

# Data Visualization trends and the future



Amblin Entertainment

For those of us who watch science fiction, we often imagine the future of data visualization to be like this, as popularized in the movie *Minority Report* from which this clip is taken. <https://www.youtube.com/watch?v=8deYjcgVgm8>

## Data visualization in entertainment (shows, sports, video games)

We spend a lot of time watching TV and consuming media entertainment. Let's take a minute to think about data that accompanies many of these experiences. This is particularly prevalent when watching sports. Consider watching baseball; besides the live action, you are also presented with on screen information about people on base, pitch location, pitch speed, balls and strikes counts and last but not least the score.

Watching football, we see superimposed, on screen, graphics showing us the first down markers, team stats, and player stats that greatly add to immersing us in the entertainment experience. When watching news channels, there is often a ticker of information whether it is showing breaking news headlines, stocks, or what segments are coming up next. Some channels experiment with live participation during shows, showing tweets of others who are watching the show. After learning about data visualization, you should become hyperaware of all the additional supplemental data displays that we are consuming all the time when watching media and also begin to develop and consider effective use versus detrimental use of poorly designed experiences.

Next, I want to also quickly touch on data in video games. Many games have what is called a HUD (head-up display) element which shows you information while you move about the game. This may be information or status about the character's health, inventory of items, as well as where you are on the map in the game. It also may display something like a heat map showing where other players are on the map and whether they are friend or foe. I know many of us are not gamers but it is a rich playground and exhibition of interesting user interface patterns.

Today UX folks may leverage UX patterns from popular apps because even if the visualization doesn't follow best practices, they are familiar now to many and thus become usable through learned use. In the future, even more interfaces that we leverage will come from sources beyond our computers and phones, such as from displays seen on TV programming and game interfaces. It is a rich resource that I draw upon in my own UX work as many of the constraints of designing UX for TV and games lead to some very clever and unique patterns that are also often beneficial when applied to PC and phone interfaces.

## Wearables, Augmented and Virtual Reality

### Augmented Reality

Augmented reality is essentially when we superimpose information on top of the real environment. This could be helpful in critical tasks like surgery or in recent entertainment successes like PokemonGo (shown below). There are also implications in retail settings. Imagine being able to hold your phone up on an aisle at the store and have it indicate which items were on sale. Augmented reality is also being used in autos to show heads-up display projected on the windshield with data, such as speed. One of the main advantage of augmented reality is that it does not obscure the real world but rather aids in decision making in the real context. Nor does augmented reality require the user to wear fully immersive headgear (virtual reality).



## What happened to google glass?

A few years ago the talk about wearables such as Google Glass were all the buzz. The Google Glass as you may recall were like monocular-like glasses with a tiny screen in front of the right eye which output visuals, giving the user the impression that the text and images are projected in front of you. Google Glass allowed the user to issue voice commands in order to do things such as search the web, take and upload pictures, record video, get heads-up gps navigation, translate text, and anything else that is possible from a typical internet-connected desktop computer.



## Why it failed?

Some analysts cited some health and safety concerns and lack of agreement on its purpose in everyday life, as detailed in this article, "[5 Reasons Why Google Glass was a Miserable Failure](#)," in *Business 2 Community*.

Simon Reynolds, writing in *Forbes*, saw marketing failures as the reason for its flop. You can read his story here:

<http://www.forbes.com/sites/siimonreynolds/2015/02/05/why-google-glass-failed/#3d81d1d21312>

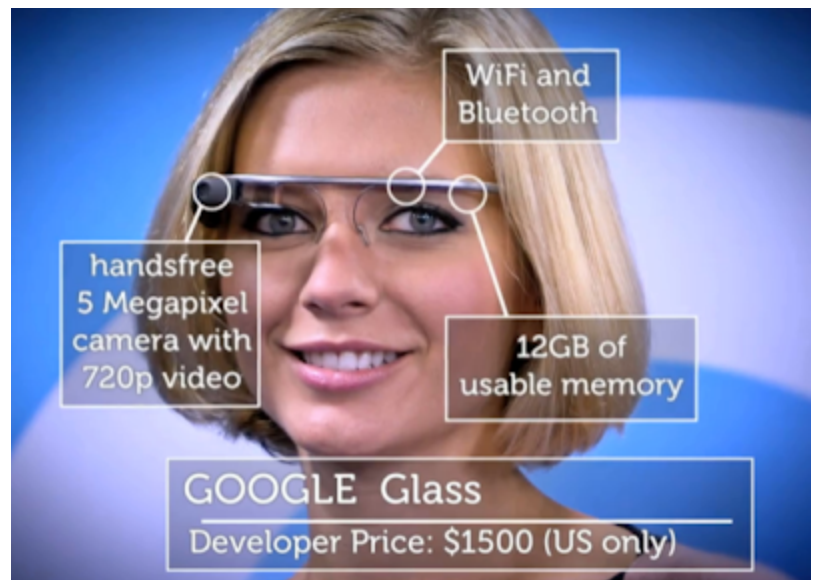
While it was a flop for broad audiences, others found it to be an innovative application, as described in a *Nature* research paper where it was implemented for use in biomedical research:  
<http://www.nature.com/articles/srep22237>

## Virtual Reality

At left below, bio-informatics scientist Anton Koning is mining the human genome in the



I-Space reality environment. (source: <http://www.zdnet.com/article/virtual-reality-helps-diagnose-heart-defects>)



While Virtual Reality has been around for years, it has been mainly limited to research and training sectors but in the last couple of years, it has become available at a price point affordable to the consumer market. Oculus Rift, HTC Vive, and PlayStation VR have all opened the way for the next generation and more mainstream use of virtual environments. Granted, it is still mainly used by gamers and gadget fans for



entertainment purposes.

We are all used to our normal flat screen monitors and while we may make them larger or have multiple displays now there is an inherent limitation on the amount of information that can be absorbed by the eye with this medium. Michael D Thomas, a SAS software architect,



states we can only process less than 1 kilobit of information in a second from a flat screen. With VR you can immerse the user in a virtual space with a 360-degree field of vision and have simulated movements in three dimensions. This should greatly increase the bandwidth of data available for our brains to absorb. It will be interesting to see whether the challenges of increased cognitive load will hinder or limit understanding or insights that can be discerned despite the technological leap.

A few years back folks at Goodyear developed a simulation of their racing tires in a virtual environment. This allowed them to view the effects of every minor variable change on the tire's performance. The visualization allowed them to answer the question of why there were losing races. This is a case where the increase in data bandwidth did in fact lead to more rapid insights.

The way to think of virtual versus augmented environments is that virtual reality is fully immersive and is in a sense virtual travel. When donning the headset, it occludes reality and takes you to a place back in time or far away like Mars, if desired. The head tracking piece allows you to look 360 degrees around you and provides a true sense of presence. While common in entertainment, this ability to go where we can't aids in important work as well. We can send robots into harsh environments for example while we sit inside teleoperating it and see what it sees. We can also go beyond human vision and be immersive at scales we could not appreciate otherwise such as when working with nano technologies. New perspectives from immersing oneself in data can also lead to new perspectives and conclusions and aid in analysis that would be difficult otherwise. Many of the barriers that hurt VR in the past are being mitigated these days with advancement in technology. The motion sickness and heavy headsets that made VR experiences unpleasant are pretty much a thing of the past today.

## IOT and data visualization

Data visualization traditionally is viewed on desktop computers which limits data accessibility and the users' mobility. As you can imagine in many scenarios and applications, this could slow down decision making that is being made based on data. Even walking around our own houses we notice some of these limitations for less critical tasks. For example, traditionally you feel cold, so you would get up and walk over to a thermostat on the wall and check the temperature and validate that it is objectively cold and make adjustments directly on the physical device. Nowadays with the popularity of smart thermostats like Nest and others, we have remote viewing through an app on your phone as well as direct manipulation on the phone screen which then communicates with the physical device. This trend will continue where we no longer look at the individual gauges and displays on the physical devices but rather can monitor them from afar and make changes from afar. User experience for the internet of things is an exciting emerging field which has to figure in the interaction of many application interfaces (or data abstracted from a traditional interface) and complex systems as well as having the fun challenge of physical space (as often users aren't at a desk when interfacing with their smart devices). IoT has its challenges such as security but the future will see us viewing many more dashboards with data from many smart devices all around our homes and environment rather than having discrete apps for each function. The growing trend of voice interfaces will continue but will be supported with displays as well for multimodal experiences. For example, you might gesture on the screen and say tell me about hotels in this area.

# Health and Safety

The amount of information regarding health and safety is overwhelming these days and more and more sources of data emerge each year with the rise of smart devices included. Safety will become a more critical factor as interfaces such as augmented reality integrate with our experiences outside the safe office desk environment and trend towards mobility. The connected car is one that comes to mind of course. Accidents related to phone use in cars is well known. So while advancement leads to the ability to supply more and more data all day, we need to be smart both in the implementation but also where it can be tolerated with our known human factors of cognitive limits around vision and attention. While those who have worked in user experience in defense industries or mission-critical industrial scenarios are quite familiar with human factors and human limitations, the number of web UX designers who have this training are few and far between. Internet of things and new mobile interfaces will require new training and skills and is an exciting new challenging space. However, if we pull it off appropriately, there will be a comfort and ease of use to make many more data-based decisions in our life effectively and efficiently and nearly effortlessly.