



Presented at the FIG Working Week 2023,
28 May - 1 June 2023 in Orlando, Florida, USA

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Protecting
Our World,
Conquering
New Frontiers

Simulation to *Test* Improvements BEFORE Investing

Ken Lyons



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What Saying in a Nutshell

- **SIMULATION** used in business to *test biz plans* before investing
- **Why NOT** use in Land Admin? [Big \$s invested; **wide spread success elusive**]
- **Examples** use a **Strategy Dynamics** Simulation Approach
- **SIMULATION** **adds value** to current Land Admin approaches

I'll provide a FEEL for the approach – detail not dwelled on

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Strategy Dynamics focuses on-

Improving the Performance of a System

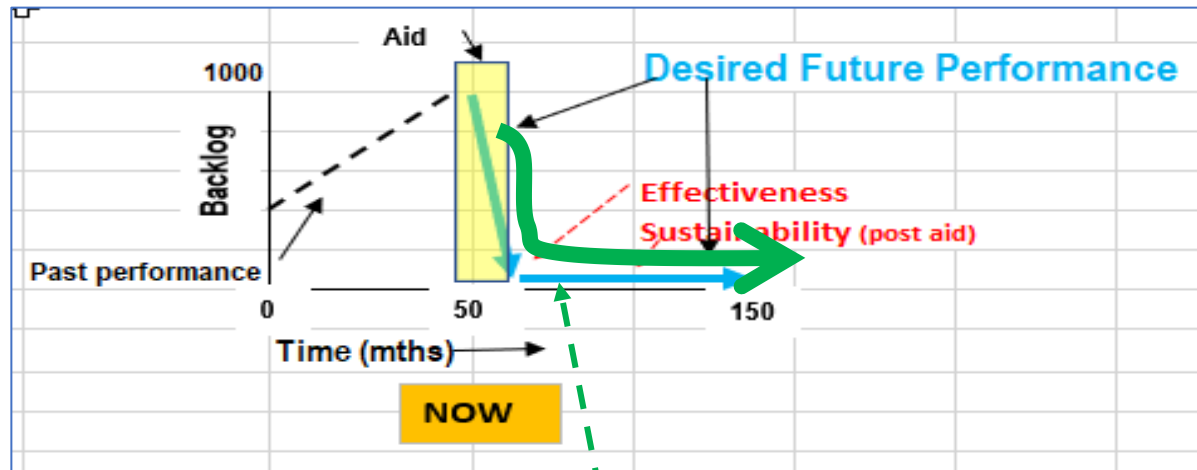
Warren K (2009)

Simulation models can be used in 2 places

1. In DESIGN - to **test** improvement proposals for **EFFECTIVENESS (with aid) & SUSTAINABILITY (post aid)**
2. During & post IMPLEMENTATION -to assist **M&E (monitoring & evaluation)** & managing the project

In DESIGN - The Test for Effectiveness & Sustainability

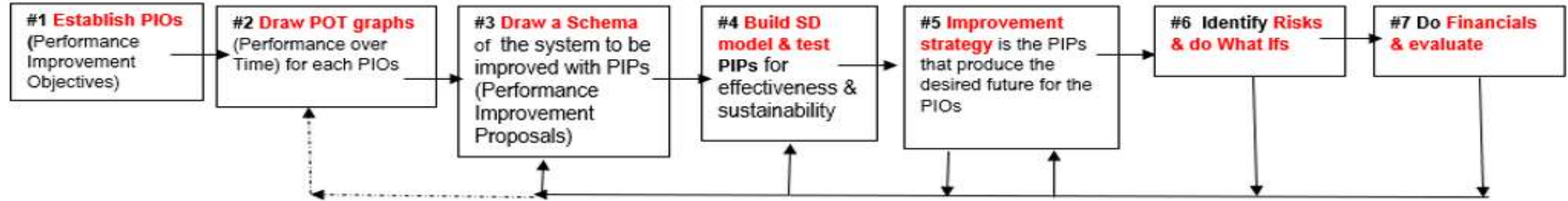
1st - **A POT Graph** (Performance Over Time) for **BACKLOG** in a Land Registry (LR)



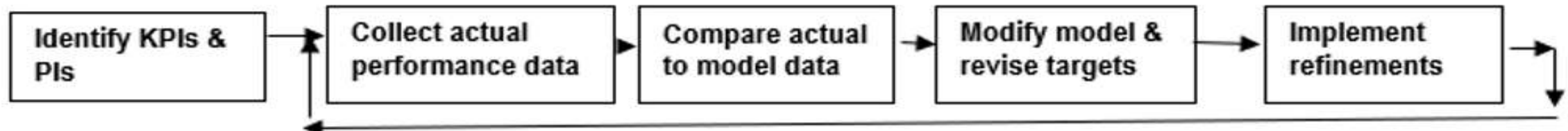
Test is – How well do –

- the trajectories from the simulation model, for the proposed improvements
- align with the DESIRED FUTURE performance trajectory

Workflow for design/testing proposed improvements in developing countries

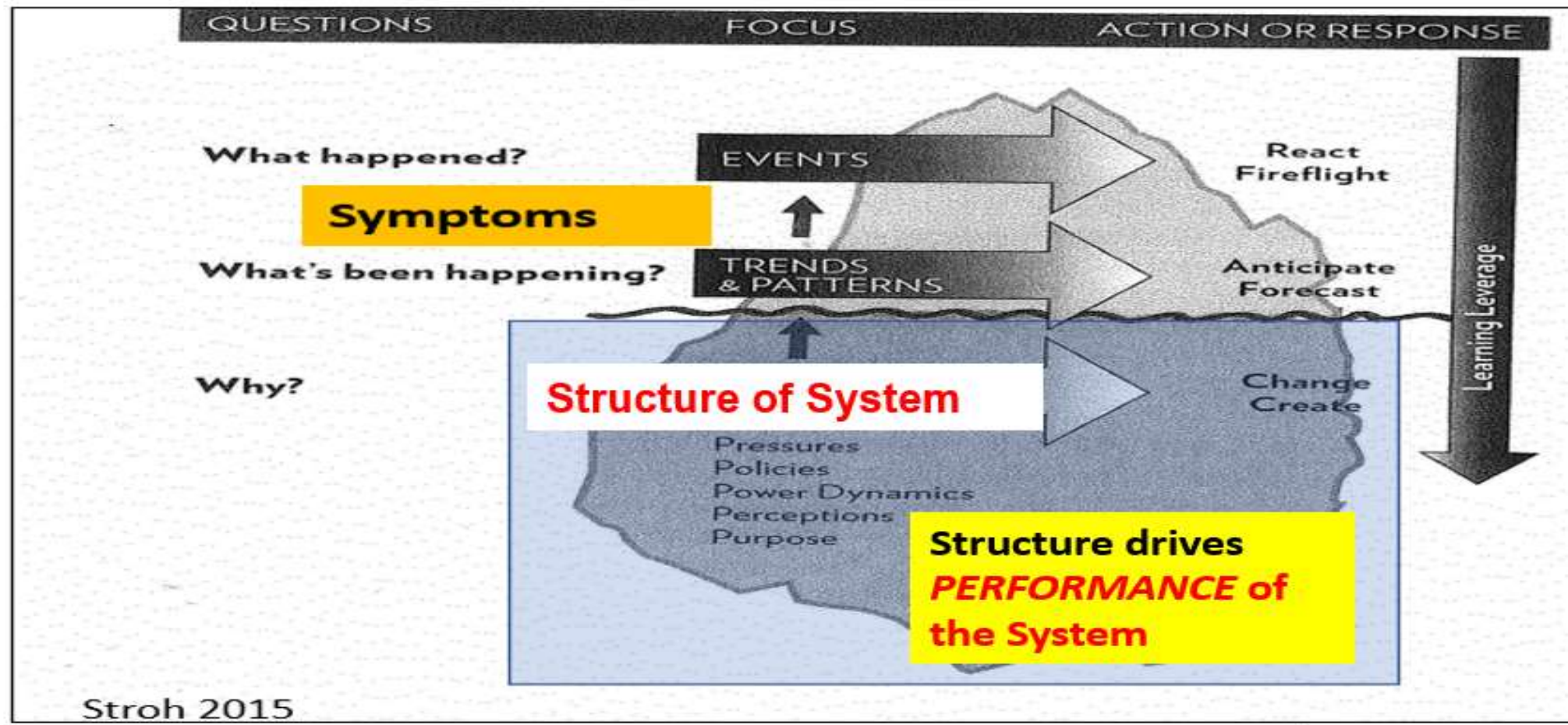


Workflow for Using as a LBM (living business model) during implementation



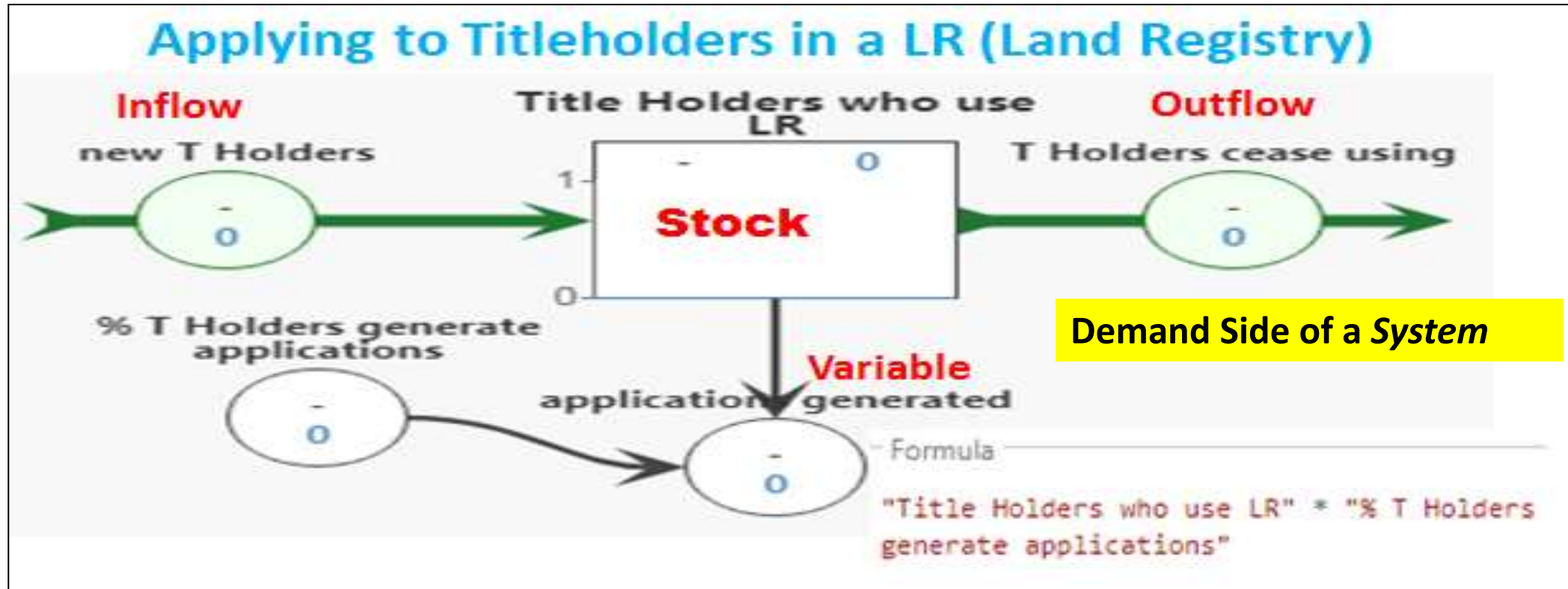
Why a **SYSTEMS** Approach?

The ICEBERG analogy



Stroh D (2015); Systems Thinking for Social Change, Chelsea Publishing, Vermont

SD uses Stocks & Flows



Simple



More complex

Simulation Examples in Orlando paper

1. Remove a Backlog - **1 Objective**
2. Increase Quality & financial sustainability - **5 Objectives**
3. Quality has subcomponents under the control of different Agencies
4. Raising Development Capital **IF banks accept Titles as collateral**

Other Examples in Lyons (2022)

- Addressing Informal Go Fast Fees
- Skills development, increasing capacity
- Options for IRPR (initial recording of property rights)
- Scaling up IRPR (under construction)

Full details in free e-book, *Land Administration: Improve Performance by Testing - A Strategy Dynamics Approach, Special Reference to Developing Economies*; Ken Lyons 2022.
<https://landadminsistemas.com>.

Applying the Workflow – in DESIGN – for Testing Proposed Improvements- simple example

Step 1 - **PIO** (Performance Improvement Objective)

Remove the backlog (with aid), & keep backlog low (post aid) i.e. be sustainable

Step 2 – **POT Graph of the PIO**



Schema of System to be Improved

Each PIP has its **Stock & Flow schema**,
an **Input & Effect** (on productivity)

PIPs

#5-Combine 2-4

#4-Increase staff skills

#3-Modify Laws (need
legislative approval)

#2-Improve Procedures
(CEO authority)

#1-Use Temp staff

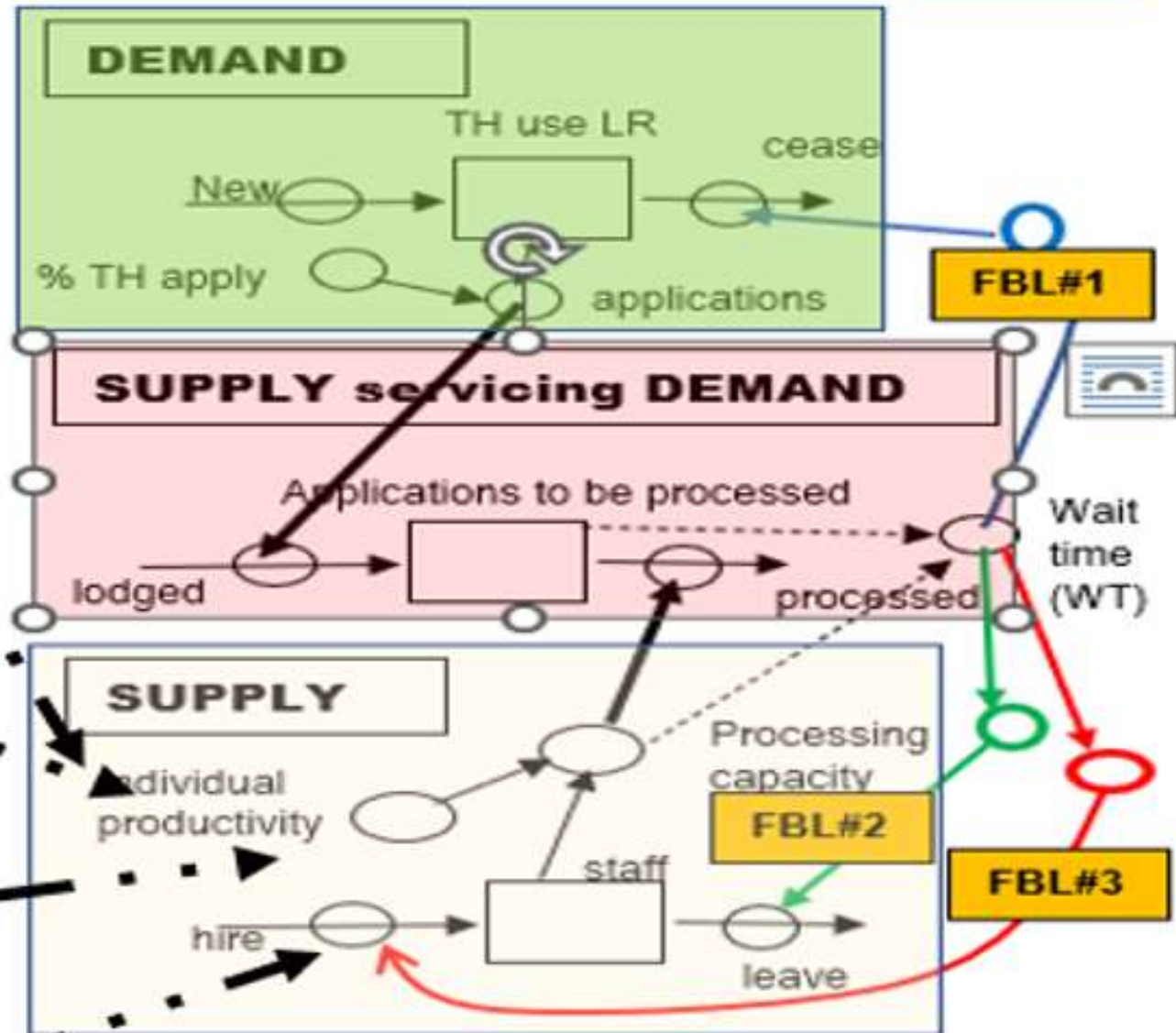
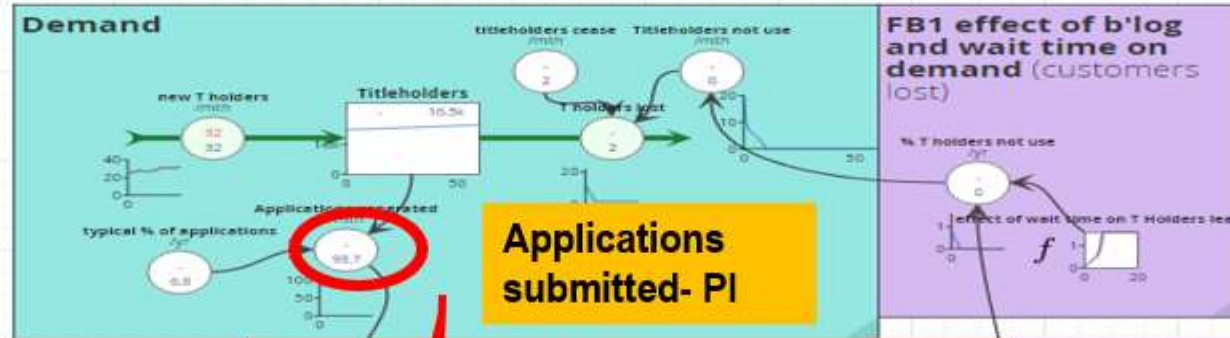




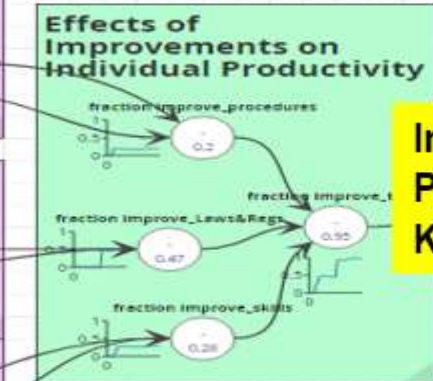
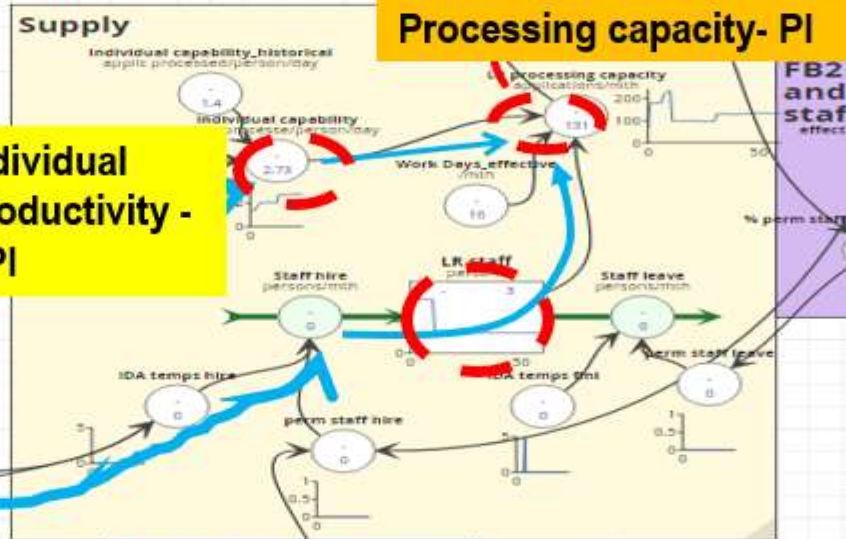
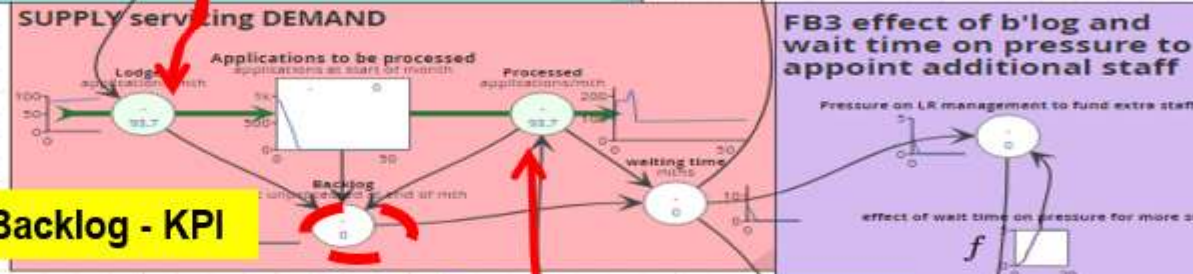
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Part of
THE SD Model



KPI/PI

KP - I Key Performance Indicator
PI - Performance Indicator



Individual Productivity - KPI

PTI #2 Improve procedures & workflows DG authority

enact improve_procedures

PTI #3 Improve Laws & Regs

enact improve Laws & Regs

PTI #4 Increase skills of LR staff

enact improve skills

PTI #1 Use temp processing staff

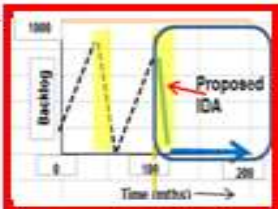
enact IDA temp hires

DECISION by Finance to fund a position

Decision (1) hire staff (0) not

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Results of Testing the PIPs for Effectiveness & Sustainability



**Backlog
(PIO - KPI)**

**Individual
Productivity
(KPI)**

Staff

**LR process
capacity**

**Applic lodged of LR
process capacity**

**PTI#1 Hire
Temps**



**PTI#2
Improve
procedures**



**PTI#3 Improve
Laws & Regs**



**PTI#4 Increase
staff skills**



**PTI#5 ALL
of above
combined**



Period of aid



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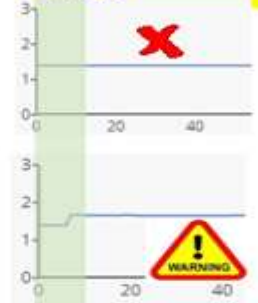
Fig 9

Results of Testing the PIPs for Effectiveness & Sustainability

Backlog (PIO - KPI)



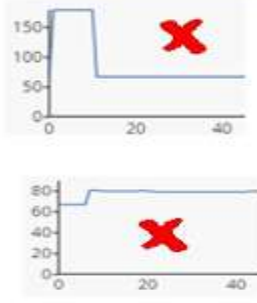
Individual Productivity (KPI)



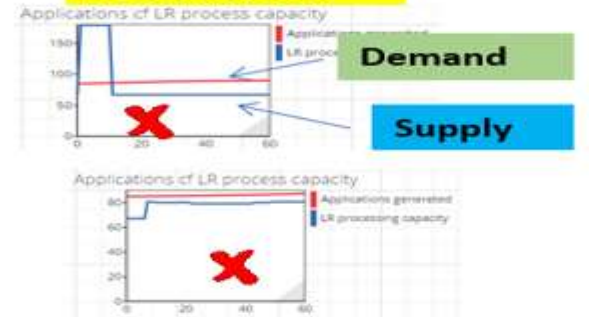
Staff



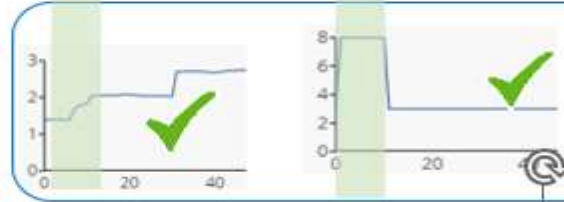
LR process capacity



Applic lodged of LR process capacity



PTI#5 ALL of above combined



Risks & What Ifs, Financials Not shown

Bench testing of proposals for improvement

Will provide great insights



Improvement Strategy (outline) – based on PTI5:

with Aid – 5 temps 10 mths clear backlog; 3 TA 6mths procedures, laws, skills; Agency executives engage with politicians to get laws modified

post Aid - executives engage with politicians until laws modified; monitor implementation



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Example#2 - Multiple Objectives in LR [Detail in Ch 9, Lyons 2022]

PIOs - Performance Improvement Objectives

1. Improve quality
2. Winback titleholders not using
3. Increase revenue
4. Achieve adequate budget - using a % of the increased revenue
5. Keep backlog low

POT Graphs of PIOs

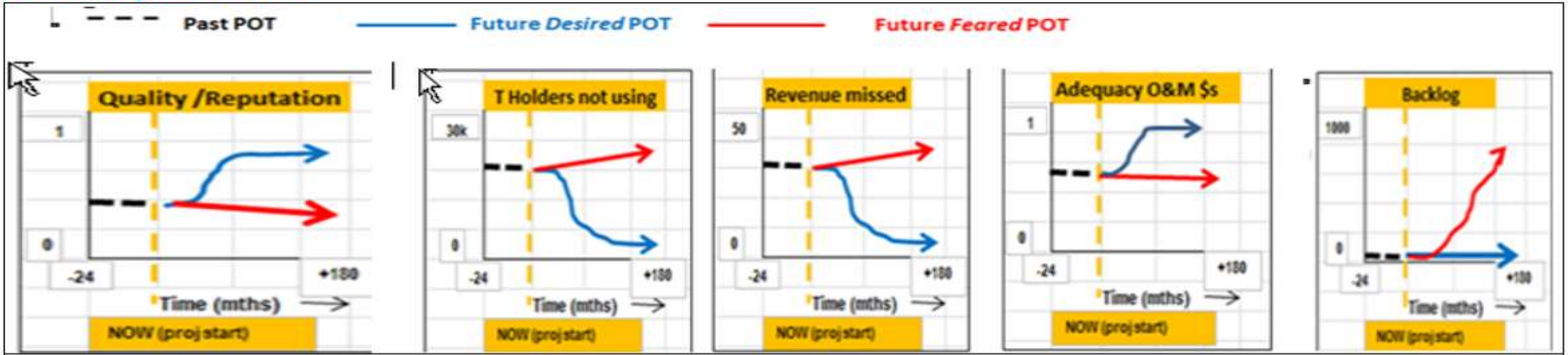




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Schema of *System to be Improved*

PIPs (Performance Improvement Proposals)

PIP2 – conduct winback

PIP3 – PIP1&2 concurrently

PIP4 – PIP3 but delay PIP2 until Reputation ~0.7

PIP1 – upgrade quality

PIP5 – PIP4 + % revenue to make budget adequate

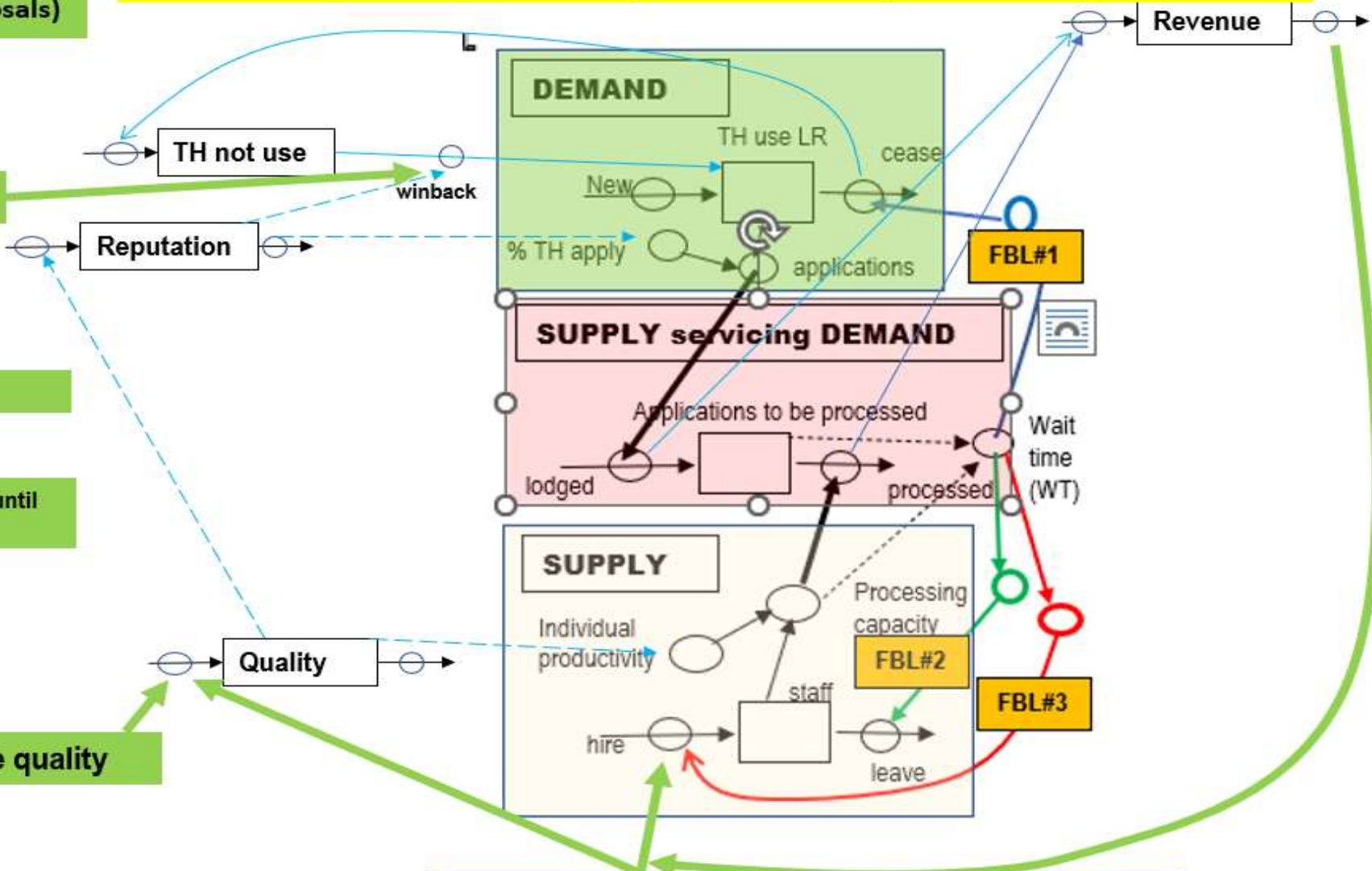
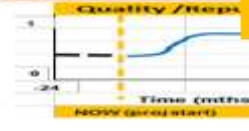




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POT graphs from "testing" each PIP for effectiveness and sustainability - 1st pass

DESIRED FUTURE



QUALITY



BACKLOG

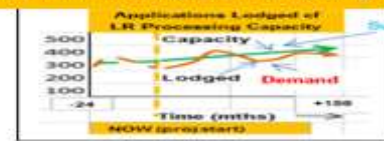


Tholders not use LR

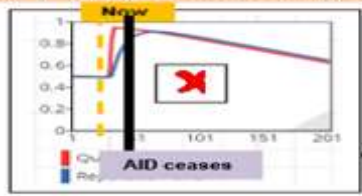


Revenue Missed

Applications lodged of Processing Capacity

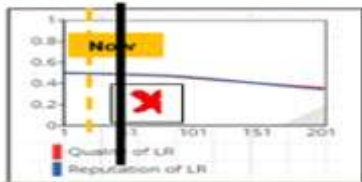


PIP 1- upgrade Quality ONLY



only

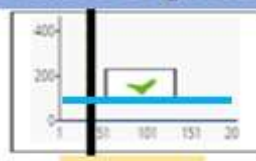
PIP 2- Winback ONLY



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



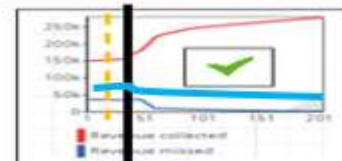
AID ceases



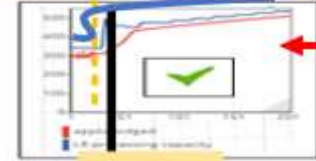
AID ceases



AID ceases



AID ceases



AID ceases

Now got a funding mechanism so that supply can meet demand & sustain quality

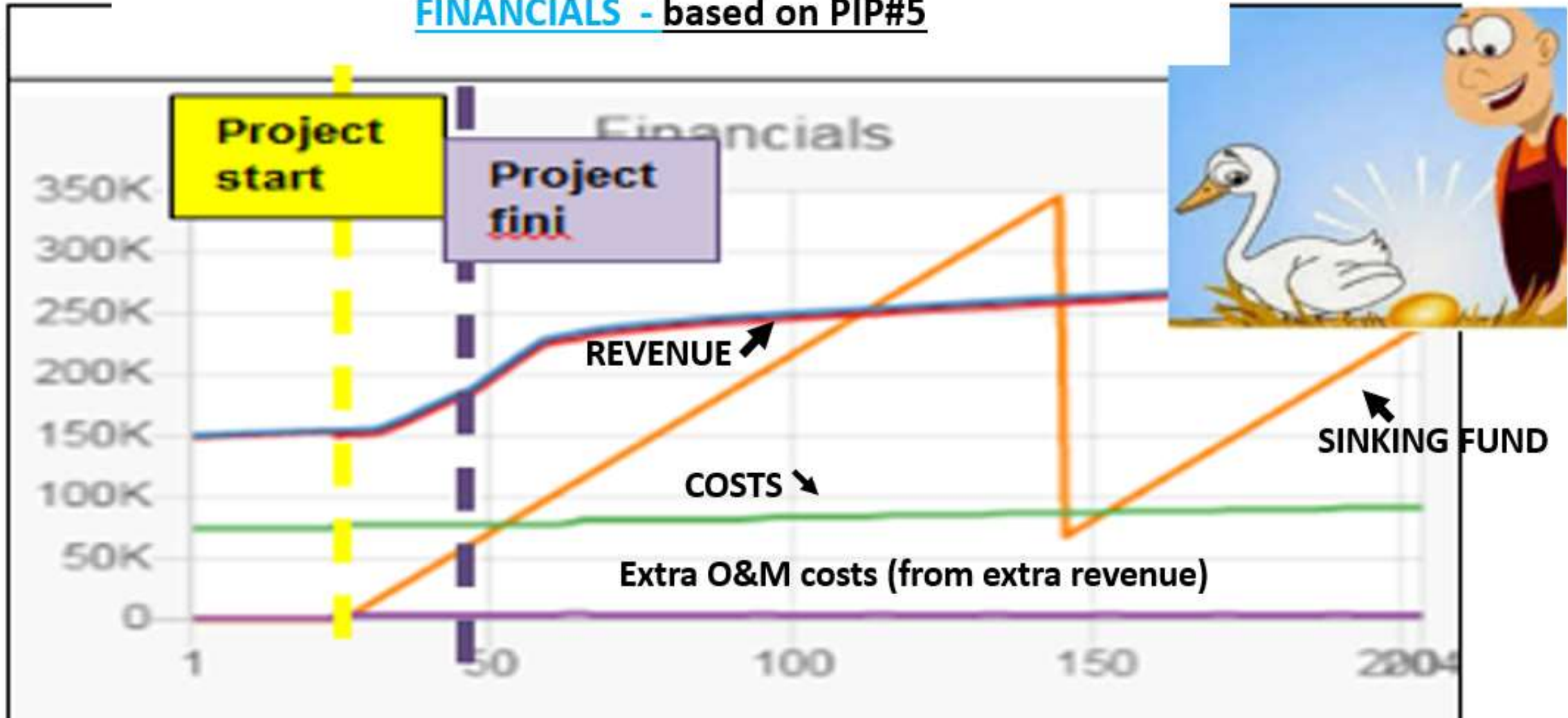
Improvement Strategy outline (based on PIP5) —

- **with AID:** use TAs, Staff (temporary and permanent) to:- upgrade quality; conduct winback; increase staff skills and productivity; gain agreement to retain some revenue.
- **post AID:** ensure budgets are adequate; maintain quality



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FINANCIALS - based on PIP#5



#3 - Upgrading Quality, where quality has subcomponents under the control of different Agencies [Detail in Ch 10, Lyons 2022]

Subcomponents

Internal to LR

Qual of Infrastructure

Qual of Services

Qual of Title records

Qual of Revenue collection

Integrity of operations

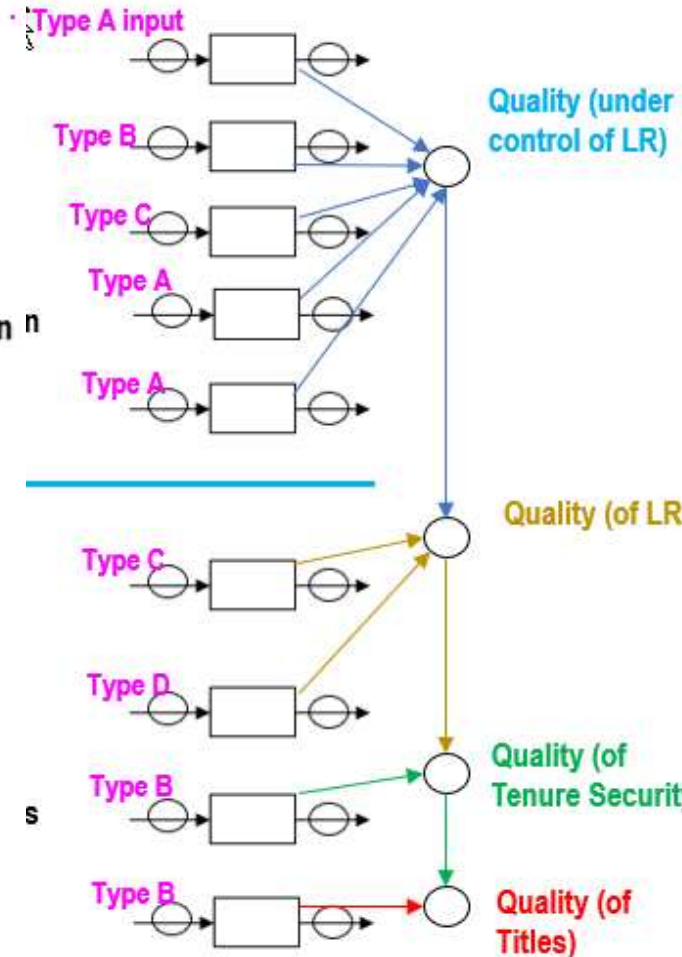
External to LR

Qual of Title boundaries
Survey Dept

Adequacy of Budgets
Finance Dept

Security of property rights
Justice Dept

Qual of Guarantee of Title
Justice Dept



Schema of system to be improved 2nd example

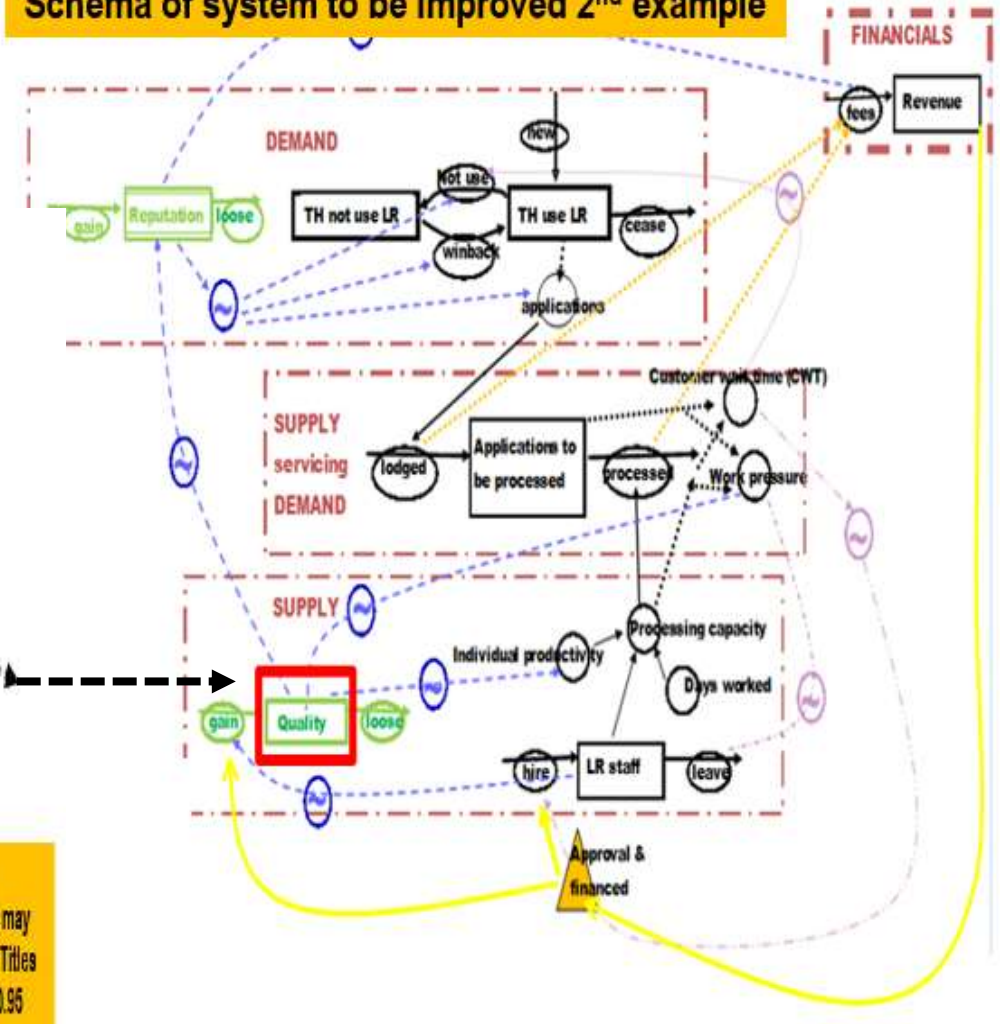




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Is necessary to be very clear on what the **AIM is** & **OUTCOME desired** from increasing Quality- **is it??**

SIMPLE



COMPLEX

Aim?	OUTCOME SOUGHT?
To increase quality in one subcomponent? (which one?)	for internal LR biz purposes?
To increase quality of some components? (which ones?)	to have “happier” customers?
To increase Quality (under control of LR) ?	to win back titleholders not currently using the LR?
To increase Quality (of LR) ?	To gain approval to use a small % of increased revenue to fund adequate O&M?
To increase Quality (Tenure Security)?	To have titles accepted as bestowing secure property rights?
To increase Quality of Titles?	To have Banks accept titles as collateral & hence raise development capital?

Different AIMS produce **different OUTCOMES** & require **different \$\$\$ & Time to Achieve**

Use **Simulation** model to **“explore & better understand”**

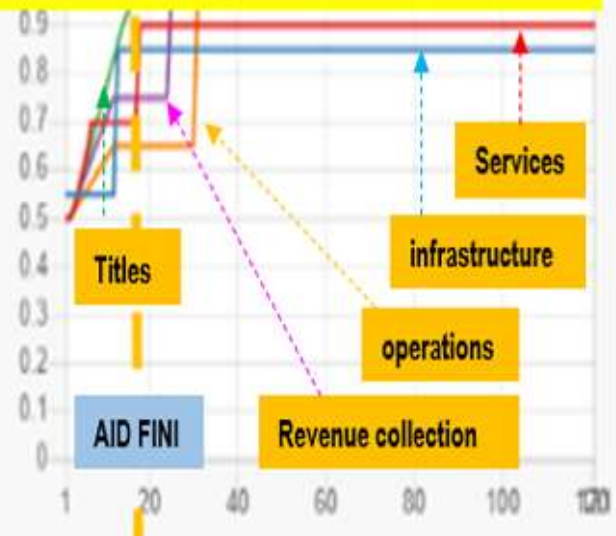
Scenarios to “explore” & “better understand”

Scenario	Agencies participating	% extra O&M from Finance
Continue AS IS – (Base Case)	LR (land Registry)	0%
Desired Future	All (LR; Survey; Finance; Justice)	100%
Feared Future	Nil (LR goes it alone)	0%
Justice not participate	LR; Survey; Finance	100%
Desired Future BUT delays doubled	All (LR; Survey; Finance; Justice)	100%
All Agencies join; extra O&M varies	All (LR; Survey; Finance; Justice)	% varies widely annually

Results from two Scenarios - Other Scenario results not shown here

Scenario #2 - DESIRED FUTURE

QUAL of subcomponents -u control of LR



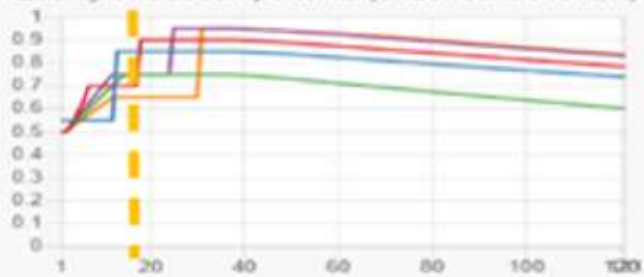
QUAL of subcomponents-external to LR

QUAL-calc as **min** of subcomponents

QUAL-calc as **average** of subcomponents

Scenario #3 - FEARED FUTURE

Quality of Subcomponents (under control of LR)



Take homes: **Need to be v clear on 1. outcome wanted; 2. \$s to upgrade once off; 3. \$s & HOW will be sustained**

#4 -the quantum of development capital that might be raised, IF banks accept *Titles as Collateral*

Scenarios parameters

- Banks do NOT accept titles as collateral
- V High Quality of titles maintained
 - **Different**:- bank lending policies; foreclosure rates, loan take up rates by titleholders; increase in titleholders (initial registration)
- **Quality of titles falls & banks stop lending**

Scenario results shown in paper

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How Simulation Adds Value

1. **Gives insights-** not available from other means
 2. **Enhances stakeholder buy in-** shows *what* is to happen, *how* & by *when*
 3. **Allows Testing** before investing
 4. **Examines sustainability post aid** -Extends timeframes
- **Is quantitative;** no implicit assumptions; handles indirect cause & effect
 - **All aspects in a single model;** any change is immediately reflected.
 - **Also use models** in- project appraisal, M&E, reviews
 - **Can incorporate pathways** of FELA & FFP
 - **Use model parts elsewhere-** in other situations.

To Take the SD Approach for Land Admin Further

- **Form a interest group** -part of FIG Commission 7 activities?
[include a Uni with postgrads & strong interest in LA in developing economies]
- **Develop an online/hybrid course** to provide **simulation/SD knowledge and skills**
- **Apply** the SD approach to some **past and current LA projects and evaluate**

FINAL THOUGHTS

- **SIMULATION USED ELSEWHERE to TEST BIZ PLANS, WHY NOT in LAND ADMIN?**
- **Would close a CAPABILITY GAP & be a New Tool in LA Toolbox**

Thank You - Questions

Ken Lyons kenlyonsspatial@gmail.com

Full details in e-book, *Land Administration: Improve Performance by Testing - A Strategy Dynamics Approach, Special Reference to Developing Economies*; Ken Lyons 2022. <https://landadminsystems.com>.