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Failure, Success and Improvisation of Information Systems Projects in Developing Countries

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Table of Contents

ABSTRACT.....	1
A. INTRODUCTION: DEFINING AND MEASURING SUCCESS AND FAILURE.....	2
THE EXTENT OF SUCCESS AND FAILURE.....	3
B. UNDERSTANDING DEVELOPING COUNTRY INFORMATION SYSTEMS SUCCESS AND FAILURE.....	5
C. EXPLAINING DEVELOPING COUNTRY INFORMATION SYSTEMS SUCCESS AND FAILURE.....	7
COUNTRY CONTEXT GAPS.....	7
HARD—SOFT GAPS.....	9
PRIVATE—PUBLIC GAPS.....	11
D. INCREASING SUCCESS RATES: LOCAL IMPROVISATION TO REDUCE DESIGN—REALITY GAPS.....	13
SUPPORTING LOCAL IMPROVISATION AND INCREASING SUCCESS RATES.....	14
<i>i. Expose Organisational Realities.....</i>	<i>14</i>
<i>ii. Improve Local IS Capacities.....</i>	<i>15</i>
<i>iii. Educate the Carriers.....</i>	<i>16</i>
<i>iv. Analyse the ‘How’ as Well as the ‘What’.....</i>	<i>16</i>
REFERENCES.....	17

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Abstract

Most information systems – including current ICT projects – in developing countries fail either totally or partially. This paper develops a model which explains those high rates of failure. The model is based on the notion of design—reality gaps: the match or mismatch between IS designs and local user reality. It helps identify three high risk archetypes that affect IS projects in developing countries: country context gaps, 'hard—soft' gaps and private—public gaps. The model explains the ways in which these gaps can be reduced through local improvisations in developing countries. It therefore provides guidance on generic ways in which the success rates of IS projects in developing countries can be increased.

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A. Introduction: Defining and Measuring Success and Failure

Do most information systems (IS) projects in developing countries (DCs) succeed or fail? Any attempt to address this question, must start by categorising success and failure. Analysis of DC IS projects indicates three outcomes.

First, the *total failure* of an initiative never implemented or in which a new system is implemented but immediately abandoned. Such an outcome can be defined relatively objectively. For example, India's Indira Gandhi Conservation Monitoring Centre was intended to be a national information provider based on a set of core environmental information systems. Despite more than a year of planning, analysis and design work, these information systems never became operational, and the whole initiative collapsed shortly afterwards (Puri et al 2000).

A second possible outcome is the *partial failure* of an initiative in which major goals are unattained or in which there are significant undesirable outcomes. In some cases, where only a sub-set of initially-stated objectives have been achieved, the notion of partial failure may be relatively straightforward. For example, the Tax Computerisation Project in Thailand's Revenue Department set out seven areas of taxation that were to be computerised. At the end of the project, only two areas had been partly computerised, and five others were not operational (Kitiyadisai 2000).

Another relatively clear type of partial failure that particularly seems to affect developing countries is the sustainability failure of an initiative that succeeds initially but then fails after a year or so. An example is the creation of a set of touch-screen kiosks for remote rural communities in South Africa's North-West Province. These were initially well received by the communities. However, the kiosks' lack of updated or local content and lack of interactivity led to disuse, and the kiosks were removed less than one year later (Benjamin 2001).

Yet other partial failures may be more difficult to identify because identification grapples with the subjectivity of failure. It may ask: "Whose goals are unattained?" and "For whom are the outcomes undesirable?". One may thus allow into this category projects in which some stakeholders deem the project to be a success and others deem it to be a failure. Such projects will only become apparent where evaluation methods recognise failure's subjectivity, and recognise and interact with multiple stakeholder groups. Such recognition is, unfortunately, rare in evaluation of developing country (and other) IS projects. There was such recognition in analysing the Accounts and Personnel Computerisation Project of Ghana's Volta River Authority. Most managerial staff in the finance department were pleased with the changes brought by the new system. However, the implementation had 'bred a feeling of resentment, bitterness and alienation' amongst some lower-level staff, and to resistance and non-use, particularly amongst older workers (Tettey 2000).

Finally, one may see the *success* of an initiative in which most stakeholder groups attain their major goals and do not experience significant undesirable outcomes. This, again, requires the relatively sophisticated approach that is absent in many cases. A South African tyre manufacturing firm introduced a relatively simple workflow tracking system using bar codes

on the tyres. Analysis from multiple stakeholder perspectives showed that all three key groups – managers, supervisors and workers – perceived the system to have brought benefits to their work (Calitz 2000).

The Extent of Success and Failure

What proportion of DC IS projects fall into each of the three outcome categories? No-one knows for certain. The question is hard enough to answer in industrialised countries. There, at least, a certain level of surveys, evaluations and analysis is present (Korac-Boisvert and Kouzmin 1995; James 1997; *The Economist* 2000). This indicates that, very roughly, something like one-fifth to one-quarter of industrialised country IS projects fall into the 'total failure' category, something like one-third to three-fifths fall into the 'partial failure' category, and the remaining minority fall into the 'success' category.

This, at least, can be used as a threshold indicator to answer the initially-posed question. There is no evidence, nor is there any theoretical rationale, to support the idea that failure rates in developing countries should be any lower than figures in the North. There is evidence and there are plenty of practical reasons – such as lack of technical and human infrastructure – to support the idea that failure rates in DCs might be higher, perhaps considerably higher, than this threshold.

What of evidence relating to developing countries? Evidence to address the question, and move beyond the threshold estimations offered above, is very limited. The constraints on evidence are several:

- ?? *Lack of literature in general*: until very recently, the entire literature on IS and developing countries would struggle to fill a single bookshelf. The attention of writers – from researchers to consultants to journalists – has been focused elsewhere.
- ?? *Lack of evaluation*: those who have the will to evaluate – such as academics – often lack the resources and capacity. Those who have the resources – such as donor agencies - often lack the will to evaluate.
- ?? *Focus on case studies*: the literature on IS in DCs has grown, but it is a literature dominated by case studies of individual IS projects. Taken alone, these provide no basis for estimation of overall failure/success rates.

Despite these limitations, there are some glimpses of evidence. An overview of the literature concludes, "successful examples of computerisation can be found ... but frustrating stories of systems which failed to fulfil their initial promise are more frequent" (Avgerou and Walsham 2000:1). A few multiple-case studies have been conducted, with examples summarised below:

- ?? Health information systems in South Africa: widespread partial failure of high cost systems with little use of data (Braa and Hedberg 2000).
- ?? IS in the Thai public sector: "failure cases seem to be the norm in Thailand at all governmental levels" (Kitiyadisai 2000).
- ?? Donor-funded IT projects in China: all were found to be partial failures (Baark and Heeks 1999).
- ?? World Bank-funded IT projects in Africa: almost all were partial – often sustainability – failures (Moussa and Schwere 1992).

Likewise, reports from individual developing countries (e.g. World Bank 1993; Oyomno 1996) find failure to be the dominant theme.

Currently, there is a new discourse emerging around IS in developing countries. It is a discourse of ICTs (information and communication technologies) rather than IT; of NGOs and the private sector rather than the public sector; of action rather than analysis. It is found in new locations: email lists (e.g. infodev-l), online newsletters (e.g. BytesForAll), Web sites (e.g. IICD's stories site) and new fora (e.g. Global Knowledge Partnership and the DOTForce) rather than journals or books. It is also a discourse of success stories rather than failure.

Learning from past failure and a rise in the absolute number of successful DC projects is likely to have occurred. However, it seems unlikely that this new discourse reflects a shift in the relative proportion of failures. Rather, it is the case writers and their environment that has changed, not the project outcomes. The major environmental change has been the arrival of significant donor funding – Japan has pledged US\$15bn to the DOTForce. Donors, keen to justify their expenditure, wish to promote the 'good news' and ignore or suppress the bad. Writers – many more of whom are now practitioners rather than relatively more disinterested academics – are increasingly either donor-funded or seeking donor funds. They therefore follow a similar upbeat agenda. Finally, and related, current literature appears to contain a greater proportion of pilots and proposals that, necessarily, emphasise potential benefits rather than actual negative outcomes. The new discourse therefore obscures rather than clarifies the true extent of success and failure, in which successes still form only a small minority of all IS initiatives in developing countries.

If, then, failure is so prevalent and success so rare, we should seek to understand why. That is the intention of this paper – to develop and then apply a model that helps explain why so many information systems in developing countries fail.

Before moving on to this, though, one further question should be addressed. Is the prevalence of failure a problem? For example, failure can have benefits, especially in relation to learning. Unfortunately, while learning from IS failure does occur, it is generally fortuitous rather than planned (Macias-Chapula 2000). There are few signs of the presence of learning systems in DC organisations, and some signs of their absence (Shukla 1997).

In a very direct sense failure is also a problem because of the opportunity costs of resource investment in failure, as opposed to success. Such opportunity costs are likely to be particularly high in DCs because of the more limited availability of resources such as capital and skilled labour.

Finally, the costs of all types of failure identified above – uncompleted/abandoned projects; projects that fail to meet objectives or which fail to satisfy key stakeholders; and projects which cannot be sustained – are high because only successful projects will ensure global economic convergence (Kenny 2001). The failures keep developing countries on the wrong side of the digital divide, turning ICTs into a technology of global inequality. For all these reasons, IS failure is therefore a very real and very practical problem for developing countries that needs to be addressed.

B. Understanding Developing Country Information Systems Success and Failure

We have an estimation that a significant majority of IS projects in developing countries fail in some way. Why should this be?

A number of writers have addressed success and failure of such projects. Their writing has tended to fall into one of two camps. The first, and larger, camp may be described as 'factoral analysis'. Taking either a case or a survey of cases, this literature focuses on categorising the factors that constrain implementation of information systems in developing countries (e.g. Matta and Boutros 1989; Boon 1992; Beeharry and Schneider 1996). This literature has been useful in helping build the overall body of knowledge. However, there have been shortcomings. Many writings have tended to focus "on conditions rather than actions and behaviors, and on weaknesses rather than on ways of overcoming them" (Montealegre 1999:201). Where there are action-oriented recommendations, they have often been normative and prescriptive. They have also been fragile, lacking the theoretical underpinnings or even models that would permit generalisation with confidence.

At the other end of the spectrum has been a smaller camp of work attempting much needed theory building; typically from the base of Gidden's structuration theory or Latour's action network theory (e.g. Baruah 2000; Barrett et al 2001). The main audience for such work has been information systems academics. Implications have often been hard to divine for those struggling at the coal-face of information systems failure.

This paper attempts to steer a 'third way' between the two camps, developing a general framework on the basis of project case studies, but a framework that provides some direct operational recommendations. Such explanatory frameworks of IS success and failure have already been offered in the literature (e.g. Horton and Lewis 1991; Sauer 1993). What follows is one particular approach, developed from soft systems ideas (e.g. Checkland 1981).

The starting point – a reaction against the normative assumptions of some previous DC IS literature – is the classic contingency model (Lawrence and Lorsch 1967; Poulymenakou and Holmes 1996). Contingency sees no single blueprint for success and failure in organisational change. Instead, it recognises that there are situation-specific factors for each DC information system which will determine success and failure and, hence, strategies for success.

Inherent within most ideas of contingency is the idea of *adaptation*: of states of mismatch and match between and within factors and of the need to change in order to adapt systems so that there is more match than mismatch. In the context of overall organisational change, this is mainly described in terms of the need for adaptation of organisational structure to the organisational environment (Butler 1991). In the context of DC information systems, too, there is an 'environment' to which the information system can be adapted.

This environment – and the information systems themselves – incorporate not just technological but also social and organisational factors. The critical role played by these latter factors in the implementation of IS in developing countries has been noted many times

(e.g. Bada 2000; Salazar 2001). In turn, these social and organisational factors are not just a question of relatively objective realities, such as work processes or organisational structures, but also of relatively subjective perceptions and values. These perceptions and values plus other assumptions about processes, structures, etc. are not merely expressed in debate during IS implementation; they also come to be inscribed into the design of information systems used in developing countries (Braa and Hedberg 2000).

Returning to ideas of contingency and adaptation, we can therefore conclude that a successful DC information system will be one that tends to match its environment in relation to technical, social and organisational factors; these latter including the values, perceptions and assumptions of key stakeholders.

However, there is a major problem here: if the information system were to exactly match its environment, it would not change that environment in any way. Yet the formal purpose of information systems is to support and bring about organisational change in order to improve the functioning of DC organisations. There must therefore be some degree of change that an IS introduces. Indeed, a greater degree of change may bring greater organisational improvements (though there is no necessary link between size of change and size of benefits).

On the other hand, the greater the degree of change, the greater the risk of failure. Thailand's Tax Computerisation Project failed by trying to change too much (Kitiyadisai 2000). The World Bank's survey of African projects found it was the 'ambitious or complex' ones that were most likely to fail; to be feasible, projects had to be 'modest' about the amount of change involved (Moussa and Schwere 1992).

Overall, then, there is a trade-off between change and risk for the information system. Reducing the degree of change may increase the likelihood of success, but also reduce the organisational benefits. Conversely, increasing the degree of change may reduce the likelihood of success but also increase the organisational benefits if the change is successful.

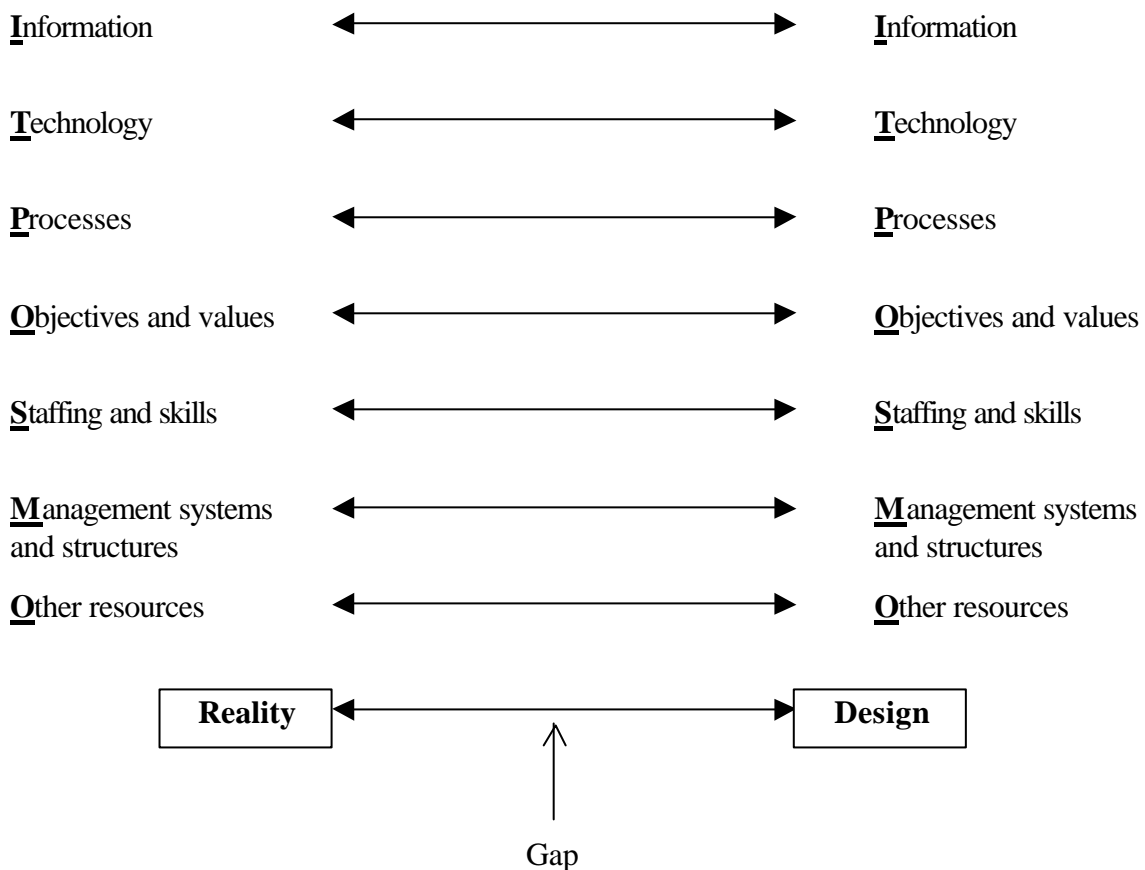
Putting all these ideas together, we see that central to DC information system success and failure is the amount of change between 'where we are now' and 'where the information system wants to get us'. The former will be represented by the current realities of the particular context (part of which may encompass subjective perceptions of reality). The latter will be represented by the model or conceptions, requirements and assumptions that have been incorporated into the new information system's design. Putting this a little more precisely, then, we can say that success and failure depend on the size of gap that exists between 'current realities' and 'design conceptions of the information system'.

Where do IS 'design conceptions' come from? They derive largely from the worldview of the stakeholders who dominate the IS design process. As discussed below, in the context of developing country IS, those stakeholders are often drawn from Northern and/or rational-technical and/or private sector contexts. In this case, the earlier phrase should be amended from 'where the IS wants to get us' to 'where the dominant stakeholders want the IS to get us'.

C. Explaining Developing Country Information Systems Success and Failure

Design—reality gaps can arise in any situation. Here, though, we can highlight situations in which large gaps are likely to arise. In turn, these large gaps make it more likely that DC information systems projects will fail. They can be discussed using the seven dimensions that case study analysis suggests are necessary and sufficient to provide an understanding of design—reality gaps (Heeks and Bhatnagar 2001). The dimensions are summarised by the ITPOSMO mnemonic – see Figure 1.

Figure 1: Design—Reality Gaps



Country Context Gaps

Gaps will arise especially when designs and dominant design stakeholders are remote (physically or psychologically) from the context of IS implementation and use. This can happen in a number of ways, but the domain of developing country information systems is particularly dominated by the transfer of Northern designs to Southern realities. This domination comes partly from the economics of innovation and the domination of ICT/IS-related R&D systems by Northern companies and Northern researchers. It comes partly

from the economics of business, which sees Northern organisations able to invest more and earlier in new information systems than their Southern counterparts. It comes partly from the economics and politics of aid, which has been dominated by a flow of resources and artefacts from North to South rather than, for instance, from South to South. It even comes partly from cultural attitudes in the South, where belief in the superiority of imported items is sometimes strong (Heeks 1996). Finally, the whole process has been both strengthened and enabled by globalisation; a Northern project that has carried ideas and systems from North to South.

Risks arise because the context of North and South differ in various ways that can be summarised using the ITPOSMO checklist (adapted from Bhatnagar 1990; Lind 1991; Ojo 1992 and Malling 2000):

- ?? *Information*: formal, quantitative information stored outside the human mind is valued less in developing countries.
- ?? *Technology*: the technological infrastructure (telecommunications, networks, electricity) is more limited and/or older in DCs.
- ?? *Processes*: work processes are more contingent in developing countries because of the more politicised and inconstant environment.
- ?? *Objectives, values and motivations*: developing countries are reportedly more likely to have cultures that value kin loyalty, authority, holism, secrecy, and risk aversion.
- ?? *Staffing and skills*: developing countries have a more limited local skills base in a wide range of skills. This includes IS/ICT skills of systems analysis and design, implementation skills, and operation-related skills including computer literacy and familiarity with the Western languages that dominate computing. It also includes a set of broader skills covering the planning, implementation and management of IS initiatives.
- ?? *Management and structures*: developing country organisations are more hierarchical and more centralised.
- ?? *Other resources*: developing countries have less money. In addition, the cost of ICTs is higher than in industrialised countries whereas the cost of labour is less.

Of course, these are stereotypes. One can find many cases in which they are reversed, and one can equally find vast gulfs within industrialised countries. Nonetheless, there are frequent clashes of context between Northern design and Southern reality that can occur in a number of ways. The most obvious happens when Northern stakeholders, such as consultants or ICT vendors or aid donors, dominate the IS design process in a developing country. Those stakeholders often bring with them the "If it works for us, it'll work for you" mentality. They also bring their context with them and then impose a design derived from that context that mismatches DC realities.

The design process can be more remote than this. Where Northern designers create an information system that is then transferred to a developing country, "What is transferred ... is not simply machines, hardware, or knowledge but a collection of attitudes, values, and social, political, and cultural structures." (Shields and Servaes 1989:50). The information system transferred contains within it inscriptions from a remote context that add up to a design package incorporating many of the ITPOSMO dimensions. A design—reality gap is the typical outcome.

Problems can even occur where stakeholders from industrialised countries are not directly involved because the North is not just a physical location, it is also a state of mind that has now come to exist for increasing numbers of key figures in developing country organisations. This transfer of context occurs directly through education in the North or even in North-developed educational systems, and indirectly through the leverage gained by Northern domination of economic, political and cultural resources and channels. These individuals therefore act as Trojan horses, devising Northern-inspired designs within Southern organisations.

An example of country context gaps can be drawn from the Philippines. There, an aid-funded project to introduce a field health information system was designed according to a Northern model that assumed the presence of skilled programmers, skilled project managers, a sound technological infrastructure, and a need for information outputs like those used in an American health care organisation (Jayasuriya 1995). In reality, none of these was present in the Philippine context and the information system failed.

These country context gaps provide an overview of differences between industrialised and developing countries; differences that lead to design—reality gaps. However, as discussed below, there are other perspectives on those differences that also create situations in which failure is more likely to occur.

Hard—Soft Gaps

Information systems for development have been affected by the intimate three-way association of ICTs, modernisation and Western rationalism (Shields and Servaes 1989; Avgerou 2000; Tettey 2000).

Information systems per se have a tendency to be designed according to models of rationality. In part, this occurs because of the continuing emphasis on ICTs within information systems change. Technology is conceived as an objective and rational entity, not as something that incorporates particular political and cultural values. The tendency towards rationality in IS design is reinforced by the rationality of the modernisation agenda that carries innovations from North to South.

This combination can readily be seen at work in the agendas of many donor agencies. For them, the overall purpose of development is the creation of economic rationalism within the economic systems of the South. ICTs are seen as a key tool in achieving this, and become part of a technically-rational and technologically-determinist agenda that focuses on the digital divide, on 'eDevelopment', and on ICT infrastructure (Wilson and Heeks 2000). Any ICT problems are, in turn, seen as best solved by resort to market rationality.

One could argue the validity of rational models in an industrialised country context. Here, though, the problem is the gap between the rationality of IS design, and the political/behavioural realities of developing country organisations. These latter realities have been extensively described, and gaps between 'hard' rational design and 'soft' political realities are summarised in Table 1 (Heeks and Mundy 2001).

Table 1: Differences Between Hard and Soft Models

<i>Dimension</i>	'Hard' Rational Design	'Soft' Political Reality
<i>Information</i>	Emphasis on standardised, formal, quantitative information	Emphasis on contingent, informal, qualitative information
<i>Technology</i>	A simple enabling mechanism	A complex, value-laden entity: status symbol for some, tool of oppression for others
<i>Processes</i>	Stable, straightforward and formal; decision outcomes as optimal solutions based on logical criteria	Flexible, complex, constrained and often informal; decision outcomes as compromises based on 'power games'
<i>Objectives and values</i>	Formal organisational objectives	Multiple, informal, personal objectives
<i>Staffing and skills</i>	Staff viewed as rational beings	Staff viewed as political beings
<i>Management systems and structures</i>	Emphasis on formal, objective processes and structures	Emphasis on informal, subjective processes and structures
<i>Other resources: time and money</i>	Used to achieve organisational objectives	Used to achieve personal objectives

Failure is frequently the outcome of such hard design—soft reality gaps. For instance, geographic information systems (GIS) are seen to incorporate a number of assumptions and requirements that derive from Western rationalism (Walsham 2000). Introduction of GIS in developing countries has therefore been problematic.

This was the case when a GIS was introduced by the Indian Ministry of Environment and Forests for forestry management. As analysed by Barrett et al (2001), identified differences can be related to dimensions in Table 1 that include information, technology, processes, objectives/values and staffing/skills:

- ?? The GIS design assumed reliance on formal types of information borne via technical channels "as compared to the informal channels of information" that were used in practice (ibid.:18)
- ?? The GIS design assumed "a form of working culture wherein decisions are made on criteria of rationality and principles of cartographic science." (ibid.:14). This mismatched a reality of politicised decision making.
- ?? The GIS design representations of the forest conflicted with the reality of forest officers' representations which did not see "land as something that is out there and that can be objectively measured and standardized in GIS models" (ibid.:13).
- ?? The GIS design required values of trust in the technology, in "new forms of rationality" (ibid.:19), and in persons unknown and absent. This mismatched the real values of trust in persons known and present.

The result was a significant design—reality gap along several of the ITPOSMO dimensions, and the outcome was failure: "there were no real operational systems established by the end of the project period" (ibid.:10).

Private—Public Gaps

In the North, the private sector dominates both ICT innovation and application of information systems, a role it took over from the public sector some decades ago (Margetts 1999). In developing countries, however, the public sector plays a comparatively far greater role – measured, for example, in terms of contribution to GDP or to total employment – than in industrialised countries. It is therefore the target for many information systems projects. To this may be added the more general philosophy of 'business good, government bad' that has pervaded the agendas of new public management and the Washington consensus ideology within many development institutions, led by the World Bank and IMF (McCourt 2001)

The result is significant numbers of development projects that involve transfer to the DC public sector of IS designed in and for the private sector. This can be problematic since the public sector remains fundamentally different from the private sector along all the ITPOSMO dimensions (Pollitt and Harrison 1992; Isaac-Henry 1997):

- ?? *Information*: Lack of competition in the public sector means it makes less use of strategic information than the private sector. Public sector organisations also tend to place less emphasis on financial cost information and more emphasis on broader performance indicator information than private sector organisations due to different regulatory requirements. Related to this, private sector organisations tend to understand their customers merely in terms of what those customers buy. By contrast, the public sector as a whole holds and uses information on virtually every aspect of a person's life: their location, health, education, finances, criminal record, children, business activities, and so on.
- ?? *Technology*: public sector organisations tend to have a more limited and older technological infrastructure than that found in private sector organisations. Technology also tends to be viewed more negatively in the risk-averse public sector, and more positively in the private sector where competition forces innovation.
- ?? *Processes*: public sector organisations undertake processes, such as policy-making, socio-political consultation, and reporting to the government and legislature that are largely absent from the private sector. The public sector environment is also unstable in a way that differs from the 'continuous change' environment of the private sector. Working within a framework of constant discontinuous changes in legislation, policy initiatives, political parties, and questions from politicians can create one-off and/or short-term processes in the public sector to which considerable resources have to be devoted.
- ?? *Objectives and values*: public sector objectives are typically broader than those in the private sector, encompassing social and political and economic factors rather than a more narrow financial focus. In the private sector, too, there tends to be greater insecurity about jobs, units and even whole organisations. One element of self-interest – of preserving one's own job – therefore tends to be a more overt part of personal decision making. This forces a greater convergence between personal motivations and organisational objectives than found in the public sector. By contrast, formal organisational objectives in the public sector often relate to the objectives of a group (the public) which is not directly represented within the organisation, and these objectives are often less than clear. In such cases, it is less likely that personal motivations can be aligned with formal organisational objectives. Lack of competition also creates a

tolerance for the promotion of personal rather than organisational objectives that would not be so acceptable in private sector.

?? *Staffing and skills*: there tends to be less labour flexibility within the public sector. As a result, there may be greater residual staffing in 'traditional' skill areas and more limited staffing in new/emerging skill areas than found in the private sector. The latter will be particularly found in situations where general labour market demand outstrips supply, where the public sector's lower pay creates greater recruitment and retention problems than experienced in the private sector.

?? *Management systems and structures*: typical private sector organisations will have management and structures relating to accounts receivable, sales, marketing and production. Typical public sector organisations will not.

?? *Other resources*: in the public sector there are more limited resources and more limited pressures of competition on performance. As a result, the public sector tends to have more time and less money than the private sector.

Given the above differences, information systems developed for the private sector will often fail to match public sector realities. They will therefore be prone to failure.

The application of an information systems strategy and implementation of related information systems in a Latin American public sector enterprise provides an example (Avgerou 1996). The enterprise's new IS manager had undertaken private sector-focused training during which he was introduced to IS strategic planning. IS strategic planning was first developed in the private sector and it has therefore come to incorporate a number of design assumptions that can easily be private sector specific.

The manager's plan was based on private sector-oriented design assumptions, including clear, unitary organisational objectives, apolitical decision making, and the presence of skilled support for implementation. These assumptions did not match the realities of the public sector enterprise, creating a gap along several of the ITPOSMO dimensions. For example, in reality, decision making was not apolitical in the enterprise. Despite its apparent autonomy the enterprise continued to be partly politically driven. Executives 'continued to rely on the old, partly bureaucratic and partly informal information channels and planning mechanisms.' (ibid: p.112). Similarly, the organisation in reality had unclear organisational objectives that encompassed not just economic but also social and political components. It also had only limited skills available for IS implementation.

The result of these and other mismatches was a large gap between system design assumptions and organisational realities. The outcome was an ineffective process of strategic planning that frustrated enterprise managers and 'which hindered the development of even the most fundamental information systems.' (ibid: p.112).

Such problems – and the attendant likelihood of failure – are likely to increase if/as the private sector-oriented reform agenda of new public management takes hold in the public sector of developing countries.

D. Increasing Success Rates: Local Improvisation to Reduce Design—Reality Gaps

Design—reality gaps are not static, but change constantly throughout the phases of an IS project. Many of these changes relate to local improvisations: actions by local stakeholders who are not so remote from the context of IS implementation and use.

If the success rate of DC information systems projects is to increase, there need to be more local improvisations that – following the logic of the design—reality gap model – reduce design—reality gaps. This means:

?? changing local realities to make them closer to IS design, and/or

?? changing the (often 'imported') IS designs to make them closer to DC organisational realities.

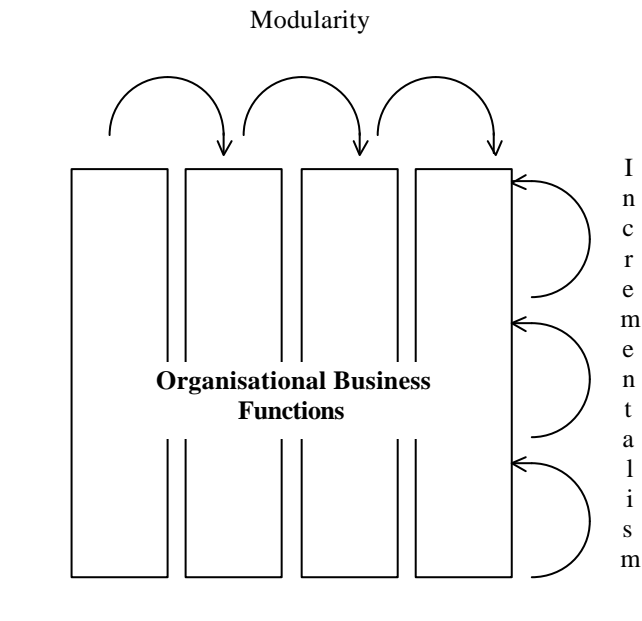
The extent to which the latter is possible depends on the extent to which assumptions and requirements are inscribed into immutable or into malleable components of the design. Some 'rationality-imposing' applications, for example like GIS, bring with them such a package of unchangeable elements that scope for local design improvisations is very limited.

Some local improvisations can be seen as specific to one or two ITPOSMO dimensions. For example, in relation to 'processes' and 'management systems', an original design option for a new hospital IS in Guatemala was to re-engineer administrative processes to make them more efficient (Silva et al 2000). This design mismatched the reality that hospital directors supported current procedures and wanted controls to remain in place to ensure corruption was held in check. The design was therefore altered to ensure that these current work processes were supported by the new system.

This was a design improvisation. A converse reality improvisation occurred during the introduction of MIS into private sector enterprises in Sri Lanka (Goonatilake et al 2000). Here the rational design of the MIS often mismatched the rather chaotic nature of most enterprise procedures. Reality was altered by, prior to computerisation, ensuring the introduction of basic manual production planning, control and accounting procedures. Computerisation could then proceed with a great chance of success.

Other local improvisations are generic approaches to gap reduction that limit the extent of change at any given time. Stretching project time horizons is one technique. There has also been use of modularity (supporting one business function at a time) and incrementalism (providing stepped levels of support for business functions) within DC IS projects (see Figure 2). For example, an incremental, evolutionary approach has been fundamental to the progress of Ghana's Volta River Authority in computerising its accounting, finance and personnel information systems (Tettey 2000).

Figure 2: Modularity and Incrementalism in IS Projects



Supporting Local Improvisation and Increasing Success Rates

How can such local improvisations be supported in order to improve the success rate of IS in DCs? Four ideas will be presented here.

i. Expose Organisational Realities

First, by exposing organisational realities. An integral part of successful IS implementation must be a proper understanding of current realities. Three elements can be seen here:

- ?? Opening communication channels to and between a variety of project stakeholders; especially those who are closest to the context of implementation and use. The intention here is not to simply describe an organisational reality, but to understand the multiple organisational realities of those involved with the project.
- ?? Legitimising reality; encouraging stakeholders to articulate the difference between rational, prescriptive models of what they should be doing and real depictions of what they are actually doing.
- ?? Providing tools; giving stakeholders the tools that help them to expose and map organisational realities. Many such tools already exist, such as self- and third party observation; use of soft systems tools such as rich pictures; and prototyping.

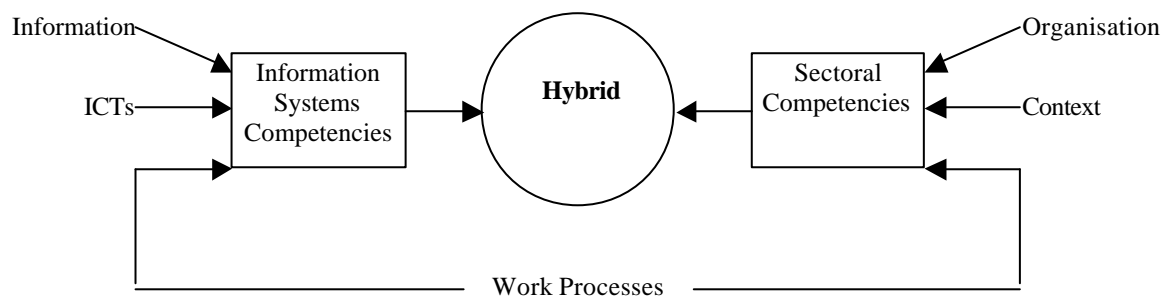
Such an approach can be seen as operationalised in the facilitated development of health IS in the teaching hospitals of Obafemi Awolowo University in Nigeria (Korpela et al 1998).

ii. Improve Local IS Capacities

Second, by improving local IS capacities. Local improvisations require local improvisation capacities. But what should those capacities consist of? They must clearly extend beyond just ICT-related skills: as the ITPOSMO checklist reminds us, information systems change requires capacities to understand and deal with far more than just the technology.

An archetypal design—reality gap – and, hence, failure – has arisen in the gap between two key stakeholder groups: 'hard', technical designers who understand the technology but not the business and context of the organisation, and 'soft' users (often managers) who understand the organisation but not the technology. The oft-cited solution to this gap is the creation of 'hybrids', those who understand both context, organisation and work processes of their sector and the role of information systems, as illustrated in Figure 3.

Figure 3: The Competencies of Hybrids



The hybrid should not be thought of as a single entity. Rather the notion of hybridisation should be seen as a way to plan skills/knowledge development for current and future personnel. For example, ICT professionals in developing countries need to be hybridised into broader change agents who combine IS and ICT skills with an understanding of context and of change management.

Organisational managers need to be hybridised towards a broader skill set that includes an understanding of information systems and ICTs. This would aim to make them confident about using ICTs, aware of what the technology can and cannot do, and aware of the role of information and information-related processes. This will allow them to take greater control over, or make a more direct contribution to, IS planning and management and ICT-enabled change.

All of this clearly has extensive implications for training provision which itself needs to be hybridised. Yet much current training supply in developing countries or for developing country participants – both short professional programmes, and undergraduate and postgraduate programmes – is too narrow in focus (Mundy et al 2001). ICTs are increasingly covered for all groups, but not IS. The role of information and the broader organisational context and processes that ICTs are intended to support are rarely included. Thus the majority of training currently available is not providing the competencies necessary for personnel to engage effectively in the creation of successful information systems.

iii. Educate the Carriers

Third, there is a need to educate the carriers. Many individuals and institutions – donors, consultants, ICT vendors, DC personnel trained according to traditional Northern curricula – act as carriers from North to South: carriers of Northern innovations, carriers of hard rationality, and carriers of private sector conceptions. These groups need to be made aware of shortcomings in current DC IS practice, and made competent in ways that help them reduce design—reality gaps.

The hybridisation of training noted above will play a part. Three other elements can be included, each of which addresses a current 'blind spot' amongst carriers, especially donors:

- ?? Evaluation. A true sense of the extent of success and failure needs to be developed. As described at the start of this paper, the current discourse on DC IS obscures the truth in a field already woefully short of hard evidence. That hard evidence needs to be produced, particularly through survey evaluation of DC IS projects. Most of the carriers have a vested interest in artificially inflating success rates and in ignoring failure. Thus independent sources of evaluation funding need to be provided.
- ?? Integration. Donors and other carriers often have a distorted perspective on ICTs. The technology has often been *isolated*: separated from mainstream staff and from mainstream organisational change objectives. More recently, ICTs have come to be *idolised*: placed centre stage in development initiatives in a way that over-estimates the technology's potential, and ignores most social components of the development process. Instead, it is an *integrated* approach that is required. Here, development project objectives are the starting point and information needs are derived from these objectives. The technology is then introduced – if necessary – to serve those needs.
- ?? Production. As already noted, closing design—reality gaps and increasing success rates depends, in part, on the development of local IS capacities. These include ICT production capacities, not so much in the field of hardware, but mainly in the field of software – from one-person back-street database designers to large, ISO-9001-badged 'software factories'. Yet donors and other carriers have focused almost entirely on support for ICT consumption in developing countries rather than ICT production. There needs to be a re-balancing of emphasis, to give equal weight to the development of the latter capacities if the former is to be more successful.

iv. Analyse the 'How' as Well as the 'What'

Finally, local improvisations can be supported by applying the contingent perspective not just to information system content (the 'what') but also to information system process (the 'how'). Some of the more analytical literature on IS in DCs avoids prescriptions about the content of IS and is sensitive to the limitations of rationalism. Yet it jumps in with both feet to prescribe soft implementation techniques developed in and for Northern organisations.

However, such techniques may be inappropriate in some DC contexts. For example, participative IS techniques were a failure in Mexico's General Hospital (Macias-Chapula 2000). Likewise, one end-user development initiative for health IS in South Africa was 'an abysmal failure' (Braa and Hedberg 2000). These implementation techniques failed because there was too large a gap between the design assumptions and requirements of those techniques and the realities of organisations into which they were introduced.

We must therefore extend use of the design—reality gap model presented in this paper. It can be used to assess not just the feasibility of a particular information system design, but also the feasibility of particular IS implementation techniques. As such, it represents a powerful management tool for those involved in the development of information systems in developing countries.

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