Bombardier Transportation
Activities and plans for Roll2Rail & Shift2Rail

Vinnova Shift2Rail Workshop
Stockholm 19th May 2015

Adam Mirza
Contents

EU Funded Research at Bombardier

Bombardiers involvement in Shift2Rail

Roll2Rail – A Shift2Rail Lighthouse Project

Examples on research topics: Noise – Energy - Interiors
EU Funded Research at Bombardier

• Bombardier Transportation has been involved in EU funded research since many years

• Previous projects:

• Focus has been on technology development but not on realization

• With Shift2Rail innovations are brought close to commercial implementation
Bombardier and Shift2Rail – A Unique Opportunity for the industry

- is the result of a higher ambition for the European railway sector
- accelerates the development of the next generation of railway system
- enables competitiveness on a market with quickly increasing demands
- high technology readiness level compared to previous projects
Shift2Rail research priorities
- Bombardiers involvement

- **IP1: Energy & Mass Efficient Technologies for High Capacity Trains**
  - 53%

- **IP2: Advanced Traffic Management & Control Systems**
  - 21%

- **IP3: Cost Efficient High Capacity Infrastructure**
  - 3%

- **IP4: IT Solutions for a Seamless Attractive Railway**
  - 17%

- **Cross cutting activities**
  - 6%

- **IP5: Technologies for Sustainable & Attractive European Freight**
  - 0%
IP1 and Cross Cutting Activities

- Noise: BOMBARDIER
- Energy: BOMBARDIER
- Integrated assessment: BOMBARDIER

Integrated Mobility Management

IP1
- IP1: Traction
- IP1: TCMS
- IP1: Car Bodyshell
- IP1: Running Gear
- IP1: Brakes
- IP1: Interiors

IP2
IP3
IP4
IP5

Bombardier is coordinating all cross cutting activities within Shift2Rail
Roll2Rail – A Shift2Rail Lighthouse Project

- Get an early start on the Shift2Rail activities
- Kick-off on May 7 2015
- Bombardier leads 4/8 technical WP:s
- 2 million Euro
- Only a fraction of the Shift2Rail budget
- Lower Technology Readiness Level
- Leads into Shift2Rail

Horizon 2020 programmes

BOMBARDIER

RCS
Roll2Rail – A selection from Shift2Rail IP1 and cross-cutting activities

Figure 5: Integration of ROLL’RAIL with SHIFT’RAIL

Not foreseen to be realized
Example: WP6 Interiors

Guideline for future train specifications:
Develop a better understanding and define the methodology for assessing attractiveness and comfort from the passenger’s point of view.

**Topic areas for “Comfort and Attractiveness”**

- **Climate**
  (heating, cooling, fresh air, thermal dynamics)

- **Noise**
  (Acoustics, parasitic, background, quiet zones)

- **Cleanliness**
  (Design for Maintenance, attractive in use, respect)

- **Vibrations**
  (Ride Comfort, stability, solid design)

- **Infotainment**
  (Information, advertising, boredom)

- **Health**
  (Human Factors, ergonomics, discomfort)

- **Usability**
  (Functionality, Ease of use, access / egress)

- **Illumination**
  (Lighting Concept, inviting, well being)

- **Smell**
  (Design for Environment, appealing / repulsive)

- **Safety**
  (CCTV, “feeling of…”, crashworthiness, fire)

- **Appearance**
  (Industrial Design)
Example: WP7 Noise

Separation method
• Define desired capability
• Develop improved methods
• Validate methods
• Recommendations for Shift2Rail
Example: WP8 Energy

How to assess energy consumption?
Generate answer in finite time
Account for operational conditions
Account for Train properties
What’s the value of
One kg?
One kW?
One …?

Metro energy consumption

- Draft flow
- 40 pax exchange, no draft flow
- New wheels
- LCC case 125 pax, 15 C

EL7 fastest run -25 C, 40 pax exchange Zero Recuperation

100% 28% 220% 410%