



Methods for Understanding Human Interface Requirements for Decision Support Tools

Decision support tools for CB
program at DTRA

Bill Ogden, Jim Cowie, Chris Fields
New Mexico State University



Goals of our methods.

- Address assumptions and raise questions in the context of predicted use.
 - Who exactly is the user?
 - What questions they will need to answer?
 - What information will they need?
 - Will the decision support be accessible?
 - Usable , Learnable, Useful, Timely
- Give development team members and stakeholders a venue for discussion.
- Identify gaps in functionality.
- Goal is a habitable decision support system



Who are the users?

Storyboard and personas

- We want to be as explicit as possible as this will determine the validity of whatever story is told.
- Personas are hypothetical archetypes, or "stand-ins" for actual users that drive the decision making for interface design projects.
- Personas are not real people, but they represent real people throughout the design process.
- Personas are not "made up"; they are discovered as a by-product of the investigative process.
- Although personas are imaginary, they are defined with significant rigor and precision.
- Personas are defined by their goals.



Methods for developing personas

- Gather data from potential users
 - Observations and ethnographic interviews
 - Representative users will be asked open-ended questions about their jobs and goals.
- Data is used to synthesize representative models of users.
- Looking for volunteers at today's conference



Questions about the user

- Experience in the subject domain.
 - Are they experts in CB?
- Experience with the task
 - Making S&T allocation judgments
- Experience with other software tools
 - What computer skills can be expected?
- Time constraints with other job activities
 - How much time will they have to learn and use the tool?



Possible personas

- Director – High level decision maker
 - Military background
 - Some domain expertise
 - Sets direction for S&T in the whole division (e.g. CB)
hands on user?
- Unit Program Manager
 - Science/quantitative background
 - Understands dominate methods in domain area
we would need specific examples
- Program officer
 - Significant domain experience.
 - E.g. chemical weapons analyst.
 - PhD in science or engineering.
Do we focus on allocations to this level of users?



Example Persona

- Roger is a DTRA program manager (PM) responsible for specific remediation type
 - His Area is Personal Protective Equipment (PPE),
 - PhD in Nuclear physics
 - Vaguely familiar with optimization theory
 - No experience with DSS architectures
 - DOES have expertise in his area
 - Has history with the agency in ongoing projects
 - Has mastery of Power Point and MS Excel
 - [what other tools?](#)



Motivations behind these questions?

- (1) What is the most effective application of \$X for the program ?
- (2) What is the most effective application of an additional \$X investment ?
- (3) How can the impact of an X% budget cut be minimized ?
- (4) What is the effect of re-allocating \$X from area 1 to area 2 ?
- (5) Is an X% improvement in capability 1 more expedient than an X% improvement in capability 2?
- (6) Is an X% improvement in capability 1 through technology more cost-effective than the same improvement achieved through operational procedures?
- (7) What is the sensitivity of the results based on changes to the environment space?
- (8) What is the sensitivity of the results based on changes to importance of criteria ?

We need to develop at least one storyboard for each question.



Storyboard example

- Roger is given an additional \$5 million to fund projects in his office. (PPE) [Question 2](#)
 - Possible goals? (These determine interaction style)
 - To decide the best way to allocate money to existing proposals – focus on immediate needs
 - To understand what effect funding different remediation capabilities would have on likely attacks – focus on exploration of the effects of improved capabilities
 - To understand what remediation capabilities are in critical need of more funding
 - ... others?



Goal: To decide the best way to allocate money to existing proposals

The user has a list of costs associated with different remediation capabilities.

- 10 – 20 proposals? 1-10 year time frames? Projects addressing multiple remediation types? Information in a spreadsheet?

The user selects an optimization mode for the tool and sets \$5 mil as the target funding.

He would like to focus just on the remediation capabilities for which he has proposals

- set funding for other remediation types at zero? May want to earmark some at a fixed level. Considers changing cost functions to reflect proposal.



Goal: To decide the best way to allocate money to existing proposals

The user has a list of costs associated with different remediation capabilities.

- 10 – 20 proposals? 1-10 year time frames? Projects addressing multiple remediation types? [Information in a spreadsheet?](#)

The user [selects an optimization mode](#) for the tool and [sets \\$5 mil](#) as the target funding.

He would like to [focus just on the remediation capabilities](#) for which he has proposals

- [set funding for other remediation](#) types at zero? May want to earmark some at a fixed level. Considers [changing cost functions](#) to reflect proposal.

[Requirement statements](#) ⇒ [Use cases](#)



Goal: To decide the best way to allocate money to existing proposals

The user has a list of costs associated with different remediation capabilities.

- 10 – 20 proposals? 1-10 year time frames? Projects addressing multiple remediation types? Information in a spreadsheet?

The user selects an optimization mode for the tool and sets \$5 mil as the target funding.

He would like to focus just on the remediation capabilities for which he has proposals

- set funding for other remediation types at zero? May want to earmark some at a fixed level. Considers changing cost functions to reflect proposal.

Input range statements



Goal: To decide the best way to allocate money to existing proposals (cont)

- The result shows money allocated across remediation categories
 - How well does this map into the task of making proposal decisions (e.g. do the remediation categories reflected in the tool match the remediation capabilities under consideration?)
 - Will Roger want to “add” new remediation capabilities to existing scenarios, by specifying a consequence-remediation function?
 - Roger will want to understand and possibly change the remediation-cost function given considered proposals.



To understand what effect funding different remediation capabilities would have on likely attacks

- Experiment with improvements in different remediation capabilities.
e.g. What are the consequences of a protective suit that can be worn 72hrs?
(v) Is an X% improvement in capability 1 more expedient than an X% improvement in capability 2?
- Different technologies effect suit performance and they need to be convertible to a single scale... dollars on the input, displayed consequence on the output?
- Roger selects “interactive mode” and enters dollar amounts and views displayed consequences.
- How does he use this information... Power point slide?



What is lacking in this example

- Details...
 - What remediation capabilities?
 - What consequences matter to Roger.
 - How much time does Roger have?
 - ...
- Realism?
 - Does Roger (someone like him) exist?



What's next?

- Develop DTRA CB personas.
 - Use open-ended interviews
 - Looking for volunteers at this conference
 - Iterate among DTRA partners and stakeholders
- Develop storyboards for each major question
 - Iterate among stakeholders (users if possible) and development team