Talking the same language: Building value into the Internet of Things
The tidal wave of data flowing from all areas of our lives is only set to gain more momentum. But in the future, a network of connected devices and sensors will enhance human intelligence and augment the way we make decisions.

"This future is closer than we think, but its success hangs in the balance; the steps we all take today will determine how valuable this enhanced intelligence will be."

Konica Minolta laid out its vision for driving real value from the Internet of Things in an earlier paper, *The Genius of Things*. We described a future that is defined not only by devices, sensors and connectivity but, more importantly, by the ability to organise meaning from data – by embedding intuitive associations into its very disparate and highly complex nature – to create an overarching “digital cortex”. We explained how this digital cortex will understand our physical world to the extent that it will be able to predict everything from markets and behaviours to processes and prices.

There is no doubt that the Internet of Things will become a reality; it is already forming before our eyes. But for now, the digital cortex remains an aspiration. It is a vision for tomorrow in which all objects, people, systems and resources are interconnected and underpinned by intelligent services to allow humans to process information from the physical and virtual worlds – and react appropriately. Once realised, it will allow us to harness ubiquitous connectivity and machine intelligence to make sense of a vast amount of complex data about our environment.
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A framework for the future

Businesses have been quick to realise the advantages of combining big data from connected sensors with human knowledge to drive better decision-making. But the evolution to a fully operative Internet of Things is currently being hindered by a lack of standardisation and interoperability between the various players supplying and leveraging data.

The vast spectrum of devices that can be interconnected and the complexity of the information that can flow between them require an extensive organisational framework that enables the fusion of both in order to augment human intelligence and improve decision-making.

A challenge with current approaches to developing Internet of Things platforms is a lack of semantic interoperability at the application layer. Semantics attempts to integrate the meaning, context and relationships between data in a layer of descriptive information linking Internet of Things technologies and platforms. While many organisations are making headway with their Internet of Things developments, most are currently working on use case-specific solutions that are based on different standards and communication protocols.

Individual companies are building ecosystems of data as end-to-end solutions: sensors, connectivity platforms and algorithms are inextricably bound together. This creates immediate silos and a barrier to realising the end vision.

Our vision is to build an Internet of Things platform that optimises the overall business process, integrates different solutions into the chain and makes operations effortless, more precise and more reliable. It must be embedded with semantic technology that makes smart connections between vertical use cases, increasing the intelligence – and therefore the value – of the resulting digital cortex.

All parties need to come together in a collective effort to create a technical Internet of Things management framework that allows data from any source to be connected at the application layer. In order to encourage participation for this greater good, it must be accompanied by a compelling business case.
As well as creating this management framework, we must join the dots between data and decision making by investing in significant advances in artificial intelligence. The industry is currently building impetus with a combination of forward-thinking applications, business process automation, machine learning APIs and open-source projects, but the effort is still in its infancy. If we are to unleash true genius from data, we need a more consistent, broader network of artificial intelligence that enables us to harness all of this coherent data and reliably automate decisions based on prescriptive (how can we create the outcome that we want?) – rather than predictive (what will happen?) – analytics.

A functioning digital cortex relies fully upon prescriptive analytics – on taking data from the environment and supplying the user with meaningful suggestions. A prediction itself is not a business action. Rather than simply telling the user what is on the horizon, true genius lies in also being able to tell the user how to profit from that information – or, if appropriate, how to avoid a future scenario. For example, a business doesn’t just want to know that it is heading for bankruptcy; it needs to know what it can do to avoid bankruptcy.

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We have discussed how we are lacking a data ecosystem that enables semantic interoperability between Internet of Things platforms. And we know that we need to build a business case around data to ensure that users can access the largest pool of data from as many sources as possible.

A viable solution is a data trading platform through which all parties can exchange valuable information by using a common communication protocol. This data layer must be, by definition, separate from the creation of end-user solutions; it should decouple the sensors from the algorithms. The platform’s in-built semantic interoperability will enable users to build clever algorithms that leverage data from multiple sensors.

The data trading platform would create a business based on both sensing and sharing data, like that conceived by the HAT Foundation\(^2\). Businesses and individuals in need of data would buy it and then build their own algorithms and concepts on top of that data. They could also exchange data for smart decisions – such as how to adapt their home to save energy, what products to buy to create a better experience or what procurement changes to make in order to be more profitable.

As with all data-related developments, privacy and security will be key issues for businesses to address – the more elements we connect to the platform, the more things we need to secure. Confidentiality and integrity must be built into the framework at a basic level.
The power of many

The trading platform can only be built collaboratively by a groundswell of companies that understand the value of sharing data and are incentivised to do so for the benefit of many.

The platform would encourage innovation by inviting developers to propose a solution and then implement it. Current ecosystem silos prevent this innovative power, which defined the internet from day one. Konica Minolta believes firmly in the power of many. In order to realise the digital cortex, we must break down boundaries and harness the innovative power of all people and data on the planet.

The challenge will then be to create offers and solutions based on this intelligence and smart decision-making ability – valuable interactions, including user experience, support and workflows – that customers will pay for. If businesses can generate true value from data and package it up in a meaningful way, users will be willing to invest in it.

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Genius in action

All of this is necessary because the human brain alone is limited; when we make decisions, we do so by considering a small number of factors. As a decision support system, the Internet of Things can augment human intelligence by providing additional insights and reducing demands on the brain to consider elements that are beyond its natural ability. Instead of applying hypotheses to the things we already know, it will tell us things we didn’t think we needed to know. This is the essence of the genius of things.

“Genius” in a work environment could mean that the facility knows where we are and what our preferences are and adjusts the environment to suit them in real time. For example, in a team of several employees sharing a small office, we might each like different levels of heat and light at different times of day – but each person may not be in the same place throughout the whole day. By harnessing the Internet of Things, we can connect data about each individual and their location during the day and adapt the environment accordingly. As a result, each employee will feel more comfortable in their space and will be better able to perform at their best.

Asset tracking within buildings is another area that can benefit from a finely tuned Internet of Things. In the context of a hospital, there is indisputable value in knowing where functioning medical equipment is – from heart monitors to x-ray imaging machines – and whether it’s in good working order. Assets could be categorised according to function, need and availability – and even alert technicians when in need of maintenance. The system would understand usage patterns in order to estimate when a given machine would become available. It could also tell the user what exposure the machine has had to certain risk conditions – for example, whether it has been used to treat a person with a particularly infectious disease that can still reside on metal or plastic surfaces.

Similarly, a leasing company could leverage the Internet of Things to understand where, in what condition and how close to being returned, all of its assets are.
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Of course, simple connectivity is not the full answer to any of these stories. A useful outcome depends on the quality of data available and the business’s ability to analyse it — and on the ability to draw conclusions from beyond the immediate scope.

Compared to the limited possibilities when an individual business attempts to set up such a system in isolation, a cohesive data framework that is shared by many enterprises and cuts through industry verticals will help build a more complete and a more valuable outcome.

Businesses can take immediate steps forward by talking to customers and finding out what they need. Instead of thinking along usual patterns — finding solutions to problems we know we have — they should start from a point of unknown to find new value in areas we don’t yet know exist. Only then should businesses begin to identify the combination of data and technology they require to provide the solutions. As a result, businesses will be able to make smarter decisions based on the widest possible pool of insights. They will draw conclusions based on a whole host of causes, not just simple correlations.
A social asset

Under the model we have described, data is a social asset shared by all so that mankind can benefit in a variety of ways. We are all currently sharing data about ourselves and our businesses without even knowing it, but there needs to be a more conscious effort to contribute to a more coherent and therefore a more usable data framework.

Gathering the data is a start; making intelligent sense of it is the way to a smarter, more connected future. We need to harness powerful prescriptive analytics and allow information to flow without interruption between places, people and devices – wherever they may be.

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Talk to us

Konica Minolta is working hard to make business better for its clients through innovations in the Internet of Things. We have stated here that we believe in the power of many, so we would like to hear from others who are also exploring and developing technologies and services in this area.

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