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Specification by Example
Leading Financial Institution

A team of 30 developers, 20 testers, 8 project teams and 12 business analysts embraced far-reaching change to make Specification by Example (SBE) a reality at a Leading Financial Institution (LFI). Defects delivered into production plummeted to zero and teams now "can't imagine working without it". But what was the impact, what changed and how do you make dinosaurs fly?

LFI engaged Assurity to help with an Agile change programme. Business stakeholders and their software teams were to adopt Agile development techniques, then follow a maturity programme for technical practices.

BEGIN WITH THE RIGHT THING

As a keystone of Agile, delivering software in small units often requires a high level of automated testing. This can be technically challenging and it is worthless investing in automation if you are not certain the team is building the correct thing. So Specification by Example begins with a Specification Workshop where intentions are discussed and example behaviours are set out in business language.

A SPECIFICATION WORKSHOP

But it is surprisingly hard to get teams to focus on *why* a system is being built. The business goals of a system have long been the domain of analysts and development staff can be unused to asking the type of questions that illuminate the business purpose.

Scrum leader Katy explains how getting Specification Workshops running smoothly has been a key challenge at LFI: "People do struggle. I'm not sure if this is because it's hard for technical people to think in business terms or if it's hard for technical people to write things down clearly and concisely. It's easy to get bogged down in the details."

But despite the difficulties, Katy is adamant that the Specification Workshop is vital for success. "A huge benefit is the removing of the 'us and them' – the business and technology split. Having Specification Workshops and having the business people talking about the examples is extremely valuable."

AUTOMATING THE EXAMPLES

"It is surprisingly hard to get teams to focus on why a system is being built" says Katy. "At first, teams can't believe the number of meetings required and it's frustrating. Eventually they realise the meetings are part of the job. The business people love getting involved in the team and the support and confidence they give has improved dramatically."

But collaboration is not the only vital outcome. The team generates a set of examples that can be automated to test the system does what is required – those actions set out in the examples and the results recorded. Teams used a variety of tools to achieve this and developed their own when open-source tools weren't available.

Selenium WebDriver was chosen to automate examples that drive web pages, but automated data setup has required data injection into The Beast's database and a 3270 emulator for running green-screen user interfaces. Teams also created mechanisms to inject data via web services and by directly invoking programs through stored procedures.

Simon develops code for the mainframe: "I think the most beneficial part has been to sit down and work out what we can, can't or won't automate," he says. "You are forced to focus on what the business wants."

BUILDING A CAPABILITY

New tools might be required to automate a given example, sometimes introducing a large amount of upfront work. At LFI, this cost included automated login, sending SWIFT messages, adding payment beneficiaries to accounts and changing foreign-exchange fees – all standard business functions for

MAKING DINOSAURS FLY

At the bottom of the LFI's technology stack hums 'The Beast'. It is a Z-series IBM mainframe holding the core of the organisation's applications and the routes between all the others. Nothing exists without talking to The Beast.

Convincing the team to write small, independent deliverables and automate their testing in such an environment presented unique problems, not least because the Cobol developers knew little of the Java-based tools, object-orientation or the HTML required to write the suites of specifications that contained the test examples.

Assurity ran a series of Dojos for Dinosaurs designed specifically to teach Cobol programmers the elements of Java they would need for automation.

Alongside the seminars, an Assurity technical coach resurrected a pre-existing, but long-since defunct 3270 open-source project which gave the team an ability to drive The Beast automatically from Java.

"There's been a huge learning curve and it was very daunting to begin with," explains host developer David. "It's new stuff I've been learning, which is great. And we've been given time on the project to do that work."

So with Java access to a host message queue, basic Java skills, a 3270 tool to drive The Beast and an embedded technical coach, they were able to automate their testing from the very first sprint.

That didn't necessarily mean it was all easy. "There was a part in the middle where automation seemed to be taking up so much of our time that we held a discussion about whether we should continue. We chose to stick with it and, once we got over the hump, it didn't hinder us as much as we thought," explains David.

He dreads what might have happened had the decision gone the other way. "Going into production, we would have had bugs" he says.

Business Analyst Sally: "I'd have worried about what bugs were there that we couldn't see," she says. "I attended a project review recently and the business was blown away by the quality. Usually you get niggles when you go into production, but they could not have been happier."

which corresponding automation was required before examples could be run against the system.

"Such a lot of time was spent in the early sprints and it appeared as if we were proving AAT, not doing a project for the business," explains Katy. "People were demoralised by that. It took a long time to show the benefits and that it wasn't just a huge overhead."

This is where she believes Assurity's help was so advantageous. They provided technical coaches to help the teams understand how their investment would be repaid and take some of the burden in the early sprints as tools, techniques and processes bedded in.

"The team needs expert people to help with the initial setup. You have to invest in the initial training." Coaches not only explained the process and kept it on course, they also developed automated tests as examples and mentored testers and developers as their skills grew.

"You are asking them to take a leap of faith. You have to say, 'This is the process. People have done it, it works and you have to give it time.' You have to force people to do something they may not want to do and expect them to realise the benefits in a couple of months."

WORTH THE INVESTMENT

Despite the perception of cost upfront incurred by writing automated tests, Katy does not believe her project took any longer to develop overall and has been a vast improvement on the previous development culture.

"Before, there were no projects going live without defects. There would be a huge list of priority three or priority four defects and the BA would sit down with the business to decide what was fixed. Many never were. This has changed. No known defects have gone into production."

Business Lead David says, "Two years ago, we were constantly delivering with defects and having defect meetings all the time."

Now the team is responsible for quality, not the business. "Previously, we'd have gone into production with 40-50 known defects ranging in severity" says BA Sally. "No known defects is just unheard of."

Sally is enthusiastic about the move to Specification by Example

TERMINOLOGY

+ **Specification Workshop:** a collaborative meeting when the business explains the intentions behind a system feature and the team develops a set of specific examples to illustrate the intentions
+ **Scrum Master:** a team leader in Agile Scrum methodology
+ **Example:** a very specific test of a system that proves a business rule has been built
+ **AAT:** Agile Acceptance Testing, another term for Specification by Example
+ **Story:** a small parcel of useful functionality that, when put into production, offers value to the business
+ **Sprint:** a defined period (2-3 weeks) in which the team guarantees to deliver a set of stories to the required production standard. For example, a contact dialogue box with zero defects, with automated tests, peer reviewed etc.
+ **Host:** the mainframe computer on which much of the organisation's business logic resides
+ **SWIFT:** The Society for Worldwide Interbank Financial Telecommunication
+ **3270:** A protocol for accessing mainframe-based applications

and believes the process pays for itself over and over again. “We set up these examples to cover business scenarios and we know when we’re in sprint 24 that we haven’t broken anything in sprint seven. Time and time again, when we change something, the automation fails and it’s a bug that we’d never have found without the automation. It’s worth its weight in gold.”

CONTINUOUS TESTING

Teams chose when to run their suite of automated tests. For some, tests are executed once a day from a continuous integration server. Others use automated tests as a safety net prior to committing new work into source control, then re-run suites on a regular basis.

Simon runs the suite from his workstation. “We use the automation to see if what we’ve done has broken anything. We don’t know where some of the changes are going to impact, so the automation gives us the touch points.”

This gives him tremendous confidence that his work is of a high quality. Simon develops in Cobol. Even though he was required to learn Java from scratch (see ‘How to Make Dinosaurs Fly’), HTML and how to operate an Integrated Development Environment and was a bit dubious to begin with. “It’s not something I could do without anymore”, he says.

SBE CONDENSED

+ Scope is derived from business goals
+ The derived scope is then defined in simple and exact examples through team collaboration – the Specification Workshop
+ Examples are filtered to find the essence of the business intentions
+ Examples are automated to prove the team has built the right thing
+ Automated examples become the living documentation – a single source of truth

A LAUNCH PAD

The organisation has six systems forming the stack for its online department. Some business features might require development on each platform, so all have been automated for testing purposes.

Yet Simon believes they have only scratched the surface. “There’s a huge amount of potential we haven’t touched on,” he says, alluding to the automation of data setup and push button promotion of code and tests through environments to production.

Katy adds: “Setting up customer data [test data] is onerous. Having shown what is possible, that this can be automated, maybe in a year’s time testers will do it.”

As it stands, projects are delivering to production without defects and testers are keeping up with developers through the automation of examples and continuous verification. “The automation takes out a lot of the mundane, the repetitive, the proving it works when you layer on a new feature. Testers have a lot more ability to do exploratory testing round the edges,” says David. Quality is driving upwards.

“Specification by Example is the trigger for these quality improvements” he says. “It is beyond comprehension how much better the quality is, how much higher, with these releases.”