



Weigh-In-Motion (WIM) and Measurement Reach Back Capability (WIM-RBC)

**The Configuration and Data Management Tool for Validation,
Verification, Testing and Certification Activities**

**to the
SOLE 2005 Conference
Logistics: Product and Process for Capability
40th Annual International Conference
Orlando, FL**

**WIM Team
Oak Ridge National Laboratory**

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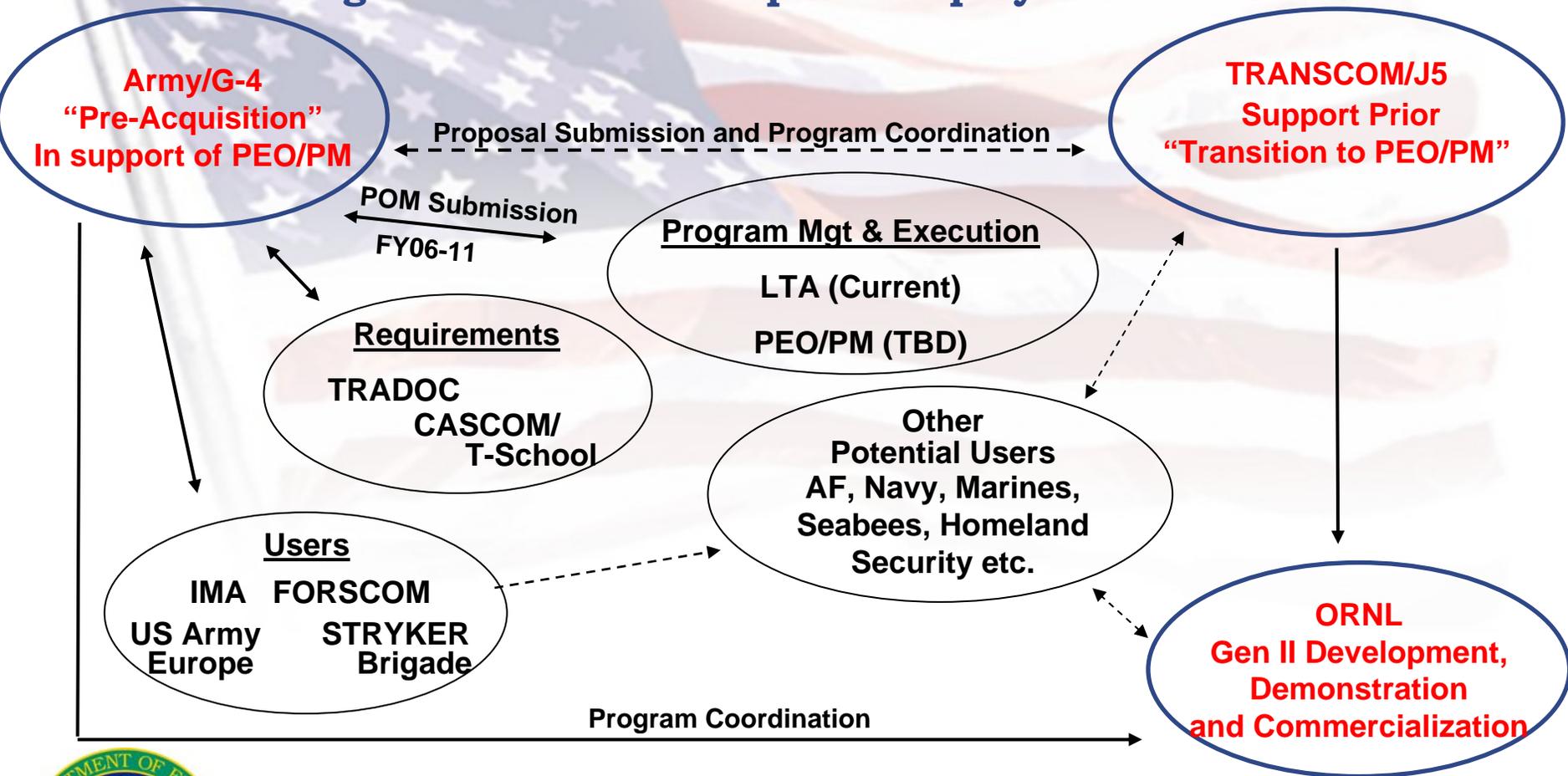


16 Aug 05

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Partnership for Rapid Development, Demonstration and Commercialization of the Next Generation WIM (GEN II) System

The Challenge and Goal: Develop and Deploy the WIM GEN II



Conclusion From DoD Management:

Unanimous opinion that a **portable, reliable, and accurate** WIM system could enhance current deployment and redeployment missions.

Agenda -

ORNL Weigh in Motion

- Why WIM?
- What is WIM? – ORNL's Version
- Reference to May '03 User Demonstration
- WIM Gen II Components
 - Artist View, Fully Assembled WIM Gen II, Disassembled Portable WIM System (4' X 4' X 3')
- WIM FY05
 - Army G-4 & USTRANSCOM J-5 Tasks Compared
 - WIM Program Status and Issues
- WIM Gen II Out Years



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Why Weigh-in-Motion (WIM)?

ORNL Weigh in Motion

- Increased Safety
- Reduced Manpower
- Reduced Time Required for Deployment Process
- Eliminates Stress, Weather Related and Other Human Errors
- Improved Accuracy:
 - Weighs and Records Individual Tire and/or Axle Weights
 - Measures and Records Spacing Between Axles
 - Calculates Vehicle Center of Balance
 - Transfers Collected Data Electronically to Load Planning/ITV Systems



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WIM Gen II

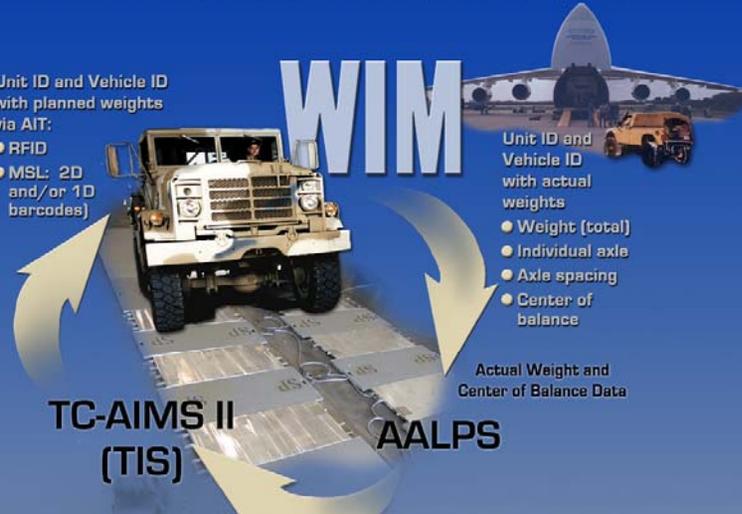
What's Unique?

ORNL Weigh in Motion

- Electronically Retrieves Deployment Information
- Identifies Vehicle
- Automatically Weighs & Determines COB
 - Dynamic or Static
- “Actual” Data processed

Logistics Transformation

ORNL is Developing the Next Generation Portable Weigh-In-Motion System (WIM) Enhancing the Defense Transportation System



Unit ID and Vehicle ID with planned weights via AIT:

- RFID
- MSL: 2D and/or 1D barcodes)

Unit ID and Vehicle ID with actual weights

- Weight (total)
- Individual axle
- Axle spacing
- Center of balance

Actual Weight and Center of Balance Data

TC-AIMS II (TIS) AALPS

Updated Actual Movement Information

- Portable
- Fully automated—no operator error
- Wireless technology and load-planning
- Determines weight, center of balance, axle weight and spacing
- 500% productivity increase, save 40 minutes per plane
- Enhances safety of the vehicle/cargo weighing process and safety of deployments

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Conclusion From DoD Management:

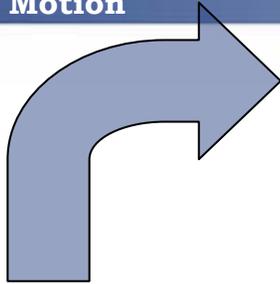
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Overall Process Demonstrated - May 03

ORNL Weigh in Motion



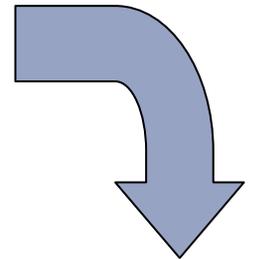
Step 1: Automated process using EEDSK captured Unit ID and Vehicle ID with "planned" weights via AIT (RFID, 1D and/or 2D Barcodes) data sent to ITV server.

Portable Weigh-in-Motion

- Portable
- Fully automated—no operator error
- Wireless technology and load-planning
- Determines weight, center of balance, axle weight and spacing
- 500% productivity increase, save 40 minutes per plane



Step 2: Automated process using WIM captured: Unit ID and Vehicle ID with "actual" weights; Weight (total); Individual Axle; Axle spacing; and Center of Balance.



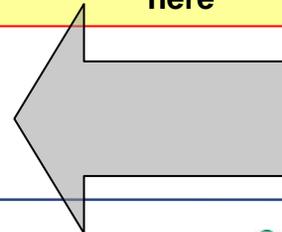
Step 3: Manual data entry process entered: "Actual" Weight, COB, and ID Info into AALPS



TC-AIMS II

Demo process stopped here

AALPS

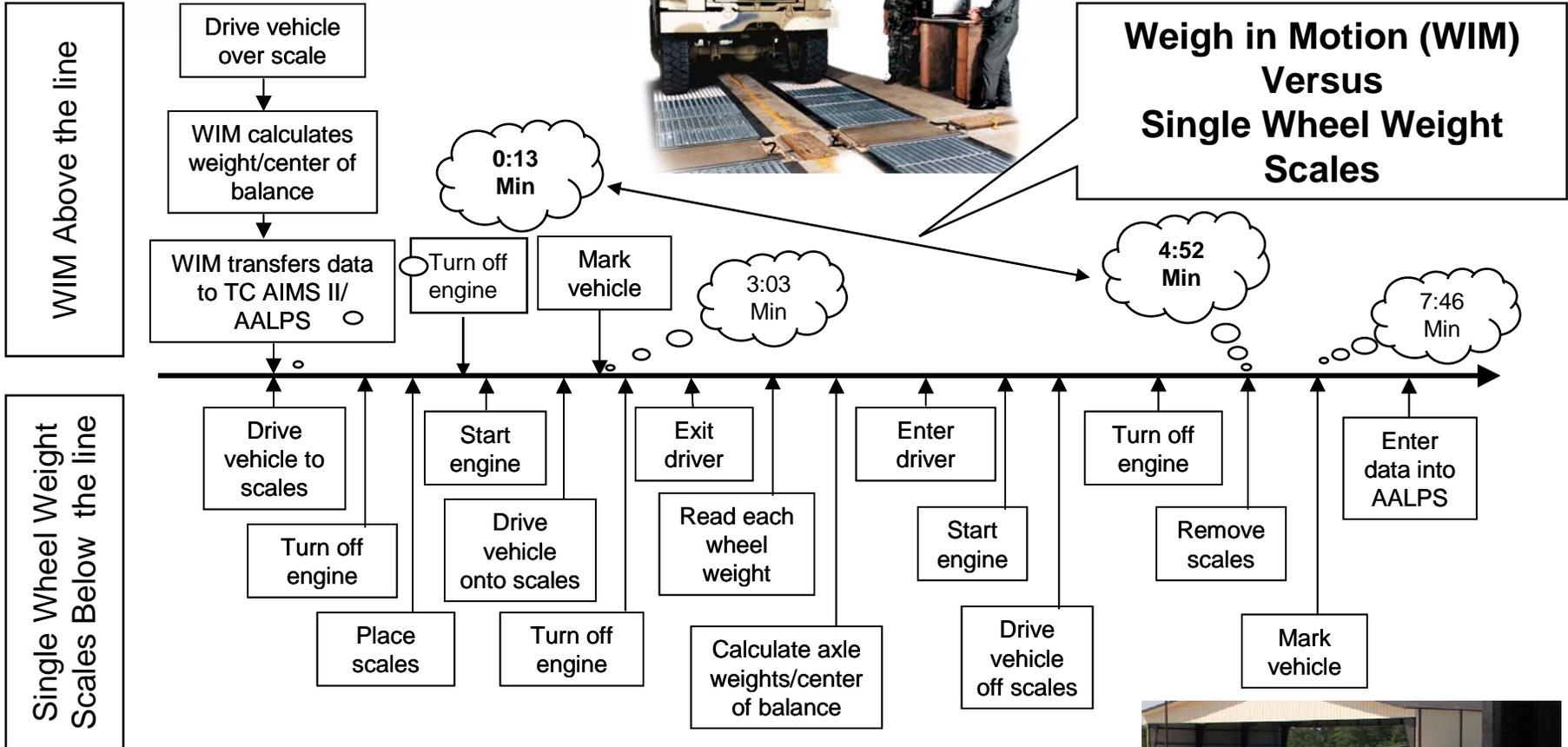


Comparison of Portable Weighing Process

ORNL Weigh in Motion



**Weigh in Motion (WIM)
Versus
Single Wheel Weight
Scales**



Single Wheel Weight Scales

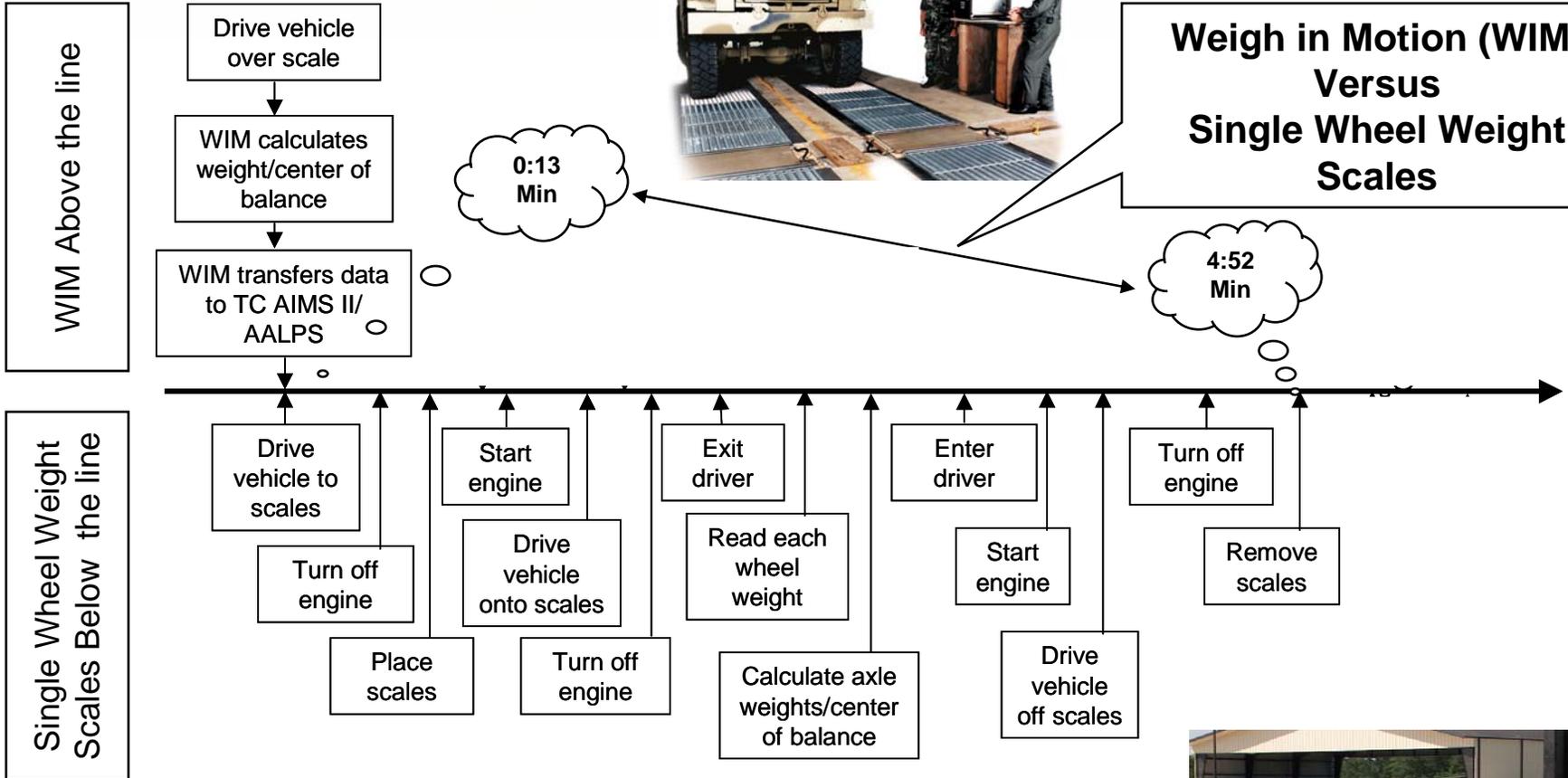


Comparison of Portable Weighing Process

ORNL Weigh in Motion



**Weigh in Motion (WIM)
Versus
Single Wheel Weight
Scales**



Single Wheel Weight Scales



WIM User Demo Technical Results

ORNL Weigh in Motion

WIM User Demonstration Technical Results				
Weighing Measuring Techniques	Average Vehicle Time (min:sec) w/marking	Average Vehicle Time (min:sec) w/out marking	Personnel Required	% Vehicle Data with Human Errors
Static Scale/ Tape Measure	7:38	4:48	3	9 %
Individual Wheel Weight Scales/ Tape Measure	7:46	4:52	7	14 %
Weigh-in-Motion System	3:03	0:13	3	0 %





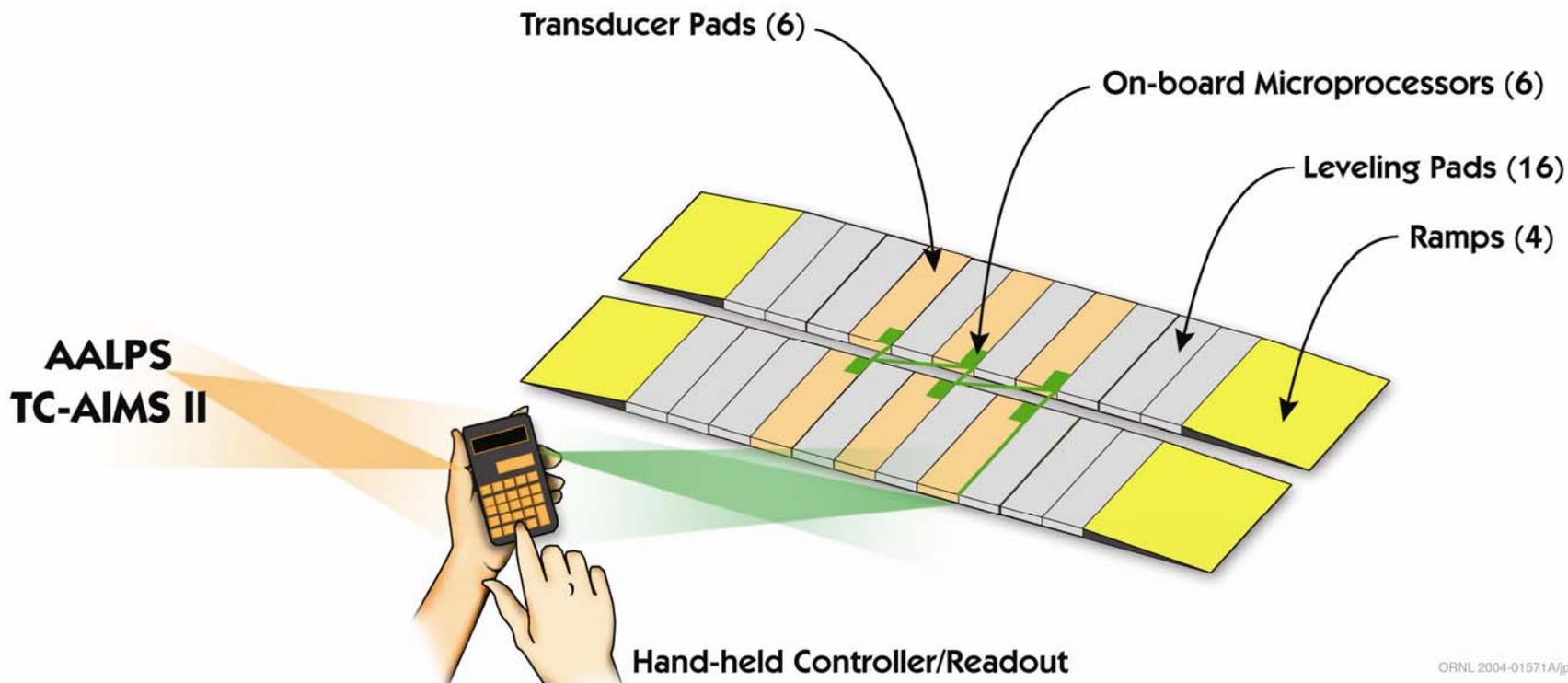
Weigh-in-Motion (WIM) Gen II Program

Initial Findings



Portable WIM Gen II Conceptual View

ORNL Weigh in Motion

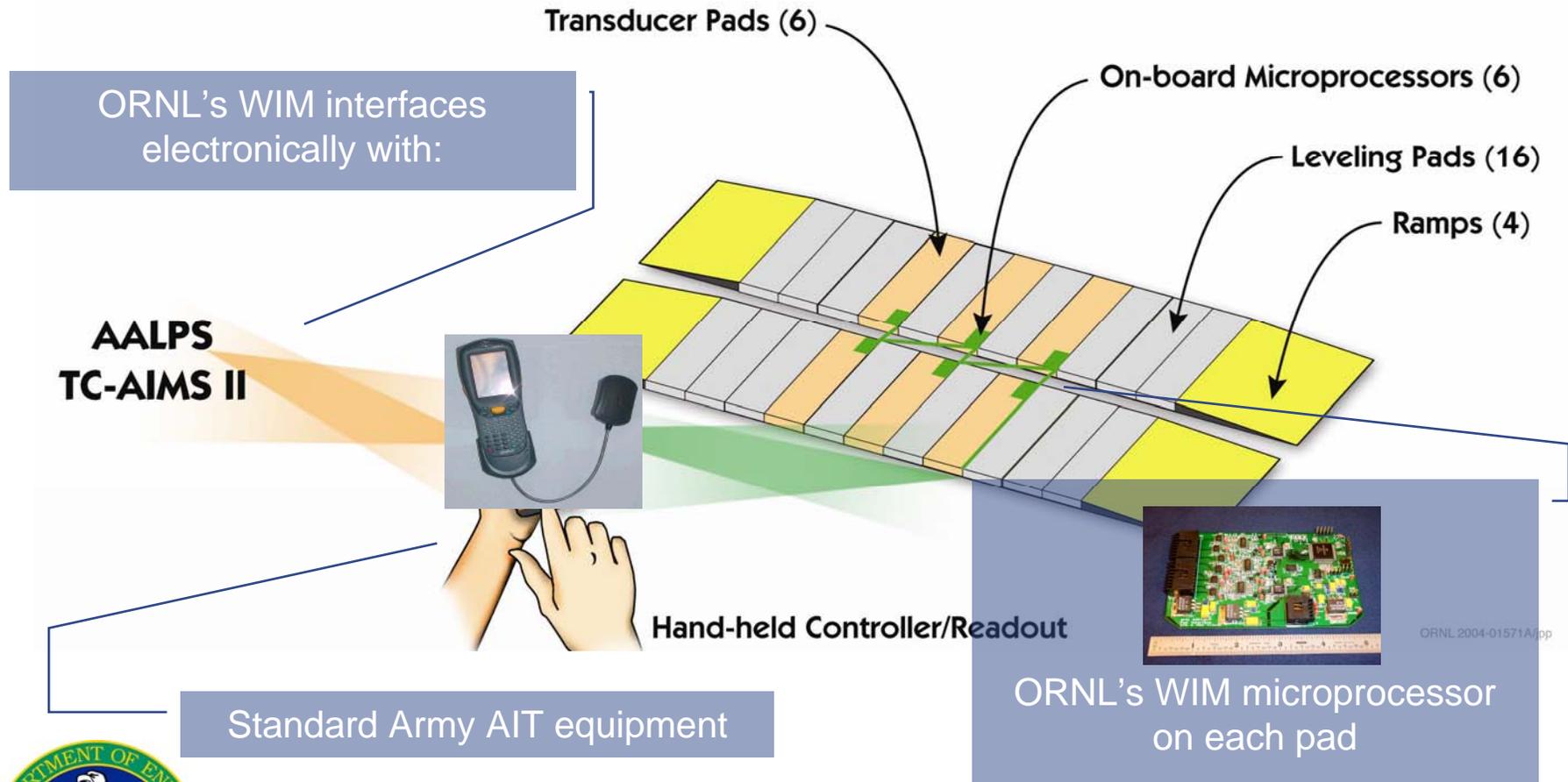


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Portable WIM Gen II Conceptual View

ORNL Weigh in Motion



Fully Assembled WIM Gen II

ORNL Weigh in Motion



Leveling pads

Power supply/converter

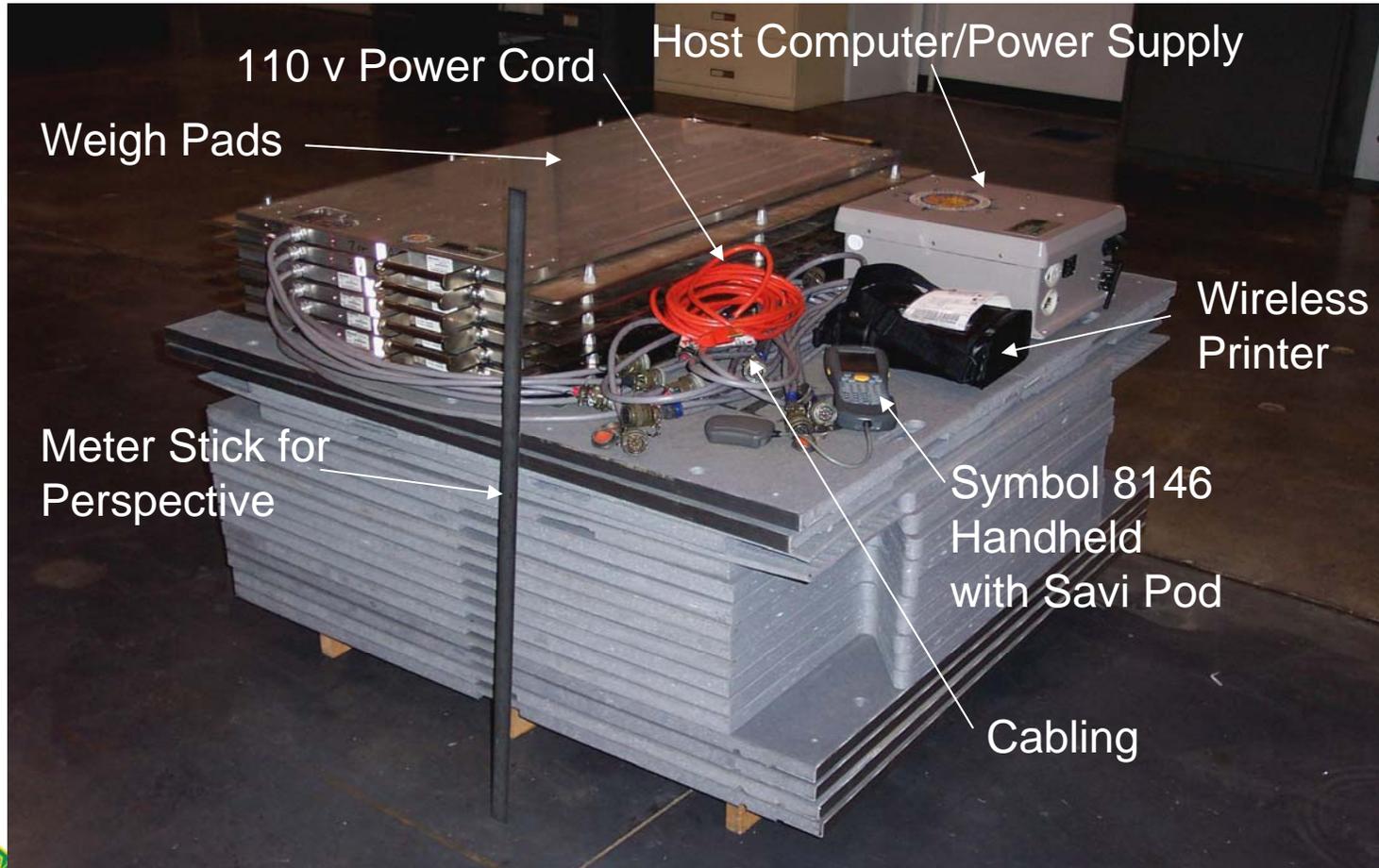
ORNL Cabling

Six individual weigh pads with embedded microcomputer



Disassembled Portable WIM System (4' X 4' X 3')

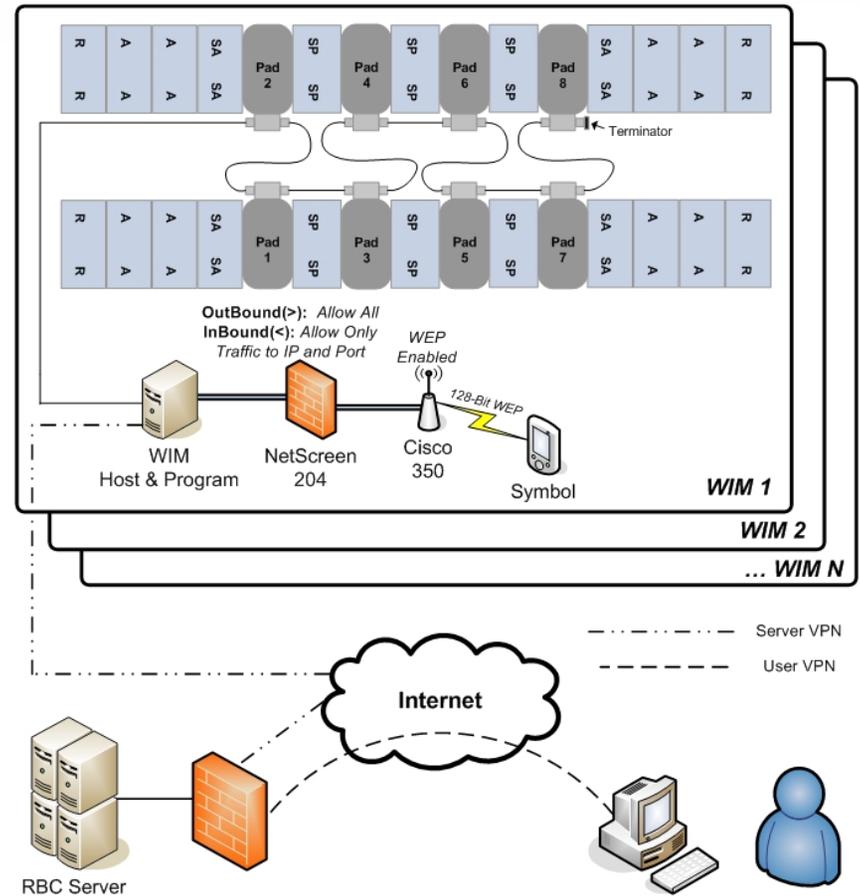
ORNL Weigh in Motion



WIM Logistics Reach Back Capability

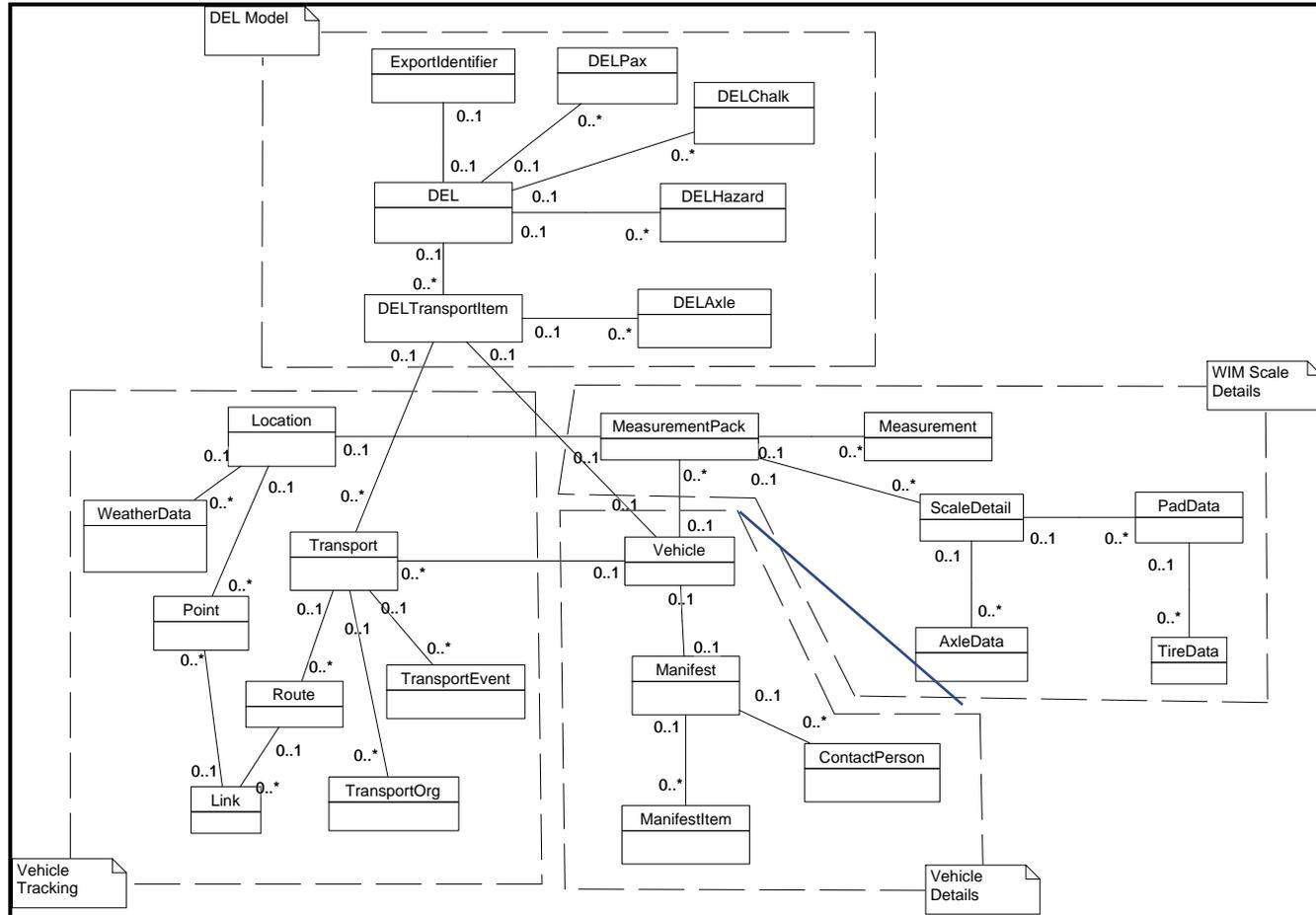
ORNL Weigh in Motion

- WIM Device
- Secure Infrastructure
 - Wireless
 - Access Points
 - VPN
- Authorized Users
 - Access
 - Retrieve
 - Analyze Info



High Level UML Class Diagrams

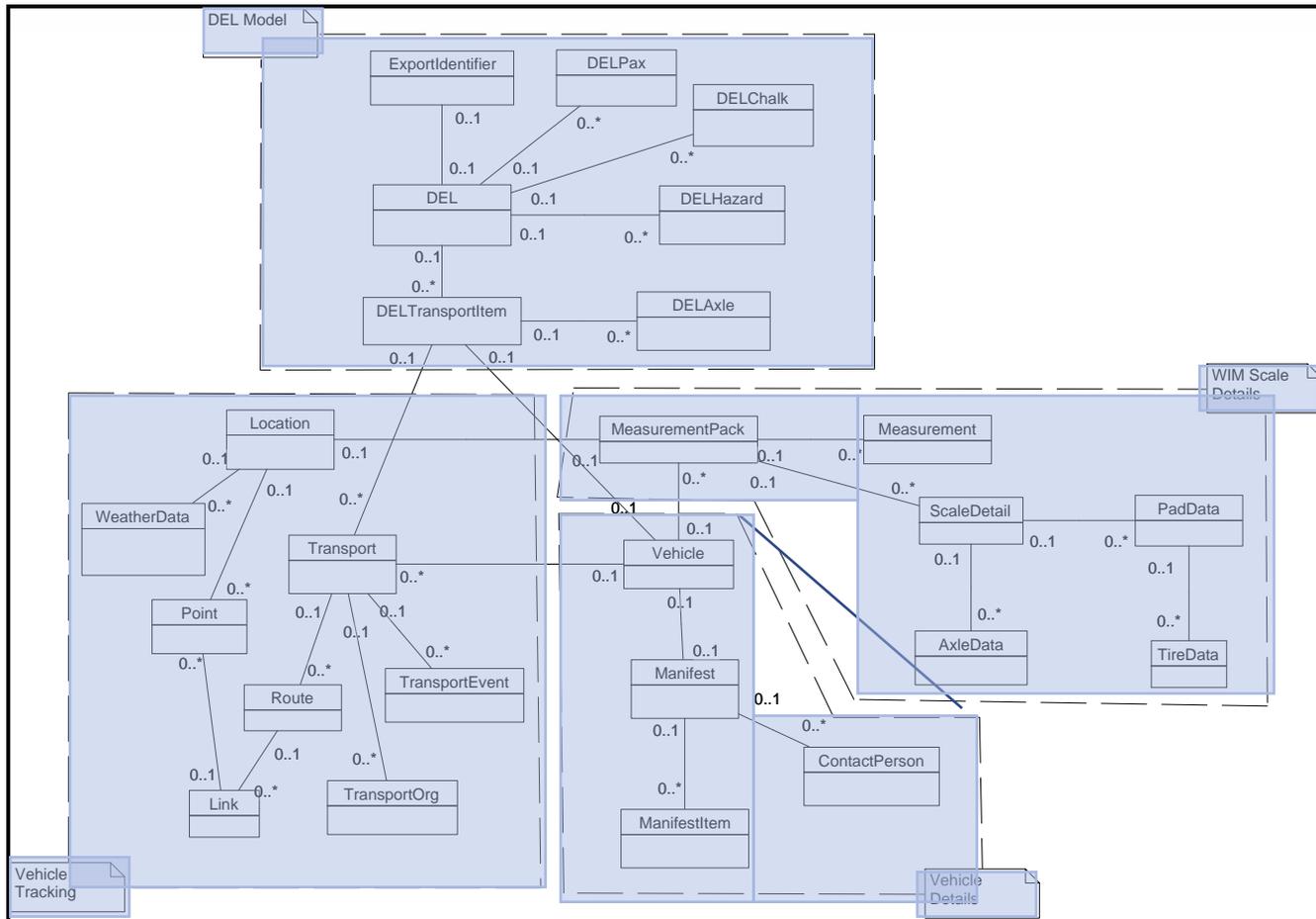
ORNL Weigh in Motion



WIM Reach Back Capability: High Level Universal Modeling Language (UML) Diagrams

High Level UML Class Diagrams

ORNL Weigh in Motion



WIM Reach Back Capability: High Level Universal Modeling Language (UML) Diagrams

WIM Reach Back Capability Status

ORNL Weigh in Motion

- WIM Reach Back data analysis is addressing:
 - Technologies for Data Collection
 - Management, Quality Assurance, and Reporting of Collected Data
 - Integration of Traditional and Operational Data Sets
 - Data Availability and Use in Decision and Policy Making
 - Improvement of Information Integration
- Establish direction for:
 - On-going, and
 - Future applied research and applications



WIM Reach Back Capability Futures

ORNL Weigh in Motion

- Integrate Following Subsystems into WIM Reach Back Capability:
 - Dimensional Measurement
 - Length, Width, Height and Cube
 - Static Scale Conversion to Dual Use
 - Address Automation of Marking
- Evaluate WIM System Operationally under Field conditions
 - Provide for one weighing protocol from multiple devices

