Rail Asset Management, a key issue for Rail Industry future.
A contribution based on SNCF experience

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Rail Asset Management:

I) What economics teaches us about Rail Asset Management?

II) Implementing innovation: specifications for new assets, retrofitting existing assets

III) Rail asset management: a systemic approach

Conclusions: how could we improve our Asset management?

A revealing topic: ERTMS
I) What economics teaches us about Rail Asset Management?

I.1 Rail Assets economical specifics:
Long lasting components or subsystems
Weak liquidity of assets
Few suppliers and a legacy in national or regional specification policy.

Thus
When you did it wrong in specifying/buying, you carry it for 40 years……
We are poised to modify assets before end of technical life
We are poised to operate simultaneously heterogeneous fleet of infrastructure components while struggling to keep as much as possible interoperability....
Cliff effects on renewal (signalling, or civil works on regional lines)
I) What economics teaches us about Rail Asset Management?

- 1.2 Sound asset management shall be based on
  - Sound design enabling easy adaption to customers' need (which could change in 40 years) during a long lifecycle
  - Sound design enabling easy renewal of components or sub systems while avoiding heavy costs to keep asset operable (good example wheelsets, bad example etcs version management)
  - Sound design so that implementation of new subsystems (e.g., in telematics) do not trigger integration costs to sky high levels, just to keep rail system interoperable during migration phases. (Crucial issue for etcs success).
  - Sound design to keep maintenance cost as low as reasonably achievable (think about some man-machine interfaces or wind screen wipers in locomotives)
  - In some respects integration and migration costs are as important as initial acquisition prices
II) Lessons from innovation programs

Diffusing innovation (eg new generation of components/ subsystems all over a consistant system on regional or national systems) could last so long that before the end of deployment component or subsystem is already technically obsolete (GSM R in French network)

Newest doesn’t always smartest or cheapest: computerized switching posts last 15/20 years compared to 40/70 with conventional relays; on a lifecycle basis total cost is not necessarily cheaper, and maintenance or operation not always easier.....

Integration costs of innovating components or subsystems in pre existing systems are very often underestimated

Safety case and proof of heavily computerized systems proved to be longer and some times trickier than expected; basically we cannot any longer specify and build computerized systems with the same ingineering methods used with conventional systems (eg with relays and point to point links)
III) Rail asset Management shall also pay tribute to systemic approach

Although some components or some subsystems could be designed in a stand alone approach (sleepers, buffers, leds for signalling), most of subsystems have strong interactions with other subsystems (eg track/rolling stock or electrical devices with EMC issues).

Specifications shall pay tribute to exported constraints which trigger extra costs on other stakeholders assets (example implementation of etcs)

So Functional specification is a must and system architecture shall be a consequence of functional design, and not left opened to designer (or supplier) choice

Who shall pay for what? (etc)

In which respect could the asset manager carry the financial risks attached to future exported constraints?
Conclusion: **how could we improve Rail Asset management?**

Specifying interface key to lasting compatibility over ages and to keep costs down during implementation of new components/subsystems (linked with retrofit for instance)

- Specifying black boxes may have had some appeal but proved often just to be a black hole for the asset manager handling later modifications or retrofitting: internal architecture is just unknown (and may be just unknowable for old enough systems due to poor tracability), so impact of external new constraints is just unmanageable

- Proper initial functional design is the best way to manage rail assets lasting so long, which means
  - facilitating easy implementation changes, taking account of exported constraints or interfacing constraints
  - detailed tracing design process to ease implementation of future versions (think about softwares)
  - Offer genuine and easy ‘interchange ability’ to plug different suppliers components