

Mindworks

Project Description



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# Team Members / Matric number

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# Description of Project

The first and primary product of the company is a cognitive simulation game called MindWorks. MindWorks consists of multiple small mini-games each training a different area of the brain. Through a variety of different games, MindWorks can provide a complete package for keeping the brain active.

Each mini-game can be independently played and usually only trains one area of brain activity. However, besides just simply training the brain, these games are also design to be entertaining for players. Certain game enhancing features like competitive scoring and multiplier streaks makes each mini-game a fun and an enriching experience.

## Mini-game Categories

The mini-games will be categorized into a variety of categories depending on their primary focus.

### Memory Games

Memory games focus almost entirely on training the short term memory of players. These games will include some aspect of speed but it usually takes a back seat in these games. Memory games will not have any timer or time pressure. Instead players care given the ability to skip a particular challenge if it proves too difficult or if they cannot remember particular combinations or images.

### Arithmetic games

Arithmetic games consist entirely of mathematical puzzles of varying gameplay mechanics. These games will require players to count, add, subtract, multiply, divide or compare numbers and figures. Arithmetic games will not have any time pressure and, like memory games, allows players to skip particularly challenging puzzles.

### Speed of Processing Games

Speed of processing games or speed games for short can consist of elements from other games but the primary focus of the game will be the speed at which players complete challenges. Speed games can include some simple arithmetic questions which players will have to solve in a limited time. The difference between such games and Arithmetic games is the complexity of the questions and the inclusion of a timer.

# Technological Overview



The game engine used to develop the game was Unity 3D. Developed by Unity Technologies, Unity 3D is cross-platform game development software. Unity was chosen for its ability to target multiple platforms effectively. This was useful as it would allow the game to be deployed to multiple mobile platforms when the need arises.

Despite the game being mostly 2D in nature, using a 3D game engine allowed for interesting transitions and effects which would be difficult to achieve in a purely 2D game engine. Furthermore, the team’s familiarity with the engine made removed the need to learn a brand new game engine allowing for faster prototyping, testing and deployment.

Coupled with the flexibility and power of the engine, Unity 3D was the perfect game engine to use for the project.

# Commercial Opportunity

Singapore is suffering from an ageing population. Research has shown that the number of elderly citizens over the age of 65 will triple to 900,000 by 2030 (Population SG, 2014). Elderly citizens will account for above 11.7% of the citizen this year (Wong, 2013). This worrying trend brings about another serious repercussion.

An article (Mayo Clinic, 2014) from Mayo Clinic states that the early onset of dementia can start from ages 30 to 40 years old but is typically uncommon to see such an early onset. It is, however, more common to see people of ages 50 and above with the disease. With so many people above the age of 50, the occurrence of dementia is likely to increase.

This game hopes to elevate this trend by helping the older Singaporeans remain mentally active. Research has shown that remaining mentally active can delay the onset or reducing the severity of dementia symptoms.

There has been much controversy over the actual effectiveness of cognitive simulation games. However, a vast number of scientific studies have shown otherwise. It is important to note that the primary purpose of the game is not to improve intellect or make a person smarter. Instead the game is created to assist people in remain mentally active.

Based on a study conducted in 2009 (Andrade & Radhakrishnan, 2009), mental inactivity is one of the primary risk factors contributing to rapid mental decline which will eventually lead to dementia. Supporting this argument is a research article from the Journal of Neuropathology and Experimental Neurology (Mrak & Giffin, 2007).

A recent study published in the British Journal of Psychiatry (Orrell, 2012) indicates that cognitive simulation therapy can help to improve both cognitive function and quality of life in people with dementia and in particular Alzheimer’s disease. A six month study conducted by Dr. Ryuta Kawashima, a Professor of the Department of Functional Brain Imaging and the Institute of Development, Aging and Cancer (IDAC) of Tohoku University (Kawashima, et al., 2003), revealed that simple arithmetic calculations and reading aloud can help in the cognitive rehabilitation of people with dementia.

The saying goes: “Prevention is better than cure.” In addition to assisting in lessening the debilitating impacts of dementia, cognitive training games can also help to prevent the onset of dementia by keeping the brain active and alert. Although this might not completely prevent the onset of dementia, it can delay or lessen the symptoms of this terrible disease.

A gradual decrease in processing power of the brain is usually associated with the normal process of aging. However, Alzheimer’s disease can cause the degradation of the brain to occur at a much faster rate resulting in the rapid decline of processing speed in the elderly with the disease. However, a randomized controlled trial conducted by the ACTIVE Study Group (Ball, et al., 2002) indicates that cognitive brain training programmes can help to improve cognitive processing power. The impact of cognitive simulation on mental processing power in elderly can be seen almost immediately in elderly with initial processing deficits (Ball, Edwards, & Ross, 2007). A related study conducted in 2010 (Edwards, et al., 2010) suggests that cognitive simulation not only improves processing speed but also transfers to everyday activities and functions.

A common symptom of Alzheimer’s disease is the inability to remember current events and information. Memory loss and low memory retention rates are commonly linked with dementia. However, cognitive training has been shown to improve memory and attention (Smith, et al., 2009). In a similar study conducted earlier (Mahncke, et al., 2006), researchers found significant improvements to nonrelated standardised neuropsychological measures of memory in healthy older adults. This memory enhancement appeared to be sustained for over a 3 month period with no contact follow ups for the period of time.

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