JSC Search System Usability Case Study

Version 1.0: February 3, 2014

Presented by: David Meza, Sarah Berndt

JSC Search SUS

JSC Search System Usability Case Study

Motivation

The advanced nature of "search" has facilitated the movement from keyword match to the delivery of every conceivable information topic from career, commerce, entertainment, learning… the list is infinite. At NASA Johnson Space Center (JSC) the Search interface is an important means of knowledge transfer. By indexing multiple sources between directorates and organizations, the system's potential is culture changing in that through search, knowledge of the unique accomplishments in engineering and science can be seamlessly passed between generations.

This paper reports the findings of an initial survey, the first of a four part study to help determine user sentiment on the intranet, or local (JSC) enterprise search environment as well as the larger NASA enterprise. The survey is a means through which end users provide direction on the development and transfer of knowledge by way of the search experience. The ideal is to identify what is working and what needs to be improved from the users' vantage point by documenting:

- Where users are satisfied/dissatisfied
- Perceived value of interface components
- Gaps which cause any disappointment in search experience.

The near term goal is it to inform JSC search in order to improve users' ability to utilize existing services and infrastructure to perform tasks with a shortened life cycle.

Continuing steps include an agency based focus with modified questions to accomplish a similar purpose.

Methodology

At JSC, the Search Usability Scale (SUS) was used to determine the usability of the intranet search interface, from the user's perspective. Users were asked to voluntarily respond to the survey during the 3 week period of activity. Once the survey was closed, the responses were tabulated and scored based on the SUS methodology. The SUS is an ideal tool for collecting data because it does not have the same time, equipment, and personnel restraints as more traditional evaluations such click-through or eye tracking studies. By participating in an online survey, users were able to quickly release their results while continuing to do their work and without interrupting the work of others, who are often required to serve as moderators for traditional studies. Additional characteristics of the SUS are its ease of use and administration, as well as its reliability and validity, regardless of sample size. According to the inventor of the SUS it was originally a way to arrive at "some objective measures that would demonstrate the value of particular changes was fundamental to that justification in order to get UI changes included in a product release (Brooke, 2013). It is intended purely as a tool for determining the problematic/agreeable system status. Michaels (2012) determined that the SUS works best for problem identification; the need to probe can be further assessed.

The SUS uses 10 subjective questions and, most commonly, a 5 point Likert scale to gather in inputs used to arrive at the usability score (Usability.gov, 2013). Sauro's (2010) validity study of the SUS compared 5 and 7 point scales in consideration of response error. It was reported that due to the 10 question limit imposed by the SUS, the 7 point scale is beneficial because there was no "interpolating between choices". For example, when survey participants were unable to choose between 2 and 3 points on the 5 point Likert, the additional 2 points provided an level of granulation to more precisely reflect user sentiment. Sauro's work points to an additional SUS 7 point validation that found "Seven point Likert scales appear to be sensitive enough to record a more accurate evaluation of the interface while remaining relatively compact" (Finstad, 2010).

Data Analysis

Scoring the SUS survey is quick, yet provides a strong suggestion to the perceived usability of the system by the end user. Each item's score contribution ranges from 0 to 6. For the positively worded items the score contribution is the scale position minus 1. For the negatively worded items, the contribution is 7 minus the scale position. Multiplying the sum of the scores by 1.66 returns the overall value of SUS, normalized to a 100-point scale, which is generally easier for users to understand and to visualize the outcome. For additional elucidation the results were overlaid with an adjective description scale and grading scale. Both of these scales have been researched and found to highly correlate with the SUS scale.

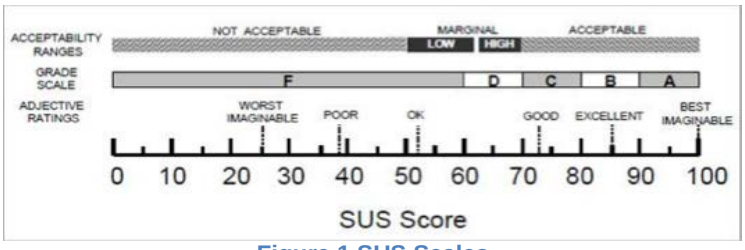

Figure 1 SUS Scales

The histograms below represent the grouping of the users calculated SUS scores. Each histogram shows the same values with a different method of description, summary statistics, adjective rating, and grade scale.

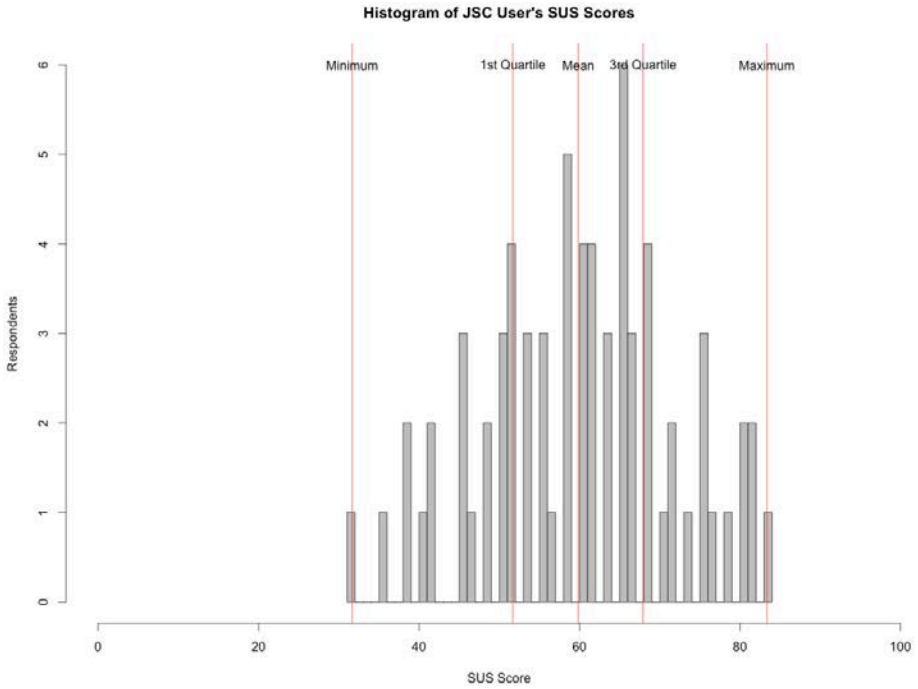

Figure 2 SUS Score Histogram with Statistics

Min = 31.67	1st Quar. = 51.68	Mean = 59.86	3rd Quar. = 67.93	Max = 83.35
Std. Deviation = 12.10		Standard Error = .04		

Table 1 Summary Statistics

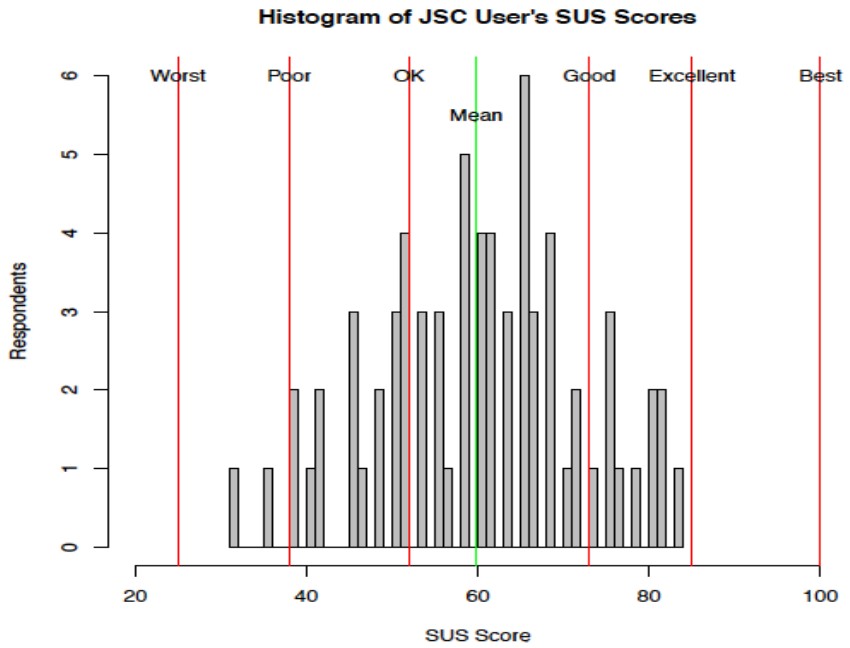

Figure 3 SUS Score Histogram with Adjective Rating

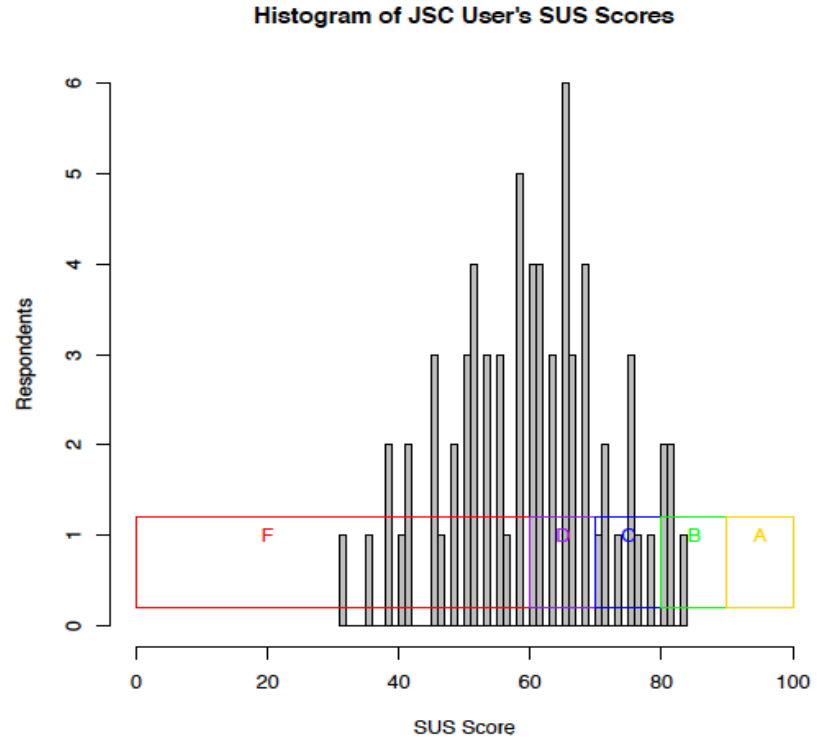

Figure 4 SUS Score Histogram with Grade Scale

Studies indicate the overall mean of SUS surveys have remained constant at about 70. In each depiction above a majority of the users give below average ratings towards their satisfaction of the search system. In the first histogram the 3rd quartile was at 67.93. This shows 75% of the

users scored the JSC Search system at 67.93 or lower. In the adjective rating, 75%, of the responses were below “Good”. On the positive side, 67% of this total fell between “Ok” and “Good”, with the reminder, 33%, below “Ok”. The grading scale, however, has the weakest representation. In this depiction, 50% of the respondents gave a grade of “F” to the usability of the search system at JSC. Additionally, of the remaining 50%, most of them graded JSC Search between “C” and “D”, with only a few respondents giving a grade of “B”.
The data shows most survey participants are not satisfied with the current search environment. The next phase in this process is to determine the underlying causes and develop possible solutions.

JSC User Comments

The first step in identifying root causes is to gather a list of issues or pain points from the users. We need to understand the symptoms of the pain in order to prescribe a cure. To that end, one question was added to the end of the survey. The respondents were asked, “What would make JSC search ideal for you?” The information from this question was to be used as a starting point for the next phase of the case study, where we look more closely at the issues affecting search and the areas users want improvement. The responses, provide useful information to help understand the mindset users are experiencing. Forty-eight of the 71 respondents chose to leave a comment. Each of the comments were read and categorized together into common themes. High-level categories were created for each group and assigned to the comment. The figure below displays a Pareto chart of the categorized comments. Close to 40% of the comments pertained to the return inadequate results. The next 30% dealt with unintuitive search interface, unfamiliarity with search features, and the delivery of an unexpected information type, i.e. a web site instead of a document. In total, 70% of the users issues could be at attributed to these four areas, providing a useful starting point as we progress to the next phases.

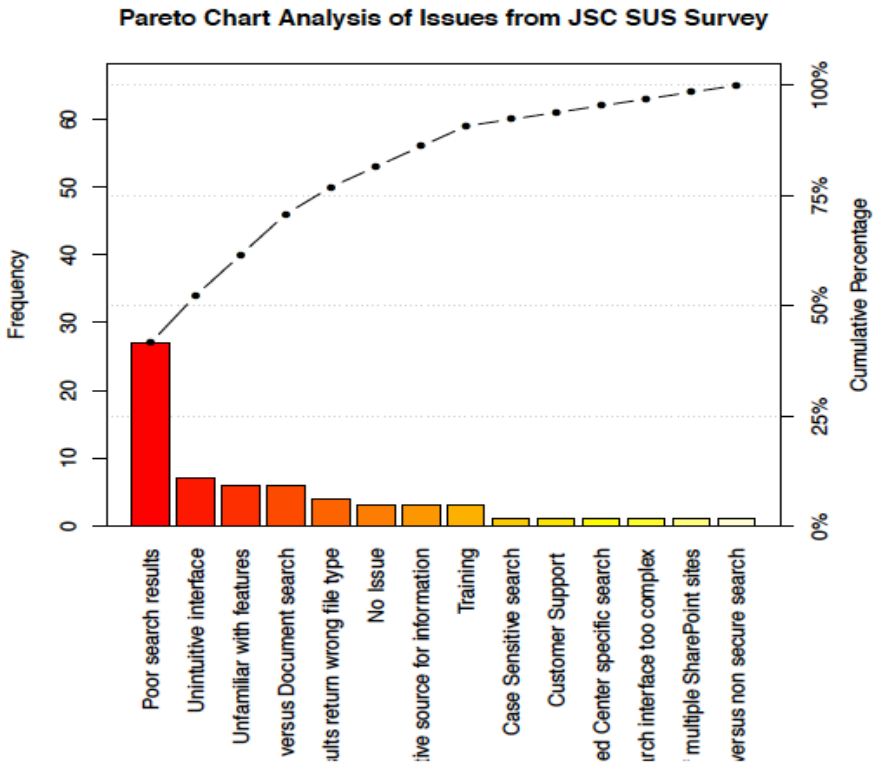

Figure 5 Pareto Chart of Issues

Next Steps

Understanding the level of the situation is the first step in defining a long term solution. The information collected in this survey provides the basic information to develop a course of action. In the next phase of the study, the Knowledge Management Office in collaboration with the Information Resources Directorate will research users tendencies and requirements as it pertains to search habits. The ultimate goal is to design and implement a search environment based on the user's discovery needs. We need to understand what they are looking for, to deliver the most relevant data in a format responsive to their queries.

Summary

JSC users were surveyed to determine the System Usability Scale score of the JSC search system. Sufficient responses were received to statistically infer findings back to the population. The SUS, in use for over 25 years, has been extensively researched and developed to quickly and accurately determine the usability of a system. Results of the scores suggest 75%, ±0.04, of the population rank the search system below average. In terms of a grading scaled, this equated to D or lower. It is obvious JSC users are not satisfied with the current situation, however they are eager to provide information and assistance in improving the search system. A majority of the respondents provided feedback on the issues most troubling them. This information will be used to enrich the next phase, root cause analysis and solution creation.

For information on this report, contact:

david.meza-1@nasa.gov
David Meza, M.S.
Operational Excellence Program Manager
Chief Knowledge Office
NASA - Johnson Space Center
281.483.6711

or

sarah.berndt@nasa.gov
Sarah Berndt
JSC Taxonomist
B1:878G / Mailcode NA141
Johnson Space Center, Houston TX
281-483-3940 Office