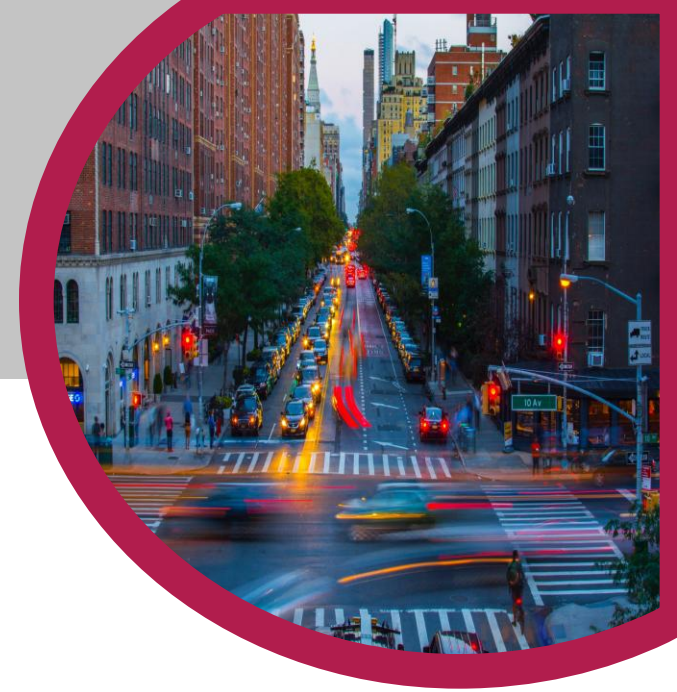


Oceania Chapter
of the System Dynamics Society
Systems Thinking & Modelling Symposium



USING SYSTEM DYNAMICS *to DESIGN & TEST*
AID PROJECTS in LAND ADMINISTRATION
for EFFECTIVENESS & SUSTAINABILITY
BEFORE committing the BIG aid \$s
A Journey still in Progress

Ken Lyons

a retired practitioner (not in SD) with field experience

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Online Symposium, 4 February 2022

STRUCTURE

Presentation is quick & light – outline of a journey, not the detail

- A little on **Land Admin (LA) & Aid Projects**
- **Needs** & **Why System Dynamics & Strategy Dynamics** turned to
- **An example** applying Strategy Dynamics
- **How Strategy Dynamics adds value** to current design approaches

in Developed Countries LAND ADMIN is a largely invisible enabler



COMPLEX

EXPENSIVE

it WORKS! &
delivers BENEFITS [secure property rights & can use Titles to get a loan]

in Developing Countries LAND ADMIN is messy & complex

Land Administration is Messy!

Accounts & Budget

Land Use Controls

Lands Dept

Titles Office

Land Applications

MANY
Work functions
Agencies involved

Rates, Rents

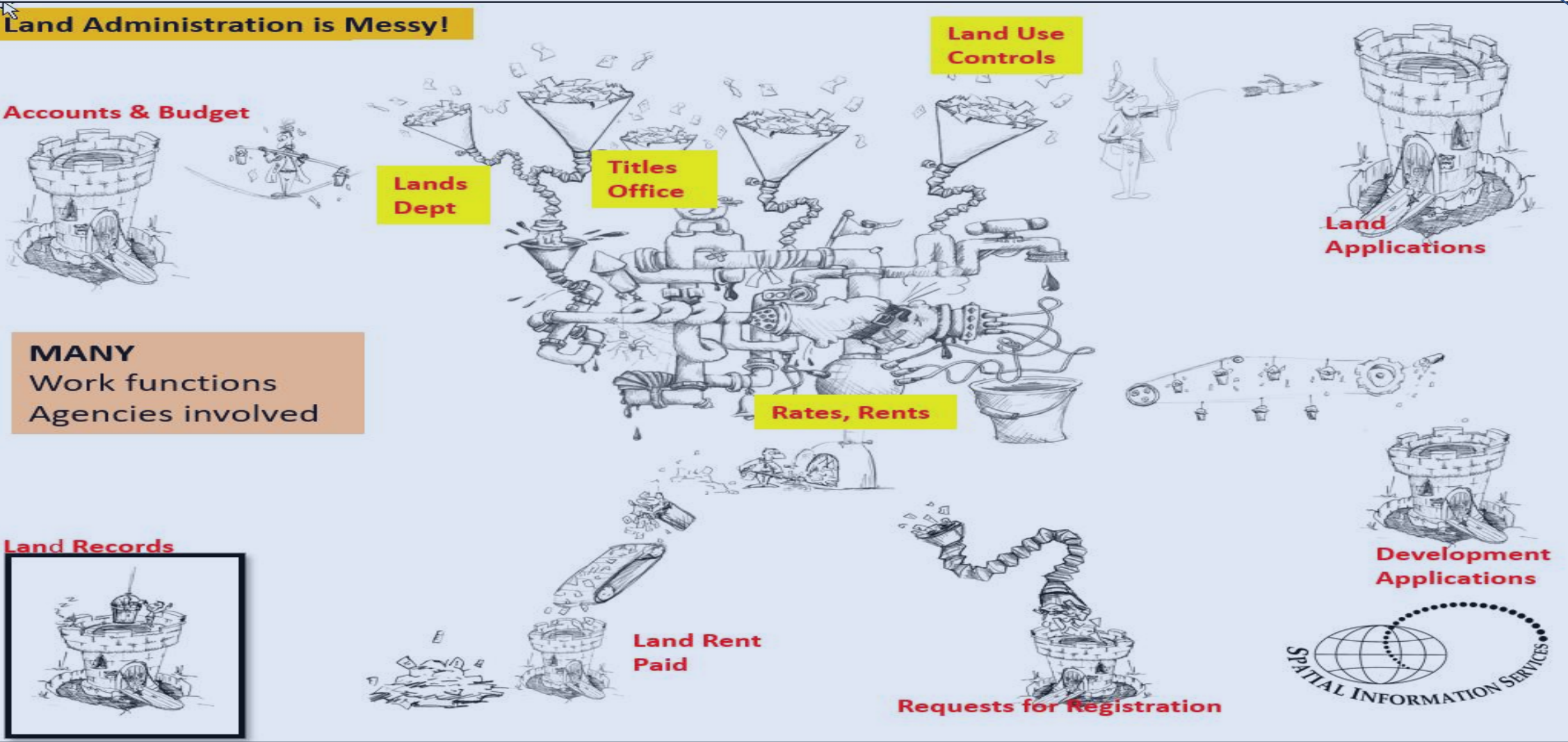
Land Records

Development Applications

Land Rent Paid

Requests for Registration

SPATIAL INFORMATION SERVICES



Some characteristics of Land Admin

Characteristics	Developed Countries	Developing Countries
Properties that have secure tenure		 
Enforceable property rights		
Property transactions put thru the Govt system		 
Property disputes		 
Efficiency & Effectiveness		 
Quality of records		 
Good governance		 
Revenue to Government cf cost to operate		
Property accepted as collateral		
Sharing of data between operational entities	 	
Adequacy of Budgets to sustain operational entities		

AIM of LA Aid Project – **to close the gap** in one or more characteristic

Duration - Mostly 3-5 yrs; can be 20 yrs with extensions: **Cost** - \$5m, \$10 to \$80m

ACHIEVEMENTS -(over last 40-50 yrs) - **Wide spread “Success” in LA is elusive**

“Success” = Achieving Project Objectives with Aid; Sustaining benefits post aid

Design & Execution of Aid Projects in general

Design

- Design team
 - The development (change) logic is shown by either
 - A logframe (logical framework matrix)
 - Theory of Change Diagram
- Both Qualitative & many implicit assumptions
- Various independent appraisals & approval processes – contract awarded

NB – good design relies on hard won experience

Execution -in general

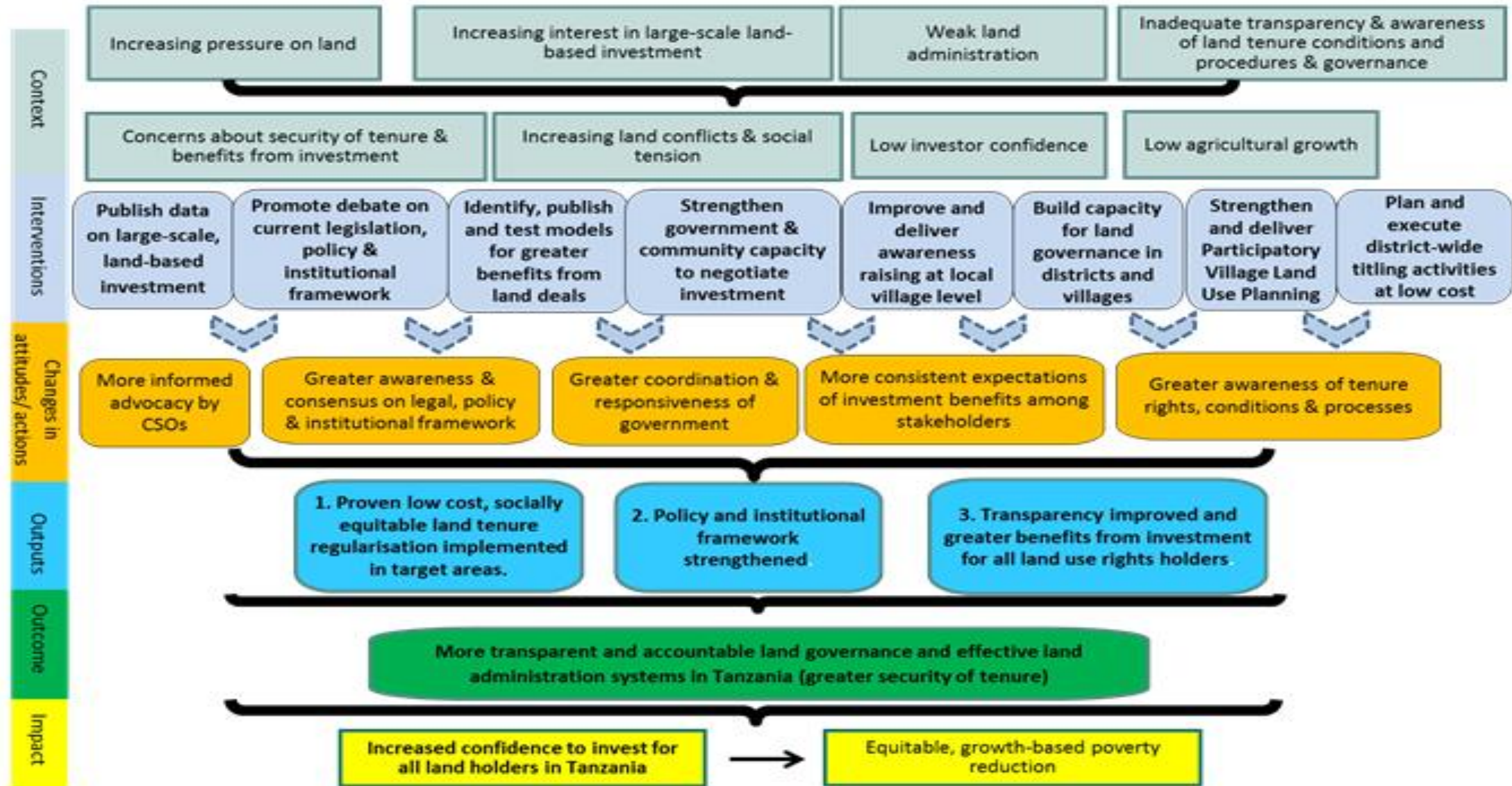
- “the design” is executed
- Regular M&E (monitoring & evaluation) of progress of the plan
- Aid ceases project finishes

The Logframe – simplified [Task – remove a backlog & keep it low]



Outcome	Verifiable Indicators	Assumptions
Processing backlog is removed and kept low without any future IDA.	- Backlog (applications awaiting processing) - Improvement in LR processing capacity	- That three outputs, are sufficient to achieve the Outcome - That LR staff are committed to reducing the backlog, increasing processing capacity, and keeping backlog low.
Outputs	Verifiable Indicators	Assumptions
O1 - Backlog is removed and kept low		
O2 - Improved LR procedures		
O3 – Staff trained and skills increased		
Activities for Output 1	Verifiable Indicators	Assumptions
A1.1 Process application awaiting processing		
Activities for Output 2	Verifiable Indicators	Assumptions
A2.1 Improve procedures approved by CEO; train LR staff and implement	- Procedures improved - Procedures in operational use - Increased productivity	That the improved procedures will result in an increase in LR processing capacity
A2.2 Improve LR procedures approval by parliament; train staff.		

Theory of Change



The Need - Why used SYSTEM DYNAMICS & STRATEGY DYNAMICS

The NEED that I saw

- A means to **“TEST” a design** quantitatively **for achievability** of objectives (with aid & post aid) & **sustainability** (post aid) **BEFORE committing the BIG AID \$s**

Why System Dynamics – System approach; feedback; simulation

Strategy Dynamics (Kim Warren’s approach) in a nutshell

- *The Determination* if a plan will work at all
- **The design of a system so that it can perform well**
- *The management of* a system so that it does perform well
- **The fixing of a system if problems occur**

Warren K (2009), Strategic Management Dynamics, John Wiley & Sons Ltd

Why Strategy Dynamics– in particular

- Focus on:- **evaluation & achievement of strategic objectives**; **improving performance**
- **The business setting**; many examples, models; online course material; associated s’ware
- Able to use the model as a **“Living Business Model”** during implementation, not just for design

What done

- **Convinced myself that SD had merit** by modelling a simple Land Admin development task
- **Developed an approach** for using SD in Land Admin
- **Applied the SD approach** to a number of common LA development tasks
- **Developed** above **into an e-book** [book is 13 Chapters & is **still WIP**]

AIM of the book

1. To provide **illustrative** examples
2. Focus on the **testing for the achievement of strategic objectives**
3. To **engender discussion** on the efficacy of using SD approach to increase LA project *success*

Steps in Project Design (using the SD approach)

1. Understand the operational & cultural environment and what sought to be achieved
2. Establish the PIOs (performance improvement objectives), with and without aid
3. Draw POT graphs (performance over time) show past, desired future, feared future for PIOs
4. Sketch a SCS (schematic of the core structure) of the *system* to be improved
5. List PIPs (performance improvement proposals) with indicative inputs and durations
6. Build a SD model of the system and show that it can replicate past POT
7. Test the PIPs for effectiveness and sustainability, using the SD model, and **identify an improvement strategy incl risk management**
8. Evaluate project -financial and non financial

Illustrative Design Example of Using the SD Approach (in Chap 9 of e-book)

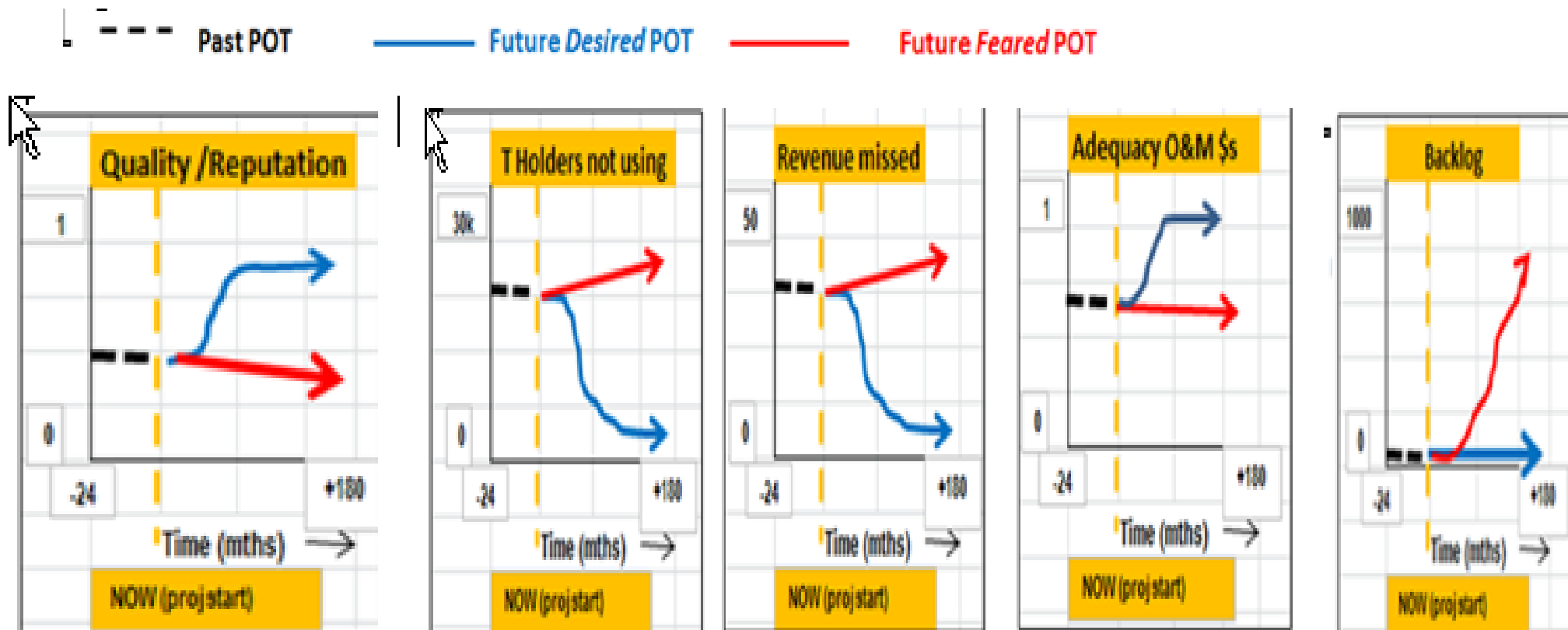
Storyline

- A small semi rural LR with 8 staff; ~100k titles & ~20k titleholders do not use the LR
- Quality & Reputation ~0.5; LR not well equipped; annual budget just covers salaries; little provision for maintenance
- ~3 yrs ago aid was provided to remove a processing backlog & this has been sustained post aid

The PIOs (Performance Improvement Objectives)

1. **To increase & sustain QUALITY & REPUTATION**
2. To **win back** a significant % of the **titleholders not using the LR**
3. To **increase revenue to government** (from fees from those won back to using the LR)
4. To **maintain very low backlogs** and waiting times for the processing of applications
5. To **make all improvements sustainable** by using a small % of the increased revenue to **provide adequate annual O&M** (operational & maintenance) budgets and **to establish a sinking fund**

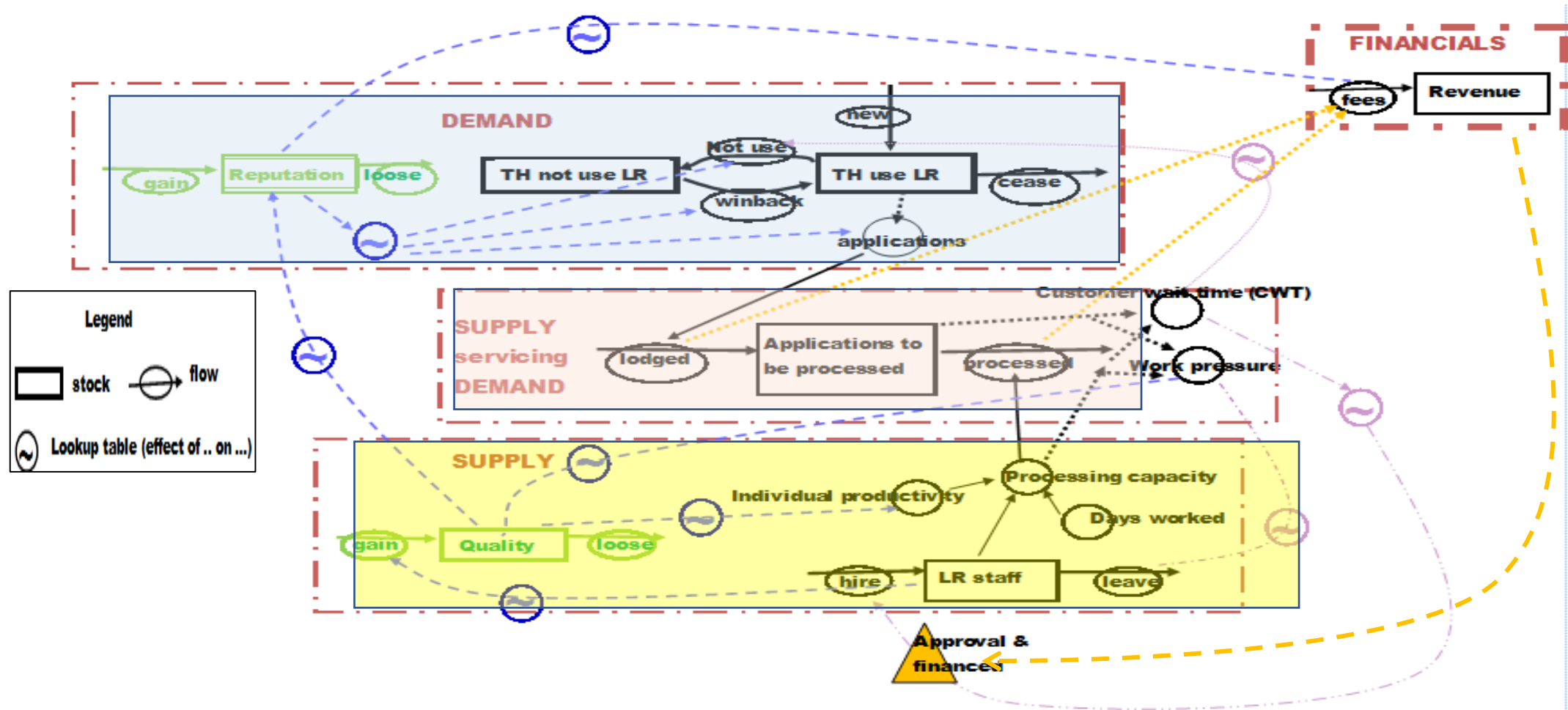
POT (performance over time) graphs of the PIOs for past, desired and feared futures
[jointly developed by Design team & Agency senior management]



System to be improved comprises

- **DEMAND** - titleholders who use and don't use LR; *reputation* of LR; applications to LR
- **SUPPLY** - staff, individual productivity, work capacity; *quality* of LR products and services
- **SUPPLY servicing DEMAND-** - supply (work capacity) strives to meet demand (applications to LR) in a timely manner
- **FINANCIALS** – fees collected; O&M (operations & maintenance) of LR; once off cost of aid
- **Feedback loops** operating within the above.

The **SCS** (Schematic of the Core Structure) of the *System*



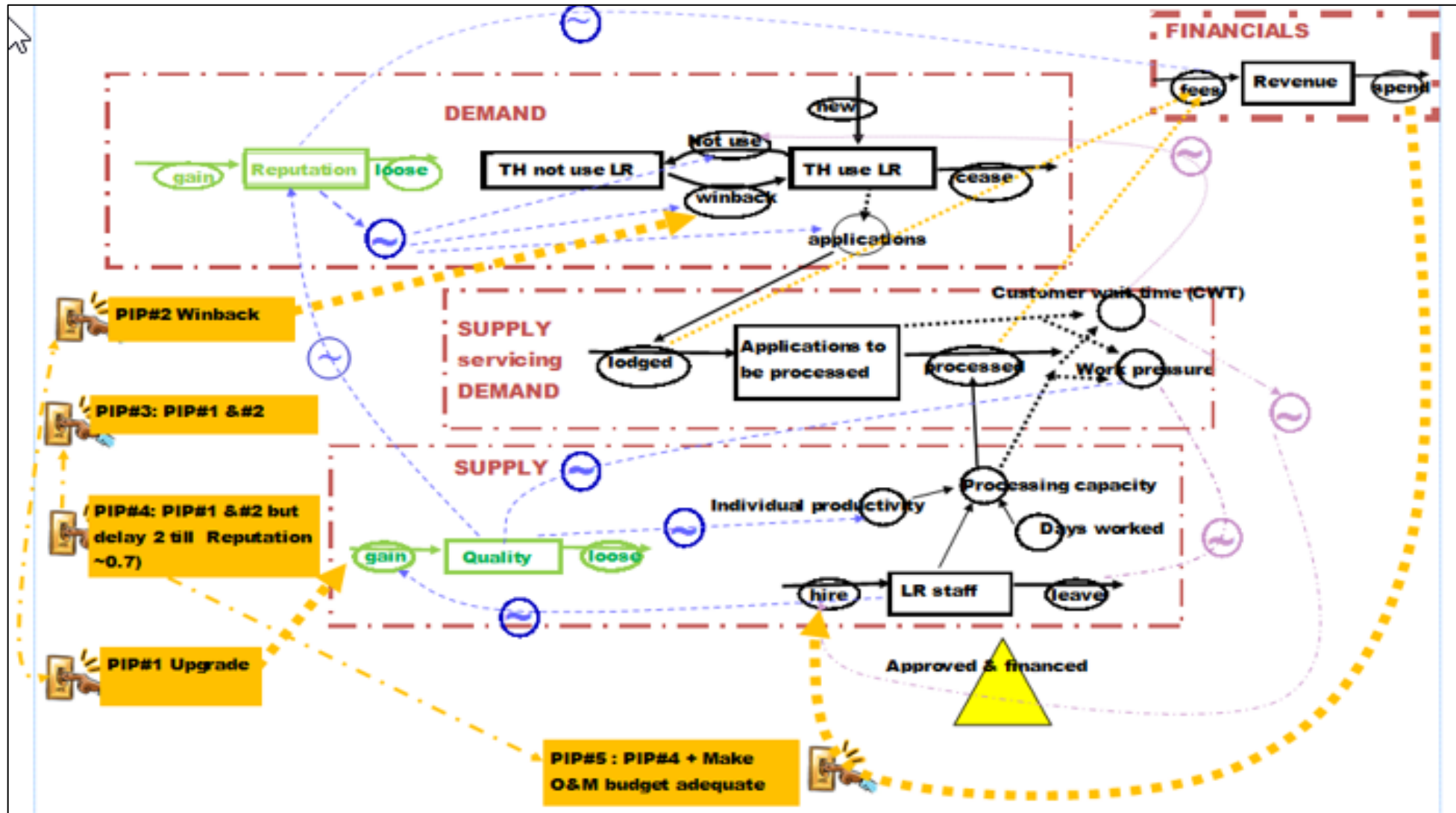
The above would be built up in stages by the design team & Land Agency personnel

V important to build understanding & “buy in” by Land Agency – have to implement, live with the results & work to sustain benefit flow

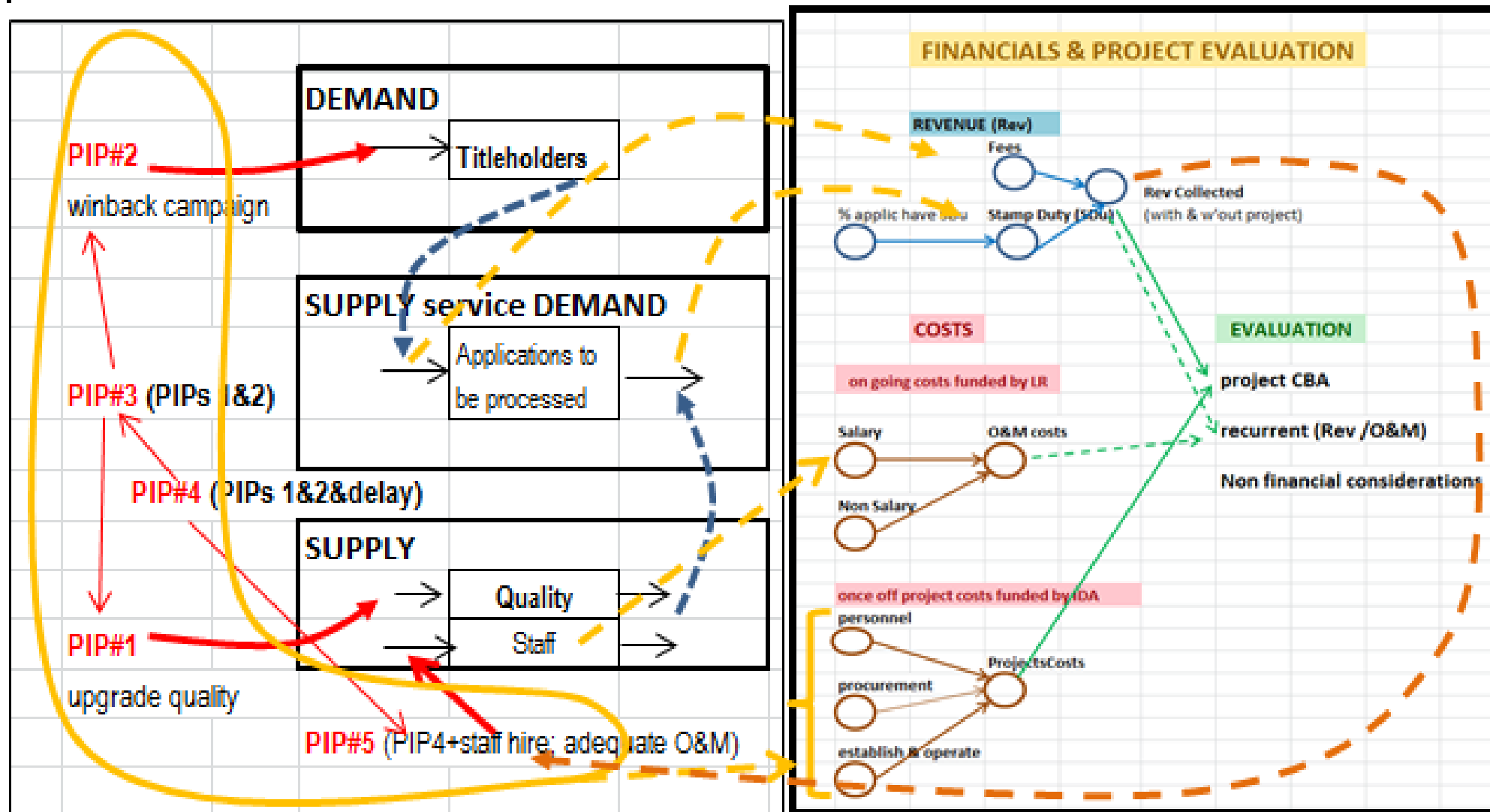
PIPs -performance improvement proposals –joint brainstorming by design team & Agency management

	PIP	When start	Persons (IDA funded)	~ Duration (mths)	Other resources (IDA funded)	Anticipated improvements
1	Upgrade quality of LR	At project start	4 x TA 18 x local	10	Local \$250k for technology	Quality and reputation increase from ~0.5 to ~0.9
2	Conduct a marketing campaign to win back titleholders not using the LR	At project start	1 x TA 2 x local	12	Local \$180k for marketing & engagement	Win back ~13 of 20k titleholders not using LR
3	Do PIP#1 & 2 concurrently	At project start	As above	12	As above	As above
4	Do PIP#1 & 2 but only start PIP2 when reputation of LR ~0.7	PIP#1 at project start PIP#2 when reputation ~0.7	As above	18	As above	As for PIP#1 Win back ~17k of 20k titleholders not using LR
5	PIP#4 + fund additional staff & extra budget from % of revenue collected	As for PIP#4	As above	18	As above	As for PIP#4 + sufficient staff + sufficient O&M \$s for sustainability + SF established

The SCS showing PIPs & where they will impact

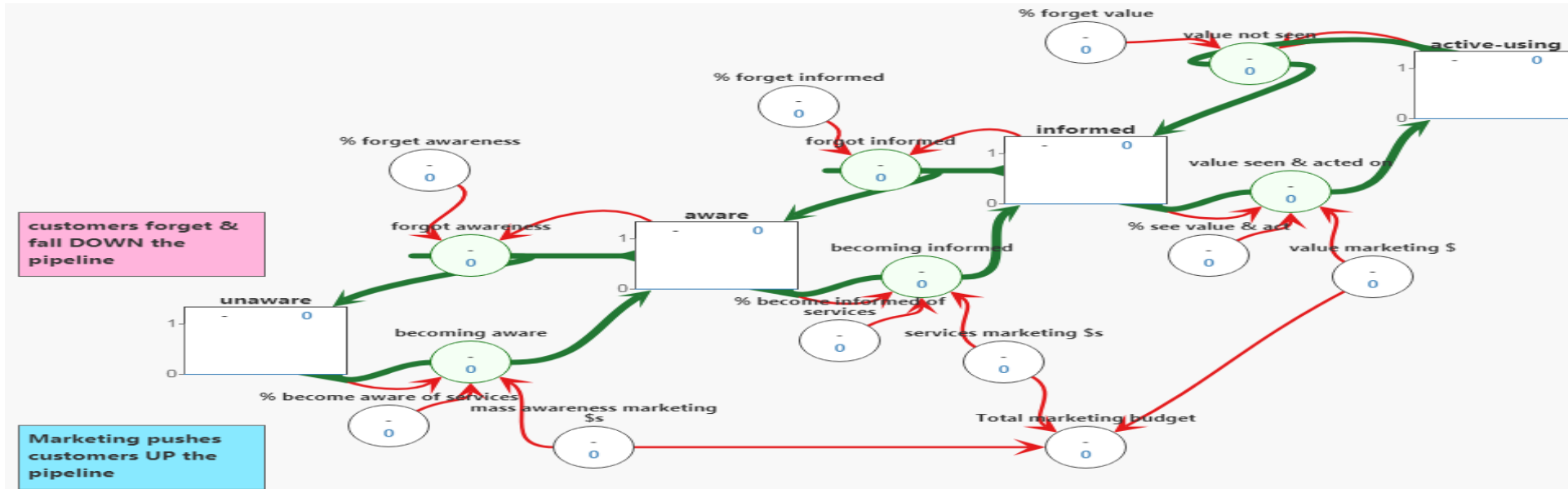


The SCS incl Financials

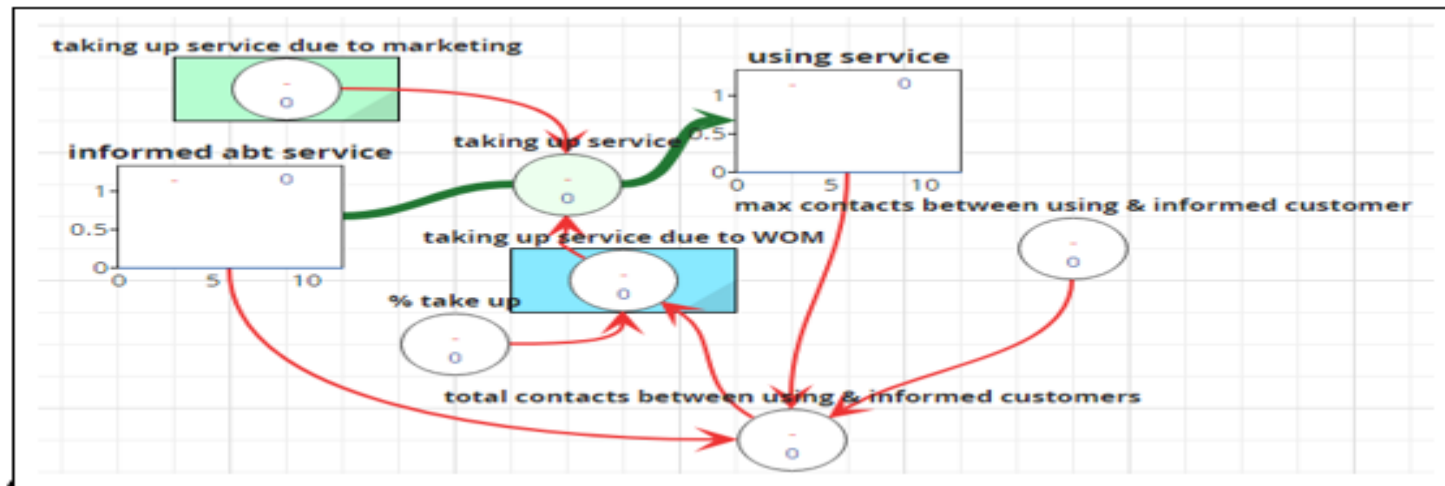


Structures for Winning back Customers (PIP #2)

The customer pipeline



Bass diffusion WOM structure

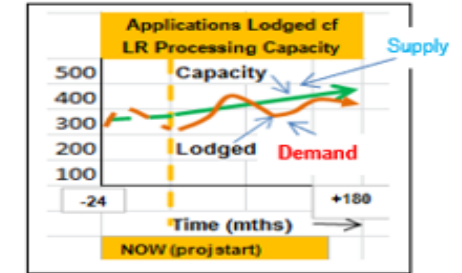
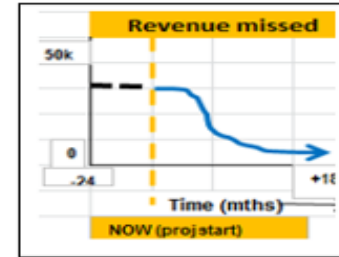
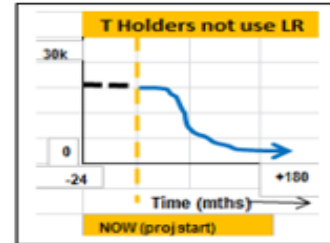
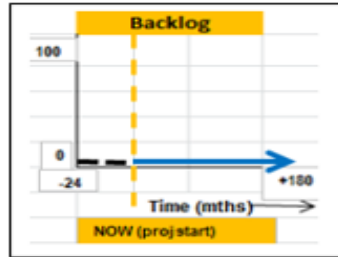


Structures for other PIPs not shown

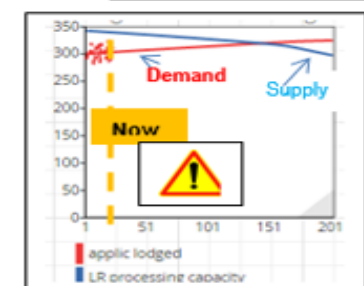
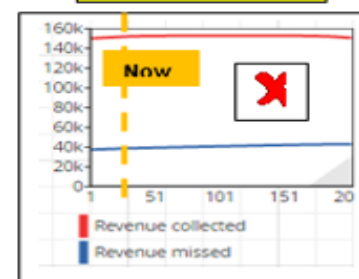
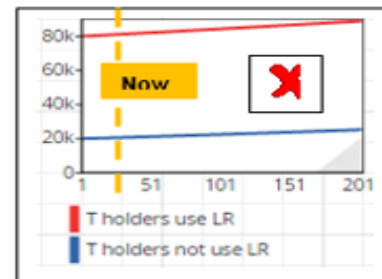
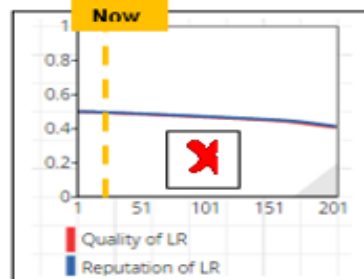
BUILD & USE SD MODEL

POT graphs from “testing” each PIP for effectiveness and sustainability -1st pass

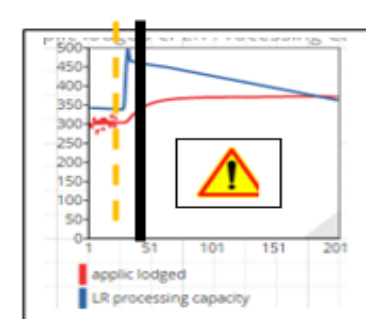
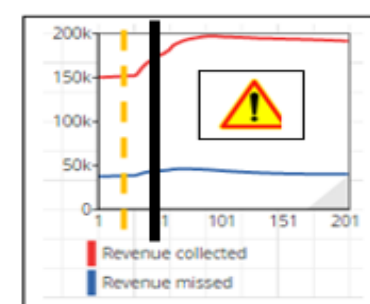
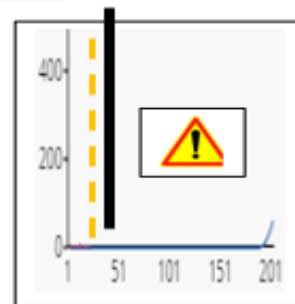
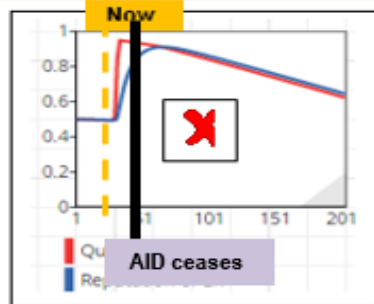
DESIRED FUTURE



Base Case – No AID



PIP 1- upgrade Quality ONLY



PIP 2- Winback ONLY

Quality of Reputation

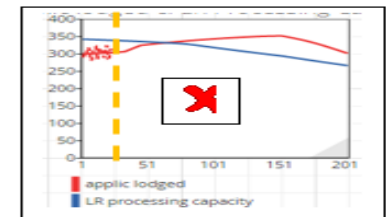
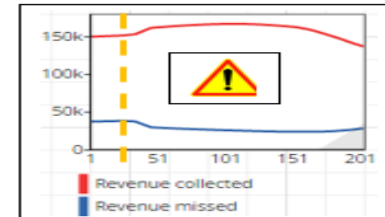
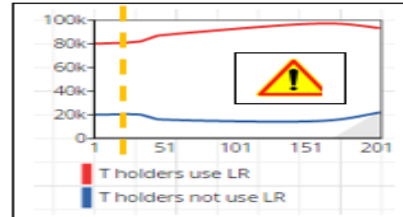
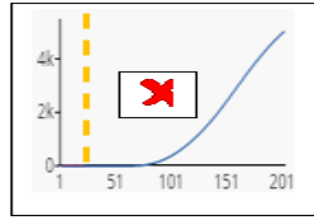
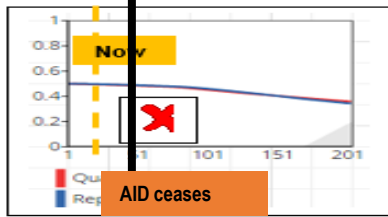
Backlog

TH use LR cf
TH not use

Revenue collected
cf revenue missed

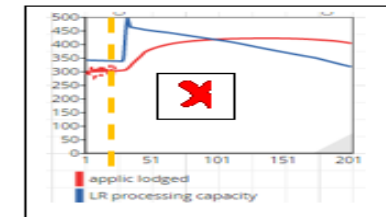
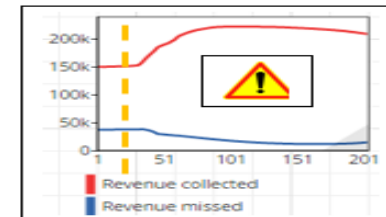
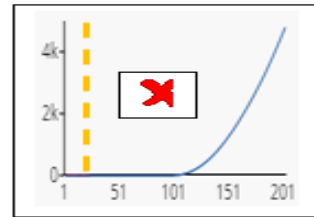
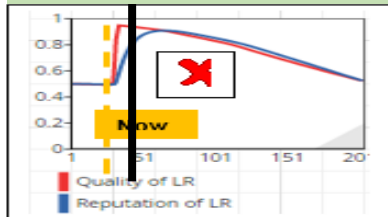
Applic lodged cf LR
process capacity

Row 4 PIP#2 - marketing only



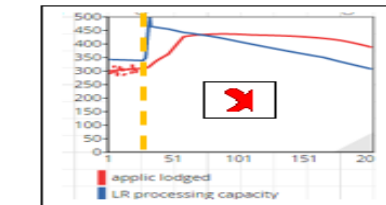
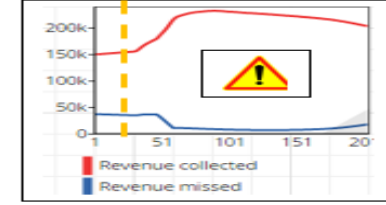
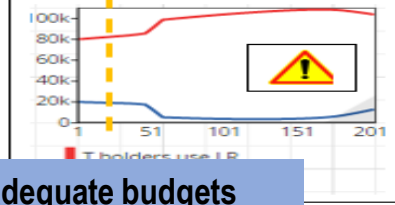
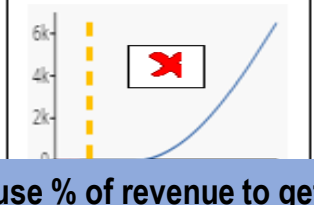
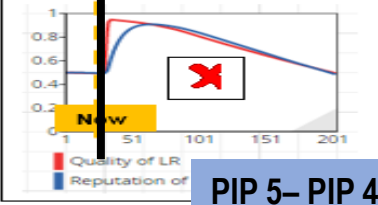
PIP 3- Upgrade & Winback

back campaign both done concurrently commencing at project start



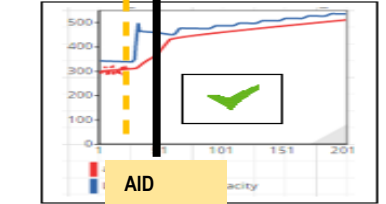
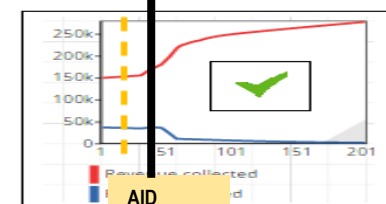
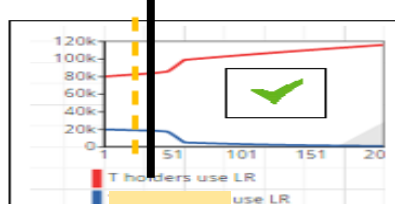
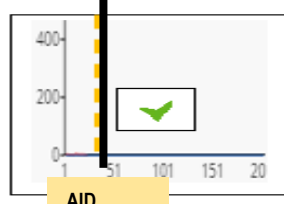
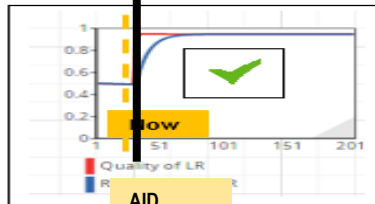
PIP 4- Upgrade & start Winback when Reputation = 0.7

Row 6 PIP#4 up - quality upgrade commences at project start but winback campaign only commences when reputation reaches ~0.7



PIP 5- PIP 4 & use % of revenue to get adequate budgets

Row 7 PIP#5 - PIP#4 with incremental stairing for QAVQC and adequate O&M



AID
ceases

AID
ceases

AID
ceases

AID
ceases

AID
ceases

The improvement strategy- 1st pass

With AID \$s

1. **Use temp local staff for processing; rotate permanent LR staff thru upgrading and winback**
2. **Use technical assistance** personnel, temporary hires, rotated LR staff to:-
 - a. increase the quality from ~0.5 to ~0.9
 - b. do community engagement to win back customers; commence winback when reputation ~0.7
 - c. Increase LR staff skills and productivity
 - d. **Prepare LR for post Aid; gain Finance Dept approval to use some revenue for adequate annual budgets & establish a Sinking Fund**

Post AID

1. **Ensure adequate O&M budgets** for: - **reinforce agreement with Finance Dept**
 - a) maintain all equipment, hardware, software
 - b) regular staff skill retention & training
 - c) adequate consumables,
 - d) adequate staff salaries
2. **Appoint extra staff as needed** to: -
 - a) **conduct routine quality maintenance** to ensure the quality of LR is maintained at ~0.9
 - b) process the increased applications lodged,
 - c) maintain the increased productivity,
3. **Increased Quality is maintained**
4. **Maintain & use sinking fund** to replace equipment with associated training
5. Conduct ~2-4 annual **community awareness campaigns on benefits of using the LR**

Done but not covered here

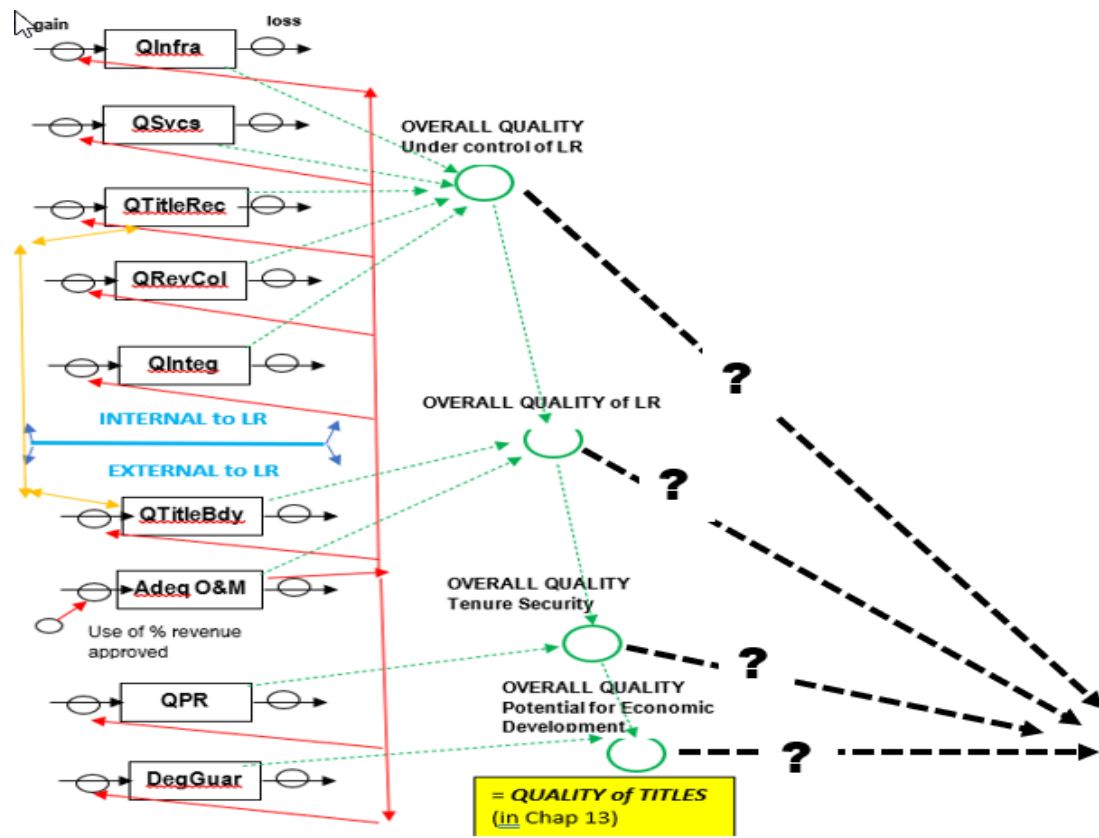
Risks & Risk Mitigation

Financials with & without the project

Non financial benefits of project

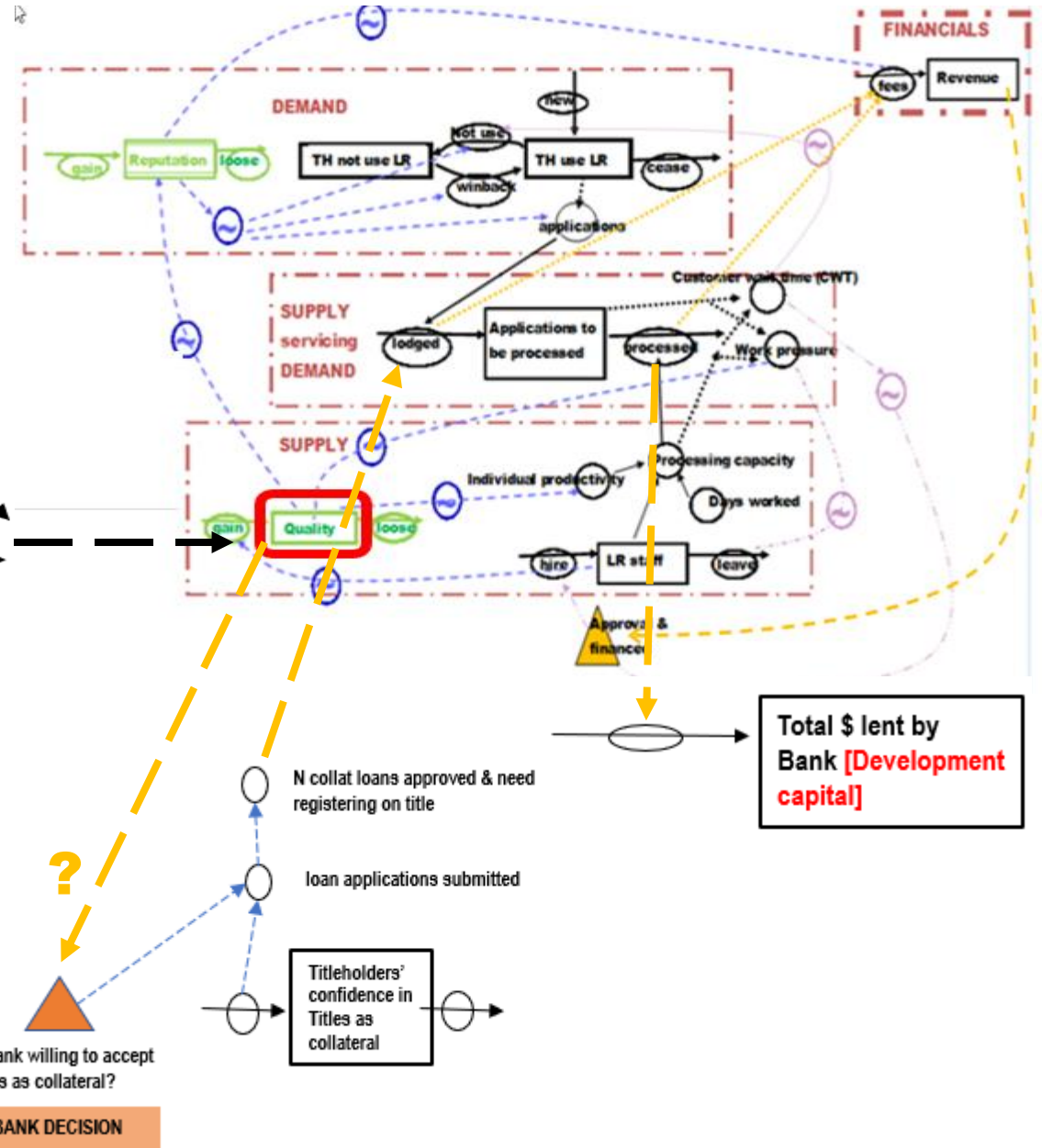
Using the model as a LBM (Living Biz Model) to assist to manage the project

Extending the Model



Treating Quality as having subcomponents-
Chapter 11

Raising Development
Capital by Banks
accepting Titles as
Collateral for a loan
Chapter 11



How the SD Approach Adds Value to design approaches of Logframe & Theory of Change

EFFECTIVENESS

- Enables QUANTITATIVE bench testing of strategies BEFORE investing
- SCS is powerful “understanding & buy in” tool– IC Agencies have to live with the results
- SD model not just for design; also for project appraisal; for formal reviews; for M&E;
- ALL above **increase likelihood of project “success”**

EFFICIENCY

- Saves work, not makes work
- Adds science to the art of design

The GAIN-PAIN equation

- Is positive (some investment in learning SD required)

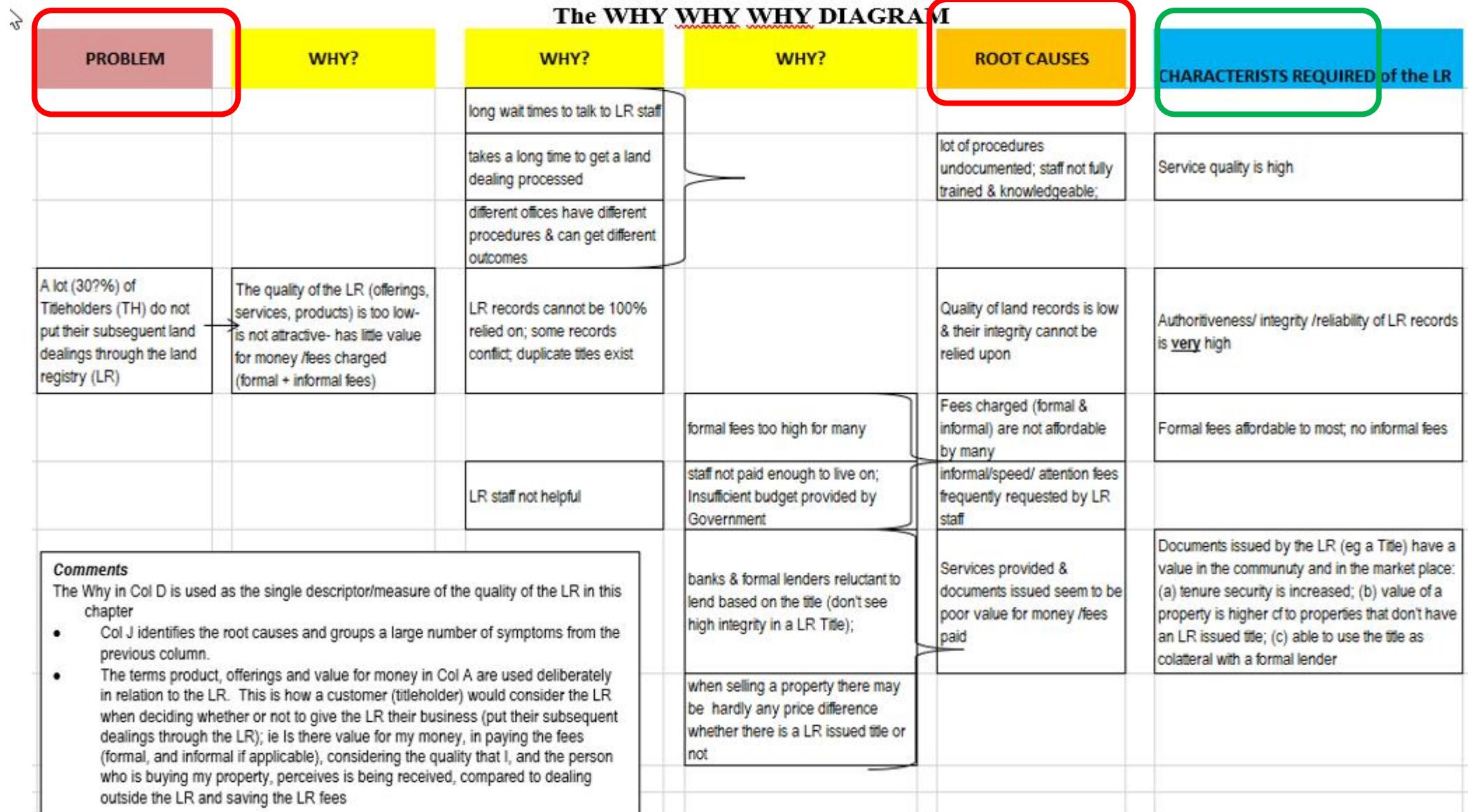
SD is a worthy additional tool for the LA toolbox

Thank You

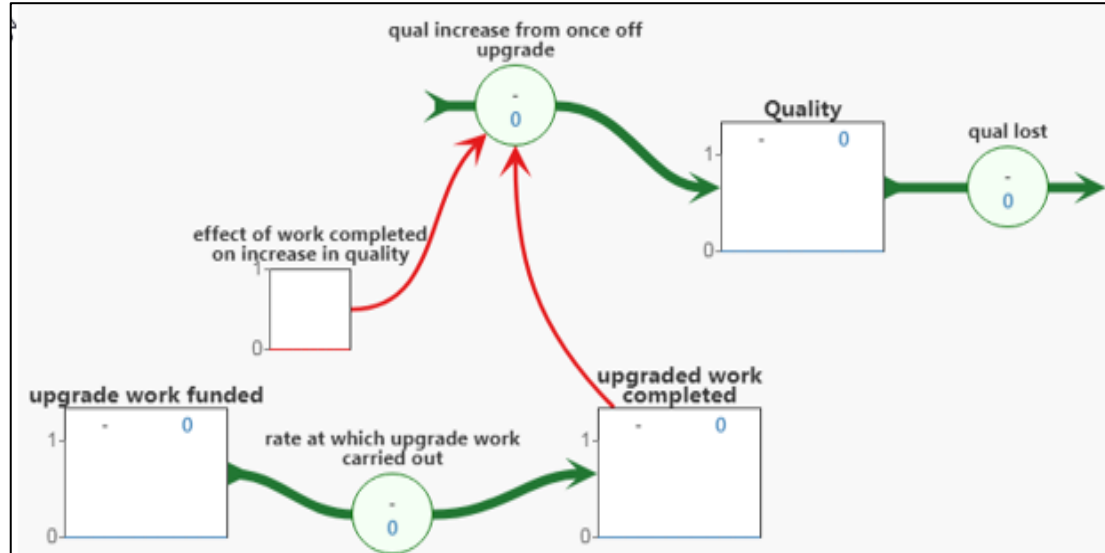
Ken Lyons

kenlyonsspatial@gmail.com

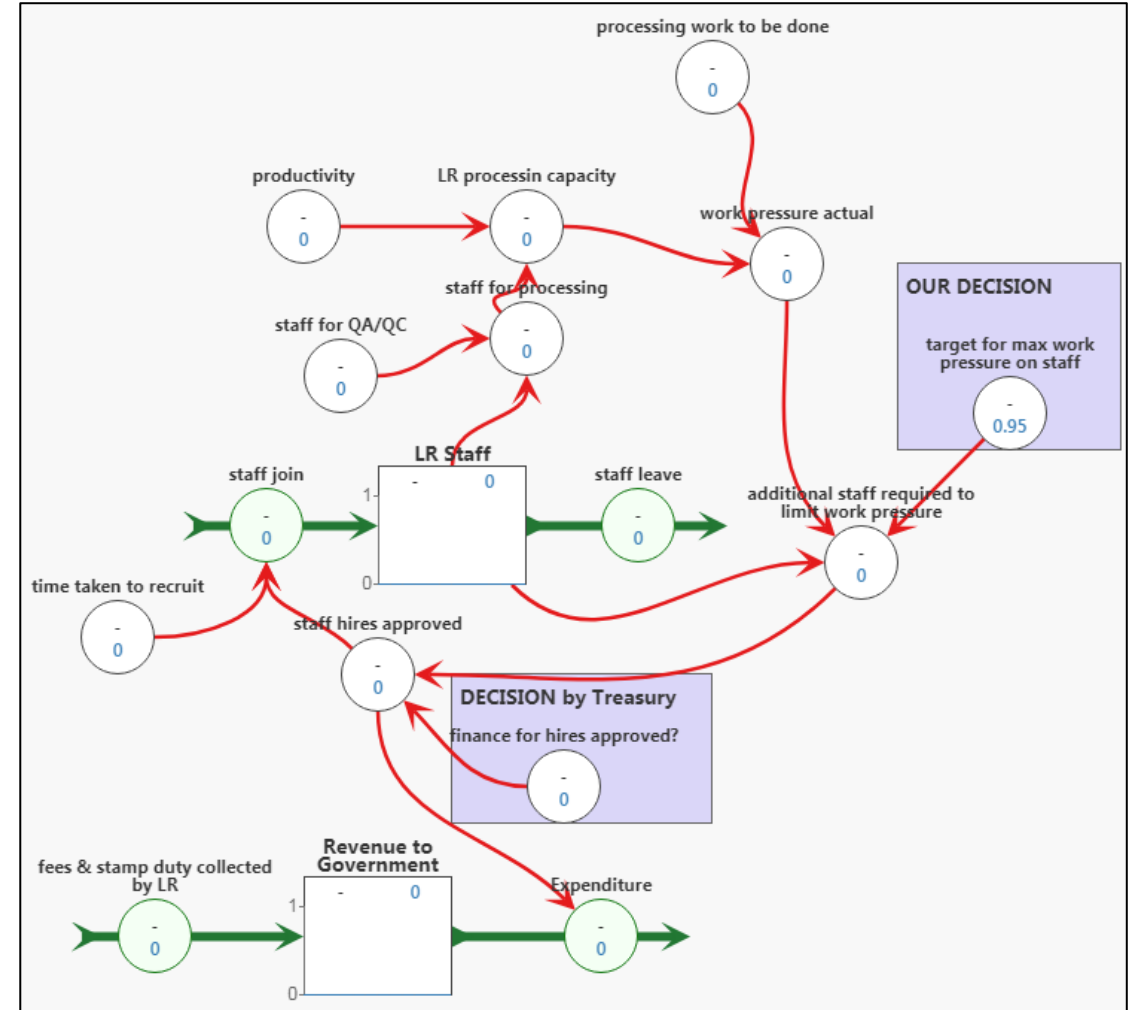
A WHY WHY WHY Diagram – developed jointly by design team & Agency senior management



Structure to increase Quality (PIP#1)



Structure to automate decisions [to increase staff when work pressure threshold is reached] (PIP #5)



Risks & Risk Mitigation

LR

Risks
#1 – quality target not achieved or sustained
#2 – target for winning back titleholders to use the LR not achieved or sustained
#3 – agreed portion of revenue to sustain LR not partially or fully provided or used for other purposes
#4 SD model not adequate

Quantitative effects of Risks 1 & 2 shown in graphs when each PIP was “tested”

Observations

- **If don't** improve and **sustain quality**, & winback then **other PIOs not achieved**
- **If don't achieve & sustain adequate budgets** improved performance not sustained post aid
- Use SD model as a LBM (Living Biz Model) during and post IDA

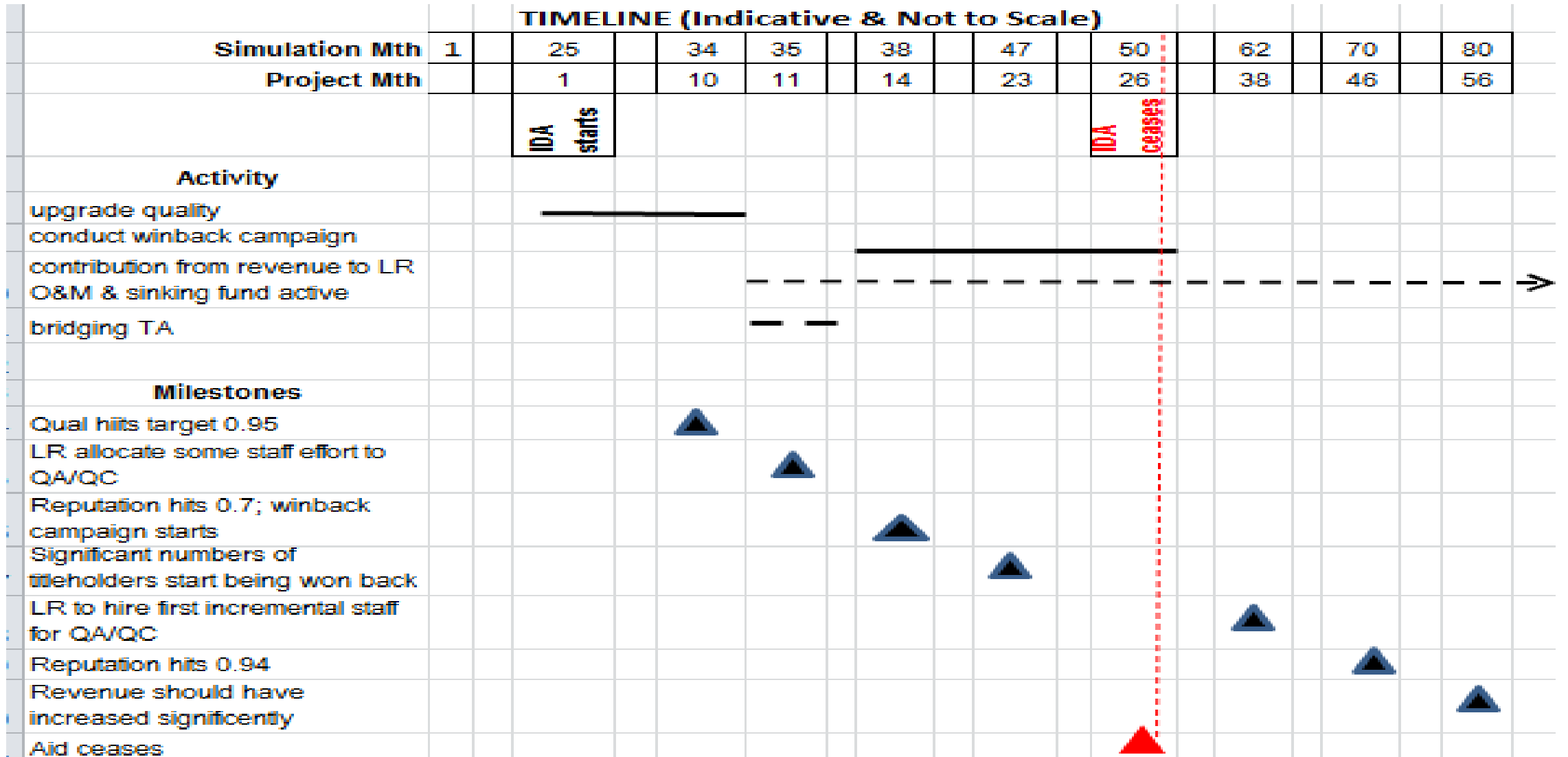
Risk Mitigation and additions to improvement strategy

- With IDA – use SD model as a LBM as part of M&E (monitoring & evaluation)
- Post IDA - use SD model as a LBM as part of M&E

What ifs – RISKS that could be examined:-

- #1 – Winback marketing campaign only ½ as successful as anticipated
- #2 – Insufficient staff allocated to QA/QC & to maintain quality
- #3 – 3 yrs post project the % to O&M from revenue is cut by ½

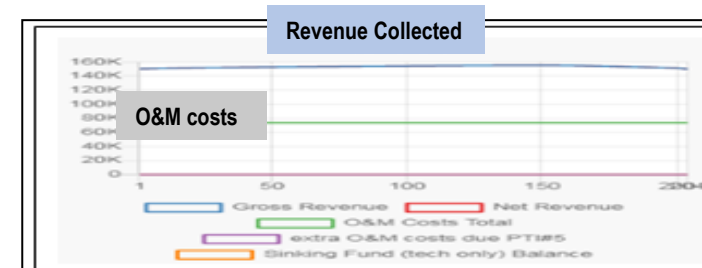
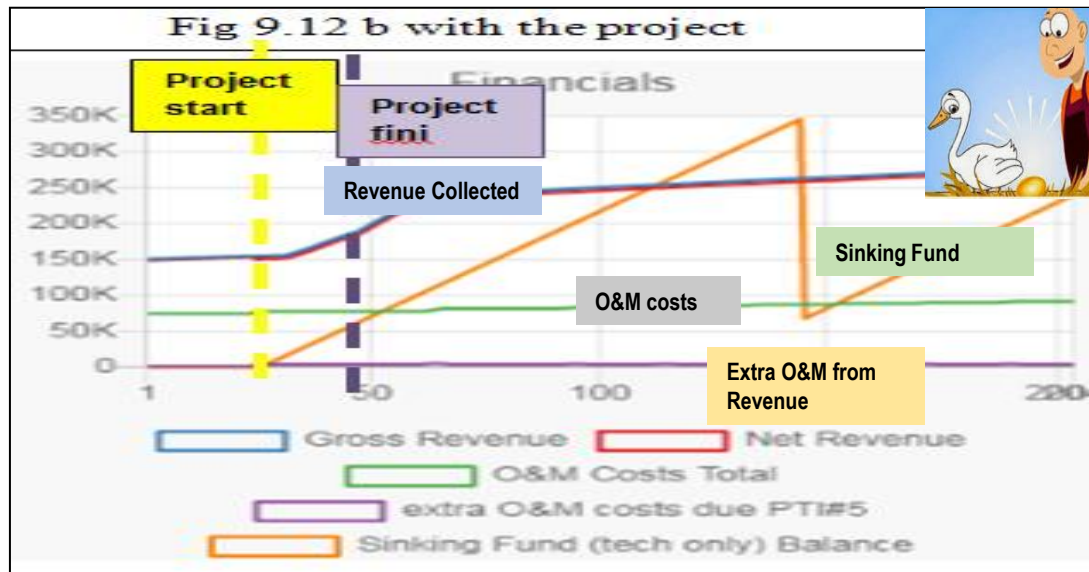
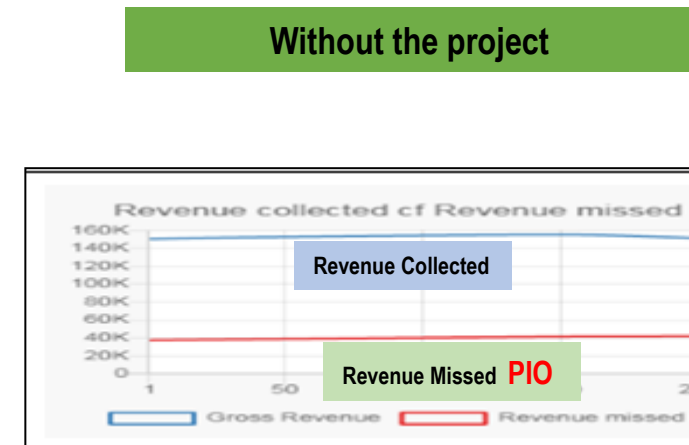
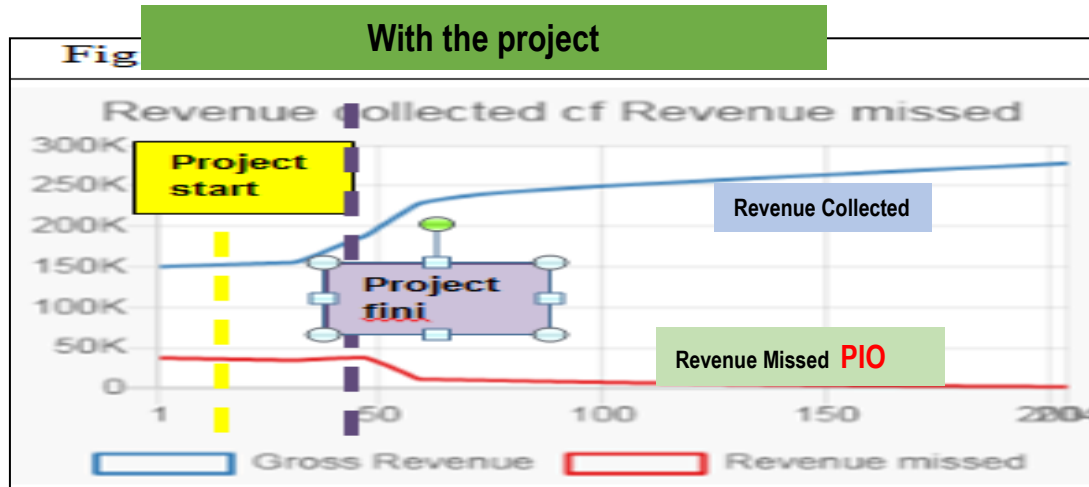
Gantt Chart– 1st Pass



Financials – 1st pass

Benefit /Cost ~1.6 (benefits over 20 yrs)

Revenue/ O&M costs: 2.4 with proj; 2.0 w'out proj;



NB – example is hypothetical & Figures are illustrative & orders of magnitude; no time discounting used

Non financial considerations of Project – 1st pass

1. Titleholders much happier with LRs improved quality , reputation and short waiting times.
2. The community & business more willing to use LR due to higher levels of confidence in the LR
3. World Bank rankings should rise for transferring a property and ease of doing business.
4. Aid providers willing to support more projects as can see improvements should be sustained post aid

Design team documents all in Aid Agency format & submits: appraisal, mods; decision if to fund

NB

- This DESIGN example shows SD applied to aid support to the “**formal**” /government LA system
- SD can be applied to “**informal**” /**community** systems where FFP (fit for purpose) LA approach may be used
- No reason SD can't be used in any aid sector