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*The Agile approach saves the FBI Sentinel Project...*

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## ***The Agile approach saves the FBI Sentinel Project...***

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Good afternoon to you all!

More than ten years on from the signing of the Agile Manifesto, we are seeing more than just an interest in Agile from leaders in Government, we have had clear statements of intent. Both the US and the UK governments have said that they want to be more Agile.

**BUT:**

- What assurance is there that problems on individual, high-profile government projects do not set back the whole Agile agenda?
- Can the US and UK Governments learn from each other's successes and mistakes in the adoption of Agile?
- Could both the private and public sectors adopt Agile at a larger scale, faster if we had more research evidence available to us?

There have only been incomplete attempts to survey the progress of the adoption of Agile in

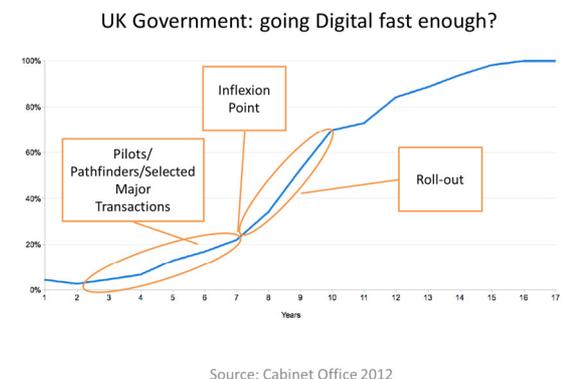
government on both sides of the Atlantic. A torrent of reports has been issued in the last two years, but their conclusions are tentative. The general consensus is that although targets for a move to Agile are broadly set, specific targets and robust measurements are needed.

And, there has been little analysis as to whether the targets in the US or the UK are achievable.

After 2 years of inaction, in the UK there is now a clear plan. A few months ago the UK Cabinet Office announced a Digital Strategy - a timetable to move, and move quickly, to 'Digital, by Default'.

The aim is for the UK government to deliver everything online that can be delivered online.

The Cabinet Office expects one in four government transactions to become digital by 2017



Then there is an 'inflexion point' - a major acceleration - over half of the remaining transactions are expected to be digitized in just three years

So - here is the question that we will address together today.

**What evidence is there that Agile is suitable for large-scale projects?**

We need to make it clear to industry leaders that there are two alternative approaches to developing large-scale technology projects - and, in most cases, only one is viable.

Either the traditional, monolithic, 'Big Design Up Front' approach of massive 'all or nothing' 'Waterfall' projects. Or, alternatively: the incremental, Agile approach using 'Just Enough Project Management' to implement the new processes and the supporting technology. Are the inherent problems of 'Big Design Up Front' and 'Waterfall' projects so difficult to explain?

I don't think so.

Let's look at it from a leadership viewpoint. Businesses need risk management, not technical engineering for its own sake. They need to effect business change at scale, not just tinker with broken processes.

Firstly, let's look at the problems with 'Big Design Up Front' from an everyday person's point of view.

Homer Simpson.

You may recall an episode of 'The Simpsons' where a car manufacturer decides that Homer, being an average American, is the perfect person to design a new car. Homer is given an entirely free rein in the design, and specifies a car with every feature he could ever want. A bubble dome, a Rolls Royce radiator - and huge tail fins!

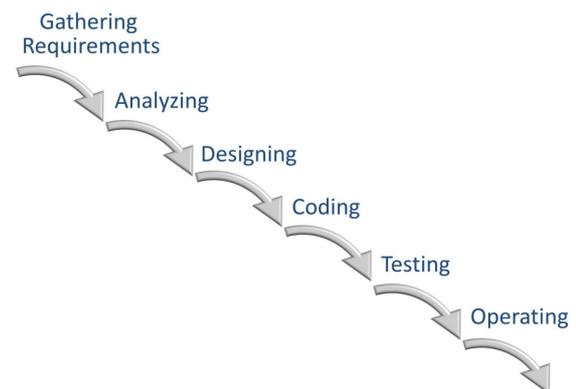


This car turns out to be totally unusable, and far too expensive to produce. An example we can use to explain to anyone the frequent output resulting from a 'Big Design Up Front'.

When we communicate with business people, we need to communicate how 'Big Design Up Front' creates a tendency towards 'Waterfall' projects.

Many people here have experienced first-hand the 'Waterfall' approach, work is divided into artificially separate and sequential steps.

In the 'Waterfall' approach, a new step cannot be started until a previous step has been completed.



Once one has committed to swimming downstream, it is impossible to return to an earlier stage without a lot of effort -as difficult as trying to swim up a Waterfall.

We need to convince senior business leaders that the fundamental problem of the 'Waterfall' lifecycle is that it relies upon pinpoint accuracy and perfect logic at every step if it is to produce a workable solution.

'Waterfall' and 'Big Design Up Front' go together like a horse and carriage - one requires and encourages the other...



And as we all know, the results are often catastrophic.



We need to move beyond belief in the Agile approach, and provide proof of the Agile approach - at scale.

Let me give you an example - one that will convince you and your management that it can be done - through a story.

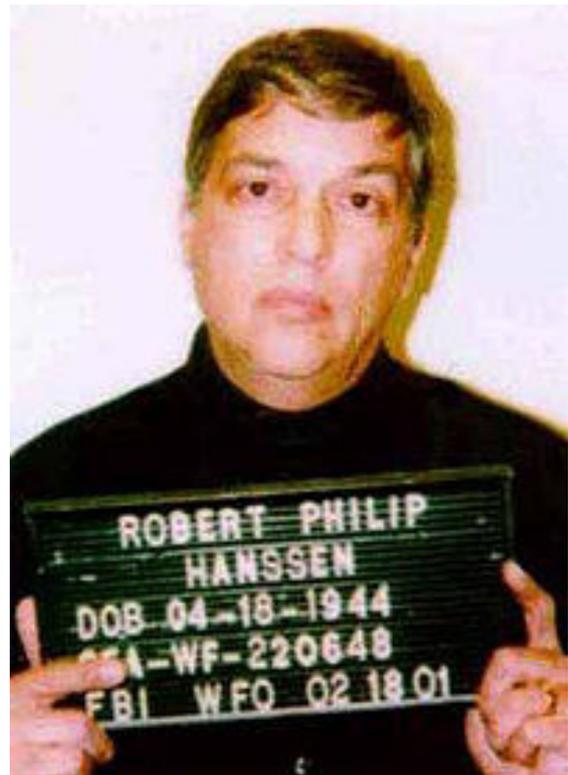
A story that resembles a scientific experiment where, after, two failed 'Waterfall' projects, an Agile approach succeeded. In half the time and at half the cost. It is a compelling tale of how Agile leadership can deliver.

This is just one story of Agile success from my new book - the story of Agile success at the FBI.

In early 2001, a rogue FBI agent, Robert Hanssen...



... was arrested



He had been apprehended dropping this package of secret information...



Hanssen was using these payments which totalled over \$1.4m in cash and diamonds to shower gifts on a stripper in this 'gentleman's club'...



...under this bridge...



... just 2 miles from his office.

The FBI had evidence that on 20 separate occasions, Hanssen had left packages for Russians. He had provided dozens of computer diskettes and more than 6,000 pages of valuable documents. And he had endangered FBI agents in the field by divulging "Top Secret" documents.

...and was about to pick up this \$50,000 payment...

So, how did a single agent get access to so much diverse information?

And, how could it be stopped from happening again?



This was not an isolated problem. Just three months later, in May 2001, the Oklahoma City bomber was about to be executed.

Then (just one week before the date of the execution) it was revealed that over 700 documents had not been disclosed to the defence.

The FBI had forgotten to send materials and in many cases - had simply lost evidence.

...which had been left by a Russian spy at another drop site just 10 miles away.

The legal process was thrown into turmoil, a stay of execution was granted the FBI came under severe criticism.

- How did the FBI forget to disclose so much information?
- How had it managed to lose important evidence in a prosecution for capital offense?

An investigation showed that a combination of an old, rudimentary computer system and outdated manual processes were to blame.

A much more secure and reliable set of systems and processes were required.

The FBI created a grand design for a huge, monolithic system - the 'Virtual Case File' or 'VCF' system.

### ***Virtual Case File (VCF) Project***

- \$400m
- Waterfall
- 600 pages listing requirements
- 200 heads
- \$78m additional budget
- 700,000 lines of code cut, then worked and reworked again and again...
- 400 change requests

... a project to modernise their organisation with a budget of \$400m

...to create a new system and upgrade procedures.

The project was planned in classic 'Waterfall' fashion.

A contractor was to build the system from scratch since no software packages commercially available were assessed to meet the Bureau's requirements.

Science Applications International Corporation (SAIC) were to build the system - with testing and data conversion being left to the end - the whole system would go live at once a 'big bang' implementation.

The development was based on a 'Big Design Up Front'.

A 200 person team spent 6 months producing a very detailed requirements document before starting to cut code.

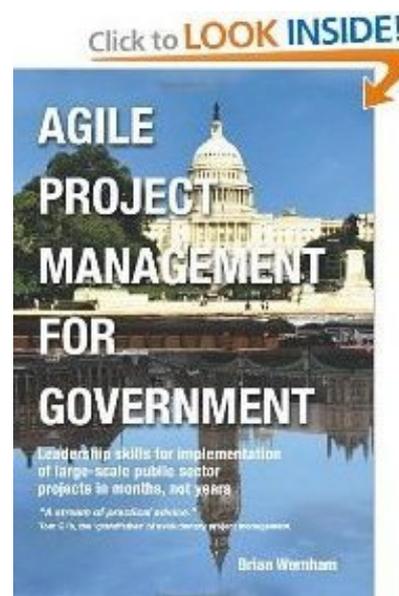
Within a year, the classic symptoms of 'Waterfall' project failure had started to reveal themselves. Despite 78 million dollars of additional funding after the 9/11 attacks

... it became obvious that the project would not deliver on time. The 600 pages of requirements were now the subject of over 400 documented 'change requests', and over 700,000 lines of program code had been being written and re-written time and time again.

700,000 lines of code were cut, then worked and reworked again and again...

The size of the requirements document went on to nearly double to one thousand two hundred pages as the development work tried to keep pace with the changes to this Big Design Up Front.

The system was based on unproven web technology - the testing that could have revealed these flaws came too late to allow a change of direction.



The deadlines were delayed again and again. Each year the implementation date was put back by another 12 months. Every year a new project executive was appointed.

A major audit noted the slippage problems, but took a traditional view of what was needed: more discipline - more detail - more planning.

So, after years of going round in circles, the project was restarted with additional controls and oversight and yet another Chief Information Officer - CIO - was appointed.

The fifth CIO in as many years. His name: Zalmay Azmi.



**Zalmay Azmi  
– the FBI's 5<sup>th</sup> CIO in five years...**

Azmi had an impressive track record in leadership. An ex-Marine - he had worked his way up from programmer to project manager whilst studying nights. As the dust settled around the World Trade Centre after 9/11, Azmi had led a small force wearing gas masks on a special mission into the US Attorney's office to secure the computers there, and get them running again.

He had also been in Afghanistan - crawling through the mountains with a special-operations unit searching for Osama Bin Laden.

Azmi immediately put the contractors who were building the system (SAIC) under pressure to finally deliver.

Four years into the project, now, integration and testing began. But hundreds of modules were failing the acceptance tests. As the software was being fixed, further problems were being found. Scores of basic functions had yet to be integrated.

Azmi warned the FBI Director, Robert Mueller, that the 170 million dollar system was in serious trouble. The FBI Director cancelled the VCF project with recriminations all round.

A 318 page post-mortem report concluded that the contractor had:

*"badly bungled the project - it should be abandoned ... the software is incomplete, inadequate and (incompetently) designed - essentially unusable under real-world conditions."*

It is easy, perhaps, to blame the contractors when projects go wrong. In this case, both the FBI and the GAO still failed to grasp that the project failure was due to the use of the 'Waterfall' approach.

Randolph Hite, from the Government Accountability Office, said:

*"When you do a program like this, you need to apply a level of rigor and discipline that's very high."*

They were missing the point - more top down control could not fix a broken 'Waterfall' approach.

## Attempt 1

- Virtual Case File (VCF) Project
  - Monolithic BDUF design
  - Waterfall approach
  - Big promises
    - 2002: no delivery
    - 2003: no delivery
    - 2004: no delivery
    - 2005: cancelled

The need for a new system remained, and Azmi needed to deliver it.

That year, yet another FBI agent, Leandro Aragoncillo, had been arrested. He had been passing damaging dossiers on the president of the Philippines to opposition politicians who were planning a coup. The ancient FBI system had failed to spot his suspicious behaviour as he fished through the existing case-management systems for over 9 months.

The need for a new system was still paramount. A new, second attempt to modernise the FBI was initiated - Azmi kicked off the "Sentinel" project.

But the planning assumptions again took a 'Waterfall' approach.

Azmi still believed in the need for a 'Big Design Up Front'. A journalist interviewing him noted that:

The road map for the project, (was) housed in a two-inch-thick binder that Mr Azmi frequently pats.

Detailed plans appeared to forecast that it could be done - the problems of the previous project would be avoided - but the stakeholders were told it would take 4 years to implement.

A great deal of effort was spent carrying out a beauty parade of contractors. A desk based exercise scored suppliers' proposals against

comprehensive, but theoretical statements of work.

The FBI eventually awarded Lockheed Martin the contract to develop the Sentinel system at a cost of \$305m.

An additional \$120m was allocated for FBI staff to track and oversee the work.

That's one quarter of the budget being spent on detailed planning and control of the contractor, who in turn was carrying its own detailed planning and control!

Azmi had promised some immediate improvements, so FBI Agents were given a web interface to the old mainframe system to hide the difficult to use screens. But the business processes remained unimproved.

As a senior manager at the time later explained:

"The new screens just allowed agents to interact with the old system through a sexy looking Web browser. Some called it *"lipstick on a pig!"*



Yes! And at sixty million dollars it was expensive lipstick!

And the FBI Agents soon stopped using the

temporary web screens because although they were pretty looking - they were incomplete.

In December 2008, Chad Fulgham was appointed as the next new CIO.

## Chad Fulgham – the 6<sup>th</sup> CIO



Fulgham, who came from Wall Street, brought a business mentality with him that favoured quick results rather than over-planning.

Status reports were still optimistic because of the apparent comprehensiveness of project controls.

But Fulgham saw that little had been delivered on the Sentinel project, and that key tasks were well behind schedule.

Fulgham's predecessor, Azmi had chucked out a failing contractor when he took over the previous failed VCF project.

History now repeated itself. Fulgham required the new contractor, Lockheed Martin, to deliver outputs every 3 months - or else!

But the project still remained bound to detailed specifications and inflexible plans. As functions were delivered, the users found that

they did not meet their requirements, and the technical approach needed to be reworked again and again.

Did the additional \$120m spent on duplicating and checking the detailed project plans help?

No.

The project structure was large, unwieldy, and exhibited a huge optimism bias.

Status reports were full of facts and statistics - but they never reported even one part of the project as being in trouble.

When it came to final testing, one year late in 2010, the stakeholders rejected the system, even though it was theoretically compliant with the original specifications.

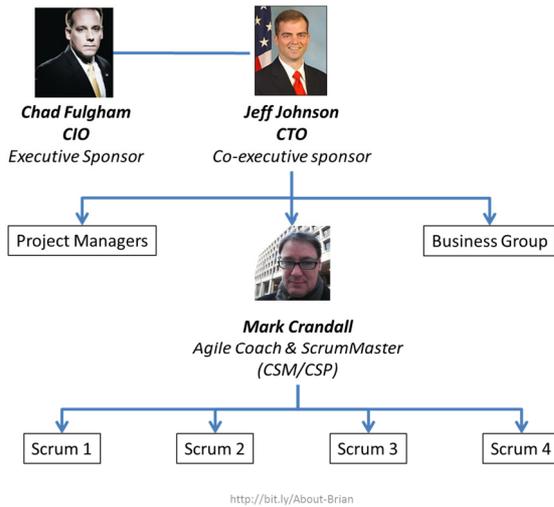
The dream of implementing electronic information sharing before the end of the decade had been shattered.

## Attempt 2

- Sentinel initiated:
  - (Even more) BDUF
  - Waterfall (naturally)
  - 'Group-think' = over-optimistic status reports
  - Planning = 1/4 of \$
- Big promises - BUT:
  - 2006: 'lipstick on a pig'
  - 2007: nothing
  - 2008: nothing
  - 2009: Fulgham pins down milestones
  - 2010: \$405m spent
    - cost to complete £351m
    - Lockheed Martin chucked out
    - Agile approach adopted...

Fulgham now announced that he would take direct control of the project.

He prioritized the existing requirements to focus on the most valuable. He reduced the project from over 300 heads to a just 45. Most significantly, he adopted an Agile approach.



A 'product owner' reported headed a business process team and prioritized the backlogs - at three levels: Sprint, Scrum and 'Scrum of Scrums'.

Mark Crandall acting as Scrum Master General, leading and enabling the Scrum teams, rather than 'managing' them.

The original, monolithic requirements document was modularized into 670 separate 'user stories' each one describing just one end-to-end process that the system needed to do.

Work now started to develop these user stories incrementally. Each cycle of work (or sprint) was two weeks long. At the end of every sprint, all testing had to be complete - and demonstrated to stakeholders.

The Executive Sponsor was responsible for regular "negotiations" with various stakeholders to reconcile priorities and conflicts.

The key lesson learned was an acute awareness of the feedback loops, ever increasing discipline being needed (particularly with automated builds and testing), and taking care not to skip integration at the end of each Sprint.

The stakeholder iterations and willingness to

improve/adapt or reconcile business process was critical to the delivery.

After a few sprints, it became possible to forecast the rough timescales and start to plan the dates for incremental business change and adoption of releases of the new software.

By June last year, the system had been delivered using only half of the budget.

Agents are now using the system on real cases. In the first quarter of its use, over 13,000 agents progressed over 600 cases, meeting or exceeding all expected targets.

The old mainframe system has now been turned off.

### Attempt 3 – Agile!

- Sentinel recovers...
  - Design broken into 670 user stories
  - Iterative
  - Self-organising teams
  - 45 staff (not 300!)
  - Actual spend \$99m

### To conclude...

The three-year Agile project has now delivered - at a total cost of only 99 million dollars. A success after 10 years of failure and 597 million dollars wasted on the two previous aborted 'Waterfall' attempts.

What lessons are to be learned?

My research has identified nine leadership behaviours which enable Agile success. Two of these were critical in the case of the recovery of the Sentinel project.

## 9 Agile Leadership Behaviours

- Satisfy the customer
- Harness change
- Be very incremental
- Get the business and technical people together
- Create trust through 'Light-Tight' leadership
- Encourage face-to-face conversations
- Set targets and reward real progress towards a working solution
- Pursue simplicity, not complexity
- Give your teams the space they need to excel

First: Being very incremental. Both Fulgham and Azmai had to deal with a non-performing 'Big Design Up Front' contracts when they arrived in post. Both broke the work into shorter phases, each 3 months long, to place a forensic spotlight on failure to deliver. But in each case this merely flushed out the symptoms of the 'Big Design Up Front' problem - it did not solve it.

Fulgham managed to recover the Sentinel project by taking direct control of it, thinning down the team and focussing on very short increments of work - each fully integrated and rigorously tested, and approved by stakeholders.

Fulgham helped the team to claw its way back to success - two weeks at a time.

The lesson here is that management became involved empirically - seeing the proof of the pudding with their own eyes every few weeks, rather than relying on status assessments by proxy through paper reports and committees.

The second Agile leadership behaviour that Fulgham exhibited was 'light - tight' management discipline. Let me explain. 'Light - tight' management ensures light management of the team, whilst senior management follow tight disciplines. The light management of the team is more than just delegating decisions. It is about making it clear that decision-making belongs with

the experts working at the coal-face.

Just as important - 'tight' management discipline was exhibited at senior levels by getting hold of the risk and managing it directly. Fulgham did not accept that risk can be completely transferred to a prime supplier. Risk always remains with the government - no supplier can bear the real costs of failure of government to deliver.

Now, in making the case for Agile to senior leaders, we should not overstate the case. A 'Waterfall' approach is often unavoidable, when, for example, making changes to mainframe systems. 'Waterfall' can produce good outputs if requirements are stable, if there is a long-standing change team in place, and if the technology is well understood.

But... and it's a big butt:



...that's a lot of 'ifs'.

There is now an extensive literature available on Agile methods and best practice, but most of it is based on a leap of faith - it is not evidence based.

What many CIOs have told me they need is a credible, evidence based argument that puts the business case for Agile to top leadership levels.

I have spent the last year researching projects in governments around the world to find Agile success stories to present in my new

book - and they are there.

The Ministry of Defence, US Veteran Affairs, the UK Government Digital Service, in India, Australia, New Zealand- and, of course, at the FBI.

All over the world these pockets of excellence demonstrate that large government projects can be Agile.

Those of you who are here to find out more about agile will now have a good grounding in the problems of Waterfall developments and the potential of the Agile approach.

I have shown that it can work on large scale developments.

I have provided evidence to those of you who may be sceptical that Agile works in Government.

Most of all, I have given you a case study which you can use to provide compelling evidence to your management that big projects can be Agile...

**Thank you!**

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Brian Wernham's new book, "Agile Project Management for Government" was published recently by Maitland and Strong (ISBN 978-0-957-22340-0)

Click here: [bit.ly/About-Brian](http://bit.ly/About-Brian)

