Gamification and geospatial health management

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Abstract. Sensor and Measurement technologies are rapidly developing for many consumer applications which have the potential to make a major impact on business and society. One of the most important areas for building a sustainable future is in health management. This opportunity arises because of the growing popularity of lifestyle monitoring devices such as the Jawbone UP bracelet, Nike Fuelband and Samsung Galaxy GEAR. These devices measure physical activity and calorie consumption and, when visualised on mobile and portable devices, enable users to take more responsibility for their personal health. This presentation looks at how the process of gamification can be applied to develop important geospatial health management applications that could not only improve the health of nations but also significantly address some of the issues in global health such as the ageing society and obesity.

1. Introduction

Gamification can be defined as a process which shapes the world (achieves goals/objectives) by influencing the actions, behaviours, characteristics and state of entities within the world (through the use of games strategies and enabling technologies). Gamification is related to but different from serious games and immersive technologies. Gamification is based on the assumption that the way society operates and functions is essentially equivalent to a game in which there are rules, prizes and penalties, winners and losers, competition and collaboration, individual players and teams. Success in society can be a mixture of merit (ability) and chance (fate/luck). Gamification uses a strategic approach to influencing and motivating human behaviours, development and performance by focusing on those factors which have the biggest impact on our actions and attitudes.

This paper concentrates on one of the most important global societal challenges today – public health and explores how enabling technologies and gamification strategies have the potential to address demographic lifestyle related health timebombs such as obesity, dementia, diabetes and cardiovascular diseases.

2.   Global health challenges

Obesity is a global problem, especially in the developed world (see Figure 1). Obesity is one example of a lifestyle related physical condition that is related to a variety of health problems, especially in later life. There is significant evidence that cardiovascular morbidity is strongly related to the following factors:

- Smoking
- Physical activity
- Nutrition
- Overweight and obesity
- Family history
- High blood cholesterol and other lipids
- High blood pressure
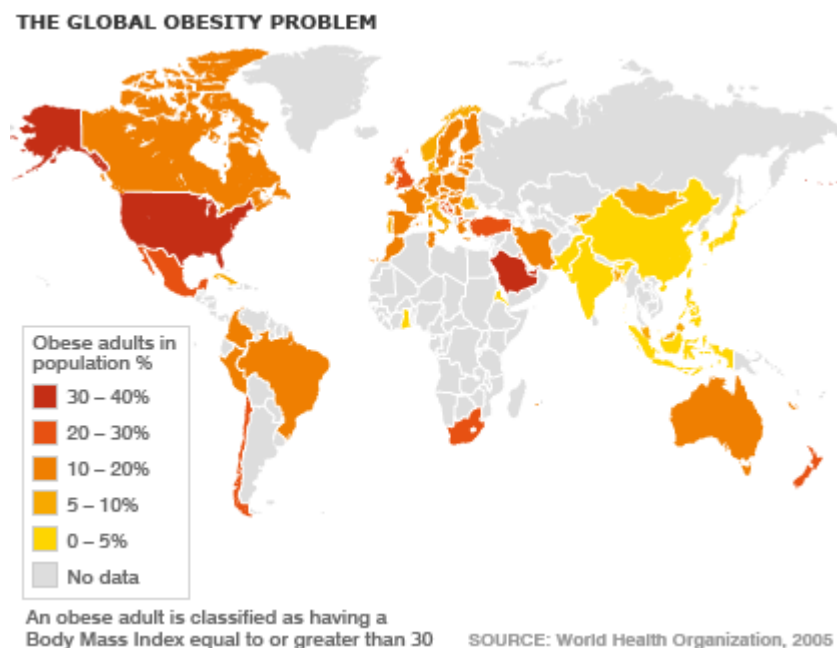- Metabolic syndrome.

Figure 1. Incidence of obesity in adult population.

In the developed world, whether through National Health Services and Private Medical Insurance, the model for health service provision is based on a universal payment system in which everyone pays to fund the possibility of needing a medical intervention whether that medical intervention arises from unforeseen accidents or self-inflicted health neglect. As the world moves towards an ageing society with increasing proportions of the population in retirement and at greater risk of health problems, there will be insufficient resources to provide health care on demand for all conditions and all people.

Since many of the problems could be addressed by improved lifestyles in the general population, any strategies which can motivate and empower large sections of the population to adopt healthier

lifestyles is going to become increasing important. The challenge is how to reduce the demands on the health services that are directly related to poor lifestyles. Governments tend to adopt policies designed to:

- Educate and inform
- Tax "unhealthy" products
- Legislate on food nutritional content
- Offer incentives to provide health beneficial services.

Whilst all these policies make some contribution to reducing unhealthy practices, they do not place any responsibility for lifestyle management on the individual citizen.

3. Gamification and enabling technologies

One of the most significant problems in empowering citizens [1] to alter lifestyles is the lack of knowledge and understanding of how to self-manage health. For those who can afford it, there has been an increasing demand for personal coaches and self-help organisations such as Weight Watchers, both of which provide feedback, education and motivation at a personal level. Today however there are an increasing number of consumer devices (see Figure 2) that track the key performance indicators that reflect health and provide tools on mobile devices such as smartphones and tablets to track and manage lifestyle related activities such as exercise, nutrition, sleep, weight, blood pressure etc.

Figure 2. Jawbone UP lifestyle monitoring bracelets.

These technologies enable gamification strategies that can give individuals greater control and understanding of their personal lifestyle factors and thus reduce the potential burden on society the arises from unhealthy lifestyle practices. The results of added control and understanding, linked to positive motivation can be impressive (see Figures 3 & 4).

Figure 3 Impact of lifestyle monitoring technologies on weight.

Figure 4 Withings Wifi weight chart.

4. Geospatial health management

The use of lifestyle monitoring devices together with a series of "win-win" relationships that can be brokered by the concept of co-production in an ecosystem or health promoting network, including the users, health and fitness professionals, insurance and nutrition industries. By adopting gamification practices that incentivise and reward not only healthy lifestyles but also the collection of key lifestyle data by each individual citizen, it becomes possible to generate "cloud-based" big data that can greatly enhance our ability to manage today and plan for tomorrow. As such devices and/or the mobile applications they use invariably have embedded GPS tracking, it becomes possible to not only analyse

geospatial related health and lifestyle features to inform policy decisions, but also to use social networking techniques to motivate citizens in a geolocation to act collectively as a team to improve the health of their community.

5. Conclusion

Society is on the threshold of major challenges to the way we manage public health because the existing funding practices do not provide incentives or penalties for self-management of lifestyle. The use of consumer wearable lifestyle monitoring technologies with geospatial enabled data capture can not only provide better data for public health management but also motivation for better community health practices.

6. References

[1]   Wortley D J 2012 *Gadgets to God* (Leicester, UK: Matador Publishing)