Team Navigation of Ill-Structured Problems

Ashley Lance, Melanie Hendricks, Jeanette Everling, Andrea Peer (MS), Sree Nilakanta (PhD)

Background

How do teams solve complex, domain specific problems?

It is important to measure:
- The problem solving process in a team, as there is only an implied set of guidelines, based on domain knowledge and experience, which is helpful in solving ill-structured problems (Ge & Land, 2003; Jonassen, 1997).
- Team knowledge representation, which is the way knowledge is represented amongst team members (Mohammad, 2001). The extent that individuals share and discuss their respective knowledge representations directly impacts the success of the team (Cooke, 2000).
- Group communication as group satisfaction and success is directly related to how the group communicates (Straus and McGrath,1994).
- Domain self-efficacy, as individuals who have higher efficacy tend to visualize successful outcomes and have higher performance levels and motivation (Bandura, 1989; Brown and Latham, 2002).
- Interaction models, which encourage searching for patterns and relationship (Jonassen, 2000).
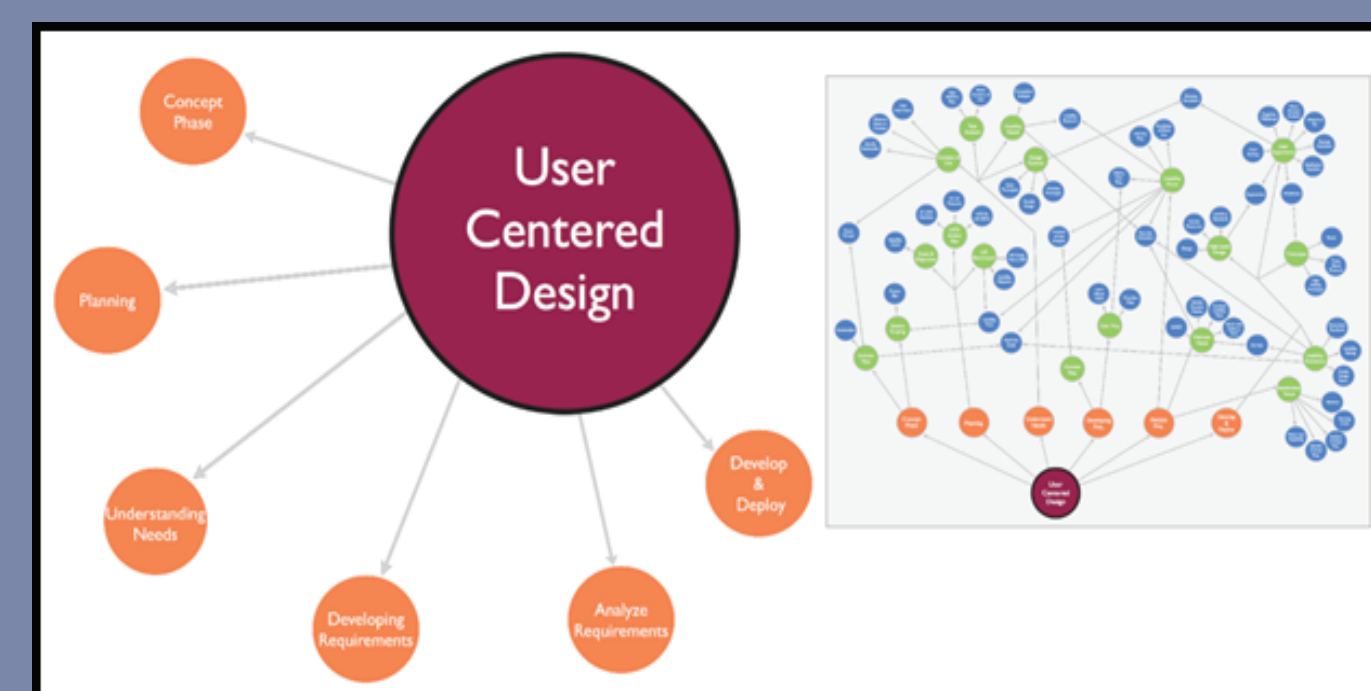
Design Alternatives
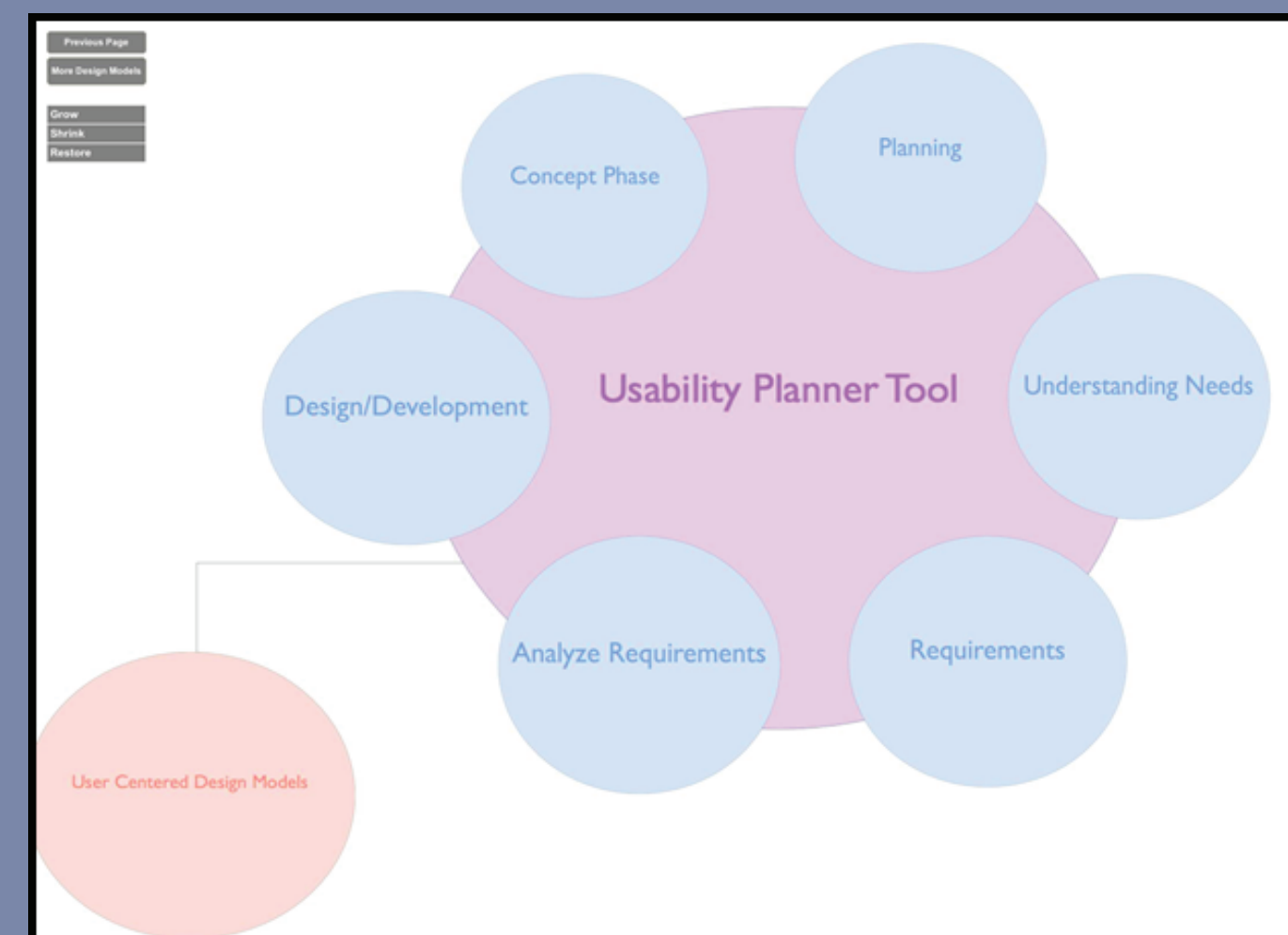
Study 1: Design Alternative 1

Nodes overlapped to show relationship between nodes. Structure on side showed previous nodes along the path.
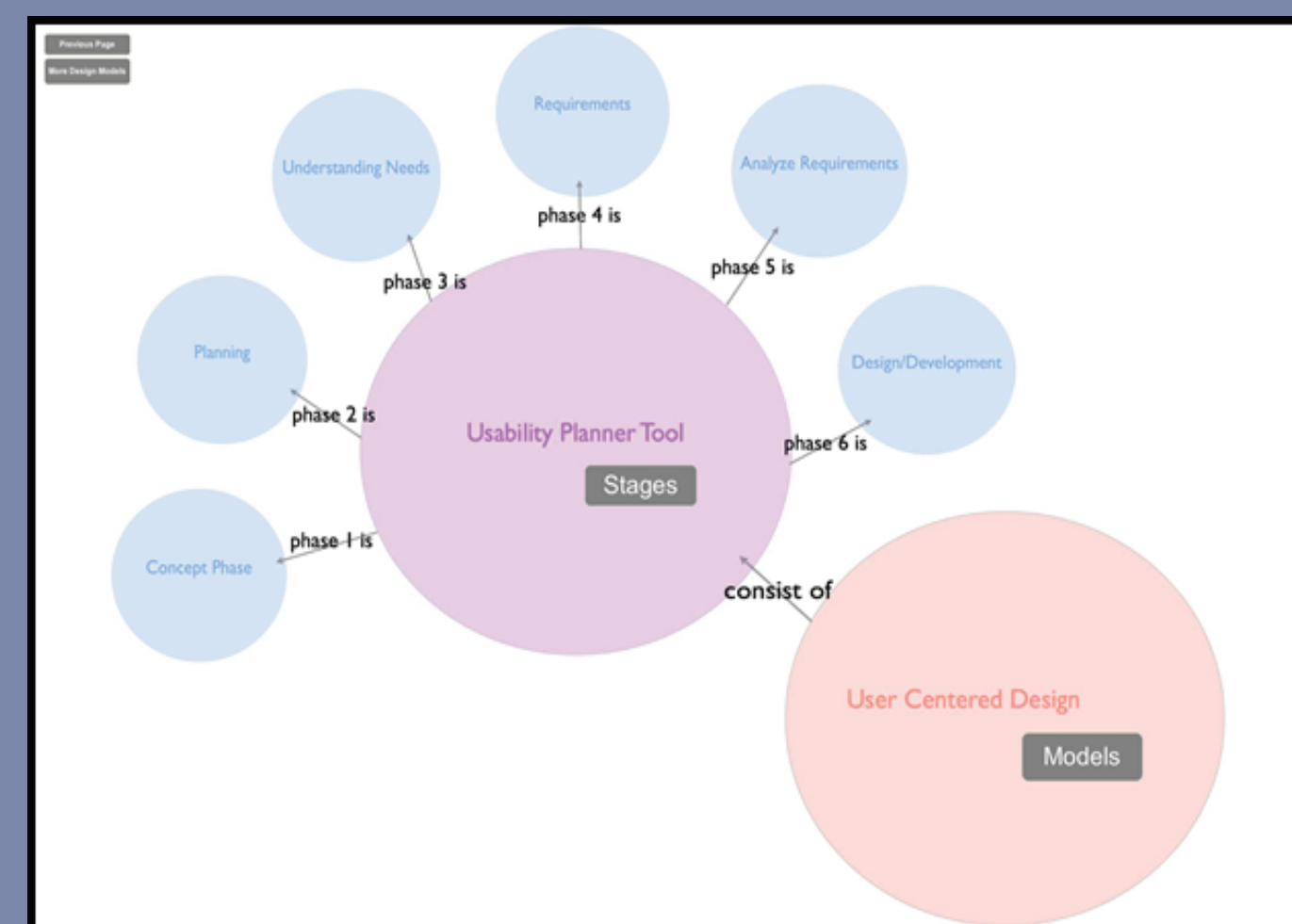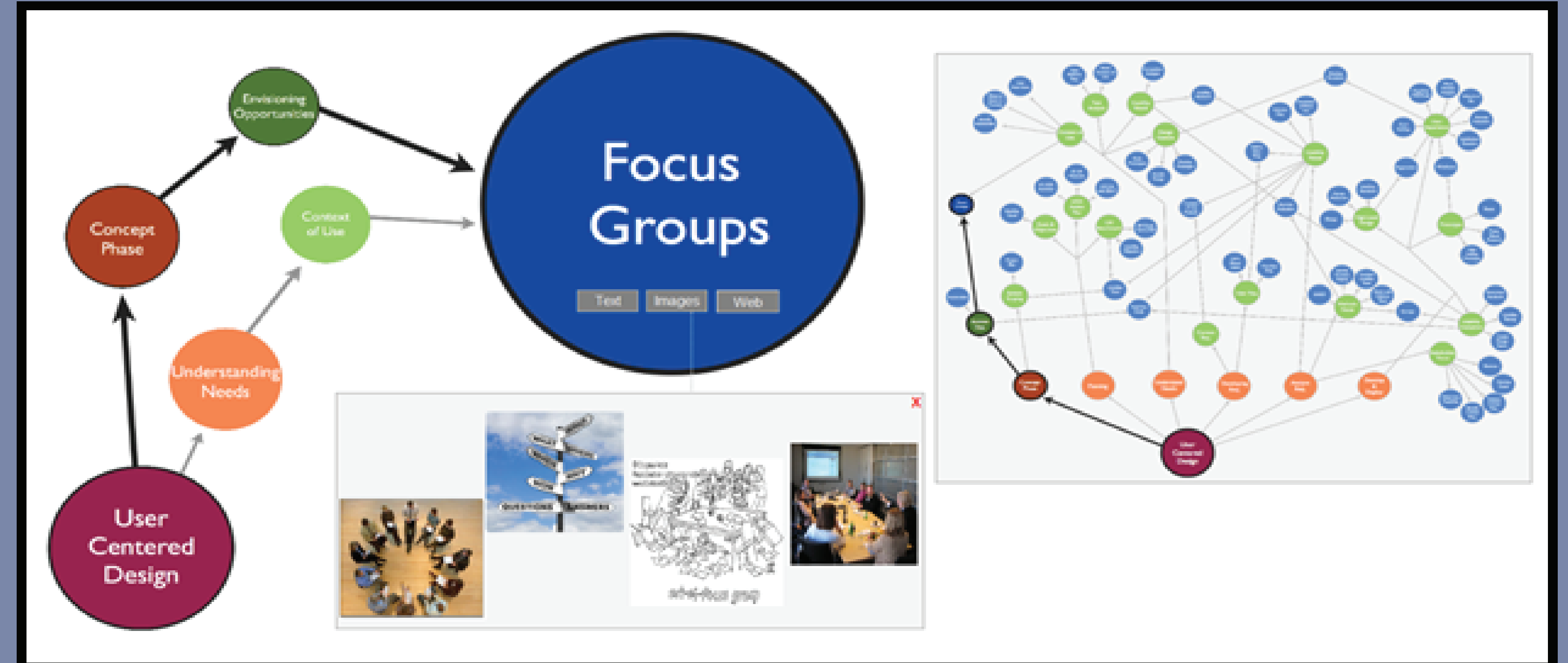

Study 1: Design Alternative 2

Directional arrows with prepositional phrases indicated a relationship between nodes. Color indicated different levels.

Study 2: Final Design Alternative

Using the results from our usability testing, we created our final design which has elements of both of the previous models.

Final Interaction Model

Clicking through the concept map allows users to learn about the different relationships between concepts. The side navigation map shows the overall structure, as well as the present location/path. By navigating to the bottom blue layer, users can view text, images, and web sources about the given User Centered Design method.

Methods

We had 2 phases to our study, which included:

1) Usability testing of two design alternatives for non-linear interaction models. We asked participants (n=4) to navigate through 9 tasks.

2) Testing the final design alternative with teams (n=4) of 3. Teams were asked to solve an ill structured problem scenario using the User Centered Design methods found in the interaction model.

Results

So how do teams solve complex problems?

The initial results of our studies suggest teams require some level of scaffolding to guide their navigation of ill-structured problems.

We also found that teams who had the option of manipulating their team knowledge representation choose not to, instead they used the representation that they were given. However, this could be due to time constraints.

Communication and individual self-efficacy may have influenced the team's final solution. Additional analysis is currently underway.

Teams who spent more time exploring the interaction model developed higher-level solutions.

Future Work

Our studies raised many questions that require future research such as:

- Longer studies to allow more time for learning.
- Examination of different amounts of scaffolding.
- Further research in how to break teams out of linear thinking.
- Additional statistical analysis of the correlation between team communication and team success.