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# The heart of the beast

Functional and non-functional specification in  
the digital state



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BIUS WORKING PAPER X

(THIS DOCUMENT DOES NOT REFLECT THE VIEWS OF SCOTTISH GOVERNMENT)

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# 1 Introduction

## 1.1 A short story about Enron

Enron is an interesting tale – a paradigmatic tragedy, a 3 act play marked out by hubris and nemesis, the high-flyer brought down by their own flaws.

In the first act Enron is a traditional pipeline company with a slightly-shady taste for cooing up to elected pols and regulators. In the second act it is a high-flying, market-making, energy-trading company. In the third act the denouement unfolds, criminal conspiracy and fraud flourish and finally the great bust flowers.

All the focus is on the nemesis, the creation of the first off-balance sheet entity to pour failing projects into, but the hubris is fascinating in its banality. The transition from pipelines to trading comes at a board meeting. A powerpoint deck is presented, the board argue for 8 hours, the ship changes direction, *le jeux sont faites*. There is a detail, a wrinkle tho, a hook. The slide deck consisted of a single slide.

This paper, with its aberrant name, flows from my long fascination and speculation with ‘an Enron slide’. What is there that can be summarised so, that can cause you to spin on a sixpence? Could I, should I, would I ever write one?

It turns out the answers are, yes, yes and yes, even tho I didn’t intend to. Whilst preparing diagrams for Working Paper 7 – *Experimental digital legislative* I doodled one up and it struck me with the force of revelation. After 20 years thinking about these problems, my Enron slide had just wandered over and pronounced itself to me, as the unicorn to the pure, the chaste, the Virgin Mary, mother of god herself. The key that unlocks digital transformation was in my grasp.

To my great joy the slide itself is a masterclass in powerpoint banality: unassuming, modest, as chaste as the virgin herself.

## 1.2 Who are you?

You are an elected member, Minister or Spad, a think-tanker or policy person, somebody in delivery trying to build out or drive joined-up government.

## 1.3 Why should you read this?

You should read this to help understand the structural problems of the emerging digital state and their origin in the analogue state – and the steps governments will have to take to address them.

## 2 The Blues Project

This is Working Paper No 5 of *Blus - Basic Law-Making For Legislative Computer Systems* which is a research project looking systemically at how the state creates the digital systems underpinning its services.

Working papers are being released gradually for comment:

Working Paper X – *The heart of the beast* (this paper)

Working Paper 0 – *The locus of change* (published)

Working Paper 1 – *Data and the rule of law* (published)

Working Paper 2 – *Rules as code* (published)

Working Paper 3 – *The Lego state* (published)

Working Paper 4 – *The remixable state* (published)

Working Paper 5 – *Law reform for data* (this document)

Working Paper 6 – *A solera for data cleansing* (forthcoming)

Working Paper 7 – *Experimental digital legislative processes* (forthcoming)

Working Paper 8 – *An Enabling Act* (published)

Blus working papers are designed to stimulate discussion about key elements of the relationship of the state to digital systems and their delivery. Your feedback, input, and particularly criticisms of this paper are most welcome. Feel free to distribute it however you wish.

Working papers are published via the *Digital Policy* SubStack.

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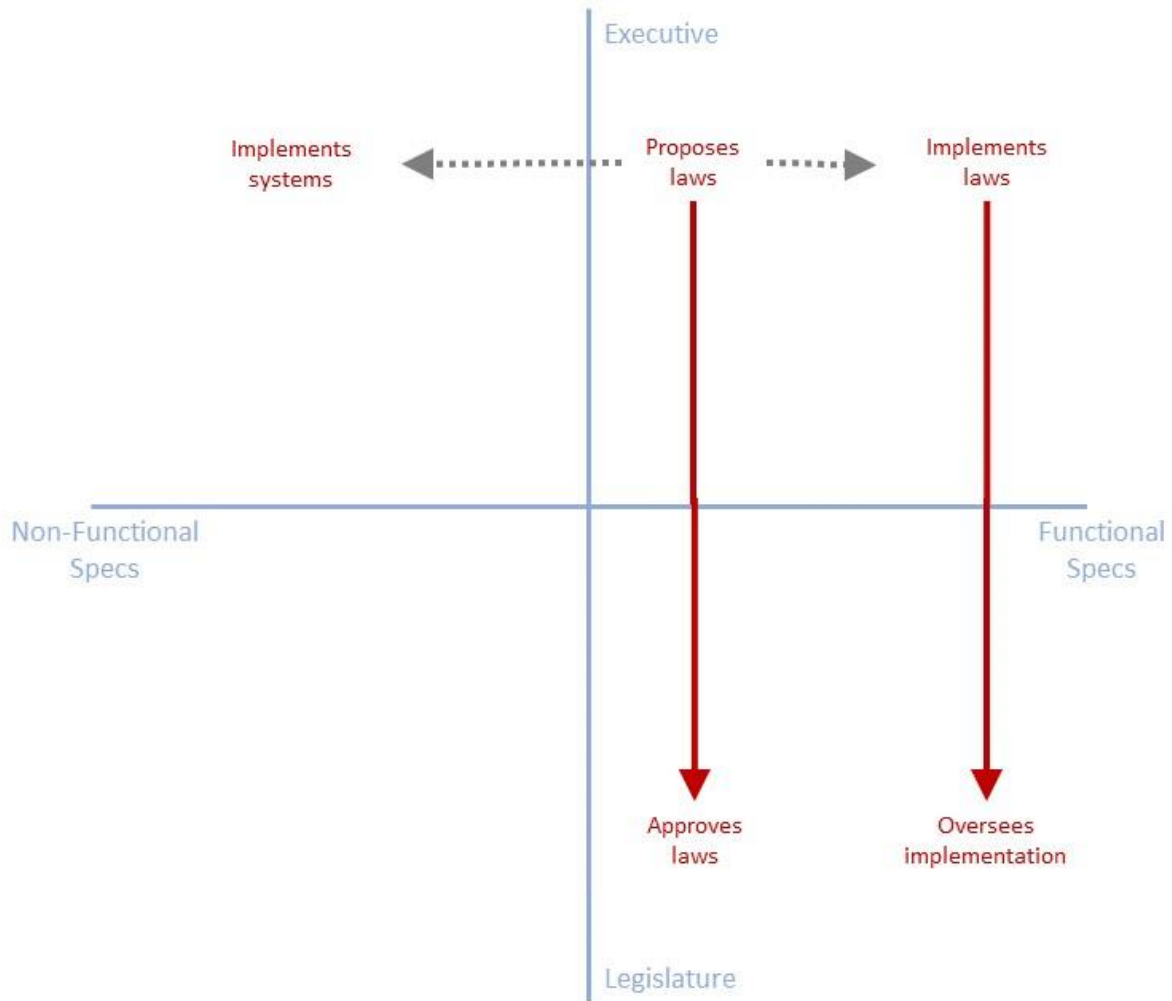
The author is an independent Research Fellow at Scottish Government under the First Minister's Digital Fellowship programme. The views of this paper do not represent the views of Scottish Government.

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<sup>1</sup> <https://digitalpolicy.substack.com/>

### 3 The heart of the beast

You will be wanting me to cut to the magic slide. So here it is – prepare to be underwhelmed.



In this slide I am mapping the journey from policy to system and its supervision on a quadrant.

The upper side is the executive side, the government, the side of agency: what we plan to do and how we do it. The lower half is the supervisory side – where the legislature keeps an eye on the executive.

The right hand side is the functional specification, and the left the non-functional specification. Non-functional here is a term of art in software development – meaning *everything-not-in-the-functional-spec* and not *it-doesn't-work*. You could think of it as the Context Specification or the Foundation Specification – the things you need to do to be able to do the thing itself.

Functional specifications of computer systems are the things that make it distinctive. A social security system will collect details of people's personal circumstances and pay out (or not pay out) benefits accordingly. An alcohol licensing system will collect data about pubs and their location and staffing and allow or deny the sale of alcohol on a premises.

The non-functional specifications of computer systems are not distinctive. The people who administer via social security systems and licensing systems alike must log in. The data will be stored in databases and backed up in both cases. There will be specific volumetrics (10,000 pubs Vs 1,000,000 people) but generally you need to squint to tell them apart.

So the government wishes to do something – it proposes a law – which is itself a functional document – it speaks of the criteria and processes of social security or of licensing. It is largely silent on the non-functional specification.

The parliament scrutinises the legislation – and this scrutiny must be functional only – there are no non-functional elements to be considered. When approved the government moves to implementation – functional and non-functional alike. In the case of a social security bill, a social security department or agency is created (a functional body) and the operations of that body are monitored by a parliamentary social services committee (a functional body).

So the challenge, the light bulb, the “oh!” is that the non-functional specifications are just... there. At this stage I expect you to be scratching your head and thinking “why <oh!> and not <what?>?”

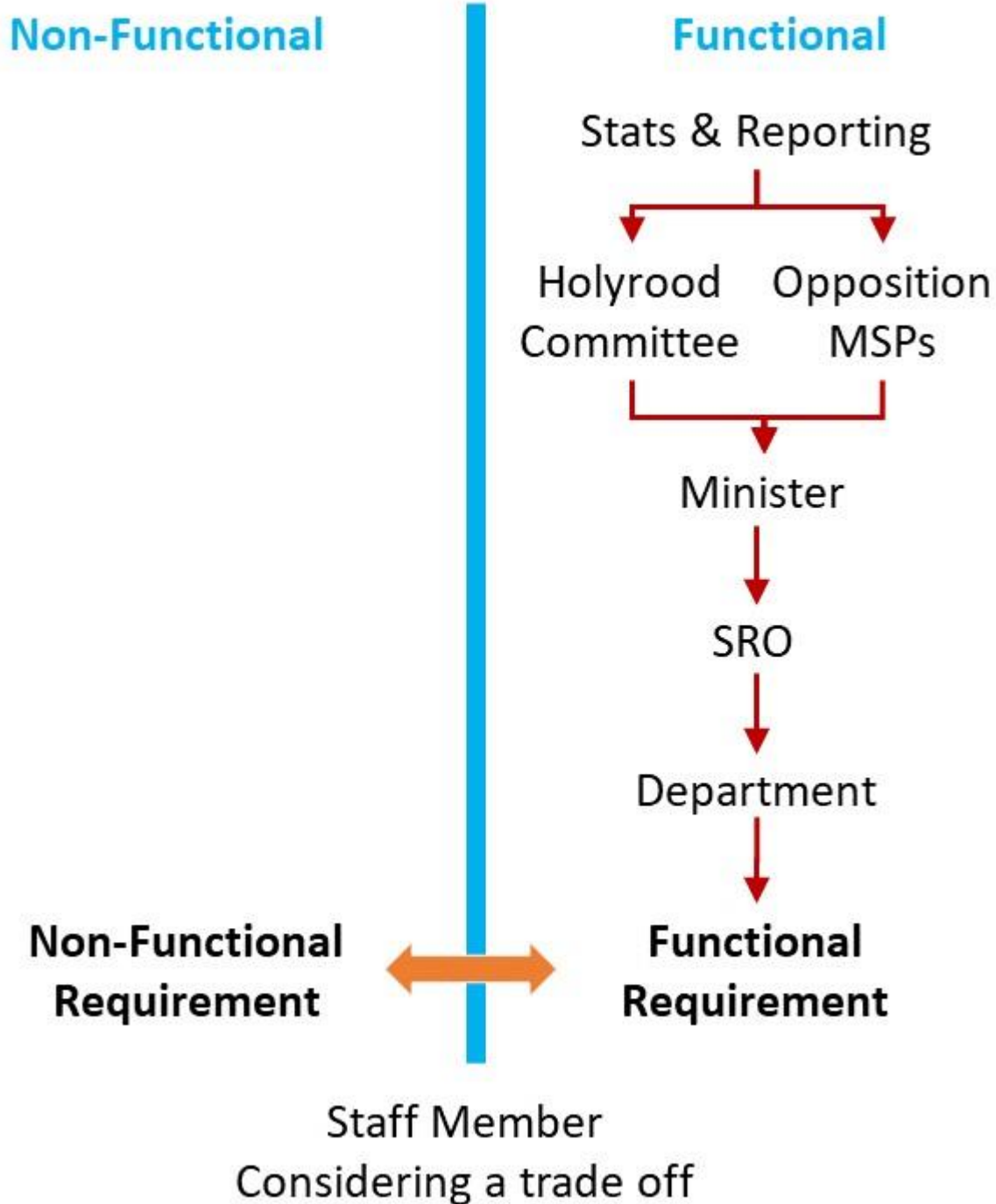
The thing is the non-functional part contains such elements as: *joined-up government*, *data sharing* and *public sector transformation*. Oh.

These things are *willed* in manifestos and ministerial declarations but the organisation of the state lacks the *means* to deliver them or supervise them.

If you have every wondered why the UK has had 12 major public sector transformation programmes and 25-odd data sharing ones, well here you go. The *will* without the *means*.

To understand how multiple initiatives over many years, with the highest level of political backing, all eventually melted into the sands, it is best to turn the problem on its head. You are a civil servant in the heart of the beast, making calls about technical issues in an implementation and you hit a trade-off between implementing a functional requirement and a non-functional one.

You are wrestling with what should be done, what is the right thing, what pressures there are on who to resolve it and all the absolutely normal questions of digital implementation. This is what your pressure and management lines look like:



For the sake of argument let's say you work in the department of Education – a functional agency. Your senior responsible officer is a functional officer responsible for delivering Education. Their minister is a functional minister for Education, who in turn answers to the functional Education committee at Holyrood. The oppositions MSPs are informed by stats and reports which are issued on a functional basis.

From a non-functional perspective there is a desire to see Education working collaboratively with Social Services.

In the case of a clash that requires a trade-off, how does the collaboration ever win?

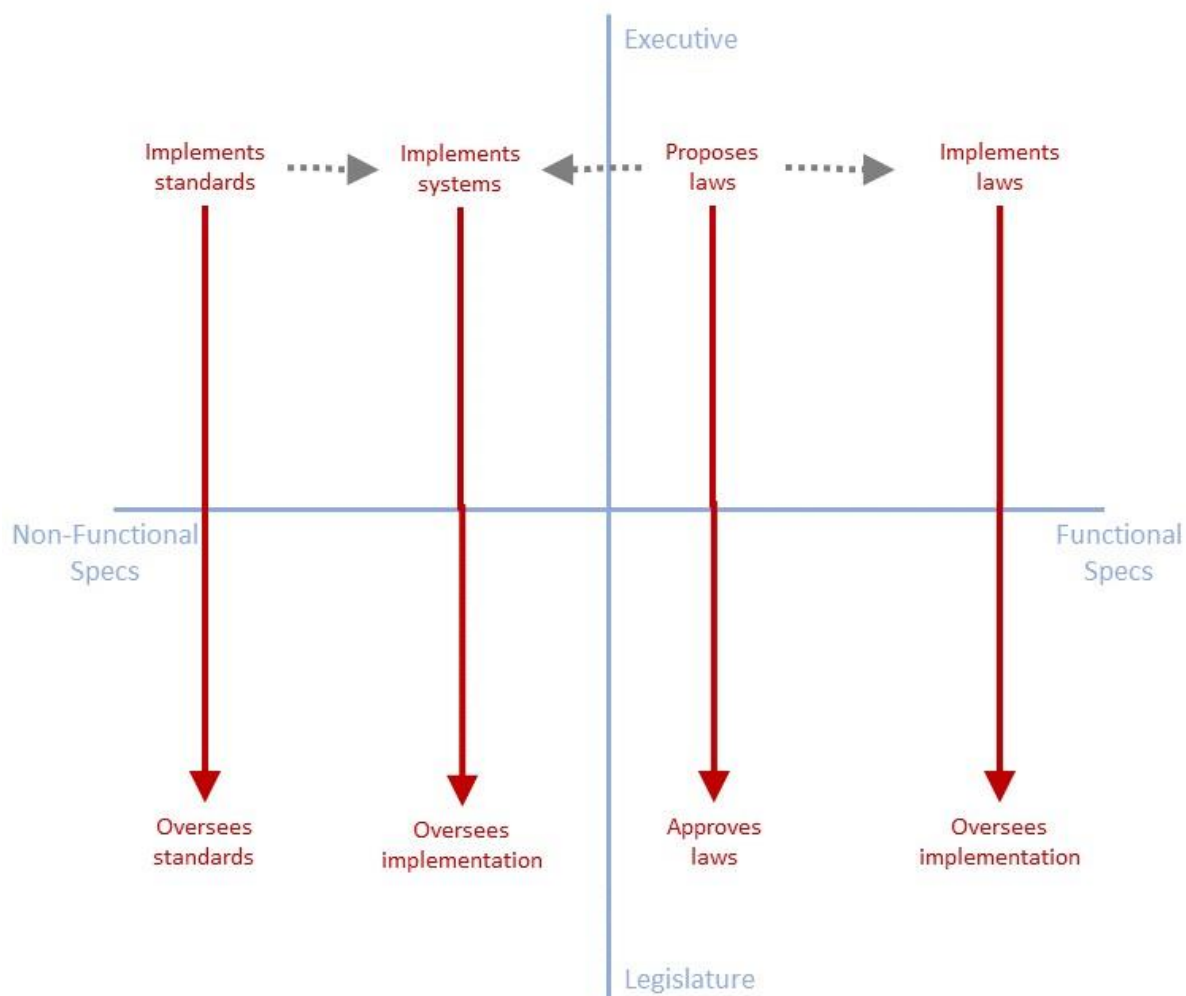
The mystery is not how government programmes swerve off the road into silos, its how anyone expected anything different.

The importance of this slide is that it provides an organising principle for all the work that has hitherto been done. It is the nexus mundi, the ophalion. I now have an analytical frame for intuiting things we should be doing that haven't emerged so far in the interview/discussion/writing/review process. Every single cog in the end-to-end cycle will need to be looked at again through a functional/non-functional lens. How exciting!



## 4 How do we fix it?

Becoming the digital state involves filling in the missing quadrants with the appropriate institutions:



Job's a good 'un, over and out, see ya down the pub, right? Uh, perhaps not. The devil is in the detail and this paper will not go into the detail. Some of the detail has already been gone over in the various working papers listed earlier.

Working Paper 0 – *The locus of change* steps through the institutional architecture – the institution that populates the top left – the Digital Reform Office, and the institution that populates the right – the Digital Scrutiny & Audit Committee. This institutional architecture and the implementation roadmap is obviously Scottish Parliament specific but should be trivially generalisable to other jurisdictions.

Working Paper 1.1 – *Data and the rule of law* lays out some of the generic non-functional requirements for all state data.

Working Paper 2 – *Rules as code* is the outlier – it is the only working paper about functional issues – but, wait for it, it starts from the premise that law is a purely functional specification,

and discusses the limitations that imposes on Rules as Code – without this working paper this analytical approach would not have developed.

Working Paper 3 – *the Lego state* discusses how to use common non-functional requirements across the state to reduce cash/tax cost, transactional time costs for citizens, and improve flexibility.

Working Paper 4 – *The remixable state* builds on the Lego state and looks at what non-functionals are required to make a state that can be reorganised to refocus on different problems and areas.

Working Paper 5 – *Law reform for data* sketches out a legislative architecture, changes to the structure of legislation, to enable data sharing to happen.

Working Paper 6 – *A solera for data cleansing* discusses an implementation process for moving state data from the old world to the new.

Working Paper 7 – *Experimental digital legislative processes* looks at embedding iteration and learning cycles into the parliamentary process to both kill runaway projects and enable more flexible and effective development of new digital systems.

Working Paper 8 – *An Enabling Act* describes a technical mechanism to handle the volume of incremental change that is required – accidental blockers of transformation embedded in law.

## 5 So how did we get here?

To understand how we got here we need to be back to the analogue state. Consider social security – the manual, paper-based social security system was also specified in functional and non-functional terms (although that analytic distinction was not used).

The functional specification is familiar from the digital age – collect this information (just on a paper form) and make this decision and record it (just in a paper file).

The non-functional specification – the common elements – is much more prosaic. There will be a building, it will be big enough for the staff, it will have a roof and windows and electricity and be near a bus stop and a car park...

The non-functionals scarcely interact with the functionals – can the building hold the number of people required? can the floor support the weight of paperwork that will be generated?

The analogue non-functional work was all boxed up and implemented. There are legal pattern books for it – a body needs these powers to own a building, and an apparatus for handling it embedded so deeply in government that its hard to remember that it's even there.

When digital came along with its tightly coupled non-functional requirements we didn't change the processes – the non-functionals went mostly unspecified.

This seems like a contradiction – nobody specified the non-functional requirements, you can't get a system without implementing the non-functional requirements yet we do indeed have government digital systems. What gives?

Well, humans are autonomous beings wrapped in a self-propelled meat envelope and they kinda solve problems and do stuff.

Its worth looking at an under-internalised period of British statecraft and organisation building – 1918 to 1919. On the 14<sup>th</sup> December 1918 the UK called a general election – the coupon or khaki election and new MPs were elected to celebrate the end of the war. In Ireland the Sinn Féin MPs went to Dublin and declared themselves Teachta Dála of the Dáil Éireann instead.

The Dáil was an organ of *will* and decidedly not *means* – being an underground government. It willed the civil administration and taxation of a new state. Men in slouch hats with guns conjured up the non-functionals – pubs became sites of local administration, a legal/illegal Dáil Loan bond was issued – the real oul Sinn Féin conjuror's outfit.

So it is with the current state. Left to themselves the slouching engineers and technical specialists conjure up the non-functionals each tailored to their functional silo. Adieu joined up government, adieu data sharing, adieu transformation.