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# Evaluation of the I-95 Corridor Coalition CVO Safety-Related Field Operational Tests – Status Update and Interim Results

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Presented to:

I-95 CVO Program Track Committee

Providence, Rhode Island

June 29, 1999



**Battelle**

*... Putting Technology To Work*

# Presenters

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- Evaluation Goals and Methodology
  - John Orban (Battelle)
- Early Results from Roadside Safety Studies
  - John Kinateder (Battelle)
- Interim Report on Focus Groups with CVO Safety Inspectors in CT, MD, NY, and PA
  - Hugh Clark (CJI Research Corp.)
- Evaluation Status and Plans
  - John Orban (Battelle)

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# Evaluation of the I-95 CVO Safety-Related FOTs Goals and Methodology

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Presented by:  
John Orban



# Discussion Topics

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- Background
- I-95 Safety Evaluation Goals
- Hypotheses/Study Questions
- Evaluation Tests

# Deployment of Safety Information Exchange Technology

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- **Pen-based & Laptop Computers**  
(Record/upload inspection data, access carrier safety data)
- **Communication Technologies**  
(Cellular, CDPD, Satellite)
- **On-line Access to CVIEW and SAFER**  
(Driver and vehicle safety data, credentials, crime data)

# Background: Coordination of Efforts

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- Ten CVISN Model Deployment States
  - CA, CO, CT, KY, MD, MI, MN, OR, VA, WA
- SAFER Data Mailbox FOT
  - DE, MD, NY, NJ, PA, VA (CT)
- I-95 CVO Program Track Safety FOTs
  - FOT 7: CT, MA, MD, NY, PA, RI
  - FOT 9: VA
  - FOT 10: CT, ME, NY, PA

# FOT 7 Evaluation Goals

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1. Evaluate the effectiveness of using safety data to help identify high-risk carriers, drivers, and vehicles in roadside enforcement
2. Evaluate the time, cost, and other impacts of electronic collection of safety data for upload and dissemination
3. Evaluate institutional issues and benefits of laptop computers for enforcement officers

# Study Questions for Goal 1

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1. Evaluate the effectiveness of using safety data to help identify high-risk carriers, drivers, and vehicles in roadside enforcement
  - What are the best technical solutions?
  - What data do inspectors use?
  - Are high risk carriers identified?
  - How timely are the data?
  - Do laptops improve uniformity of inspections?
  - Is interstate enforcement improved?



# Study Questions for Goal 2

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2. Evaluate the time, cost, and other impacts of electronic collection of safety data for upload and dissemination
  - What are the purchase and operating costs?
  - What type and how much training is required?
  - What are the impacts on inspection procedures?

# Study Questions for Goal 3

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3. Evaluate institutional issues and benefits of laptop computers for enforcement officers
  - What are the institutional impediments?
  - What are the institutional benefits?
  - What are the differences among states?

# SAFER Data Mailbox Evaluation Goals

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1. Demonstrate effectiveness for reducing violations of OOS orders.
2. Evaluate time, cost, and other impacts of real-time inspection data.
3. Document institutional issues and benefits.
4. Measure effectiveness of outreach programs for deterring OOS violations.

# Safety-Related Evaluation Tests

## – CVISN, SDM FOT, I-95 FOTs

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- Safety Compliance Rate Study (OR)
  - Measure changes in safety compliance rates
- CVISN Cost Study
  - Costs (to states) of safety compliance programs
- CVISN Motor Carrier and Driver Surveys
- Screening Assessment Study (OR, CT, KY)
  - Measure improvements in targeting high-risk carriers

# Safety Related Evaluation Tests (cont.)

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- Special Tests for I-95 and SAFER Data Mailbox FOTs
  - Inspector focus groups (FOT 7 states)
  - Inspector survey (FOT 7 states)
  - Cost, technology, and institutional issues/benefits survey (I-95 and SDM states)
  - SDM Data timeliness studies
    - Uploads, updates, PIQs
    - SAFER Utilization

# Results

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- John Kinateder
  - CT Screening Assessment Study
  - Answers to Selected FOT 7 and SDM Study Questions
- Hugh Clark
  - Findings from Focus Groups in CT, PA, NY, MD

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# Evaluation of the I-95 CVO Safety-Related FOTs **Early Results from Roadside Safety Studies**

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Presented by:  
John Kinateder



# CVISN Model Deployment – Safety Goal:

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**Reduce CV Crashes and Related  
Injuries and Fatalities**



# Surrogate Measures (Examples)

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- Safety Compliance Rates
- Inspection rates for high/low risk carriers
- Number of OOS order violations prevented

# Efforts Underway – Safety

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- Screening Assessment Studies (CT, OR, KY)
  - Measure improvements in targeting high-risk carriers
- Special tests for I-95 and SDM FOTs (CT, DE, MD, VA, NY, PA, MA, RI)
  - Data timeliness
  - SAFER Utilization

# Screening Assessment Studies (CT, OR, KY)

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**Does CVISN improve targeting  
of high-risk vehicles?**

# Screening Assessment - Approach

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- Identify carriers/trucks by USDOT/LP#s
- Observe inspection selection process
- Classify (off-line) risk using SafeStat scores

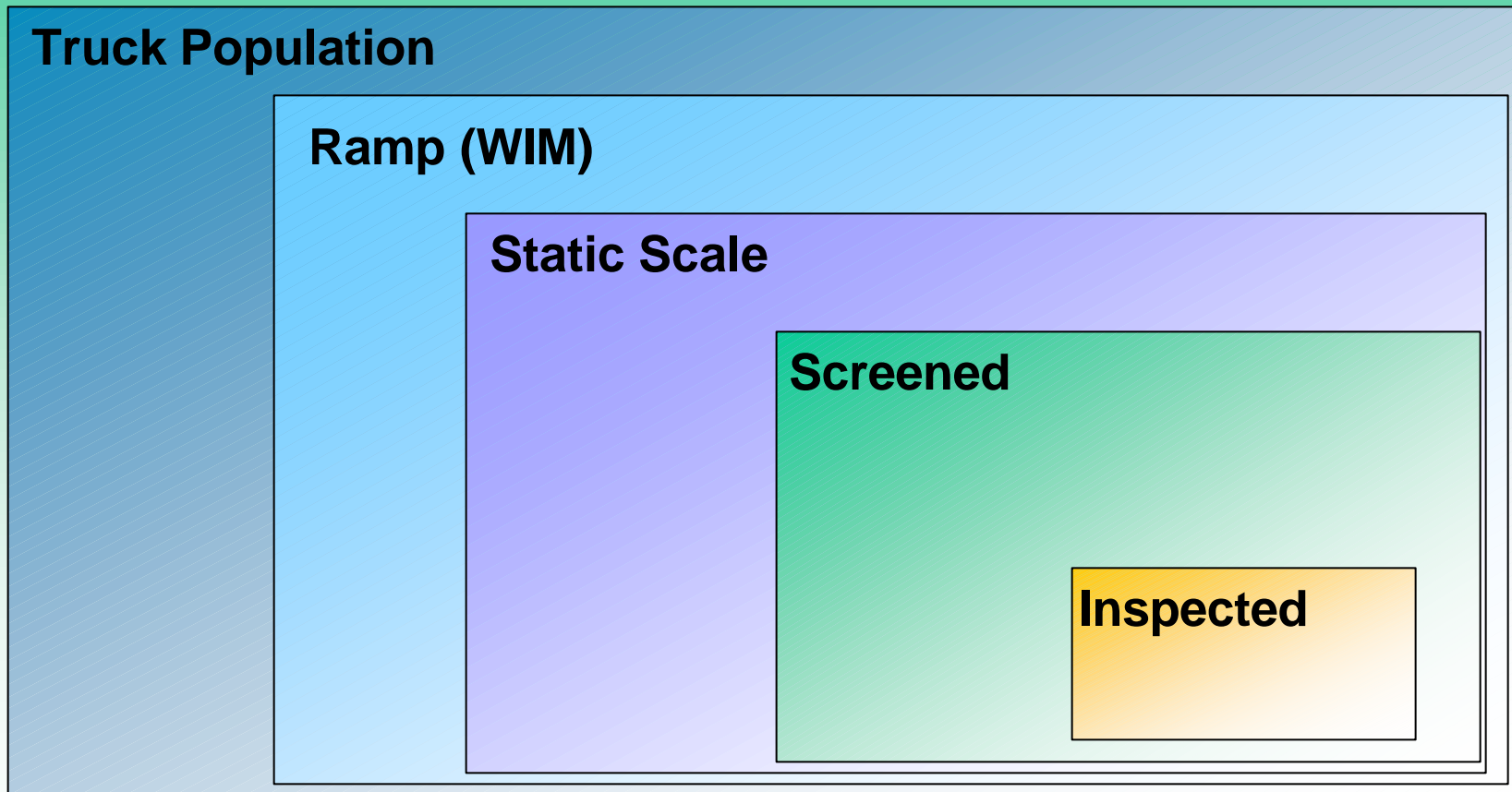
# Analysis

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- Compare inspection rates by risk category at different types of facilities
  - with and w/o access to real-time information
  - different agencies with different priorities/processes
  - fixed vs. mobile

# Inspection Selection Process

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# Data Collection

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- CT - 4 sites, 13 days
- KY - 4 sites, ~ 2 weeks each
- OR - With/without laptops  
(inspection data only)

# CT Screening Study Data Collection

Location	Days	Trucks Identified (DOT/LP#)	Trucks Inspected
Danbury	2	430/461	26
Greenwich	2	1,230/1,624	9
Middletown	2	N/A	36
Union	7	4,712/5,894	108



# CT Inspection Site Characteristics

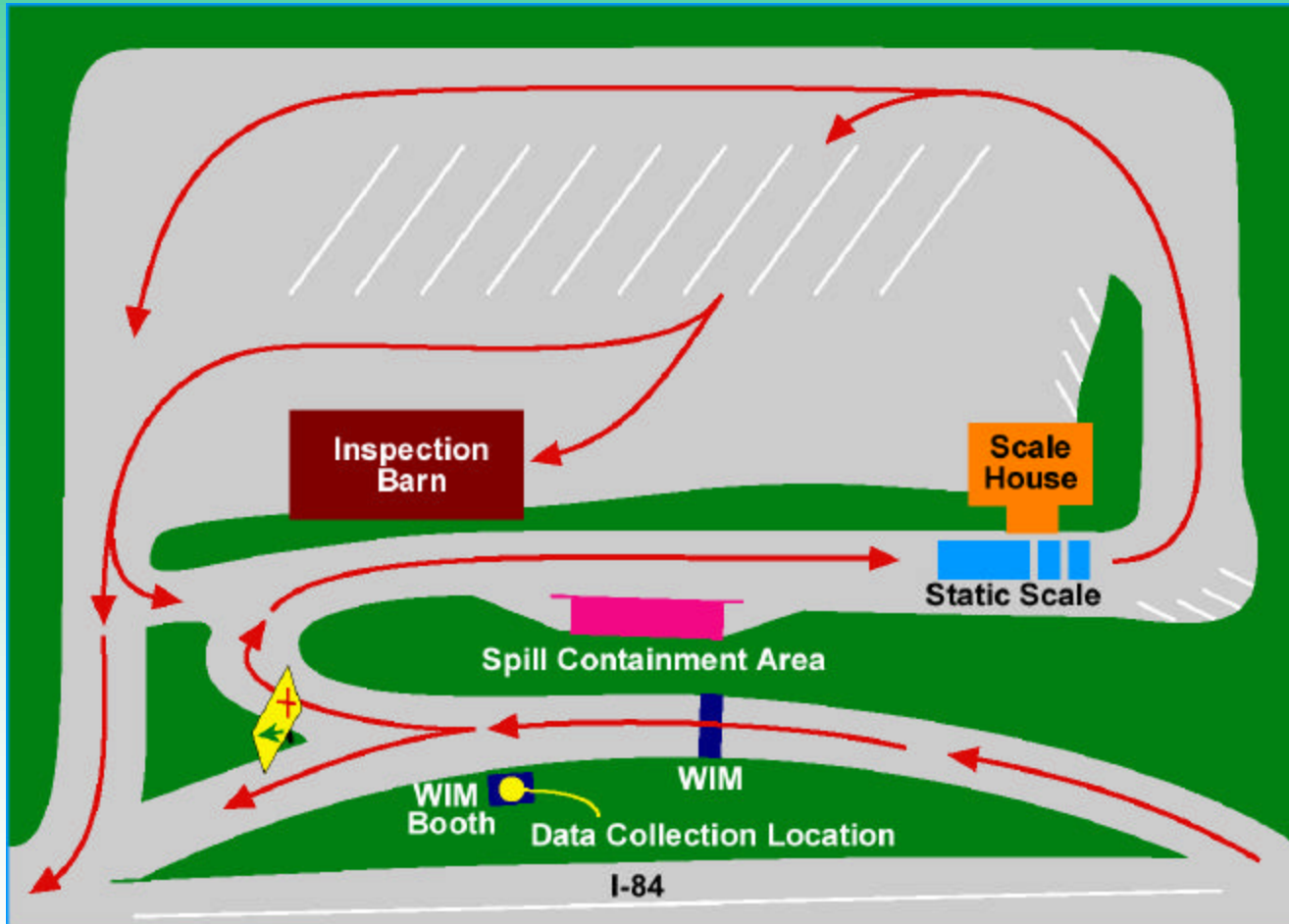
Union	Greenwich	Danbury	Middletown
POE, I-84 WB (350 trucks/hour)	POE, I-95 NB (485 trucks/hour)	POE, I-84 EB (215/hr)	I-91 NB (Central) (350/hr)
4100 inspections in '98	1200 in '98	1300 in '98	1000 in '98
All mainline traffic enters sorter WIM ramp	Continuously opened/closed to manage queue and staff resources		
Screening on WIM ramp - Height and weight - Distant visual inspection from scale house	Screening on WIM ramp - Weight - Quick, up-close inspection from WIM booth	No WIM screening	
Screening at static scale by ISS1/ISS2 on scale house computer	Screening at static scale by ISS1 on scale house computer	No computer screening (Sometimes laptops from cruisers are used)	

# Union CT Weigh Station

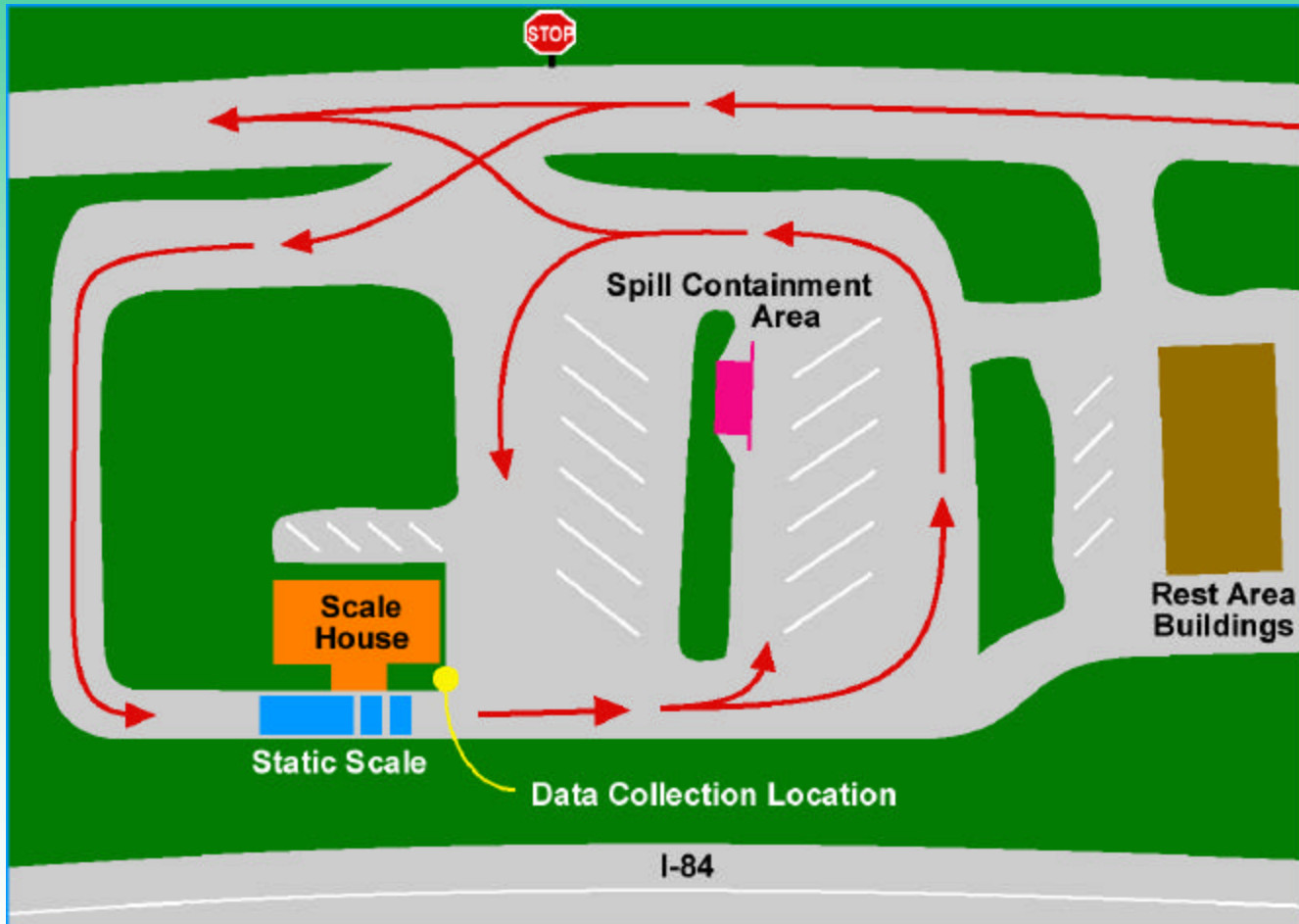
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# Schematic of the Union Facility



# Schematic of the Danbury Facility





# Collection of Data

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# Risk Categories of Traffic/ Inspected Trucks

## Union

Risk Category	Observed at Roadside			1999 YTD
	Ramp	Static	Inspected	Inspected
High-risk	5%	5%	8%	9%
Medium-risk	28%	29%	24%	28%
Low-risk	52%	46%	41%	39%
Insuff. Data	15%	20%	27%	24%
Total (100%)	4712	417	108	1845

# Risk Categories of Traffic/ Inspected Trucks

## Danbury, Greenwich, and Union Combined

	Observed at Roadside			1999 YTD
Risk Category	Ramp	Static	Inspected	Inspected
High-risk	5%	6%	8%	9%
Medium-risk	28%	31%	27%	28%
Low-risk	49%	34%	36%	34%
Insuff. Data	18%	30%	29%	29%
Total (100%)	6372	572	143	2903

# Screening Efficiency

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- How much more likely are high-risk vehicles to get inspected than low-risk vehicles (in 1999)?
  - Danbury: 1.9 times more likely
  - Greenwich: 2.8 times more likely
  - Union: 2.4 times more likely



# SAFER Data Mailbox Utilization

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- Utilization
- Timeliness of uploads
- Response time
- Past Inspection Queries (PIQs)

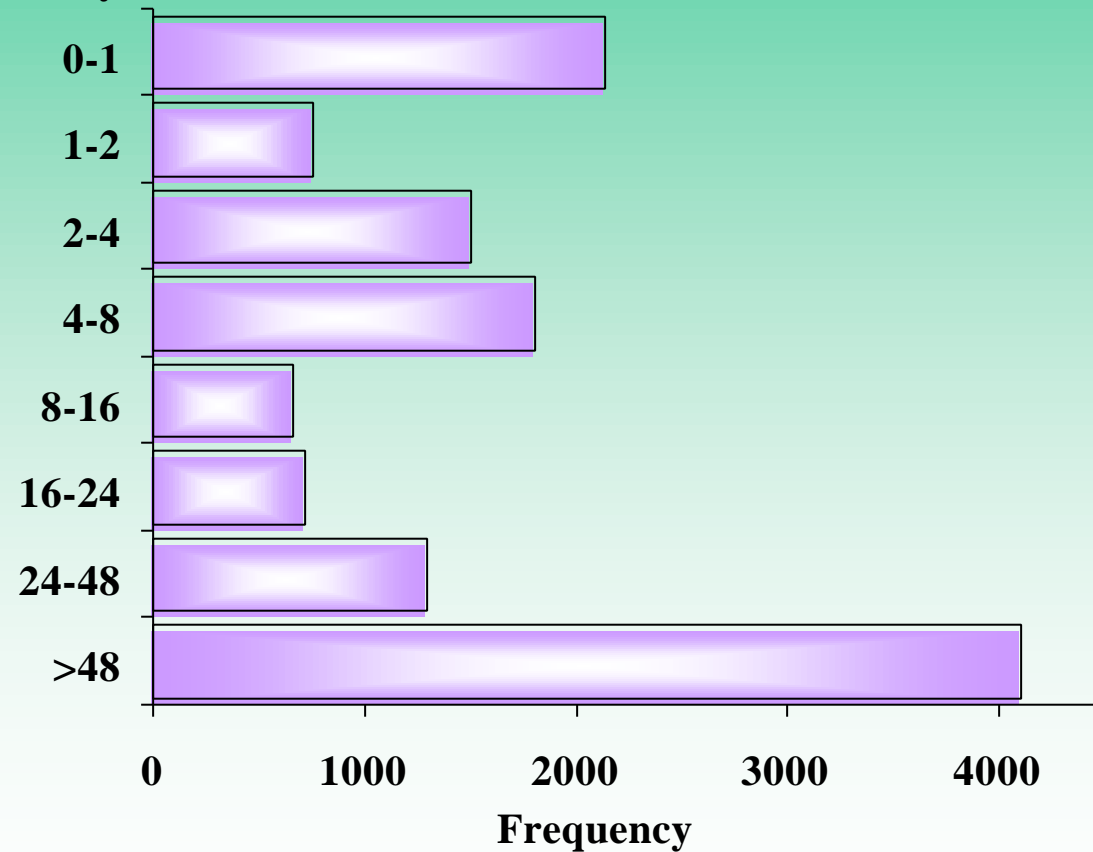
# SDM Utilization

State	1988 Inspections	Inspections Uploaded April-May	PIQs	Positive PIQs	OOS PIQs
NY	45,000	5,016	72	16	8
MD	100,000	3,893	84	30	11
CT	15,000	2,532	1,095	115	40
RI	?	563	53	8	1
DE	6,400	497	40	3	1
VT	?	300	2	2	0
ME	?	289	0	0	0
VA	42,000	181	7	4	2
Other	?	?	359	135	58

# How Long Before Inspector Initiates Upload to SAFER?

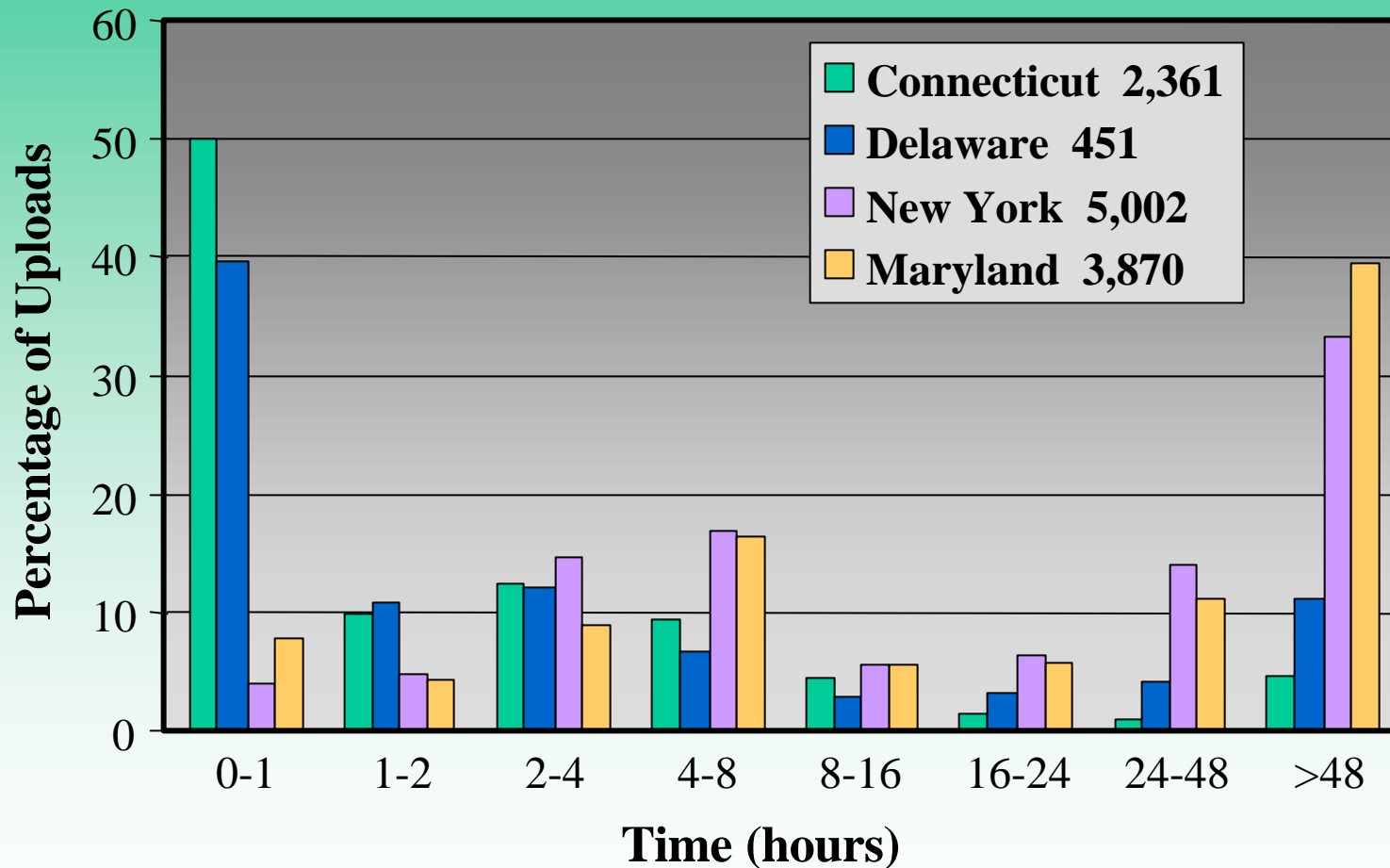
April and May, 1999 - All Eastern States

Delay (hrs)



Pct.	Cum. Pct.
16	16
6	22
11	33
14	47
5	52
5	57
10	67
31	98

# Upload Times Vary by State



# Response Times

Activity	Communication Method	
	Land-line	CDPD
PIQ	50-70 sec	25-75 sec
ISS Carrier Refresh	40-70 sec	45 sec
Subscription Upload	6 min for 3,800 carriers	3-5 min

# CT Screening Study: *How often do PIQs provide results?*

## Trucks and Inspections Observed During CT Screening Study

	Trucks	Previous Inspections (last 45 days)	Previous OOS Orders (last 45 days)
Observed trucks	7,979	64* (1%)	16 (0.20%)
Inspected trucks	164	5 (3%)	2 (1.2%)

\* 19 trucks had previous inspections in other states

# Past Inspection Queries (PIQ) in CT

Time since last inspection

Trucks	No prior inspections	<12 hrs	12-24 hrs	24 hrs	>1 wk
7979 (100%)	7905 (99%)	1 (0.01%)	3 (0.04%)	48 (0.60%)	22 (0.28%)

# Is PIQ outcome related to inspection outcome?

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- 5 inspections in CT were observed where the PIQ produced a previous inspection
  - 3 showed no previous OOS order; no OOS order was given during current inspections
  - 2 showed a previous OOS order; both of those vehicles were put OOS



# Are PIQs being used to identify recent OOS orders?

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- Nationwide, PIQs were performed on 4.5% of the 36,000 inspections uploaded to SAFER

CT: 31%

MD: 0.6%

DE: 11%

NY: 0.6%

# Results Still to Come

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- Further results from screening studies
  - Kentucky: Effect of transponders on screening
  - Oregon: ISS-2 evaluation
- Comparison of SAFER Data Mailbox configurations
- Projected impact of screening improvements on crash rates
  - Building upon OMC's "Safe-Miles" model

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**Evaluation of the I-95 CVO  
Safety-Related FOTs  
Interim Report on Focus Groups  
with Roadside Inspectors**

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Presented by:  
Hugh Clark (CJI Research Corp.)



# Focus groups

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- Groups of inspectors in four states
  - Connecticut
  - Maryland
  - New York
  - Pennsylvania

# Objectives

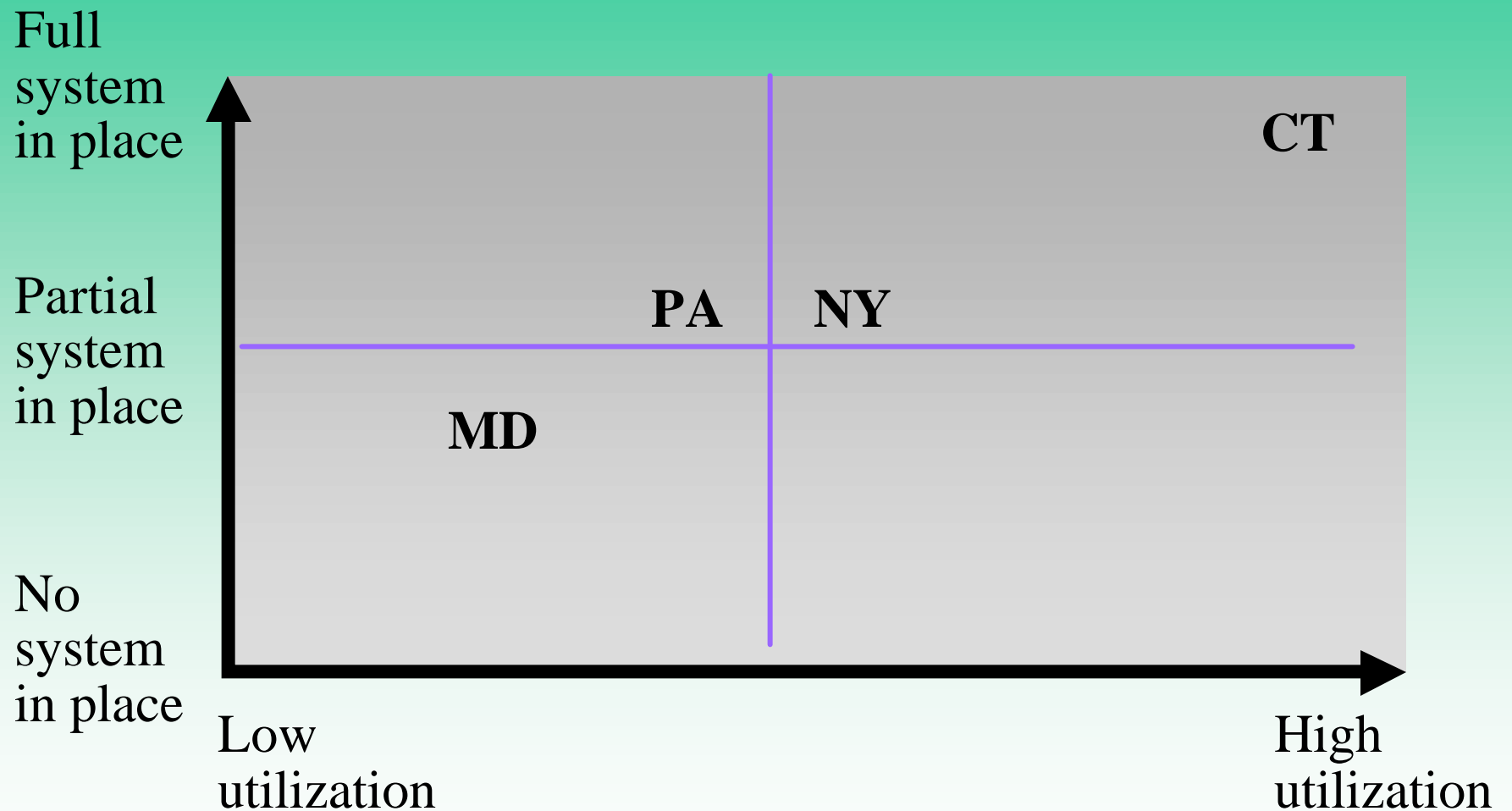
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- Differences & Similarities among the states in adoption.
  - Practical effects of the way it is deployed at various sites
- Using ASPEN & SAFER -- Advantages and disadvantages as perceived by the inspectors using the system
- Suggested changes in the systems
- Suggested topics for including in quantitative research to follow.

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# Differences and Similarities

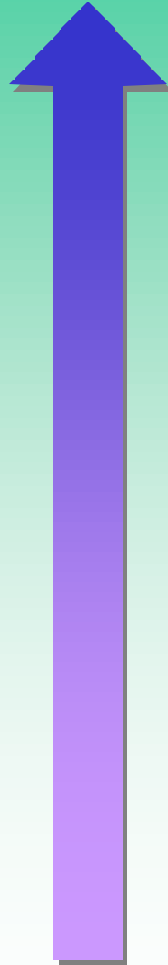
# Apparent Level of Implementation and Level of Utilization



# Levels of Implementation

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Full  
system  
in place



- Individual laptops
- Individual assigned vehicles
- Mounted equipment
- Full wireless
- Police powers - all inspection agencies
- Dedicated support
- Hardened equipment

Partial  
system  
in place

- Shared computers
- Shared vehicles
- Equipment not mounted
- No wireless
- No power of arrest
- Shared support
- Office equipment



# Variables in Adoption of Systems by Inspectors

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- Training and / or prior inspector experience with computers
- Support services provided and how they are organized
- Breadth of authority wielded by inspectors
- Types of sites at which inspections are conducted
- Level of connectivity: No wire, hard wire, wireless
- Type of equipment used
- Convenience of physically using the equipment
- Size and geographic complexity of the state

# How Systems Are Used

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- Connecticut: High utilization
  - Individual
  - SAFER daily
  - ISS Updates weekly
  - Some screening using ISS score
  - PIQ
  - Ancillary - PC Miler, CDLIS, NCIC, email
- New York & Pennsylvania: High Partial
  - Some individual, some shared
  - SAFER weekly or monthly
  - ISS Updates coming (planned quarterly)
  - PC Miler
- Maryland: Low partial

# Using ISS at Two Connecticut Sites



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# How sites affect utilization

# Site Most Suited to Maximum System Use: Union Scale

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- HC: Tell me about the mechanics of how you go about using that ISS code, the vehicle inspection value. At what point do you usually put in that number?
- Inspector 1: When he gets to the main scale area. The weigh in motion booth will kick in a potential overweight or somebody speeding on the ramp. That's the outside scale. Then that will kick them into this scale. This scale is where you can see all the numbers and we have a computer right here.
- HC: Okay. So usually you wouldn't be on your laptop. You'd be on one of these computers?
- Inspector 1: Initially here and then on the laptop
- HC: Then you go to your cruiser which has the laptop?
- Inspector 1: Yes.

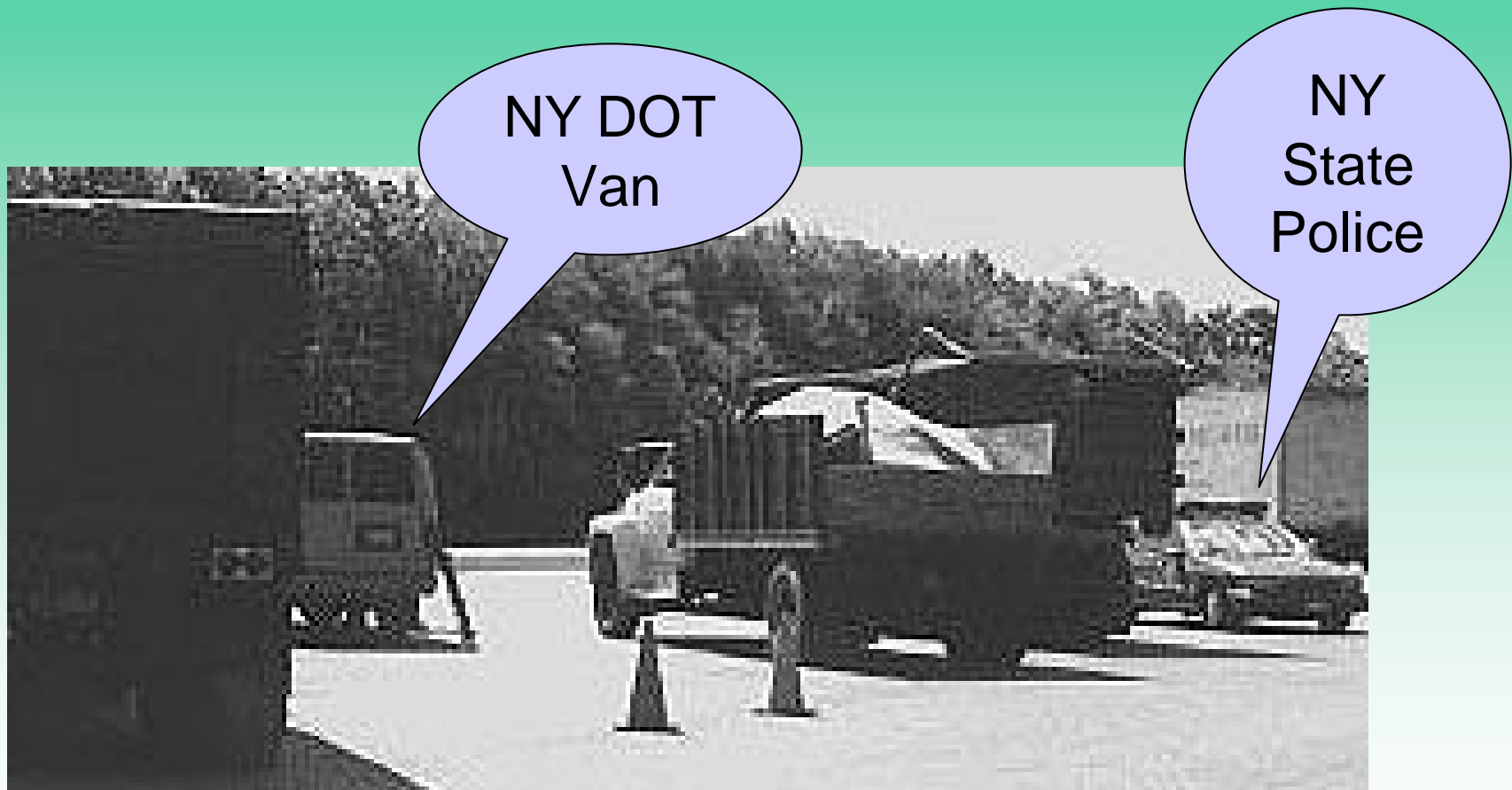
# Fixed Site: Limited Facility - Middletown Scale



- HC: How do you choose the trucks to inspect?
- Inspector 1: When I finish an inspection, I generally come back here (to the small office pictured). You can see the trucks whether you are inside or outside. I will look at it and if I see an obvious violation I'll pick it and wave him over.
- HC: So when do you use the ISS score, or do you?
- Inspector 1: Oh. Yes, I use it. I get the DOT number and either I get the driver's information then or I go to my car first, but wither way, when I get to my car I enter the DOT number and get the score.
- HC: How do you use it?
- Inspector 1: Well, it's a tool. It helps you know what to look for. Like for example, if a driver has a history of log book problems, I'll be extra careful going over the log book.
- Inspector 2: I don't even look at the score until I'm done because I want to be completely independent.

# Using ISS at a Mobile New York Site

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# Mobile Sites

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- NYDOT inspector We use our van as an office, and they (State police) use their cruisers the same. The laptop stays right here (pointing to laptop on van seat).
- NYDOT inspector: We work in teams - a state police inspector and a (New York) DOT inspector. They are supposed to direct traffic through the area. But we are short-handed today, and he is inspecting instead. But both the police and DOT do inspections.
- State police inspector: Working in sites like this, the signs are crummy. Truckers can't really see them. (Sign was partially hidden behind overgrown weeds.) So I'm not going to chase them if they go by (pointing to a truck by-passing the site).

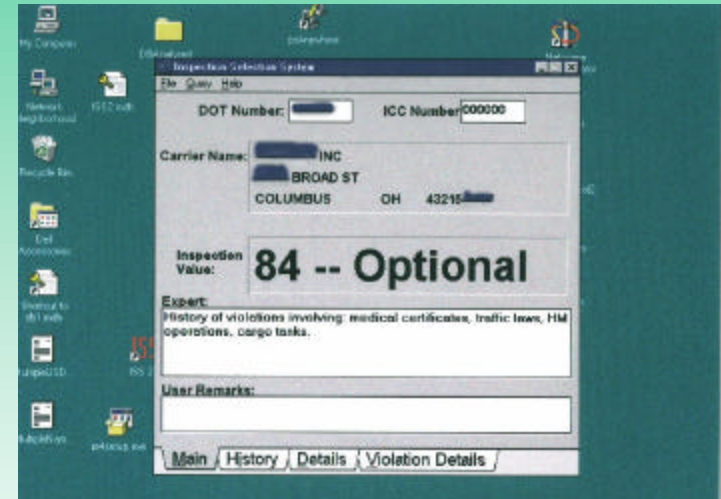


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# Inspector attitudes

# Using the Inspection Score

- HC: Is experience teaching you to distrust or trust the ISS score?
  - Inspector 1: I'd say 'trust.'
  - Inspector 2: They're kind of interesting! There are some carriers will be word for word what it says in the history block.
  - Inspector 3: I'd say trust, but it's not gospel!
  - Inspector 4: I don't pay a whole lot of attention to it.
  - Inspector 5: I don't either. If I see a truck and I want it, I inspect it regardless of what rating it says.
  - Inspector 2: It's a tool, not the be all end all. It helps you focus on what you need to look for. You do a better inspection.



# Using the Inspection Score

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- HC: How do you use that inspection value?
- Inspector 1: Usually there's the printed information written underneath it like 'violation for brakes, medical, drugs' whatever. Then you stick that in the back of your head when you do your inspection and you key in on those items.
- HC: So, it's the notes you look at?
- Inspector 1: Generally, at the fixed location we look at the value itself. Anything generally 85 or above we will inspect. If it comes up with a rating of 90 where less than 3 inspections have been done on that carrier, we'll do an inspection on it.
- Inspector 2: It depends on the vehicle, too. That's just a piece of information that you use. You don't base everything on that. It's just added to the information that you already have.
- Inspector 3: Obviously, if it has an obvious defect, we're going to inspect it.
- Inspector 2: It could be a '99 truck coming over and they could have a history of brakes suspension and you know it's a '99 truck and chances are that those violations don't exist on this vehicle.

# Advantages

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- Inspectors generally cited three primary advantages
  - Saving time in certain aspects of the inspection,
  - Legibility of the reports
  - Efficiency, and effectiveness of the total process.

# Advantages

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- Inspector 5: At first I didn't like it, but I like the computer now. I can do a level one and a level 2 just as quick. I can do a level three faster than he can write down a 3. A level one written should take 20-25 minutes to get all the information. What's another 5-10 minutes when you can read it and you don't have a trooper trying to decipher through.
- Inspector 3: I like it because if you left anything out, it will tell you and it won't allow you to print the inspection. If you miss anything, it will report what you missed.

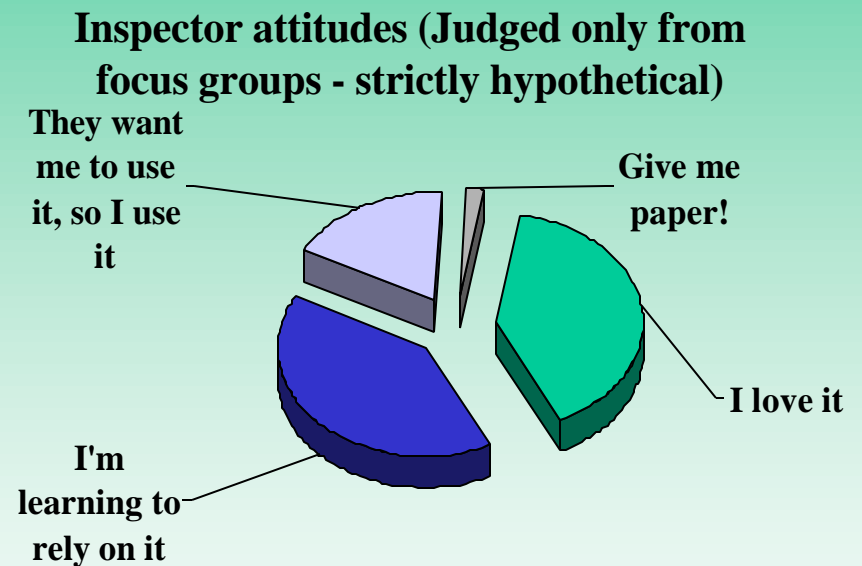
# Other Advantages

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- HC: If you had to name one advantage of the electronic system over paper, what would you say?
- Inspector 1: Speed
- Inspector 2: Easier to get the codes because then otherwise you have to look them up in the manual which takes a lot more time.
- Inspector 3: I agree. Speed definitely. Not having to look up the codes.
- Inspector 4: Well I don't know about speed. It may save time one one thing or another, but the whole inspection takes about as long. And you have more things you should check now too, during the inspection, like CDLIS and PC Miler -- you just couldn't do that before.

# Adoption of the Innovation: Levels of Acceptance

- They can take away my gun, but don't take my laptop!
- At first I didn't like it, but I like the computer now. I can do a level one and a level 2 just as quick. I can do a level three faster than he can write down a 3.
- I wish I had more training. I don't really know ... like can you tell me how I can use PC Miler without shutting the whole thing down and starting over?
- I like it. It's fast, it gives me information. But I learned DOS and Windows. But Harry hates it. He didn't get beyond the basic training and that was not enough. He gets frustrated when the system crashes or he can't figure it out. He is faster on paper.
- Inspector 2: Turn off that tape, and I'll tell you what they can do with ASPEN and the laptops!



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# Improvements needed



# Desire to Improve

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- Add citation
- Complete wireless
- More training in computer basics such as accessing ancillary programs while running ASPEN
- Equipment mounts (PA)
- Refine codes
- Easier customization and retention of customized entries when upgrading

# Comments on Other Needs

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- **Citation:**

- If you could print out the ticket too, that would be awesome! You wouldn't have to write everything all over. I would do it for you.

- **Uniform wireless coverage:**

- Inspector 1: We don't have a problem right here (Union Scale). But if you drift from here you do.
- Inspector 2: The northwest corner of the state which being the west team, we do work that area periodically. Danbury as well is in and out. Greenwich. You can be in part of the parking lot and get nothing and just move to the other side and have coverage. Waterbury you don't have anything.

- **More training in the basics of computer use:**

- Can you tell me how I can use PC Miler without shutting the whole thing down and starting over?

- **Mounts (PA)**

- Now we are mobile. Usually I will wait an pull over a truck with obvious violations. That means I have to chase him. If I have my lap top all set up on the seat, it is going to fall on the floor. So I have to shut down before I can go after him.
- Yeah. But I made a plywood board, and I strap everything down, even the print.

# (Continued)

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- **Refine codes**
  - Sometimes you just can't find the violation code you need, so you have to fudge by being general.
  - Also trailer types. Lots of them aren't in the data base.
- **Easier customization of jurisdictions and retention at upgrade**
  - New York is a big state with lots of jurisdictions. I put a lot of them in. But when you upgrade to a new version of ASPEN it just wipes them out.

# Other Needs

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- More uniform use of SAFER
- Faster updates of ISS files
- Check full capture of inspections

# Bottom Line

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- The greater the system capacity, the greater the acceptance
- The “system” includes everything from the software and hardware to the mounts in the car, the printer, the type of inspection sites, wireless connectivity, training, backup for questions, and the authority of the inspector.

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# Evaluation of the I-95 CVO Safety-Related FOTs Evaluation Status and Plans

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Presented by:

John Orban



**Battelle**

*... Putting Technology To Work*

# Evaluation Status and Plans

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- Draft Evaluation Plan distributed April 2
  - No comments received
  - Finalize?
- Data collection for CT Screening and SDM-related tests complete or nearly complete
- Focus Groups with inspectors
  - MD, NY, PA, CT complete
  - RI, MA to be scheduled (early July?)
  - Draft report to be reviewed first by states

# Evaluation Status and Plans (continued)

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- Survey of Inspectors
  - Questionnaire under development
    - About 2 pages
    - Using info from focus groups
    - Coordinated with related efforts (UGPTI and CVSA surveys)
  - Need census frame of inspectors from states
    - Number of inspectors by agency and/or location
  - Questionnaire Distribution
    - To be distributed by states



# Outline of Questionnaire for Inspector Survey

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- Inspector Information
  - Institutional (agency, location, assignment)
  - Personal (rank, experience)
- Inspection Basics and Technology
  - Typical approach
  - Technology available and level of use
- Perceived Strengths and Weaknesses
- Attitude (rating scales)
- Recommended Improvements

# Evaluation Status and Plans (continued)

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- Cost, Technology Solutions, Institutional Issues/Benefits Questionnaire (for states)
  - Distributed to SDM and FOT 7 states April 2.
  - Received completed questionnaires from MD, ME, NY, PA, RI, VA
  - Still need DE, CT, and MA
  - Need SDM project cost data from SDM final report

# Evaluation Status and Plans (continued)

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- Expanded Distribution of Enforcement Practices Questionnaire (from SDM Evaluation Plan)
  - Prior information from DE, NJ, NY, PA, MD, VA, CT
  - Additional responses from ME and MA
  - No input from RI, VT, NH
  - Will coordinate with ATA Foundation on FOT 10.

# Evaluation Status and Plans (continued)

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- Reporting (proposed dates)
  - Interim Results (June 29, 1999)
  - Draft Final Report (July or August)
    - CT Screening Results
    - Inspector Focus Groups and Survey
    - SDM studies
    - Report on costs, technology, & institutional issues
  - Final Report (December)
    - Selected results from MC and driver surveys
    - Other related CVISN evaluation results