SI 501: Guidelines for Brainstorming Solutions

Objectives

- To develop and prioritize good recommendations for your clients, based on your analysis.
- To exercise creativity and brainstorming skills.
- To learn one way of choosing among a set of solutions.

Identify the Right Problems

Good problem solving begins with posing the right problem(s). You want to be clear what the *actual* problems are that you'll tackle for your client. In some cases, they will be exactly what the client posed at the beginning (though now, you'll have more insight into them); in other cases, the problem(s) may differ, sometimes significantly, from what your client initially proposed.

1) After you complete your affinity wall, some of your higher-level sticky notes will either be descriptions of key problems, or descriptions of issues closely associated with key problems. Start by copying these onto another document.
2) Next, try to identify problems that are the root causes of as many of the other problems as possible. (This will often happen naturally in the affinity wall, with the higher level sticky notes being root causes of lower-level ones.) Mark the root-cause problems, and lightly cross-out any problems that are subsumed by root causes. For each of the problems that are left unmarked, do one of the following:
   - Cross it out because it's actually caused by an existing root-cause problem.
   - Cluster the problem with other unmarked problems that might have a common root cause. Add the new root cause problem, mark it as such, and cross out the original problems.
   - Mark it as its own separate root-cause problem.

3) After you go through this, you should be left with either one root-cause problem, *or* several root-cause problems that don't cause each other. (If two root-cause problems have a lot of interaction, there is often, though not always, a single root cause to both.) If you have only one, this is your client's *main* problem and you'll proceed to brainstorming ways to address it.
4) If you're left with multiple root-cause problems, then prioritize them. Think in terms of which ones are most likely to be the cause of the client's initial concerns, or which ones, if solved, would be most likely to eliminate the client's concerns for as long as possible. When you brainstorm solutions, start with the problems at the top of your list, and proceed down the list. For problems lower on the list you might just want to highlight that they are problems that you found, but you may not need to brainstorm solutions or provide recommendations.

Brainstorm Solutions

Once you have a set of problems, you'll *brainstorm* possible solutions. In this phase, try to withhold judgment about how good a solution is. Suggest obvious ideas, but also be willing to suggest crazy ideas. As a team, your goal is to raise as many possible solutions as you can, and not worry about their quality. Good designers and good problem solvers can generate *hundreds* of solution possibilities to any given problem.

The instructions below work for individual brainstorming, as well as for brainstorming as a team. However, it is *strongly suggested* that you first give each team member a chance to do some brainstorming on their own, and then to meet as a team, collect all of the individual ideas, and continue brainstorming from there. (Some brainstorming methodologies recommend starting as a group right away, but social interaction sometimes suppresses unique ideas. Also, brainstorming requires *thinking* and some types of thinking are better done alone.)

1) Start by brainstorming broad classes of solutions. Some ideas to think about…
    a. Solutions that only require people to do different things.
    b. Solutions that only involve new technology.
    c. Solutions that require both new technology and new people habits.
    d. The best solution in some ideal world with no constraints at all.
    e. Solutions that would work under actual constraints.
    f. Solutions that would work if there were no manager/leader.
    g. All kinds of circumstances under which the solution would have to work: What if there were no phones in the world? What if everyone were working from home all the time? Etc. (Of course, these are just ways to help you think about *creative* solutions – they may not be realistic scenarios.)
    h. Make sure that in understanding the problem, you haven't presumed a specific type of solution. For example, if the HR director and the CFO disagree about which of two databases to use, the solution could address (1) How do we get the HR director and CFO to agree? (2) How could we find/design a database that would satisfy both? (3) Could something other than a database do the work that both people need? (4) Could both use the database they each want, and interact through other means to get the work done? Etc. Note that each question suggests very different set of solutions.
    i. Etc.
2) For each class of solution, think through the possible variations. List each of these under the broad class of solution.
3) Consider hybrid solutions that combine or mix-and-match multiple ideas you already have.

Once you have a big list of recommendations for each problem, put them all in the column of a spreadsheet. It can be useful to use two columns – one for a coarse-grained solution class, and another for the more fine-grained, specific solutions. You might want to add a third column that just counts up from 1. (You'll do some sorting later, and might want to be able to recover the original order for some reason.)

For an example spreadsheet, see the accompanying Excel sheet.

Define a Rubric

Once you've brainstormed a lot of ideas, a *rubric* will help you choose among the many brainstormed solutions you have.

1) Think through what qualities a good solution will have. Some possible categories include…

   - degree to which the problem is actually solved
   - financial cost
   - required effort
   - technical feasibility
   - political support among managers
   - political support among employees
   - customer friendliness
   - elegance / simplicity
   - a "fudge factor" for each team member
   - etc.

2) It's not necessarily better to have too many rubric categories, but you also want to have enough that you cover the key concerns. Also, try to minimize the degree to which your rubric items conceptually overlap, though to a certain degree they necessarily will. For example, if you already have "political support among employees" and "required effort" you don't need another category about "effort to motivate employees" because that is mostly subsumed by the first two.

3) Decide how to weight categories in your rubric. This will depend on what you know of your client and the project. Which categories are more important than others? It can be helpful to think, "Out of 100, how important is each category?" If the organization is not well-funded, and people are overworked but very collaborative, financial cost might be 30, degree to which problem is solved 20, technical feasibility 20, required effort 20, and political support 10.

4) In your spreadsheet, allocate two rows at the top. In the first row, add the rubric elements. In the second row, add the weighting. (Again, see the accompanying Excel sheet for an example.)

Score the Solutions

1) Fill all the blanks in your spreadsheet, by rating each solution with a number. Use integers in a predefined range. 1-3 or 1-5 is recommended. (Too many more, and it's not clear whether you can make meaningful distinctions between scores.) Use the higher numbers to mean "better" in each rubric category. When you do this…
   a. Have individuals do an entire column (i.e., one person does *all* of the rankings for the "financial cost" category in the rubric; another person does the rankings for "required effort"; etc.). This helps ensure that the scoring is consistent

across solutions.

b. Start by scoring entire solution classes; copy the same set of scores across all of the variations within the solution; and then make small adjustments, as necessary, for each specific solution. (You can also postpone making the adjustments for specific solutions until after you've found the top solution classes.)

2) Once the entire matrix is full, use the SUMPRODUCT function that is available in any decent spreadsheet (including Google Sheets and Microsoft Excel) to compute a final score for each solution.

Prioritize Solutions

Finally, you will prioritize solutions and pick the "best ones. Start by finding a good *ideal* solution.

1) Temporarily set to 0 the rubric weightings for any rubric category that in some ideal world would not be an issue. For example, you might decide that financial cost, required effort, and political support are not issues, so make those rubric weightings 0s. When you do this, SUMPRODUCT will automatically update the scores, to reflect the new weighting scheme.
2) Use the spreadsheet's sorting capability to sort the rows by the final score, in decreasing order. Now, you can see the top-scoring solutions for an *ideal* situation. (You can also use a filter to do this, if you know how.)
3) Even with a good rubric and a good weighting scheme, going strictly by the final score might not always make sense, so look at some of the top-scorers, and pick from among them. Now you have a "top" ideal solution.

Next, find the best all-around solution, which incorporates realistic constraints.

4) Put back the original weightings you decided on with your team. Again, SUMPRODUCT will automatically update scores for your comprehensive weighting scheme.
5) Use the spreadsheet's sorting capability to sort the rows by the final score, in decreasing order. Now, you can see the top-scoring solutions.
6) Even with a good rubric and a good weighting scheme, going strictly by the final score might not always make sense, so look at a range of top-scorers, and pick what your team believes are the best ones. Typically, solution classes will tend to cluster in score, so within a given solution class, look carefully at the higher-scoring options.

At the end, it's useful for each problem to have an ideal solution, as well as your *one* "top" solution. You can also list alternate good solutions, but most clients like to know the top recommended solution according to you, the consultant.

Again, refer to the accompanying Excel sheet.

(Your effort will be reflected in your Final Report, so there is nothing specific to turn in with this work.)