VIRTUAL & AUGMENTED REALITY TOOLKIT TO ENGAGE SENIORS BRAIN WITH INTER-GENERATIONAL UNDERSTANDING

ERASMUS+ PROJECT

Intellectual Output 3:

An Empowering Guide to Exploiting AR/VR with Seniors

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CHAPTER 5 – THE BUSINESS SIDE TO EXPLOITING VR/AR TECHNOLOGIES FOR SENIORS

5.0 The Ageing Population

Thanks to advances in medicine, as the years go by, the life expectancy is continually increasing. As the population ages, and technology keeps on advancing, elderly are faced with the opportunity of lifelong learning – for example 'learning to use new pieces of technology' falls under one of the pillars of lifelong learning. Recently the term 'Ageing 4.0' is being used [1] which refers to seniors making use of 'Industry 4.0' technologies, such as Virtual Reality (VR) and Augmented Reality (AR).

5.1 Augmented and Virtual Reality Technology for Seniors

There are many benefits for the use of VR and AR for older adults including maintaining social contact via digital interfaces, helping with their rehabilitation, aiding them with daily tasks and promoting a healthier lifestyle by keeping them active [2]. In fact, VR and AR in the healthcare and medical field can be divided into 4 main areas [3]:

a) their role in *Communication* between the digital and real world;

b) their use in *Training* and Support;

c) their use in *Simulation*;

d) how they help improve *Therapy*.

5.2 Business Models for VR/AR

Business models for companies offering AR/VR solutions are aimed mainly at providing 'new experiences' for their customers. [4] mentions that there are very few business models referred to in research papers that target the medical field.

Osterwalder [2004] defines a business model as 'a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the

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architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams'. He proposed the 'Osterwalder business model framework' specifically aimed at technological businesses, as per Figure 1, containing 4 pillars (Infrastructure Management, Product, Customer Interface and Financial Aspects) and 9 related elements.

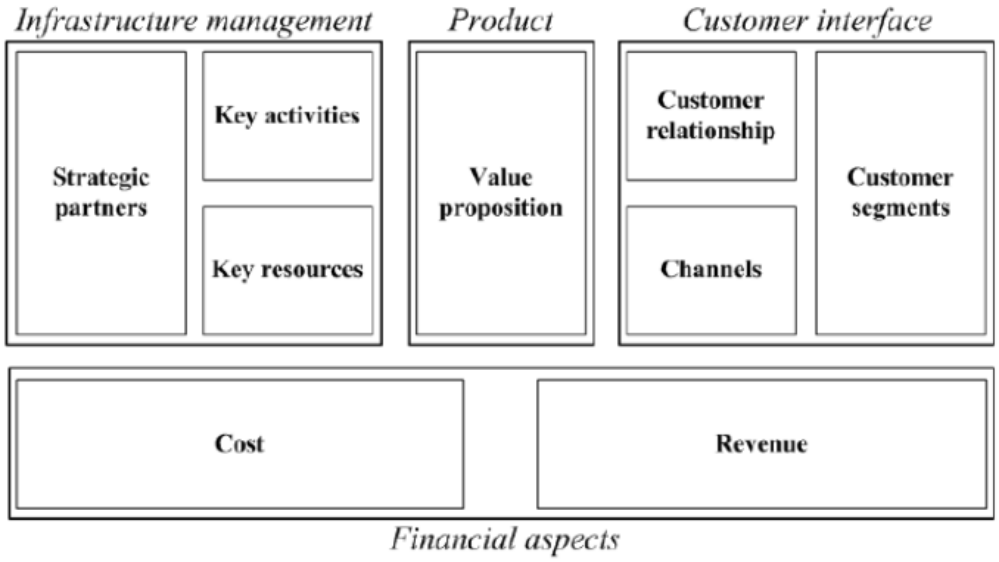

Fig. 1. Osterwalder Business Model Framework [3]

Figure 2 includes the Osterwalder Business Model Framework for AR applications.

Key partners Development technology provider Software platform provider Device manufacturer Internet service provider Application broker	Key activities Designing software Implementing software Testing software Fixing problems Documenting problems Key resources Patents Expertise Devices Staff	Value proposition In situ, utility, training, social gaming, location layers, virtual demo, experiential education, enhanced classifieds, 3D virals, personalized shopping, cooperation, blended branding, augmented events, intertainment, understanding systems, recognition & targeting	Customer relationships - Distribution channels Internet Application brokers Stores	Customer segments Manufacturers, architects, "smartphone"users, students, teachers, gamers, shop customers, shopkeepers, museums, zoos, educational institutions, business professionals, home entertainment users, mechanics, marketers
Cost Staff Internet hosting			Revenues Advertisements Application fees	

Fig. 2. Osterwalder Business Model Framework for AR applications [3].

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Amit and Zott [4] proposed the 'business model design approach' for studying the formation and development of a company's business model, based on two sets of design parameters to analyze activities: design elements (that constitute the business framework of the company – i.e. Market Offer, Development Focus, Partner/Customer Collaboration and Ecosystem View) and design themes (related to the specific type of company). A summary of a study with 42 medical companies that offer VR/AR solutions, is found in Figure 3. They classified a successful VR/AR business model into 12 design themes under the 4 design elements.

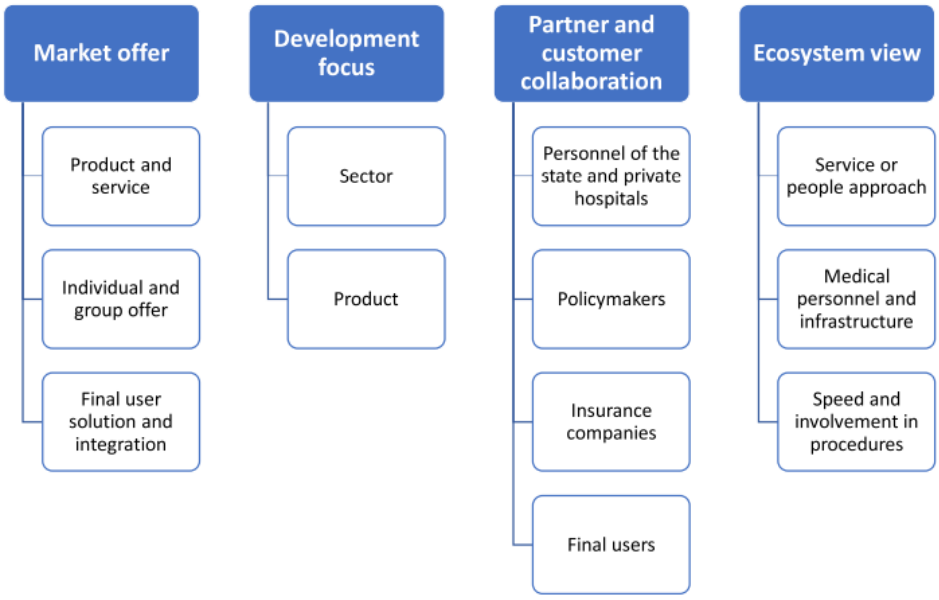

Fig. 3. Amit and Zott's Business Model Design Approach [4]

5.3 VR/AR Business Case-Studies

Rendever [5] is a company that has developed an innovative 'subscription-based service' VR business model for two market segments [6]:

a) Individual elderly (B2C); and

b) Public and private facilities – i.e. care homes (B2B).

The business offers virtual tourism offering concerts, historical tours or architectural exhibits offering elderly with limited mobility to travel around the world from the comfort of their home.

Fig. 4. Seniors enjoying a VR therapeutic group session [5]

Rendever also provides a service of personalized content such as creating sentimental value content by converting photographs of family members, family events into a VR experience, making the experience more personal and allowing elderly to be present in events that they could not participate physically in.

In the case of selling to senior communities, the business model includes an upfront cost for the hardware, installation and training, plus a monthly fee for content and ongoing support. The standard system includes 4 headsets but this can go up to a maximum of 8.

AR on the other hand, has been mainly used in the context of marketing allowing brands to offer unique and immersive digital experiences, and to engage consumers in a

memorable way. However, it is gradually also picking up its importance in the healthcare industry via a number of promising start-ups[7] that are offering amongst others:

i) *Augmented surgery:* The company EchoPixel [8] uses True3D software platform, which creates a holographic digital twin of a patient's heart. When pre-planning operations, patients can be shown this platform to explain to them what will be happening during their surgery.

Fig. 5. EchoPixel's AR platform showing 3D image of the heart [8]

ii) *Augmented diagnosis:* The company Accuvein [9] uses AR and a handheld scanner that projects over the skin and shows nurses and doctors where veins are in the patients' bodies so that IVs can be easily inserted for blood draws without having to prick the patients many times.

Fig. 6. Accuvein's scanner that uses AR to show 3D image of veins [9]

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One of the emerging trends in AR are what are referred to as 'Smart Glasses' [10] that will not only be revolutionalising our lifestyles and taking over smartphones but also the healthcare industry. Their biggest advantage over smartphones is that they are hands-free which in the case of healthcare staff such as nurses is a great benefit since they can use both their hands to take care of a patient while at the same time e.g. take pictures of wounds and have all the data documented in real time and uploaded into the patient's electronic record database.

Fig. 7. Example of smart glasses being used in healthcare [11]

5.4 Conclusions

When developing such technologies that combine AR/VR (known as XR/mixed technologies), ideally the patients/elderly people are involved in a very early stage when defining the product specifications – so that their needs and limitations (such as in the case of the elderly decrease in hearing, color vision, cybersickness, ergonomics etc..) are identified and taken into consideration during prototyping, testing and products amended accordingly.

The Aging2.0 Berlin innovation platform [12] explains how apart from involving seniors, ideally caregivers and family members should also be involved since they are the ones who create awareness, pay and stimulate seniors to start using such technologies. Startups therefore need to develop business models that do not just address the needs of seniors, but also those of family and caregivers.

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