Immersive Media

## Technology Overview

6.1.1   Immersive media determines the ability for consumers to experience an event more realistically but in a virtual environment in the near future. Strong demand for more realistic and immersive experiences has pushed video display providers to deliver high-resolution screens that give viewers unprecedented immersion into content on display. New media formats, delivering and accessing content through social media, and new devices like Ultra High Definition (UHD) displays and panoramic displays, help forge new hyper-realistic experiences that are more engaging, informative and immersive. Sensory technologies like wearables and surround sound take immersion to the next level with contextual media environments and content.

6.1.2   Human-computer interaction is also becoming more sophisticated. From recognition and tracking technologies to natural language learning abilities, computers can now offer new media experiences, efficiently perform daily tasks and increase productivity. Subtitle translations are becoming more accurate and reliable. Content that are not in the native language can be translated and sold to other countries such that viewers can continue to be immersed in content produced from all round the world, expanding the reach of media experiences across cultures.

6.1.3   In the digital future, virtual reality through holographic and augmented reality can also support immersive experiences in areas such as gaming, education, simulation training, biological and experimental visualisation. Immersive viewing of biological/biochemical reaction will allow researchers to gain in depth understanding of the intricacies and complexities of biochemical reactions and bondings.

6.1.4   With greater demand from viewers to gain access to live content from various parts of the world as well as to support the community of the visually and hearing impaired, media distributors have to consider offering accurate real-time subtitling and translation so that this group of viewers can continue to be immersed in watching their favourite TV content.

6.1.5   Visual recognition technologies can also allow content providers to customise and personalise media content for the consumers through facial expression.

Market Size

6.2.1   The immersive media global market size[36] was estimated to be US$143 billion in 2014, with immersive consumer products and devices being a major contributor in the market at US$127 billion. Strong growth in immersive consumer products is expected from Head Mounted Displays (HMD)[37] such as the Oculus Rift and Mobile Augmented Reality consumer products.

6.2.2   In Singapore, the immersive media market is expected to grow from US$195 million in 2014 to US$275 million in 2018 at a CAGR of nine per cent. Likewise, immersive consumer products are expected to be the largest segment.

Singapore's Immersive Media
Addressable Global Market, 2014 – 18 (US$ mn)
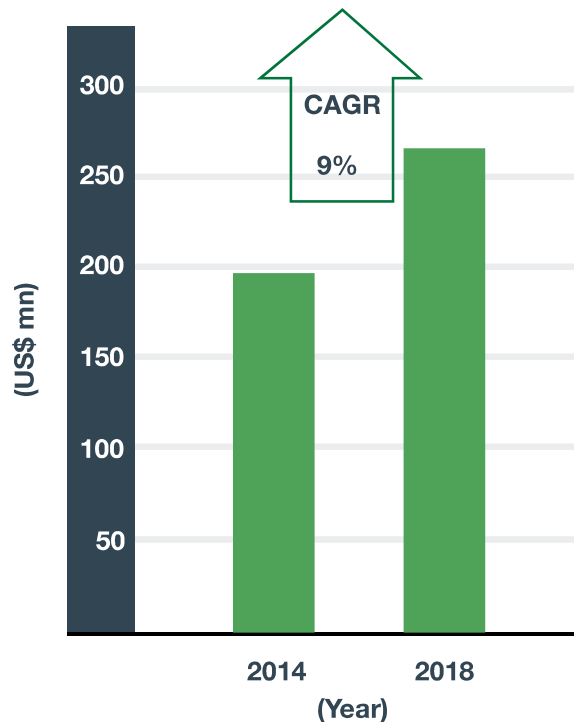
Trends

6.3.1   <u>Growing popularity in Virtual experiences:</u> The Virtual/Augmented Reality (VR/AR) market will hit US$5,800 million by 2019, with a CAGR of 39.2 per cent from the market value of US$470 million in 2012. Increasingly, mobile apps developers are taking advantage of the 'smartness' in smartphones to develop apps with AR elements to give consumers an immersive experience. This signals the move of VR from niche to mainstream, where more mainstream manufacturers can develop consumer VR kits that work with readily available consumer devices. With the explosive growth in mobile devices and high speed internet, AR today is known to be the one of the most disruptive technologies of the decade. It is beginning to make its way into the lives of consumers outside of gaming. Qualcomm, together with Samsung, has developed an AR app to complement the Guinness Book of Records. Utilising the front camera of the Note 4 strapped onto the VR gear, consumers are able to interact with the content on the pages of the book and experience a new level of interactivity and immersion in education. Further highlighting this trend is Microsoft's venture into AR with the HoloLens, which overlays holograms of imaginary objects onto the real world, allowing users to view and interact with three-dimensional images. The HoloLens is intended for entertainment as well as more serious purposes, such as helping a surgeon visualise a new operating technique.

6.3.2   VR hardware sales are expected to rise from 5.7 million units in 2015 to 23.8 million units in 2018. These are worth an estimated US$2.3 billion in 2018 and an accumulative revenue of US$8.4 billion from 2014 to 2018. Total 2018 annual software revenue is projected at US$2.8 billion from 47.6 million active users, with the cumulative software revenue from 2014 to 2017 to be worth an estimated US$7.7 billion. Combining hardware and software, the consumer VR market is estimated to be worth an accumulated US$16.2 billion across the period from 2014 to 2018. Head-mounted display or wearables are gaining traction in terms of enticing consumers to experience VR which creates Stereoscopic 3D that is different from 3D movie seen today. However, 360 degree image processing for VR is going to be resource intensive and requires higher processing power chipsets to overcome the delay. In order for VR to be successful, wearables need to take into consideration the level of comfort when worn, especially in terms of weight.

6.3.3   Audio also plays an important role in giving the users immersive experiences. Multi-phase audio and object-based audio create an additional depth for users. Audio technology has improved so much in recent years that the technology is able to deliver various 3D audio experiences to complement the immersive video parts. Using intelligent audio projection, the user is able to perceive sound coming from various directions and sound moving nearer as well as moving further away.

6.3.4   <u>Growing demand for subtitling and language translation:</u> Despite huge advancement in machine translation technology, it is now just an enabler for quick translations, but not enough for professional publishing. There has been an increased demand for professional translation services, especially for frequently translated romance languages like French, German, Italian, Portuguese and Spanish. Popular Asian languages such as Chinese, Japanese and Korean are also high in demand in second position, while other languages such as Arabic and other Middle Eastern languages rank in third position. However, it is still a very fragmented market. The estimated size of the industry was $33.5 billion in 2012. The translation services industry is expected to keep growing and reach $37 billion in 2018. The United States represents the largest single market for translation services. Europe is a close second and Asia is the largest growth area. Currently, business is generated from both government and private industries. Subtitling and language translation in real-time is a huge market for the media sector that is yet to be uncovered as part of providing compelling content across regions.

Technology Roadmap

6.4.1   This table reflects the industry's view of the likely evolution and mainstream adoption of Immersive Media.

Demand Drivers	1-2 Years	3-5 Years	>5 Years
More Engaging Human-Computer Interaction	**Vision Intelligence**	**Higher Degree of Detection**	**High Resolution Imaging**
	• Visual navigation • Human recognition • Computer Assisted Vision for wearable vision systems	• Intelligent human movement analysis • Wearables image projection • Enhance motion detection • High resolution display technology	• Holographic/3D display technology • Virtual control of the digital world • Next generation teleconferencing • Advance patient condition assessment • Flight simulation
Higher Accuracy & Sophistication in Machine Language Learning	**Language and Speech Recognition**	**Higher Accuracy in Non-Real Time Translation**	**Language Translation in Real-Time**
	• High degree of speech recognition • Language recognition	• Speech-to-text translation • Text-to-speech translation • Improve accuracy in translation • Translation tools for the four native languages	• Real-time language translation • Real-time subtitling with high accuracy • Help local broadcasters to transmit live subtitling • Language translation for healthcare assistance
Immersive and Realistic User Experiences	**Immersive Audio/Video Experience**	**Immersive Prototyping**	**Total Immersion with Interactivity/Feedback**

	• Object based audio
	• Multi-phase audio processing
	• 360 degree image processing
	• Video Compression, Storage and Streaming
	• Scalable multi-screen video delivery
		• Immersive viewing display
		• Intelligent audio projection
		• Mobile Augmented-Reality
		  - 3D audio
		  - Mobile Apps on Android/IOS for AR
		• Large-scale multimedia networks
			• Augmented-Reality/Virtual Reality participation
			• Seamless interactions with the digital world
			• Tourism navigation guide
			• Enhanced educational tools
			• Gaming technology

^{T} is classified as Technology, otherwise as Capability.
Industry has differing views on the timeframe for mainstream adoption for some technologies.

R&D Opportunities

6.5.1   R&D opportunities in Natural Language Processing and Machine Learning will be required to support the Immersive Media technology area. Please refer to R&D opportunities under Cognitive Computing and Advanced Robotics for more information. Some possible immersive applications are listed below:

(1)   Sense-surround sound
(2)   Directed sound to suit listeners
(3)   Sports events using 4K/8K video with multiple angles
(4)   Aircraft maintenance
(5)   Simulated training and warfare games
(6)   Surgery for medical use
(7)   Simulation of biological processes and chemical reactions