Can healthcare learn from online gaming?

by Candesic

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Discussing how technology is revolutionising health care, usually starts with questions such as: Who owns patient data? Can doctors and nurses treat you on-line or over Skype? In this article Dr Michelle Tempest, Miss Heidi Tempest and Dr Leonid Shapiro of Candesic take a leap forwards into the brave new world of tomorrow's tech enabled health and social care.

Let's use the analogy of chess to understand how it has evolved from handheld pieces to online gaming. Chess is an ancient game and in 1200 it started life called 'The King's Game' and was a **popular way to teach aristocracy about strategy**. Chess in itself has an exceptionally clear and distinct goal – achieving checkmate. Its' relatively simple set of rules are without chance or randomness. And as yet, anyone who has ever played chess knows, using simple rules to achieve that simple goal, is not all that easy!

So, when human brain effort is high, what advantages do computers have over us mere humans?

- Computers are fast at calculations,
- Computers will not make errors - unless the errors are encoded,
- Computers will not get tired or get distracted – even when football is on the TV,
- Computers do not play emotionally – they don't become overconfident and squander a winning position, nor do they grow despondent in a difficult position that may be salvaged.

Today we all take for granted the **advantages of computer power** – yet it was not that long ago since Russian chess grandmaster Garry Kasparov predicted that no computer would ever be able to defeat a human grandmaster. In fact, he quipped that "*if any grandmaster had difficulty playing a computer – I'd happily offer advice*." Yet in 1997 the unthinkable happened and the chess computer, IBM's Deep Blue, beat the best and most intimidating chess player in the world – Garry Kasparov.

So, what can we learn from the Garry Kasparov journey?

There certainly seem to be many similarities, for example, there are many amazing clinical teams - grand masters of their medical field are yet to adopt the powers of technology. Plus, healthcare, like chess, is always trying to diagnose and predict the future.

Admittedly, chess is a lot simpler than the human body as it has only 32 pieces on the board but fundamentally both deal with prediction. Both use a kind of Bayes's theorem to analyse data and test a hypothesis with the goal of coming to a more accurate diagnosis – or in chess, to get you one step closer to checkmate! So can medical technology learn from the chess computer advancement? In chess, they broke the game down into the three component parts of how our brain processes information:

1. **The opening:** Here possibilities are almost infinite. There are over nine million possible moves after just moving three chess pieces! At the start of game chess computer prototypes struggled as opening moves are more abstract and human players had a better understanding of heuristics - like 'take control of the centre of the board'.
2. **The midgame:** Here the pieces are already locked into combat and this is where there is much choice about strategic options. Again chess computer prototypes struggled with strategy, being frequently befuddled by human player's sacrificial moves.
3. **The endgame.** Here chess prototype computers sometimes got lost, as they could not see the wood for the trees.

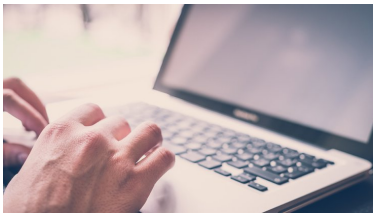
Overall, teaching a chess computer to beat a World Champion like Kasparov came down to the banal process of trial and error and feeding it big data, which enabled it to learn from the masses about how to forecast the future. So just like IBM's Deep Blue chess computer, in healthcare, we are still on this journey teaching computers about the human body and needing big data and artificial intelligence to get there.

But ultimately perhaps this journey can also be broken down into three component parts:

First, the opening starts with one symptom which could mean millions of different things. Second, the midgame, where the diagnosis evolves into a strategic direction for a treatment plan. Then finally, the endgame with the delivery of treatment, all the way through to recovery.

Technology is having an impact in each of these components. For example

The Opening -symptoms



Patients look up their own symptoms online, rating websites can guide patients to make more informed choices. Wearables, owned by almost 20% of the UK population, are constantly collecting big data and this is developing into implantable tracking devices. Also, genetic testing is becoming so inexpensive that soon everybody will have had their genome sequenced, and 'social networks' are enabling patients to seek and give help to each other, with or without moderation by a healthcare professional.

The Midgame of getting a diagnosis.

Remote 'Skype-like' consultations are becoming popular with remote second opinion services becoming easier to get; John Hopkins and the Cleveland Clinic have bourgeoning online consultation businesses. Remote consultations are enabled by devices such as digital stethoscopes and FDA approved home ECG devices, such as Alivecor, which retails at under £100.

Artificial intelligence also has the promise to quicken diagnosis and Google's Deep Mind (like IBM's Deep Blue) is already analysing millions of NHS health records to learn and find patterns that will help patient and healthcare professionals make better choices.

The Endgame, treatment.

Remote monitoring is enabling hospital level patient surveillance to be achieved at home, driving the use of virtual wards and early discharge. Similarly, point-of-care home laboratory kits are becoming so inexpensive that most routine hospital tests can soon be performed at home. Virtual ward rounds are already in use at Imperial Hospital in London where doctors can monitor their patients from home or even another hospital.

So what impact are these advances having on the private healthcare sector?

PMI

Already some private medical insurance companies are using tracking technology. In the UK, Vitality is offering free Starbucks coffees, discounts at retailers, airlines and hotels, in exchange for points earned by keeping active (monitored through wearable devices), buying healthy foods (monitored through your Nectar card) and getting certain health check-ups and tests. In the US, United Healthcare is giving activity trackers to policyholders and offering up to $1500 in cash if they meet certain healthcare goals, with the costs of the programme being split with employers and the insurance company in the form of reduced premiums.

Hospitals

Some hospitals are already selling additional consultant services by using fully equipped remote consultation rooms. This may result in a **more globalised consultant pool** as physical distance reduces in importance and there maybe the emergence of 'Superstar consultants' similar to how many ordinary people have become Youtube megastars.

Patients

In the light of on line choice and ratings, **marketing will become more important for both providers** and clinicians and **patients will expect more timely care** in more convenient locations.

In summary let's return to the chess analogy. Chess is a good reminder that the best result often comes from neither man nor machine. For example, in 2005 there was an online 'freestyle' chess tournament. It was so freestyle that players were free to supplement their own insight with any computer programs they liked and get help over the Internet. Although powerful chess computers and several human grandmasters entered the tournament – it was not won by either of these groups.

Instead, it was won by a couple of twenty something amateurs who surveyed a combination of computer programs and human chess masters! They played by aggregating advice and, as a result, highlighted the power of man working synergistically with machine.

In summary, **healthcare should neither worship at the altar of technology nor be frightened of it**. Computers are a reflection of human progress and ingenuity but to get the most out of them they work better in combination.

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