White Paper: Asymmetric Design

Public Sector IT - The CSA Case

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Status

Introduction

There are many views about the root causes of the current situation facing the Child Support Agency (CSA). Observers have variously sought to fix the blame on one or other of the main actors in the drama (EDS, the Department of Work and Pensions, the CSA itself), and have identified a range of possible causes from alleged lack of competence and expertise, to inappropriate policies.

This note asks what the nature of the problem is. Is it a systems development problem to do with complexity or capability? Is it a procurement problem to do with contracts and behaviours? It is an organizational problem within the CSA? Our conclusions point to there being intrinsic properties of the task that mean that the approach taken by all parties could not succeed in its own terms.

Recent Government procurement policy has been to outsource large public sector IT requirements to a small number of large and powerful suppliers, such as EDS, under Private Finance Initiatives[1]. Successful implementation of this procurement policy depends on a number of factors which may have been absent in this particular case (the competence and discipline of the suppliers[2], presence of enough experts within the Agency "to know about and police what the outside supplier is doing".[3]). Doubts about the effective implementation of this procurement policy frequently lead to doubts about the overall wisdom of the policy itself.

An alternative point of view attributes the failure to the complexity of the provisions in the original legislation, the subsequent 'simplification' forced on the CSA's work in response to public outrage at its *modus operandi*, and the continuing politically-motivated changes to the specifications following on from that 'simplification'.

In this paper, we identify a more radical explanation, based on the fundamental difficulties of providing complex services to citizens. We argue that the current situation is the natural consequence of a lack of shared assumptions about how to go about providing services to citizens where there is significant computerisation of those services. This lack of shared assumptions is most apparent between the judgements and actions of civil servants and those of software developers, and relates to the way service demands on the Agency are understood, assumed to be 'asymmetric' in the former case, and 'symmetric' in the latter. The consequences of

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[1] "£450m EDS system under fire again as child support complaints rise", Silicon.com 1st July 2004; "CSA boss falls on sword over £456m IT system fiasco", The Register, 18th November 2004.
[2] "UK MPs criticize secrecy in EDS system probe", NetworkWorldFusion 22nd October 2004.
[3] "Problems Bedevil EDS Case Management Project for UK's Child Support Agency", Computerworld 6th September 2004.

this difference are apparent in the differing management approaches to the way service elements should be composed in response to demand. We argue that the failure to resolve this difference led to the failure of the CSA system, and is likely to lead to the failure of many other public sector IT projects.

For those who accept at face value the blame attached to some of the players, this is a counterfactual ("what if") argument. Large public sector IT projects are exclusively outsourced to a small number of very large IT contractors, with similar management styles and with similar strengths and weaknesses. So there is no direct evidence to support or refute the proposition that smaller, differently managed IT organizations would deliver a different outcome. However, we believe that even if all the players are assumed to be properly competent, there are some insurmountable difficulties in the task itself, which a traditional software development approach would not have solved.[4]

A traditional approach relies on a presumption of Symmetric Demand, enabling it to make use of 'directed' composition of service elements. If we replace this presumption with one of Asymmetric Demand, then this leads to the adoption of an alternative software development approach of 'collaborative' composition. We explain why we think this approach would have produced more satisfactory results for the CSA and its clients, and we outline our support for Asymmetric Demand and Collaborative Composition.
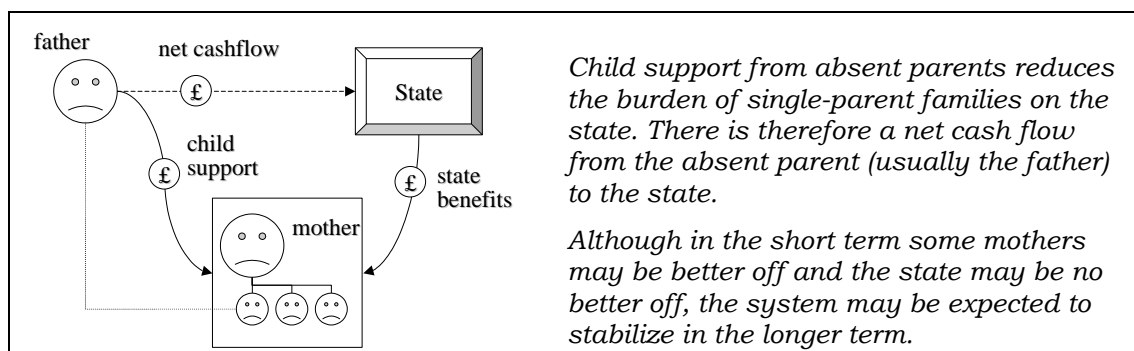
Background

Child Support Agency

The Child Support Agency was established by the 1991 Child Support Act, and launched in April 1993 to address a related set of social and economic policy requirements in relation to single-parent families and absent parents (usually fathers).

The official purpose of the Act was to force absent parents to take some economic responsibility for their children. This was thought to yield several social benefits. It would:

• Encourage absent parents to remain in contact with their children.

• Reduce the economic burden of existing single-parent families on the state.

• Provide an economic disincentive for the creation of new single-parent families, although this would have a marginal effect on the number of cases.

Although it was not the official objective of the Agency to tax or punish absent fathers, an encounter with the Agency was often experienced both as a covert form of taxation (since many of the mothers are on state benefits, increased support from absent fathers is equivalent to a net cash flow from absent fathers to the state– see Box 1) and as a covert form of bureaucratic disapproval/ punishment. Such experiences received widespread publicity from campaigning fathers, caused many cases of hardship and suicide, and might conceivably have caused some men and women to make greater efforts to avoid falling into the CSA's scope, thus over time reducing the extent of the original social problem. To the extent that the CSA systematically generated these experiences, and these experiences could plausibly be linked to longer-term social benefits, we might have inferred the existence of an unacknowledged objective of social engineering.

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[4] The current understandings of "service" in the minds of users of the CSA services can no longer be encompassed by an imposed set of rules for the allocation of support. The diversity of expectation is composable into a deliverable service but not by a team consisting only of the CSA and their IT partners. We see no recognition of this possibility yet by the players.

Child support from absent parents reduces the burden of single-parent families on the state. There is therefore a net cash flow from the absent parent (usually the father) to the state.

Although in the short term some mothers may be better off and the state may be no better off, the system may be expected to stabilize in the longer term.

Box 1 Net Cash Flow Effect of Child Support

By 1999, it was being predicted that the CSA would be handling 1.2m cases affecting 2.4m parents, while it was also being admitted that fewer than 250,000 children were benefiting directly from maintenance paid, and of those only half were seeing all the money that was due. Meanwhile, CSA staff were spending 90% of their time on complex assessments, and only 10% on enforcement, so that the net effect was that in the CSA's first eight years, the proportion of lone parents on income support receiving maintenance from the father had remained exactly the same – 20% of them. Some stakeholders became convinced that simplification was the answer.

The provisions of the 2000 Child Support, Pensions and Social Security Act, which received Royal Assent in July 2000, was intended to come into effect in April 2002. This combined tougher penalties for non-compliance with simpler methods and criteria for calculating maintenance payments, using a simple percentage rate of maintenance payment based on 15% of the absent parent's net income for one child, 20% for two children, and 25% for three or more children (with a fixed rate at the lowest levels of net income). The Government had announced in 1999 that the system implementing the new provisions would come into effect in autumn 2001. In March 2002 its implementation was delayed indefinitely, and it was not until March 2003 that it eventually went on-line.

Of course, the total experience of absent fathers results (among other things) from a composition of the actions of multiple agencies, including the family courts, social services and police, as well as the CSA. Questions of financial support interact with questions of custody and access, as well as being affected by such things as allegations of violence and abuse. As a result, even with simplifications of the calculation of liability, the CSA's interaction with other agencies is unavoidable, with obvious implications for its collaboration at this level. We shall return to this question later, but first we shall focus on the CSA.

History of Systems

To date, there have been two contrasting attempts to create a computerized system to support the CSA.

The first attempt was basically an electronic version of a paper-based casework system. The approach had to be case-based both because of the complexity of the legislation and because of the potential complexity of the cases themselves. In the resultant system, cases were captured in an unstructured way, and processed on a case-by-case basis by CSA caseworkers.

In effect, a judgement was having to be made in each case as to the income, expenses and circumstances of each parent, combined with the application of further 'fudge factors' to arrive at a final figure. The scope for obfuscation and abuse of this system was so great, let alone straightforward inequities generated in good faith, that it was not surprising that the application of the Act resulted in an uproar.

No attempt was made to manage this complexity within the software, this being left to the caseworkers. As a result, there were three main criticisms of this system

1   It was considered slow and inefficient.

2   Clients could use relatively simple tactics to achieve indefinite delay in processing their case.

3   There were concerns about the consistency with which the caseworkers interpreted the application of the Act. Because the manner of interpretation was not itself codified, monitoring and supervision were weak and unreliable.

To address these criticisms, the original Act was amended, and a second attempt was made to create a computerized system, this time incorporating more of the logic of the amended Act within the software itself. This involved commissioning some new and expensive software from a consortium led by EDS, interfaced with a call centre system built by BT Group. At the time of writing, following the resignation of the CSA Director, there is a possibility that the system will be scrapped.

Complexity

Some of the original complexity of the demand side may have been exaggerated for spin purposes. But there were a complex set of contingencies affecting a determination of liability, involving a number of determinations that had to be made in relation to both parties[5], as well as the contingent ways in which they had to be related to each other in determining the amounts of maintenance.

Once simplification had been decided upon to facilitate computerisation, there were three possible ways of managing this complexity:

(i)   write a really complex bit of software that contained all of the logic on day one, imposing a structuring of data on the cases in such a way that it could contain the variety of ways in which this logic could be applied.

(ii)   simplify things so that the justice was cruder, but still good-enough (the approach adopted, in which the actual numbers of different ways in which people tried to use the software in the face of the actual user probably made it fall over more than expected); and

(iii)   the approach put forward in this paper, which would require retaining 'design accountability' in the agency, with a 'meta' set of rules on how caseworkers performed this role. This would make it possible to start out with a relatively simple approach which could be progressively elaborated through the way caseworkers exercised design control over the way they performed their roles.

Since the simplification of the provisions of the Act, resting on a determination of net income, much of the remaining demand-side complexity arises where several cases have to be handled together (e.g. one father with multiple mothers; one mother with multiple fathers), sometimes generating long chains.

The apparent difficulties experienced by the EDS development team may result partly from trying to impose a painting-by-numbers development approach on a large number of freelance developers using a variety of development tools[6]. But the failure of the CSA system to address the demand-side complexity in the variety of ways in which the system was to be used cannot be completely explained in terms of these difficulties.

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[5] For example Maintenance Requirement, Assessable Income, Basic Element, Additional Element, Protected Income, Housing Costs.

[6] None of the data in the existing system was structured, the new system was based on software brought in from elsewhere, and it was modified by large numbers of independent programmers. There was no real integrity of the original data, and the fact that it was a modification to an existing system meant that there was no testing of the functional integrity of the new system as a whole.

There was also a lack of collaboration between the stakeholders involved arising as a result of the system being procured through a Private Finance Initiative.[7] Thus not only did some of the parties supporting the original system drop out[8], but also the remaining parties (including BT) established strong inter-organizational barriers to protect their IPR, together with there being internal boundaries between the CSA and other Government Agencies obstructing a full understanding of the requirements of the system.[9] No surprise, then, that the project suffered major delays from the effects of the simplifying assumptions underpinning the PFI compounded by a flawed development approach, intractabilities in integrating the data from the legacy system, and obstacles to working across organisational boundaries

This situation would therefore appear to provide *prima facie* evidence of the need for a (iii) approach as above, not only at the level of the caseworker (doing what we will describe as the clockwise bit within anti-clockwise constraints), but also at the level of the governance of the procurement process as a whole, which also needed to be collaborative in the ways it sought to satisfy the needs of different government stakeholders as well as the will of Parliament.

Public Sector IT

Large public sector IT projects are typically allocated to powerful consortia, which are dominated by a select group of large contractors. The justification for this situation has typically been that these projects are large and complex, calling for high levels of reliability and scale, and that only the largest suppliers can guarantee these requirements. However, there is a chequered history in these contractual arrangements, and the justification appears to be based on false premises.

Furthermore, these arrangements are characterized by a state of co-dependency between government and the large contractors. The contractors cannot afford to reveal the truth about a particular project, because this would threaten projects or priorities elsewhere in government – and this means that the appropriate corrective action is not always accessible. Meanwhile, government may sometimes be reluctant to enforce contractual commitments that appear to have passed all the cost and risk on to the contractors, since this would threaten contractors' ability to support projects elsewhere in government. All of these dynamics are then further intensified through the use of Private Finance Initiatives, where an arms-length relationship favourable to (ii) above becomes necessary even when it is not desirable.

As a result of this co-dependency, government has a stake in the continued commercial survival of these contractors, and is therefore obliged to perpetuate the situation by providing a constant stream of new work – under much the same flawed conditions.

So to reiterate the basic question: given the positions, assumptions and interests of the groups involved, is there a system that can be built that will be accepted? The various parties seem to assume that there is, thus precluding the ability to examine their own positions for their effect on the viability of the underlying task.

General Framework

Given a demand arising within a context-of-use, it is always possible to define 6 strata, the top three being demand-side strata, and the bottom-three being supply-side strata. If the heterogeneity of contexts-of-use can be ignored, so that the

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[7] The use of PFI was based on the assumption that a new system would be built from scratch in such a way that it could determine how the agency responded to cases, but it included taking over all of the existing IT people and culture with responsibility for migrating the existing systems to the new systems.

[8] IBM and Accenture withdrew from the original consortium.

[9] The situation originally inherited by EDS was not auspicious - the processes within the department had not been well thought through, and communications with other departments were not well set up, so that data was not provided to the CSA.

demand can be defined independently of context-of-use (i.e. is symmetrical to the supply-side), then only the 3 supply-side strata are needed to describe how an autonomous system is built out of sub-systems that are themselves built from components (see Figure 1).
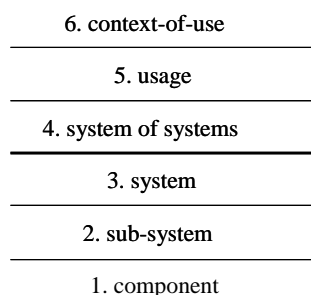
| 6. context-of-use |
| 5. usage |
| 4. system of systems |
| 3. system |
| 2. sub-system |
| 1. component |

Figure 1 Stratification into 6 layers

If demand cannot be defined independently of the context-of-use in which it arises (i.e. is asymmetric to the supply-side), so that the heterogeneity of contexts-of-use cannot be ignored, then the relation to the context of use is described in terms of two further layers: the orchestration of a system of systems, and its composition with the context-of-use through the way it is used.

6   asymmetric demand   the context-of-use

5   the use-in-context   composition of 4 with 6

4   the system of systems   orchestration of 3 in support of 5

3   the systems   providing autonomous services in their own right

2   the sub-systems   out of which 3 are built

1   the components   from which the sub-systems of 2 are built

Using this framework, we can describe the three options above as follows:

(i)   write a really complex bit of software – anticipate all of the demand-side complexity in how the supply-side is constructed.

(ii)   simplify things so that the justice was cruder – reduce the amount of demand-side complexity that has to be addressed in how the service operates; and

(iii) retain 'design accountability' in the agency, with a 'meta' set of rules on how caseworkers performed this role – build a demand-side capability that can manage the complexity of the demand-side in such a way that it makes use of an underlying range of supply-side services that can be composed.

Looked at in these terms, it can be seen how the original attempt at computerisation aimed to provide a supply-side capability to the caseworkers that only provided document management, while not addressing the demand-side need at all.

Smart Procurement

It can also be seen that 'Smart' Procurement needs to be regarded as a supply/demand interaction at a higher level of abstraction. We are now concerned not with delivering against a fixed requirements specification but against a dynamic set of meta-requirements, aspects of which may be rendered 'fixed' periodically.[10]

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[10] The notion of control needs visiting here. The client-side assumption in PFI is that it is the supplier who needs to be controlled in order to deliver value for the purchaser. The supplier side assumption is that the risk being exported from the client to the supplier needs to be paid for. Neither side are motivated to look at any aspect of deliverability that lies outside these assumptions. Can we seriously imagine EDS telling the government that a system cannot be built?

For an analogy, we might look to lean manufacturing systems, where only by making supply chain partners vulnerable to each other's failures is it possible to tune the performance of the system as a whole. Pre-judgement of the form that collaboration should take precludes effective process design.

The Original System: Clockwise

In figure 2, the relationship between the supply-side (layers 1-3) and the context-of-use (layer 6) is represented by 4 quadrants. Two of them represent the processes of orchestration and composition of services in layers 4 and 5. The other two represent meta-knowledge about how this orchestration and composition is done. It is the codification of this meta-knowledge that makes the third option above possible. But before considering how this might work, the model can be used to describe the original system and its EDS-supported replacement.
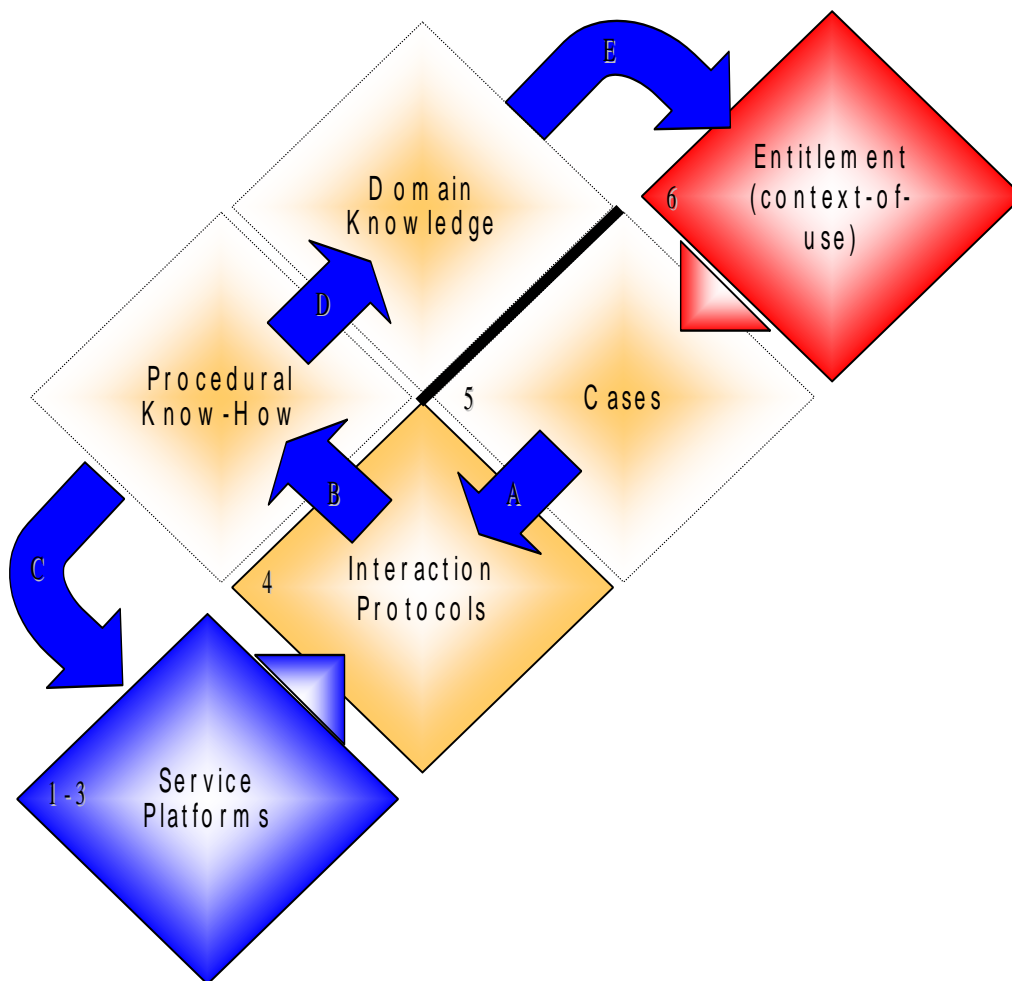

Figure 2: The original (clockwise) system

A	The legislation results in claimants bringing cases to the CSA
B	Caseworkers seek to apply the legislation to the cases
C	Departmental managers define those aspects of the casework that can be supported by computerisation, which in the CSA's case involves the management of the paperwork.
D	Learning about the procedural know-how involved in managing the casework leads to knowledge about the complexity of the cases themselves under this legislation.

E	The levels of backlog, failures to resolve complex cases, difficulties on enforcement and popular uproar lead to a simplification in how entitlement is defined.

Player Advantage

The civil service ethos of providing a fair service to the citizen within the confines of the legislation is preserved, and the role of computerisation is restricted to one that does not challenge existing working practices, being restricted to functional substitution for within the existing workflow logic. Those working practices themselves remain unchallenged, and remain unable to inform the way in which the legislation is itself drafted. As a result, the provisions of the legislation (along with a great deal of other legislation) are in danger of not being implemented effectively.

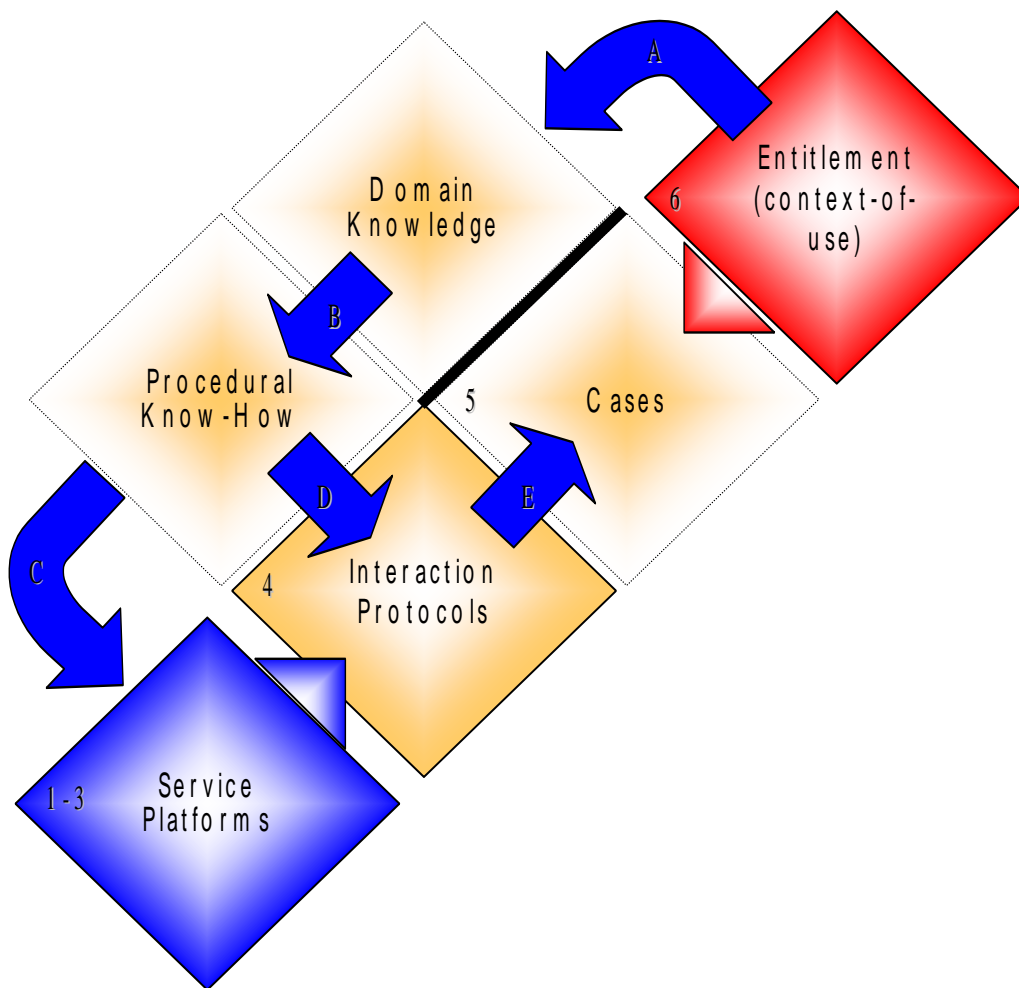## The EDS-supported System: Anticlockwise

Figure 3 The EDS-supported System (anti-clockwise)

A	(In desperation) the Minister defines through legislation top-down a simplified version of what the Government wants.
B	This is worked up into a requirement for the services that the CSA system should provide, leaving intact the existing working practices of the departmental managers.

C	A requirement for a system is developed and the system is procured through an arms-length process involving PFI, in which more functionality is demanded of the system, but its role and interfacing with other departments and other systems remain untouched.
D	User training and re-organisation of business processes is undertaken to enable the department's services to conform to the way it has been designed.
E	The whole thing goes 'live'. Problems in practice may initiate a clockwise counter-movement, but the effectiveness of this will depend on the structural flexibilities built into both the platform and the business processes implementing it.

Player Advantage

The anticlockwise process is focused on delivering a one-size-fits-all solution. From an IT perspective, this generally favours the large system integrators who can supposedly deliver economies of scale in how the system is delivered.

If the inhouse IT department tries to play an anticlockwise game, it can almost always be beaten at this game by systems integrators. However, even the systems integrators are now finding that the anticlockwise game is not working very well for them either.

Platform providers produce technologies that further shift the balance of advantage towards system integrators. However, this puts them one step further away from the end-user and the delivery of business benefit. The platform becomes an invisible utility.

The Proposed Approach: Collaborative Composition

Bureaucracy

The challenge here is to bureaucratize casework – to gain efficiency and fairness, without sacrificing requisite variety. According to Weber, bureaucracy potentially represented an improvement over corrupt and inefficient systems. We now know a lot more than Weber about the pitfalls of bureaucracy. However, an agency such as the CSA cannot and should not seek to avoid bureaucracy altogether – but should seek to gain its advantages without suffering its disadvantages.

Combine Clockwise and Anticlockwise

For both solution providers and platform providers, there is a potential gain from moving to a clockwise process, which brings them closer to the demand side.

The drivers for this at the tactical level will be the amount of post-implementation change needed to maintain the usefulness of the platform + business processes; while at the strategic level it will be the sheer complexity/heterogeneity of the design task if pursued solely in an anti-clockwise dominant way.
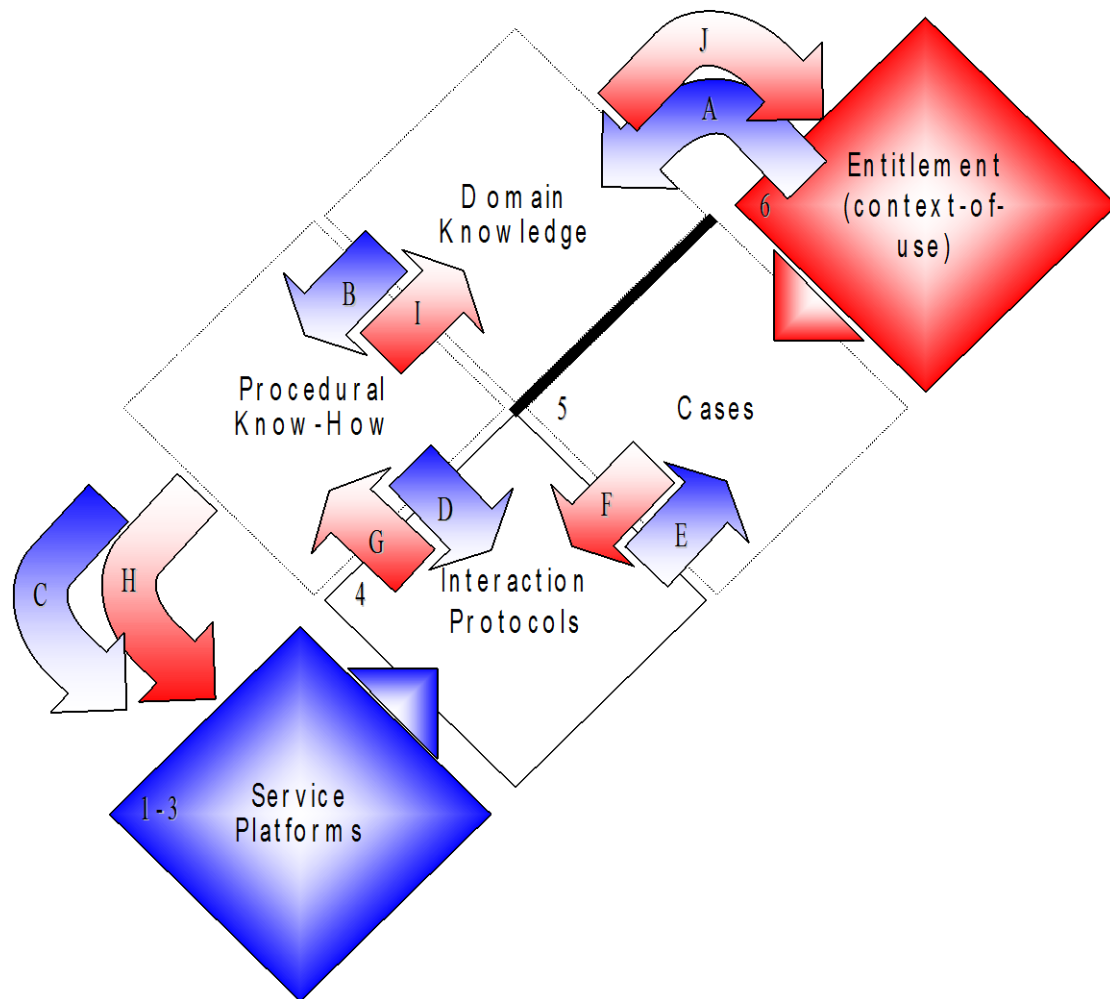
Figure 4 A collaborative approach

A	The Minister defines through legislation what the Government wants
B	This is worked up into a business model for the way the CSA should itself work in relation to other agencies as well as in relation to its authorising legislation
C	A requirement for services is defined at a level of granularity capable of supporting the orchestration requirements of the department, including interfaces to other departments' services
D	A composition platform is created that will support orchestration and composition of services, and user training and re-organisation of business processes is undertaken to make best use of the available services.
E	The whole thing goes 'live', with problems in practice being used to initiate clockwise counter-movements.
F	Within the context of an existing anti-clockwise context, cases are selected that 'disrupt' the existing approach, and/or where a new form of response is identified as being needed. The composition requirements of these cases are expressed in terms of orchestrated service elements which may use presently available service elements, or may define new ones.
G	Having examined a number of these cases, the procedural know-how being assumed by the changes in the orchestration process are defined.

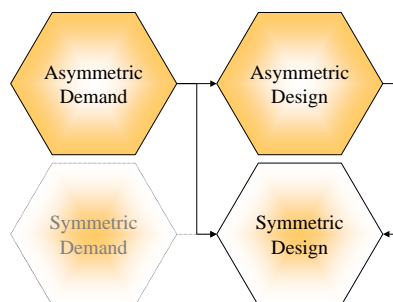| H	The new forms of procedural know-how may involve translation into new definitions of the behavioural repertoire and granularity of the service elements provided from service platforms, which may lead to re-engineering aspects of strata 1-3.
I	The domain knowledge through which the variety of cases is described is modified, so that there continues to be shared understanding of what the department is doing in how it responds to the cases.
J	Revisions may be made in the legislation affecting the contexts-of-use that the department is exposing itself to, as new understandings of its strategic role emerge.

Method and Support

Asymmetric Demand

Asymmetry means that the forms of demand are increasingly specific to the context in which they arise. What the user wants is always to be something more than what can be provided. This 'more' may be because of the way the need is embedded in a larger context-of-use, but it is very likely to be also because that larger context (the context-of-use) is itself changing.

Responding to Asymmetric Demand

In a situation where Asymmetric Demand prevails, the design response may be either Symmetric or Asymmetric.

Symmetric Design acts as if the Demand were Symmetric (or near-enough Symmetric). Symmetric Design will often produce results that appear acceptable within a closed view of the world (narrow and short-term), but show their inadequacy when viewed strategically.

As we have seen in this example, business services are commonly designed in a symmetrical way, addressing requirements derived from a simple and stable understanding of the customer demand. However, when this understanding is out of touch with the complexity and dynamic nature of customer demand, the services will fail to deliver relevant value, and may turn out to be surprisingly inefficient to maintain. And yet there may be nobody within the service organization capable of appreciating this until it is too late.

In contrast to this, Asymmetric Design presumes that the aim of an asymmetric design process is not to render the demand symmetric, but to manage the asymmetry through a continuous and continuing process.

Holding Open the Asymmetry

For teams that are unfamiliar with Asymmetric Design it is often tempting to revert to Symmetric Design. To maintain an Asymmetric focus, we must address three things:

1. **Establishing a collaborative relationship between supply-side and demand-side** – this typically takes the form of a joint venture between user and provider, with appropriate mechanisms for managing and sharing the risks and rewards.

2. **Joint appreciation of what is driving the asymmetry** – this requires the production of a demand-side model that is independent of the supply-side model, so that they can be juxtaposed and assembled.

3. **Collaborative composition** – the user must be able to compose the service that best approximates to his or her need close to the time of use, and then orchestrate the available supply-side services to support that composition. Depending on the dynamic nature of the demand, this may be a one-off process or has to be supported by a demand-side composition platform (operating in the manner of a 'wizard').

Asymmetric Leadership

What, then, are the challenges this poses to senior management of such organizations?

1. Management has to lead in a different way – he or she cannot know best how to create growth, but rather must create the conditions in which those at the edges of the organization can learn how to create growth.

2. Management has to authorize the processes of questioning the existing ways of doing business, expecting that this will be disruptive, but demanding that these forms of disruption be worked through in the long term interests of the business as a whole.

3. Management has to ensure that the supply-side infrastructures of the business are organised in such a way that the maximum performance and economic sustainability can be extracted from them in support of the 'edge'.

Notes

The methods outlined in this white paper were developed by Boxer Research Ltd www.brl.com. For further information about Asymmetric Design, please visit www.asymmetricdesign.com.