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TOC-Mining
- the core problem

Dr. Rudy Phillis, Harmony Gold, South Africa

22 May 2014

Rudy Phillis

Brief bio

Rudy has 14 years TOC experience. His Jonah Programme resulted in a business plan which served him well for a decade as a TOC Entrepreneur, servicing the RSA Mining Industry. Services included; Mining Construction & Management Consulting within the Gold, Platinum & Coal sectors. Rudy built capacity of some 350 TOC staff at various levels of competency; facilitated through the adoption of TOC as its single, overall management philosophy.

Currently, Rudy works as a Mine Manager for Harmony Gold's Masimong Mine; a deep level (+2000m), underground gold mine, with a compliment of some 3000 employees.

In 2006, Rudy obtained a PhD based on; *f*(TOC, Mining Engineering, and Postmodernism). He is a TOC Implementation Expert and continues to working on his aspiration of making "TOC the Main [Mining] Way".

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Content

My Mission: Make TOC-Mining the main way

Background & Scope

- Anglo-American Platinum
- Impala Platinum
- Harmony Gold – Masimong

TOC-Mining Practice

- Way Forward

Introduction

- Eli Goldratt: Make TOC the main way
- Rudy Phillis: Make TOC-Mining the main way
  - Private capacity
  - Lessons learnt;
    - TOC-Mining induction (individuals)
    - TOC-Mining interventions
    - Endeavours to institutionalise TOC-Mining
- Like all good solutions, TOC-Mining does not sell itself

Anglo-American Platinum

Core conflict cloud

Problems and Dilemmas

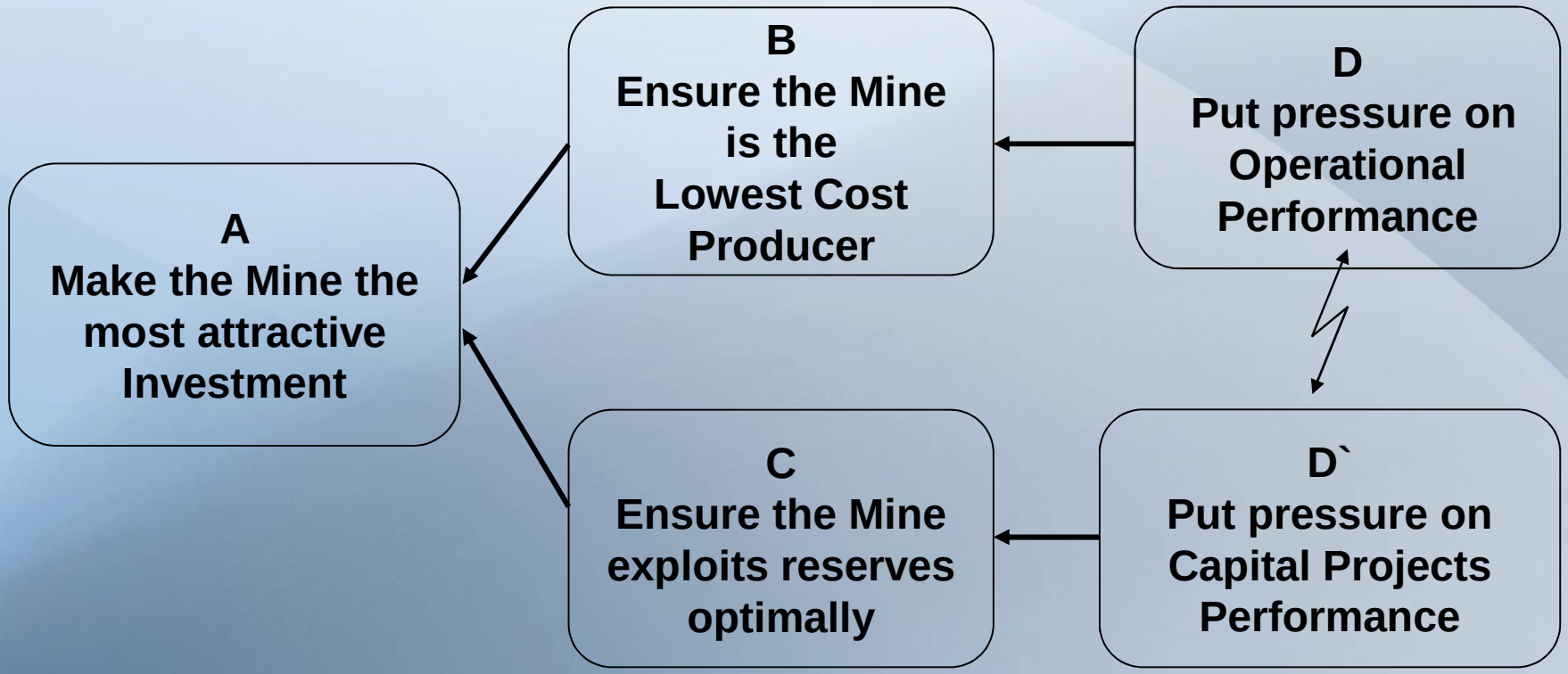
Source: A PhD Case Study

Each mine competes for internal investment and hence needs to appeal to the Anglo-American (London).

Key Entities from the Current Reality

- Mines 'Perception of Value' (POV) is determined by being in the lowest Cost Quartile
- Investors enjoy optimum Return on Assets (ROA)
- Mostly, mines do not sustain good production performances
- Mostly, mines do not deliver on planned production (Annually)
- Most projects do not deliver on promised ROA
- Most mines are in the 3rd & 4th Cost Quartiles

Core Conflict Cloud



Corporate Investment Issues

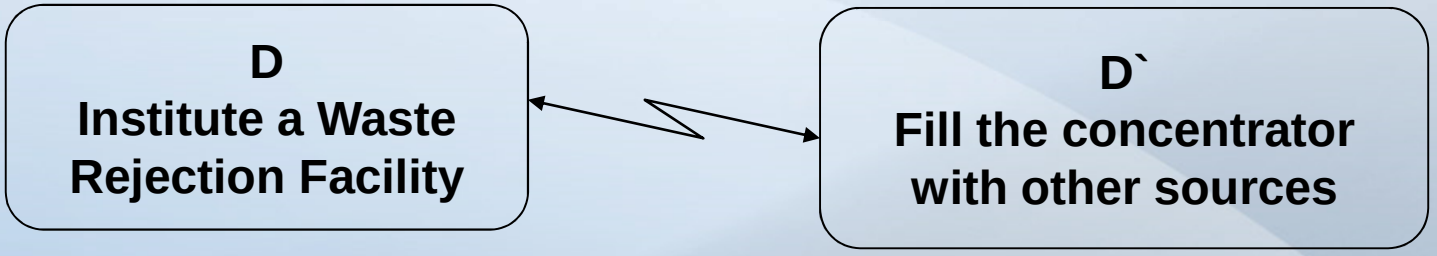
D
Sub-divide the Mineral Resource into Phased Investment Proposals

D`
Conduct Holistic Investment Proposals for Mineral Resources

Supporting Arguments:

- Reduce uncertainty for unproven reserves
- Capital constraint
- Make quick local return on investment as measured by IRR/ NPV
- Evaluate optimal mining infrastructure (e.g.: Ventilation, Water Handling, etc.)
- Reduce rescheduling

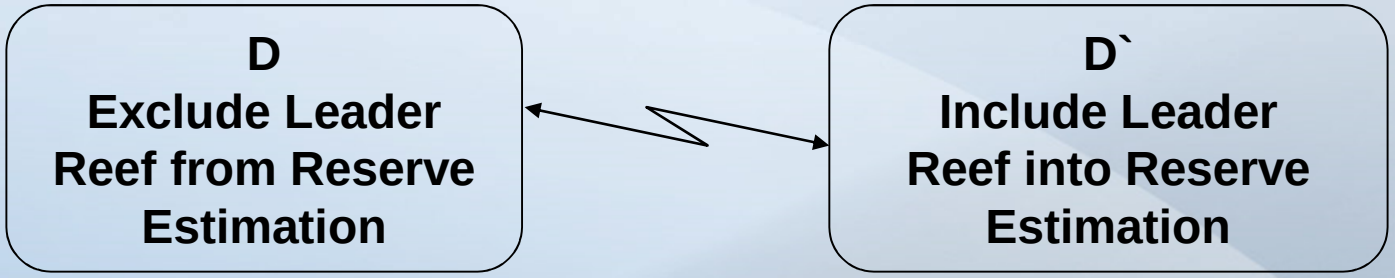
Logistics Issues



Supporting Arguments:

- The Mine will increase grade to meet original investment returns
- Significantly improve costs as measured by R/ounce
- The mine does not have the capacity to meet concentrator ROI
- The concentrator must generate its own revenue – "Profit Centre"

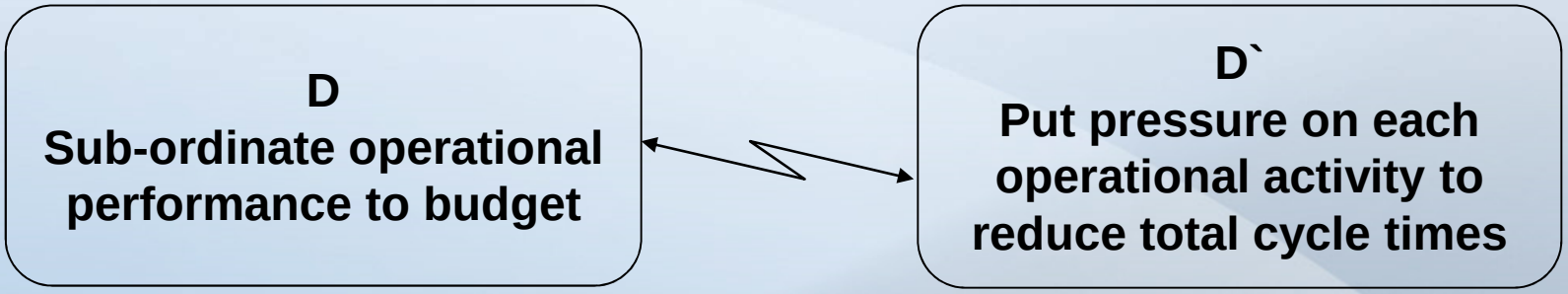
Geology Conflict



Supporting Arguments:

- Reduce costs of treating Waste Rock that is on either side of reef
- Reduce costs of Transporting Waste Rock
- Reduce Costs of Mining Waste Rock
- Leader reef is part of original grade calculation / mine evaluation
- Leader reef mining results in better ground conditions

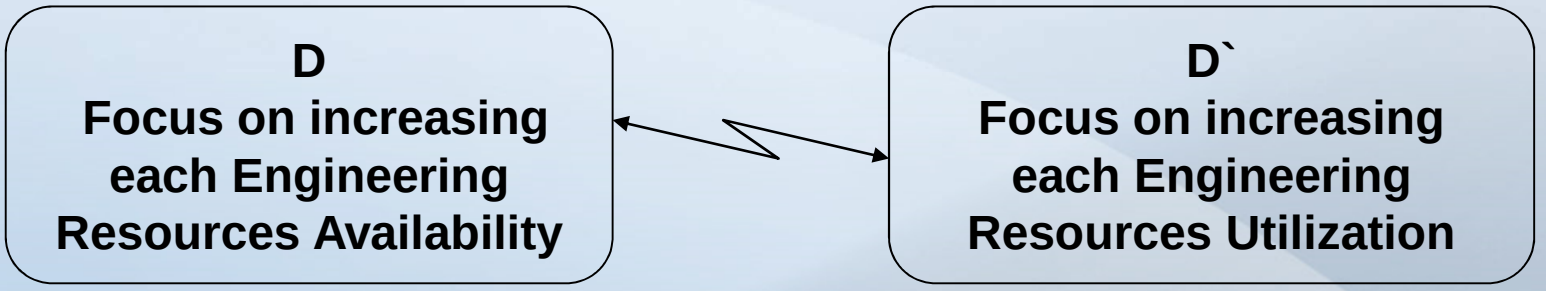
Production Dilemma



Supporting Arguments:

- Need to stay prepared to reduce costs when market price suddenly changes
- Budgeted expenditure encourages reduced spending in line with Budget tonnages
- Sum of optimized local utilizations will increase Tonnage production
- A resource standing idle is a major waste

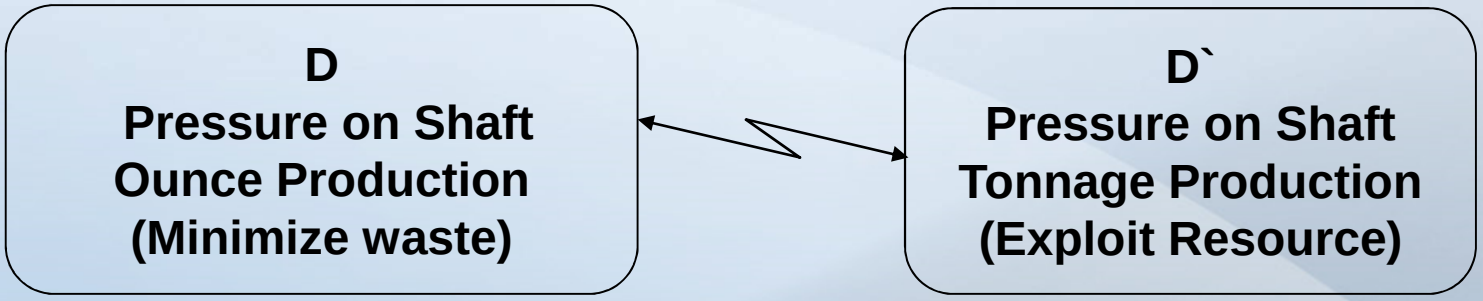
Engineering Dilemma



Supporting Arguments:

- Reduce Overtime Cost
- Reduce cost of Inventories
- Reduce Costs of Damages
- Sum of optimized local utilizations will increase Tonnage production
- A resource standing idle is a major waste

Planning Conflict



Supporting Arguments:

- Mine Platinum, not Volumes
- No external limitations
- Enjoy unprecedented pricing

Specialist Functions Issues

D
Specialists experience pressure to reduce estimate "Safeties"

D`
Specialists experience pressure to increase estimate "Safeties"

Supporting Arguments:

- Benchmarking reveals excessive over-estimations
- No external limitations
- Enjoy unprecedented pricing

Impala Platinum
Core conflict cloud
Problems and Dilemmas

Institutionalising TOC
Executives vs. Mine Management

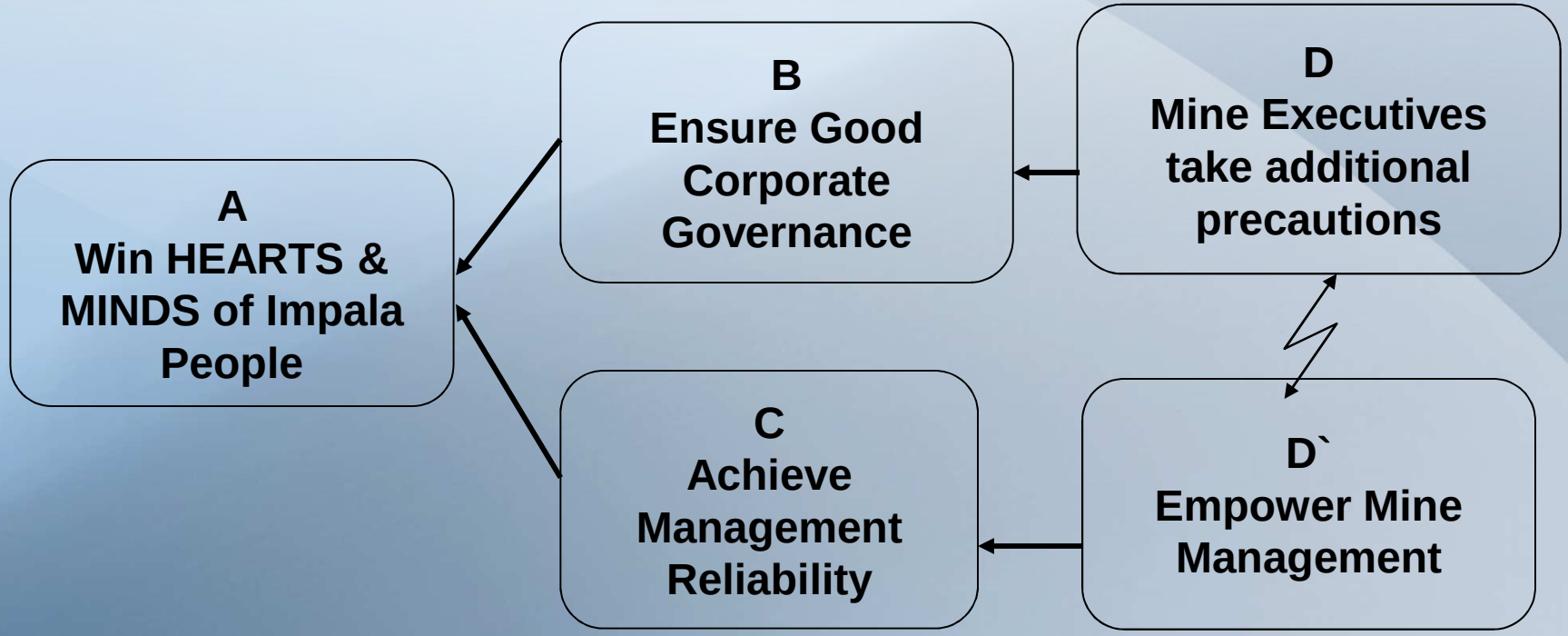
Key Entities from the Current Reality

- **Impala average performance = 17m/month**
  - *Platinum industry average = 12m/month*
  - *Impala management are very capable*
- **Concern: Performance plateau / regression**
- Goal: Increased overall annual Productivity by at least **1m/month = +R 1 billion in Sales**
  - *FY 2006 : Sales = R 17Bn : Face Advance = 17m*
  - *FY2007: Sales = R 31Bn : Face Advance = 16m, therefore 1m = R 2Bn*
- Focus: Improve performance at Face

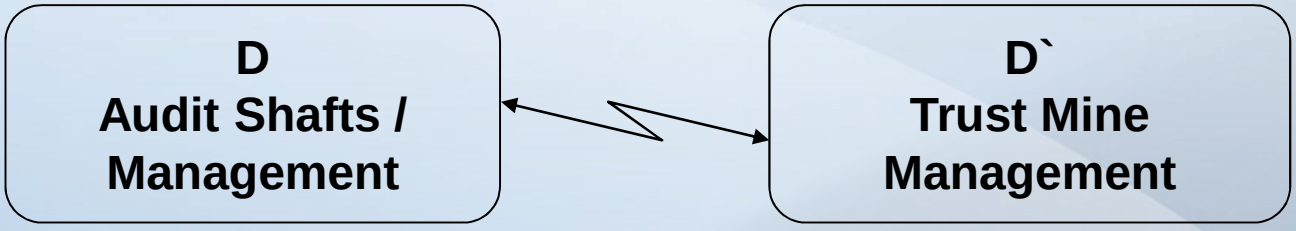
Key Entities from the Current Reality

- **Good Corporate Citizenship ("License to practice")**
  - Investor Confidence
  - Employee Pride
  - Ongoing Improvement
- **Mine Executives accountability to Investors**
  - General under-achievement of Operations
  - Executives must manage risk proactively
- **Mine Management responsibility for delivery**
  - Management prerogative to resolve daily issues
  - Authority to respond quickly is centralized (disempowerment)

Core Conflict Cloud



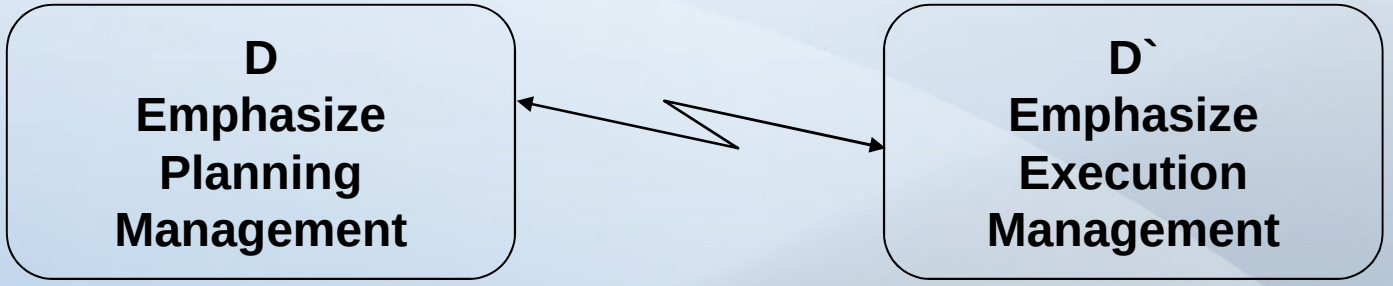
Trust Dilemma



Supporting Arguments:

- Despite numerous interventions & controls there are still major SURPRISES of major non-conformance / non-compliance
- General under-achievement production plans
- Mine managers are responsible via legal appointment
- Ambition – Mine managers are reliable
- Promotion of Mine management Self Esteem / Ego is good motivation

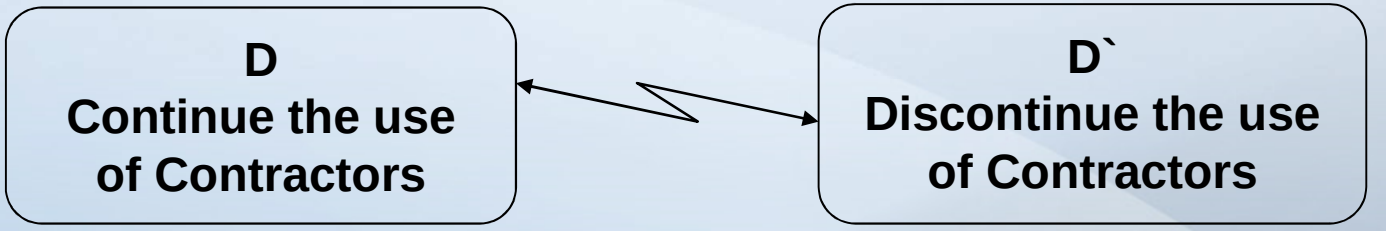
Planning Dilemma



Supporting Arguments:

- Planning reduces uncertainty inherent in long-term commitments
- General under-achievement
- Murphy is increasingly active when a plan becomes dynamic – during execution
- Management only knows of misestimating, in hind-sight
- Generally, there is poor response times to problems

Contractor Conflict



Supporting Arguments:

- Shortage of Operational Flexibility
- Contractors can move in /out of organization without Labour Issues
- Insufficient capacity for permanent employment of Specialist Competencies
- Under-achievement of due-date-performance
- Contractor unreliability (Liquidity, Poor HRM)
- Contractor conflict of interest
- Poor response to client concerns

Harmony Gold
Core conflict cloud
Problems and Dilemmas

“Story telling vs. Clock building”

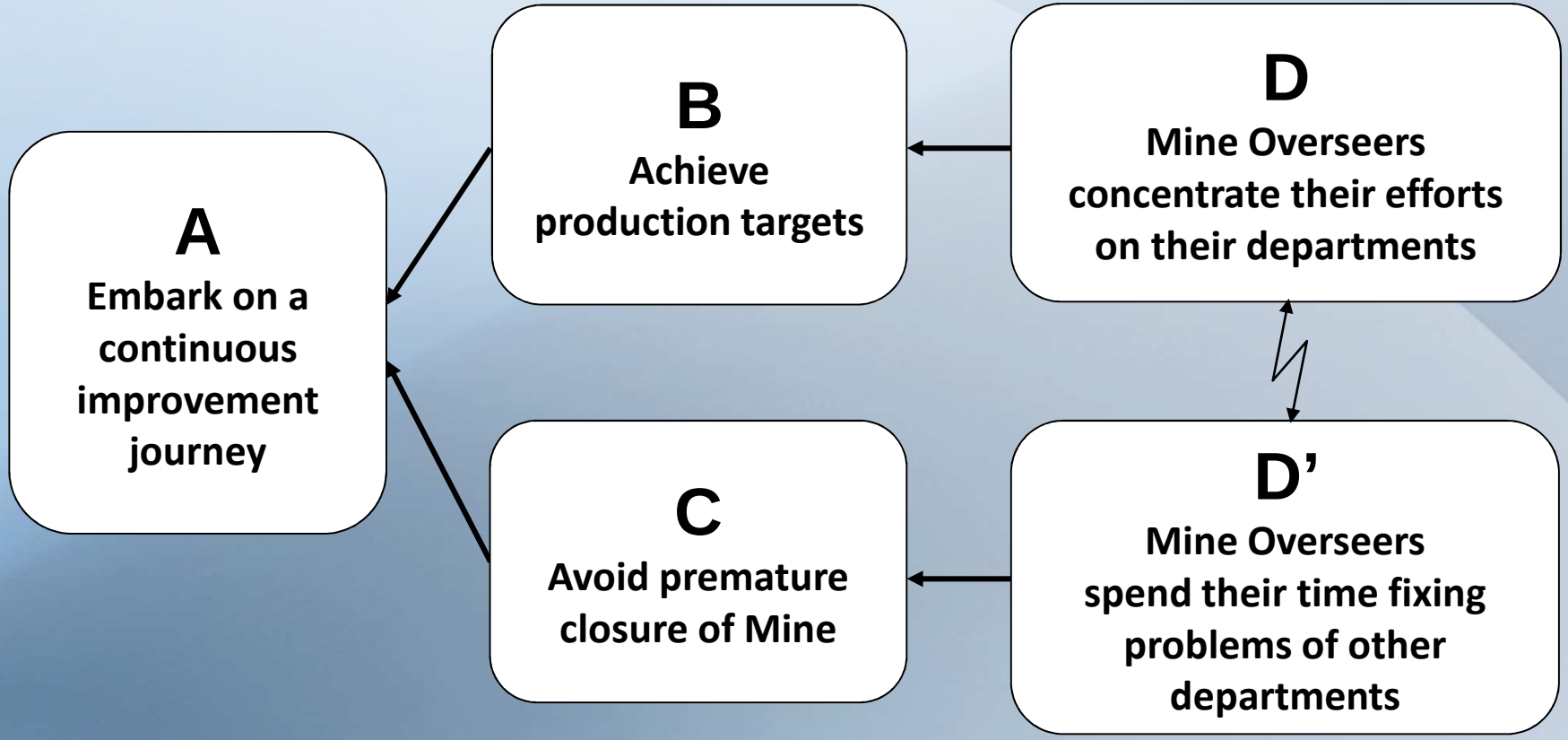
Mine Managers vs. Mine Overseers

Steady state mine expected to continue contribution to group Profitability & Market Capitalisation

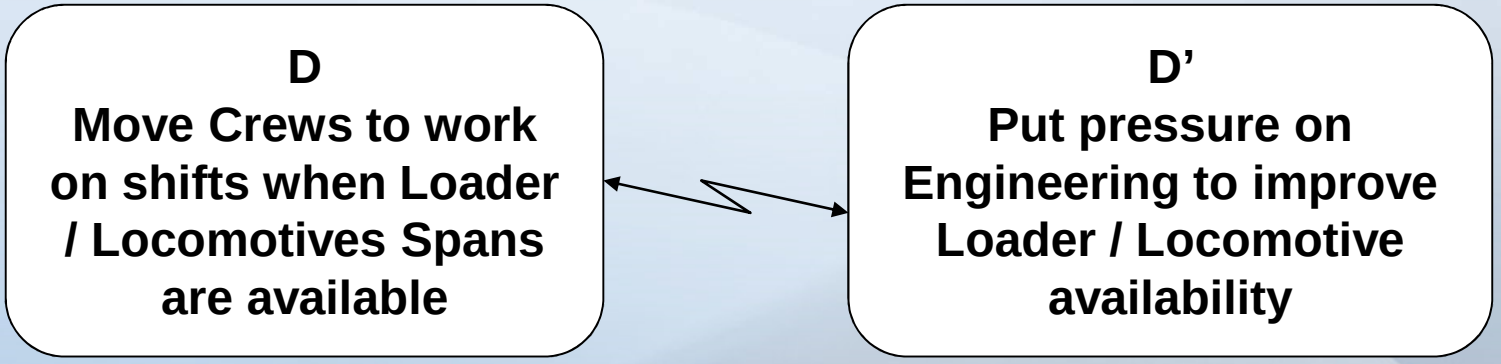
Key Entities from the Current Reality

- Mine is not delivering promised profits
- Mine environmental factors have changed; Price and R:$ exchange
- Mines at risk of premature closure / sale
- Extreme Pressure to improve production & grade
- Mine Overseers do not successfully manage production limitations (Labour, Material, Equipment, Equipping, etc.)
- Manages espouse servant leadership, but don't really know how to help

MINING – Core Conflict Cloud



Development - Conflict



Supporting Arguments:

- Often, Loaders / Locomotive Spans are not available during Development cleaning shifts when Crews are available
- Sometimes, there is compressed air short supply for Development
- Loaders / Locomotives availability is too low
- Planned maintenance does not result in improve reliability
- Get assistance from Engineering management, due to poor services lower in ranks

Stoping Conflict

D
Mine Overseers are under pressure to improve blast - frequency & - advance

D'
Mine Overseers are under pressure to improve many aspects of the mine simultaneously

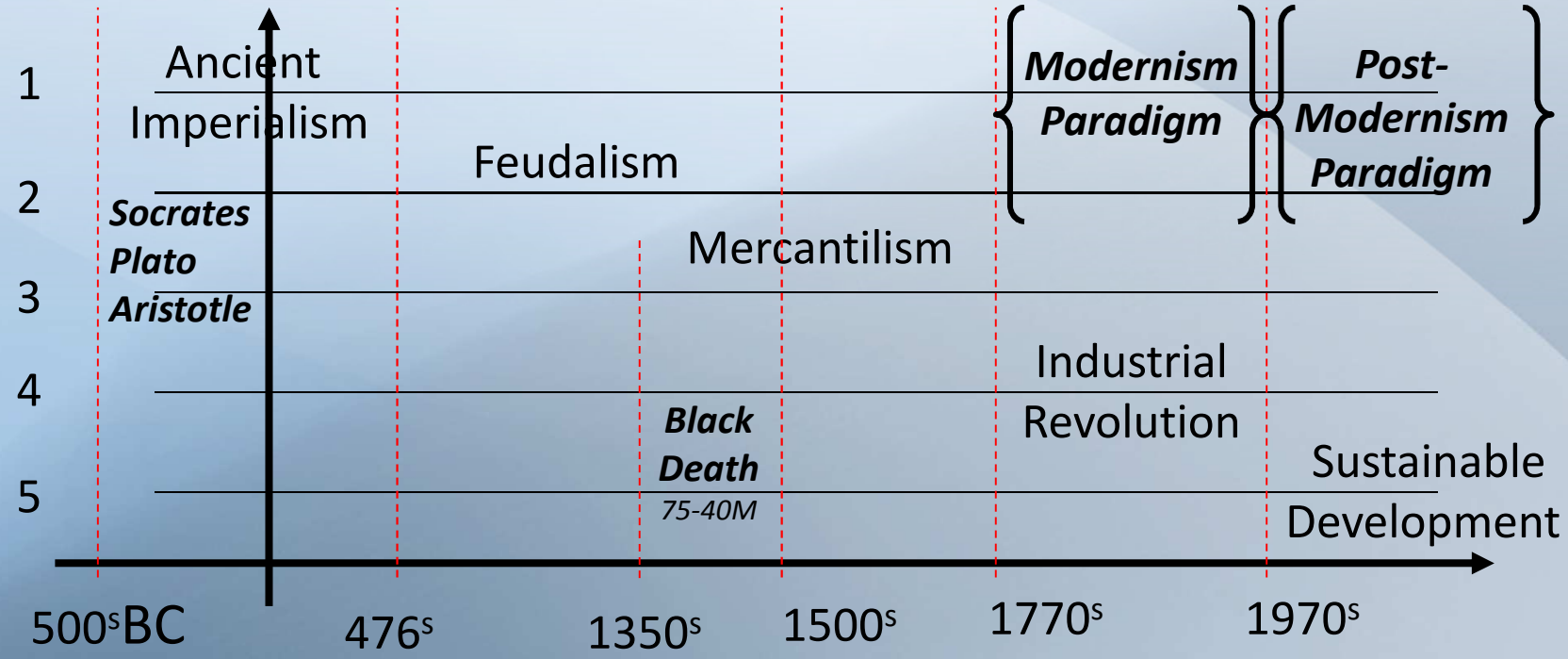
Supporting Arguments:

- Often, Mine overseers under-achieve on the blast frequency & face advance in accordance with the Face Length (F/L) manned
- Mine overseers don't have F/L flexibility for Crews whose panels are suddenly stopped due to adverse Geology or otherwise
- Mine overseer bonuses are heavily weighted on production
- Safety indicators are trending poorly – major risk
- Grade is below plan – Cleaning & Sweeping is sub-optimal
- Volumes are too low – blasting under performance
- Labour availability is too low
- Safety & Quality bonuses do not generate the desired behaviour

The TOC-Mining Core Problem

- TOC should not be **optional**; without it Managers condemn their mines / their careers
  - "Survival is not mandatory" [Deming]
- Mining Core Problem
  - Policy Failure: TOC the overall management philosophy
    - Institutions (ECSA, SAIMM, AMMSA, IOD, etc.)
    - Mostly, Managers do not apply a TOC **systems approach / holistic approach** to mining
    - Mismanagement of **Conflicts**, Dialectics & Rhetoric
    - Mastery of the **"fire-fighting" modus operandi**
    - Over-reliance on the person vs. the process

Recall: Historical Review (*…not a passing fancy*)



Ref.: Prof. Blignaut – University of Pretoria

The Way Forward

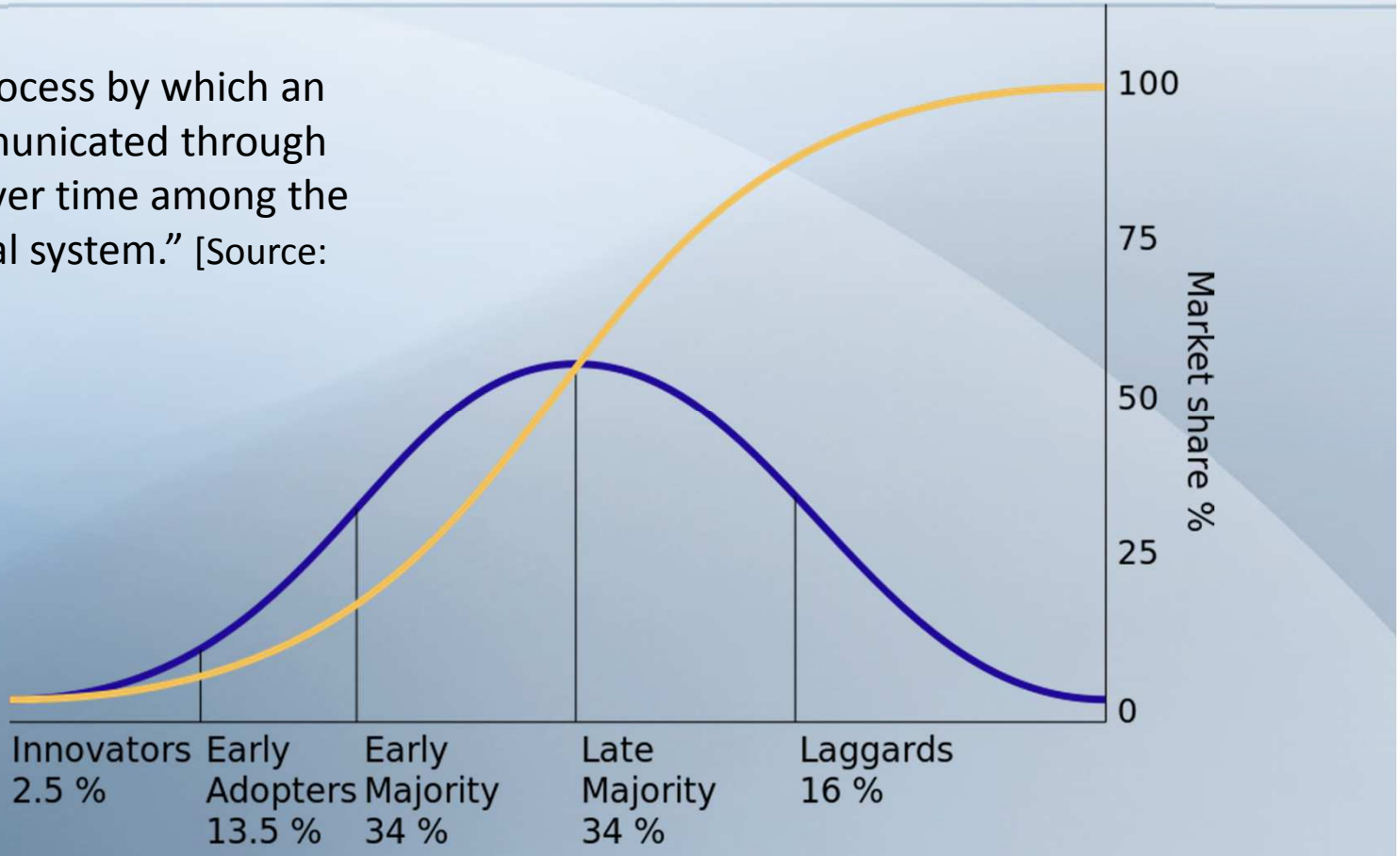
Quo Vadis

Considerations

- My new COO & new GM: Pro - Constraints Management
- Cross the Chasm: Mining Reality & TOC Starting Point
  - From a rudimentary level to POOGI … in 2 years
- Paradigm shift / Change of Comfort Zones **[The Choice]**
  - Change the Strategy, Buffer for Success, Up scale **[TOC Mining]**
- Arm ourselves with the 'Art of Rhetoric' **[Aristotle]**
  - Rhetoric: Art of persuasion
  - Dialectic (counterpart of Rhetoric) **[One from Many]**
- Market Segmentation
  - "Good Sense, Good Moral Character, Goodwill" **[Art of Rhetoric]**
  - "Right people, right seats, right bus; wrong one off" **[Good to Great]**
  - Diffusion of innovations **[Everett Rogers]**

Diffusion of innovations

"Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system." [Source: Wikipedia]



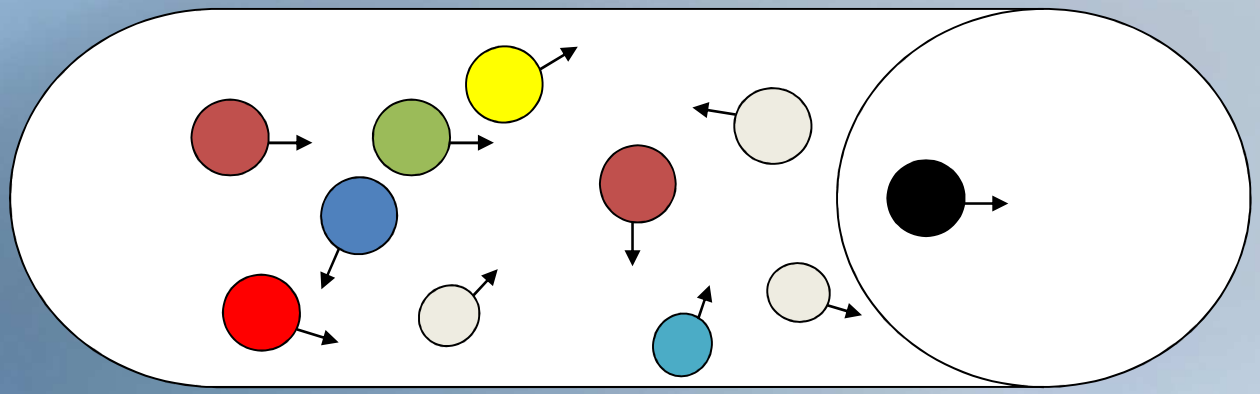
"The diffusion of innovations according to Everett Rogers. With successive groups of consumers adopting the new technology (shown in blue), its market share (yellow) will eventually reach the saturation level. In mathematics the S curve is known as the logistic function." [Source: Wikipedia]

Recall: Local Optima

*"**Adam Smith** (Philosopher: 1723-1790)*

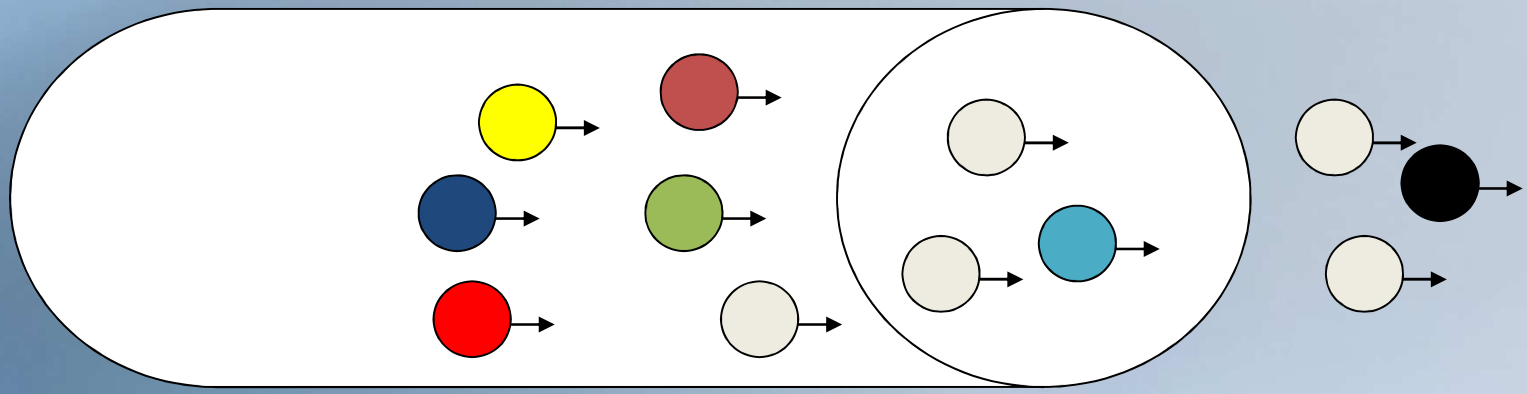
- *"Father of Modern Economics":*

"IN COMPETITION, INDIVIDUAL AMBITION SERVES THE COMMON GOAL - EVERY MAN FOR HIMSELF ... "

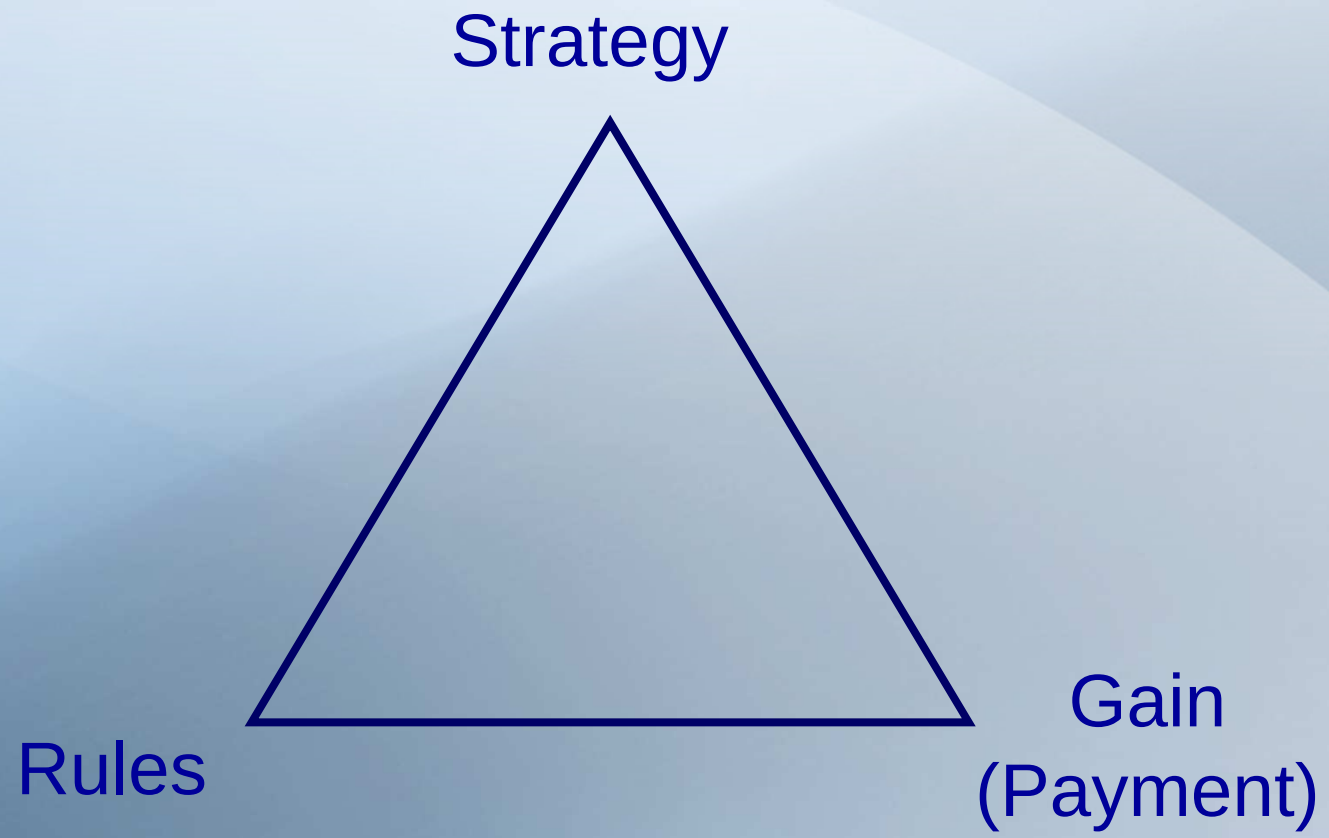


Recall: Global Optima

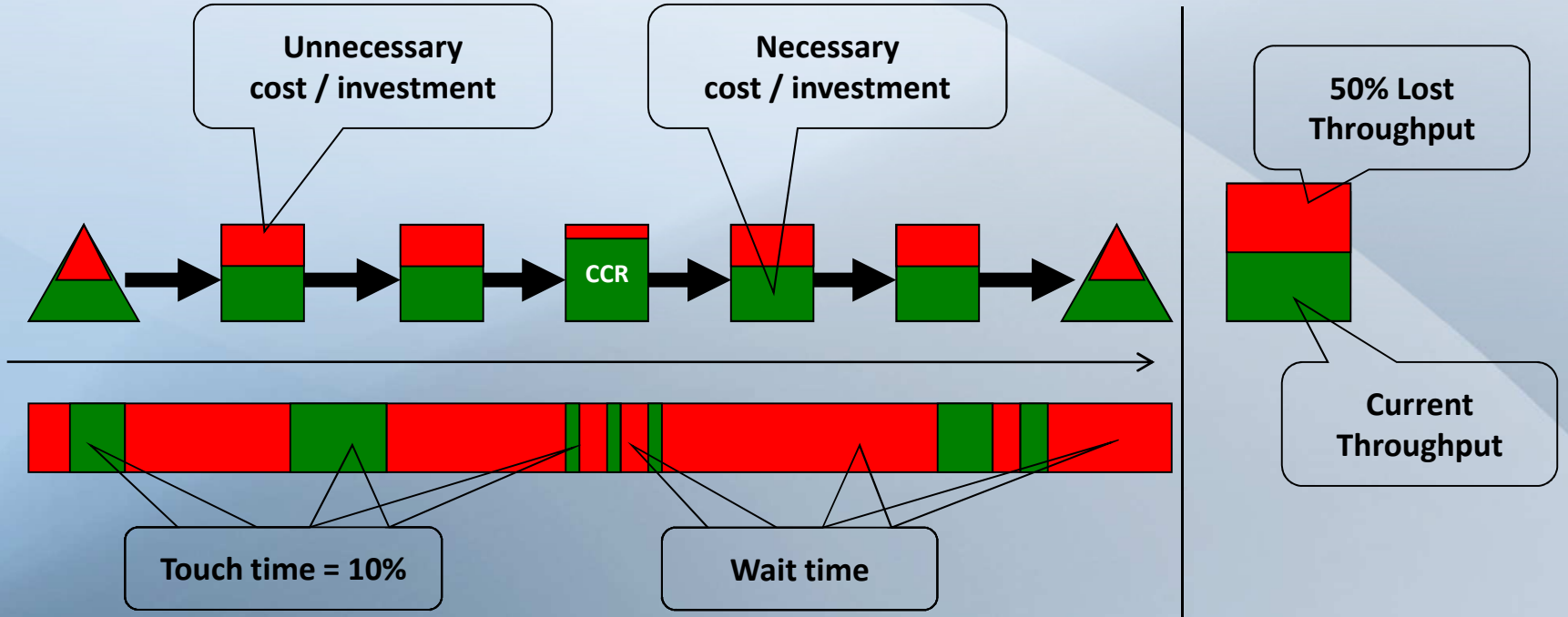
- "***John Nash*** *(1994 Noble Prize winner for economics)*
  - ***Nash Equilibrium:***
    "A solution that maximises everyone's benefit"



Nash Equilibrium

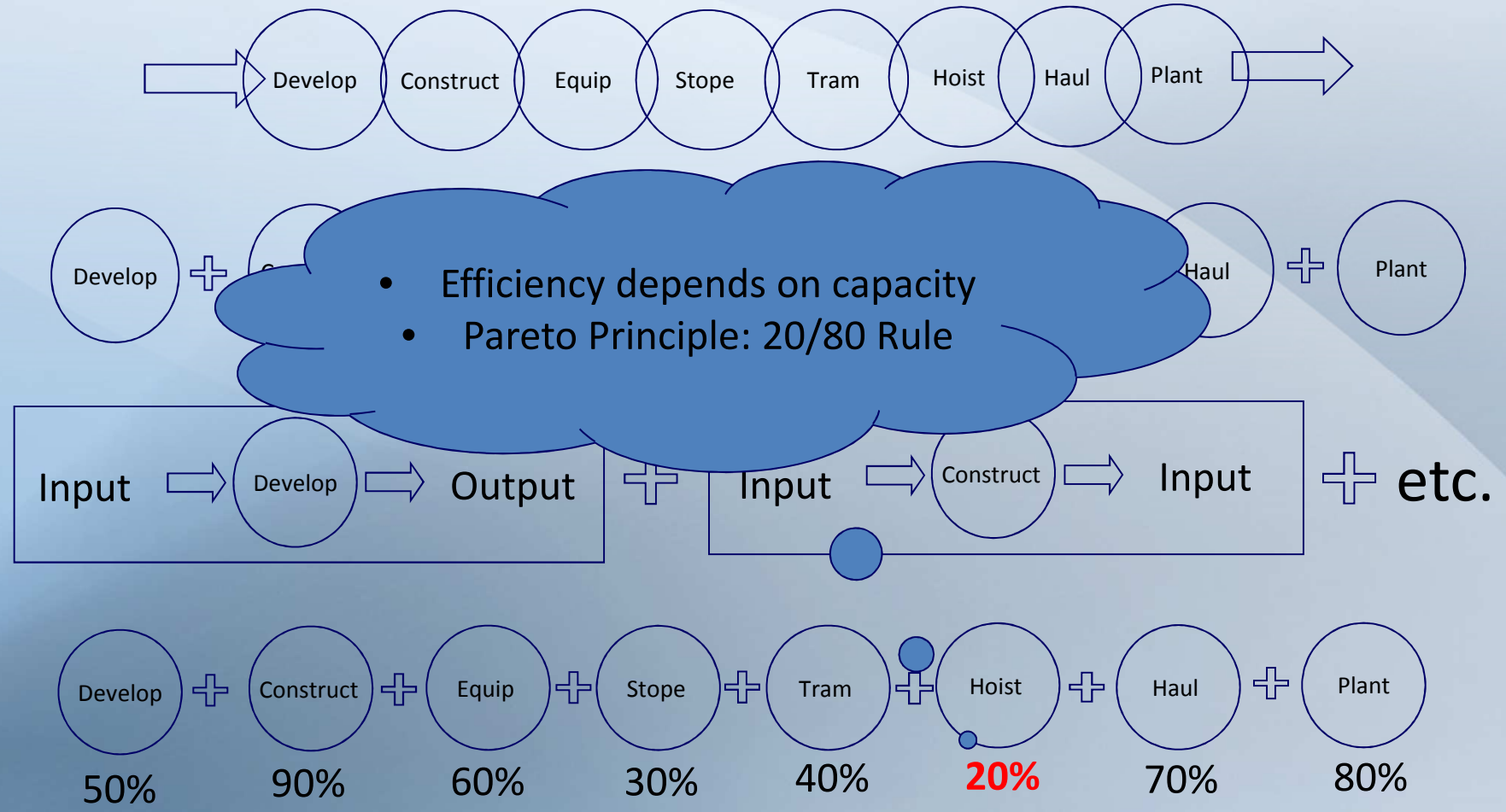


Potential Gains

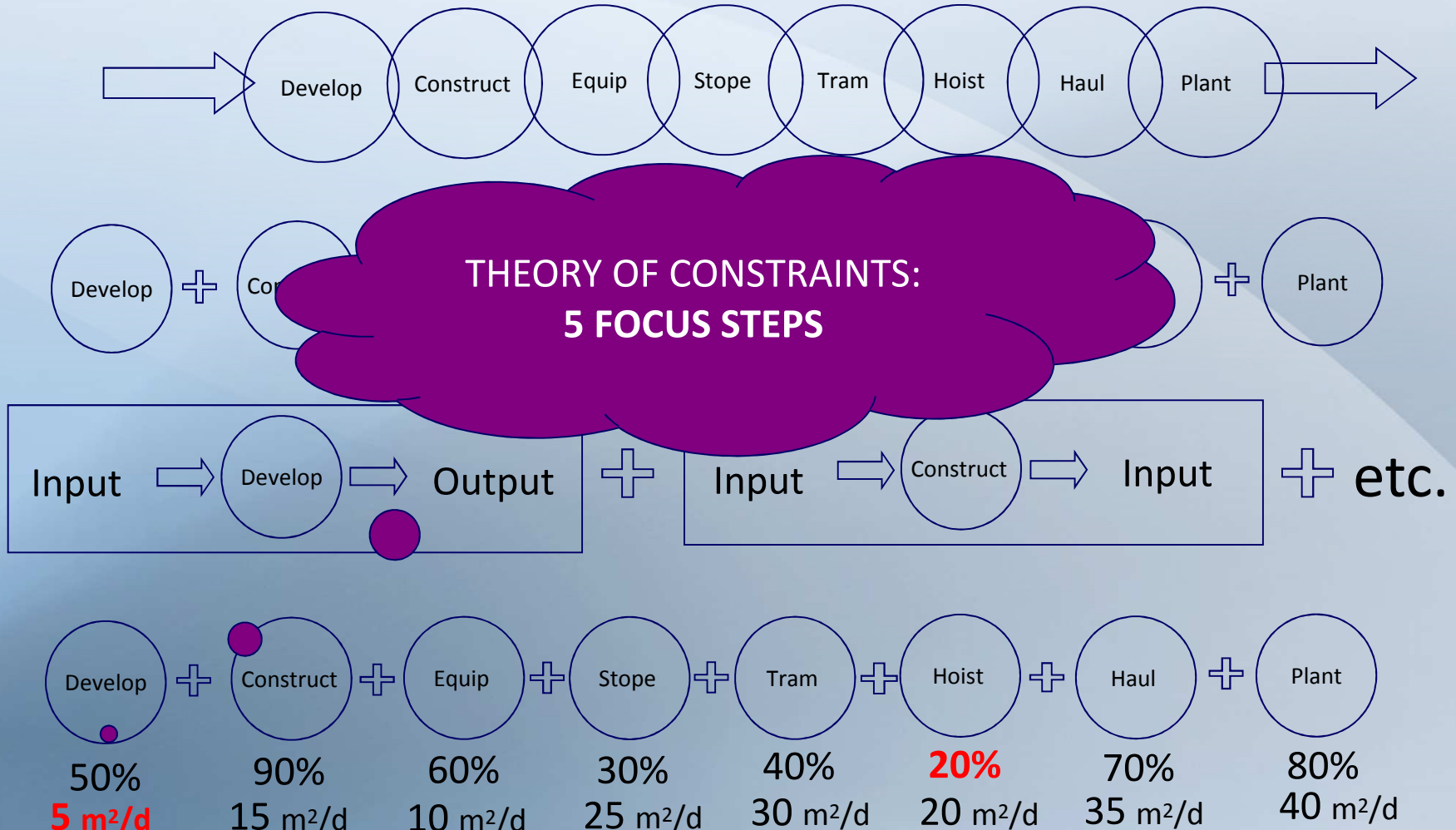


Identifying the Inherent Potential to "*do more with less in less time*"
Source: Barnard, 2004, TOCICO Conference Presentation

Modus Operandi: EFFICIENCY FOCUS



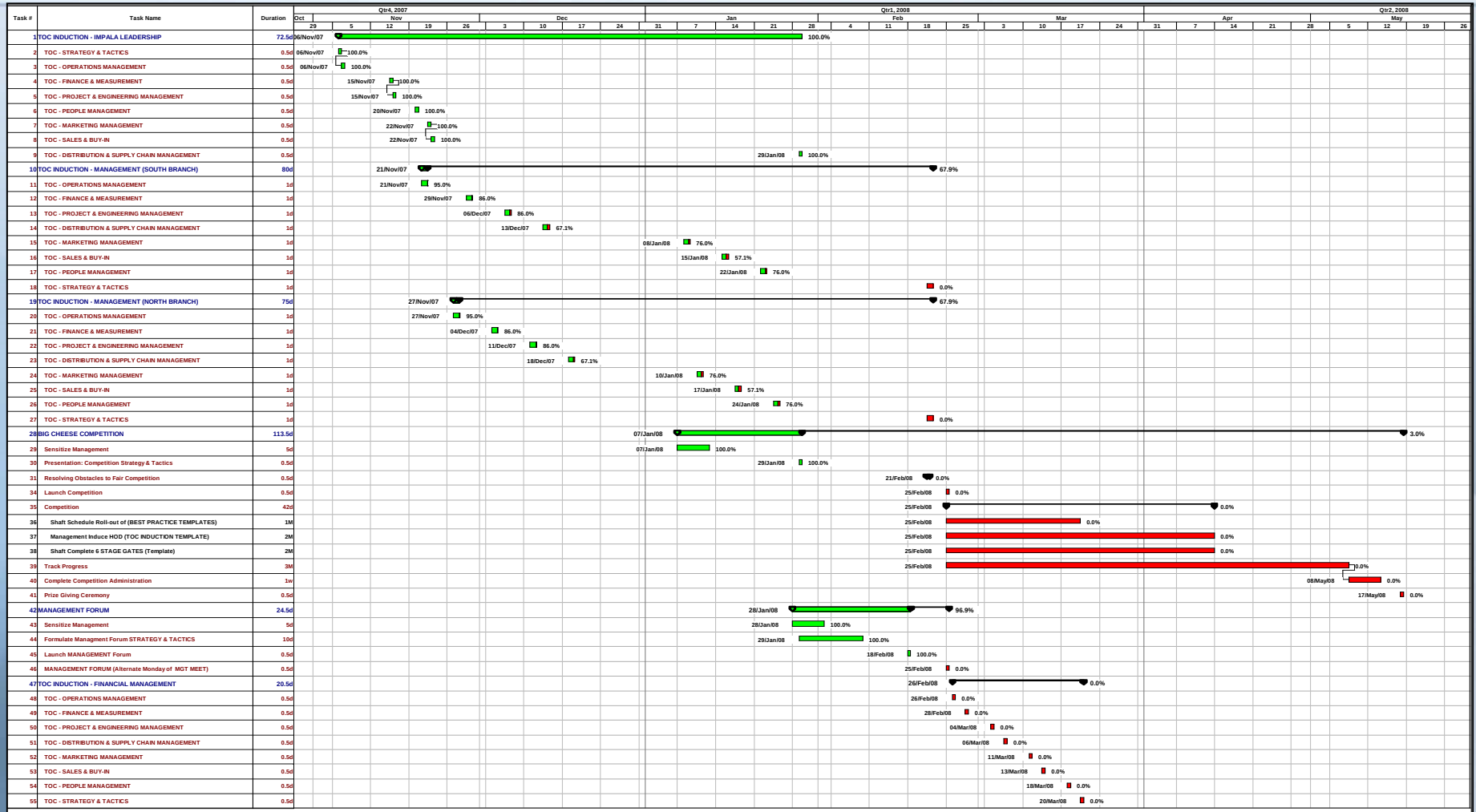
Strategy: EFFECTIVENESS FOCUS



Operations Effectiveness Rules

- Operations Management: (“*Thousands of people to synchronize”*)
  - *Actual average = 50% of potential*
  - *Wrong Strategy – individual ambition – Local optima*
- Finance & metrics:
  - *Evaluation & Decision effectiveness*
  - *Incentive alignment*
- Project & Engineering Management: (“*High uncertainty*”)
  - *People factors cause waste*
    (i.e.: Student’s syndrome / Parkinson’s Law / Convergence / Resource Contention)
  - *Bad Multi-tasking extends lead-times (Touch time = 10%)*
  - *Uncertainty versus Predictability*
- Distribution & Supply Chain Management: (“*Conflict of interest*”)
  - *Increased service level = 85% to 99%,*
  - *1/3 Inventories being used*
  - *Increased Throughput & Reduced Costs*

Leadership: 7% Touch Time



Task #	Task Name	Duration
1	TOC INDUCTION - IMPALA LEADERSHIP	72.5d
2	TOC - STRATEGY & TACTICS	0.5d
3	TOC - OPERATIONS MANAGEMENT	0.5d
4	TOC - FINANCE & MEASUREMENT	0.5d
5	TOC - PROJECT & ENGINEERING MANAGEMENT	0.5d
6	TOC - PEOPLE MANAGEMENT	0.5d
7	TOC - MARKETING MANAGEMENT	0.5d
8	TOC - SALES & BUY-IN	0.5d
9	TOC - DISTRIBUTION & SUPPLY CHAIN MANAGEMENT	0.5d
10	TOC INDUCTION - MANAGEMENT (SOUTH BRANCH)	80d
11	TOC - OPERATIONS MANAGEMENT	1d
12	TOC - FINANCE & MEASUREMENT	1d
13	TOC - PROJECT & ENGINEERING MANAGEMENT	1d
14	TOC - DISTRIBUTION & SUPPLY CHAIN MANAGEMENT	1d
15	TOC - MARKETING MANAGEMENT	1d
16	TOC - SALES & BUY-IN	1d
17	TOC - PEOPLE MANAGEMENT	1d
18	TOC - STRATEGY & TACTICS	1d
19	TOC INDUCTION - MANAGEMENT (NORTH BRANCH)	75d
20	TOC - OPERATIONS MANAGEMENT	1d
21	TOC - FINANCE & MEASUREMENT	1d
22	TOC - PROJECT & ENGINEERING MANAGEMENT	1d
23	TOC - DISTRIBUTION & SUPPLY CHAIN MANAGEMENT	1d
24	TOC - MARKETING MANAGEMENT	1d
25	TOC - SALES & BUY-IN	1d
26	TOC - PEOPLE MANAGEMENT	1d
27	TOC - STRATEGY & TACTICS	1d
28	BIG CHEESE COMPETITION	113.5d
29	Sensitize Management	5d
30	Presentation: Competition Strategy & Tactics	0.5d
31	Resolving Obstacles to Fair Competition	0.5d
34	Launch Competition	0.5d
35	Competition	42d
36	Shaft Schedule Roll-out of (BEST PRACTICE TEMPLATES)	1M
37	Management Induce HOD (TOC INDUCTION TEMPLATE)	2M
38	Shaft Complete 6 STAGE GATES (Template)	2M
39	Track Progress	3M
40	Complete Competition Administration	1w
41	Prize Giving Ceremony	0.5d
42	MANAGEMENT FORUM	24.5d
43	Sensitize Management	5d
44	Formulate Managment Forum STRATEGY & TACTICS	10d
45	Launch MANAGEMENT Forum	0.5d
46	MANAGEMENT FORUM (Alternate Monday of MGT MEET)	0.5d
47	TOC INDUCTION - FINANCIAL MANAGEMENT	20.5d
48	TOC - OPERATIONS MANAGEMENT	0.5d
49	TOC - FINANCE & MEASUREMENT	0.5d
50	TOC - PROJECT & ENGINEERING MANAGEMENT	0.5d
51	TOC - DISTRIBUTION & SUPPLY CHAIN MANAGEMENT	0.5d
52	TOC - MARKETING MANAGEMENT	0.5d
53	TOC - SALES & BUY-IN	0.5d
54	TOC - PEOPLE MANAGEMENT	0.5d
55	TOC - STRATEGY & TACTICS	0.5d

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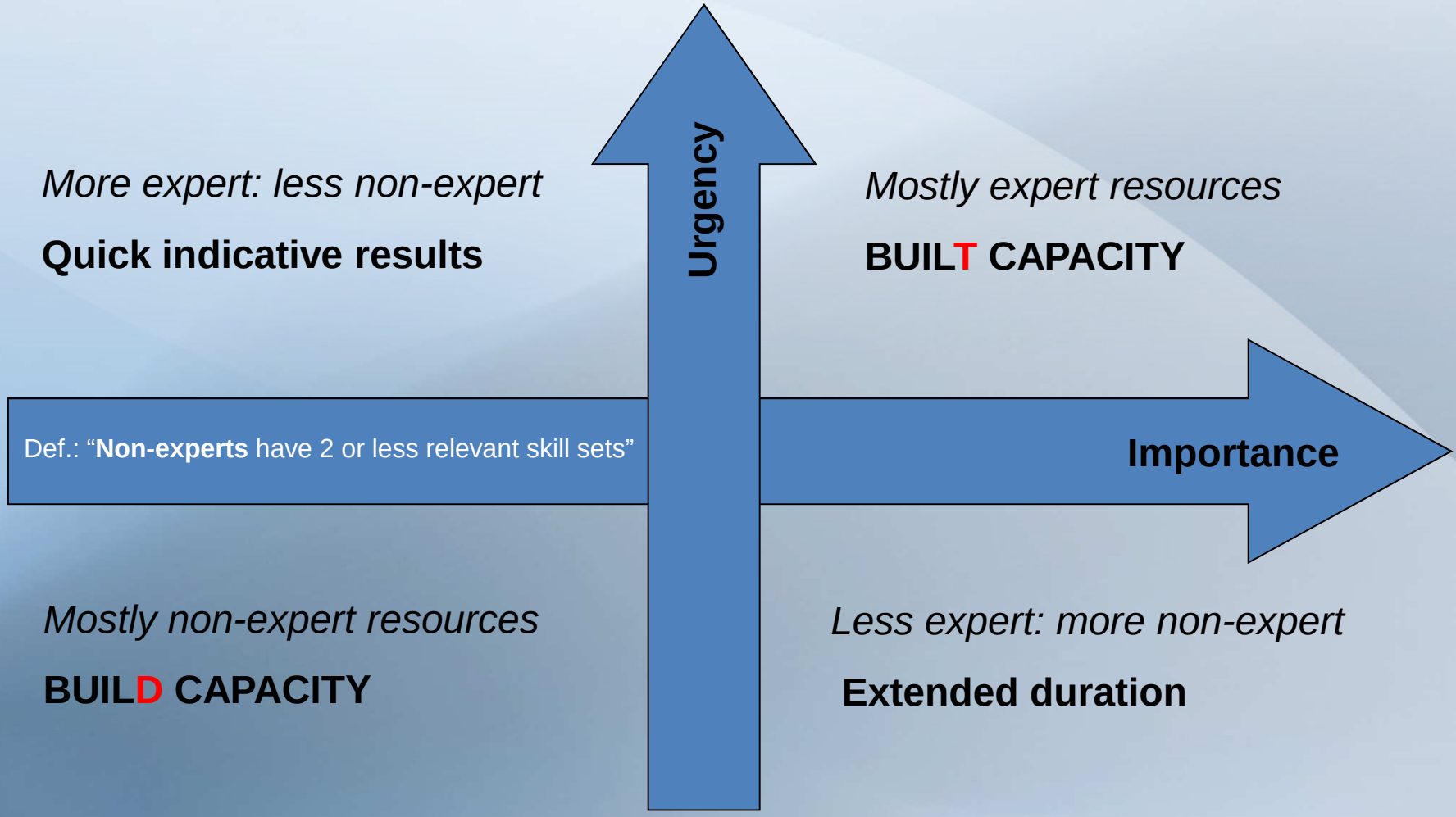
Resource Decisions: Make / Buy



Thank you

- Acknowledgements
  - TOC BoK
  - Mentors
  - Mines / Employers
- Questions / Clarity