Using Microworlds to Improve Success and Sustainability in Land Development Assistance Endeavours

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SUMMARY

Achieving sustainable improvements in land administration via development assistance could be considered "a wicked problem". This paper shows how system dynamics and microworlds can be used to gain insights into the dynamics at play, identify possible improvement leverage points of varying powers, and allow potential courses of action to be fully explored and understood, <u>before</u> an aid agency and a partner country commit to an improvement endeavour. An example is shown. It is contended that this approach will engender greater commitment to improvements because they are better understood. This in turn will lead to a greater likelihood of sustainable improvements, thereby increasing aid effectiveness.

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I forget what I hear; I remember what I see; I know what I do. – Chinese proverb

1. INTRODUCTION

1.1 Development Assistance to Improve Land Administration

There is wide agreement that land is a fundamental factor in a country's social stability and economic development. Significant development assistance (DA) has been provided over the years to improve land administration (LA)[1] in developing countries. The literature indicates that wide spread success is elusive. Williamson et al (2009) cite sources. Because of the money and effort devoted and the lack of sustained return, improving LA in developing countries could be considered a "wicked problem"[2]

The authors' experiences indicate that an important factor in this is the lack of a *full* understanding in the host country of what the proposed DA will entail, how and why improvements are to be achieved, and what will be the *full* ramifications, and resource requirements expected from a government lands department (GLD), during and post DA. This lack of understanding causes a lack of confidence in and commitment to the endeavour, which in turn affects the likelihood of project success and sustainability.

In an effort to address this lack of understanding, the authors have developed a number of microworlds for land administration.

1.2 Microworlds for Land Administration

A microworld is a virtual simplification of reality. It allows the examination *today,* of likely *future consequences* of possible decisions. It is test driving before deciding. It is conducted as learning by doing, either as a board or a computer simulation "what if" management game. Senge (1992) provides an explanation and some examples of microworlds. Microworlds are used effectively in a variety of industry sectors.

Microworlds are based on system dynamics and simulation as developed in the 1960s by Forrester at MIT (Massachusetts Institute of Technology). Meadows (2008) provides an excellent introduction, and Sterman (2000) an in depth treatment.

In system dynamics, cause and effect are indirectly related and separated in time. Feedback loops are typically present and may be reinforcing (vicious or virtuous) or balancing. Charting these relationships provides an understanding of the dynamics at play and identification of

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1 Section 2 has a discussion of what comprises land administration
[2] Problems that mutate and reappear, sometime worse, even after many efforts to address.

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potential improvements, as well as the base for a simulation model (microworld). Figure 1 illustrates the concept.

Figure 7 (Sec 3.3) illustrates the control panel for the microworld for the macro operation of a GLD. There are a variety of knobs that allow key variables to be changed and potential improvement policies to be switched ON/OFF. The results, typically graphs, show the likely future values of key performance variables.
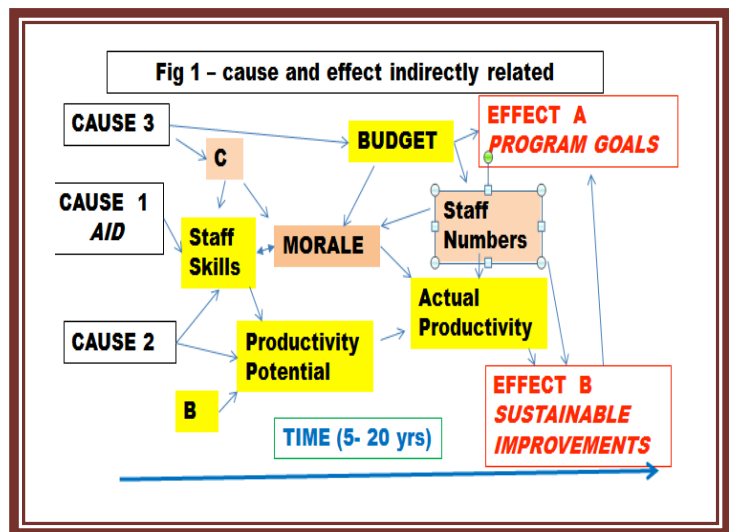
The underlying proposition is that those advocating change and improvement in LA should be able to:-
  – Portray the causal relationship of cause and effect, and explain the logic of why the proposed improvements should achieve the desired objectives
  – Illustrate the above, by means of a simulation model, explicitly showing all rates of accomplishment, values of variables, and assumptions
  – Illustrate under what conditions and when the target quantum of improvements will be achieved, and that they are likely to be sustainable (i.e. conduct Bench Testing)
  – Work collaboratively with stakeholders and interested parties to explore all required scenarios and What Ifs, so that understanding and commitment is built, before agreeing to and commencing an improvement program.

This should mitigate against the feeling of some developing county staff who, when another aid improvement is under discussion, may think- "previous aid improvement efforts have not stuck in the long term, why should this one be any different? Let them spend their money, it might work; they will come and go in a short period, but I have to live and work here for a long term".

The authors have developed a number[3] of microworlds, termed LAMPS (Land Administration and Management Policy Simulators). The purpose of each LAMP is to allow managers in government lands departments (GLD) in developing countries, to fully explore and understand the nature and implications of proposed improvements, before agreeing to be part of an improvement endeavour. They provide critical input into the design of DA. They also enhance the understanding of aid agency officials and host country executives, particularly with respect to the time required, and the rate and conditions under which progress is likely. They are best used in group learning situations, with key stakeholders.

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[3] for the following:- processing land transactions; formalising illegal households; customary land; the macro operation of a Lands Department and a whole system of land administration, capacity building

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The example in this paper illustrates a typical situation in small independent island countries in the Pacific and is set in the hypothetical country of Paradise Islands. The central land issues facing Paradise Islands are:-how to get LA working effectively and efficiently over the small amount of already registered land; how to improve the tenure security of squatters and formalise rights initially; how to enable customary landowner groups to get some economic return from their land asset, while ensuring safeguards; how to ensure a sufficient supply of land for government purposes and for development.

The challenge for each country is how to address these issues, with or without extra resources from an aid donor. The challenge for an aid donor is to be confident that the aid provided will achieve the desired outcome, the goals of LA (Section 2) and be sustainable, within the planned time.

The remainder of this paper will illustrate the use of system dynamics and a LAMPS, for the macro operation of the GLD in Paradise Islands. LAMPS can be applied to any sized GLD and can be quickly modified to reflect operational situations.

2.0 WHAT LAND ADMINISTRATION IS AND WHAT IT IS TRYING TO ACHIEVE

Before looking at this LAMP, the goals that LA is seeking to achieve are discussed. A core aspect of system dynamics is examining the structure and dynamic performance of the system in place, together with the goals that the system is supposed to be achieving.

Clarity of the goal being sought is vital. Firstly, it provides a focus for all involved and allows action plans to be directed to achieving the goal. Secondly, it allows monitoring to ascertain if the actions are causing any change in key *performance* variables over time. The BOTG (behaviour over time graphs), Figure 2 are very useful. Thirdly, it provides a focus for modelling efforts. Scenarios can be evaluated to ascertain if proposed changes are likely to achieve the goal, under what conditions, with what resources, and over what time frames.

It is postulated that the ***goals of land administration*** are to:-provide security of property rights; contribute to social well-being and stability; contribute to economic development; provide a well ordered, regulated and functioning property market; provide land services. It should be affordable to the government to run and to users to access and comply with, exhibit good governance and have people's confidence. Lyons et al (2002a,b) have argued that in Australia the objectives of LA are implicit rather than explicit and that structures have grown up over time and are now so complex that only experts understand certain parts. Subsequent unreported work indicates that the costs to government in Australia in running the system, and to users in complying with it, are high and largely unrecognised.

It is considered that ***land administration is:*** - the setting of the "rules of the game" – policy, laws and regulations; the necessary institutions and procedural mechanisms with their roles clearly defined; provision of the necessary services; the wide and ready provision of information on the legal and market status of land and the operation of the "land system"; the

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provision of independent dispute and appeals mechanisms; ensuring that the goals of LA are achieved.

There are a myriad of **approaches and technical tools** such as:-deeds, titles, title insurance, paper or computer assisted or computer based registries; marked, unmarked, surveyed boundaries; etc. The list is long. While all these tools are valid and have their place, caution must be exercised in seeking to improve particular aspects of an operation using one or more tools, as making a particular aspect run more efficiently may have little impact on the goal.

There is no one *true* LA system. Systems in countries such as United Kingdom, Australia, and USA are all different, but they all achieve the goals of land administration, albeit in different ways and with different operating and compliance costs. There is a danger that some DA land advisers may consider that what is done in their home country is very good and hence is appropriate for another country. Section 5 comments on the evolution of land administration and the time taken for change to occur.

It is contended that LA is a means to an end, (that is its goal) and not an end in itself, and that it is important to distinguish this from the many technical tools used in LA. It has been observed over the years that many technical advisers tend to focus more on the technical minutiae of their specialty rather than on the goals that are sought to be achieved.

3.0 A MICROWORLD FOR THE OPERATION OF A LANDS DEPARTMENT

The **purpose** of this microworld (LAMP) is to:-chart the dynamics at play (Section 3.2); explore high level management What Ifs (Section 3.3); identify potential improvement areas to achieve the goals (Section 4)

The **intended players** in this Microworld are senior executives from groups such as:- GLD; treasury; national development; chamber of commerce; NGOs involved in land; potential aid donors.

3.1 The setting – the hypothetical country of Paradise Islands

The LA *situation* in Paradise Islands is:-90% of GLD resources are devoted to the 10% of land that is in the formal system, about 20,000 parcels. The country's ranking for registering property is 130 out of 178; (World Bank Doing Business Rankings); there are large processing backlogs; only about 50% of land rents are being collected; there are indications that good governance is patchy and that favours are provided. Squatter households on government land are about 30% of the formal households and growing at about 15% per annum. An effort is being made to formalise some squatters but progress is very slow due to the precise and complex procedures used and the small number of staff allocated. At current rates the annual increase cannot be met, let alone the backlog addressed. Few resources are being devoted to customary landowners. The goals of LA are not being achieved.

The macro **challenges** are:-to get LA of the small formal system operating well and raise the registering property index (termed work area A); to significantly increase the rate of

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formalising squatters (work area B); to address the needs of the customary landowner groups (work area C); to achieve the goals of land administration. ***Development assistance*** has been provided twice previously. Improvements achieved during DA were not sustainable.

3.2 The dynamics at play

Compiling ***Behaviour over Time Graphs*** (BOTG) of key variables of interest and performance is a first step in system dynamics. The aim is to get an understanding of the system's performance over time. Figure 2 shows a BOTG for the processing backlog in the Paradise Island Land Registry, where DA has twice been provided. The oscillating behaviour

of the processing backlog, increasing, reducing during DA, but increasing again (often worse) after cessation of DA, is the system dynamics archetype termed, ***The Fix that Fails.*** During DA, productivity of individual processing staff more than doubles, due to increases in skill, teamwork, morale, leadership and procedures efficiency. After DA ceases these gains gradually decay over 6 to 12 months. This is another system's archetype termed, ***Drifting Goals,*** which occurs when an organisation is not working towards firm goals.
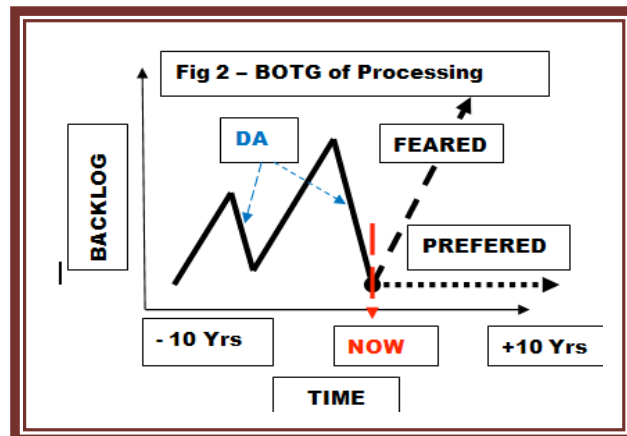

Figure 3 illustrates the ***dynamics at play***. It indicates the following:-aid is provided to increase the capacity of the GLD so that processing is improved, backlogs are reduced and customer

happiness increases. This leads to a reduction in the need for aid and therefore of sustainability. However, because the current backlog is high, customer happiness is low, so some customers are willing and able to pay unofficial speed fees to get their applications processed quickly, and some processing staff are willing to accept these fees and process the requested applications before others. This increases the happiness of these customers, who are willing to go on paying speed fees to get quick service. This sets up a vicious reinforcing loop (R1 which then causes a

push back effect (balancing loop B1) on the overall processing (to ensure that the backlog does not get too low, which would reduce the market for speed fees). This in turn sets in train another push back effect (B2), decreasing the willingness to change, and in turn reducing the effectiveness of the capacity increasing effort.

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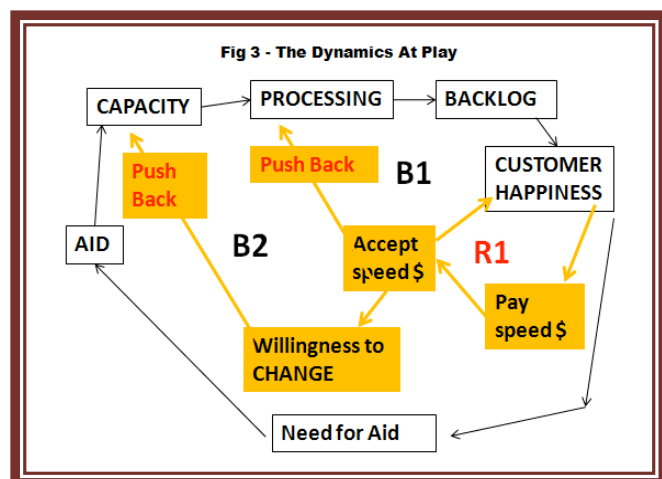Sydney, Australia, 11-16 April 2010

Figure 4 incorporates some *missing dynamics* that are usually present in well functioning service oriented organisations. These missing elements are:-*incentives, penalties, alternative service provision, pressure to change.*

Incentives act as virtuous reinforcing loops; *penalties* act as balancing loops. Both of these, if present, should act against the vicious reinforcing loop of unofficial speed fees. *Alternative service provision* aims to guard against monopolistic behaviour, to

Fig 4 – missing dynamics

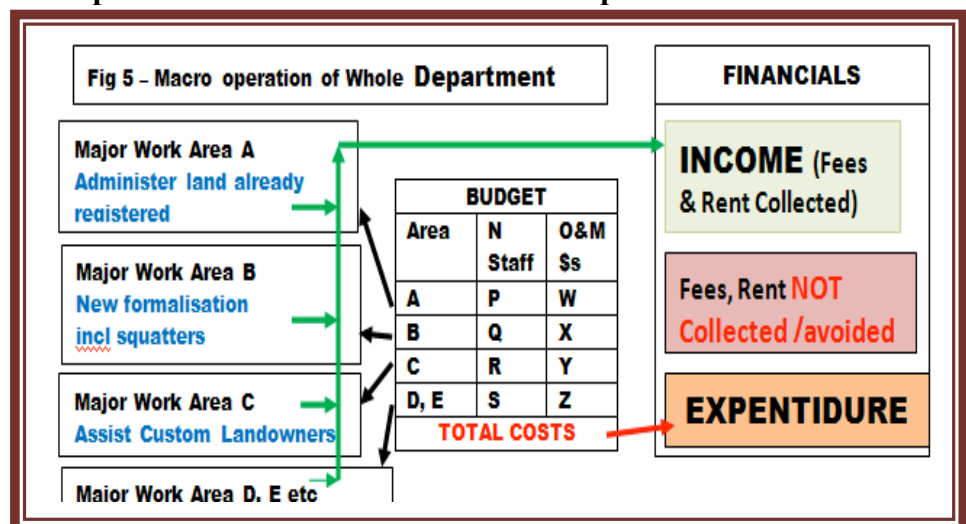Fig 6 – simple model for one work area

increase the overall available capacity, to increase competition, and to expand and improve service delivery. This overcomes another systems archetype, **Limits to Growth**. *Pressure* (on a system) *to change* is normal and in the case of Paradise Islands is very low. Potential pressures could come from business and customers (wanting better service), customary land owners (wanting some service), Treasury wanting the missing 50% annual rent. The inclusion of these missing dynamics as potential improvement points is discussed in Section 5.
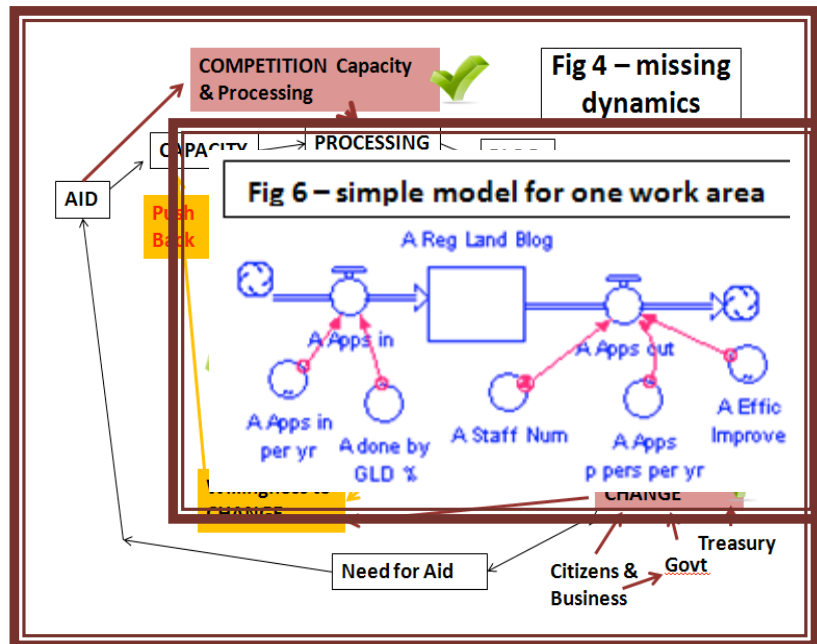
BOTGs and analysis of the dynamics, both at play and missing, provide input into the formation of the simulation model (Section 3.3) and potential leverage points for improvement (Section 4).

3.3 A model for the macro operation of the Government Land Department

Figure 5 shows a **schematic diagram** for the macro operation of the GLD. The essential elements are:-three (or any number of) major work areas, resources allocated annually to each work area via the budget process, the financials.

Each *work area* can

Fig 5 – Macro operation of Whole Department

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be considered as comprising:-work waiting to be done (the backlog), new work arriving, work being completed. The rate at which work is completed will depend mainly on three aspects:- number of staff (via the annual budget), individual productivity, and efficiency gains. A simple simulation model for one work area, using iThink software, Richmond (2004), is shown in Figure 6. More complex models are used in the individual LAMPS (not shown in this paper) for each individual work area. For an examination of macro operations a simple model suffices, as the rate of processing reflects overall achievement. Ford (2009) suggests using a number of models.

In the LAMP for the macro operation of the Department models for each work area, similar to Figure 6, are linked and a financial model integrated.

The control panel for this LAMPS model is shown in Figure 7. It allows policy explorations to be run by simply pushing the appropriately numbered option button on the control panel. Values of key variables can be changed for What Ifs within each scenario, by changing numeric values on the appropriate "dial" on the control panel. The key variables are:- staff numbers allocated to each of the main work areas and to corporate/support, and to rent collection. Other more standard values, such as average values for rent, fees, staff salaries, etc, can be changed in the model which sits behind the control panel. The control panel also displays the result of key performance variables (backlogs for each of the 3 main work areas, value of rents collected and net income to government) resulting from running each of the following options for a 20 year period.

Some initial **options** that might wish to be explored are:-
1. *Continue AS IS* - current staffing, budget allocations, processing productivity, ~50% rent collection
2. *Transfer some corporate and support staff to work processing areas* – Building on #1- with 40% of corporate and support staff reallocated to work areas A and B (7 and 3 staff)
3. *Change the method for formalising squatters* – Building on #2 - the method used in work area B (formalising squatters) changed, giving a 5 times increase in productivity; 4 saved staff transferred to work area A.
4. *Productivity increased and maintained long term (sustainability)* – Building on #3 - in work area A productivity is built up over 5 years to that achieved during prior DA, (double, Figure 2); 11 staff transferred from work area A to C (8 staff) and rent collection (3);

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5. ***Increase capacity, competition and productivity*** – Building on #4 but with ~70% of processing in work area A handled by the private sector (for the processing fee) and 11 GLA staff transferred from work area A (land in the formal sector) to work area C (assisting customary landowners).
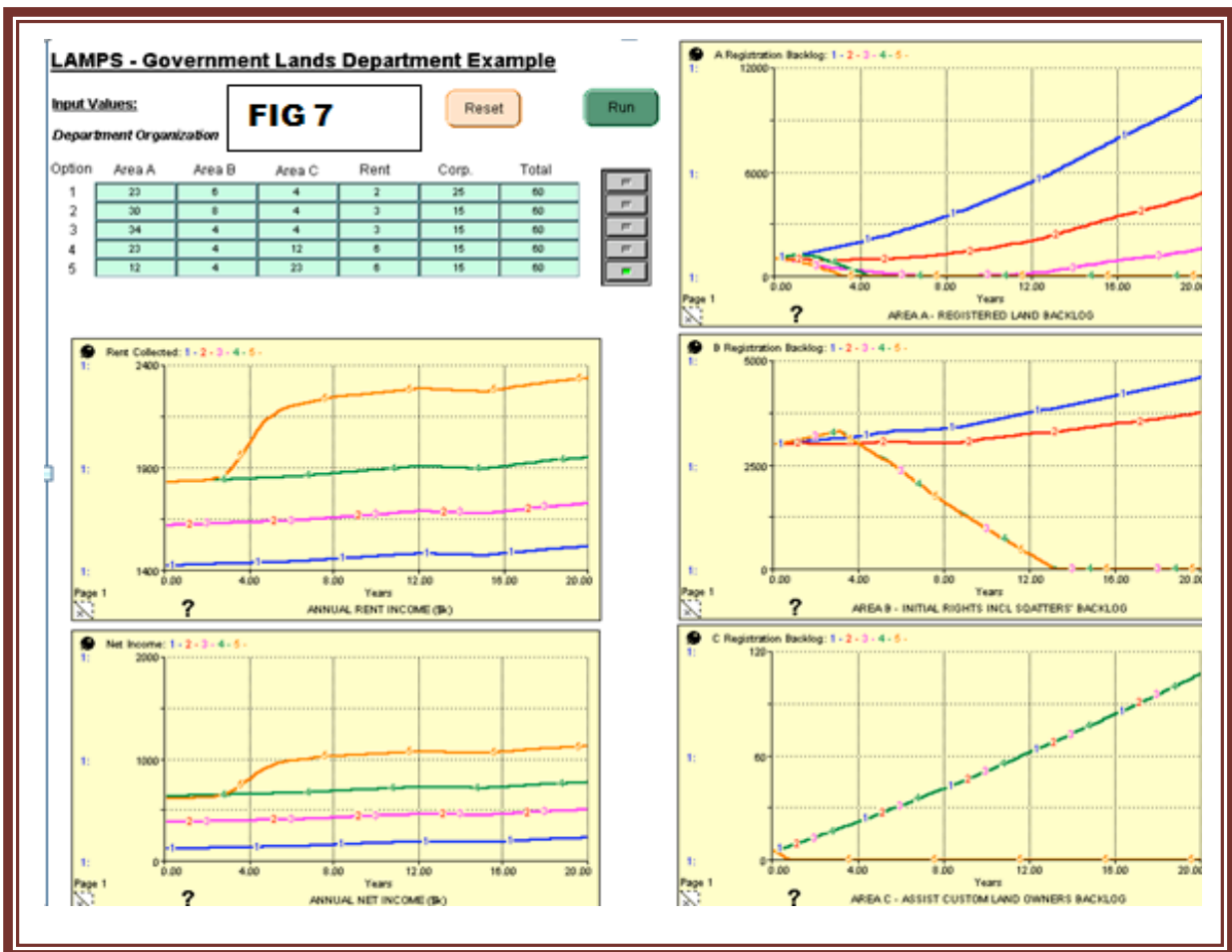
The **results** for each of the 5 *explorations* are shown in Figure 7. The following insights are gained:-

- If the GLD continues "AS IS", GLD resources are not adequate to administer the current main focus of work, administering the small amount of land in the formal system, let alone addressing the other priority areas, even if 40% of corporate and support staff are transferred into operational work areas *(From options 1 & 2)*

- Significant improvement (5 fold) could be made in work area B, assigning new rights and squatters, if procedures were changed from highly technical to less technical, but sufficient to formalise and give secure rights. (*from Option 3*)

- GLD resources are probably adequate for the current main work area of administering the formal land, IF efficiency gains achieved during DA in that area could be sustained, and if AS IS corporate and support staff are transferred into that work area. Little improvement in work area C (customary land owners) would be achieved. Some improvement in rent

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collection would be achieved. This result could be considered *unlikely* as two previous improvement efforts were not sustainable.

- Allowing the private sector and other non government entities to provide land services would increase the capacity to deliver services and also provide competition, leading in turn to pressure to attract customers, and to increase productivity, which is more likely to be sustainable. Such competition could well lead to rent collection reaching 90-95%, If Treasury was convinced that the land rent collection rate was likely to stay high, it may well be willing to allow the retention of part of the new revenue to be invested in additional operational services.

Other policy options that could be explored are:- more involvement of non government service providers to give additional capacity and competition; have land rents based on much simpler rules, procedures, and payment to lower the cost of administering and collecting, and making it easier for people to pay.

The aim of this LAMP is to examine various ways to ascertain what arrangements are likely to result in a LA system that will *achieve* the *goals* of LA and yet <u>be affordable to the country</u> to administer <u>and to users</u> to comply with. If the LA system can be got to work and to have the trust of the users and general populace, then over the long term it can evolve, (Section 5) and maybe one day it will be as sophisticated as the ones of some now developed countries, while still meeting the goals, being affordable, and having the confidence of the people.

Senior management involvement and sustainability. The efficiency improvement factor was shown in Figure 6 as a single variable for simplicity. It actually has 2 parts, the improvement achievement during DA, and that that achieved post DA.
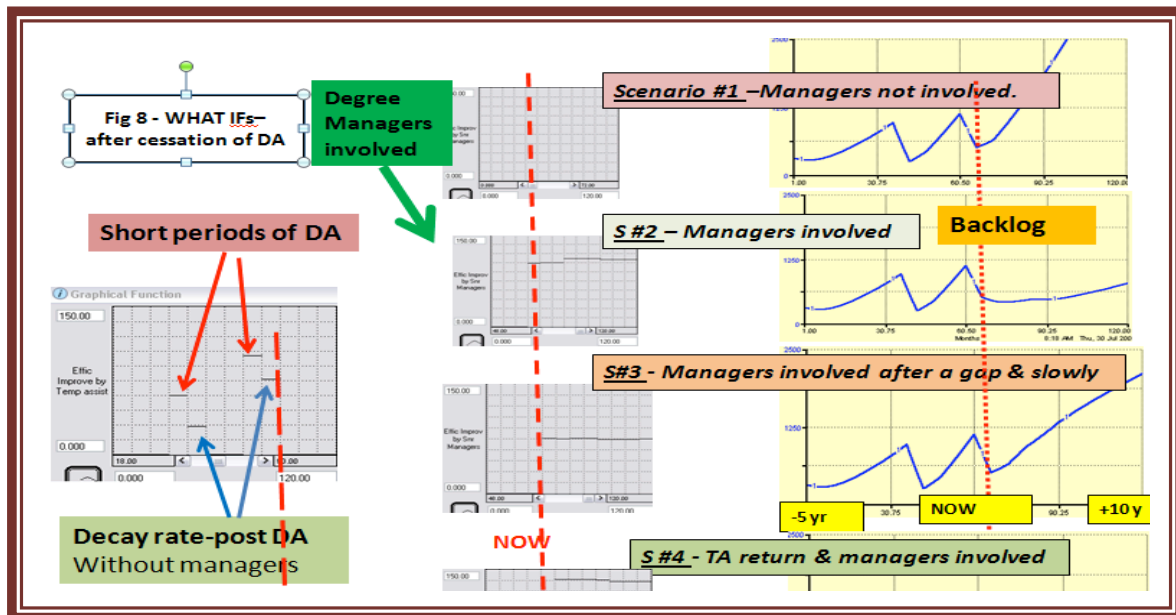
Figure 8 shows 4 possible scenarios with varying levels of management involvement post DA, and the likely effects on processing backlogs.

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This illustrates *how vital* the continuous, active and committed involvement of the GLD senior management team is to achieve sustainable improvements, post DA.

4.0 THE LEVERAGE AREAS FOR IMPROVEMENT

Meadows D H (1998) identified twelve different points, (termed leverage points) to intervene in complex systems. Leverage points are places where a small shift in one thing can produce big changes in everything; the trim tab of a rudder, Senge (1992). The twelve different points have increasing order of effectiveness.

For land administration microworlds the authors have reduced this number to 4, still in increasing order of effectiveness. They are:-Improving the rate at which work is done (L-M) [4]; Addressing the feedback loops: (M-H); Changing the rules of the system and focusing on achieving the goals of the system (H-VH); Changing the mould/paradigm (VH). The first area tends to apply to specific areas in discrete subsystems. eg a Land Registry. The second and third areas are best considered in a current whole system context. The last fundamentally involves a completely different system and way of doing things.

The importance of considering the whole system is well illustrated by the following homily, believed to have originated from a British Airways senior executive seeking to illustrate the futility of conducting capacity building for personnel, while ignoring the system in which the personnel work. Imagine a group of goldfish sluggishly swimming around in a bowl filled with murky water. The goldfish are taken out in groups, resuscitated and treated at a day spa, and then thrown back into the same murky water. They operate well for a day and then resume their original behaviour of swimming sluggishly.

Examination of the dynamics (Section 3.2) and the LAMP scenario results (Section 3.3) identified a number of *potential* improvements, listed below, for executive discussion. While these points relate to the hypothetical Paradise Island, they are considered applicable in real life situations.

1. Improve the rate at which work is done: (L-M effectiveness)
a) Support activities that improve the rate of achieving key performance variables
b)   Foster senior management involvement to achieve sustainability
c)   Collect due and avoided income
2. Address the feedback loops: (M-H effectiveness)
a) Establish incentives and use penalties (carrots & sticks)
b) Widely provide information on LA system performance, and support customers
3. Change the rules - focus on achieving the system goals: (H-VH effectiveness)
a) The GLA to focus on the achievement of the goals of LA and the establishment and
    proper operation of all the elements of LA (Section 2), compliance checking and
    enforcement, rather than focusing on and being the sole service provider.

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[4] L = low; M = medium; H = high; VH = very high for the levels of effectiveness

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b) Allow the competitive provision of a range of land services which could be via the private sector, churches, NGOs, etc

c) Have the authority "to approve" be based on personal independently certified competency (irrespective of which sector a person is in), rather than on being appointed to a certain position in a government department[5]

d) Aid donors to provide DA to all involved, and not predominately to GLDs.

4. Change the mould/ paradigm: (VH effectiveness)

a) Allow locally based deposit of records and agreements

b) Treat land/property dealing as a purely commercial legal contract

c) Have a system based on "the Melanesian Way"

d) Allow Titles insurance

Comment - Space does not permit comment on each item however some general observations follow. Area #1, will, if sustainable, bring about long term improvements. It would most likely focus on particular aspects in a particular subsystem, and, hence, would be unlikely to provide a significant contribution to improving the system as a whole. Similarly, Area #2, whilst probably operating on the whole system, is unlikely to bring about the achievement of the goals. Area #3 is the one most likely to lead to an achievement of LA goals as it is focused on the achievement of the goals.

The beauty of microworlds is that they allow alternative futures to be postulated as scenarios, modelled and the results examined. Any number of "what if" can be proposed and quickly examined in a group learning situation, <u>before</u> a decision is taken.

5.0 EVOLUTION AND CHANGE IN LAND ADMINISTRATION

History tends to indicate that a country's land and property rights, administration and management arrangements *evolve* slowly over long periods of time, frequently hundreds of years. Even where there are significant changes due to new legislation or upheaval, these are often preceded by long periods of debate and often agitation. De Soto (2000) comments on the evolution in the USA. Linklater (2002), whilst focusing on USA land property measurements, provides some interesting social evolution context.

An examination of important "land" dates for New South Wales (NSW), Australia over the 240 years since white settlement indicates that LA did not proceed without problems and that it evolved slowly through many fairly frequent changes, (NSW Lands Department (2008). Grant (2009), a former NSW Surveyor General (a GLA), comments that even in the mid 1980s, when a range of reasonably uncontentious evolutionary changes were sought, it took up to 25 years to bring them to fruition; and this in a state with a long and stable democracy, competent governments, quality universities and professional societies with land disciplines, good infrastructure and telecommunications. Some interesting insights into the effort to transform Britain's public services are provided in Barber (2008).

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5 The need to checks, balances and independent audits is recognised

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Some Australian local governments (Municipalities) have been able to fully implement Land Information System within 5 to 10 years. The vast majority of these have land parcel numbers many times those of Pacific countries. Some of the reasons for this success are considered to be:-a single focus organisation and no other government agency with a related mandate over the same geographic area; senior management is relatively small and committed to improving service to customers; some digital data available from GLDs; the technology was available, as was as a skilled private sector to assist in planning, implementation and maintenance.

The LA systems in developed countries have evolved slowly over hundreds of years to the sophisticated, complex and costly (to run and to comply with) systems that exist today. Change, even in the late 20th century, tends not to happen quickly. This gives rise to the following questions:-
1. Is it reasonable to expect developing countries to be able to evolve their systems significantly faster (even with DA), than it took today's developed countries?
2. Is the typical time span of 5 to 10 years for DA land projects appropriate?
3. What are possible roles for DA and over what time frames?

It is the view of the authors, from observation, experience and using system dynamics and microworlds that:-
- It is unrealistic to expect DA land projects with their short time spans to achieve sustainable change and benefits of the magnitude commonly aimed for;
- The *current* land administration systems in the Pacific (chiefly a legacy from colonial times) have structural limitations inhibiting effectiveness, achievement of the goals. They are also costly to run and may well be unaffordable to the country
- DA agencies consider dialogue with partner developing countries with a view to supporting *slower and longer term* evolutionary development of LA that has the overriding objective of achieving the goals of LA.

6.0 SUMMARY AND IMPLICATIONS FOR DEVELOPMENT ASSISTANCE

6.1 Summary
The system dynamics approach provides deeper insights than other methods of analysis and identifies improvement leverage points of varying power. Microworlds enable wide exploration and bench testing of "proposals to improve" BEFORE committing to them. They encourage collaborative learning and engender greater understanding of LA, a complex system. Greater understanding and involvement leads to greater confidence in a course of action and stronger commitment, which in turn leads to a greater achievement of program objectives and greater sustainability.

While the findings emanate from the hypothetical country of Paradise Islands, as befits a learning experience, the key findings are considered to have wider applicability. They are:-
- A GLD does not, by itself, constitute a country's LA system and current LA system can have serious inherent structural limitations

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- There is need for a greater focus on achieving the <u>goals</u> of LA, rather than improving particular technical aspects. This will probably mean considering higher power improvement leverage points, some of which are likely to be contentious
- Capacity and competition can be significantly increased by a much greater involvement of the private sector and other non government entities
- Making DA widely available to all the players in the LA system, rather than concentrating on government agencies, would benefit the LA system as a whole.

6.2 Implications for Development Assistance Agencies
The following could be fruitful propositions for contemplation:-
- Take a more "whole system" and longer term view, with a greater focus on achieving the goals of LA, with considerable attention to affordability to the country and achieving sustainability; treat conventional ways and means with much greater scrutiny. The same amount or fewer resources may be required, but over much longer periods of time.
- Use microworlds to build, with partners, a clearer understanding of the situations, the scenarios, what ifs, and gain commitment <u>before</u> deciding on a course of action
- Focus less on supporting GLAs and more on building up all participants in the LA system
- Put significant effort into assisting partner countries to evolve the land administration system that deals with already registered land so that there is an achievement of goals. [If a suitable system that works well cannot be evolved for these relatively small amounts of land, it is difficult to see how more can be taken on, and why the additional should work any better].

This approach can be used in DA areas besides lands, such as health, education, public service as it be enhances understanding, ownership and commitment, design effectiveness, capacity building, the likelihood of sustainability and aid effectiveness.

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BIOGRAPHICAL NOTES

Ken Lyons and David Hebblethwaite have worked together and individually over the last 20 years on a variety of land projects in a wide variety of positions in over 10 countries. Their quest for "a fix that might stick", led to system dynamics and microworlds. Ken was a Professor and Head of Department at the University of Queensland while David was a project manager for Intergraph and the Queensland Department of Geographic Information. Both were previously army officers specializing in surveying and mapping.

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