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Winter Season Prep.

- Expected Levels of Service
- Salt Application
- Calibration



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For Comparison

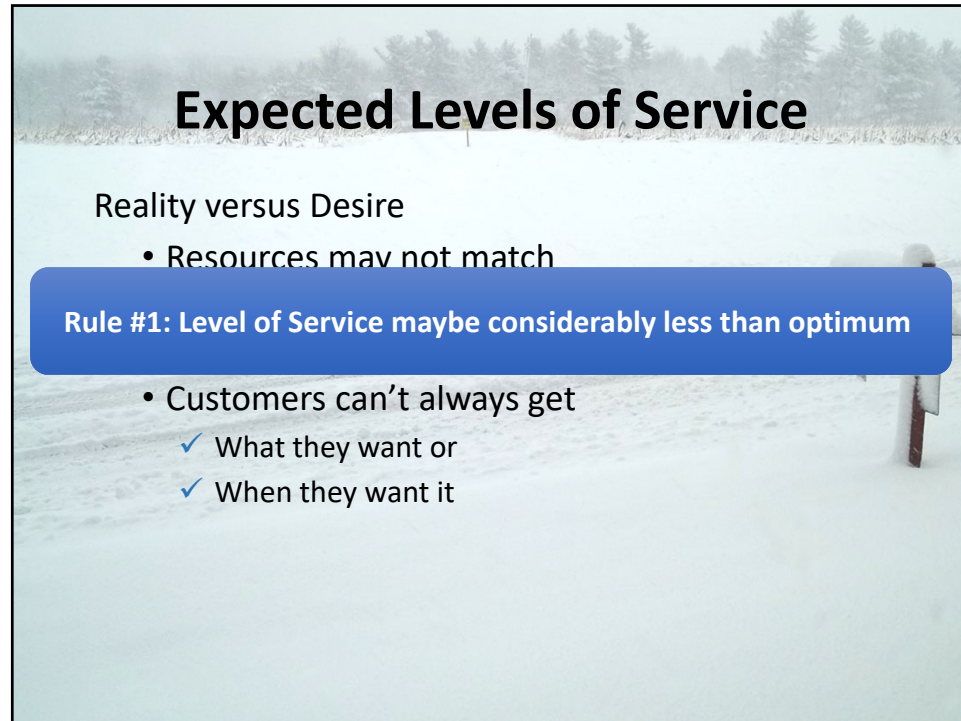
	Iowa	West Virginia
Miles Pave (approx.)	40,000	39,000
January avg. low	12-24	13-24
January avg. High	29	33-43
Snowfall average	33 inches	36 inches
Snowfall avg. variance	23 – 41 inches	11 – 159 inches
	Ottumwa – Mason City	Huntington - Snowshoe
Salt Usage 2018-19 (tons)	222,045	212,608

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Expected Levels of Service

- What determines the level of service?
- It depends (not one size fits all)
 - ✓ State highways
 - ✓ Rural paved roads
 - ✓ City streets
 - ✓ Unpaved roads
- Bare pavement versus some snow pack

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Expected Levels of Service

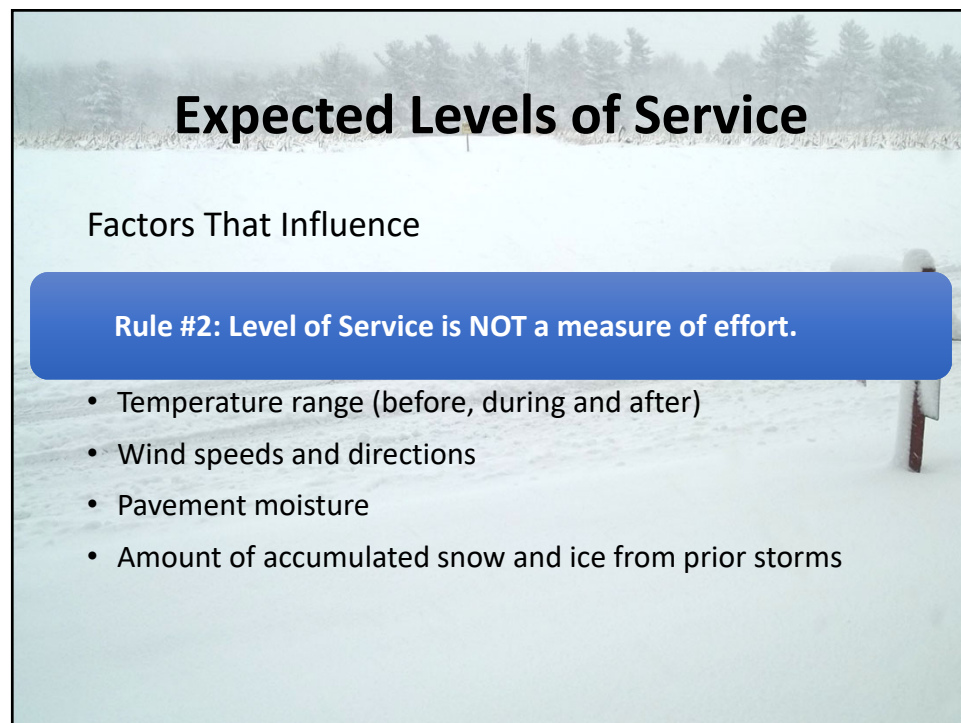
Reality versus Desire

- Resources may not match

Rule #1: Level of Service maybe considerably less than optimum

- Customers can't always get
 - ✓ What they want or
 - ✓ When they want it

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Expected Levels of Service

Factors That Influence

Rule #2: Level of Service is NOT a measure of effort.

- Temperature range (before, during and after)
- Wind speeds and directions
- Pavement moisture
- Amount of accumulated snow and ice from prior storms

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January 16, 2014 Event

Precipitation

Precipitation	0.10 in	0.03 in	1.04 in [1980]
Month to date precipitation	0.30	0.51	
Year to date precipitation	0.30	0.51	

Snow

Snow	3.30 in	0.30 in	3.90 in [1885]
Month to date snowfall	5.5	4.2	
Since 1 July snowfall	20.5	16.1	
Snow Depth	T in		

Sea Level Pressure

Sea Level Pressure	29.79 in
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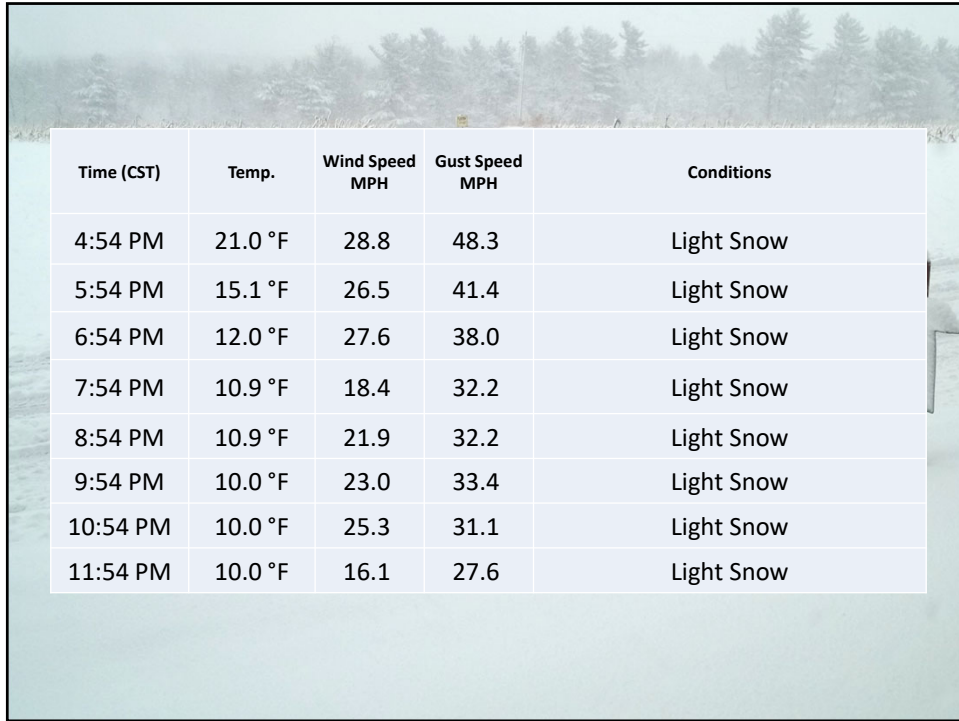
Wind

Wind Speed	20 mph [NW]
Max Wind Speed	41 mph
Max Gust Speed	54 mph
Visibility	4 miles
Events	Fog , Rain , Snow , Thunderstorm

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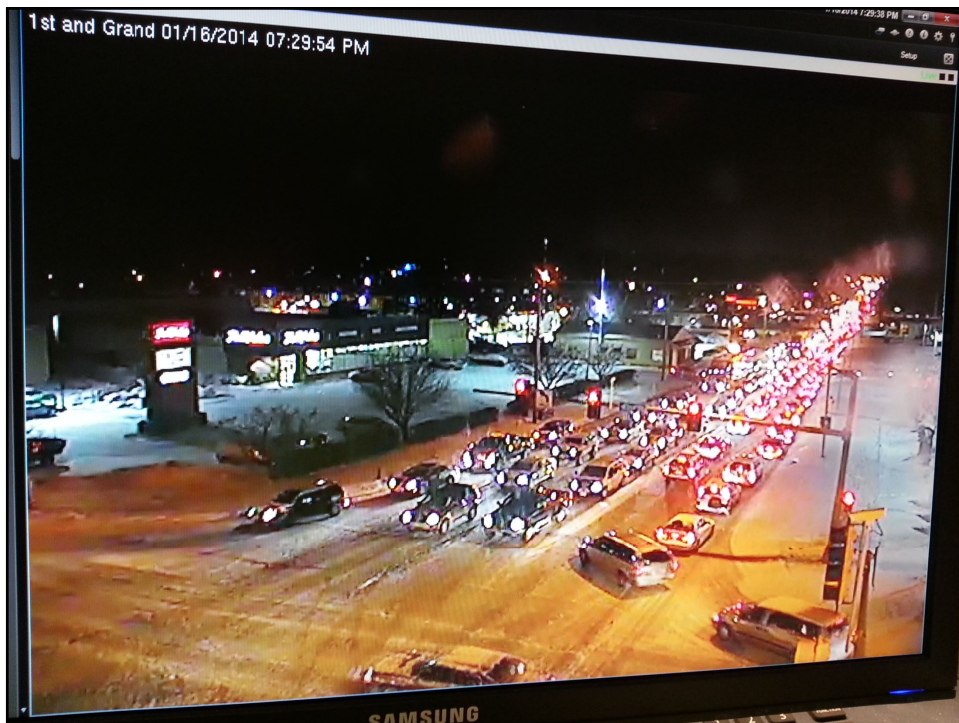
Time (CST)	Temp.	Wind Speed MPH	Gust Speed MPH	Conditions
11:54 AM	39.9 °F	26.5	35.7	Overcast
1:54 PM	34.0 °F	13.8	-	Light Snow
2:54 PM	34.0 °F	10.4	-	Light Snow
3:54 PM	32.0 °F	12.7	-	Heavy Thunderstorms and Snow
4:15 PM	28.0 °F	19.6	32.2	Heavy Snow
4:22 PM	27.0 °F	21.9	31.1	Heavy Snow
4:30 PM	26.1 °F	25.3	39.1	Heavy Snow
4:40 PM	24.1 °F	29.9	49.5	Heavy Snow
4:48 PM	21.2 °F	31.1	48.3	Heavy Snow

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Time (CST)	Temp.	Wind Speed MPH	Gust Speed MPH	Conditions
4:54 PM	21.0 °F	28.8	48.3	Light Snow
5:54 PM	15.1 °F	26.5	41.4	Light Snow
6:54 PM	12.0 °F	27.6	38.0	Light Snow
7:54 PM	10.9 °F	18.4	32.2	Light Snow
8:54 PM	10.9 °F	21.9	32.2	Light Snow
9:54 PM	10.0 °F	23.0	33.4	Light Snow
10:54 PM	10.0 °F	25.3	31.1	Light Snow
11:54 PM	10.0 °F	16.1	27.6	Light Snow

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From Iowa DOT

Salt Application Rate Guidelines							
Assuming: Prewetted salt & 12-foot lane, 2-Hour Run							
	Surface Temperature (F):	33-30 F	29-27 F	26-24 F	23-21 F	20-18 F	17-15 F
Pounds of Salt*	Heavy Frost, Light Snow	50	75	95	120	140	170
	Medium snow (1/2 inch per hour)	75	100	120	145	165	200
	Heavy Snow (one inch per hour)	100	140	185	250	300	350
	Freezing rain, drizzle, sleet	140	185	250	300	350	400

Assuming: Prewetted salt & 12-foot lane, 3 Hour Run							
	Surface Temperature (F):	33-30 F	29-27 F	26-24 F	23-21 F	20-18 F	17-15 F
Pounds of Salt*	Heavy Frost, Light Snow	75	115	145	180	210	255
	Medium snow (1/2 inch per hour)	115	150	180	220	250	300
	Heavy Snow (one inch per hour)	150	210	275	375	450	525
	Freezing rain, drizzle, sleet	210	275	375	450	525	600

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Pre-Season Calibration

Do you KNOW how much is being applied?

- Types of controllers
- Closed versus open loop
- Other considerations (sand/salt)
- Is it really needed?



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Pre-Season Preparation

Closed Loop Controllers

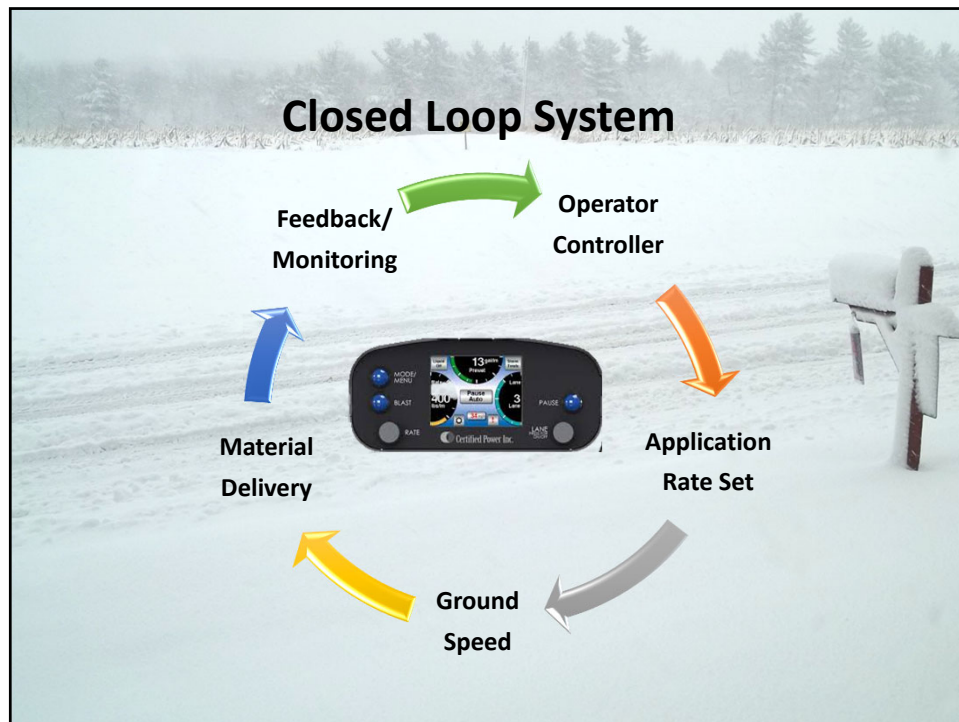
- Based on ground speed (Speed sensor)
- Adjust to truck speed
- Continuous feedback and monitoring

**When the vehicle speed increases, the auger or belt speed increases.*

**When the vehicle speed decreases, the auger or belt speed decreases.*



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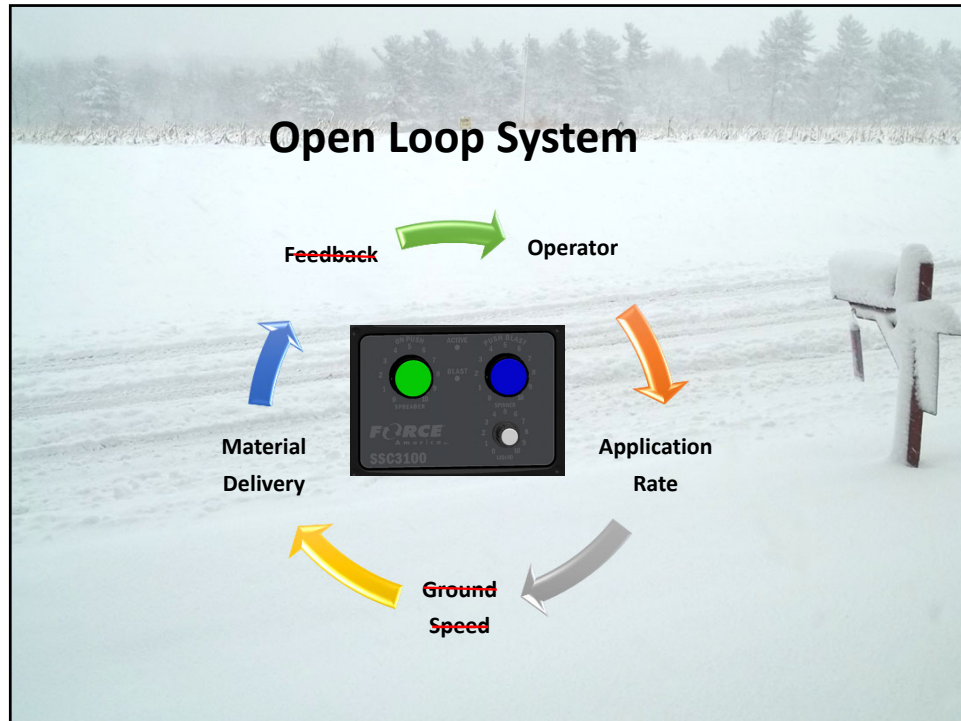
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Pre-Season Preparation

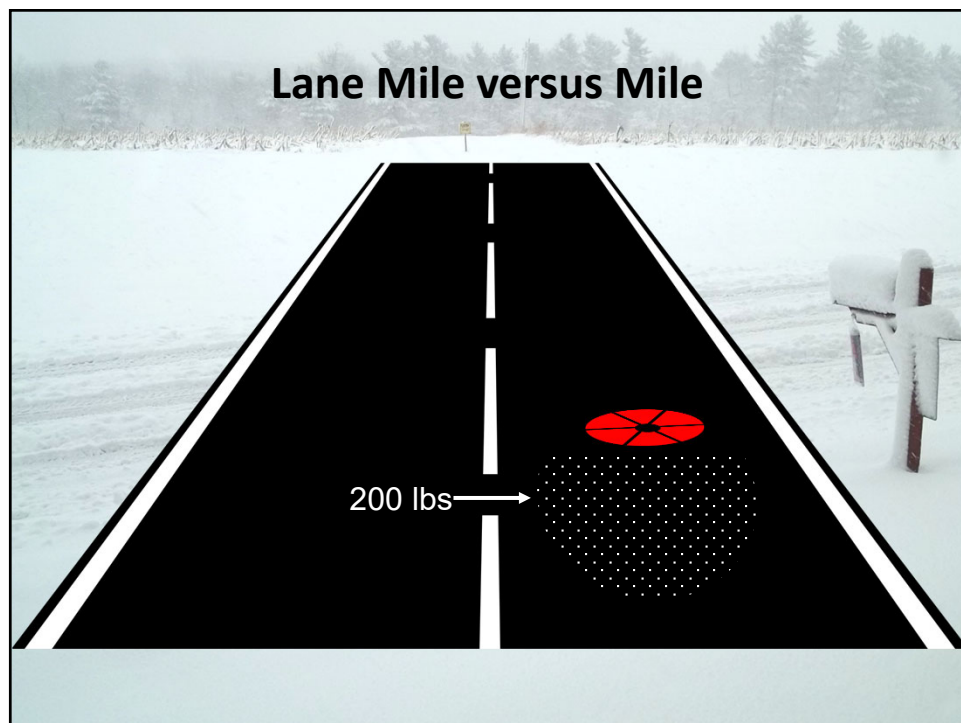
Open Loop Controllers

- Is not based on ground speed (Speed sensor)
- Does not adjust to truck speed
- No continuous feedback and monitoring
- A little more challenging to calibrate

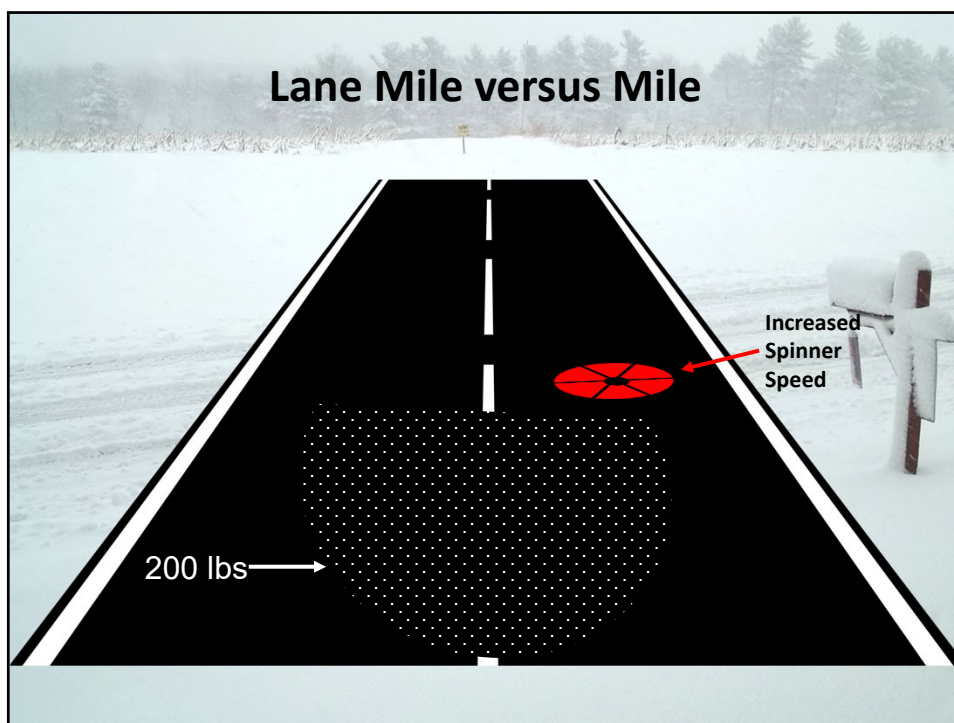
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Pre-Season Preparation

- Stranded Motorist
 - ✓ Policies
 - ✓ Dangerous situation
- Towing Vehicles
 - ✓ Department policies
- Bridges
 - ✓ How to plow
 - ✓ Diverging diamond challenges
- Future storage



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Pre-Season Preparation

General Plow Driver Guidelines

- Safe
 - ✓ PPE
 - ✓ Cell phones
 - ✓ Radios/communication
- Courteous
- Professional



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Preparing For Each Event

Adequate Rest

- 12 hour shifts (or more)
- Two 12 hour shifts
- Balance of work and family
- Can't get it back!



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Questions?

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