FUJITSU

Whitepaper
Proactive and Predictive: The intelligent approach to maximising uptime

The intelligent way to engineer your always-on enterprise

Contents

Failure is insight

"A single failure is a source of knowledge that we might not have gained in any other way," writes Henry Petroski, Professor of Engineering and History at Duke University. "They reveal weaknesses in reasoning, knowledge and performance that all successful designs may not even hint at."[1] Simply, failure is useful.

It is impossible to design a perfect system. A system that never breaks. In the end, everything wears out. Even ones and zeroes get corrupted, or, at least, affected by external forces; from power cuts to hacking to unexplained software glitches which seem to arise organically over time. The point is to embrace both the possibility of failure, and its actuality, and put in place ways to avoid the dreaded outages and downtime.

Downtime is bad. It's costly. It makes boards of directors look for scapegoats, and, often, it's the IT department that gets blamed for it. The 'always-on' economy demands 'always-on' enterprises. That puts a lot of pressure on technology. Whether it's a production line making cars or consumer white goods, online banking or ATMs, or retail operations with thousands of till-points across a distributed store estate... everything must work.

That takes engineering. Up front in terms of design and configuration, and while the technology is in operation through engineering support. But, engineering isn't just about fixing things. It's about much more than that. Petroski puts it succinctly; "Successful engineering is all about understanding how things break or fail."[2] That's how you achieve lasting success; understanding how things fail to design ways to avoid them failing again, or, at least, predict and prepare for failure more successfully.

That's what we do at Fujitsu. We are firm believers in the need to study why things fail and then design support services that enable us to be proactive. We want to get to your machine or system before it fails, so you can keep on working, trading and making money. "It really is that simple," says Fujitsu's Head of Business Development, Global Technical Support Services Martin Smithen.

"The standard way of doing things, even in the Digital Age, has been focused on fixing technology reactively. We wait till it breaks or just stops working, and then we go out to try and fix it, or replace the machine and bring it in for diagnostics. That approach doesn't work anymore. It's not fit for purpose in the 'always-on' economy," says Martin.

There's no time for downtime

"Our customers understand that very well, which is why they're looking for proactive engineering support rather than just the ability to call out an engineer once something has gone down," Martin says, "We are increasingly being asked for an invisible service, one that's predictive. We understand why things fail because our job is to fix them, so we should use that knowledge and insight to spot potential failure points and get out in front of them."

Martin stresses that it's not just about keeping systems running, it's also about cutting the costs of downtime and engineering support. "When you dispatch engineers to deal with incidents that have already happened, you end up with a suboptimal approach that costs money in terms of time, fuel, and parts. You could have one failure 50 miles in one direction, then another 20 miles in the other. The engineer zig-zags from one incident to another and, quite often, discovers that, because users haven't provided an accurate description of the fault, they don't have the right parts or tools to deal with it."

Fujitsu's engineering team wanted to overcome the limitations of a reactive approach to engineering so that the costs of the service could be cut. By being able to predict failures, and/or schedule servicing, parts replacement or software upgrades more intelligently, then the engineering team would be utilized in a much more efficient way. Efficiency always has a beneficial effect on costs. "Customers get a better service and more value for money," says Martin, "That means they're able to operate with more confidence and plan for the future with more certainty."

"There's no time for downtime," says Mark Andrews, Fujitsu's MIS head of Analytics Platform, "When you're thinking about very expensive or safety critical machines, like an aircraft engine, then downtime is very costly and failure is dangerous. Everyone understands why you can't have downtime and it's obvious that companies would be willing to invest significant sums in sophisticated systems to monitor and analyze these types of devices. A barcode scanner or a till in a shop are much lower cost devices and their failure doesn't put life at risk, so it is harder to justify a very expensive system to analyze them – yet they are still vital to retailers. Understanding how those things fail, and why, is important but has to be done cost-effectively."

Proactive and predictive: A new approach to engineering

"This isn't rocket science," says Martin, "It's simple, down-to-earth common sense. When something fails, learn from it so you can avoid that same failure happening again if possible."

The intelligence in Intelligent Engineering is generated through observation, correlation and understanding causality. And that takes data. "Not just digital data, but human data, that's the way Fujitsu has created a very human approach to Intelligent Engineering."

As Canadian-American architect, professor and writer, Witold Rybcynski put it, "Experience not science is the basis for engineering."[3] Luckily, Fujitsu's engineering team had a wealth of experience.

Mark explains; "We set out to reduce the cost of support and we knew that making it more proactive would achieve that goal. Most of our customers were operating lots of machines and systems that had to cope with high-volume work (both actual and digital) and were using reasonably common devices across their estates. How could we cut the cost of that support? By making it more predictive. When you can predict events with greater certainty you can plan simple things like an engineer's schedule and routes so that they are more efficient each day."

Data was the key. "But we knew that by initiating a project to monitor all failures from scratch, digitally, would take time. Analytics would need to be set up and then run, and we would have to wait for the data to come in and then analyze it. That would mean that we couldn't be proactive and deliver immediate benefits to our customers," says Mark.

"We realized that we already had a wealth of data within Fujitsu – the experience of our engineers," adds Martin.

So, a project was created that based modern analytics (forged to work in the age of Big Data) and which leveraged the power of the 'data' in the heads of a team of very experienced engineers.

"We focused on points of sale in retail stories – till points – which are vital, of course, it's where the money comes in. You can't get more important than that!" Says Martin. "And we worked to bring multiple data sets together to understand how those tills failed, how the environment might influence those problems, and then, link that to the data generated by our customers. It's a much bigger, richer picture that deepens our understanding of failure."

The team pooled their experience of working with all kinds of hardware – tills of different types and manufacturers – and then correlated their problems, faults and issues to create a very detailed overview of what usually went wrong.

"A simple machine-learning approach to creating that data set based on many devices over set periods of time, would reveal a lot of information. We wanted to do that, but layer it on top of the human data we already had. It was the best of both worlds, and meant we could start being more proactive quicker," says Martin.

A till or a PC have many potential points of failure, so it's important to understand the scenarios that lead to those failures. It's not just the headline incident that counts, but what might have caused it. Once you understand that chain of events you can identify potential failures quicker and with more accuracy. So, that could mean something like a PC that fails in a fast-food restaurant for no apparent reason, but when you check the conditions – the heat in the office or the kitchen, for instance – you can work out that the PC needs to be relocated or cooled more efficiently.

Every PC or till is potentially different in the details of its internal components. The basics might be similar, but different manufacturers have different standards and configurations. "Whilst machine learning systems can build that data, we have to operate in the here and now," says Martin. "There are commonalities in terms of why things fail. We see them in our repair shops every day. We run diagnostics and learn from them. We can apply that knowledge generally across all kinds of tills."

Dealing with the usual faults

Analysis yields insights into typical patterns. The usual faults. The team used a monitoring tool which collected the same data from different makes of tills, old and new, some worked, and some had failed. Because many components are common or at least very similar, the team could deal with customers using new makes or types of technology far quicker. The learning curve had been shortened. "Of course, this approach works for any technology that's subject to failure. Which is every technology! We could achieve consistent data because we used a single monitoring tool. That was a breakthrough for us," says Martin.

Data was collected at different intervals – short and long – and ensured that there was no impact on the day-to-day operation of functioning tills. "That enabled us to learn what is normal for each type of till, and all tills in general," says Mark. "That then allowed us to see abnormalities and what triggers them."

The point was to find potential problems before they became faults. For instance, experience tells us that a Central Processing Unit (CPU) in a till is, normally, cooler when it's idle than when it is running fast due to high usage. We see it getting hot at peak times of day, that's fine, but what is it doing in the evenings when the shop is closed? So we keep monitoring day and night if it is cool or hot. If it's hot at night there's a problem. If that data isn't picked up then, it will eventually fail, probably when the store is busy and the till is being used most.

The monitoring tool picks up the hardware data and sends it to the analytics system. Parameters are looked at individually and in combinations to identify patterns that show abnormal operation. The Fujitsu team can then inform the engineers that specific tills are likely to fail, and then a schedule is put together for the engineer to go out and investigate the problem or swap-out the till for another one.

Obvious, but clever

The intelligent approach, therefore, has achieved some simple, but important outcomes:

- Issues were identified early
- Proactive prevention became the focus
- The till point was back into service faster
- Staff were more productive
- Engineering costs were lower than they would have been
- The Fujitsu engineer's day was more efficient and better planned
- That costs Fujitsu less
- Which means our customer gets a more cost-effective service
- And keeps the tills working
- Which keeps the revenue flowing

The logic is inescapable.

'Invisible demand' - beyond engineering

Carla Hall, Fujitsu Offerings Development Manager EMIEA, says "This isn't just about engineers and engineering, it's about making the right decisions at the right times. It's about what I call 'invisible demand' – the 'known' unknowns and 'unknown' unknowns you need to understand to factor into your day-to-day strategies, especially in fast moving sectors like retail."

Carla is clear about the benefits of Fujitsu's approach: "We want to help customers make more informed decisions about a range of issues, from what technology to invest in, through to how to its set up – its architecture – to how it needs to be supported. Most importantly, we can help drive their business strategy through the right technology which works when it needs to, supporting both their employees and their consumers."

That's where 'invisible demand' comes in. "The technology that's working every day, used by real employees and real consumers, is yielding more than just data about how the tech is working, it's revealing data about demand. That then reveals whether they need more robust devices, or more of them. Or even, fewer of them. Or It reveals that they need more manned or self-serve tills points. It also helps them set the level of engineering support they need. So, if you're a petrol station with two lanes, then the failure of one pump is going to affect 50% of your business. If you have twenty tills, then the failure of one or two will have less of an impact. So, you can set support levels – and therefore its costs – more finely to the dangers of tech failure."

That means that Service Level Agreements (SLA) can be far more focused to real, every day needs, rather than blanket agreements that could end up costing an enterprise more. "It's probably quite unusual for an engineering function to tell customers that they need us less, but if it's the truth, then we save them money and can focus our resources more efficiently. In the end, that benefits everyone."

Carla's point is that Fujitsu's engineering team is good at thinking 'beyond engineering'. "Our core function should not be repairing stuff, but facilitating commercial enterprise. That is, selling stuff. It really is that simple."

That approach also extends to helping train staff in the use of technology. Many technical failures are due to the way staff handle devices. That might reveal that the device itself is not suited to the job or the environment in which it is used. They can lead to a different investment decision, one based more on real needs, than on price. In the long run, a more robust (though perhaps more initially expensive) device will save money.

The data Fujitsu collects can also influence user behavior. If faults are due to the way the device is used, then better staff training can be rolled out to ensure that staff don't cause faults (reducing downtime) and they use the device more efficiently (boosting productivity).

"We're working with a major retailer that really buys into our intelligent approach," says Carla. "They've been our customer for 15 years and as we've developed our approach, we've been able to help them visualize their technology estate much better and point them in the right direction more accurately. That's helped them make better, faster, more effective decisions."

The bottom line is that the retailer avoids downtime in store: Less queuing and frustration; less damage to the retailer's brand reputation. And, of course, more sales. "What we've done is shown them where the invisible demand is and revealed the invisible disruption too. Our multi-layered, intelligent approach based on data and real experience cuts down on call-outs, tickets, and delays."

Intelligent Engineering: A summary

Fujitsu's Intelligent Engineering uses data to drive predictive, proactive and preventive services that provide you with:

- Reduced cost of IT delivery
- Decreased disruption through fewer onsite interventions and better quality interventions
- A support service aligned to your business needs
- Maintenance of legacy infrastructures and identified upgrade paths that are cost effective and reflect the rapidly changing nature of business
- Management of all technology with a clear view of how it can deliver business benefits
- Access to Fujitsu global capabilities and innovation

It's maximum up-time in an always-on world. Intelligently delivered. Find out more about Fujitsu's approach to Intelligent Engineering and how it can benefit your enterprise.

Stay ahead of downtime, all the time.

Sources

[1]To Forgive Design: Understanding Failure Henry Petroski Belknap Press 2013

[2]Ibid

[3]Witold Rybcynski 'How Things Work' New York Times Review of Books, June 9th, 2005

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