



U.S. Department  
of Transportation  
**Federal Railroad  
Administration**



**OFFICE OF RESEARCH DEVELOPMENT & TECHNOLOGY**  
FRA OFFICE OF RAILROAD POLICY & DEVELOPMENT

# FRA Best Practices Workshop on VTI Simulation

June 30, 2015

**DR. JOHN TUNNA**  
**DIRECTOR**

**OFFICE OF RESEARCH, DEVELOPMENT, AND TECHNOLOGY**  
**OFFICE OF RAILROAD POLICY AND DEVELOPMENT**



**Moving America Forward**

FRA – Office of Research, Development, and Technology

6/30/2015



U.S. Department  
of Transportation  
**Federal Railroad  
Administration**

# Two Primary FRA Offices

- Office of Railroad Safety – Robert Lauby (Associate Administrator for Safety/Chief Safety Officer)
  - Rulemaking and enforcement
  - Rail Safety Improvement Act (2008)
- Office of Railroad Policy and Development – Paul Nissenbaum, Associate Administrator
  - Obligation and oversight of grants and loans (Amtrak, RRIF, HSIPR, TIGER, etc.)
  - National Rail Plan
  - Passenger Rail Investment and Improvement Act (2008)
  - Research and Development

# Office of Research and Development



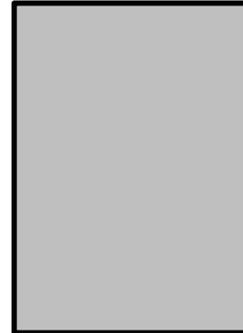
**Track Research Division**  
Chief, Gary Carr  
(6 Staff Members)



**Equipment and Operating Practices Division**  
Chief, Kevin Kesler  
(5 Staff Members)



**Train Control & Communications Division**  
Chief, Sam Alibrahim  
(5 Staff Members)



**Human Factors Research Division**  
Chief, Maryam Allahyar  
(3 Staff Members)

# FRA Best Practices Workshop on VTI Simulation Background

- **FRA uses commercially available simulation packages (codes) for:**
  - ❖ derailment investigations;
  - ❖ rule making activities;
  - ❖ vehicle-track system qualification;
  - ❖ evaluation of vehicle parameters;
  - ❖ defining loads to be used in other studies;
  - ❖ etc.
- **Codes lack certain capabilities that are needed to address some of the modeling requirements above.**
  - ❖ Some codes have some features, while no code appears to have all features

# FRA Best Practices Workshop on VTI Simulation Research Needs

- **FRA wants to reduce the risk of derailments due to vehicle-track interaction**
  - ❖ Improve fundamental understanding and capabilities of commercially available simulation codes
    - Wheel-Rail profile and contact geometry
    - Contact condition (non-Hertzian, conformal, etc.)
    - Friction/Lubrication/3<sup>rd</sup> Body Layer
    - Suspension elements
    - Track modeling
    - etc.
  - ❖ Bring together the experts in the field to identify research needs
  - ❖ Provide research funds
  - ❖ Share solutions

# FRA Best Practices Workshop on VTI Simulation Goal

- **The goal of the modeling workshop is to assess current vehicle-track simulation software capabilities and identify desirable improvements.**
- **Issues to be considered are development of model capabilities, modeling of difficult components, model validation.**
  - ❖ Develop fundamental science and understanding
  - ❖ Define procedures for model building
  - ❖ Define procedures for model and code validation
  - ❖ Work together to define benchmark problems to evaluate capabilities

# FRA Best Practices Workshop on VTI Simulation Agenda

## Day 1 - Tuesday June 30, 2015 (morning)

9:00 AM	Welcome and Opening Remarks	Anne Aylward - Volpe
9:10 AM	Introduction and Meeting Objectives	John Tunna - FRA
9:30 AM	<b>SESSION I: Presentations on leading commercial software tools</b>	
	NUCARS	Nicolas Wilson
	SIMPACK	Christoph Weidemann (via web)
10:30 AM	<b>SHORT BREAK</b>	
10:45 AM	<b>SESSION I: Continued (30 min each)</b>	
	VAMPIRE	Peter Klauser
	VI-Rail	Gabriele Ferrarotti (via web)
11:45 AM	<b>SESSION I Wrap-up and Summary</b>	John Tunna
12:00 – 1:00 PM	<b>LUNCH</b>	

# FRA Best Practices Workshop on VTI Simulation Agenda

## Day 1 - Tuesday June 30, 2015 (afternoon)

<b>1:00 PM</b>	<b>SESSION II: Selected Modeling Challenges (30 min each)</b>	
	Modeling wheel/rail contact including conformal contact	<i>Edwin Vollebregt</i>
	Extended-creep-force model in vehicle dynamics simulation	<i>Heinz-Peter Kotz</i>
	Suspension components – Part I	<i>Peter Klauser</i>
<b>2:45 PM</b>	<b>SHORT BREAK</b>	
<b>3:00 PM</b>	<b>SESSION II: Continued (30 min each)</b>	
	Suspension components – Part II	<i>Nicolas Wilson</i>
	Model Validation	<i>Bridget Eickhoff (via web)</i>
	Benchmarks	<i>Phil Shackleton</i>
<b>4:30 PM</b>	<b>Panel Discussion on Modeling Challenges</b>	<i>John Tunna and Jean-Pierre Pascal</i>
<b>5:30 PM</b>	<b>ADJOURN</b>	

# FRA Best Practices Workshop on VTI Simulation Agenda

## Day 2 – Wednesday July 1, 2015 (morning)

9:00 AM	DAY 1 Summary	<i>John Tunna</i>
9:15 AM	Modeling Challenges Facing FRA	<i>Ali Tajaddini and Brian Marquis</i>
9:45 AM	SHORT BREAK	
10:00 AM	Discussion/Prioritization of simulation research needs	<i>All Participants</i>
11:30 AM	Summary and Next Steps	<i>Ali Tajaddini</i>
11:45 AM	Closing Remarks	<i>John Tunna</i>
12:00 PM	ADJOURN	

# RAIL – *Moving America Forward*

*Visit us at:*  
***[www.fra.dot.gov](http://www.fra.dot.gov)***



Connect with us **USDOTFRA**