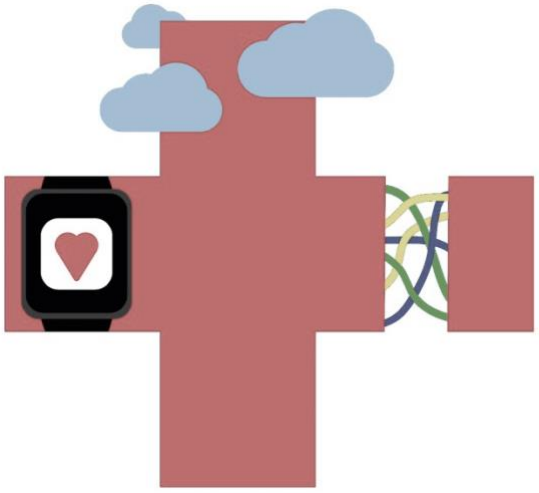
OXFORD BROOKES UNIVERSITY

Strategic Management

- Portfolio Assignment Task



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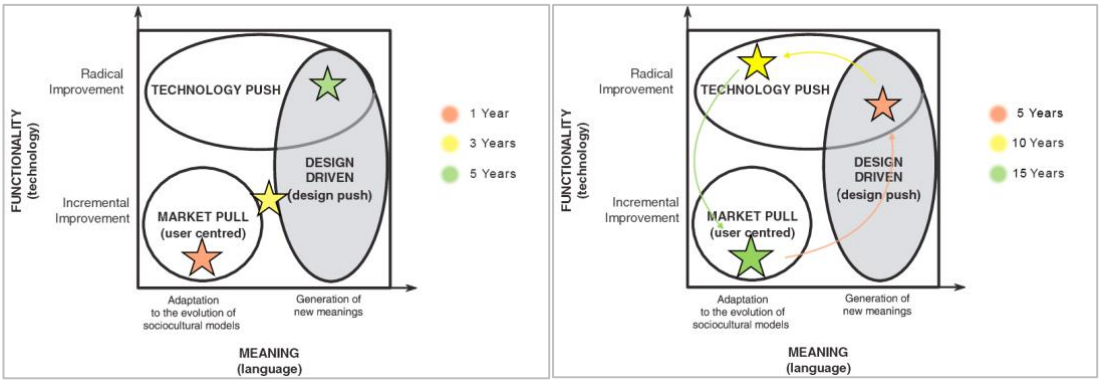
Part 1A – Evaluation of the Business Model on Verganti's Matrix

As a group we established that our business model (*Intelligent Health*; detailed in Appendix 1) would mainly pivot around the healthcare industry, picking up on common shortcomings found in the realm of Hospitals, Private Surgeries & General Practitioners, providing effective solutions by taking advantage of the plethora of new and upcoming technological advancements (e.g. AI, Automation, IoT, biotech, CRISPR etc.) and infrastructures (Dzau & Balatbat, 2018). In a sense, the business model's objective is to blur the lines between public-healthcare and personal-computers (hand-held or not, i.e. smartphones, laptops, desktops, smart-watches, SoC's and all other smart-devices). Our 5yrs envisioned scenario trusts in the sustained advancement of the aforementioned technologies and the resilience of the U.K.'s economy. The *Intelligent Health* road map represented on Verganti's Matrix in Figure 1 (2009) sees the business model reach the area of convergence between Technology Push and Design Push in a 5-year timeframe. The foreseen changes will be radical, put in simple the vision is to flip the current established business model where the patient seeks for advice from the GP, to the GP reaching out for the patient about health issues and concerns, proactively caring for health and thus drastically augmenting prevention. As illustrated by Troughton et al. (2019) 'The monitoring of patients is changing; new market entrants, new business models and the IoT revolution are providing more insight into the patient condition through novel data feeds and analytics'. The drivers for such change are many, like the attainability of lowering general costs & better focus for one's care, which may translate to a more efficient system and better clinical outcomes (Troughton et al., 2019).

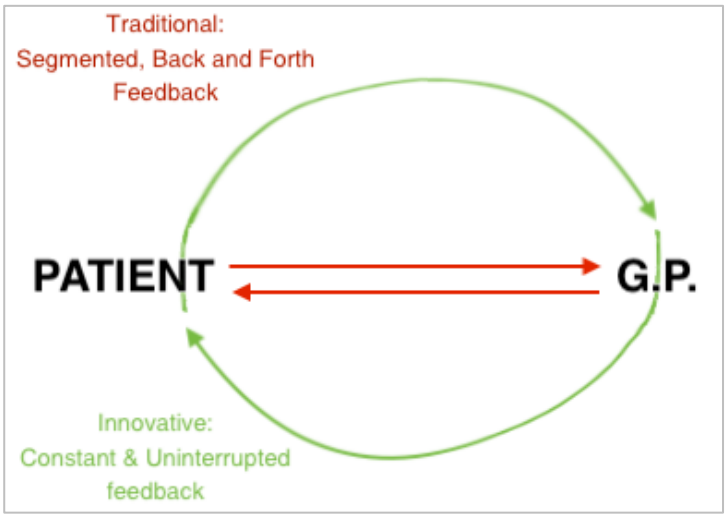
Figure 1 – Verganti's Matrix for the Business Model, 5 & 15 Years
(adapted from Verganti, 2009)



Part 1B – Overview of the Team's Creative Climate & Group Process

The groups thought process behind the ideation of the business model (see Figure 2; detailed in Appendix 1) spurs from our collective belief that health and the industry behind it will undoubtedly face major transformations at some point in the next few years, given that 'AI and machine learning have the potential to reshape almost every aspect of our lives' (Lawrence, cited in Walsh, 2019). People are also growing much more conscious about their health, and as demand for care grows, supply has to adapt accordingly. However, it is a common subject of speech that national healthcare systems & infrastructures are struggling and facing increasingly growing complications (TMP, 2019). The NHS is constantly pushed to provide top, personalised and efficient healthcare plans while perpetually improving upon results and controlling costs. As such, we strongly believe the industry requires a revamp, with focus on introducing new procedures and protocols to minimise the incidence of complications along the entire length of a patient timeline, aided by new technology via innovative data collection and predictive analytics capabilities, as suggested by Troughton et al. (2019). Hence, the team's focus was essentially directed towards improving the logistical aspect of the aforementioned industry. Once more, the vision is to flip the current established business model where the patient seeks advice from the GP to the GP reaching out for the patient about health issues and concerns. By doing so we are expecting a much more proactive environment, with fewer interruptions between an individual's care plan by essentially 'keeping the engine going'.

Figure 2 – Business Model Visualisation (produced by author)

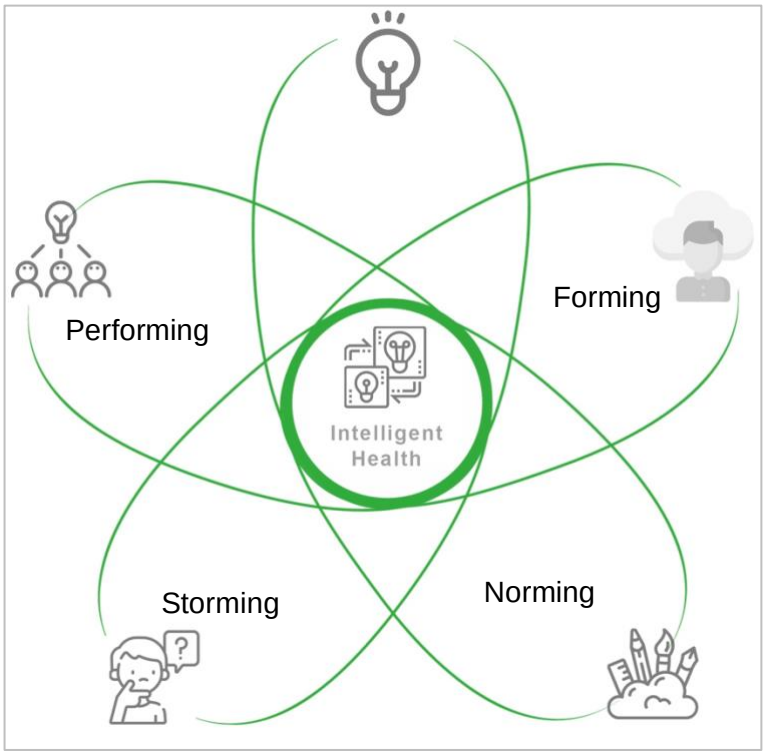


As per the scenario matrix (see Appendix 6) we mainly considered economic and technological variables. We backed the 'Tech Euphoria' scenario which

complemented well the design of Verganti's Matrix (see Figure 1). As a group, we often brainstormed the implied value propositions (& features) of such an innovative business model, with key points being high conveniency, ease of use & accessible, high value for money, increased personalisation of care plan, swift & reliable outcomes, proactivity of prognosis, and improved efficiency. Having defined the VP's, we followed up by populating the Business Model Canvas (see Appendix 2).

Our developmental process (see Figure 3) closely followed Tuckman's (1965) original formulation of the 'stages of group development' model. Overall the creative climate of the team was positive, with a share of pragmatic moments and some upbeat ones too. We quickly agreed to the foundations of the business model, as we all believed health would be a pivotal factor in the near future. Also, notable was our thought process: we clearly established that we weren't looking at a new business idea (or a start-up) but a plan with viable sources of revenue, a set customer base, with a few exemplary products & more. However, we often ended up with *concrete* ideas for actual businesses & products which in a sense diverged from the scope of the task. Thus, we commonly agreed that these ideas where only meant as vehicles or figures of speech used to convey *tangible concepts* relevant to an otherwise *abstract & theoretical* business model.

Figure 3 – Group Developmental Process (adapted from Tuckman, 1965)



Part 2A – Evaluation of the Business Model & the Value Proposition

The main challenge for *Intelligent Health* is consolidating the plethora of data sources into one interface standard, enabling its use within an exclusive platform solely dedicated to health. As drawn attention to by Chen (2019), many tech giants are already venturing into actualizing their analogous concepts with different approaches such as with new medical devices, wearables, AR implementations, prime prescriptions, e-health records, embedded EKG's and many more. Essentially, the common objective is enabling healthcare professionals to better assess patients and personalise treatment for different individual needs (DocWire, 2019). However, the roadmap to its realisation has complications such as patient trust, 'data privacy issues and the highly regulated nature of the healthcare sector for the rapid and widespread adoption of such systems' (DocWire, 2019). A closer look into these complications is given in Figure 4, by going over the main CSF's (full list of CSF's in Appendix 7) derived from the intended VP's.

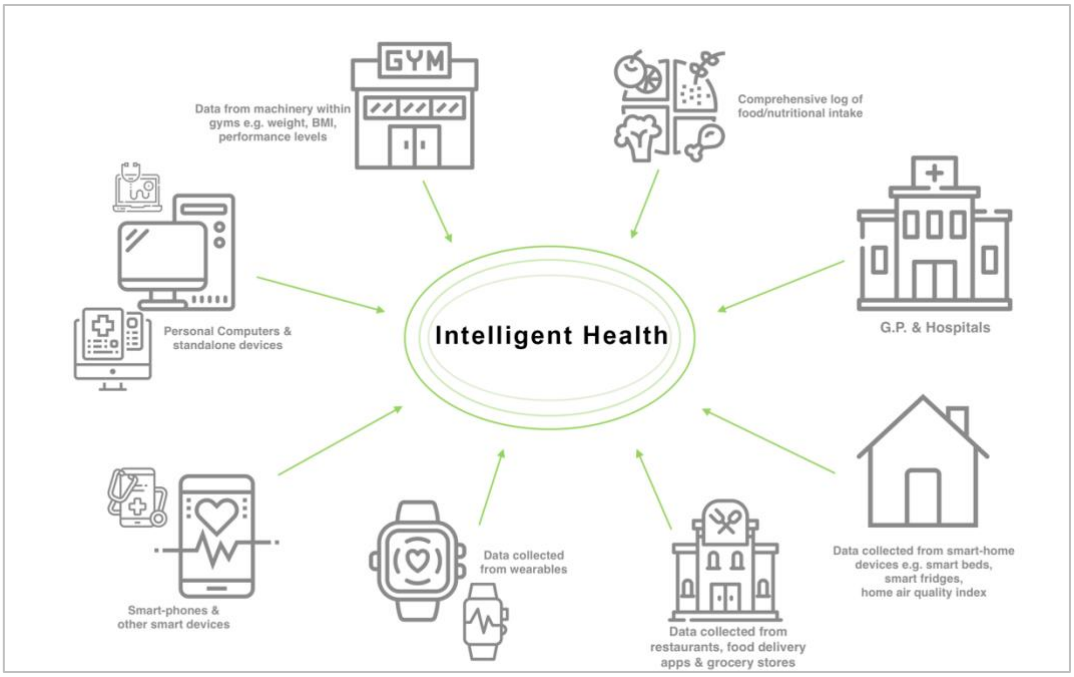
Figure 4 – Critical Success Factor Analysis Table

Business Model Value Propositions	Critical Success Factors	Evaluation Business Model Capability to Deliver the CSF
High conveniency: No stalling for appointments, no need to travel to location of GP **Ease of use & accessibility:** At your fingertips, available wherever and whenever, lower need for human interaction **High value for money:** Prevention over treatment **Increased individual catering potential:** Tailored one-to-one approach, collected datasets allow for precisely targeted care. **Swift & reliable outcomes:** Less human opinion. Based on factual information. **Proactivity of prognosis:** Care plan is not a slow back and forth correspondence with G.P. Feedback is readily available thanks to ease of use and accessibility **Improved efficiency:** Less stress on the system as a result of prompt and preventive measures. Healthier patients = less strain on the system/infrastructure = better services for the patients = higher sustainability	**Reliability:** Will it prove itself as a viable alternative	*Intelligent Health* is expected to be the flexible backbone to a value-based healthcare system, the 'healthcare delivery model in which providers, including hospitals and physicians, are paid based on patient health outcomes' (NEJM Catalyst, 2017; Shen et al., 2019).
	Uptime of technology & related infrastructures: Susceptible to environmental factors & cyber-attacks	Many of the largest and most successful business run on the cloud, however when cloud-based services cease to function, it can cause a myriad of problems (Cox, 2017). As for now it is a rarity and mostly avoidable, but as time goes by unknown issues like massive cyber-attacks may emerge.
	Stakeholder engagement: Trust in new technology & innovation from stakeholders	AI can both create or weaken trust depending on how it is employed: "The age of AI also offers new ways of protecting public trust as we shift from humans towards machines. In audit, for example, cognitive systems can analyse millions of records and identify patterns to create more insights on a company's processes, controls and reporting. Algorithms, meanwhile, can be designed to reduce human biases in decision making, and blockchain can offer greater data security and new distributed trust models" (Moltzau, 2019). This shift to digitalisation can be seen as a double-edged sword, however if employed correctly it is only beneficial.
	Online infrastructure, availability/coverage: Feasibility for extensive coverage	Will it be accessible by everyone? (Miklin et al., 2019)
	Data privacy policies (e.g. GDPR): Security of private data	Major corporations such as Facebook, Google and Yahoo have experienced data breaches that put tens of millions of personal records, data and passwords into the hands of criminals. 'These breaches are only the "tip of the iceberg" when it comes to hacked accounts and stolen data' (Uwizeyemungu et al., 2019). People are now taking more and more action to counter these wrongdoings. 'As terms such as crypto-ransomware, crypto-mining, and banking Trojans make their way into the mainstream, data privacy concerns among people in the U.S. are hitting an all-time high' (Uwizeyemungu et al., 2019).
	Accuracy and recency of medical data/info: Trusted and reliable research	'A major issue with health care data banks concerns their reliability and validity for a wide spectrum of possible research questions' (Roos et al., 1982).
	Technological competency from seekers and providers (skilled workforce) High need for expertise/knowledge to design & upkeep advanced AI. Patient computer proficiency	'Enabling enormous promise whilst stewarding progress is a complex balance. It requires engineers, computer scientists and mathematicians to build systems that learn from data, and that think both like humans and unlike humans; it requires experts in fields as different as climate science and criminology to develop innovative uses of these machines that learn; and it requires researchers to pose new questions about safety, trust, transparency, security and privacy in an algorithm-rich world' (Walsh, 2018).

Part 2B – Analysis of the Competitiveness of the Business Strategy

Intelligent Health is believed to have an enduring lead-time competitive advantage being the early mover (Grant, 2016), with a high chance of achieving cost leadership in respect of correlative business models. As denoted by Celi et al. (2015), such cost advantages can be achieved through the endeavour of automation, artificial intelligence and decentralisation of operations which result in higher operational efficiency and reduced spending on redundant facilities & systems. The expectation is to reduce general operational costs without negatively affecting the overall quality of the end-service, through the intelligent use of data. Yet, *Intelligent Health* isn't solely focused on the technological change aspect found on Verganti's Matrix (see Figure 1), it is also heavily design-driven as it intends to also revolutionise how one's health is taken care of. *Intelligent Health* seeks the congregation of the segmented domain in which it operates (as shown in Figure 5), by bringing together the relevant services/devices/data into one sole and simple to use outlet, which according to De Potter et al. (2012) would provide substantial benefits to the end-user/patient and society at large.

Figure 5 – Intelligent Health Cross-Integration Visualisation (produced by author)



Analysis of how competitors might react to the business model

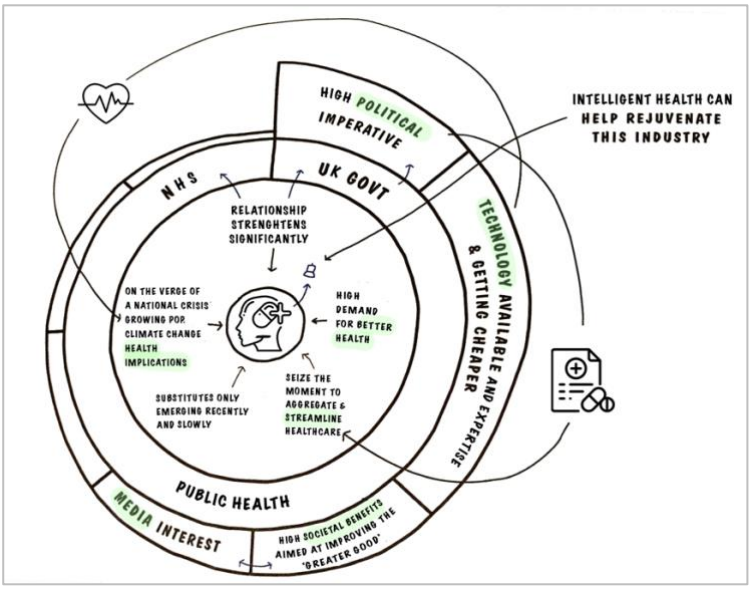
Competitors to *Intelligent Health* are not limited to the evident ones, in similar sectors & industries. In fact, it faces competition from essentially everyone & everything. Noteworthy is also the fact that it is not intended for commercial applications, or to 'make or intend to make a profit'. The main objective is societal benefit through transparency and the internal reinvestment of funds. As it is expected to be heavily funded by the government through tax collection, we expect general competition to struggle to match or better our offering. However, there may be hitches when faced with tech giants (e.g. Apple, Google, Amazon, Samsung). They have recently begun moving into the health sector as it's their main bet for the future (Chen, 2019). As Chen highlights, in most countries the health care sector is quite predominant and has major turnovers. And as indicated by experts, worldwide healthcare systems are guilty of being extremely inefficient. As a final remark, due to its scale it leaves competitors with plenty of space to comfortably move around without directly competing with each other, although the likelihood of this changing soon is unquestionable. E-health records are a notoriously fraught area of any health care system (Chen, 2019). Its ascension to its wider adoption has been extremely convoluted and has led to an undesirable fragmentation which has caused a myriad of complications (Yurkiewicz, 2018). Celi et al. (2015) further note that ‘errors, inefficiencies, and increased costs occur on the basis of unavailable data in a system that does not coordinate the exchange of information, or adequately support its use’, substantiating that the gaps derived from the aforementioned fragmentation are indeed the cause of the complications in question.

Robustness of the business model in withstanding competition

'Future healthcare will have a different geometry... sophisticated diagnostic tools, cloud-based applications and artificial intelligence... an extensive toolbox of therapeutic approaches, all personalised to the individual' (Lowe, cited in Walsh, 2017). It is widely accepted that this is the clear and viable path for the advancement of public/governmental healthcare.

In the five forces analysis (see Appendix 4) notable are the competitive rivalry and the threat of new entry, with both scoring High. The tech giants have already commenced their journey towards the incorporation of the health aspect of the market in their businesses, which can be detrimental to the robustness of the model by means of increasingly growing competition. The interpretation of both the VRIO and Five Forces analysis have led to one dominant finding: competitors with the appropriate amount of funding can most definitely replicate the business model for personal benefits, although dampened by the fact that they may have to get governmental approval for different privacy, regulatory and copyright aspects.

Figure 6 – Environmental Ecosystem (adapted from Cummings & Angwin, 2015)



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Appendices

Appendix 1 – Business Model Summary *'Intelligent Health'*

The *Intelligent Health* business model focusses on the healthcare industry, picking up on common shortcomings found in the realm of Hospitals, Private Surgeries & General Practitioners, providing effective solutions by taking advantage of the plethora of new and upcoming technological advancements (e.g. AI, Automation, IoT, biotech, CRISPR etc.) and infrastructures. In a sense, the business model's objective is to blur the lines between public-healthcare and personal-computers (hand-held or not, i.e. smartphones, laptops, desktops, smart-watches, SoC's and all other smart-devices). It seeks to unify the world of health into a simple, easy, accessible portal/outlet. As people are growing much more conscious and caring of their health, and as demand grows, supply has to adapt accordingly. However, it is a common subject of speech that national healthcare systems & infrastructures are struggling and facing increasing complications. Currently, the NHS is constantly pushed to provide top, personalised and efficient healthcare plans while perpetually improving upon results and controlling costs, however it is evident that it is not able to. The industry is in need of a revamp, focusing on introducing new procedures and protocols that minimise the incidence of complications along the entire length of the patient timeline, with the aid of new technology with data collection and predictive analytics capabilities. Noteworthy is also the fact that it is not intended for commercial applications, or to 'make or intend to make a profit'. The main objective is societal benefit through transparency and the internal reinvestment of funds. As it is expected to be heavily funded by the government through tax collection, we expect general competition to struggle to match or better our offering. In most countries the health care sector is quite predominant and has major turnovers. And as indicated by experts, worldwide healthcare systems are guilty of being extremely inefficient. Cost advantages will be achieved through the endeavour of automation, artificial intelligence and decentralisation of operations, resulting in higher operational efficiency and reduced spending on redundant facilities & systems. The expectation is to reduce general operational costs without negatively affecting the overall quality of the end-service, through the intelligent use of data. It is also heavily design driven as it intends to revolutionise how one's health is taken care of. *Intelligent Health* seeks the congregation of the segmented domain in which it operates, by bringing together the relevant services/devices/data into one sole and simple to use outlet, which would provide substantial benefits to the end-user/patient and society at large. One of the main challenges for *Intelligent Health* is consolidating the plethora of data sources into one interface standard, enabling its use within an exclusive platform solely dedicated to health.

Appendix 2 – Business Model Canvas (Osterwalder & Pigneur, 2010)

<table>
<tr>
<td rowspan="2">Key Partners:

Technology Companies (e.g. Apple, Fitbit, Google)

UK Government

Healthcare providers

Patient Platform Ltd (Patient Access)

Private practices</td>
<td>Key Activities:

Technology Partnership Management and Healthcare by:

AI Development
System Maintenance
Expanding Patient Base
Monitoring health
Automation

Decentralisation of information source</td>
<td rowspan="2">Value Propositions:

High Convenience: No stalling for appointments, no need to travel to location of GP

Ease of Use and Accessibility: At your fingertips, available wherever and whenever, lower need for human interaction

High Value for Money: Prevention over treatment

Increased potential for Individually catered care plans: Tailored one-to-one approach, collected datasets allow for precisely targeted care

Swift and Reliable outcomes: Less human opinion. Based on factual information.

Proactivity of Prognosis: Care plan is not a slow back and forth correspondence with G.P. Feedback is readily available thanks to ease of use and accessibility

Improved efficiency: Less stress on the system as a result of prompt and preventive measures. Healthier patients = less strain on the system/infrastructure = better services for the patients = higher sustainability</td>
<td>Customer Relationships:

Self-Service

Automated Service

Personal assistance

Communities</td>
<td rowspan="2">Customer Segments:

NHS

Private Healthcare

Mass Market/ General Public

Our main customer is characterised by being increasingly accustomed by todays speed of day-to-day life, having increasingly less time for routine activities. As such the health aspect of life is often skimped over. However, often it is not one's will to neglect it and the purpose of Intelligent health is to essentially lower the barriers for its accessibility and adoption, thus allowing one's personal health to be less of a burden in today's routine circumstances</td>
</tr>
<tr>
<td>Key Resources:
Human
Intelligence

Physical Assets:
Devices
Technology
Finance (e.g. Governmental aid)
Medicine expertise
IT expertise</td>
<td>Channels:

Online platform between providers of healthcare and seekers of healthcare.

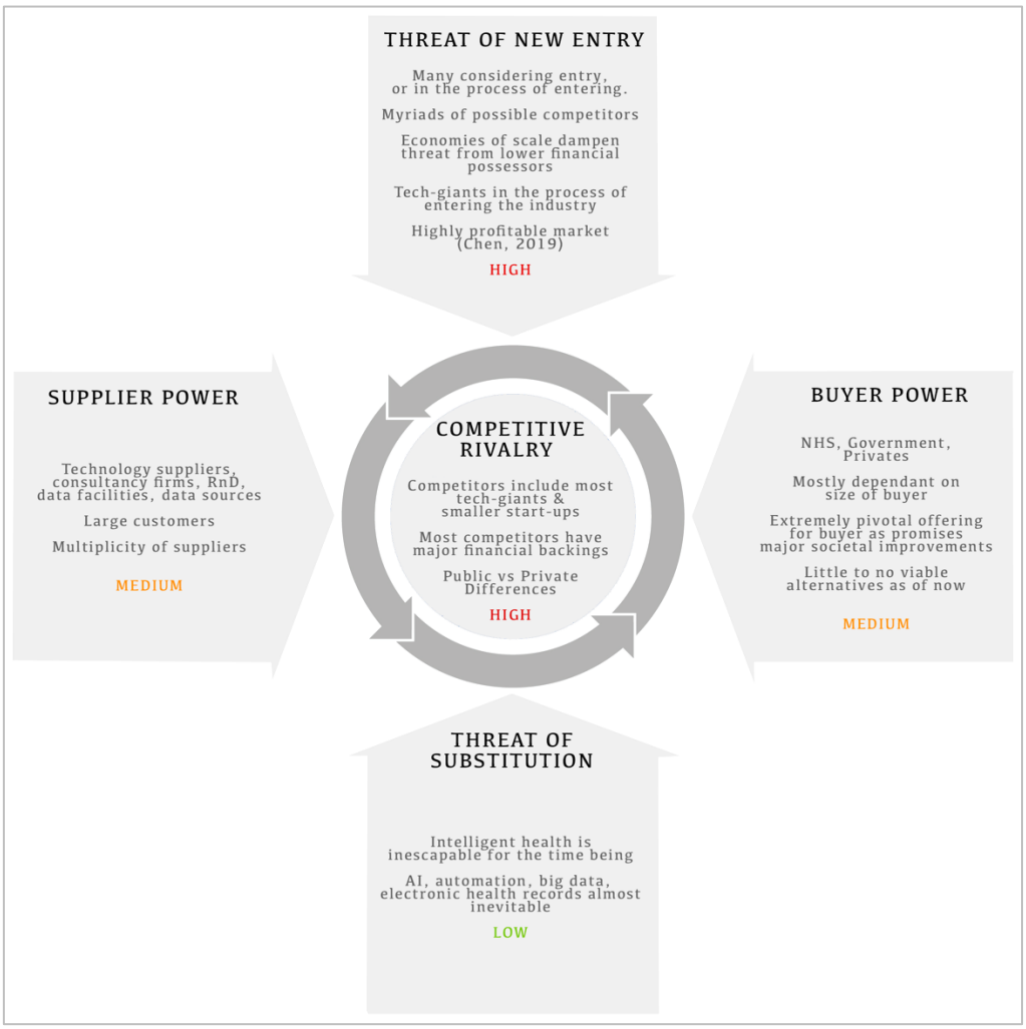
Mouth-to-mouth

Accessible via a multitude of devices, ad-hoc kiosks and located in key POI's</td>
</tr>
<tr>
<td colspan="3">Cost Structure:
Value Driven
RnD Costs
Economics of scale costs
Equipment and technology</td>
<td colspan="2">Revenue Streams:
Government spending
Subscriptions to system
Tax</td>
</tr>
</table>

Appendix 3 – PESTLE Analysis

Political	Economical	Social	Technological	Legal	Ethical
General Election set for 2022, may be an early election at the end of 2019 (Edgington, 2019). Tax policy changes. Insurance mandates. "The transfer of personal data from the EU and other adequate countries to the UK may be restricted if the UK leaves the EU without a deal" (Gov, 2019).	Inflation, Unemployment, Policy spending, Labour costs, consumer power, fuel price, exchange rates and interest rates. Income tax	**Trend to be health conscious.** Oils as a cure for illness. Specific health diets. Ageing population - 20% of the population will be 65 or over. . Reactions to surveillance depends on how aware we are of it and what we perceive as the motivation behind it. (Rogers, 2018). If patients feel it is being misused or they are being targeted, it could cause anxiety and be a detriment to their health	IT and Data management (health term, 2018), information governance. Technology transfer, reduction of communication costs (affecting also economical). Use of technology is not universal (prediction for the future) Apple API - App that will obtain medical records from over 500 hospitals on the go (Martin, 2018).	Patient rights (consumer protection legislation) employment laws Cambridge Analytica Scandal - collected data could be used for something unintended such as marketing and scams (Rogers, 2018) Consumer protection and e-commerce law	Waste management (disposable computers), pollution, quality of water. Finite resources used in device technology, such as aluminium in Apple products (Apple, 2018). What will we do once these have run out?

Appendix 4 – Porters 5 Forces (adapted from Porter, 1979)



Appendix 5 – 'Intelligent Health' VRIO Analysis (adapted from Barney, 1995)

Valuable – Yes. Efficiency cost savings, revolutionary innovation in healthcare access, cross integration increases usability & convenience.

Rare – Yes. Currently no other BM offers integration so extensively. The BM trust element is especially rare as sole focus is not on profits.

Imitable – To an extent. Many individual aspects of the BM are already in use and could be merged into one, however this is costly. Despite this the innovation property rights, tacitness and complexity of the BM offers it lead time (Grant, 2016).

Organised – Yes. The BM is prepared organised and ready to implement the process of infrastructural adjustment & ready to incorporate the varying elements to achieve

Result: Temporary Competitive Advantage

Appendix 6 – Scenario Matrix

<table>
<tr><td></td><td colspan="2">Increased Policy spending</td><td></td></tr>
<tr><td rowspan="2">Plateaued rate of innovation</td><td>“Promises, promises”:

Spending money but no changes Inefficient development.
Sector stays the same, or shrinks, due to the efficiency of new technology, such as direct access applications.</td><td>“Tech Euphoria”:

Perfect scenario, allows growth and generates more investment capital allowing for better equipment and ultimately a happier healthier society.
More likely to be kept in the public sector (more competition)</td><td rowspan="2">High rate of innovation</td></tr>
<tr><td>“The Phantom of Healthcare”:

Worst-case scenario, leads to perhaps sector extinction (as strain on resources increases) or privatisation of sector.</td><td>“DR. Magician:”

Being resourceful, no budget but all the innovation. Cut-backs to other health departments for small innovations.</td></tr>
<tr><td></td><td colspan="2">Decreased Policy Spending</td><td></td></tr>
</table>

Appendix 7 – Complete Critical Success Factor List

- Reliability: Will it prove itself as a viable alternative
- Uptime of technology & related infrastructures: Susceptible to environmental factors & cyber-attacks
- Availability of genuinely intelligent & accurate Artificial Intelligence: High need for expertise/knowledge to design & upkeep advanced AI
- Stakeholder engagement: Trust in new technology & innovation from stakeholders
- Increasing political interest for health and healthcare matters: Need for political motives to support public healthcare
- Online infrastructure, availability/coverage: Feasibility for extensive coverage
- Extensive datasets, Wide & quick adoption of service: Availability of novel data to develop from
- Data privacy policies (e.g. GDPR): Security of private data
- Accuracy and recency of medical data/info: Trusted and reliable research
- Ease of use: Accessible to the larger part of the population
- Technological competency from seekers and providers (skilled workforce)
- High need for expertise/knowledge to design & upkeep advanced AI. Patient computer proficiency
- Medical intelligence/experience

Appendix 8 – Impact Uncertainty

		Impact		Uncertainty	
		Low	High	Low	High
Political	**P1** General Elections		*		*
	P2 Tax Policy changes		*		*
	P3 Insurance Mandates		*	*	
	P4 Brexit		*		*
	• Personal data transfer restrictions (Gov, 2019)				
Economical	**E1** Inflation		*	*	
	E2 Unemployment	*		*	
	E3 Policy spending		*		*
	E4 Labour costs		*	*	
	E5 Consumer power	*		*	
	E6 Exchange rates		*		*
	E7 Interest rates		*		*
	E8 Income tax		*	*	
Social	**S1** Demographics (Ageing Population)		*	*	
	• 29.5% of population over 60 by 2039 (Pozniak, 2016)				
	S2 Health conscious trend		*	*	
	S3 Surveillance, Sense of anxiety (Rogers, 2018)		*	*	
Tech	**T1** IT and Data management		*		*
	T2 Technology transfer		*		*
	T3 Use of technology not universal		*	*	
	T4 Apple API		*	*	
Ethical	**H1** Pollution		*	*	
	H2 Waste management	*		*	
	H3 Finite resources		*		*
	H4 Quality of water		*	*	
	H5 Climate change		*		*
Legal	**L1** Employment laws		*	*	
	L2 Consumer protection legislation		*	*	
	L3 Cambridge Analytica Scandal		*	*	
	L4 E-commerce law	*		*	