CREATING A VISUAL LANGUAGE FOR VISUALIZING ARGUMENTATION AND LARGE DESIGN SPACES

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GOAL

To create a visual language that is able to display the argumentation and design choices of a complex societal effort

- Visualization argumentation displays all the positions taken in an argument or debate such that the viewer may arrive independently at a possible conclusion.
- Societal efforts are what a society may strive towards. In order to make the decision of executing and following through the effort, the society needs to understand the argumentation and technical aspects of the effort.
- Most visual languages that are used for visualizing arguments do not adequately display design choices of a problem. It is often the case that the viewer needs to be trained to recognize the different components of the visual language in order to follow the argumentation.
- We would like to create a simple visual language that would adequately convey both the argumentation and technical aspects of a societal effort.

RELATED WORK

### Stephen Toulmin: basic argumentation display

Toulmin developed a schema that breaks down the aspects of a small-scale argument. He also created a basic visual representation for the schema.
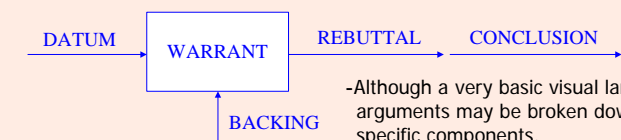
- Although a very basic visual language, not all arguments may be broken down into these specific components.
- Viewers may need to adjust this format.
- More importantly, this visual language does not allow the representation of design spaces.

Robert Horne: developed a simpler visual language for large-scale visualization argumentation

He had successfully applied his visual language to a complex problem "Can Computers Think" over a span of seven posters.
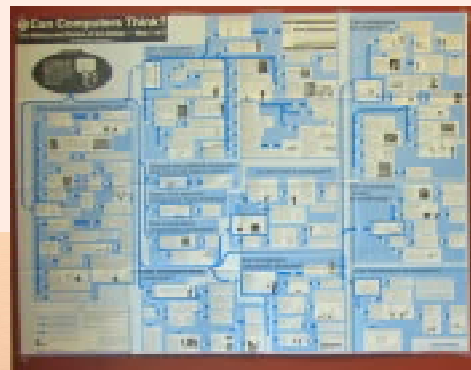

- Even though the visual language is much simpler, consisting of arrows "is supported by" and "is disputed by", the layout may be confusing to the first-time viewer.
- Again, this visual language is not able to display design spaces.

There are also computer-based visual languages, but large-scale diagrams are not easily viewed on a limited computer monitor.

METHODOLOGY

We applied the visual language that we developed to a complex societal effort: a manned mission to Mars.
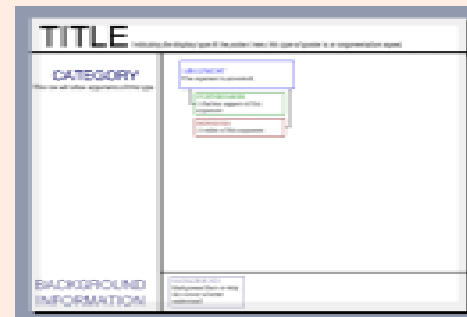
- To the right is a template of our visual language.
- The title indicates the display type of the poster, whether it is an argumentation aspect or a design space.
- The categories refer to what the arguments are arguing for, if the poster is an argumentation aspect. If the poster is a design space, then the categories display design choices.
- Background information supplies supplemental information to help the viewer's understanding.

The argumentation aspect of this societal effort is whether we should send a manned mission to Mars.
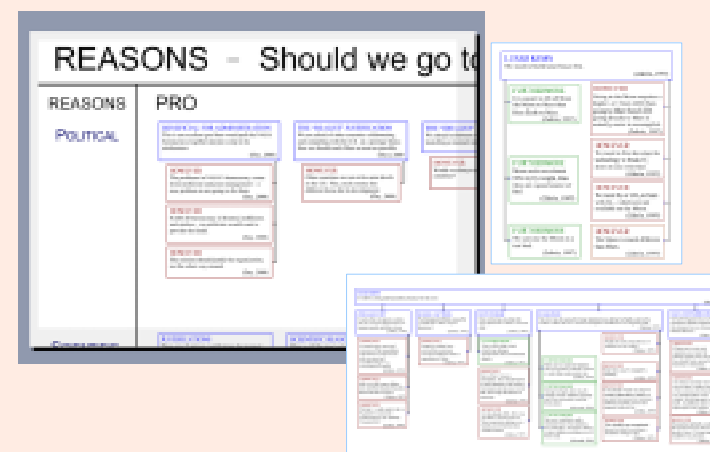
- Space was a big issue. We did not want to make overly large posters, nor did we want to have cramped displays which may confuse the viewer.
- We modified our visual language such that it may comfortably display several "Furthermores" and "Howevers" at once, preserving the simplicity of the visual language and cleanliness of space.
- Sometimes there may be smaller sub-arguments that collect under a larger heading.
- We created the smaller sub-arguments using the usual argument structure, and extended the larger heading to include all of the sub-arguments.

Several large design spaces are part of this societal effort in the form of technical considerations of the mission.
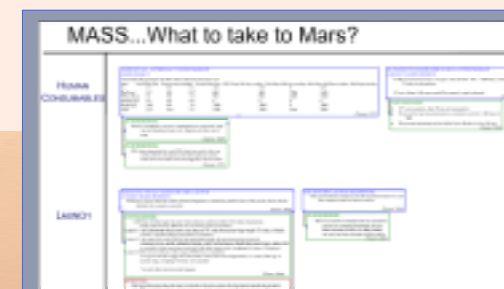
- Although the formats of both argumentation and design space posters look the same, they have different functions.
- On an argumentation poster, the categories are different fields of reasons. For example, in the "Reasons" poster, under the "Political" category are a series of political reasons that are for or against the effort of sending a manned-mission to Mars. The top blue box is states the reason, and the "Furthermores" and "Howevers" support or dispute the reason, respectively.
- On a design space poster, each category displays possible design choices. For example, in the "Mass" poster, under the "Human Consumables" category, there are several design choices that show different allocations of food, water, oxygen, etc. The "Furthermores" list the benefits and other supports of each allocation, and the "Howevers" show how the allocations may be inadequate or even harmful.

RESULTS

We created a simpler visual language that can be used to display both visualization argumentation and large design spaces of a complex societal effort.

We produced the argumentation and technical aspects visually on poster form.

However, we did not foresee the magnitude of a complex societal effort. We were able to cover most of the technical aspects of a potential manned-mission to Mars, but there are still areas that may be added to the posters. Thus, we did not have enough time to conduct user-studies to evaluate how effective our visual language is.

FURTHER WORK

Further work is needed to...
- Add and/or edit to the categories of each poster
- Create more posters
- Design and perform user-studies to evaluate the effectiveness of the visual language
- Modify the visual language as needed
- Although large-scale diagrams are hard to view on a limited computer monitor screen, we would like to suggest the creation of a wiki in order to let others add and/or modify the posters.

ACKNOWLEDGEMENT