sasol
reaching new frontiers

Optimising equipment utilisation and improve turnaround time

Underground Logistics Case Study

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Session Overview

- Project background and approach
- Monitoring and recognising improvement
  - *Information gathering and modelling*
  - *Tools and techniques*
- Identifying and comparing impacts
  - *Evaluating and comparing alternatives*
- Conclusions

Background

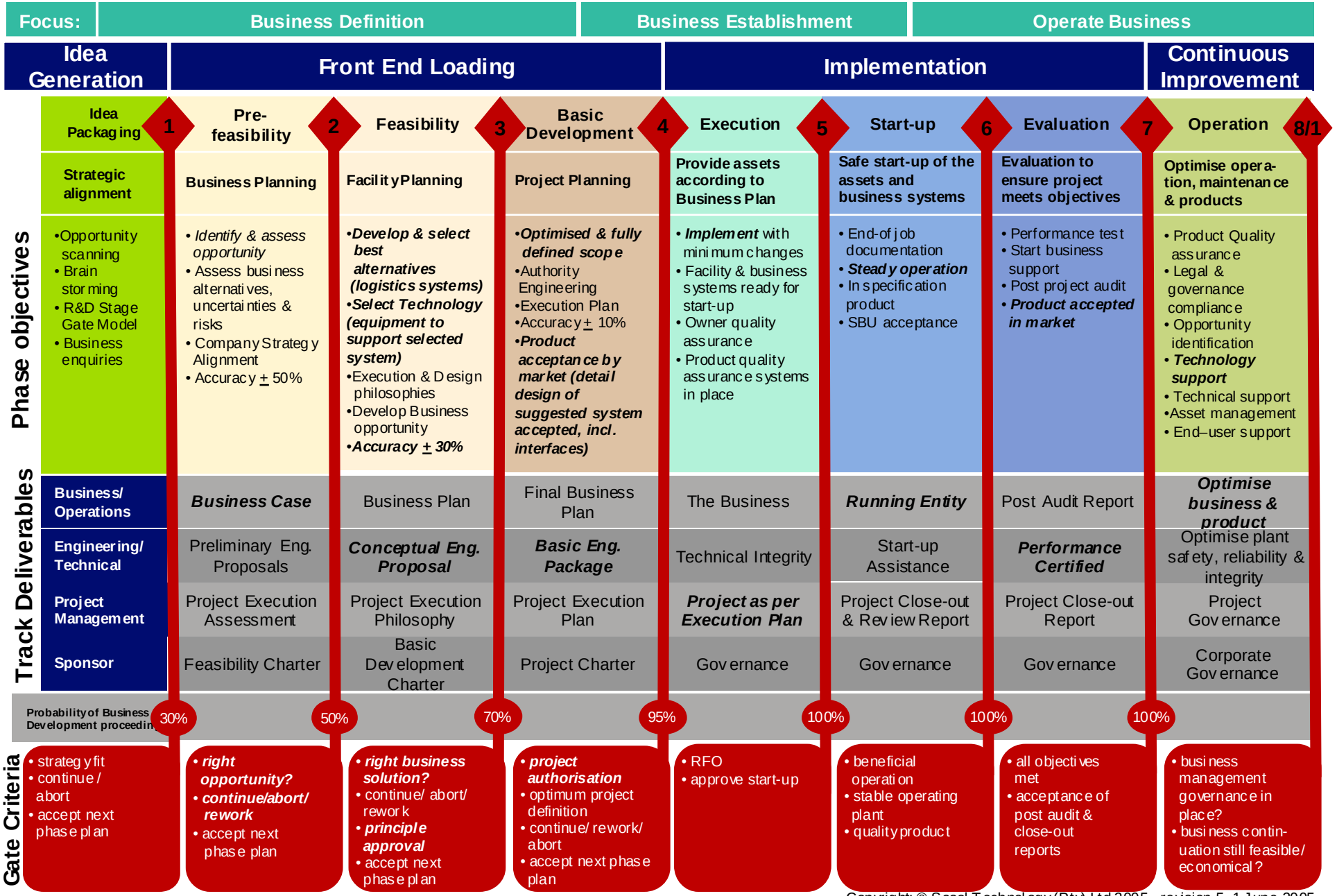
- Case for Change
  - *Operational cost*
  - *Effective vs. Efficient*
  - *Safety requirements*
  - *Equipment replacement strategies*

- Should we spend the money on the current system or should we redesign the logistics system?

Approach

- Sasol Business Development & Implementation model (BD&I)
  - *Systematic approach for the development and implementation*
  - *Based on traditional stage gate process*

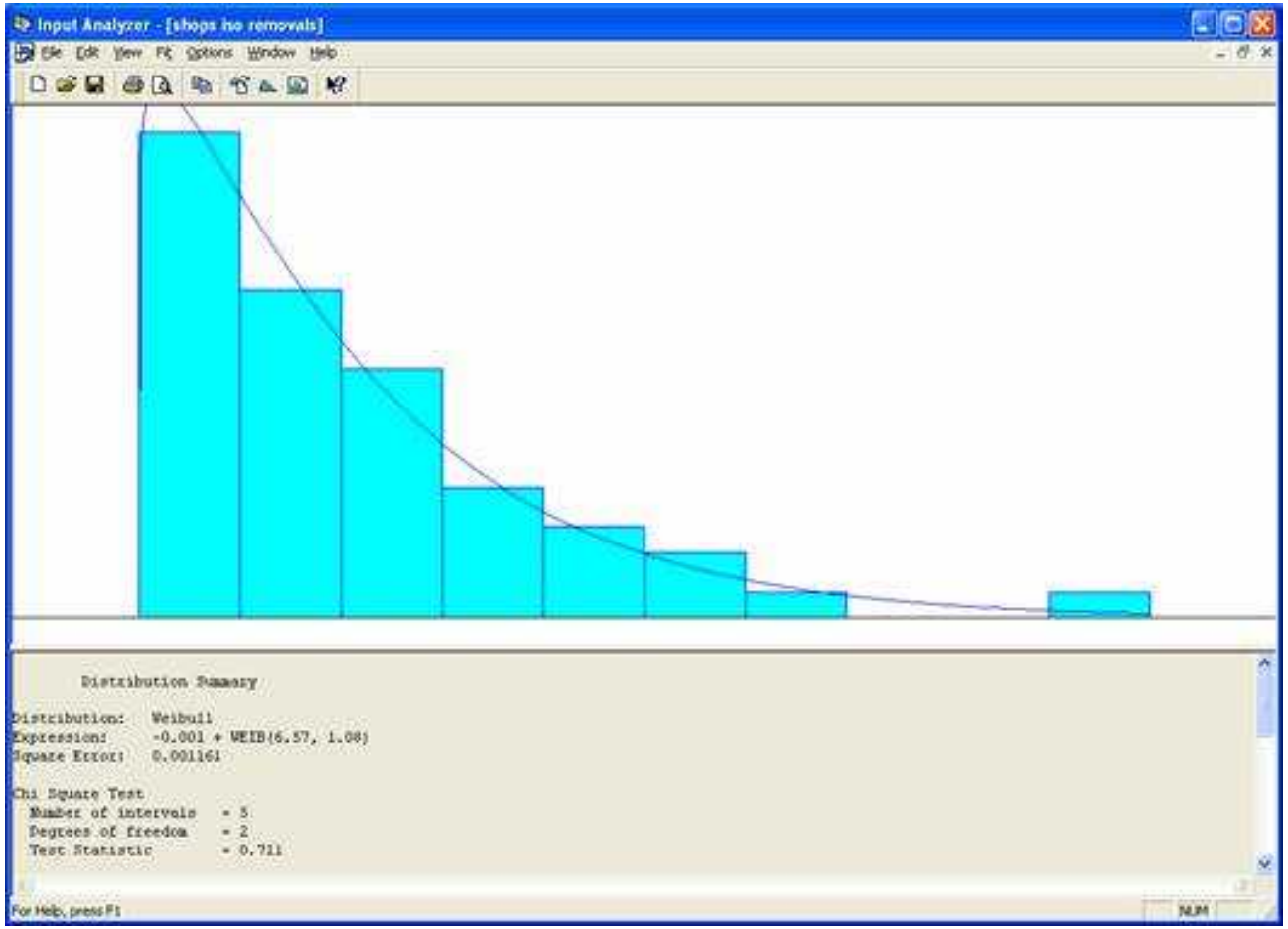
- Value Add
  - *Align leadership, business, operational and technical efforts*
  - *Helps us to do the right thing at the right time*
  - *Guides us through a sequence of clear decision gates*



Pre-feasibility (Monitoring and recognising improvements)

- Information gathering
  - *Underground observations / Interviews / Business information (SAP)*
  - *Time studies*
  - *Material movement and process*
  - *Equipment*
    - *Utilisation*
    - *Costs*
  - *Safety record*
- Simulation model
- Opportunity quantification

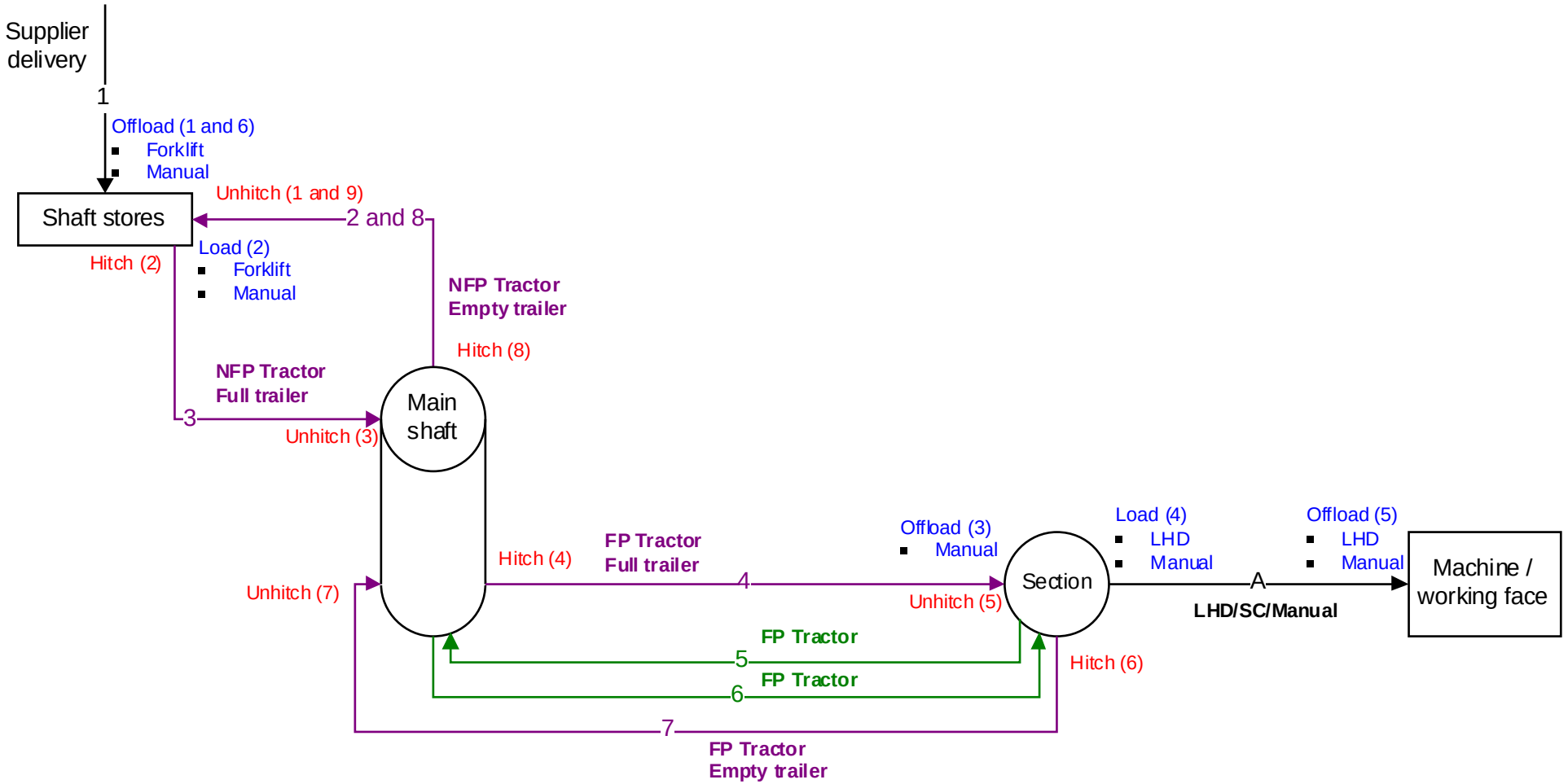
Time Study



Material Movement and Process (1)

- 106 logistical needs identified
  - *Driven by*
    - *Breakdowns*
    - *Production*
    - *Schedules*
    - *Deliveries*
    - *Ad-hoc work*
- Main areas
  - *Material movement to sections and other areas*
  - *In-section movement*
  - *People movement*

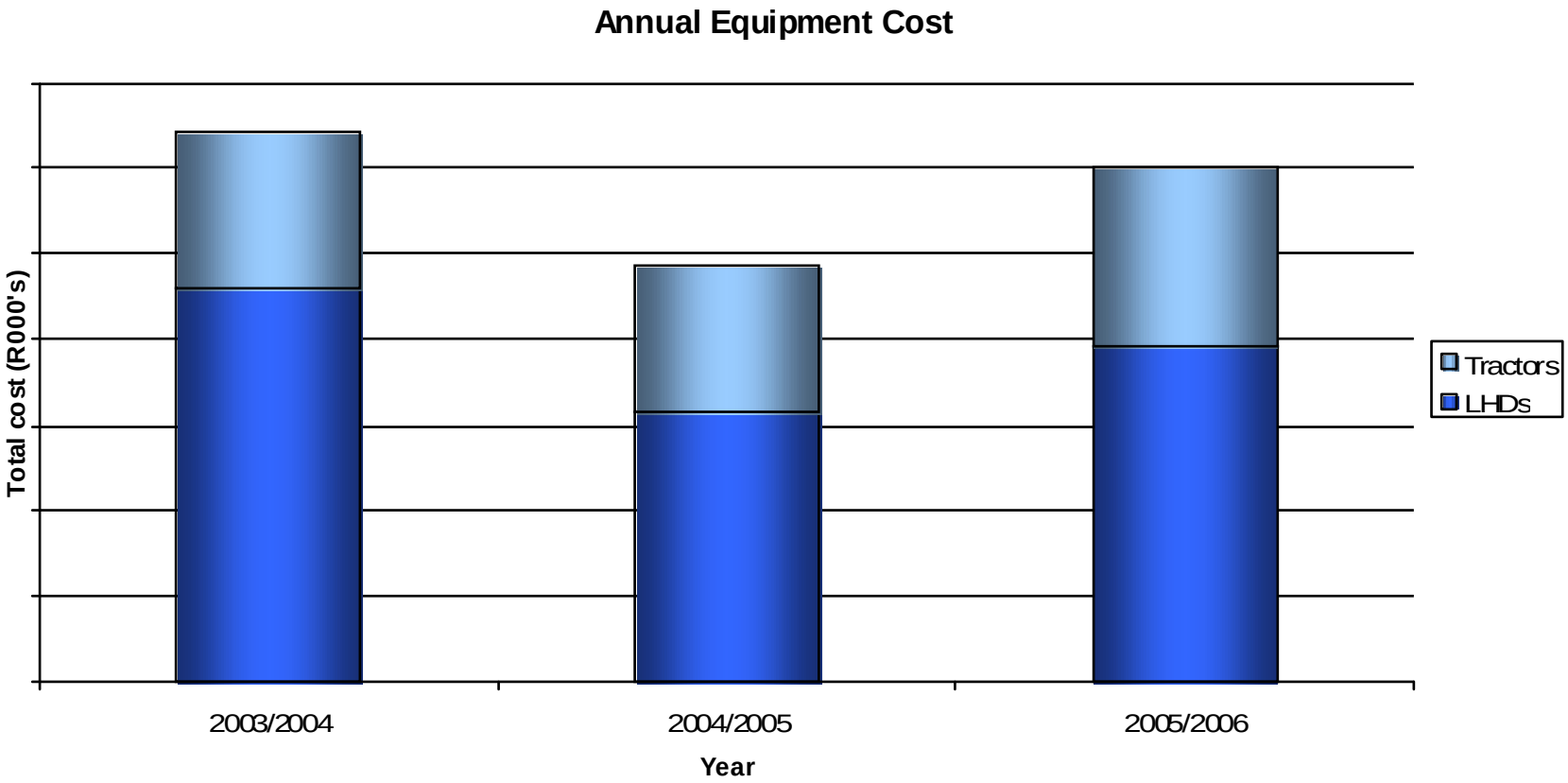
Material Movement and Process (2)



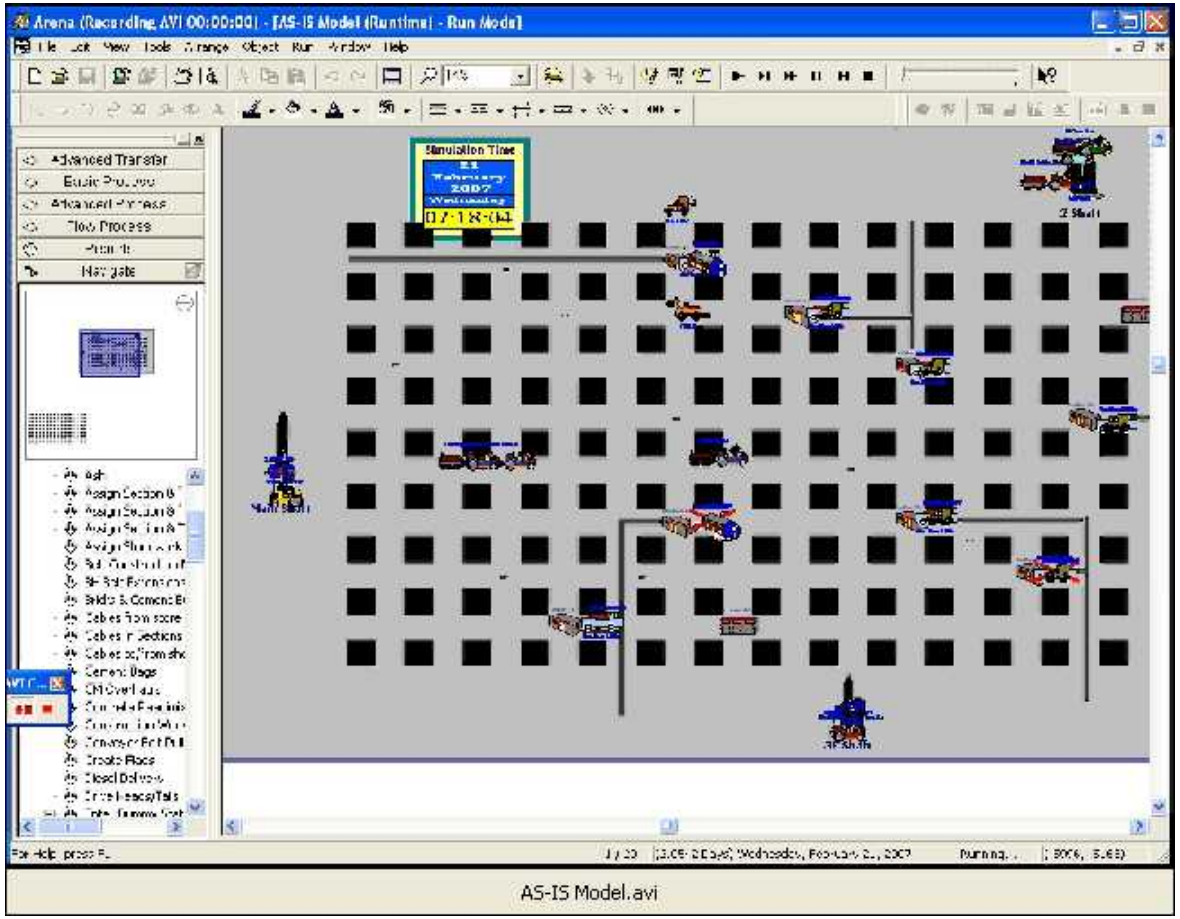
Equipment Utilisation

Type	Number (Percent)	Adapted Utilisation
LHD	5%	41%
Tractor	12%	21%
FEL	1.5%	8.5%
LDV	18%	12.5%
Trailer	63.5%	N/A

Equipment Cost



Simulation Model



Safety Record (Logistics related)

Category	First Aid Case	Medical Treatment	LWDC	Total
Fall of Material	1		1	2
Machinery	1			1
Material Handling	7	4	1	12
Mobile Machinery	3	4	6	13
Slip and Fall	2			2
Tools and equipment	1			1
Grand Total	15	8	8	31

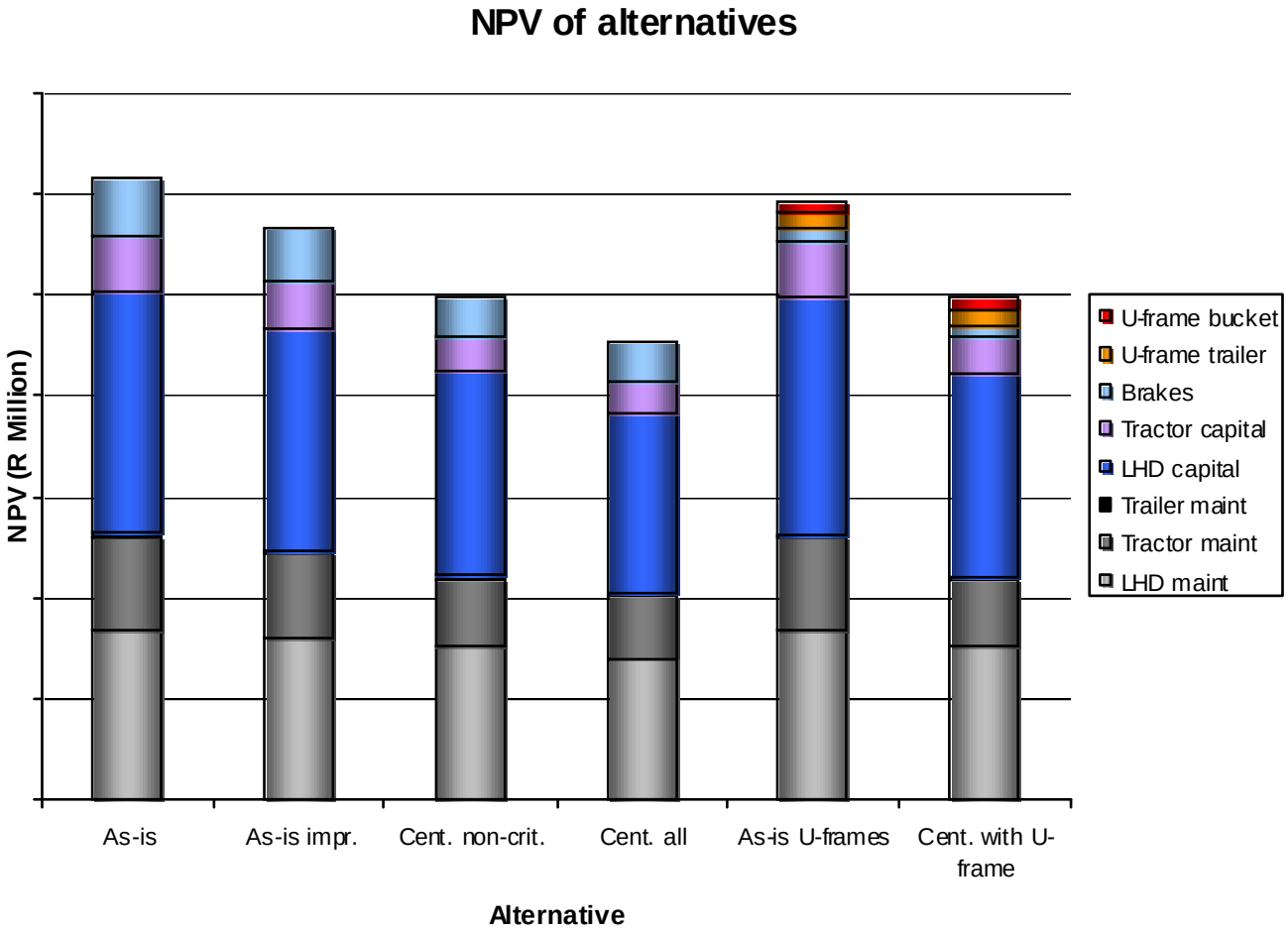
Based on Sasol Mining June 05 to Feb 07 –

Contributor to Sasol Mining RCR – Target < 0.5

Opportunity Quantification – Equipment Numbers

Type	As-is improve	Centralise non-critical	Centralise all	As-is U-frames	Centralise U-frames
LHD	-5%	-10%	-15%	-	-10%
Tractor	-10%	-25%	-35%	-	-25%
LDV	-1.5%	-	-	-	-
Trailer	-10%	-33%	-33%	-75%	-75%

Opportunity Quantification – NPV's



Feasibility Phase (Identifying and comparing impacts)

- Alternatives generation
  - *Brainstorming and interviews with end-users*
  - *Benchmark (RSA & USA)*
- Conceptual design of alternatives
  - *Alternative screening*
  - *Simulation models of alternatives*
- Evaluation of alternatives

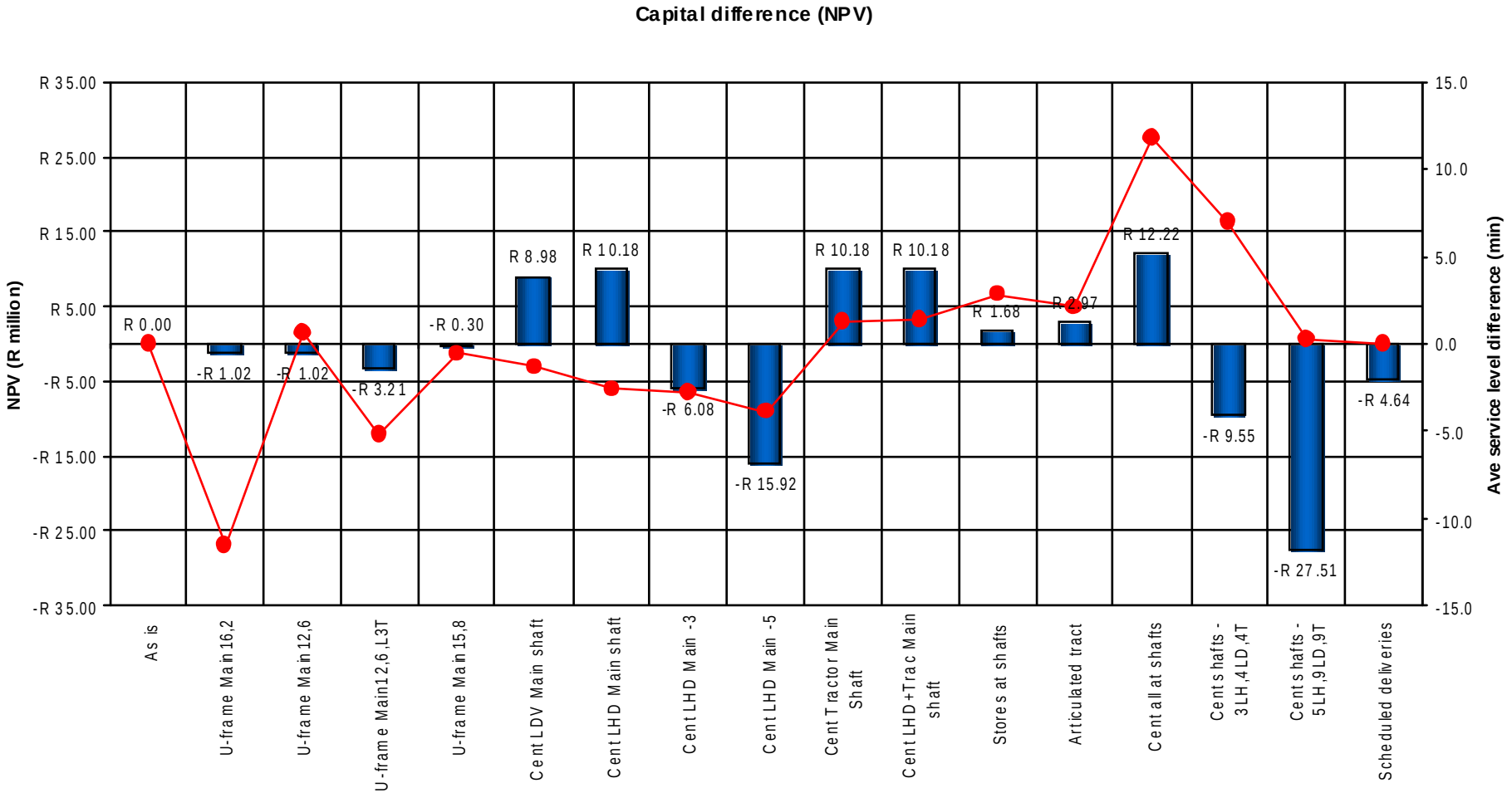
Evaluation Criteria

- Service levels
  - *Waiting/delivery time of materials*
- Costs
  - *Utilisation*
  - *Fleet size*
- Safety
  - *Qualitative*

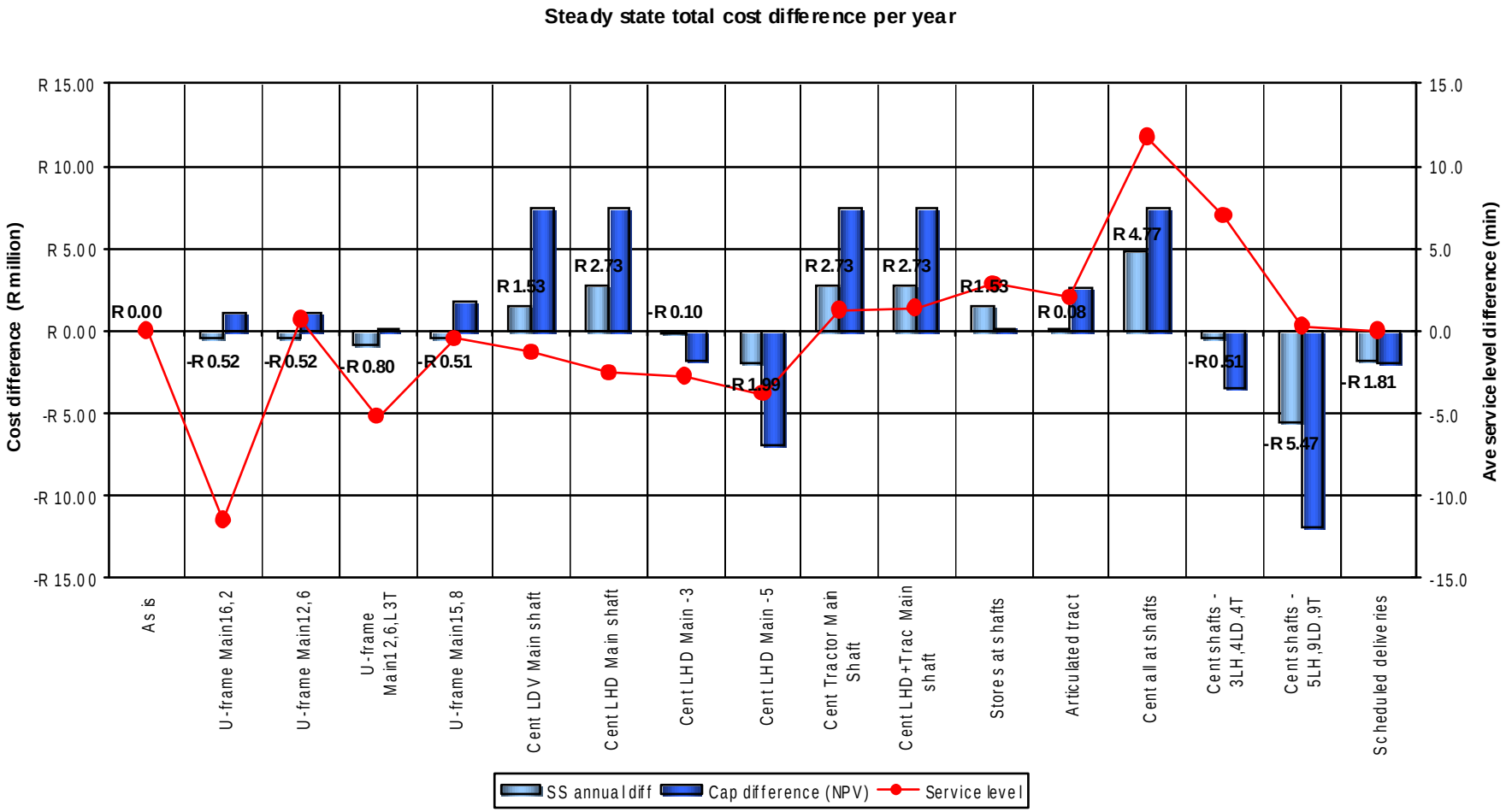
Summary of Alternatives

- Current system
  - *All trailers with brakes*
  - *Replace tractors and LHD's with new units*
  - *Diesel and flame-proofing in section*
  - *More equipment*
- Centralisation of fleet
- Decentralisation of transport
  - *Materials down at satellite shafts*
  - *Old oil and ISO at both satellite shafts*
- U-frames
- Articulated tractors
- Communication system
- In-section battery scoops and/or utility vehicles
- 24h deliveries

Alternative Comparison (Capital)



Alternative Comparison (Operating & Capital)



Conclusions

- The BD&I Model provides roadmap for the process
- Pre-feasibility and feasibility work form the basis of every project
- Data integrity and analysis of data critical for decision making
- Decision criteria for every gate
- Change Management
- Application of a process – Result will be optimising of Logistics System and the improvement of the turnaround time of logistics equipment.