MAKING THE RIGHT INVESTMENT DECISIONS ON END-OF-LIFE ASSETS

Celso de Azevedo, Ph.D
ASSETSMAN / IFRAMI
Celso de AZEVEDO

- Founder and CEO of ASSETSMAN
- Founder and International Director of IFRAMI – France
- Former Operation & Maintenance manager in Metro Network System
- Ph.D. in Asset Management - University of Paris Sorbonne
- Engineer and MSc. in Complex Infrastructures ENPC
- Chairman of the French National Asset Management Commission at AFNOR – France
- Head up of the French delegation to ISO Asset Management ISO 55000
- Founder and member of the GFMAM council - 11 countries
- Professor in Maintenance & Asset Management - ECP & ENSAM
- Member of IAM Examination Board - Institute of Asset Management – UK
- Recognized FIAM - Fellow of the Institute of Asset Management – UK
AGENDA

- The global context and gaps in infrastructures
- The end of life assets issue
- The life-cycle costing approach
- The main methodological trends
- Until when is worth to operate with an asset?
- The usual asset renewal processes
- How to prioritize number of projects
- Use of algorithms to prioritize capex sustaining projects
THE GLOBAL INFRASTRUCTURE CONTEXT

- Worldwide infrastructure assets worth about US$ 50 Trillion
- Global stock market capitalization worth about US$ 55 Trillion
- Global GDP worth US$ 72 Trillion

Source: World Economic Forum
The global demand for infrastructure Capex

US$ 3,7 Trillion per year

which 360 bn/y for Rail Transports (10%)

The current Capex invested in infrastructure globally

US$ 2,7 Trillion per year

which 320 bn/y for Rail Transports (12%)

Source: World Economic Forum
The global investments gap in infrastructures is about US$ 1 Trillion per year which 40 bn/y for Rail Transports.

To bridge the gap, most investors emphasises construction of new assets.

However a complementary and potentially more cost-effective approach is to improve:
- Utilization
- Efficiency
- Longevity of the existing assets.

Source: World Economic Forum
Different Assets & Different Lives

INDIVIDUAL ASSETS “lifes”

ASSET SYSTEM “lifes”

PORTFOLIO OF ASSETS

ISO 55000
THE LIFE-CYCLE COSTING CURVE

Cumulative Costs (CAPEX & OPEX)

Zero Profitability Point

ROI

(LCC)

Incomes

Age

α

t_1

t_2

tg
The Risks/Costs relationship for each life cycle phase

- **Investment**
  - Failure Rate: Investissement
  - Corporate Cash Flow: CAPEX

- **Operation & Maintenance**
  - Risk vs Costs: Operation
  - Life (Years): OPEX

- **Remplacement**
  - Life (Years): Life (Years)
ECONOMIC VALUE OF THE ASSET MANAGEMENT

TOTAL LIFE CYCLE COST

CAPEX = Investment Costs
OPEX = Operating Costs

Corrective Maintenance + Impact to Prod. + Environmental + Safety Costs of Low Reliability

Operating Costs + Planning

HOY
Future
Construction
Time (Years)

CURRENT

CAPEX = 3,5 Capex

PREFERRED

CAPEX = 1,8 Capex

Opex = 1,8 Capex
Opex = 3,5 Capex
METHODOLOGICAL TRENDS

REPLACEMENT

For end of life assets

Rigorous distinction between useful life & mature life of assets

Ageing Management Techniques
Trade-off Risk / Cost

Definition of timing replacement for each project face the news asset candidates

Prolonging the life of an asset in production

To level the flows of CAPEX
Sustaining projects in the multiannual base
RELIABILITY = LONG LIFE

HAZARD RATE

REDUCE RISKS

EXTEND THE LIFE

H(t)

t
THE PHYSICAL LIFE OF ASSETS

Useful life

Mature Life

End of life Management (Ageing Mgt)

Maintenance management

$\lambda(t)$

$t$
EVERYTHING HAS ITS LIMITS !!!

MODIFICATIONS AND UPGRADES AS WELL...
INNOVATIVE ALGORITHMS*
IN PRIORITIZING CAPEX SUSTAINING PROJECTS

*ASSETS VALUE Toolkit
UNTIL WHEN IS WORTH TO OPERATE WITH AN ASSET?
COSTS & RISKS: THE SAME LESSON!

- Ignore
- Disregard
- Bypass
- Dissemble
- Leave out

Risk -> Avoid
Accept
Reduce
Transfer
"W" Assets Value Algorithm Principle

- EAC
- Current Asset
- New Asset
- Penalty curve

moment of the CAPEX decision

Optimum moment to replace the current by the new asset
A DEMAND FOR RENEWAL \textit{versus} AVAILABLE CAPEX SUSTAINING BUDGET
THE REALITY OF THE CAPEX SUSTAINING PROCESS
A MANDATORY REQUIREMENT FOR PRIORITY
ADRESSING THE GAP IN ASSET STRATEGIES OF END OF LIFE
HOW TO PRIORITIZE
NUMBER OF PROJECTS OBJECTIVELY?

- ALIGNED WITH BUSINESS -
Using the Penalty Curve of each Project
Optimum time of asset replacements for a group of concurrent projects
HOW TO LEVEL THE MULTI-ANNUAL CAPEX CASH FLOW ON THE RISK/COST BASES?
Répartition des investissements sur les années

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Pénalités

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USING “ASSETSIM ALGORITHM” TO PRIORITIZE CAPEX SUSTAINING PROJECTS
CONCLUSIONS

- End of life is one of the topics with the biggest gap in terms of policy and strategy in rail industry today

- The LCC approach is an accelerator of Asset Management alignment between the operational and financial areas

- The LCC approach demonstrates that ALL THE ASSETS reach their long-term zero profitability point

- Very few companies have enough cash availability for the all annual capex projects

- Prioritizing is necessary but requires objectivity and rigor

- The multi-year prioritization allows a smoothing of risks and costs tailored to budget
THANK YOU - MERCI
cazevedo@assetsman.com