on Command Metrics
- Lost more documents in 2nd qtr than ever before
- Worked overtime through 3rd qtr to get back on track
- Ended the year 20% below our goal

5. Considering Figure 1, indicate how much you agree with the following statements:

Scale: 1-Strongly Disagree, 2-Disagree, 3- Neither agree nor disagree 4-Agree, 5-Strongly Agree

Survey Item	Believability	Perceived Usability	Aesthetics
Information in the presentation was honest	X		
Information in the presentation was truthful	X		
Information in the presentation was credible	X		
Information in the presentation was reliable	X		
It is simple to use this slide		X	
I will be able to effectively make decisions using this slide		X	
I feel comfortable using this slide		X	
It is easy to learn from this slide		X	
Overall I am satisfied with the appearance of this slide			X
I feel the design of the slide is pleasant			X
I feel the design of the slide is clear			X
I felt the design of the slide is sophisticated			X

Figure 2



Fuels Flight Furniture Request



- Productivity Goals are Cumulative and based on Command Metrics
- Lost more documents in 2nd qtr than ever before
- Worked overtime through 3rd qtr to get back on track
- Ended the year 20% below our goal



Productivity Goals are Cumulative and based on Command Metrics

6. Considering Figure 2, indicate how much you agree with the following statements:
Scale: 1-Strongly Disagree, 2-Disagree, 3- Neither agree nor disagree 4-Agree, 5-Strongly Agree

Survey Item	Believability	Perceived Usability	Aesthetics
Information in the presentation was honest	X		
Information in the presentation was truthful	X		
Information in the presentation was credible	X		
Information in the presentation was reliable	X		
It is simple to use this slide		X	
I will be able to effectively make decisions using this slide		X	
I feel comfortable using this slide		X	
It is easy to learn from this slide		X	
Overall I am satisfied with the appearance of this slide			X
I feel the design of the slide is pleasant			X
I feel the design of the slide is clear			X
I feel the design of the slide is sophisticated			X

Figure 3



Fuels Flight



- Productivity Goals are Cumulative and based on Command Metrics
- Lost more documents in 2nd qtr than ever before
- Worked overtime through 3rd qtr to get back on track
- Ended the year 20% below our goal



7. Considering Figure 3, indicate how much you agree with the following statements:
Scale: 1-Strongly Disagree, 2-Disagree, 3- Neither agree nor disagree 4-Agree, 5-Strongly Agree

Survey Item	Believability	Perceived Usability	Aesthetics
Information in the presentation was honest	X		
Information in the presentation was truthful	X		
Information in the presentation was credible	X		
Information in the presentation was reliable	X		
It is simple to use this slide		X	
I will be able to effectively make decisions using this slide		X	
I feel comfortable using this slide		X	
It is easy to learn from this slide		X	
Overall I am satisfied with the appearance of this slide			X
I feel the design of the slide is pleasant			X
I feel the design of the slide is clear			X
I fell the design of the slide is sophisticated			X

8. Please rank figures 1-3 in order of preference (participants may only select 1 ranking for each figure from a drop-down menu and cannot use the same ranking twice).

Figure 1 [1,2,4]

Figure 2 [1,2,3]

Figure 3 [1,2,3]

9. Please indicate what you liked best about your number one choice.

Section 3: Demographics:

10. Please answer the following questions about yourself

Gender:

Age:

Highest education completed:

Occupation/Career field:

Appendix C. Narrative Scripts

Attachment 1: Video 1 (Storytelling) Script

SLIDE 1

Good morning,
I am Captain Jones from the Mission Support Group here to brief you on our request for funding for the Logistics Readiness Squadron's Fuels Flight.

SLIDE 2

In Fiscal Year 18, the mission support group worked hard to take care of its mission and to do so, we had to find ways to fund requirements that were underfunded in our annual budget. Through contract reviews and reductions to travel and supply purchases we were able to stretch every dollar to maximize our capabilities. As you can see from the chart, all unfunded mission requirements have been funded; however, in focusing on mission requirements, some people requirements often get ignored. What we are requesting is \$129K to take care of our fuels flight people who are working hard to accomplish the mission, despite substandard working conditions.

SLIDE 3

The fuels flight is filled with truly exceptional Airmen. One particular Airman is SSgt Dayton Xenia, team leader of the scheduling and reporting flight. SSgt Xenia came to our team at the end of 2016 and truly hit the ground running. He revamped our training program and streamlined our scheduling processes. In 2017, his leadership was recognized through 4 different major command quarterly award winners and 2 annual awards. During the wing's unit inspection, he was coined for the actions and innovations he led to mitigate possible mission failures. The rapid scheduling program he brought to the fuels flight has been benchmarked by higher headquarters and will be mandated to all wings by the Installation Management Support Center.

After a year and half of hard work improving the flight, SSgt Xenia did not slow down. This year, when our mission grew due to the increased wing training mission and our manpower increased from 40 to 55 personnel, SSgt Xenia led a tiger team to best reorganize the office. You have to understand that our office has been around a long time and it shows! The modular configuration, purchased in 2000, only seats 45 Airmen. Due to sequestration and budget concerns, updates and replacement furniture has been delayed. Instead of complaining, SSgt Xenia worked with DRMO to get additional desks. Because there are not enough desks for every Airmen, he created a shared workspace for junior Airmen assigned to evening shifts.

SLIDE 4

Despite our efforts to reorganize, the productivity in our flight has seen some sharp decreases. Last year we lead the command in productivity metrics however, this year we haven't been able to achieve 90% of our goals. Imagine walking into work every day and waiting to use a computer or sit at your desk. That's exactly the challenge SSgt Xenia was faced with. Although he tries to make the most of his time, he needs a workspace to review reports and approve scheduling requests. In the second quarter alone this year we had to rework 86 reports which is 30% of our total submissions for the quarter. A flight filled with pride will not just allow the mission to slow because of

their mistakes, the reporting and scheduling flight, led by SSgt Xenia worked weekends to correct their mistakes and complete additional training, but all of those extra hours isn't sustainable. By the fourth quarter our Airmen were burnt out and there seemed to be no end in sight.

SLIDE 5

All of the additional trainings, extra weekends, and innovation was led by Airmen like SSgt Xenia, who believed in our mission and exemplify our core values of service and excellence. What we forgot was SSgt Xenia is more than the Reporting and Scheduling team lead. He is a single father from Dallas Texas who joined the Air Force because he believes in service, but even he has his limits. Every morning at 0700 SSgt Xenia is at the CDC dropping his son off. Because he has to work late, at 5pm his son is picked up and taken from daycare to an after-hours group home where they feed him dinner. At 7pm SSgt Xenia finally leaves work to pick up his son, takes him home only to put him to bed by 8. How much are we asking of our people, when we set them up for failure by rejecting to supply them with the basic resources needed to complete their jobs like functioning furniture and office equipment? \$129K buys more than new furniture, its supporting our SSgt Xenia's and his family—our Air Force family as they strive every day to accomplish the impossible.

Attachment 2: Video 2 (Fact-based) Script

SLIDE 1

Good morning,
I am Captain Jones E from the Mission Support Group here to brief you on our request for funding for the Logistics Readiness Squadron's Fuels Flight.

SLIDE 2

Today I will describe the budget shortfalls faced by the Mission Support Group and what they have done to correct them; give you information about the fuels flight and background about their current situation; and finally outline their request for furniture in detail.

SLIDE 3

In Fiscal Year 18, the mission support group encountered several budgetary shortfalls; some of which we were able to correct internally and others we were able to garner funds from higher headquarters. We were able to scrub over \$1M to cover our shortfalls through a very thorough contract review, reduction of Temporary Duty travel, and supply purchases. Advocating and justifying new requirements to the headquarters staff resulted in additional funding of \$317.8K.

As you can see from the chart all of our shortfalls have been funded except for a request for furniture for the fuels flight.

SLIDE 4

The fuels flight is filled with truly exceptional Airmen. In 2017, they were recognized as superior performers through all measured metric areas of performance. During the Wing Inspection, the fuels flight was specifically highlighted for efficient processes and corrected action plans. Their rapid scheduling program was benchmarked by higher headquarters and will be mandated to all wings by the Installation Management Support Center.

Unfortunately, this stellar group of Airmen work in a sub-par office environment on a daily basis. Due to this year's increased training mission, the flight has grown from 40-55 with 53 currently assigned. The modular configuration, purchased in 2000, only seats 45 Airmen. Due to sequestration and budget concerns, updates and replacement furniture has been delayed. These Airmen have salvaged old furniture from DRMO to replace broken and hazardous pieces. Because there are not enough desks for every Airmen, some junior, swing shift personnel must share desks.

SLIDE 5

New furniture for this office would maximize the space available in the Fuels Flight Office and seat 65 people. The request for \$129K includes carpet, chairs, and cubicles. Since last year the fuels flight has not been able to meet or exceed productivity metrics. On average, the productivity has fallen 20% since last year, with the leading cause for missed points being reworks due to lost or incomplete documentation. Despite their efforts to streamline processes and correct deficiencies, the flight constantly has to

work later hours to correct rejected documents reducing the morale of what should be a high performing team.

SLIDE 6

The Mission Support Group has been diligent resource managers, making the most out of every dollar available. We request \$129K to fund new furniture to replace the broken/mismatch modular units currently being used in the Fuels Flight.

Updating the furniture for this flight would allow all Airmen to have their own desks, potentially increase productivity back to prior year levels, and improve unit morale and sense of pride. Thank You.

Appendix D. Storytelling PowerPoint Slides

Attachment 1: Video 1 (Storytelling) PowerPoint Slides

Slide 1

Headquarters 355th Fighter Wing

**MSG Unfunded Request:
Fuels Flight Furniture**



This Briefing is:
UNCLASSIFIED



Slide 2





FY18 Shortfalls



Status	Group	Squadron	Item Description	Funded (\$K)	Unfunded Amount (\$K)	Notes
G	MSG	All	Civilian Pay	\$2,096	\$130	HQ only funded 86%
G	MSG	CES	Utilities shortfall	\$4,476.5	\$179	4% increase from estimate
G	MSG	CES	Work Order Supply	\$750	\$750	50% funded at initial distribution
G	MSG	CS	Cable/Satellite Television	\$0	\$31	Unfunded in FY18 Plan/ HQ Funded
G	MSG	SFS	Security Camera Maintenance	\$0	\$36.8	New requirement. Funded by HQ
G	MSG	CS	TACAN Fiber	\$0	\$250	New requirement. Funded by HQ
R	MSG	LRS	Furniture	\$0	\$129	Unfunded


Taken care of all mission requirements.. *But not our people*








SSgt Dayton Xenia

- His team boasts winners of 4 MAJCOM quarterly awards and 2 annual award winners
- Coined by Inspector General during wing inspection
- Streamlined scheduling process saving time and money for the wing recognized by higher headquarters



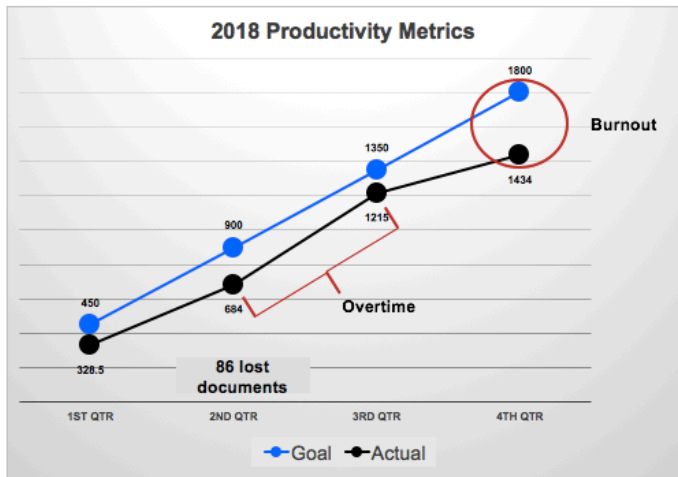
Scheduling and Reporting Team Lead






Fuels Flight

- Haven't reached 90% of goal
- 2nd qtr alone lost/reworked 86 reports
- Hard push in 3rd qtr to fill gap
- Rework and overtime isn't sustainable



Quarter	Goal	Actual
1ST QTR	450	328.5
2ND QTR	900	684
3RD QTR	1350	1215
4TH QTR	1800	1434

Productivity Goals are Cumulative and based on Command Metrics





Fuels Flight



- **More than our Reporting and Scheduling team lead**
- **After two years of long hours and hard work, SSgt Xenia has decided not to re-enlist**
- **If we can take care of our SSgt Xenia's we can take care of the mission**



2/12/18

Attachment 2: Video 2 (Fact-based) PowerPoint Slides

Slide 1

Headquarters 355th Fighter Wing


***MSG Unfunded Request:
Fuels Flight Furniture***




This Briefing is:
UNCLASSIFIED




Slide 2




Overview




- **Budget Shortfalls**
- **Fuels Flight Background**
- **Furniture Request**
- **Summary**



Slide 3




FY18 Shortfalls




Status	Group	Squadron	Item Description	Funded (\$K)	Unfunded Amount (\$K)	Notes
G	MSG	All	Civilian Pay	\$2,096	\$130	HQ only funded 86%
G	MSG	CES	Utilities shortfall	\$4,476.5	\$179	4% increase from estimate
G	MSG	CES	Work Order Supply	\$750	\$750	50% funded at initial distribution
G	MSG	CS	Cable/Satellite Television	\$0	\$31	Unfunded in FY18 Plan/ HQ Funded
G	MSG	SFS	Security Camera Maintenance	\$0	\$36.8	New requirement. Funded by HQ
G	MSG	CS	TACAN Fiber	\$0	\$250	New requirement. Funded by HQ
R	MSG	LRS	Furniture	\$0	\$129	Unfunded


- Scrubbed all contracts, reduced travel, and supply to cover shortfalls
- Civilian pay, utilities, and work order supply shortfalls were all funded internally
- Furniture for Fuels Flight is only remaining unfunded requirement



Slide 4



Fuels Flight





Outstanding Airmen!

- Recognized by HQ for superior metric performance
- Highlighted by Inspector General's team during wing inspection
- Rapid scheduling program benchmarked by Headquarters and will be mandated to all wings by the Installation Management Support Center


Sub-par Working Conditions

- Increased manpower due to new wing training mission 40 – 55 (currently 53 assigned)
- Current modular configuration only seats 45
- Original furniture purchased 18 years ago
 - Delayed replacement in 2012 due to sequestration
 - Salvaged used furniture from DRMO to replace broken and worn pieces
- Some swing shift personnel utilize a shared workspace



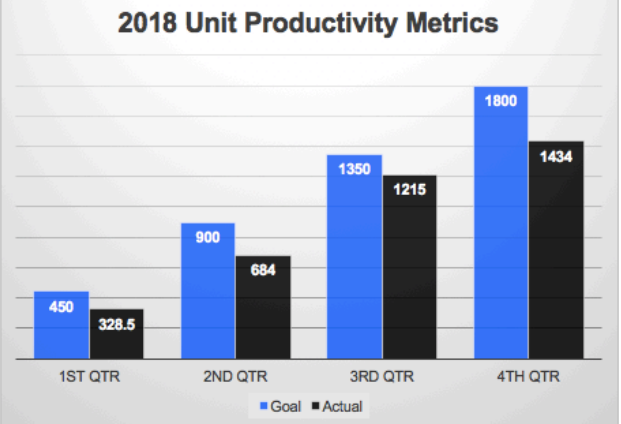


Fuels Flight Furniture Request




- Maximize space and seat 65 people
 - Request includes carpet, chairs, and cubicles
- Increase productivity
 - Top reasons for missed metric points: rework due to missing documentation
- Improve unit morale
 - Often required to work late/weekends to correct rejected documents


2018 Unit Productivity Metrics




Quarter	Goal	Actual
1ST QTR	450	328.5
2ND QTR	900	684
3RD QTR	1350	1215
4TH QTR	1800	1434

Productivity Goals are Cumulative and based on Command Metrics






Summary



- **MSG has maximized all funding available**
- **Request \$129K to fund furniture for the Fuels Flight**
- **Outdated furniture is negatively impacting productivity and morale**



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14. ABSTRACT In a military environment where the demand to deliver analytically rigorous, actionable knowledge has outpaced the skills and tools to effectively communicate information, the occasional "death by PowerPoint" seems inevitable. As data collection and analysis has evolved, communication and presentation skills have stagnated, neglecting opportunities to create powerful presentations by capitalizing on the fusion of human connection and data visualization to persuade and influence. The true problem is not PowerPoint, but the standardization of presentation techniques that eventually lead to misuse. Training decision support personnel in the art of storytelling with data, that is to transform data into visualized narratives, is essential to evolving antiquated briefing practices.					
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