



# AUGMENTED REALITY BRIEF

## Augmenting the World: The Future of Augmented Reality

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### ◆ BREVITATIS CAUSA ◆

If, as the saying goes, trust arrives by foot and leave on horse, augmented reality arrived on a jet flight. Indeed, augmented reality (AR)'s most antic version arrived to humanity inside 1950s jet cockpits to help pilots optimise flight angles. AR enables a live vision of the real world, through a hardware and software-generated sensory inputs projecting virtual objects and volumetric imagery that seamlessly blend into our perceptions. Just like when Tony Stark in *Ironman* projects the photorealistic image of Jarvis' brain. We don't seem to fully realise that AR has infiltrated our lives at a flight speed. Yet it has rapidly secured its feet on multiple grounds. Boeing launched an AR-enabled system that provides live instructions to assembling workers to reduce the mistake rate and increase efficiency. Microsoft recently rolled out the "HoloLens" headset to enable medicine students to dissect virtual cadavers in the air. L'Oréal "Makeup Genius" app was also an early footstep of AR. Out of the \$150bn that alternative technology (VR and AR) is predicted to generate by 2020, nearly 80% will come from AR (Digi-Capital, April 2015). Can our world truly be augmented in the next ten years?

### ◆ ANALYSIS ◆

• **The Reality of Augmented Reality.** One issue currently preventing AR to blast off into high orbit is cost. The technology and components involved in AR headset are extremely complex: high-end gyroscopes for rotational information and precision (a key success factor of any AR system), light materials (carbon) and innovative design (e.g. Meta's headset) to ensure good experience, incorporated intelligent software to coordinate vision and movement of the subject as well as the appearance/disappearance and "palpability" of virtual objects. Microsoft's HoloLens thus costs \$3,000 and Meta's Kit \$949. This represents an important purchase barrier and prevents instant mass market penetration, currently achieved by artificial intelligence (AI) software like Apple's Siri or virtual reality (VR) devices such as Google's Cardboard (free). Yet it would be inaccurate to say that AR is a niche market only for the rich or for corporate use. Pokémon Go, although still a "primitive form" of the AR technology (*The Economist*, 4<sup>th</sup> Feb. 2017), along with Snapchat's Filters, are probably the world's most widely-used forms of augmented reality, from teens to the elderly. Partly because they're both free and fun to use, as they don't seek to optimise human cognition like the more advanced AR systems.

• **The Headaches of AR Headsets.** In the next ten years, AR is likely to continue to fight off major concerns about its technology if it is to scale and achieve full deployment. These include privacy issues and aesthetics, which explained the failure of Google's AR-enabled "Glasses". Another step to achieve worldwide adoption is to achieve inter-country regulatory harmony. This poses a problem in terms of privacy regulation if, for example, future AR technology enables instant data gathering and "intelligent" information on real people "visualised" on the street. It is wise to remember that the famous jurists Warren and Brandeis created the American right to privacy in an 1890 *Harvard Law Review* article, out of fear that Kodak's first mass-market camera would allow anyone to snapshot people's privacy. The current privacy regulatory frameworks in the U.S (e.g. 1974 Privacy Act), Canada (PIPEDA) or Europe (ECHR, article 8) are not adapted to AR, partly because AR's precise impact has yet to be measured and fully apprehended. In that regard, AR could shape future international relations: if the U.S were to maintain an economic edge over Europe in the AR market (i.e. with its successful companies like MagicLeap and Meta), would a new EU-U.S Privacy Shield, adapted to AR, be reasonably possible between two differently-performing continents? If so, who will get to decide the contours of AR privacy?

At the other end is the potential danger of AR applications. One of which is acutely depicted in the UK show *Black Mirror* (season 3), where a man takes up a one-off gig to test a revolutionary Japanese horror video game. With a special sensory capsule implanted into his neck (the futuristic equivalent of an AR headset), he is locked in alone in a mansion and told that the game is to "survive" until dawn. The miniature capsule encapsulates an algorithm that processes the man's deepest psychological fears and projects them in awfully terrifying "augmented" visuals. After a few real-looking screamers, the man dies from a heart attack. The virtual game lasted several hours in his augmented mind. The real-world time-lapse between putting the neck capsule and his actual death was 0,4 seconds. The episode smartly illustrated the potential power of AR and poses the question: can we trust augmented reality(ies), if they can augment our minds so powerfully to make us believe what doesn't exist?

• **The Future of AR Technology and Philosophy.** At the core of AR technology is the dogged desire to blur virtuality and reality: to make the virtual objects graphically so precise and acute that they truly seem real. One key issue with this desire is how to emulate textures in order to make these objects feel real to our finger cells as we touch and move them around. This remains extremely difficult as it would mean interacting directly with the somatosensory system, i.e. the neuronal receptors that give the sense of touch, sense of grasp (haptic perception) and sense of position and movement (proprioception). Haptic technology already exists (tactile telephone, the first patent of which was granted in 1973 to Thomas Shannon) but so far AR systems only provide the illusion of touch. It is yet unclear whether full-sensory immersive AR experiences could be truly achieved within the next few years

At the core of AR philosophy is the pressure to move from "novelty" to "utility" (R. Metz, *MIT Tech Review*, 2012). Indeed, the potential space for AR applications is very wide yet only minimally exhausted: medicine (intelligent surgery instructions while operating a body), education (aiding spatial visualisation for young kids), business (teleconferences with PowerPoints "shared" in the air) and even entertainment (4G cinemas simulate seat movements, 5G could add sensory-inputs to enable viewers to "touch" the movie characters).

### ◆ CONCLUSION ◆

One thing will likely need to happen to unleash and maintain the magic of human super-perception in the next thirty years. Not to move from novelty to utility, but to combine them to make AR both desired *and* necessary. The bar to clear for public perception is steep. The reason is that the Hollywood promises of AR are so grand (think *Iron Man* and *Avatar*) that any variance between movies and real-life technology might be unconsciously perceived as a failure by the public, thus mitigating AR's mushrooming momentum.