Five Ways to Escape the IoT Valley of Death

Globalstar

Investors in new companies talk about the "valley of death." It's the period in the life of a startup when it has begun operating, doesn't yet have a customer and is burning cash. Getting to the far side of that valley can challenge even well-funded young companies.

Industrial Iot projects can face their own valley of death. It's made up of high costs for hardware and software, complexity that gets out of hand and disappointingly meager results. A study of 25,000 IoT adopters by Beecham Research found that only 12% considered their fully successful and 58% said called them unsuccessful. Three-fifth of respondents, in other words, never left the valley behind.

There has to be a better way. And there is – by sticking to five fundamentals.

Understand the demands of the application

When it comes to IoT connectivity, one size definitely does not fit all. If all the sites you need to monitor are in fixed locations, connectivity by wired or wireless may be your best choice. But do all those locations come with electric power? That will impact your choice of devices.

Do you need always-on connectivity, as you might for a video surveillance application? If not, how often do you need sites to connect? For some applications in fixed locations, once per day may be enough. For others, particularly applications where changing location data is of prime importance, much more frequent messaging is needed, which affects devices and transmission costs.

Are some or all of the assets in motion, either most of the time or from time to time? If so, you may have issues with cellular connectivity, because coverage can be spotty outside cities, suburbs and highways. Cellular can be a great, cost-effective solution, but you should investigate whether adding satellite capabilities offers a better business model.

Example

On any given day, more than 16 million trucks are on the road in North America, including nearly 4 million tractor-trailer big rigs that can spend long periods beyond the reach of cellular. With an average of 2 to 3 trailers for every tractor, carriers waste time and money matching trailers to trucks. They walk their yards looking for available trailers, call customers to see if they are detaining trailers and search for lost trailers. More money is wasted on leasing extra trailers to ensure on-time delivery. It's a cost hiding in plain site that adds up to millions of dollars for even a medium-size carrier.

A Canadian company makes a low-cost IoT transmitter that can be attached to trailers. Each transmitter periodically sends short bursts of data reporting on its GPS location. Because it is solar powered, it delivers years of use with little maintenance, and has enough onboard intelligence to report on battery level and confirm that it remains attached. The data populates a digital map application that trucking companies use to track the location of their assets. For one business managing hundreds of trailers, the map data led the company to realize it did not need 100 trailers it was renting or a new order for 40 more. Total savings exceeded $2 million.

Keep the physical technology simple

The temptation in IoT is to measure too much. On a typical offshore oil rig, for example, control room operators receive data from as many as 30,000 sensors. Research has shown, however, that they actively monitor a few dozen readings to maintain safety and performance.

Success comes from determining what you really need to measure and the minimum physical technology needed to measure it reliability over time. Getting it right reduces the cost and complexity of devices, which multiplies the benefit as the number of devices grows. Keeping things simple also improves reliability and reduces power demand – especially important for battery-powered devices – and can reduce the traffic generated by the devices to save recurring costs. You may also be pleasantly surprised by how much useful information simple tech can provide.

Example

A company based in Australia with customers around the world sells a solar-powered gadget. It does just one thing: measures how much water is in a water tank and transmits that data plus location to a customer portal. That simple metric, however, has profound impact on cattle ranchers.

Cattle need access to water in hot weather: 24 hours without it can produce a measurable reduction in their growth. On most ranches, that water is stored in tanks, which are refilled by rainfall and by water pumped from underground aquifers. Those tanks are always at risk. Leaks may drain them. Pumps can fail or local wells run dry. On a large property, ranchers can waste hundreds of hours a year simply driving to check on water levels, let alone doing anything to fix the problems they find.

Ranchers buy online and install it themselves in a few minutes. It transmits water level readings by satellite, and the portal displays each rancher's full inventory of tanks with water levels of each and sends alerts to low levels that demand action. Drilling down to the individual tank level, users can see how water levels change with time, which lets them identify potential problems from leaks to pump malfunction. In a business where it's tough to make a profit, that one metric gives a big boost to the productivity of ranchers and cattle alike.

Make software turn simple input into high-value output

Few people outside the coding profession can appreciate just how much valuable information can be wrung from one or two simple measurements. If you wear a smart watch, you may have some feel for it. The watch contains a tiny accelerometer that measures the swinging of your arm. It typically also tracks your heart rate. From those two numbers, it can figure out if you're out for a walk, lifting weights, playing tennis or lying on the couch with a bowl of chips. (It probably can't be sure about the chips.)

The advantages of simple devices and low-data-rate transmission are available because smart software and artificial intelligence can create such rich interpretatons from a few simple measurements.

Example

Another Australian company makes the world's first IoT device small enough to serve an ear tag on cattle. It tracks the GPS location of the tag and changes reported by an onboard accelerometer. From those numbers, the company uses data analytics to identify the animal's performance (weight gain, milk production, etc.), how efficiently it feeds (a key measure for ranchers), how healthy it is and how much methane it produces. They can help ranchers figure out how much land they need for a herd of a certain size – based not on guesswork but on the actual activity of their cattle. By identifying cattle that are most efficient at feeding themselves and bulking up, they can select them for breeding high-performing calves. They learn more about their cattle than if the animals were all in the barn.

Process what makes sense at the edge

Keeping devices simple is a good rule of thumb. But there are situations in which it pays to make them more complex. Edge processing is the IT buzzword of the moment, but it has a real point.

Its value lies in providing benefits that outweigh the additional device cost. If it pays to have the device respond instantly to conditions instead of routing everything to a distant server, edge processing works. If transmission volume and costs can be meaningfully reduced by analyzing data and prioritizing packets on the device, edge processing works.

Example

The ear tag company packs more into its small, lightweight device than GPS and accelerometer. Careful engineering analysis led the company to integrate a microprocessor, memory and machine learning software as well. These enable the tag to learn an animal's behavior patterns, which inevitably vary from one to the next, and make decisions about what data to report. The average Australian cattle herd has more than 1,500 head and large ranches herd more than 5,000. The company's business depends on giving ranchers reliable data on each animal, not just averages across the herd. Those considerations made it imperative to put the smartest possible tag on the ear of every cow.

Keep network costs affordable

This principle seems hardly worth repeating. But assumptions about affordability can get in the way of success. It is accepted that if you can physically wire together a bunch of sensors, or use Bluetooth to connect them, it's the cheapest option. But it is also accepted that cellular is always cheaper and more reliable than the other wireless option, satellite. And that's dead wrong.

In densely populated areas, where cellular operators compete aggressively, market pressures deliver good service at low prices. But if your application leaves those places behind, reliability declines, costs escalate and the devices may requiring costly roaming or the swap-out of SIMs to get service. Though satellite is considered difficult and costly, short-messaging service for data can be handled by small autonomous devices at low transmission costs. And connectivity is available just about anywhere on Earth that has a view of the sky. For many applications, the best solution is the best of both worlds: satellite and cellular connectivity integrated into a single chip that automatically selects the least-cost option.

New and better tech

The companies profiled brought new and better technology to market. But their common denominator is Globalstar, a low-Earth-orbit satellite operator. Each company designed its device around a small, low powered Globalstar satellite modem. It sends regular bursts of data over the Globalstar Satellite Network for processing at Globalstar's control center and delivery to their own servers.

That network is made up of more than 24 satellites and 32 ground stations, all forming a single reliable network across 200+ countries. Despite the high stack of technology, however, the hardware and service are affordable enough to be deployed across thousands of tanks, cows or wild animals. From the simplest data can come profound insights into things that matter to our lives. And isn't that what IoT is supposed to accomplish?

Connect smarter