# THE SMART APPROACH TO HARNESSING DATA

We live in the age of big data. Devices and services are now a fully integrated part of everyday life in many countries and the influence of this technology is spreading ever further. As the drug delivery world moves to embrace it, it is important to remember that unseen risks await the unwary. Tom Lawrie-Fussey, Healthcare Digital Strategist, Cambridge Design Partnership, explains further.

"Connectivity" and "smart" have become familiar terms when discussing modern products, stemming from the underlying technology. However, the key unit of merit is not the technology itself but rather what it enables – specifically data, and thus information, about all aspects of the environment and our interactions within it. Where once products were purely transactional, they can now be seen as facilitators of data, enabled by smart or connected technology, with the real business value now residing in the information gleaned from the data the device collects, rather than simply the sale of the devices themselves.

But where to start? The first step is to consider what users are likely to need and want to engage with, letting that drive how you create a product or service that is seen as smart by those who interact with it. You also need a clear idea of how your business can derive value from what you produce. All of which must be underpinned with a keen understanding of what technology can achieve, wrapped up in a model of how it can be deployed and operated.

Context is king – and there are many ways of obtaining a better understanding of it. Bolting on technology is, of course, one option, but there are many others, often involving less development, deployment and analysis costs. Some of the best smart packaging solutions contain no technology – instead, they use an understanding of the on-the-ground problem, and they solve it using innovative thinking, not innovative technology.

An interesting example of smart packaging is the VanMoof bicycle box. This company had significant shipping damage costs; more than 25% of its mail-order bikes were arriving damaged. The company considered adding complex electronic impact-logging equipment to better understand where the shipments were

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being damaged. But even these kits require the end user to upload the data – not an easy ask for its customers. So, instead, VanMoof thought more laterally. It realised that logistics companies simply didn't take sufficient care of its boxes, which were clearly labelled as containing bicycles. It needed a solution that would go further than embedding technology and cost into packaging – the company had to find a way to change human behaviour.

The smart packaging solution? VanMoof made its boxes look like TV boxes. Overnight, product damage dropped by more than 80%. The perception of fragility meant boxes were handled with far more care, with logistics providers knowing all too well the implications of delivering damaged electronic goods. Thus the problem was solved by knowing the local context, instead of adding technology to provide a proxy to context.

Context is also key when it comes to creating patient-friendly drug delivery devices. It would be a mistake to assume, for example, that patients want to have an interaction with your organisation each time they self-administer. Consider instead the idea that, contrary to such an assumption, it's common for patients to desire less interaction and engagement, preferring to get on with their lives. Instead, you should be measuring "smart" from the patient's perspective, not yours. Can your new connected offering provide a subtle, legitimate, compassionate

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interface, where the patient feels empowered to contribute and interact, rather than them perceiving the service as being a little invasive and akin to some all-seeing "Big Brother" snooping? When the technology gets out of the way and the only perceived interactions are ones where the patient receives "surprise and delight", then you have the start of a recipe for success.

Once a suitable method has been deployed that can capture context, and can translate these observations into insights and value, the data collected is the next big challenge for companies to overcome. There's a tendency to collect as much data as possible. This hunger for data stems from a perception that there may be ways to use it to create new revenue streams in ways not yet understood. Many industries have adopted this future vision where, by crunching sufficient numbers for long enough, with ever-more-powerful data analysis methods, they hope (or in many cases expect) to be able to uncover future value. This is one of the values on offer from "big data" and it seems to be a good bet. However, there remain many challenges that must be better understood to make future digital and data decisions wisely, from a well-informed perspective.

## MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

Machine learning and artificial intelligence (AI) have quickly become the buzzwords of data analysis. Whilst hugely powerful as an approach, they need to be understood clearly so that the right approach can be selected and deployed for each application, according to the desired outcome.

The machine learning approach only works with the data you give it and, without care, it will likely tell you more about your measurement approach than the thing you are trying to measure. It's more helpful to think of such tools not as the standalone

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answer, but rather as one tool within a large toolbox devoted to extracting value from data, with the key focus being data science. Other tools in the box include classical signal processing and analysis methods, with selection of the most appropriate tool for the job being as important as the ability to wield it. The automated deep dive and pattern matching of machine learning is best deployed when expert know-how has already pieced together part of the puzzle (i.e. worked out roughly where to look), and where scale is a suitable approach to find the solution.

Even then, such output predictions need to be validated by data scientists before any actions are taken. Fully automating this process without expert intervention – and allowing algorithms to link (and potentially confuse) correlation with causation – can deliver unexpected and misleading outcomes that are potentially crippling for an unsuspecting organisation.

## BIG DATA

To achieve success in AI and the various automated analytics techniques now becoming widespread, vast amounts of data are needed. However, there is also a risk here as, once collected and understood, data can't easily be forgotten. If data collection is largely uncontrolled and widespread, there is a very real chance that what is uncovered forces a company into an awkward strategic situation.

For example, what if such usage data uncovers genuine misuse or a fundamental issue with a top-selling drug delivery device? It may be that this data is only relevant for one demographic, and one use case, but the simple fact of knowing about the existence of an issue creates a hugely complex commercial and legal situation. Such data is almost always automatically backed up and stored. It cannot be undone. The insights, however unpalatable, cannot be unlearned.

In any business there are aspects of day-to-day reality that are known to carry some risks but, with no detailed evidence to the contrary, continue to be implemented and embraced. Such companies, along with their competitors, continue to operate without confronting these issues – often with a sector-wide "blinkered" view of the status quo. Whilst big data could lead to the discovery of new opportunities to innovate, there is a very real chance of it also uncovering some unwanted truths. Collecting and storing big data isn't cheap

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and when that data uncovers usage issues, the commercial impact is doubly painful. Companies are then impacted on both sides of the balance sheet. Not only has the substantial investment caused potentially much larger ones, the competition (perhaps those that adopt a fast-follower approach) can continue to sell their own solutions without suffering the same fate (whilst they lack the evidence to suggest they have the same issues). Proof, when it works against the very organisations investing heavily to uncover it, can be hugely costly.

We have seen exactly this behaviour in the logistics market, with a device we helped to develop that could monitor all aspects of a parcel's condition – such as whether it was dropped during transit or the temperature it was stored at. Such were the capabilities of the device, it could not only tell what method of transport was being used (e.g. car, van, flight) but it could also infer some insights into the speed of those vehicles.

What started as a legitimate desire to better understand the parcel delivery process (and openly share this with the end-consumer) quickly became a new headache, since it could have potentially proven where vehicles were being forced to speed to meet delivery schedules. Whilst the logistics company possessed no direct evidence of such speeding being required to meet its schedules, some of the management team suspected that it may indeed be the case that the industry as a whole was pushing the absolute limits of final-mile logistics to remain competitive.

Such a sensing device, if enabled to collect and process speed information, could have created a potentially huge new problem for the client – a problem that would have only been evident for its own parcels, on its own vehicles. If allowed to proceed to launch in its fully tech-enabled configuration, it could have potentially affected the entire company – whilst its competitors carried on business as usual, watching in amazement, amusement and relief.

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Being first to market with new and powerful big data collection technologies brings with it new risks – particularly for those who don't fully understand the implications of what they think they want to capture. It's important to have a good understanding of the desired outcomes (and the potentially undesired outcomes) so any new technology can be mindfully developed and deployed. We typically propose data collection nodes that capture the absolute minimum (for now). Whilst this inherently limits the big data analysis opportunities, consider it simply "big data 1.0", which we believe better represents the risk-reward balance – enabling an organisation to learn

the benefits at each step, before switching on further capabilities and therefore the risk and benefits of further analysis.

Another aspect to consider is customer data. In the experience of Cambridge Design Partnership, we typically find it best to steer clear of patient-specific data. By partitioning the rich contextual information we can extract, and storing this separately from the customer data, many security risks can be avoided. Data protection and security regulations, especially for medical data, have very specific requirements – and teeth to ensure compliance. Rarely do companies actually need much of this data and the risk of data security is significant, with data breaches regularly reported that cause significant damage to consumer/patient confidence. The key (beyond taking sufficient data-security precautions) is to be considered and careful in the data collection strategy. We are able to uncover huge amounts of user insights without ever meeting the patient or knowing their age, background, address, etc. In most cases, we don't want to know – we'd rather the data highlights if they have a usage issue, and

that such observations weren't inadvertently skewed by some erroneous causation assumption. We find that the data itself is able to highlight particular behaviours and our own analytics experts and algorithms can quickly identify data patterns, which allows us to draw a remarkably accurate picture of in-home usage, without needing to know the "traditional" user information.

This approach can help to uncover unexpected insights – as people rarely say what they do or do what they say – but also maintains the anonymity of data, reducing unnecessary information management burden. It provides a steer towards innovation opportunities, without committing an organisation to a path it never actually wanted to be on in the first place.

AI, machine learning and big data are here to stay, offering huge potential when harnessed and deployed correctly. It's important that the risks are balanced against the opportunities before diving in. Large investments are at stake, with the potential for uncomfortable findings which cannot be unlearned.