

Arcs of Innovation in Canada's Railway Industry

Canadian Rail Summit 2016

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12 May 2016

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Railway Association
of Canada

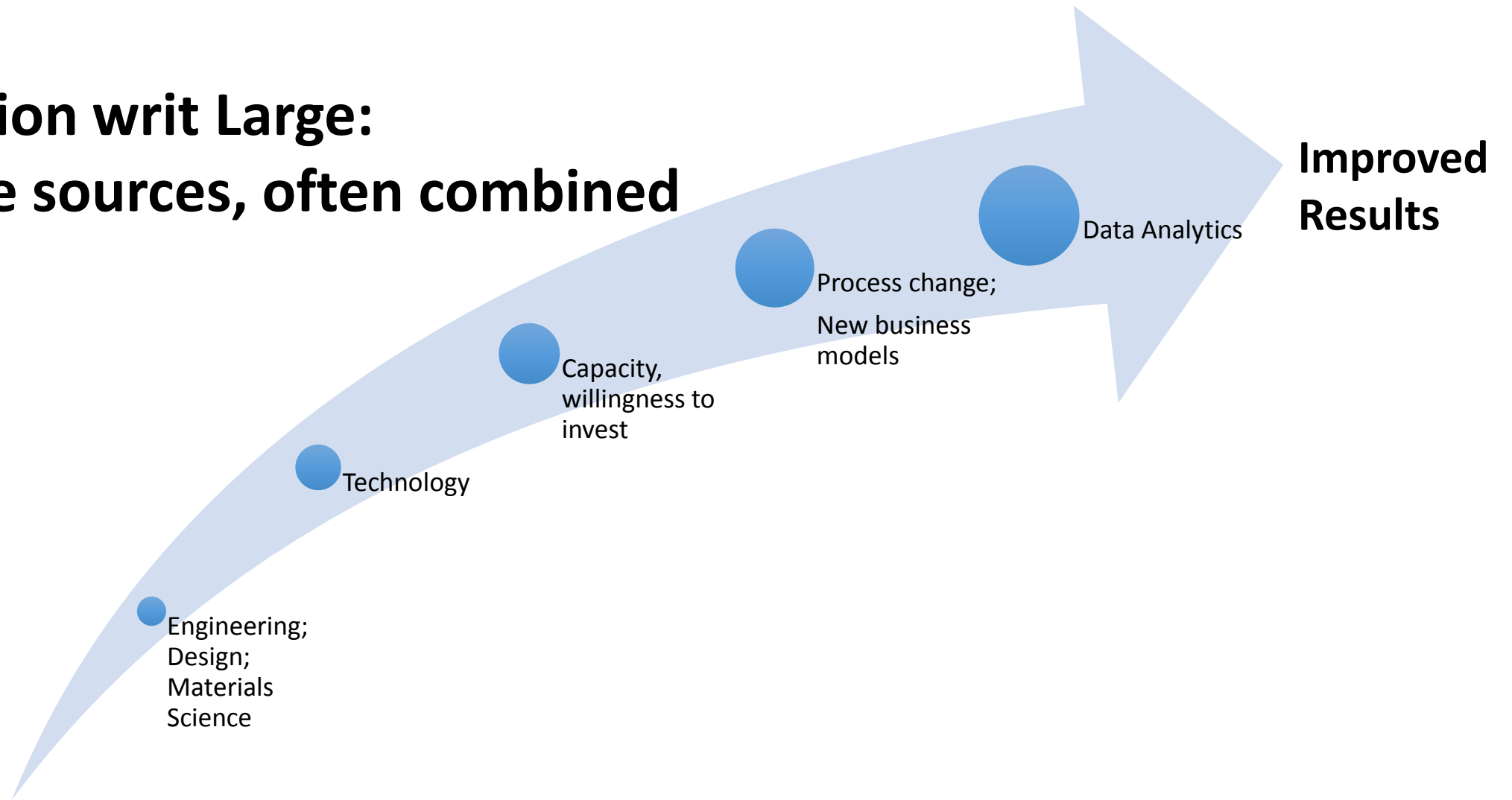
Innovation drives Safety, Service, and Productivity

“The challenge for manufacturers is...to focus on research and development, investing in machinery and equipment. And, more importantly, introducing a lot more innovation”.
(Canadian Manufacturers and Exporters, 2015)

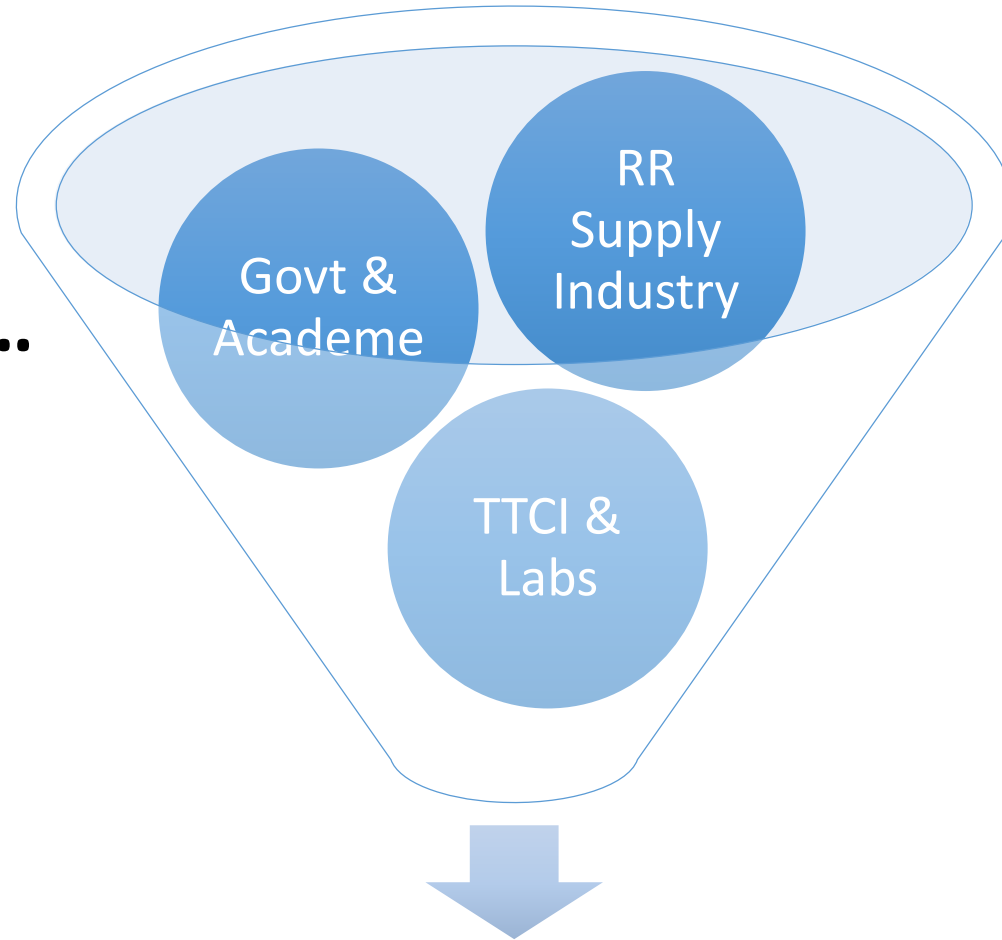
“Countries that are innovative...boast high productivity and thus a superior standard of living.”
(Conference Board of Canada)



Innovation writ Large: Multiple sources, often combined



**Not only the
Railroads themselves...**



**Deep-rooted culture of innovation –
Passenger, Commuter, Freight**



Weight,
Metallurgy,
Welding

URFD, WILD,
grinding,
lube, train
handling, DP

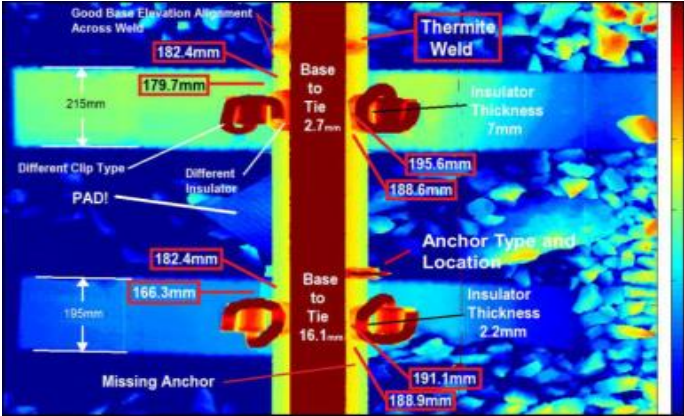
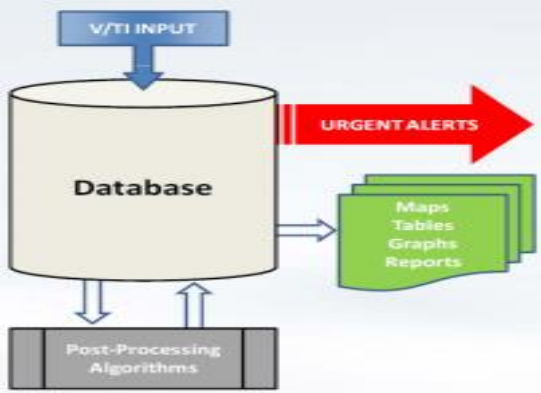
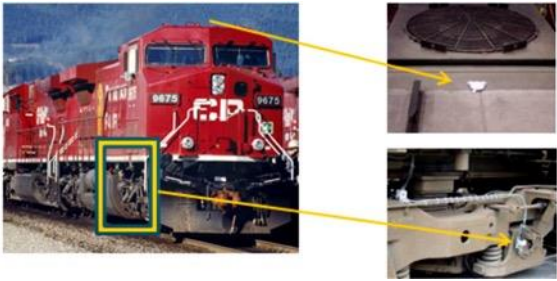
Frequency,
Improved
Technology,
Investment

Data
Analytics

**Safety, Service,
& Productivity
Improvements**

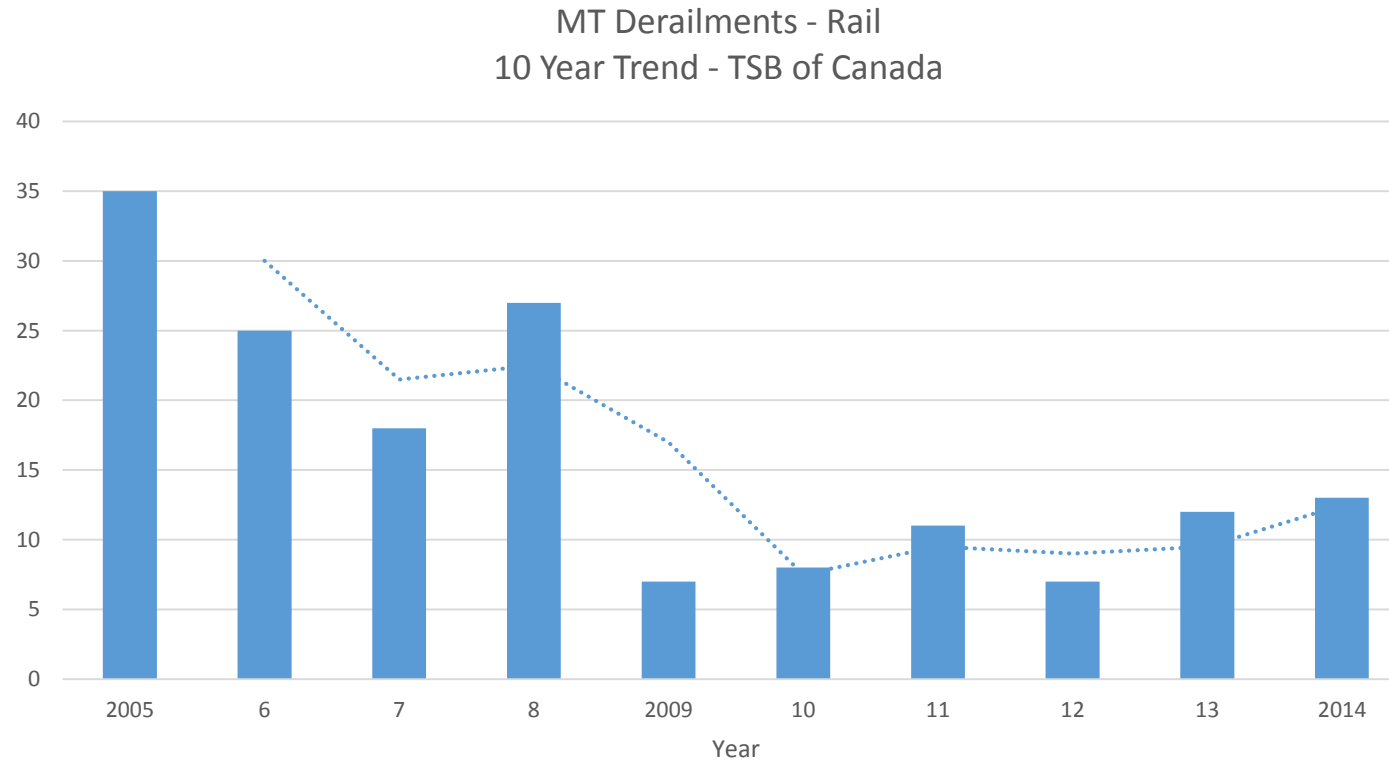
Arc of Innovation: Reducing Broken Rail Derailments

Infrastructure Safety Innovations



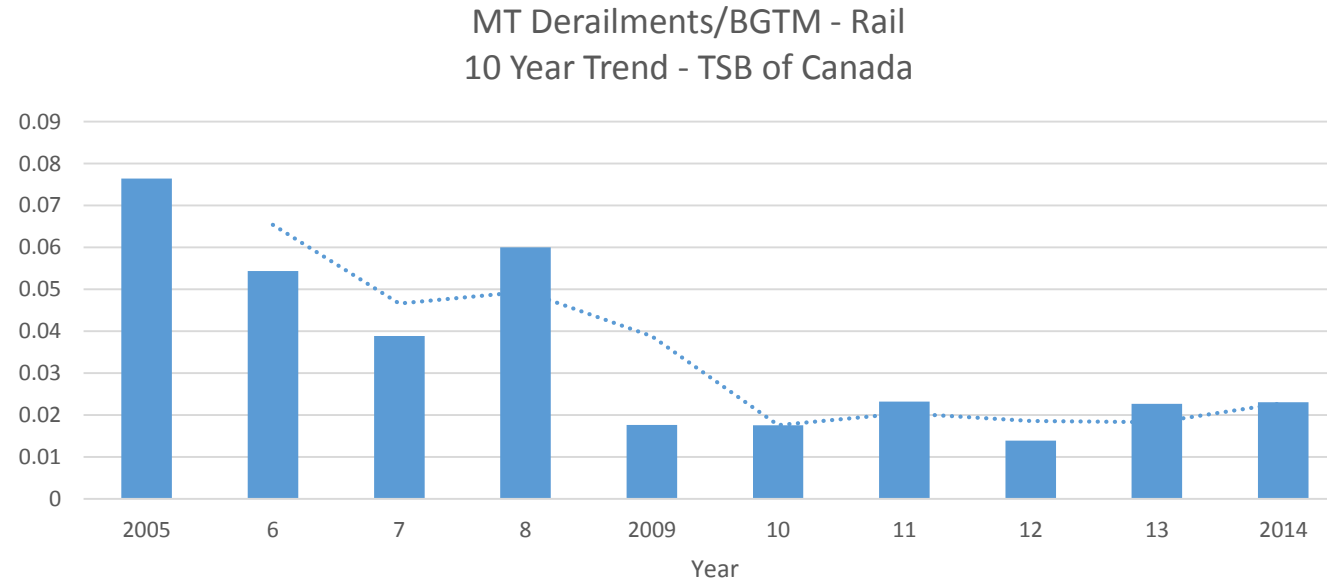
Results of Broken Rail Innovations

Significant improvement



Results of Broken Rail Innovations

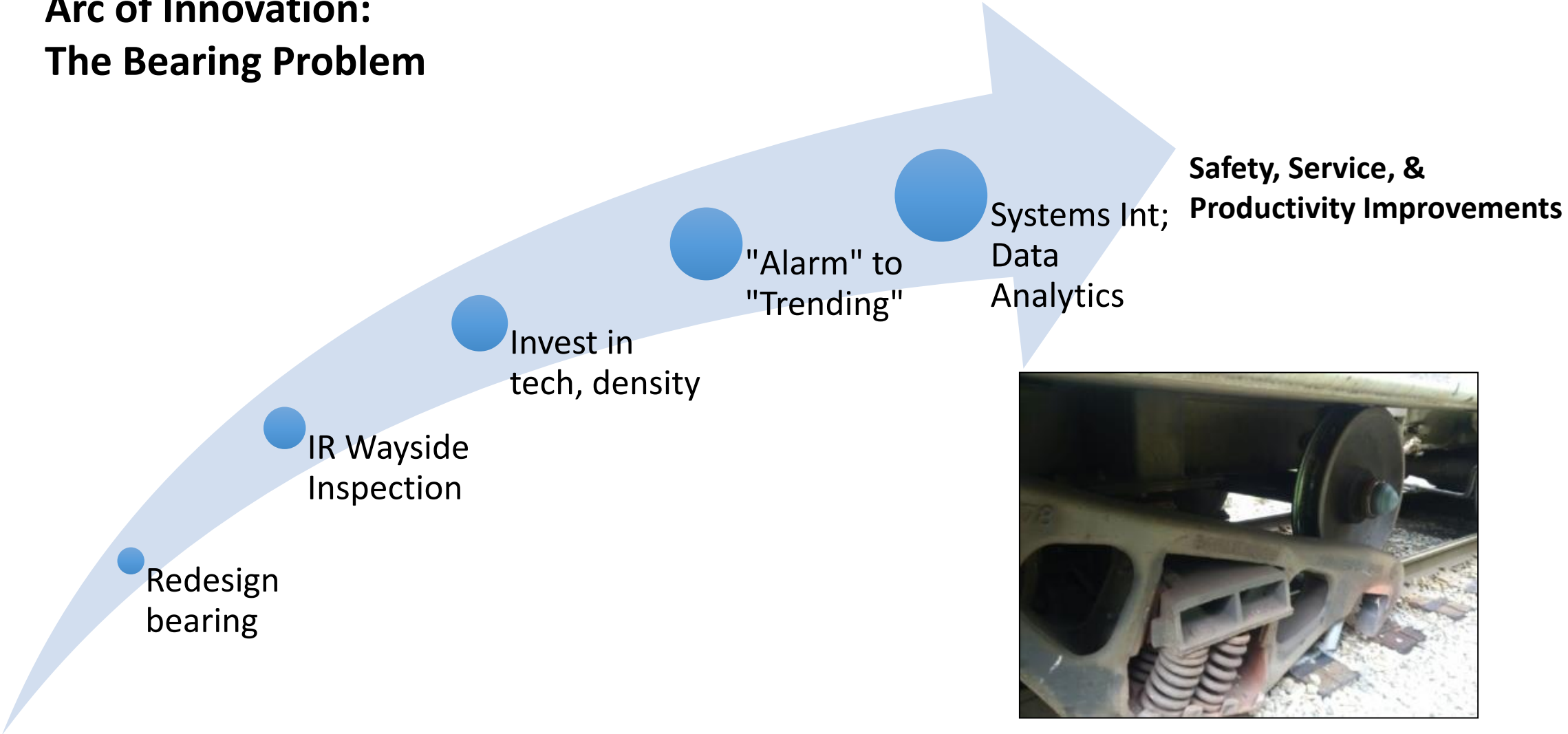
Normalized for traffic...



Track Inspection & Maintenance

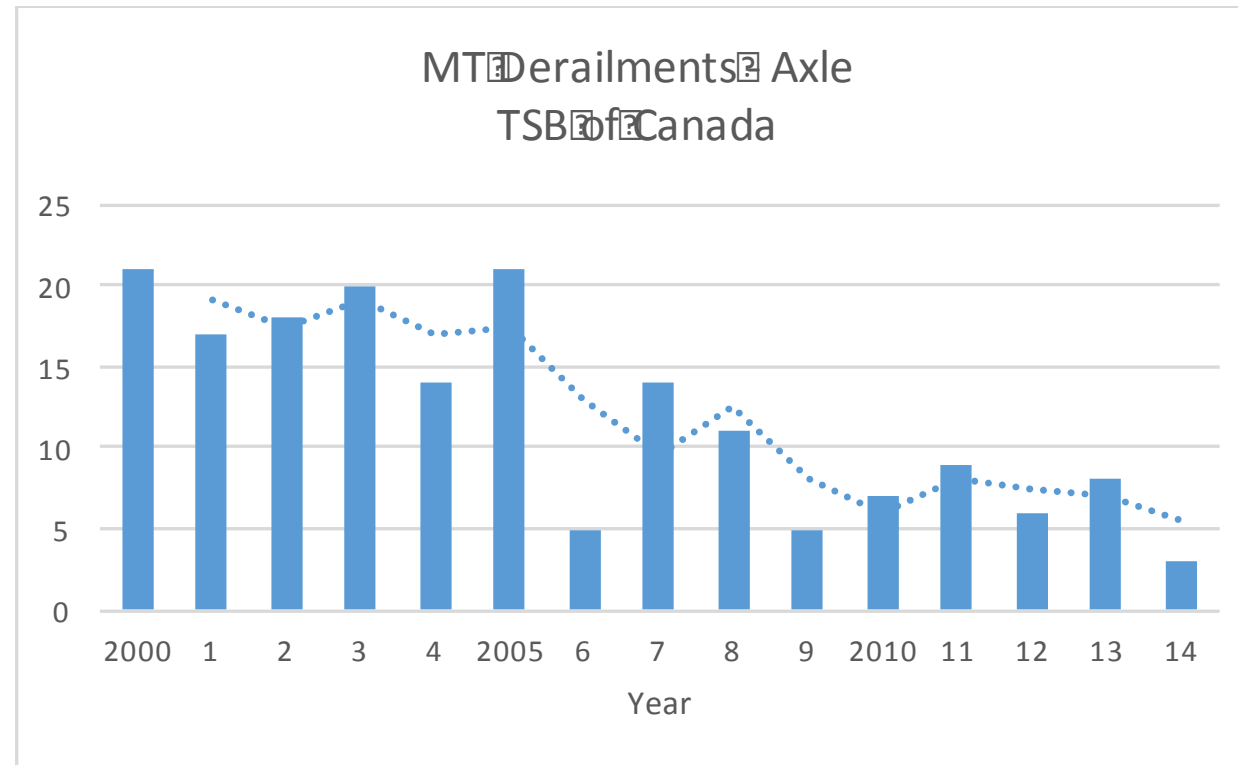


Arc of Innovation: The Bearing Problem



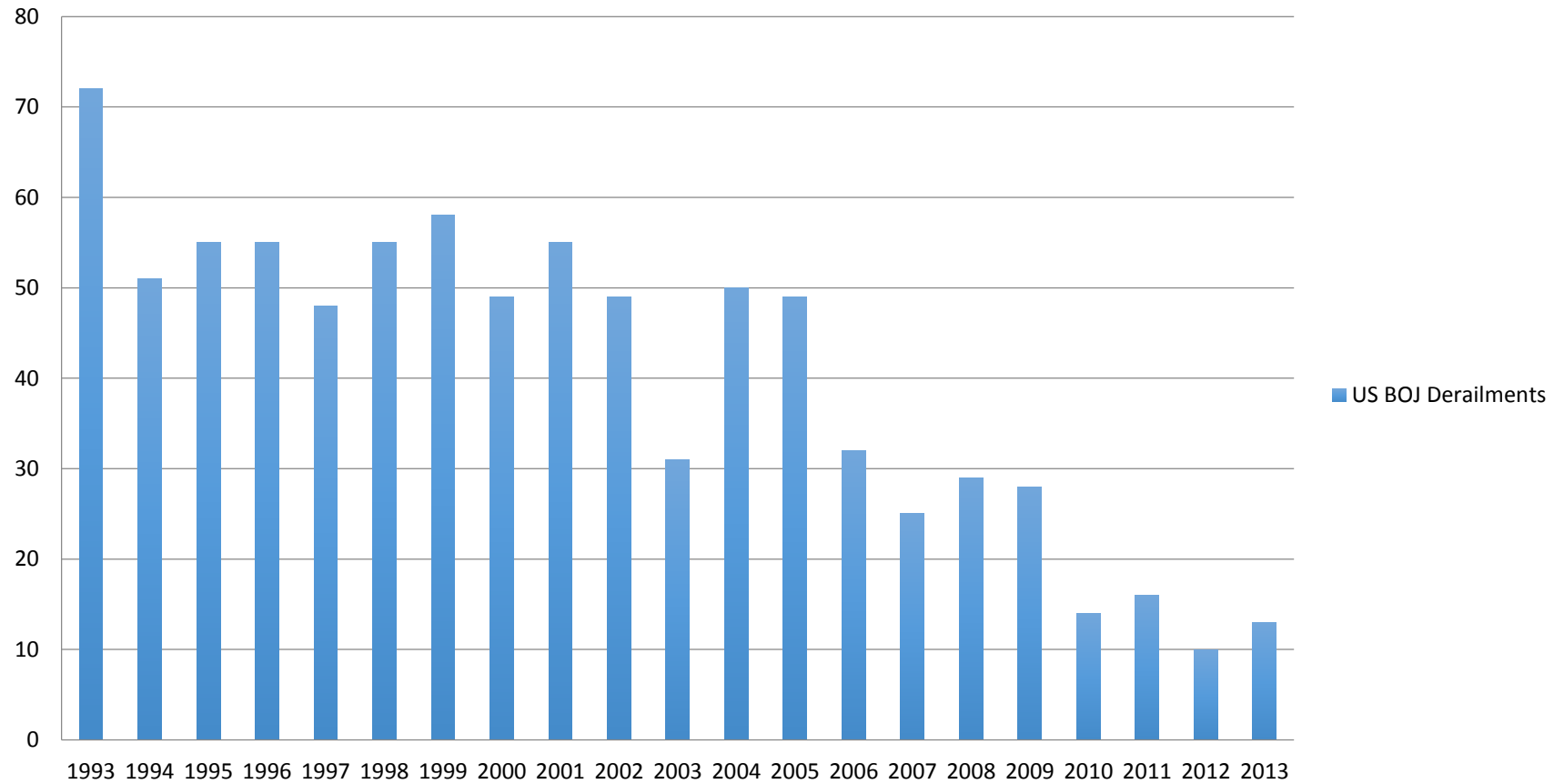
Results of Bearing innovations...

In Canada

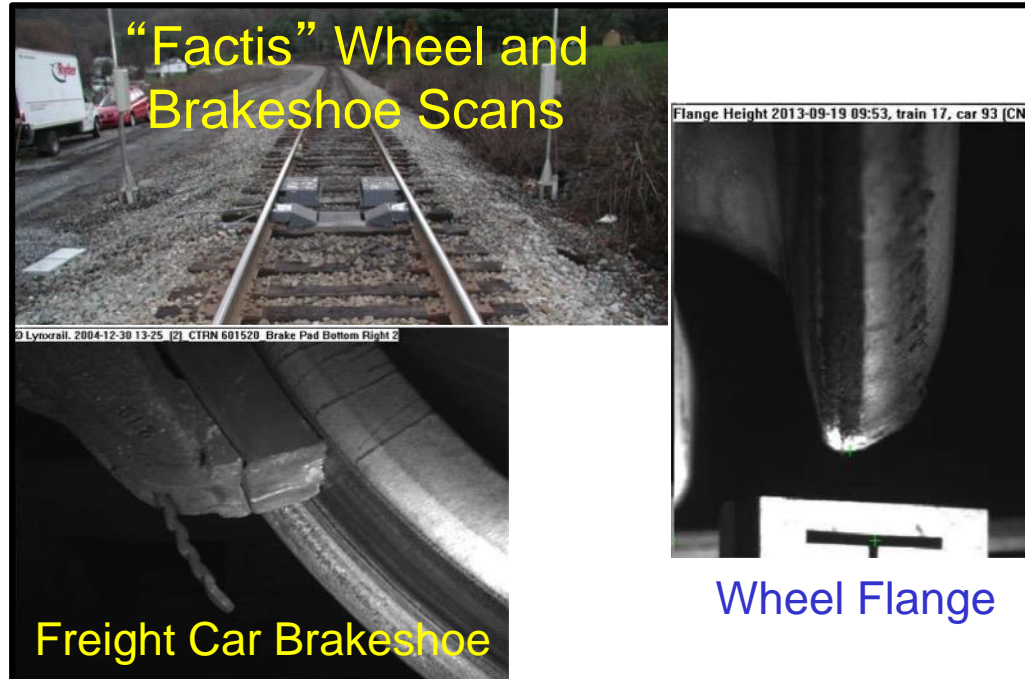


Similar pattern in US...

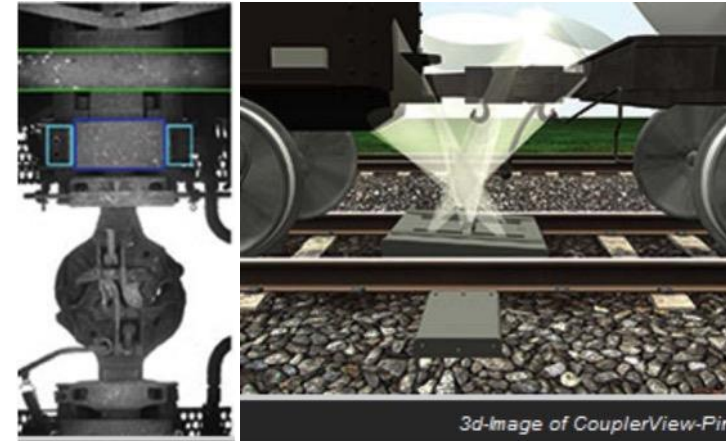
US Burned Off Journal Derailments



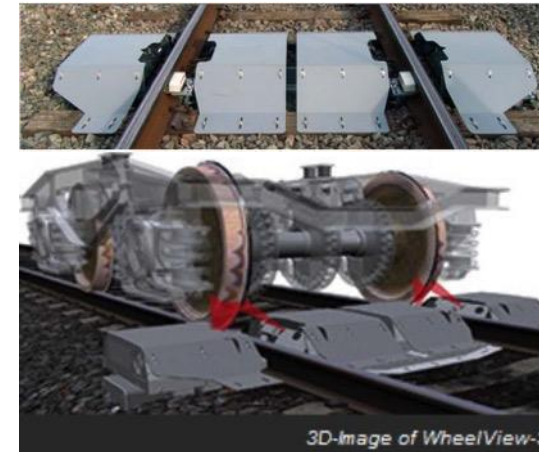
“Machine Vision” Systems



BeenaVision Coupler Scans



BeenaVision Wheel Scans



BeenaVision Corner View for Hose Scans



Locomotive Innovations



Business Model Innovations

“Piggyback” to Double Stack



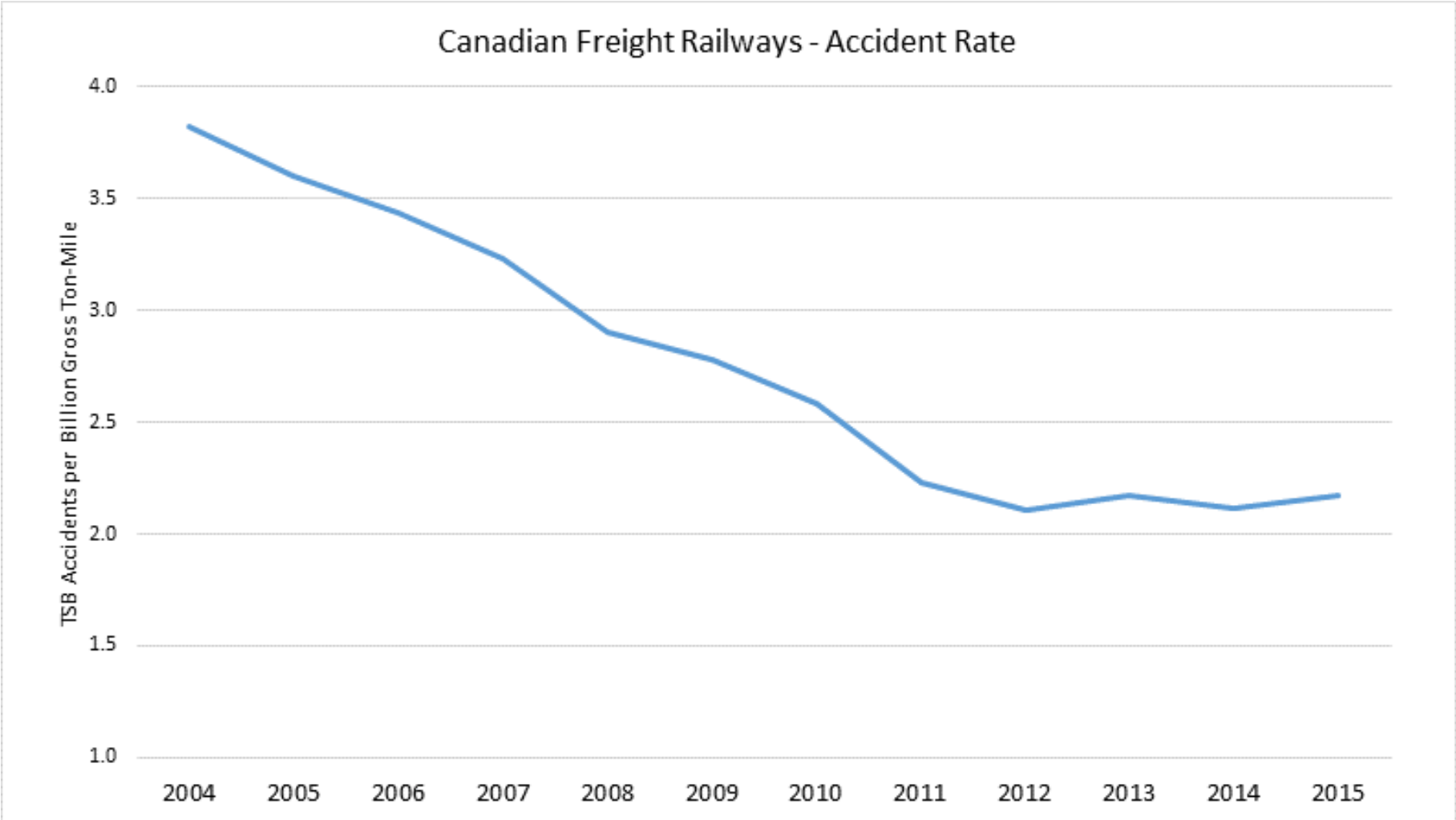


Business Model Innovations

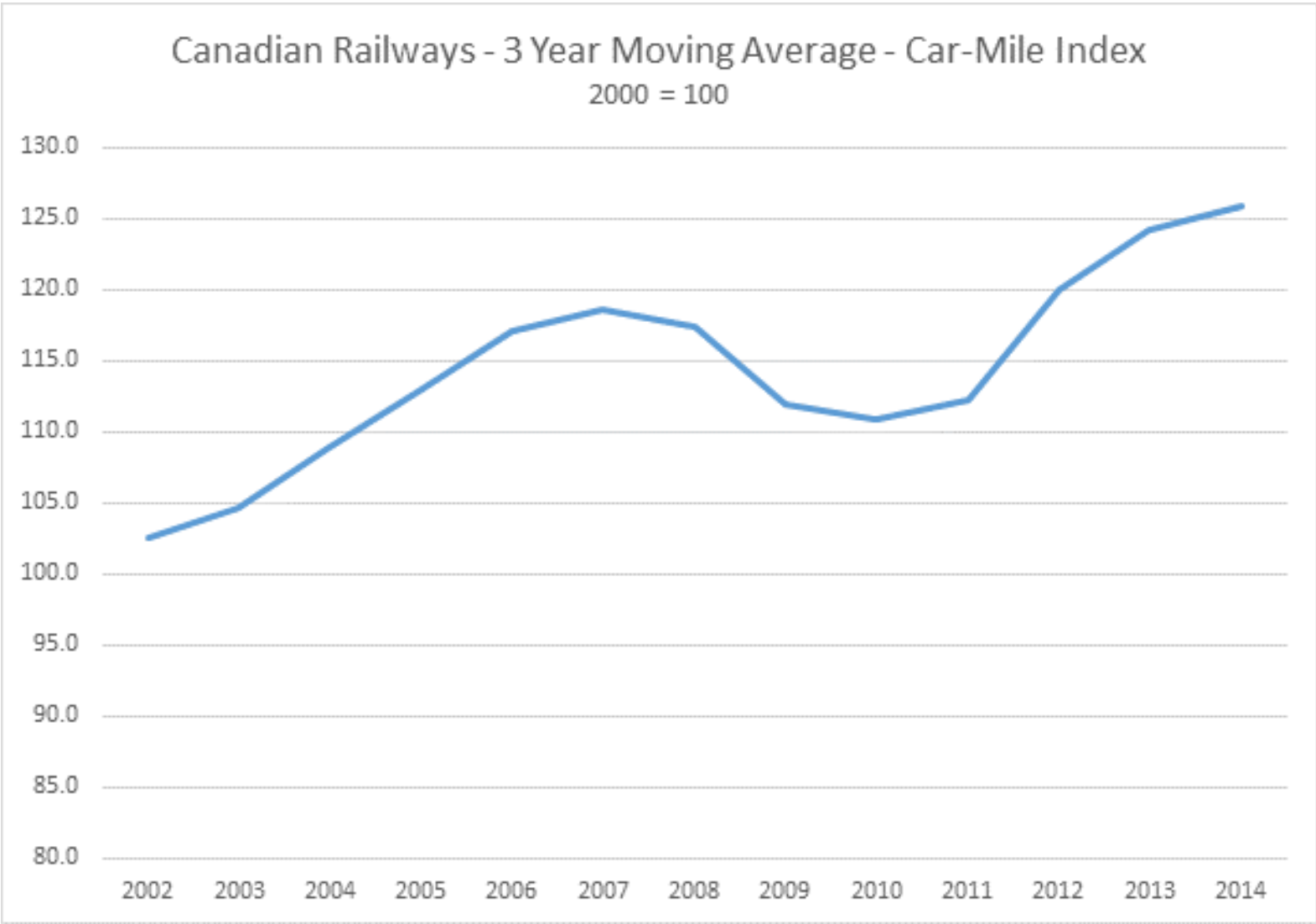
- ✓ Precision railroading
- ✓ Co-production
- ✓ Gateway optimization
- ✓ SC collaboration
- ✓ Commuter “crowbar”



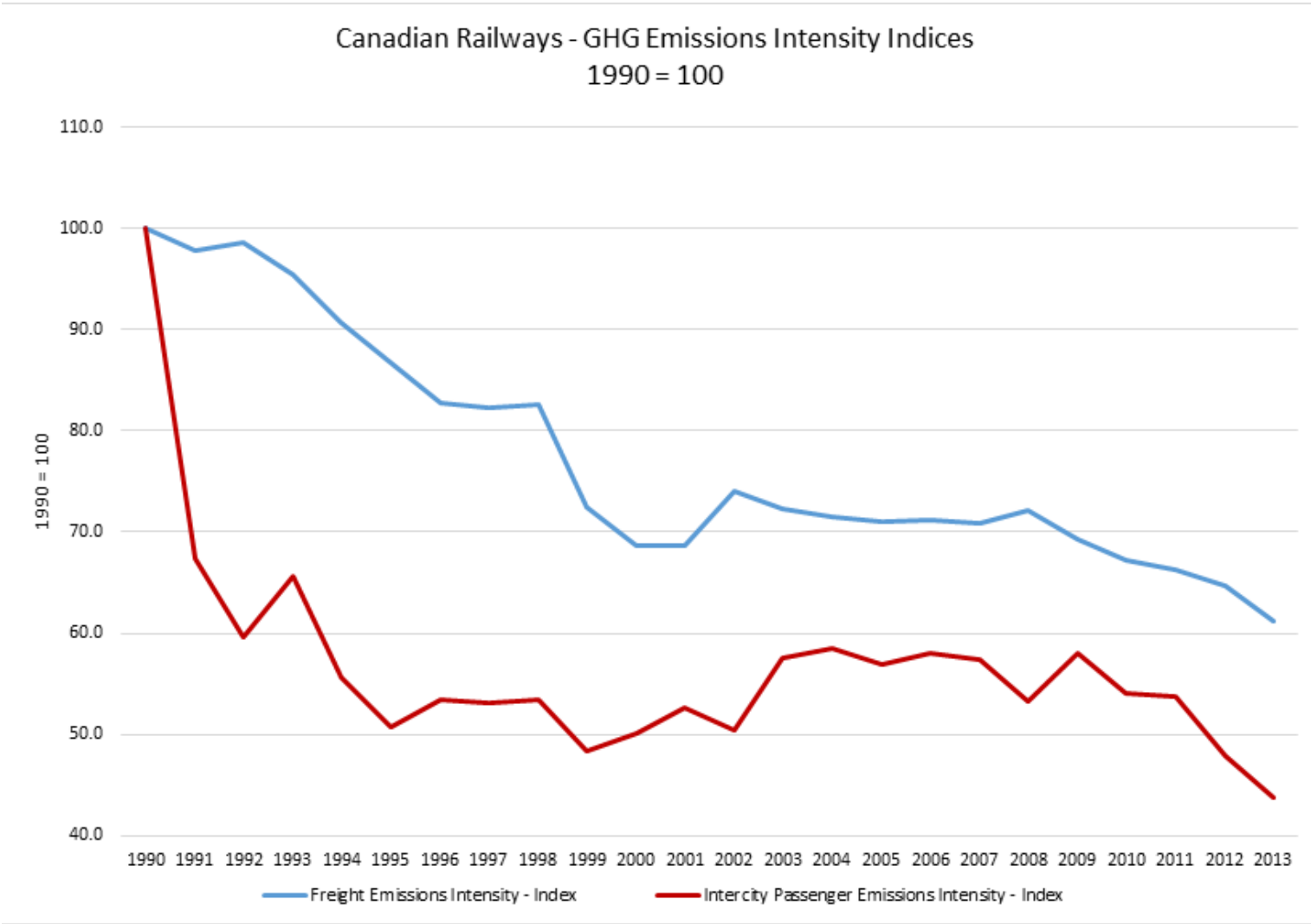
Safety



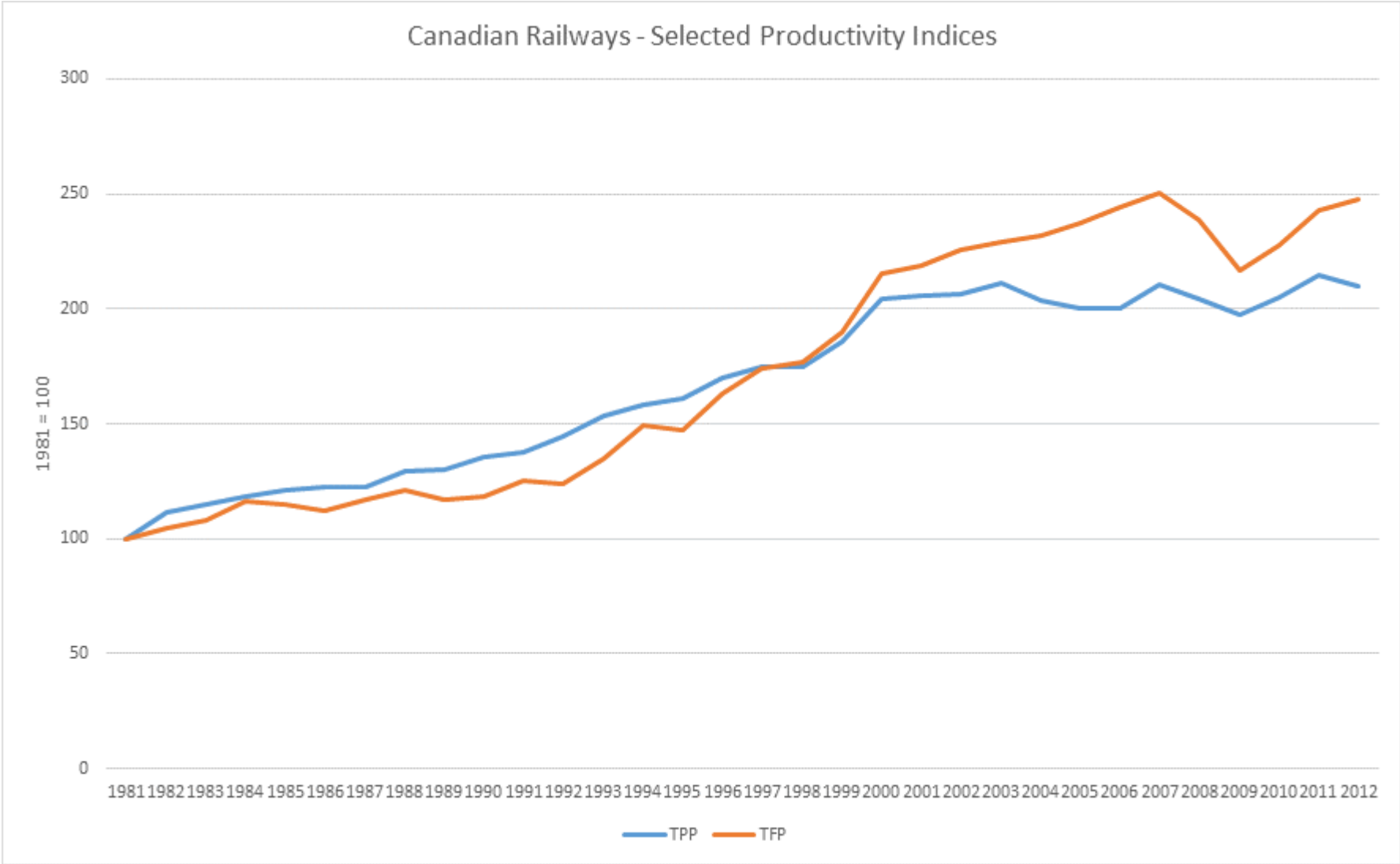
Service



Sustainability

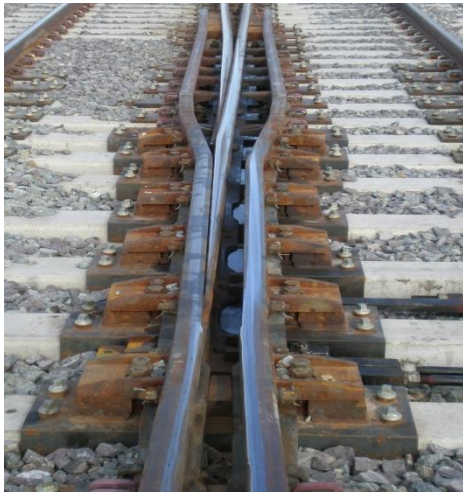


Productivity and Pass-Through



Arcs of Innovation in Canada's Railways

How do we accelerate and sustain improvements?



- Innovation writ large
 - Eng'g, Matl's Science
 - Process
 - Tech, IT, R&D
 - Data analytics
 - Business models
 - Often in combination
- Collaborative approaches
 - Railways
 - Suppliers
 - TTCI, Labs, Universities
 - Government
- Remove *barriers* to innovation
- *Results*
 - Safety
 - Service
 - Sustainability
 - Productivity

“Four cars to a coupling...two cars...one car...

