A Master Inventor at work

How IBM's Andy Stanford-Clark and his llamas inspired a new type of auto insurance…and other tales of innovation

Some people might take the view that innovations happen by accident.

I would argue against that. I would say that, in fact, most innovation happens in response to a particular problem that you need to solve.

My name is Andy Stanford-Clark; I'm one of IBM's Master Inventors.

Centers of innovation like IBM at Hursley put a lot of focus on encouraging people to try out new ideas. I have a scheme with my team where we have a "90-10 rule," where 90 percent of our time is booked to development and 10 percent of the time, i.e., half a day per week, is for back burner projects, for people to investigate things that are of interest to them, and quite often, from those kinds of ideas, new products and services and solutions grow.

Any organization at all can be innovative if it's prepared to embrace the idea.

An auto insurer can learn from a llama

We have a llama trekking business here on the Isle of Wight, and one of the things we're concerned about, is the security of the animals, both when they're here in the field, if they escape or if someone tries to steal them. So we've been looking at the use of the on-demand messaging technology to look after the llamas. One of the prototypes we're looking at the moment is a commercial tracking unit that's got a GPS and a GPRS modem inside it, which goes over a cellular connection.

This is technology that's derived from the equipment that we use for our telematics projects for tracking vehicles like army vehicles, or emergency vehicles, or the Norwich Union® insurance project.

The Norwich Union® application is designed for a new type of car insurance, called Pay As You Drive™, where the insurance for your car is based on where you drive, and when you drive, rather than the factors that they use typically today, and so by putting a satellite tracking unit into the vehicles, you can find out where the vehicles are and where they go, and from that, derive the data that they need to come up with the new insurance premiums.

It’s very important to give people the space to innovate, and also there’s sort of the peer recognition, a sort of the culture that it’s okay to take time to innovate, rather than having to be heads down, working on the day job all the time.

One of the things that I like to try and do is show by example that it’s okay to be slightly wacky and innovative, and trying new ideas out and some of which fail, some of which succeed, some of which become products.

A flood warning can start with a stick

For the last two years, we’ve been doing a project with Southampton University to monitor river flooding and river levels, and we did a pilot in the River Crouch in Essex, but I wanted to try out some stuff of my own here first before we got going with the real project, so I built an early prototype, which I would just lower over the side, and it would measure the river level by shorting out different pieces of metal in between the sections

But this one failed miserably, because there’s a horrible piece of science I didn’t understand, and that was water doesn’t conduct electricity very well. So this was completely doomed.

The new high-tech version that I’m trying out at the moment uses ultrasonic sensors, and we’re going to attach this underneath the bridge using a wireless link using WebSphere® MQ telemetry back to the micro-broker in the house, so it’ll actually send back the distance that the ultrasonic signal goes down to the water and reflects back up again, and that will give us depth below the bridge

The main motivation for the FloodNet project is for insurance companies, because the longer warning you get before a flood, the more stuff you can take upstairs, and therefore, the smaller the insurance claim, but also the UK’s Environment Agency with its sort of ten-year outlook for looking after our waterways and our water systems is very interested in how the rising sea levels and global warming, and so on affects the waterways of Britain.

IBM works very hard to create an innovative environment for their employees to create innovative ideas, and to produce some solutions for our customers. I think customers can learn a lot from that in terms of not only the environment that we create to encourage innovation, but also the ways we get ideas through prototyping, and without being too judgmental at the beginning, allow ideas to flourish and then to become solutions, and we’ve taught a lot of customers and a lot of universities, about the way we innovate, and every time we do it, they go, ‘Ah, we can all learn from that.’

A CIO can embrace a better mousetrap

So this is my famous mousetrap system. It's actually the first MQ telemetry project we implemented about five years ago now, and here in this old, 450-year-old house in the middle of the fields, in the winter, we get loads of mice heading in to hibernate, and they'll eat their way through anything they can find, so we have to have an efficient mousetrap system to keep them under control.

So, it occurred to me that this is a really obvious application for monitoring and trying out the MQ telemetry technology, so what we have here is an embedded computer system with digital inputs that can detect changes in voltage between the connections, and the connection goes in through the bottom of the mousetrap through the loop, and back out again, so it's a closed circuit, so electricity flows all the way around, so if there's a break in that circuit that gets detected by the logic in here—that's what we call a 'mouse event'—and it gets published as a message to the micro-broker, which then gets sent to the Internet, and then it comes down to my phone to give me an alert. And if it all works, and I do this, we can have a live demo here. Never do things with animals and children, but here we go. And here the message is, 'Mousetrap has gone off.' Cool.

This is showing a general class of applications for monitoring remote assets.

There's a change happening in the industry for monitoring solutions, and that is at the operations side of the business, where they're monitoring and controlling remote assets, and are now being brought under the jurisdiction of the CIO.

Whereas it used to be the case of the operations guys would be on their own, autonomous, able to do the sort of the hard science that's allowed them to get the data in from the field, now the CIO is demanding that his or her applications that run the business get that data as well.

High-level business executives should care about pervasive and mobile computing, because it's what enables an event-driven, on-demand business.

You've got to know second-by-second what's happening, and whether that's latest sales or the latest problem on the shop floor, or something new that's emerging out in the marketplace, you need to know about it right there, and if you can get the data to you wherever you are, then you're in position to act on it at that time.

A power company can benefit from tea time

This is my power monitoring system. What we do is, we put this current clamp around the wire that comes into the, brings electricity the house, and it doesn't break the wires, so it just goes around it. That produces a voltage that's

proportional to how much current is going through this wire, and therefore, we can tell how many kilowatts the house is consuming at any time. It's plugged into the analog to digital converter of this embedded computer system, which then takes the value that it's read and publishes it off across the home network to the Internet where it can then draw a graph of what the power consumption is at any given point in time.

The power utilities are particularly interested in this kind of technology, because they can monitor and predict the kind of load consumers are going to be using. So, for example, when we turn on the cooker to cook dinner in the evening, then the power company would know we're going to be using a fair bit of power for a couple of hours so they can make sure they can send enough power down to this little corner of the island to make sure it all works. Another use of it is that the manufacturers of white goods, like dishwashers and washing machines and so on, can look at the profile of the data to remotely assess whether a machine is failing or beginning to wear out, or needs repairs,

Okay, so this is the other end of the power monitoring system, this is where there's a website on the Internet where you can go and see the power consumption blow-by-blow as it happens, so these big spikes here are the kettle boiling, and we have things like the under-floor heating, and the fridge, and those sort of things. And what I can do from here is I can actually turn devices on and off, and we can see what effect it has immediately on the power consumption. So, for example, I can go and turn on the heater over in the gym and see if it jumps up there. Yeah, see it went up there?

One of the big problems in the telemetry industry is there are so many different protocols.

You used to spend so much energy producing the complicated protocols for things talking to each other that you completely ran out of energy and money to do anything creative or innovative on top of that. Now, with an open standard way of getting the devices talking to each other and talking to the back-end applications, then that bit kind of just works. It then frees you up to spend your creative energy on what you will do with the data when it gets there, rather than worrying about the mechanics that actually get it there.

An oil company can profit from Christmas lights

So these are the reindeer lights, and we put these on at Christmas, and the point is not so much the reindeer themselves, but with an on-demand messaging infrastructure within the house, it was very easy for me to add these just before Christmas, and I can just click on my phone and it sends the message through MQTT to a broker, and before I even finish saying it, the lights come on.

This is an example of a remote control application, so we're using hand-held

pervasive devices to send the messages up into messaging infrastructure, and then they come down and control something, whether it's a relay or a lighting system or a valve control sequence on an oil pipeline.

Innovation: The intersection between invention and insight

Sam Palmisano, our Chairman, says that innovation is the intersection between invention and insight, and I think that's probably true. We set a lot of store by the number of patents IBM gets year-on-year and also by the solutions we provide our customers. Innovation is really the cornerstone of those two things coming together. An innovative idea solves a problem and produces something which is novel and unique, and yet, requires a very incisive view of the problem that's being faced by our customers,

I think it's very important for people in all kinds of industries and all kinds of occupations to think about how they can become more innovative. I think there are benefits to be made, costs to be saved, new processes that make the business more efficient or allow it to branch out in new ways.

I think innovation has to be part of your life.

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