Part of a draft paper that framed workshop methods as creativity support tools

6.4 Workshop Methods – Factors for Consideration

These design considerations are intended as prompts for thinking about workshops when selecting from the range of creativity techniques for appropriate methods to **adopt**. As such, they provide a useful overview for planning. But the way in which methods are used will depend upon the details and the dynamics of the workshop, and there is plenty of scope for variation in both cases. We have found it useful to plan and run methods by considering a small number of key factors for the workshop and its participants: the scope for achieving and varying levels of *collegiality*, *agency*, *challenge*, *trust* and *interest* associated with each. These have been important factors associated with likely workshop success in our experience. To help us remember the five we term them **CACTI** *factors*. Each creativity method offers particular opportunities to vary levels of these factors that need to be managed throughout a workshop along with levels of engagement with data, visualization and the specialist domain in which collaborators are working. The degree to which each method delivers what is intended is somewhat unpredictable. This is the case in terms of direct outputs, but also indirect effects on the key factors that can result in a productive and creative workshop.

- **C** ollegiality – the degree to which communication and collaboration are encouraged and occur;
- **A** gency – the sense of participant ownership in workshop outcomes (and perhaps process);
- **C** hallenge – the barrier of entry to, and likelihood of success in workshop methods and tasks;
- **T** rust – the confidence that participants have in the methods, the design process and in the researcher's domain expertise;
- **I** nterest – the amount of attention, energy and engagement that occurs;
- **+** – other *relevance* factors that can effect these:
  the levels of engagement with *data*, *visualization* and the specialist *domain* in which collaborators are working.

The factors are not independent, neither are they consistent or easily measurable. They do not map exactly to particular methods and the extent to which the various methods enable and effect them will depend upon who uses them, how, in what contexts and various (often unknown and unpredictable) characteristics of the workshop group. And yet maintaining appropriate levels of collegiality, agency, challenge, trust, interest and domain focus are likely to be important if workshops are to be inspiring and enjoyable. Enjoyable workshops, are not only more likely to produce valuable outputs in our experience, but are likely to establish lasting rapport and build trust among researchers and collaborators.

Creating a workshop plan that builds and moderates these characteristics is of course as much of a craft as design itself. As is responding to a failing method (*nobody feels like an animal this morning*; *post-its don't stick*), a loss of interest (*there is no energy*; *the room is too hot*; *we had a tough away day yesterday*) or a lack of agency (*some participants dominate some tasks*). Given our collective experience, we offer some examples of methods in action that show how they have worked and failed in light of these 5 factors. These considered experiences could be informative and instructive in pre-workshop planning and in the essential on-the-fly workshop management that is required for a successful event.

Framing workshops as *creativity support tools* can provide criteria to select effective methods [$\mathcal{D}$.19]. While all of the creativity support tool guidelines proposed by Shneiderman et al. [57] are valuable to workshop design, three seem to relate closely to the factors we have identified.

First, selecting methods that *"provide low barriers, high ceilings, wide walls"* is important as workshop participants should use their energy generating ideas instead of understanding methods (low barriers) and methods should allow for exploration without boundaries or stopping conditions (high ceilings and wide walls). We may want to *challenge* participants to think broadly in places, but should ensure that they use their mental energy to think hard about the problem in hand and not to understand our methods.

In planning one workshop [P2.R], we piloted a method in which ideas on post-it notes are placed on a drawing of a tree according to their implementation cost — to discover low hanging fruit. We rejected this method as the initial activity in the workshop core because of its barriers, it required knowledge about the difficulty of ideas and resulted in discussion on implementation instead of the breadth of ideas. We deemed the barrier to entry to be too much of a *challenge* that could result in a loss of *trust* and *interest*.

Second, selecting methods to *"support collaboration and communication"* underlies the entire purpose of the workshop. In our experience, every method that involves individual ideation is best balanced with group discussions to support the kinds of *collegiality* that are typical of successful creativity workshops. Mixing groups between activities and ensuring that participants with different views, experiences and perspectives work together seems important. Our workshops often involve groups that are faceted on different criteria during different methods. Groups may grow through merging in hierarchical decision making processes [P1.R].

This incorporates the need to establish *agency* – the feeling of ownership, responsibility, and ability to act [4] promoted by using methods that encourage multi-directional communication between workshop participants and facil-itators [4]. Methods that encourage one-way communication, such as lectures, are notorious for hindering agency [29]. Yet, this is a mistake we have made [P8]. Establishing *Trust* is an important fac-tor and must be achieved initially and reinforced if collaboration is to be successful and communication is to work well. Trust is the confi-dence that participants place in each other and in the workshop team. Encouraging trust between participants and facilitators leads to open communication, the uninhibited sharing of ideas between individuals [Jones1989]. This can be achieved by showing intent to listen, and demonstrating vulnerability [4]. Achieving trust in the process (see opening), the knowledge of the academic experts, the value of participants' knowledge (see agency) and the likely impact of the day's activities (see closing) are all important and can be achieved in a number of ways. The visualization awareness exercise can be used to show the breadth of knowledge of the visualization specialists, and situate their contributions to the academic discipline. On occasion we have trusted participants to lead sessions or fix technology problems that have occurred.

Following one workshop in which we evidently achieved academic credibility, senior analysts were more willing to spend time with us answering our domain questions, discussing their needs, and evaluating prototypes.

Third, *"invent things that you would want to use yourself"*. This advice has two dimensions in our experience. Firstly it is important that facilitators enjoy the activity. So adopt methods that are playful, fun, engaging and productive. Workshop methods can be selected from a growing body of valuable resources [$\mathcal{D}$.16] and should always be tested in advance. Running a workshop with methods that you know, trust and like to use will likely maintain the enthusiasm and energy of that you have as a workshop facilitator. Along with the use of relevant examples, efforts to ensure agency and direct variation of other factors (mix individual work with group work, limit high challenge activity - but introduce it in supportive ways and mix it with some low barrier work), this should maintain *interest* in our experience.

We have used methods from the following resources: McKenna et al. [37], who provide 100 exemplar methods relevant for visualization researchers, but these methods may need to be adapted to a workshop setting; Kumar [26], who describes 101 product design methods useful in a business setting; Gray et al. [15], who describe methods that encourage creative thinking and can be chained together into workshops.We have also drawn inspiration from Tinkertoys [39], which describes creative-thinking techniques to approach and solve problems at home and in business; as well as Innovation Games [17] and Game Storming [15], which both describe methods in the form of innovative games for improving workplace engagement, idea generation and communication.

Knowing these resources and finding alternatives as they emerge, adopting methods in light of likely effects on *CACTI* factors, and logging experiences are important components of creative visualization workshop design.

6.5 Workshop Methods – Data, Visualization & Domain

The majority of these resources target domains outside of visualization, but we see plenty of scope for **adapting** established creativity methods for use in visualization design and have some experience of this working effectively. Being creative in this way allows us to engage with meaningful *data*, through *visualization* and tailor workshops to the specialist *domain*. In turn, this can achieve *trust* and *agency* and develop and maintain *interest*. It is achieved by injecting vocabulary, imagery and technology to explicitly focus on domain challenges, data characteristics, visual methods or analysis tasks [$\mathcal{D}$.18]. In the following section we present some of our adapted methods.

The *wishful thinking* method in our example workshop (Fig. 2) is a visualization-specific form of *aspirational thinking* [36]. We have successfully used this method in a number of our workshops P2.R, P4.R, P5.R. Fig. 3 illustrates the method in greater detail.

The method starts with an individual activity with a low barrier to entry, which allows for a gentle step from opening into core. This, and then presenting the ideas to the room ensures inclusively, promotes *agency* and can prompt the externalization of a wide range of ideas. To *challenge* the participants the activities get progressively more difficult as participants form small groups and start to iterate and build upon these ideas by assuming that the initial idea has already been implemented [P2.R,P5.R]. As an alternative we have also used hierarchi-

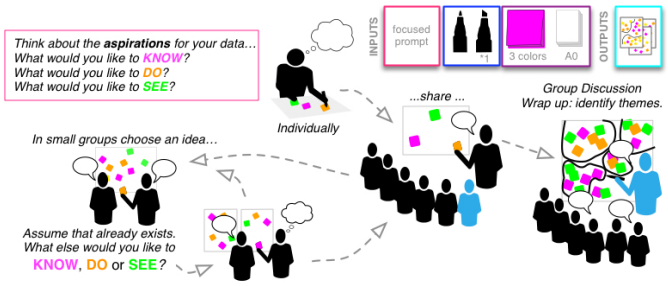

Fig. 3. *Wishful Thinking* for Data Visualization Projects, adapted to ensure greater understanding of the needs and tasks of the application domain (to know, to do) and visual ideas (to see).

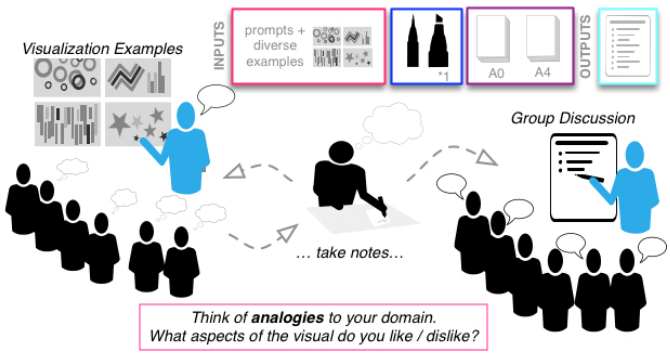

Fig. 4. *Visualization Analogies* for Data Visual-ization Projects. Passive presentation with individual ideation ensures inclusion and div

cal discussion from small group to large group discussion to explore interesting ideas [P4.R].

Whilst designing the workshop, an important input for this method is the focused scenario to which the method is targetted. This must be adapted to the specific *domain*. The participants are then asked to think about the scenario and answer the following questions: *"What would you like to know? What would you like to see? What would you like to do?"*. These questions have been specifically formulated to adapt aspirational thinking to focus on *data* and *visualization*.

We use different colored post-its for the externalization of ideas related to the three questions, as shown in Fig. 3 [D.8, D.9]. This encourages participants to create tangible artifacts, which can later be revisited, rearranged and used in our analysis. We have found the three questions prompt quite different responses and these are useful at different stages of the design process. *"What do you want"*: *"to do"* and *"to know"* seem to be easier for the majority of participants to externalize. These ideas often refer to analytical tasks that they would like *"to do"*, or envisaged insights they would like *"to know"*. *"To see"* is often more of a *challenge* for participants, but it ensures visualization appears early in the workshop. These initial ideas are then revisited and iterate as we build their visualization awareness and develop *trust*. All three prompts can reveal unexpected or hidden goals. In addition to informing the design process, we have found that the *"to know"* artifacts can formulate evaluative triggers for our prototype designs [P2.R].

A second method that we have adapted is *visualization analogies*, also in the example workshop (Fig. 2). This resembles analogy-based creativity methods [14]. During *visualization analogies* participants are shown a curated collection of visualizations. and *challenged* to think (usually independently) about how aspects of the visualizations may apply to their domain. They are also asked to think about what they like and dislike about the visual examples. The diverse examples are important to prepare with care as they can not only result in increased *interest* but also in the participant's *trust* in researcher's domain expertise. Subsequent group discussions on these visualizations prompts *collegiality* and increases *agency*, and can result in some really inspiring ideas.