A railway journey into risk management

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The Risks Then

1804 : Richard Trevithick built 1st railway steam loco.

He died in 1833 in poverty.

Cast iron ‘L’ shape rails could not take the load.
The Risks Then

1830: First railway fatality
- William Huskisson MP ran over by Stephenson’s loco “Rocket” (London & Manchester Railway – 1st intercity line)

“He thus became the first fatality on a passenger railway and signalled to the Government potential for disaster that were possible with these new railroads.” - Samuel Smiles
The Risks Now - Safety

No. of passengers carried by national railways in 2004

<table>
<thead>
<tr>
<th>National Railways</th>
<th>Patronage (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>921</td>
</tr>
<tr>
<td>France</td>
<td>931</td>
</tr>
<tr>
<td>China</td>
<td>1,073</td>
</tr>
<tr>
<td>UK</td>
<td>1,088</td>
</tr>
<tr>
<td>Russia</td>
<td>1,299</td>
</tr>
<tr>
<td>Germany</td>
<td>1,695</td>
</tr>
<tr>
<td>India</td>
<td>5,112</td>
</tr>
<tr>
<td>Japan</td>
<td>8,617</td>
</tr>
<tr>
<td>Worldwide</td>
<td>&gt;26,000</td>
</tr>
</tbody>
</table>
The Risks Now - Safety

Railway systems

- more complex
- more capable
- more potential for disaster
- more intense public reaction to accidents

Are we coping with this complexity?
The Risks Now - Service

1807: 1st passenger railway service (horse drawn) from Swansea to Mumbles

1870: 63 years on, horsepower increased - so did payload
The Risks Now - Service

1908 : Sydney

Today …
The Risks Now - Service

1921: In-flight entertainment in 11-seater hydroplane

In Aviation:

Today
The Risks Now - Service

- Higher service quality expectation
- More enquiring
- Media sensitive
- Need to proactively manage customer demand and associated risks

Requires a revolution in railway culture – is this happening?
The Risks Now - Security

Security measures in 19th century

21st century

Thailand

France
The Risks Now - Security

- Security threats:
  - Terrorism
  - Acts of violence
  - Assault
  - Vandalism
  - Mugging
  - Sexual harassment
  - Railway must remain open and accessible

As society becomes more complex does our design consider societal needs?
Why is under-investment endemic to railway industry?

- Conservative?
- Lags behind
- Requires long lead time to bring new technology into service
- Under-investment hampers
  - Renewal
  - R&D
The Risks Now – Politics & Finance

- Strong political and public interests
- Many stakeholders
  - Government
  - Politicians
  - Share holders
  - Operator/Concessionaire
  - Contractors/Equipment suppliers
  - Transport competitors
  - Unions
  - Public/media

Are politicians, financiers, opinion formers and other stake holders proactively engaged?

Railtrack PLC (in Railway Administration)

French Railway strike
How Can we Cope

How MTR began:

- One step at a time
- 1st HAZOP on train door system in 1992
- General response: ??!!
How Can we Cope

1994 –
- ALARP based Safety Risk Control System
- Organisation; IT system; process
- Practical and effective

**Organization**
- MTR Staff
- HC / HCo
- SSG
- HRS
- Verification/Monitoring

**System**
- Information & Advisory
- Hazard Info.
- Monitoring

**Process**
1. Identification & Ranking
2. Registration and Resolution Proposal
3. Verification
4. Endorsement
5. Implementation & Monitoring
6. Update and Risk Profile Review

- Info.
- Endorsement
- Hazard Info.
How Can we Cope

Subsequent years –

Service Risks

- Extended customer service targets
- Equipment assigned criticality ratings C1-C4 based on failure impact on service
- Maintenance/improvement effort commensurate with criticality

<table>
<thead>
<tr>
<th>Criticality Rating</th>
<th>Rolling Stock</th>
<th>Platform Screen Door</th>
<th>Track Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C2</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>C3</td>
<td>11</td>
<td>34</td>
<td>2</td>
</tr>
<tr>
<td>C4</td>
<td>2</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>
How Can we Cope

Security Risks

- Modeled on safety
- People; Revenue; Premises; Property; Information
How Can we Cope

Project Risks

● Major renewal/improvement projects
● Consequence based risk identification & assessment (Cost overrun, Programme delay, Political pressure etc)
● Life cycle approach
● Covers service outsourcing

Project Feasibility Study → Design and Specification → Tendering → Construction / Installation → Testing & Commissioning → Operation

Initial Project Risk Appraisal + Risk Register → Project Risk Review & Risk Register Update → Residual Risk Transfer
How Can we Cope

Environmental risks

- noise pollution, water pollution, air pollution, land contamination and depletion of resources
- Environmental aspects ranked and registered

4000m of noise barriers being built along Airport Express Line by Sept 2007
How Can we Cope

Supplier Risks

- Spares Shortage
- Asset Conditions
- Asset Life profile
- Support Asset Replacement Planning

<table>
<thead>
<tr>
<th>Asset Age Level</th>
<th>Life Factor (Current Age / Asset Life)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L4</td>
<td>&lt; 0.5</td>
</tr>
<tr>
<td>L3</td>
<td>0.5 to 0.7</td>
</tr>
<tr>
<td>L2</td>
<td>0.7 to 0.9</td>
</tr>
<tr>
<td>L1</td>
<td>&gt; 0.9</td>
</tr>
</tbody>
</table>
How Can we Cope

2003/2004 –

Asset Management System
• Minimise life cycle costs and maximize values
• Integrates risk management activities
• Manage technology risks through
  • Understanding business requirements
  • Assessing asset capabilities
  • Timely asset improvement/replacement programmes

Certified to PAS 55-1
How Can we Cope

2005 –
Enterprise Risk Management
- Growth & Corporate Social Responsibility
- Finance; Safety; Business Operation; Reputation; Legal
How Can we Cope

More risk management challenges –

Human Factors

- Loss of expertise and experience
- Cultural differences as we move to new territories
- Decision making in stressful conditions
- Communication of vital information
Conclusions

Risk Management:
- Tool – meet & evaluate social responsibility
- Common Language – communicate with & evaluated by society

Railway Industry:
- Caught in a time warp – not kept in pace with changing times
- Ability to manage risks more critical than ever before

Questions:
- Are we coping with complexity?
- Is our culture keeping pace with business and societal needs?
- Does railway design incorporate social and technical needs?
- What are we doing about endemic under-investment?
- Do we proactively engage stakeholders?
Conclusions

MTR has evolved a pragmatic risk management approach to address these issues to fulfill its mission, which is to “Provide excellent value to our customers, enhancing their quality of life, and contributing to development of the communities in which we operate”

Challenge:

How can you start your own journey to assure the future for your railway/company?
Thank you