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# **APPLYING LONG-TERM THINKING TO WINTER MAINTENANCE OPERATIONS**



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## **TODAY'S PRESENTERS**

- **R. Mark DeVries** – Application Expert, VAISALA Inc.
- **Dr. Wilfrid Nixon** - Vice President for Science and the Environment, Salt Institute



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Winter Maintenance operations require long- term thinking because actions which appear good in the short-term can actually be harmful in the long-term. We will discuss a "soup to nuts" approach to winter maintenance planning. We'll feature examples for measuring operational performance and deploying sustainable practices.



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# TODAYS AGENDA

- Long Term Thinking
- Resilience and Efficiency in operations
- Quantifiable performance measures
- Minimizing environmental impacts
- Sustainability in Operations
- Technology and Innovation



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# Long Term Thinking

- “Past performance is not a predictor of future events”
- Expectations are increasing – can we meet them?
- We cannot know what will happen, but we can certainly imagine what might happen...



# Three Questions to Ask

- What magnitude of events will I likely see in the future?
  - What will be my new normal?
- How can I respond to events that exceed my capacity?
- Do my tools allow me to communicate effectively how I am performing both internally and externally?





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# The Weather is Getting Worse!





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# Severe Weather – How much more can we take!







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# Data does not show it...

Lighting strikes are not increasing, nor are tornado or Hurricanes

Today, the weather is alive!

- Caused by
  - Smartphones (with camera technology)
  - Social media
  - Internet
  - Media coverage (brings viewers)
  - Increased interest in storm chasing (tornadoes, hurricanes, blizzards)
- Our reaction is different
  - We see things as it happens.
  - We can see the actual destructive forces not just the outcome (i.e. car crash)
- We feel what others are going through!
  - And we may never experience it ourselves





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# Resilience

- Definition: *the capacity to recover quickly from difficulties; toughness*
- *Are you prepared for disastrous situations?*
- *What available resources can you count on?*
- *Have you communicated your plan and exercised it?*



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# Efficient Operations – Long Term...

What will the transportation system we care for look like in 20 – 30 years?

- New, expanded modal responsibilities?
- Expanding system, or shrinking?
- Impact of autonomous vehicles?
- Optimal winter maintenance operations allow maintenance enhancements elsewhere

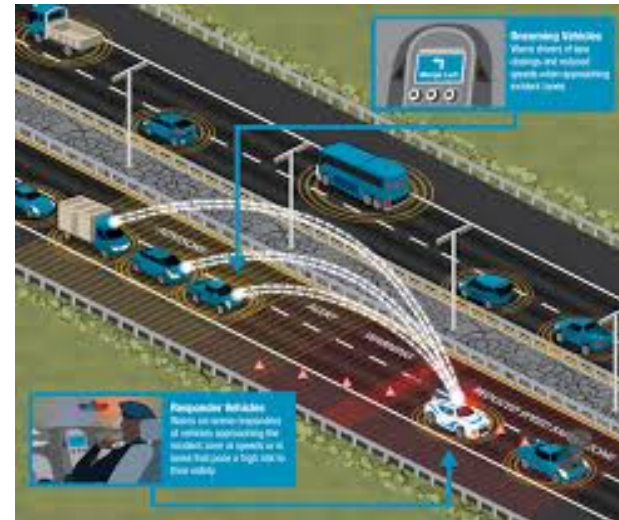


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# Connected Vehicles





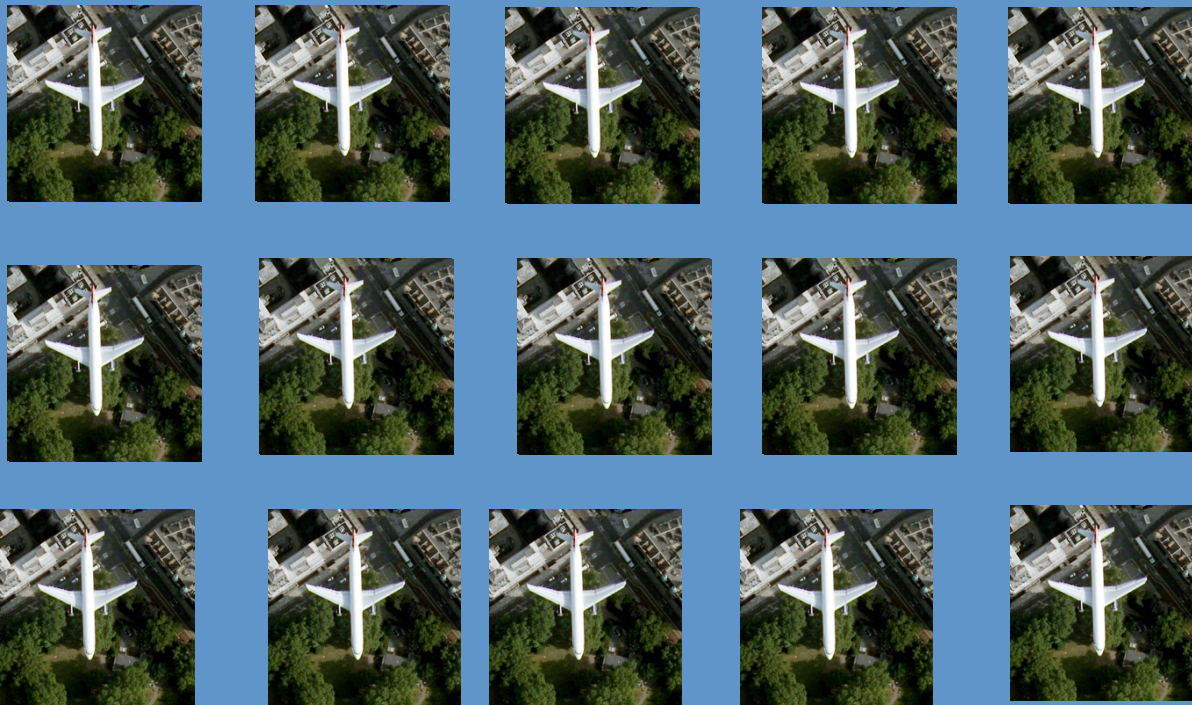
# Driverless cars

Someone will get hurt or killed  
I can drive better than any computer!

- Annual Global Road Crash Statistics
  - Nearly 1.3 million people die in road crashes each year, on average 3,287 deaths a day
  - An additional 20-50 million are injured or disabled.
- Annual United States Road Crash Statistics
  - Over 37,000 people die in road crashes each year
  - An additional 2.35 million are injured or disabled
- Road crashes are the single greatest annual cause of death of healthy U.S. citizens traveling abroad



# Globally its equivalent to fifteen 737's crashing each day!



Of course they will not work in winter!

- <https://youtu.be/C3GgJoVTHSU>



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# Performance Standards

Do you have clear standards? Were your customers involved in setting them?

- Collected into a snow plan?
- Various forms
  - Time to bare pavement
  - Time to regain speed
  - Time to regain traction or grip
- Different levels for different facilities
- LOS cuts both ways – do not over-perform...



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# Performance Measurements

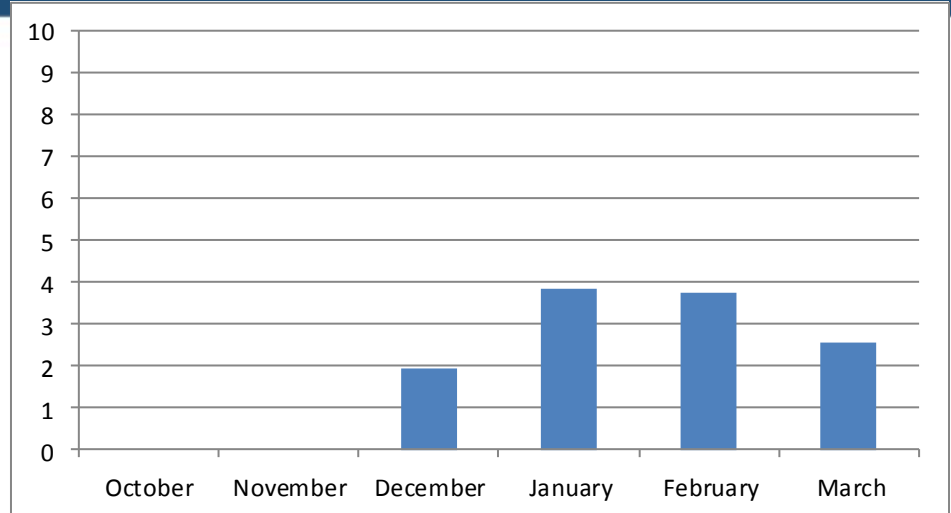
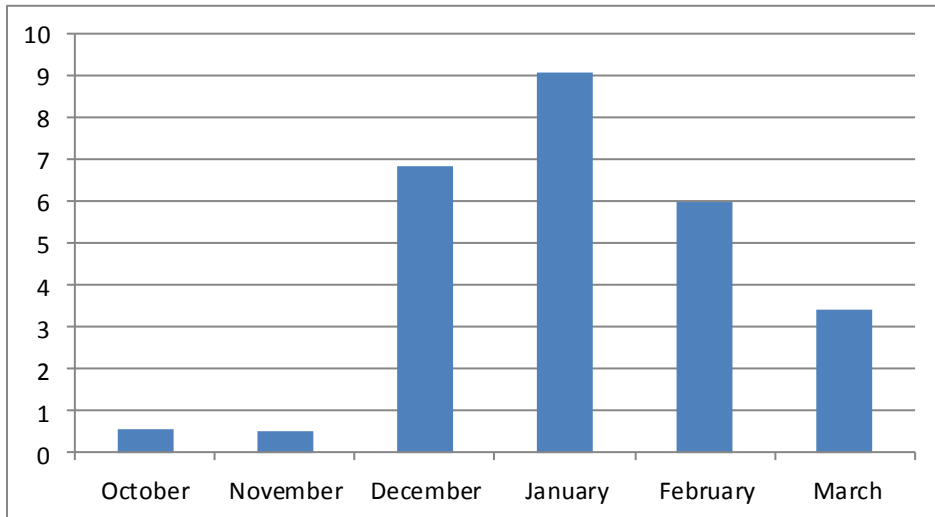
What gets measured, gets done

- If you only measure tons of salt used, you will use more salt than you need to...
- Use outcome based measures instead of output based ones
- Normalize your measures with winter indices





Moline 2013-14  
Total Salt Used = 13,420 Tons  
Tons/Index Point = 499



Moline 2012-13  
Total Salt Used = 11,200 Tons  
Tons/Index Point = 848

# Using the Winter Index



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# Performance Tools and The Long Term

We do not know what the climate will do for our particular location, but it will change...

- Have to balance risks and rewards - resilience
- Have to break away from what we have always done
- Just as being proactive is BMP in winter maintenance, so being proactive in planning is needed



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# Sustainability and the Long Term...

- By definition, it is long term thinking!
- NOT JUST environmental awareness!
- Again a balancing trick
  - Social
  - Economic
  - Environmental
- No one sustainable solution
- One size ***emphatically*** does not fit all
- But, sustainability does impact all aspects



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# Job One

- Does our current operational framework reflect best practices?
- What are those best practices?
- Where can I find out about them?
  
- The Top Ten List... (Keynote closing session)
- BMP guide... [clearroads.org](http://clearroads.org)



## How Do These Help

- Serves as a starting point to figure out operational needs
- Used to guide future research (the Winter Maintenance Peer Exchange process)
  - “winter wins the budget battle”
  - Efficiency in operations – 46%
  - Performance standards – 43%
  - Optimal route planning – 41%
  - Using sustainable winter maintenance practices – 34%



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# Technology and the Long Term...

Not a Means to an End – a Force Multiplier

- Have to make sure that the new technology is tied into changes in practice
- If you get the new technology, but still do the same old thing...
- So, once again tie technology choices into key performance goals



# The Force Multiplier

Suppose a data-transmission solution costs you \$1,000 per block of data moved today

- In 18 months, it will cost \$300
- In 36 months it will cost \$100
- In 54 months it will cost \$30
- In 72 months (6 years) it will cost \$10
- Is it affordable then? If so, start planning for it now...
  
- AVL is a perfect example!



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## Dealing with “Beyond Design” Events

- Liaise with other agencies – multiagency agreements and planning are key
- A dynamic outlook requires you to look forward – capital expenditures need to be this way
- Performance measures can build a case for long term changes
- Sustainability provides a method to involve customers

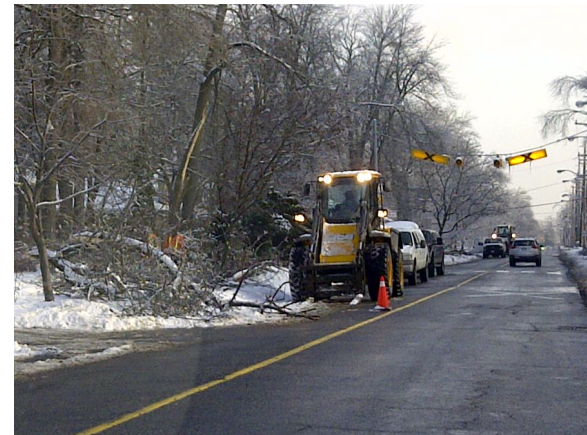




## EOC as a Tool

Do you do EOC exercises on winter events?

- So the players know who is who
- So the available equipment is known to all
- So you know your capabilities when EOC is deployed
- So you can practice using the command process established by NIMS





# What Ifs and Implementation

- We have to use imagination to deal with possible new scenarios
  - Trains us away from “the way we have always done things”
- All capital purchases are long term in their implications
  - That new truck will be with you for 15 years or more
- How can we extend the use of our resources?
  - Use water trucks to anti-ice
  - Use heavy GVW vehicles to plow (garbage trucks)
  - Equip all small trucks with (small) plows



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Relying on the past to plan for winter might not be sufficient in these times of changing climate and more frequent extreme events



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Long-term thinking about the climate and your capabilities allows you to control your own destiny rather than reacting to changes after the fact



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Performance Standards and  
Performance Measures create a  
vocabulary for discussing winter  
maintenance with employees and  
the public



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Performance Measures can help  
make the case for changes in  
operations by playing “what-if”  
scenarios



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Sustainable solutions provide the balance between the environment, budget and public expectations and create the framework for discussions between the different groups with competing interests



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Technology is always offering new solutions, but remember, technology is only a force multiplier to achieve efficiencies in activities





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Utilize social media and other forms of communication with employees and the public – they thirst for information



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Practice for the “beyond design” events with other agencies so when they really happen you already have a relationship with the others who are there to “help” you



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# Questions?