How Interactive Storytelling can explain Complex Natural Phenomena

by Nils Wiberg Co-author Lemke Meijer.

Introduction

There role of museums are changing from being archival repositories of information to creating context and memories around the topics they are covering.This is both in response to audience demands and to the societal relationship with knowledge. With the increasing access to information through our pockets, museums and exhibitions are seeking to innovate the way their stories are told. Since some years interactive storytelling, where the visitor is a more active participant in the exchange of information, has been growing in presence in the exhibition space. The design of such interactive experiences for these stories opens up a whole world of possibilities. Through examples this paper outlines how we use tangible interaction and argues that it creates more understandable and memorable experiences, especially when talking about complex natural phenomena. The goal of these designs is to change an end users perspective on something rather than just being a retinal afterglow created by the familiar confetti of modern technologies.

Tangible Interaction

We use tangible interaction as a tool that takes the visitor, their human behavior and the desired emotional experience as a starting point in designing interactions with installations. We design these tangible interactions with the goal to connect the story to the visitor, in such a way that the visitor becomes part of the story that is being told. When retrieving stories from an installation we avoid complex menu systems, but rather revolve our thinking around the story and the required visitor experience, and let that lead to how one could interact with it. We will address a few key principles when we use tangible interaction through a number of examples.

Intuitive Behavior

If you look over the lake in the National Park of Thingvellir in from a birds eye view you will most likely start pointing out things in the landscape. An expert would point out hidden treasures and explain where the ice age left its marks or how to recognise masses of lava reshaping the ways of the rivers. Not everybody has access to this birds eye view but the idea of pointing out things in a landscape is a very natural behavior. In the Thingvellir Lake installation we tap into this natural behavior and let the visitor point onto a vivid view of the Thingvellir Lake. The visitor performs this deixis by turning a haptic knob which is the virtual pivot point of a ‘spotlight’ that moves over the landscape. We take this interaction one step further by revealing a hidden layer with underground streams and topographical data within this view as the visitor is pointing over the lake. We designed, virtual haptic steps actuated via liquid metal within the knobs so the visitor will not only see, but also feel when there is an information spot to explore. As the visitor points the deictic line at an information spot, an animation opens up showing the information tidbit in an easy to understand isometric orientation, fitting with the view of the lake. In order

get information from their point of view, the visitor does not have to figure recalibrate their bearings, but are rather guided by instincts which then leads to a smooth memorable experience.

Interactive Metaphor

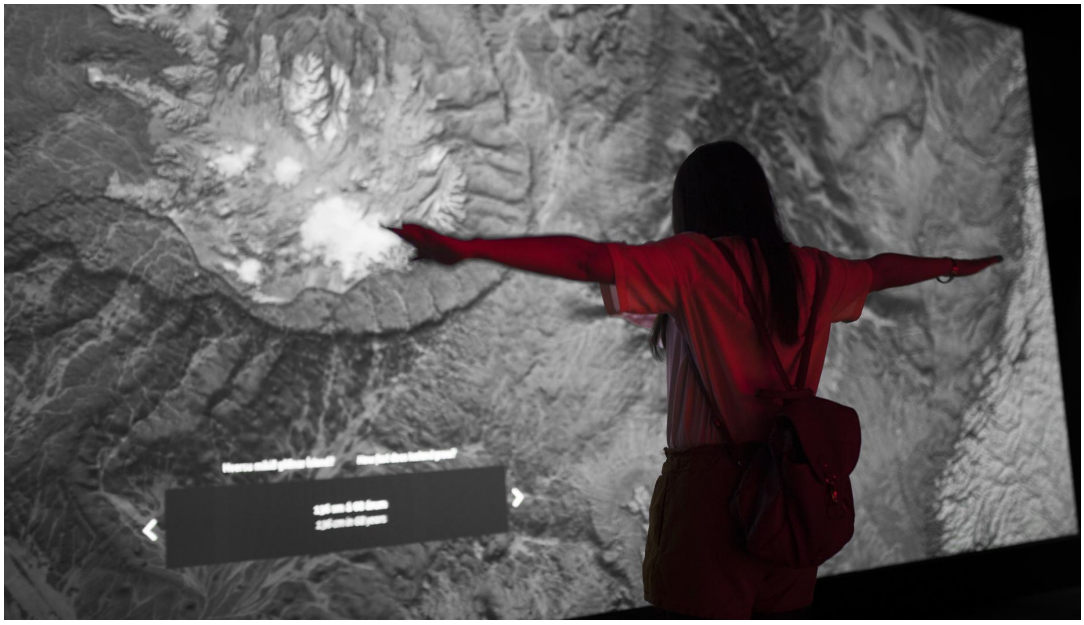
Hovering a magnifying glass over an object or spinning a lens to zoom in and out of a view are actions we know from cameras, telescopes and the like. This interaction is known to most people, and therefore you can see this as some sort of pre-programmed behavior. Tapping into an interactive metaphor like this can prove to be useful, especially when retrieving a plentitude of information at different magnitudes of scale. In the Ecosystem Viewer installation we were challenged with the communication of a large amount of information; not only show what vertebrates, microbes and plants one could encounter, but also their interrelationships and the complex interdependent systems that hold everything together. Showing the difference in appearance of these ecosystems gives the visitor an idea of how to recognise them. Scattered over the table a number of rings are laid out, magnifying the content within it. At a glance dragging the ring with the magnified content moving along turns the ring into a magnifying glass for the visitor and makes him understand what to do with it. The visitor intuitively moves the ring over the ecosystems and finds hidden points of interest. Subsequently he can spin the ring, and the view transitions to the next zoom level. A new layer in the ecosystem opens up in which the visitor can explore life through moving the ring. As the visitor knows there is more to explore, he does not want to miss out and is encouraged to keep spinning to the next level, each time getting closer to the smallest of life in the ecosystem. If all the content of this installation was shown simultaneously to the visitor it might quickly become an overwhelming encounter. However, when crafted into several narratives with smaller amounts of information, the visitor is incentivised to reveal the next step through a playful interaction, constantly curious to discover the next chapter. The interactive metaphor then corresponds the the food chain of the biotope that is built up via the movement in the interaction. Therefore the interaction both creates context and afford more exploration than otherwise would be the case.

Perspective

Some phenomena are not just complex in the way they are constructed, but look very different depending on the way they are perceived. Just imagine perceiving it from the perspective of something else than yourself. This installation in Iceland did just that, it tells the story from the top of Vatnajökull glaciers and explains it from the glaciers point of view. Glaciers to us seem like static mountains of ice, not much different from the rock pile it covers. When we try to look at it from a geological perspective, the glacier is so strong that it has the power to sculpt the mountain that lies underneath it.
At this Glacier Panorama installation we let visitors step physically into different perspectives, looking at the events on the glacier from a biological, geological or anthropocentric view. Flash floods, surging ice, volcanic eruptions and calving ice can all be seen as beneficial, disruptive, majestic, constructive or entertaining, depending from which perspective it is perceived. An eruption brings a lot of trouble for people, but the nutrient rich ash that spreads over the country forms a source of life for the biosphere. Flash floods in their turn wash away all life, and any construction they encounter, but bring nutrient rich water to the oceans, benefitting the ocean life. By presenting the different aspects from distinct perspectives, the understanding of such phenomena and the value of each of the events are perceived through a standpoint other than the human one. This hands the visitor the tools to think further and see the impacts of geological events and objects beyond what is good for the human, creating an empathetic identification with nature.

Embodied Mnemonic Device

Interaction can be used as a mnemonic technique, helping to understand, internalise and remember facts and stories. Relating an explanation your body, using the sense of proprioception, information becomes more than data one needs to understand. It becomes a physical story, which makes things easier to understand. The earthquake wall installation explains how earthquakes in Iceland happen due to tectonic movement. As the tectonic plates part, Iceland grows with two cm (0.8 inch) each year. This fun fact is very simple to understand, until you try to extrapolate those cm over years and then try to fathom how vast that actually becomes. As such, this very simple information bit quickly becomes way more complex. In the earthquake wall we implemented a simple interaction along with physical feedback that takes away the cognitive load immediately and provides a much easier approach to the subject, focusing on the sense of proprioception: the visitor is asked to measure a certain distance with their hands and reflected on the wall across from them it is immediately translated to a number of years. Without the need to understand how many centimeters it actually is, the feeling within your body of the distance between your hands provides a lot of understanding of the speed in which Iceland is under constant growth. In the effort of opening up a geological imagination in the mind of the visitor this installation combines proprioception with the equilibrioceptive feedback given to the visitor via vibrations in the floor in tune with the movement of tectonic plates. The use of these other senses embodies the knowledge in the visitor in a way other means of communication may not have.



Combined

These design principles are combined in the immersive volcano room installation in the LAVA centre. This room is the culmination of a narrative through the centre, where the visitors have learned about the origins and technicalities of volcanoes in Iceland. The last room brings the visitor to the present, showing a 270° view of the volcano landscape around the LAVA Centre.Here the volcanoes present themselves in poetic terms by speaking in the first person to the visitors as they approach a volcano. This individuation of the volcanoes as characters with certain traits -derived from folklore and geology- transform them from static background landscape to individuals. They are given a voice and are presenting a different perspective of how the world might app. Then, as the visitor is standing in a landscape, using the interactive metaphor of deixis, he can point at things he sees in the landscape and while doing so,

volcanic individuals come to life in front of him. Being surrounded by volcanoes, each erupting one by one, the physicality of the experience and being immersed in it strengthens the memorable experience. Having an interaction with an individual volcano gives the visitor the opportunity to become acquainted with them in a way they otherwise would not.

Concluding

As the previous examples show, stories can be told in different interactive ways. By involving the visitor in the storytelling, using tangible interaction, stories change in their appearance and become more natural to the visitor. Instead of each story using a similar language to be communicated, such as text and images under glass, we use all the senses in order to create these experiences of stories, focused on eliminating unnecessary computer administrative debris. When we pick the right language to communicate the message, it requires less cognitive bandwidth to the organisation of information, and therefore reduces the complexity, and as such, making it more intuitive, understandable and memorable.