

Storytelling: its role in information visualization

Wita Wojtkowski

W. Gregory Wojtkowski

Networking, Operations & Information Systems

BSU

1910 University Dr.

Boise, ID 83712 USA

e-mail: <wwojtkow@boisestate.edu>

e-mail: <gwojtkow@boisestate.edu>

Abstract:

In this paper we discuss the efficacy of storytelling for information visualization. We posit that computer technology provides us with new media and modalities that can now be used to convey information in a story-like fashion. This paper is based on work of Thomas, Gershon and Ward.

Keywords:

visualization, storytelling, information

1. Introduction

Information visualization originally defined in 1993 by G. Robertson [Robertson (1993)] combines aspects of information technology, imaging, graphics, scientific visualization, and human-computer as well as human-information interaction. The media of visual computing and display were developed and commercialized only recently [Gershon and Eick (1995); Munzner (1998)], thus visualization software developers do not yet completely understand all the strengths and shortcomings of the approach. In addition, as it often is the case with any new ways of doing things, metaphors of old technologies interfere.

Many users and designers still view these new media and modalities as replicas of the paper-based ones. This is only natural, since humanity has grown accustomed to them over past thousand years. Nevertheless, new technologies allow us to do things we never could do with paper [Ware (2000)].

A major challenge in information visualization for the user/viewer as well as the designer is to solve real-world problems in areas as diverse as information systems management, financial analysis, telecommunications, and industrial control. The real world is profoundly complicated - massive amounts of information create a problem of scaling. Methods for dealing with scaling issues include information organization, condensation, segmentation, and summarization [Gershon and Wade (2001)]. In this paper we take a brief look at story telling and posit that storytelling allows visualization to convey information efficiently. By efficiency, in this context, we understand conveying great quantities of information in a format that is easily assimilated by the consumer of this information: a decision-maker.

2. On Story Telling

Stories are very compelling. We have always used stories to convey information, experiences, ideas and cultural values. Since the invention of writing, printing press, telegraph, radio, movies, and the computer, these technologies and culture have constantly provided us with new and increasingly sophisticated means to tell stories. What is more, with the computer, entertainment, art and technology, have converged in an interesting way: the ancient art of story telling and its adaptation in

film and video, for example, can now be used to convey information in this increasingly computerized world [Keim (2000)].

Of course, well-told story (in varied modalities: in words, or in words and images) may convey great quantities of information in a format that is readily assimilated by the listener or viewer. Let us consider an example as shown in Figure1 (based on an example from the work of Gershon [Gershon and Eick (1995)]).

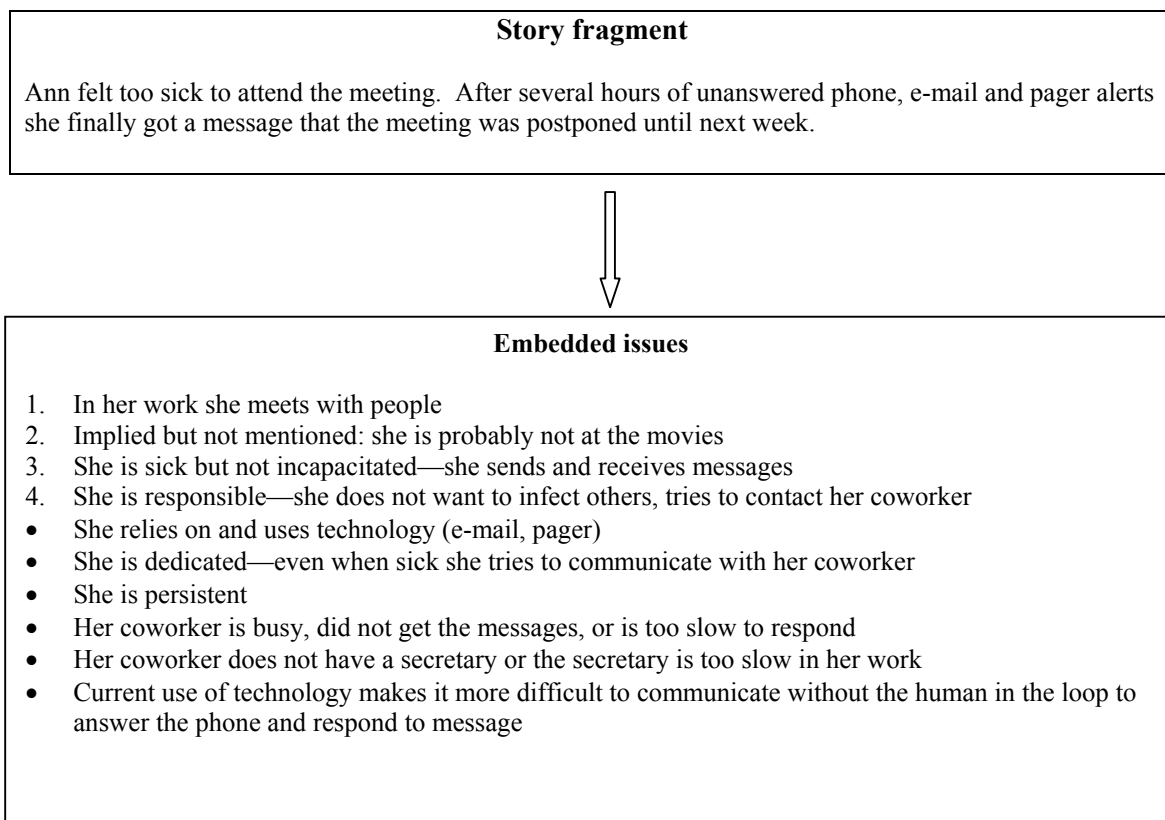


Figure 1 An example of story fragment and issues embedded in it

We note that despite its sketchiness, the story fragment in Figure 1 is loaded with information. The story is short and memorable. If we follow analysis as that in the work of Thomas [Thomas (2002)], many pieces of information may be deduced about the person in this story. The story does not express this information explicitly; some is only implied. We can surmise, for example, that the person in the story is probably not on a tropical island or at the movies. Her attendance at the meeting is important to all involved. As in most stories, this one involves uncertainties, including, for example, the number of people she has tried to contact about the situation. Uncertainties of this sort are used in good story telling on purpose. Readers or viewers clear them up through their own imagination, supplying their own experiences and expectations. The story in our example is a written narrative. The same story could be presented through other modalities, such as image alone or as a combination of words and images.

Transforming the representation from text narrative to visual domain requires adding more information to the presentation. Images are also susceptible to the uncertainties and might require some declarative statements to clear them up (for example, consider silent movies and the need for the declarative text in them). For the story in our example, the narrative is much more economical than its

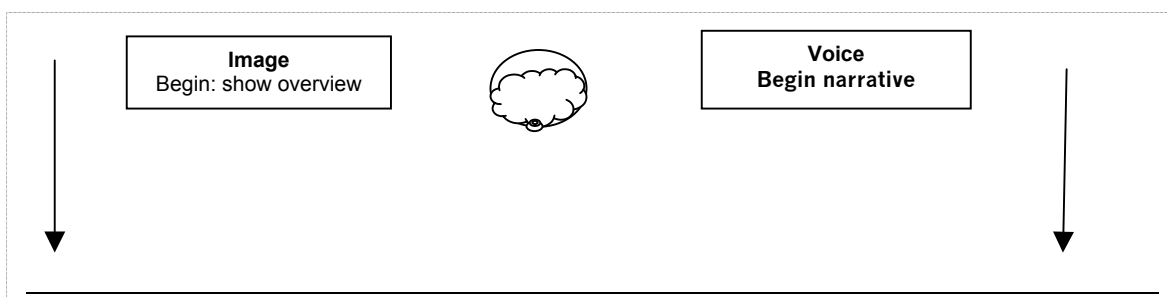
ultimate visual representation. We all know, though, that this is not generally true: visual representation might be more compelling than the script. We also are aware that to represent information in as compelling way as possible, we need to choose appropriate modality. And the modality we choose might depend on the story and the audience.

3. On Information Visualization and Story Telling

We all began our lives getting most of our information visually. With computer technology we may use visualization to tell complex stories. Let us consider information visualization and information visualization environments. Information visualization is a process that transforms data, information, and knowledge into a form that relies on the human visual system to perceive its embedded information. The goal is to enable the user/viewer to observe, understand, and make sense of the information. The difference between information visualization and traditional entertainment of film, video, theater, or television is this: the information and story conveyed in information visualization environments are much more complicated. Command centers such as those in power, transportation and telecommunication industries may serve as examples of information visualization environments. Complex information that moves into such command centers needs to be analyzed then communicated up and down the decision stream. Time-dependence of this information further complicates matters. Moreover, often the incoming information is not organized in any consistent way, and may require further processing. In such environments the problems often are these:

1. How to structure and give the information, so that it is presented efficiently and economically
2. What to include and what to leave out (as in all good story telling, the intended audience fills in the gaps)
3. How to present information in compelling and appealing way so that it is quickly understood

Here story telling and story-like visualization representation using computer technology can be invaluable. Moreover, the information problems encountered in complex environments and the actions they require may mean that information visualization is more than a single image or animation clip. It is therefore possible that like in a work on a film, story-like visual presentations in complex information environments may use at least two part scripts with images and voice in combination with comic like representations. An example of a fragment of a two-part script is shown in Figure 2.



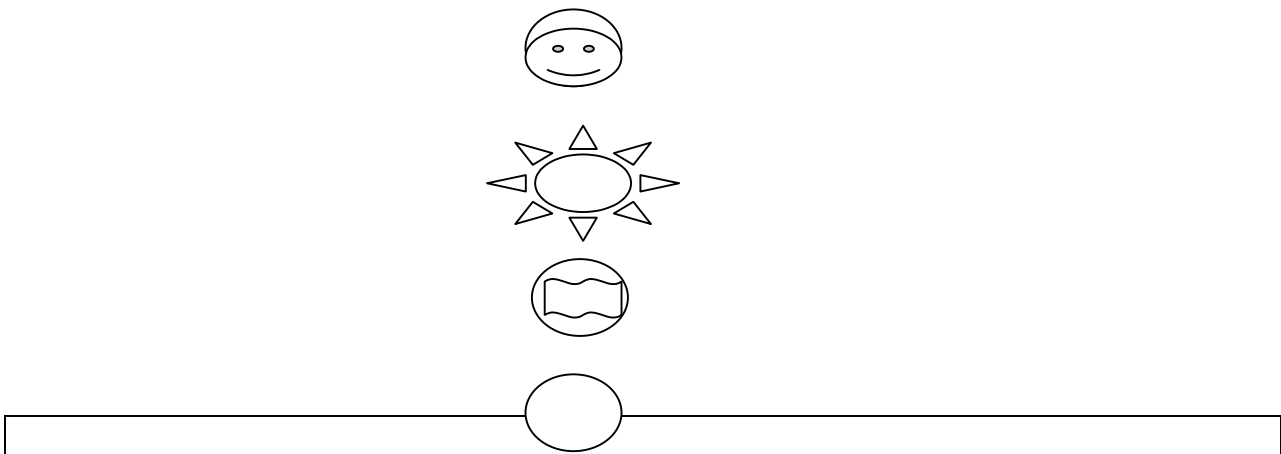


Figure 2. An example of a fragment of a two-part script for the visual representation of information.

To represent the information visually in a story-like fashion, following sets of actions are often needed [Shank (1990); Gershon and Eick, (1995), Gershon and Ward (2001)]

- Building the picture
- Use of comics metaphor
- Animating the events
- Setting mood and place in time
- Conflict and ambiguity resolution
- Intentional omission
- Continuity
- Effective redundancy
- Increasing attention

These are all storytelling techniques that are used in good storytelling. They support the story and convey the information [Pinker (1994)].

Because of the page limits put on this paper, we omit detailed description of the actions listed above. Nevertheless, even from casual pondering of this list it is clear that the development and use of information visualization for presentation (of often complex and massive amounts of information), especially in real time, is non-trivial, even when using visual media [Card et al. (1999); Keim (2000)].

4. Conclusion

Technology in the form of computers has given us a dynamic new visual medium beyond paper that is very valuable to those who are interested in visual storytelling. And visual storytelling, in turn, might be of critical importance in providing intuitive and fast exploration of very large data resources in real-time. Real world data and information are often complex, of diverse types from diverse sources, and

not always reliable. Users of data in the real world come with all types of personal skills, tastes and education. The problems the information visualization has to address are diverse. Employing storytelling modalities caters to the fundamental mode of human information processing and thinking. Thus the critical research question that needs to be addressed is this: how to tailor visualization systems to accommodate storytelling, uniting film, video, internet, radio, written and voice static and dynamic narrative? That is, how currently available information technologies can be used to accommodate human perception and information processing?

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