Safe and Sustainable Snowfighting

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Outline

- What does sustainable winter maintenance mean
- How does this relate to the situation in Northern Virginia
- Using multi-pronged approaches to achieve a new paradigm

Why Do We Do Winter Maintenance?

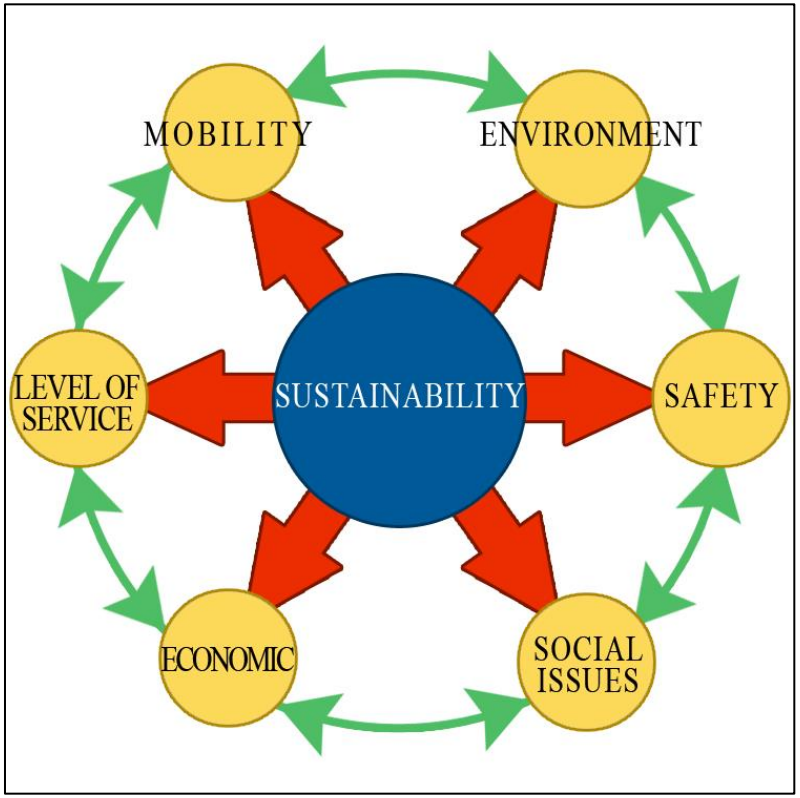
- Two primary reasons, both well established by research
- Safety – Marquette University study showed proper use of road salt resulted in:
  - Crashes reduced by 88%
  - Injuries reduced by 85%
  - Accident costs reduced by 85%
- University of Waterloo Study showed proper use of road salt resulted in a 95% reduction of crashes on four-lane highways
- Related University of Waterloo study showed that chloride levels were reduced by 50% when best practices were used

Not Just Safety - Mobility

- Study by Global Insights looked at the impact of a one day shutdown for a State due to a winter storm. They found:
  - A one-day major snowstorm can cause a state $300-$700 million in direct and indirect costs
  - The economic impact of snow-related closures far exceeds the cost of timely snow removal
  - Snow related shutdowns harm hourly workers the worst
- Other studies have shown that safe and sustainable snowfighting when applied to a winter storm pays for itself in the first 25 minutes of operations
- Plus, a high level of service is what we expect…

SO what is in winter maintenance?

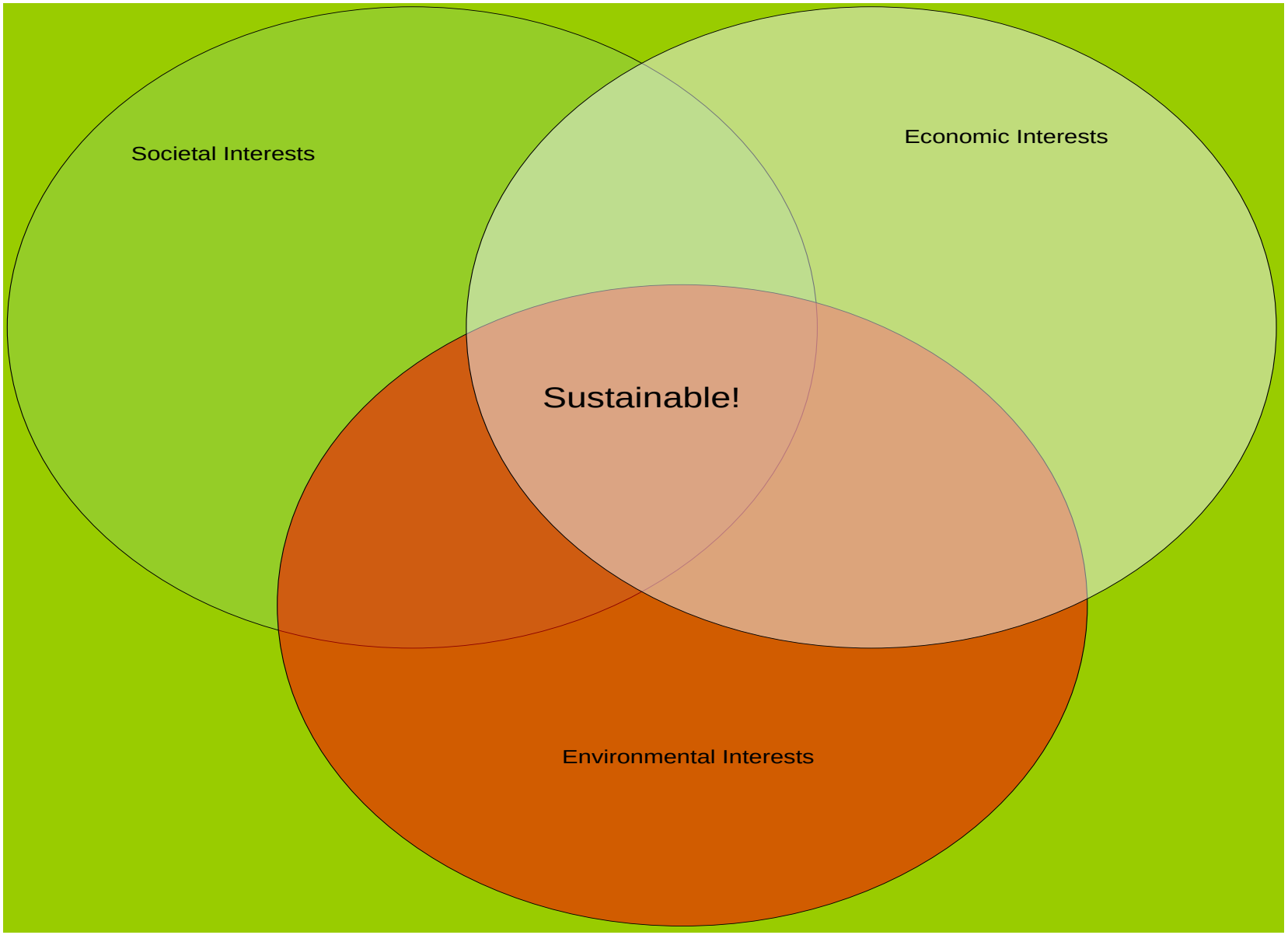
- Let's take it as a given that a sustainable program will impact all issues of a winter maintenance program
- How can we break this down?
- How can we make it work for us?



Winter Maintenance Goals

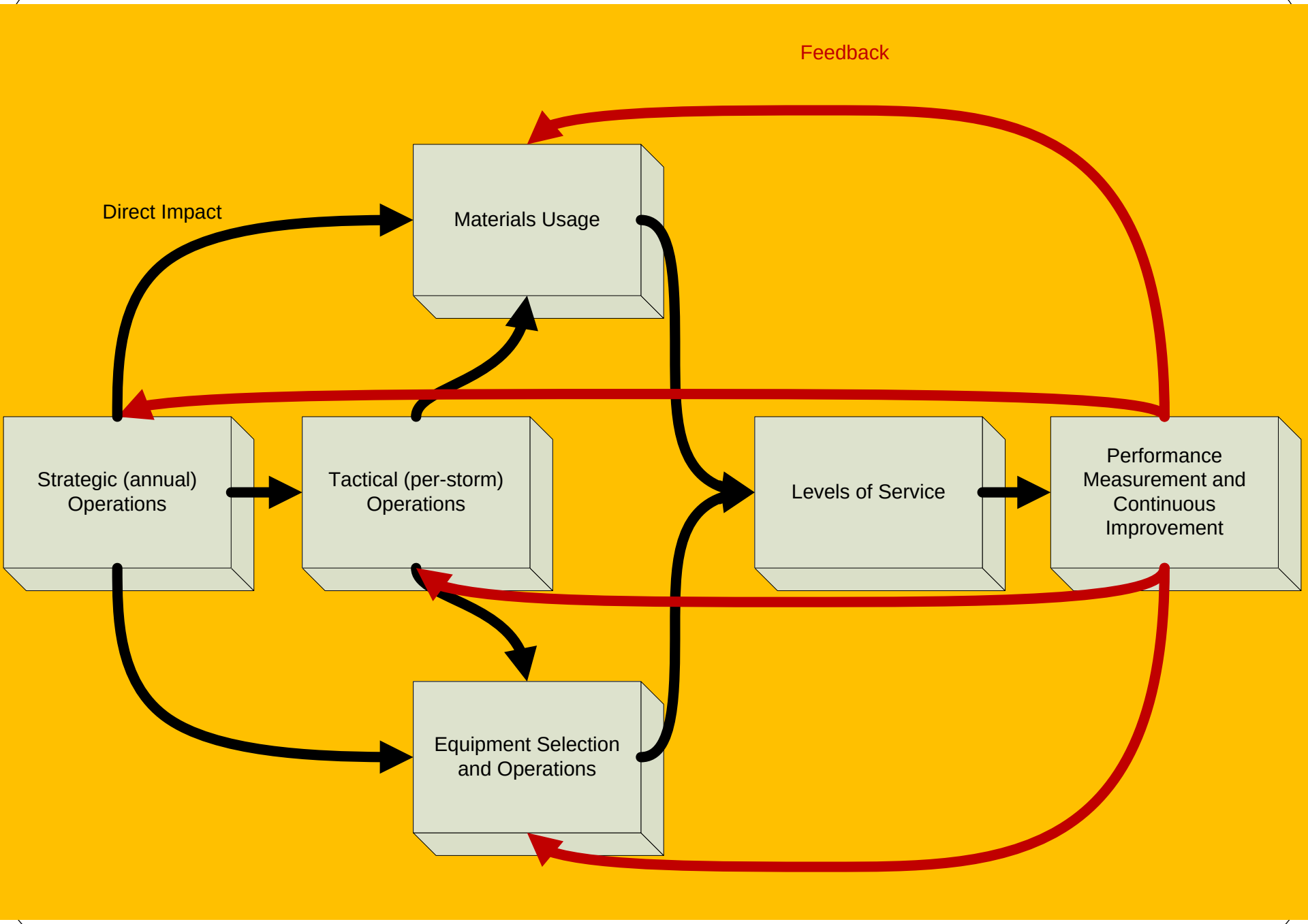
- Provide **safety** and **mobility** to road users
- Do this without negatively impacting the **environment**
- Do this within budget
- Provide the right **level of service**
- Address the **social expectations** of our community
- Has to be a systems based approach
- Every step along the way requires attention
- Needs cooperation and collaboration between all stakeholders
- Sustainability requires such cooperation to be effective

Overlapping Circles



Complexity

- If we want to look at winter maintenance sensibly, we need to consider it as a system
- Everything we do impacts (perhaps) everything else we do
- Which is a bit daunting!
- So, what can we do to break it down a bit and try and get a handle on it?
- When in doubt, draw a diagram!


Feedback
Direct Impact
Materials Usage
Strategic (annual) Operations
Tactical (per-storm) Operations
Levels of Service
Performance Measurement and Continuous Improvement
Equipment Selection and Operations

The Center Point

- Level of service drives all our decisions
- Or, it should!
- In short, level of service is the equivalent of the old saying: If you don't know where you are going, you will end up somewhere else!
- So, do you know where you are going?

Levels of Service

- Different roads receive different levels of effort
- Often some sort of manual sets the goal for a given road type
- Road types often differentiated in terms of Average Daily Traffic (ADT)
- Priority Levels Assigned

How Clean is Clean Enough?

The Level of Service and Societal Factors

- We have to provide the "right" level of service
- This is different for different communities
- An interstate should have a different level than a county road
- Base this on ADT and other factors (school bus routes, emergency routes, etc.)
- But, consider this as one circle (of several) that we need to make sure our winter maintenance falls within
- The "diameter of the circle" reflects the requirements of our community

The Economic Circle

- We have not yet found the "winter maintenance budget fairy godmother"
- Which means we all struggle with budget limits
- A bigger budget means more options (a bigger "budget circle")
- But remember to think in terms of life cycle costing, not just up-front, or operating costs
- **A solution that ignores or short changes economic concerns is inherently unsustainable**

What the Systems Approach Reminds Us

- Every crash is a small scale, localized, environmental disaster
- Spilled fluids
  - Gasoline or diesel
  - Coolants
  - Engine oil
- Spilled cargo
  - Hazardous materials, anyone?
- Energy burden of vehicle replacement
- …

What is our “Triple Bottom Line?”

Customers expect safe roads but want us to achieve that without negatively impacting the environment.

What Can be Done?

- Step 1 – review current levels of service – are they correct?
- Step 2 – examine current practices – what is the starting point?
- Step 3 – examine various sources of good practice to see if current practice can be improved

Examples of Practices

- Calibration – when the spreader is on setting number 2, how much material is really being applied?
- Many agencies assume that the spreaders are calibrated when they leave the factory, but experience shows this not to be the case
- For example, one small agency in Wisconsin decided to do calibration and found huge discrepancies in the application rates between different trucks
  - For that agency – saved $75,000 in salt during one winter
- The only cost to the agency is time…

Second Example – Application Rates

- The amount of salt we need on a road depends primarily on three things
  - The temperature of the pavement
  - The moisture in the snow (the potential for dilution)
  - The cycle time of the operations (when will a plow visit again)
- Our application rates should vary depending on conditions – every storm is different, our application rate should be different too
- BUT, implementing this approach means that you have to work with your crews carefully and consistently…

Many More Examples

- The three Salt Institute publications show many more ways an agency can make their snowfighting operations more safe and more sustainable
- Salt storage obviously very important
- The Award application may not seem an obvious source of such information, but it provides a checklist of 71 different actions an agency can take to become more sustainable in their snowfighting
- Other sources of good practice exist and some are listed on the handout

Going Forward

- Start examining the options
- Learn about the possible approaches
- Decide on an implementation plan
- Salt Institute will be working with you as you go forward

Who Else?

- Other areas of the country have been addressing these and related issues
  - Shady Creek, MN
  - Chicagoland
  - New York Lake George area
  - Some parts of MA
  - NH especially in their southern corridor down to Boston
- Different areas have tried different approaches

Responses

- TMDLs typically require implementation of best practices
- Variances require much the same thing
- But, the practices to implement vary from place to place
- In NH for example, provided limited tort immunity for private contractors if they got trained
- MA simply signed parts of the road system as low salt areas

Conclusions

- There are methods available that allow agencies to provide safe and sustainable snowfighting
- These methods are proven, both by research and in practice