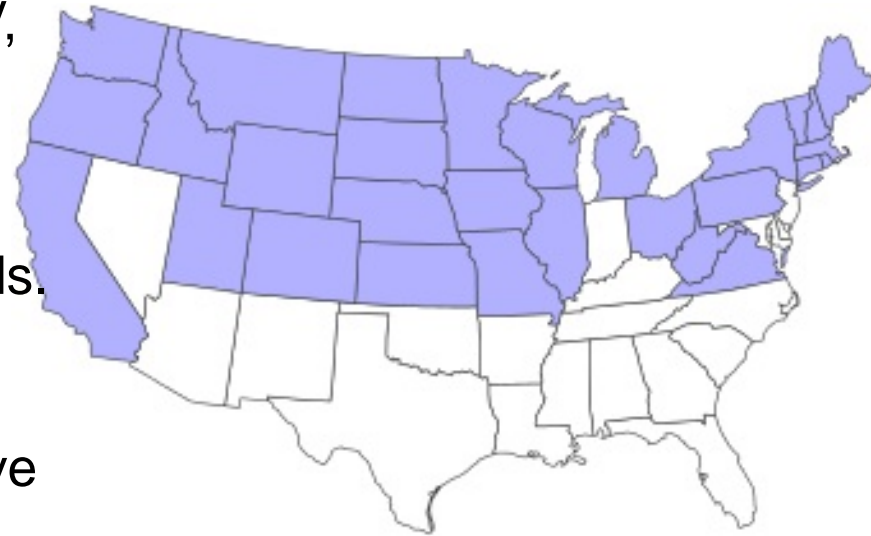
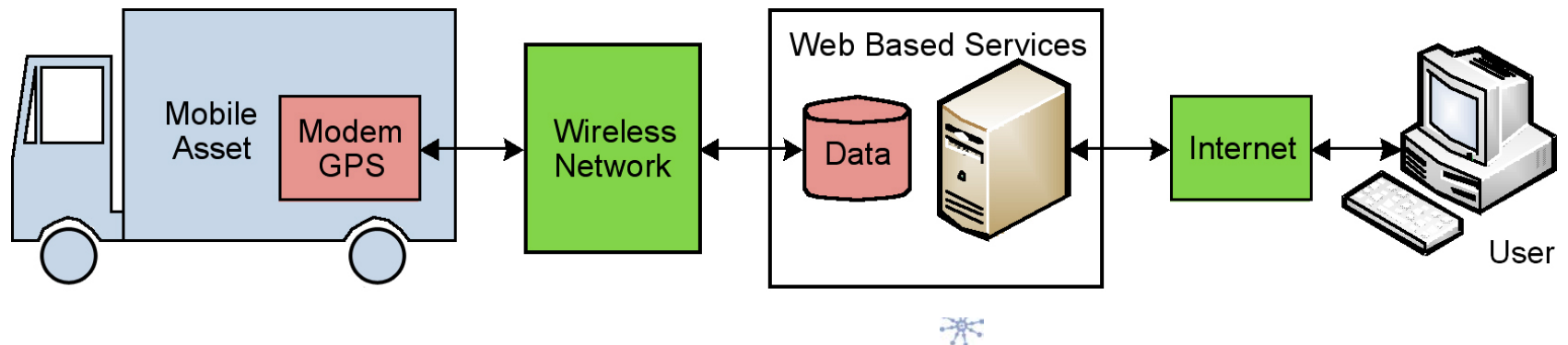


## What is Clear Roads?

- 29 current members:  
CA, CO, CT, IA, ID, IL, KS, MA, ME, MI,  
MO, MN, MT, ND, NE, NH, NY, OH, OR,  
PA, RI, SD, UT, VA, VT, WA, WI, WV,  
WY
- Primary activities include:
  - Evaluating winter maintenance materials, equipment and methods.
  - Developing specifications and recommendations.
  - Studying and promoting innovative techniques and technologies.
  - Supporting technology transfer by developing practical field guides and training curriculum to promote the results of research projects.



# Plug and Play Initiative Update

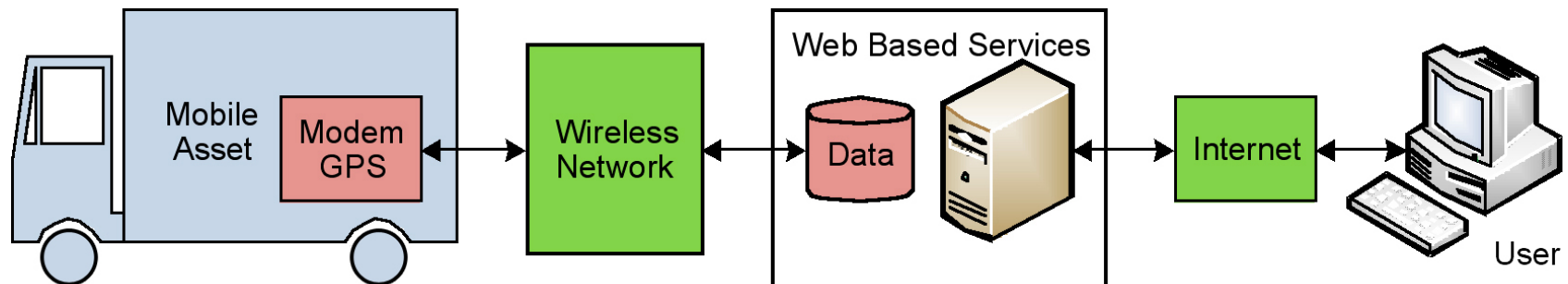


## Problem

**In-cab electronics used on DOT vehicles are often provided by different vendors**

**Each vendor has their own proprietary communication protocols and data formats**

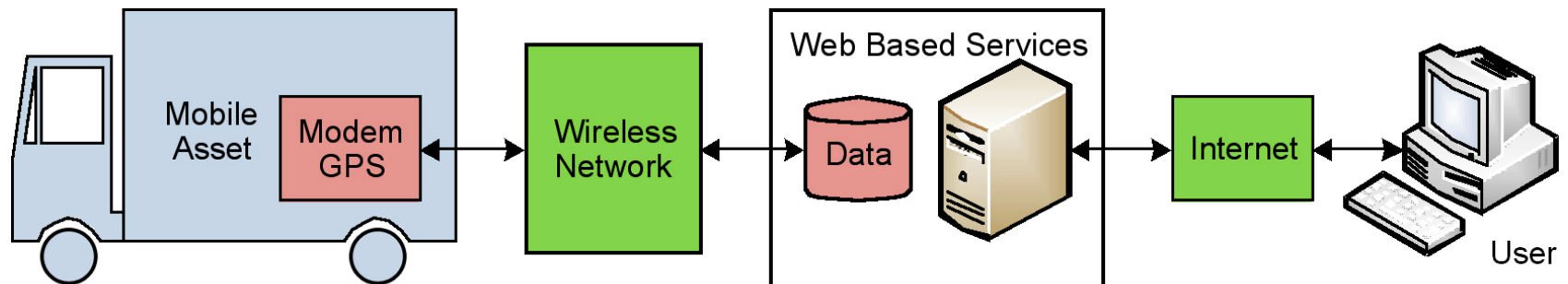
**Costly and time intensive to integrate the different systems into one data stream**



## Project: Plug and Play Initiative

The goal was to develop specifications that would support a “plug and play” approach to integrating electronic devices and sensors on plow trucks.

Clear Roads developed an initial specification and then engaged the vendor community to get their support and input.



## The Approach

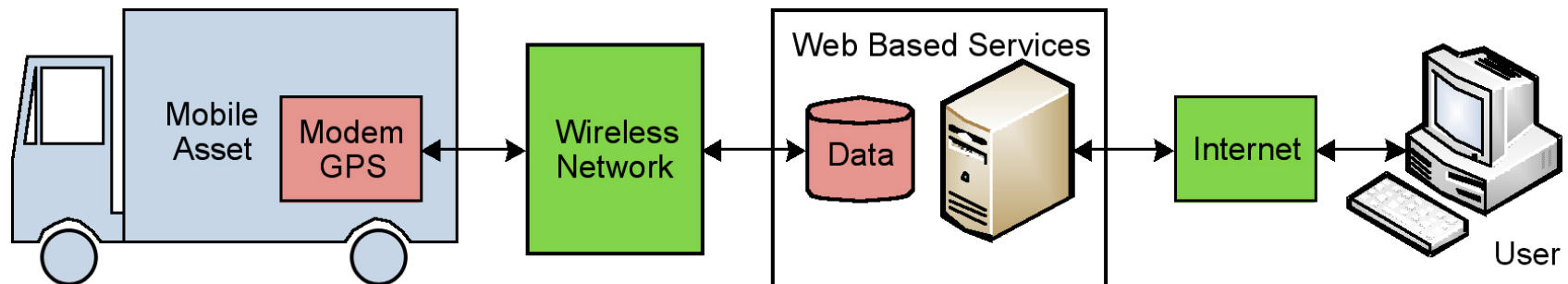
### Specify a universal bi-directional communications protocol for in-cab electronics

Examples of in-cab electronics include spread controllers, temperature sensors, plow up/down indicators, etc.

### The protocol will be configurable and dynamic

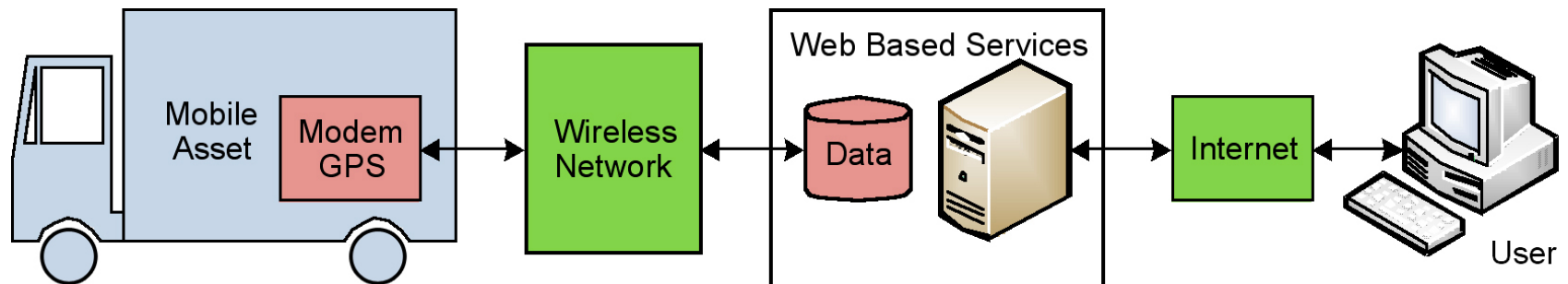
To provide the end user with the maximum available data at the lowest cost

### Wherever possible it will be backwards compatible to support legacy equipment



## Expected Results

A standard protocol that each state can specify in procurement to facilitate a “plug and play” approach to sharing operational data from electronic devices on modern winter maintenance vehicles.



## Protocol Development Timeline



**A collaborative group of spreader and AVL vendors have developed a draft protocol**

**It was posted for public comment in February 2014. It will be posted for a second round of public comments in August 2014.**

**Testing and validation will take place in the 2014-2015 winter season. Revisions will be made based on the testing.**



**Clear Roads will host a free web-based “test bed” so that vendors can validate that they are compliant with the protocol.**



**The protocol should be final by the 2015-2016 season.**





# Recent Project Results



# Completed Research Highlights



## Understanding the True Costs of Snow and Ice Control Operations

	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3	True Cost of Winter Maintenance Estimating & Data Entry Tool										
4											
5											
6											
7											
8											
9	Prepared by: 										
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Estimation Mode

Data Entry Mode

Storm Comparison

Period Comparison

Note: Macros must be enabled

Disclaimer: These results are based on user inputs. The outputs generated by this assessment are only as relevant as the data put into the model.

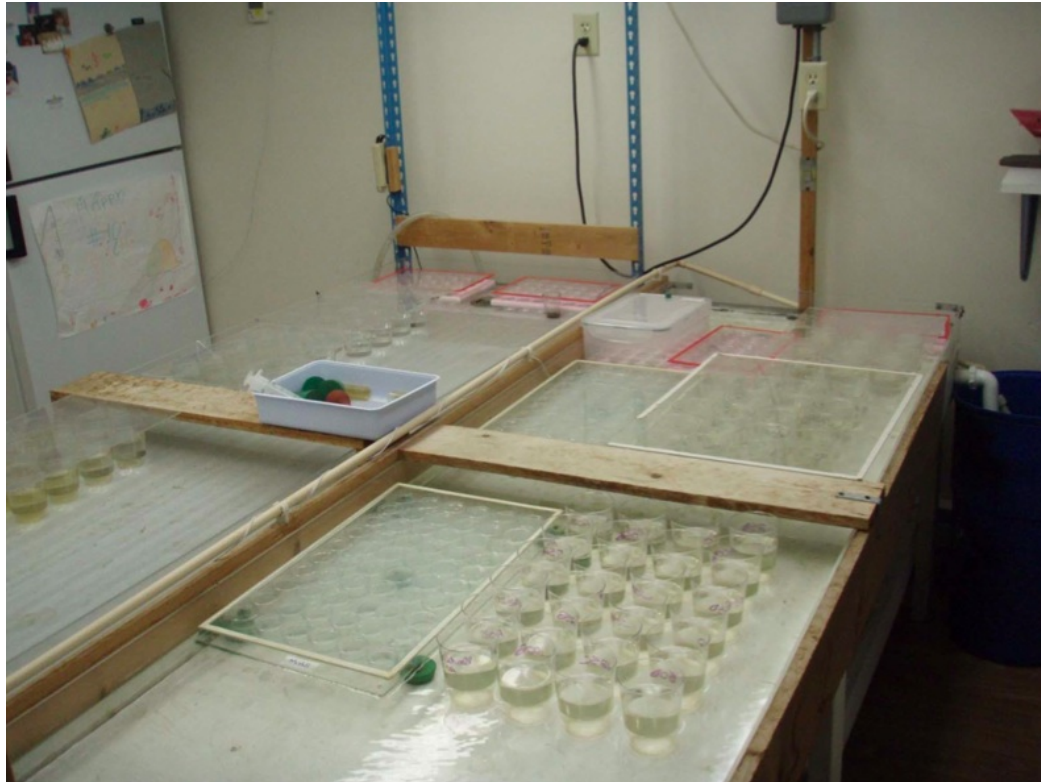
All dollar amounts in the tool are in year-of-expenditure dollars.



## Completed Research Highlights



### Determining the Toxicity of Deicing Materials



# Completed Research Highlights

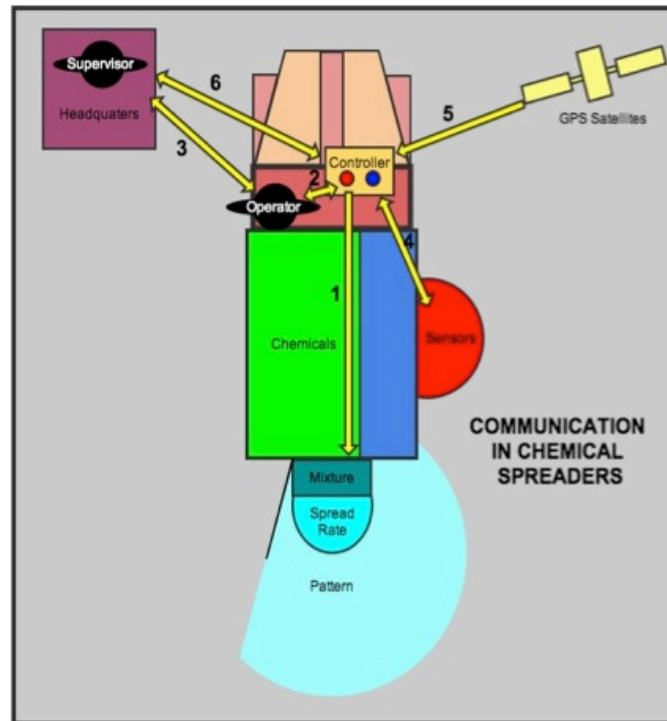


## Environmental Factors Causing Fatigue in Snowplow Operators



# Completed Research Highlights

## Development of a Totally Automated Spreader System





## For more information:

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