ROUTE INDUSTRIAL POLICY

A common RFF and SNCF Infrastructure project

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ROUTE INDUSTRIAL POLICY

Chapter 1 – The aims of the «Politique Industrielle d’Axe»
Chapter 2 – Four steps of the methodology
Chapter 3 – Example of application “Nimes – Montpellier”
Chapter 4 – Conclusions & perspectives
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Chapter 4 – Conclusions & perspectives
1 - The aims of the «Politique Industrielle d'Axe»

→ Initial context: to generate the information for a better informed decision making regarding maintenance programs

• Maintenance traditionally addressed with lower priority than extension and renewal programs
• Impact of extension and renewal project decisions on maintenance not enough taken into account
• Need for an objective approach, evaluating alternatives and making better decisions with RFF, taking into account multiple constraints:
  • current circulation plan
  • future capacity requirements
  • conditions, costs of intervention and impact on service
  • longer term impacts on maintenance cost and service quality...

→ Program initiated two years ago
ROUTE INDUSTRIAL POLICY

Chapter 1 – The aims of the «Politique Industrielle d’Axe»

Chapter 2 – Four steps of the methodology

Chapter 3 – Example of application “Nimes – Montpellier”

Chapter 4 – Conclusions & perspectives
2 - Four steps of the methodology

→ “Route Industrial Policy” ( Politique Industrielle d’Axe) is based on a four step methodology

1. Data acquisition of related assets
   - Target performance
   - Weaknesses in related assets
   - Maintenance cost analysis
   - Analysis of route conditions

2. Scenario 1
   - Development portfolio
   - Development projects (2012 – 2020)
   - Meetings with DP, GP, route coordination (“porteur d’axe”), project team
   - Modélisation du besoin d’entretien

3. Analysis of the capacity required by each scenario
   - Modelling of capacity requirements (per year and per possession type)
   - Total life cycle cost related to scenario

4. Economic evaluation
   - Budget objective

5. Iterations to achieve a scenario consistent with capacity and budget objectives
2 - Four steps of the methodology

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2. Scenario 1
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   - Meetings with DP, GP, route coordination ("porteur d’axe"), project team

3. Scenario 2

4. Scenario 3
   - Identification of required maintenance (2012 – 2020)

5. Capacity objective
   - Modelling of capacity requirements (per year and per possession type)
   - Total life cycle cost related to scenario

6. Economic evaluation
   - Budget objective

7. Iterations to achieve a scenario consistent with capacity and budget objectives
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7. Iterations to achieve a scenario consistent with capacity and budget objectives

Description of the possible scenarios – estimation of the maintenance and renewal needs...

8. Economic evaluation

9. Budget objective

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Capacity objective

Budget objective

Estimation of track possession needed to do the works ...
2 - Four steps of the methodology

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5. Iterations to achieve a scenario consistent with capacity and budget objectives

Economic evaluation of each scenario over more then ten years...

Capacity objective

Analysis of the capacity required by each scenario

Total life cycle cost related to scenario

Budget objective
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3 - Example of application: “Nimes–Perpignan”

This new policy was applied in particular to the Nimes - Perpignan line.
3 - Example of application: “Nimes–Perpignan”

The PI Axe model is able to forecast the state of infrastructure at different horizons and for specific scenarios.

<table>
<thead>
<tr>
<th>Nimes to Lattes</th>
<th>Lattes to Sète</th>
<th>Sète to Narbonne</th>
<th>Narbonne to Perpignan</th>
</tr>
</thead>
<tbody>
<tr>
<td>810000 (2 * 84 km)</td>
<td>640000 (2 * 71 km)</td>
<td>677000 (2 * 63 km)</td>
<td></td>
</tr>
</tbody>
</table>

- **UIC60 LRS**
- **UIC60 BN**
- **U50 LRS**
- **U50 BN**
- **U33 LRS**
- **U33 BN**
- **Other**

**Theoretical Age Calculation for Rail**

**Theoretical Age Calculation for Sleepers**

- **To regenerate by 2020 based on maintenance rules:**
  - 156 km rail
  - 60 km sleepers
  - 156 km ballast

- **To regenerate by 2025 based on maintenance rules:**
  - 29 km rail
  - 80 km sleepers
  - 85 km ballast

**Nimes – Perpignan Example: Theoretical Age and Consistency of Railway**
3 - Example of application: “Nimes–Perpignan”

### Scénario 0

No renewal

### Scénario 1

- Renewal of Nîmes Lattes in first (2015 / 2016) – More urgent and more crowded track section
- Renewal of Lattes Narbonne in (2018 / 2019)

### Scénario 2

**Before the putting into service of the HSL CNM:**
- Renewal of Lattes Narbonne in first in (2015 / 2016)

**After the putting into service of HSL CNM:**
- Renewal of Nîmes Lattes (2019 / 2020) with a shunting route through (CNM)

### Scénario 2 variante RVB

Idem scénario 2 with a total track renewal (RVB instead RBRR) of all the line between Nîmes et Narbonne.
3 - Example of application: “Nimes–Perpignan”

→ Economic valorisation of the different scenarios (track)

<table>
<thead>
<tr>
<th>Description</th>
<th>Scénario 0</th>
<th>Scénario 1</th>
<th>Scénario 2</th>
<th>Scé 2 Variante RVB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Renewal costs</strong></td>
<td>0</td>
<td>397</td>
<td>397</td>
<td>425</td>
</tr>
<tr>
<td><strong>Maint. costs</strong></td>
<td>176</td>
<td>78</td>
<td>81</td>
<td>75</td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
<td>176</td>
<td>475</td>
<td>478</td>
<td>501</td>
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<tr>
<td><strong>Residual value of</strong></td>
<td>0</td>
<td>300</td>
<td>300</td>
<td>357</td>
</tr>
<tr>
<td><strong>the renewal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>T. Costs Opex</strong></td>
<td>176</td>
<td>175</td>
<td>178</td>
<td>144</td>
</tr>
<tr>
<td><strong>Risks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High impact of the quality of service (speed restrictions) until 2020</td>
<td></td>
<td>Good quality of service then the opening of the HSL CNM</td>
<td>Necessity to come back renew 90km of track around 2030 of the Nimes – Sète section</td>
<td>Anticipated investment of 28 M€</td>
</tr>
</tbody>
</table>
The impact on maintenance costs of each of these scenarios is computed.

The renewal of 87% of line until 2023 would cut costs on current rack maintenance by around 60% in relation to 2012 prospect.
3 - Example of application: “Nimes–Perpignan”

The impact of each independent signalling level can be estimated / IF the design preserves the possibility to renew one without to replace the others

- Block system (BAL+KVB, TVM, ETCS…) → European, Linear, Combinatory
- Interlocking (mechanical, electric, computerized) → National, Nodal, Sequential
- Resources (Track Circuit, switches, signals…) → National, Punctual, Combinatory

No Asset Management possible!
3 - Example of application: “Nimes–Perpignan”

→ A part of the renewal will have an impact of the regularity (quality of service) at 2020

Population of signalling resources

Failures estimation (by modelling)

Signalling

Track

Base 100

No renewal

TC replacement

Connexion replacement

Switch engine replacement

Track renewal

Target

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3 - Example of application: “Nimes–Perpignan”

→ Capacity model – general principle

**Constraints of the track possession**
- Time / Day Night / Track circulated …
- Ex : 7h de nuit sur 2 pas d’IPCS

**Localised needs**
- Current maintenance: Number of UOP
  - Needs express in volume
- Renewal: Work database
  - Needs express in volume
- Investment projects: Development project documents
  - Needs express in volume

Ex : 10 km de RR V1 sur l’IPCS
Lunel – Baillargues en 2012

**Adequation need model / Track possession condition**
- Automatic simulation of the operations ordonnancement for each year regarding the benefits and the technical constraints

Ex : 1.4 pas au semestre1,
2.2 pas au semestre 2

**Track possession calculation**
- Number of track possessions by track section
- By month
- With a confidence interval
- With potential impacts (speed restrictions…)

**Parameter and technical constraints**
- Massification, Productivity, Exclusions, Needs of simultaneous track possessions

Ex : Les opérations qui n’ont pas la même mobilité ne sont pas massifiables
3 - Example of application: “Nimes–Perpignan”

→ A model computes the impacts on capacity in each scenario

**Non consolidated capacity requirement**

*Nb works days * nb of IPCS steps*

Consolidated capacity requirement, in standard time windows and speed limitations

- **Average IPCS steps required per day**

  - Target 6 steps

  2014: 6.5
  2015: 6.7
  2016: 6.8
  2017: 4.4
  2018: 3.9
  2019: 5.0
  2020: 4.8

- **Average speed limitations planned per day and line (in minutes)**

  - Time credit 5'

  2014: 4.1
  2015: 6.9
  2016: 6.3
  2017: 3.0
  2018: 2.3
  2019: 3.0
  2020: 2.0
3 - Example of application: “Nimes–Perpignan”

→ A significant trains delays on the Nimes – Narbonne section during several years

<table>
<thead>
<tr>
<th>Year</th>
<th>V1</th>
<th>V2</th>
<th>V1</th>
<th>V2</th>
<th>V1</th>
<th>V2</th>
<th>V1</th>
<th>V2</th>
<th>V1</th>
<th>V2</th>
</tr>
</thead>
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<td>48</td>
<td>48</td>
<td>27</td>
<td>13</td>
<td>48</td>
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<td>13</td>
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<tr>
<td>2016</td>
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<td>27</td>
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<td>2017</td>
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<td>2018</td>
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<td>48</td>
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<td>27</td>
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<tr>
<td>2019</td>
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<tr>
<td>2020</td>
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<td>48</td>
<td>27</td>
<td>13</td>
<td>48</td>
<td>48</td>
</tr>
</tbody>
</table>

LTV Principalement localisées sur Montpellier - Narbonne
LTV Principalement localisées sur Nîmes - Montpellier

Estimation of the waste of time per track and year (Nimes – Narbonne)

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4 - Conclusions & perspectives

→ Created tools are working well but need significant work

→ The objective estimation of the impacts of each scenario helped us to describe the real situation, to obtain the necessary track possessions to do our work regarding the network strategy

→ Target: industrialised the tools and processes to apply easily the methodology on all the lines of the network

• “Objective” process the maintenance, renewal and investment programs regarding the main constraints:
  → Current circulation plan → future capacity requirements
  → Evaluation of the current and the future maintenance needs
    → Modelling of the asset behaviour
  → Track possession, costs of intervention and impact on service
  → Long term impacts on maintenance and renewal costs, quality of service...
Thanks for your attention

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