



North Dakota Association of County Road Engineers – Scenario Planning and the SFRP, February 3, 2023

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Classic Case of Short Sightedness

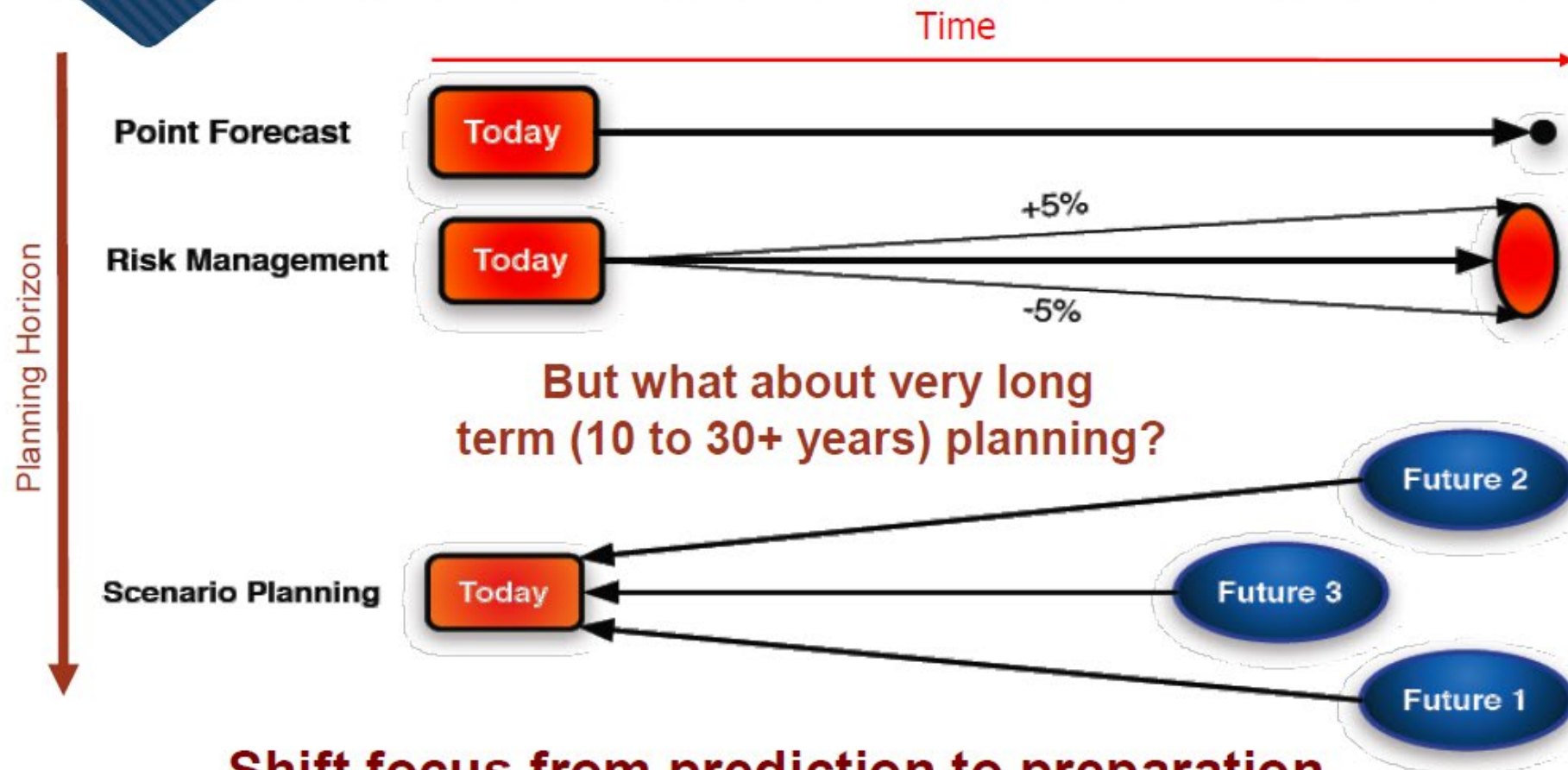
Great Horse Manure Crisis of 1894

- More than 150,000 horses in NYC producing over 2,000 tons of manure per day
- Estimates of manure reaching 3rd floors by 1930 & 9th floors in London by 1950
- 1st International Urban Planning Conference held in NYC in 1894

By 1900, over 4,000 cars were sold in the US. By 1916, more cars than horses were registered in NYC.



Different Methods for Planning



Shift focus from prediction to preparation

Think about the 25-year period from 1997 to 2022.....

- 1997 – The end of a horrendous winter – The Grand Forks flood
- 2001 – September 11th
- 2006-2008 – The Bakken Oil Boom begins.....
- 2007-2009 -- The Great Recession
- 2011 – Minot Flood
- 2020 – The COVID Pandemic is declared

A quarter of a century is a long period of time.....

The Real Value of Scenario Planning

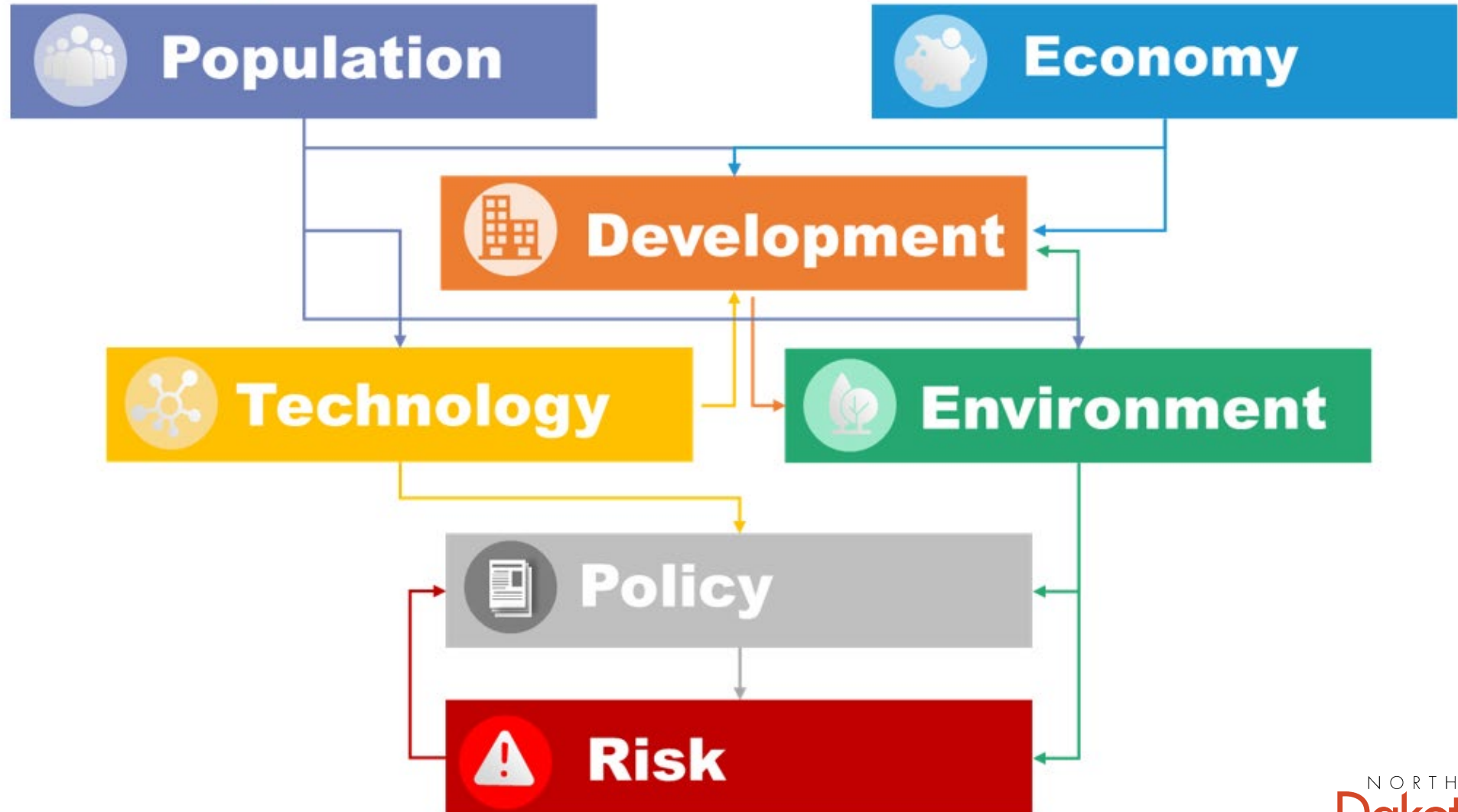
- Forecasting Challenges
 - Without step changes, forecasting would be easy!
 - Step changes are driven by events, and . . .
 - Events are next to impossible to predict, but . . .
 - Planners do a pretty good job preparing, so . . .
- Scenario planning allows us to shift from....



Take Aways

- Scenario Planning focuses on preparing for an **uncertain future** rather than a forecast based on the past. Today, we will focus on plausible, but extreme, scenarios.
- People are **more effective** at planning for the future than forecasting it.
- Traditional forecasting methods assume that the future will be like the recent past. They do not consider **unforeseen events/changes/innovations**.
- The goal of scenario planning is to **be prepared for any future, not just one**.

Drivers of Change



The 'Rules' of Scenario Planning

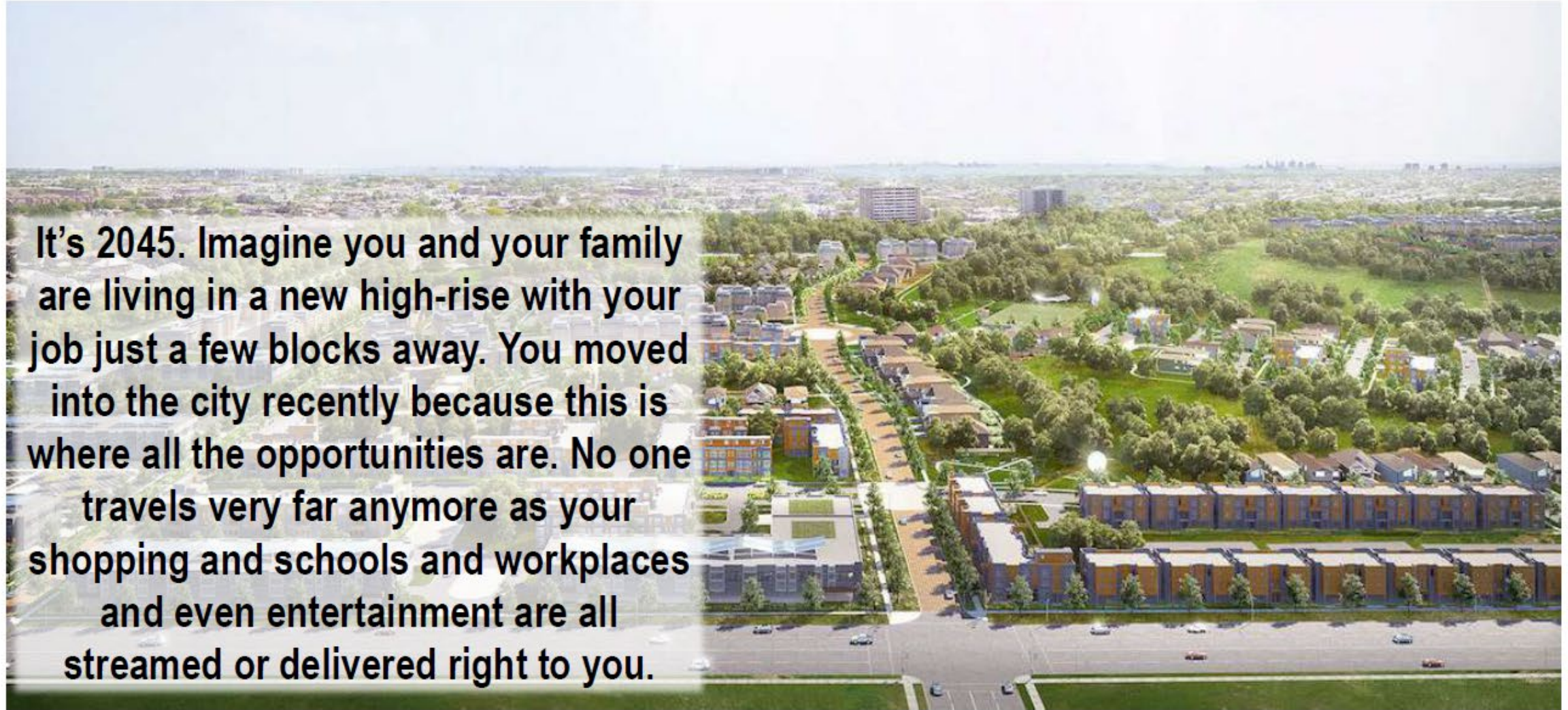
- Invite a broad section of stakeholders – the more diverse the better
- Focus on one scenario at a time
- Don't fall into the trap of a scenario's plausibility – they are meant to be extreme, but still “could” happen
- Multiple scenarios could occur in different parts of the state – one scenario will likely not be our probable future
- Any feedback you get is valuable – don't discount anyone's answer. Sometimes one person's feedback could unearth a gem you have never accounted for before.
- This is your chance to “shape the future”

Freight and Rail Questions asked under each possible scenario

- **How might our future transportation needs change in this scenario?**
 - Freight and delivery movements
 - Multimodal, transit, and new mobility options
 - Road and bridge condition improvements
 - Safety and security needs
 - Natural hazard and risk mitigation
 - Technology and data needs
 - Community livability and public health

Cities and Centers

What if our cities grow quickly and become the centers of the state?



It's 2045. Imagine you and your family are living in a new high-rise with your job just a few blocks away. You moved into the city recently because this is where all the opportunities are. No one travels very far anymore as your shopping and schools and workplaces and even entertainment are all streamed or delivered right to you.

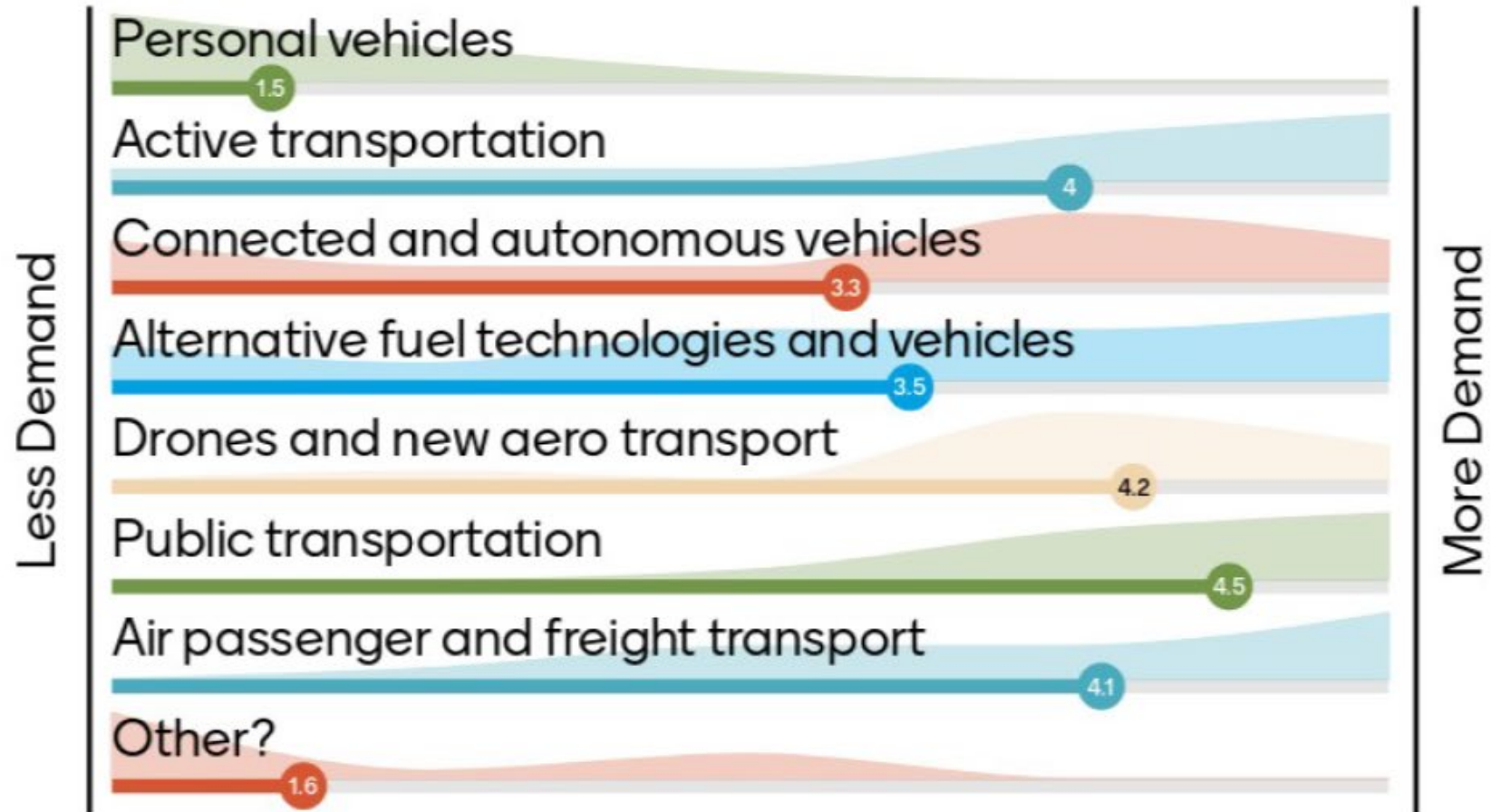
Cities and Centers

What if our cities grow quickly and become the centers of the state?

- Mass migration to cities occurs and all new growth is concentrated in urban areas
- Economy diversifies into professional and technical services
- Energy and agricultural remain important, but their share of economic growth slows
- Energy production becomes more distributed and diversified
- Connected devices and smart infrastructure make it easier, safer, and more convenient to travel
- Urban growth spurs need for natural hazard mitigation around centers



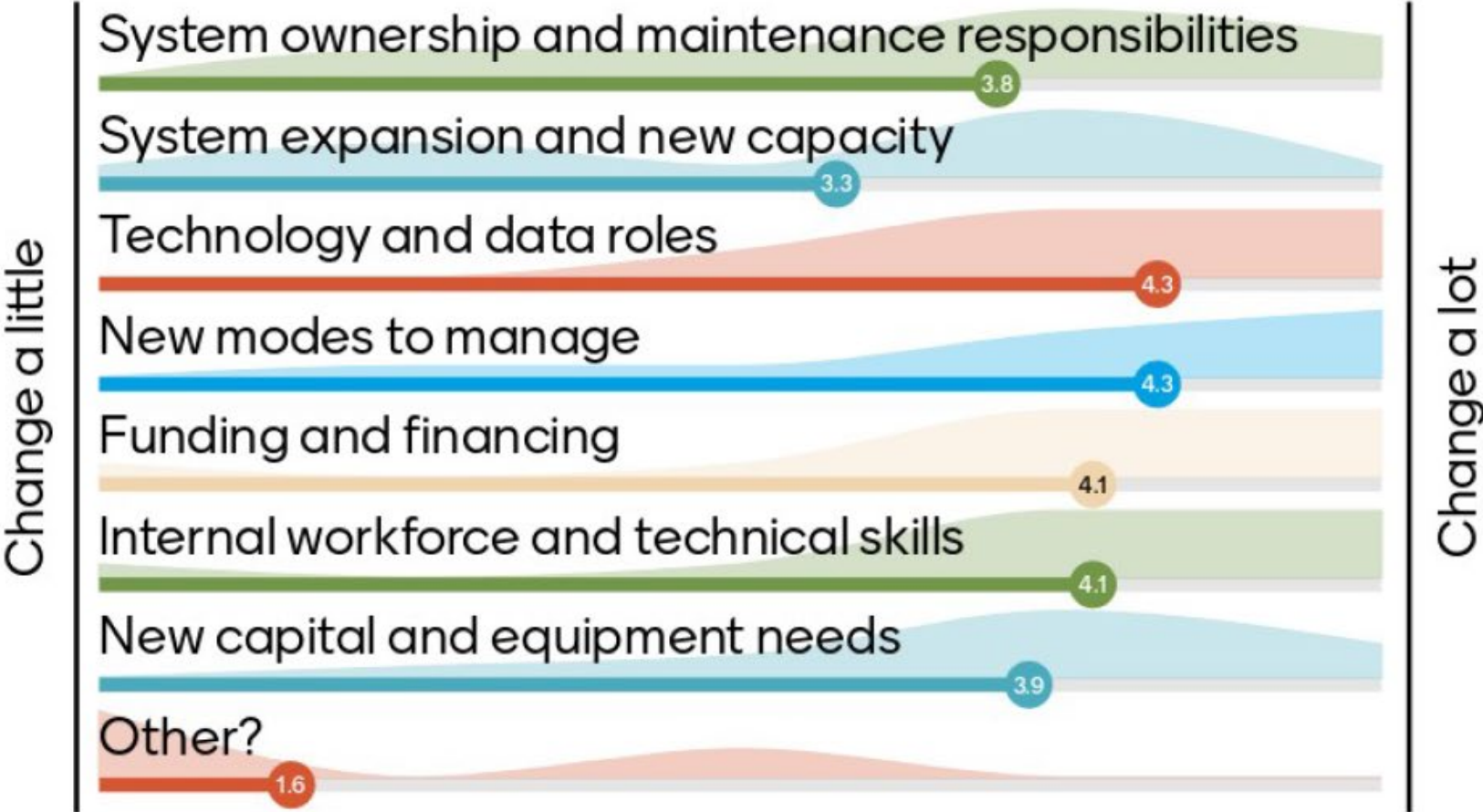
How might North Dakota's transportation systems and services change in the Cities and Centers scenario?



How might North Dakota's transportation needs change in the Cities and Centers scenario?



How might NDDOT's roles and responsibilities change in the Cities and Centers scenario?



Cities and Centers Freight Discussion

- Inbound rail and truck increase
- Large distribution centers served by rail and truck
- More intermodal facilities needed
- People don't need to travel/own cars – what about the gas tax revenue?
- More goods moving into cities
- Drone deliveries more prevalent
- Uptick in air cargo
- Urban air mobility (uber)
- Trucking automation
- Curbspace management
- Rural needs are harder to meet
- More local level investments

Rural Renaissance

What if our rural areas become communities of choice in the future?

It's 2045. Imagine you just moved into your new smart house with open space and fields all around. You check your greenhouse before getting on a call with customers on the other side of the globe, while your spouse is out in an outbuilding 3-D printing drone components for a manufacturing company in Minot.



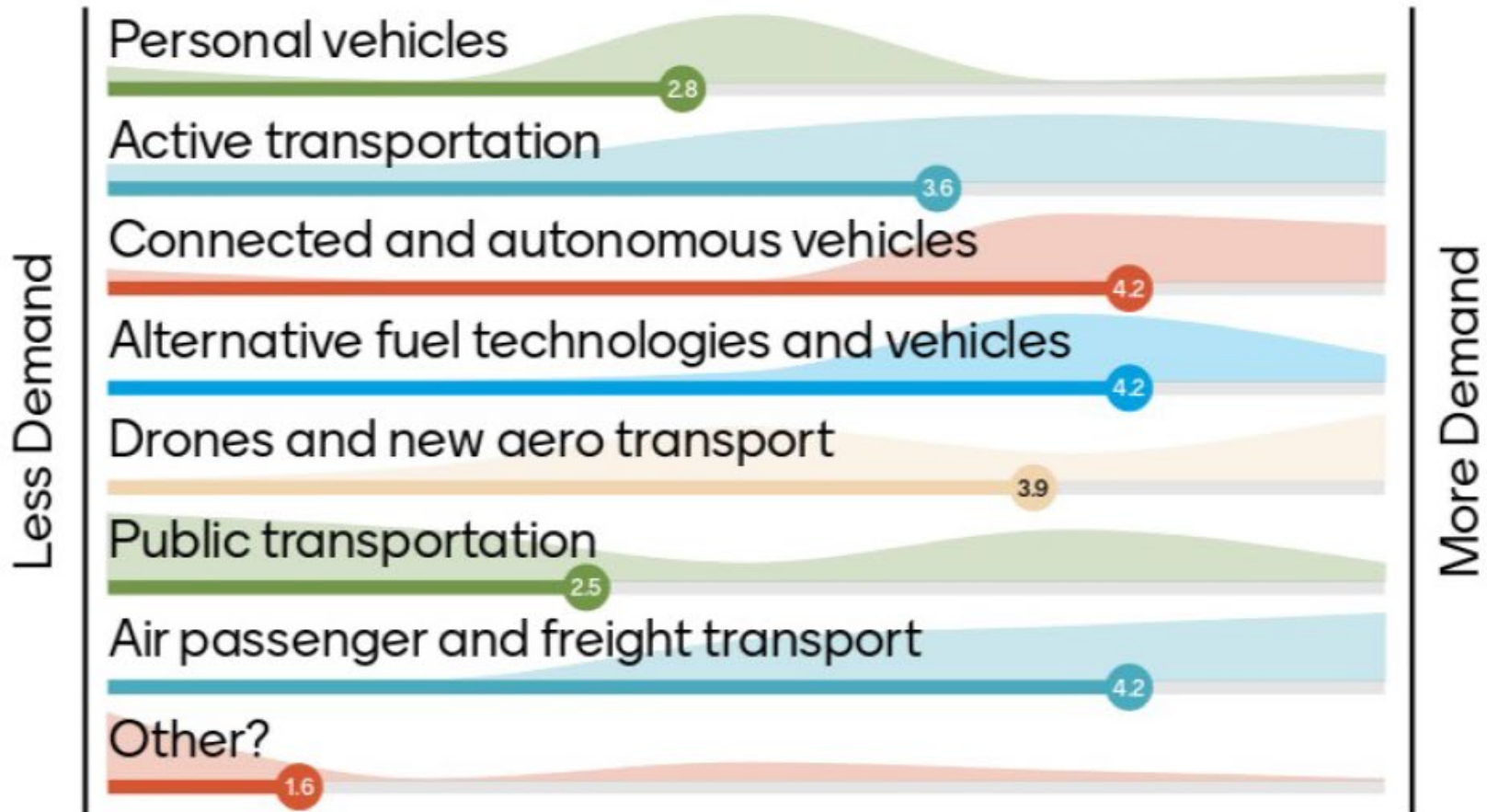
Rural Renaissance

What if our rural areas become communities of choice in the future?

- Rural communities become drivers of new population growth
- Gig work and home-based advanced manufacturing take off
- Local energy and agricultural production
- All industries are connected, smart, and efficient
- Local economies diversify and small town centers expand
- Recreation and tourism increase
- Mitigation reduces natural hazard risks



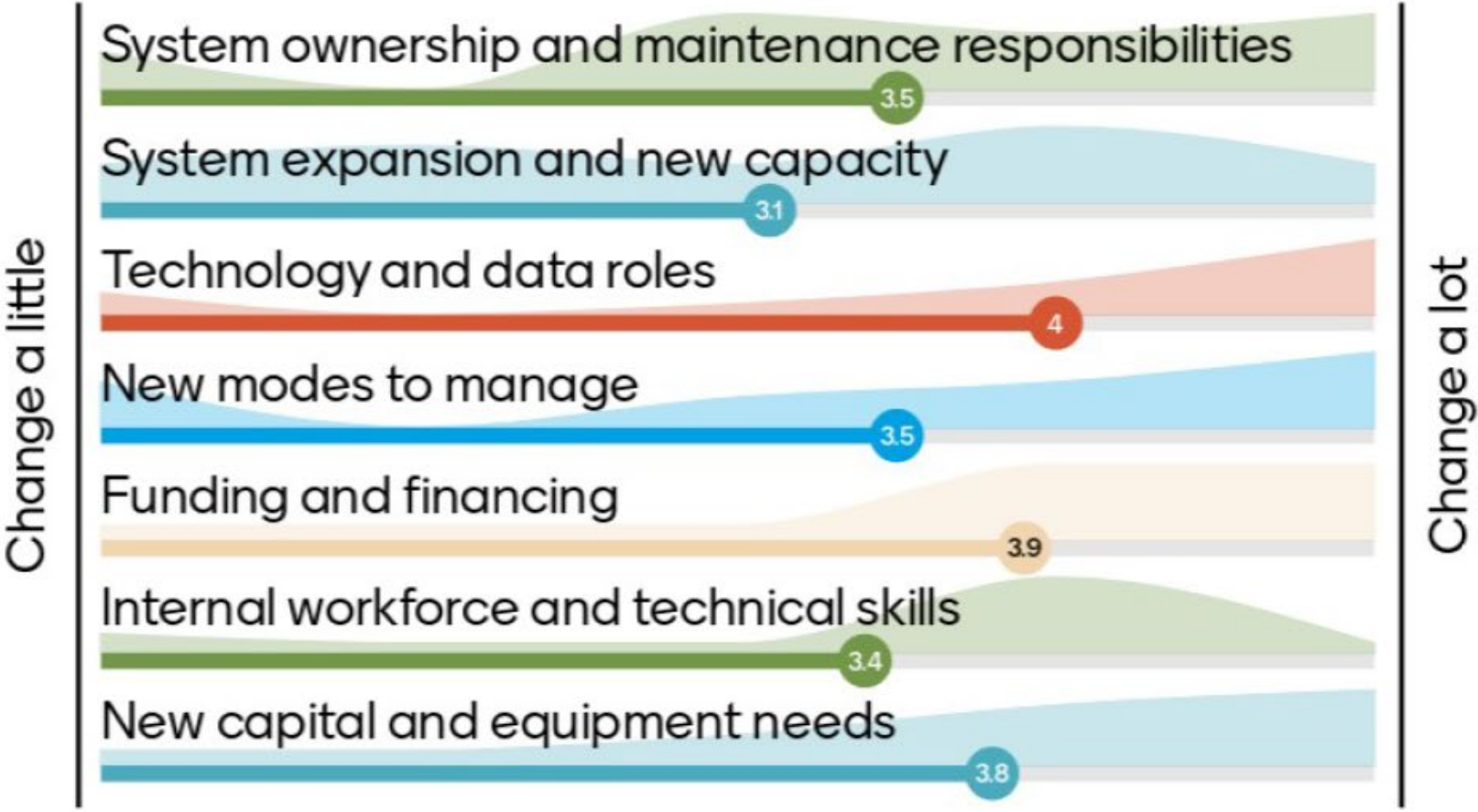
How might North Dakota's transportation systems and services change in the Rural Renaissance scenario?



How might North Dakota's transportation needs change in the Rural Renaissance scenario?



How might NDDOT's roles and responsibilities change in the Rural Renaissance scenario?



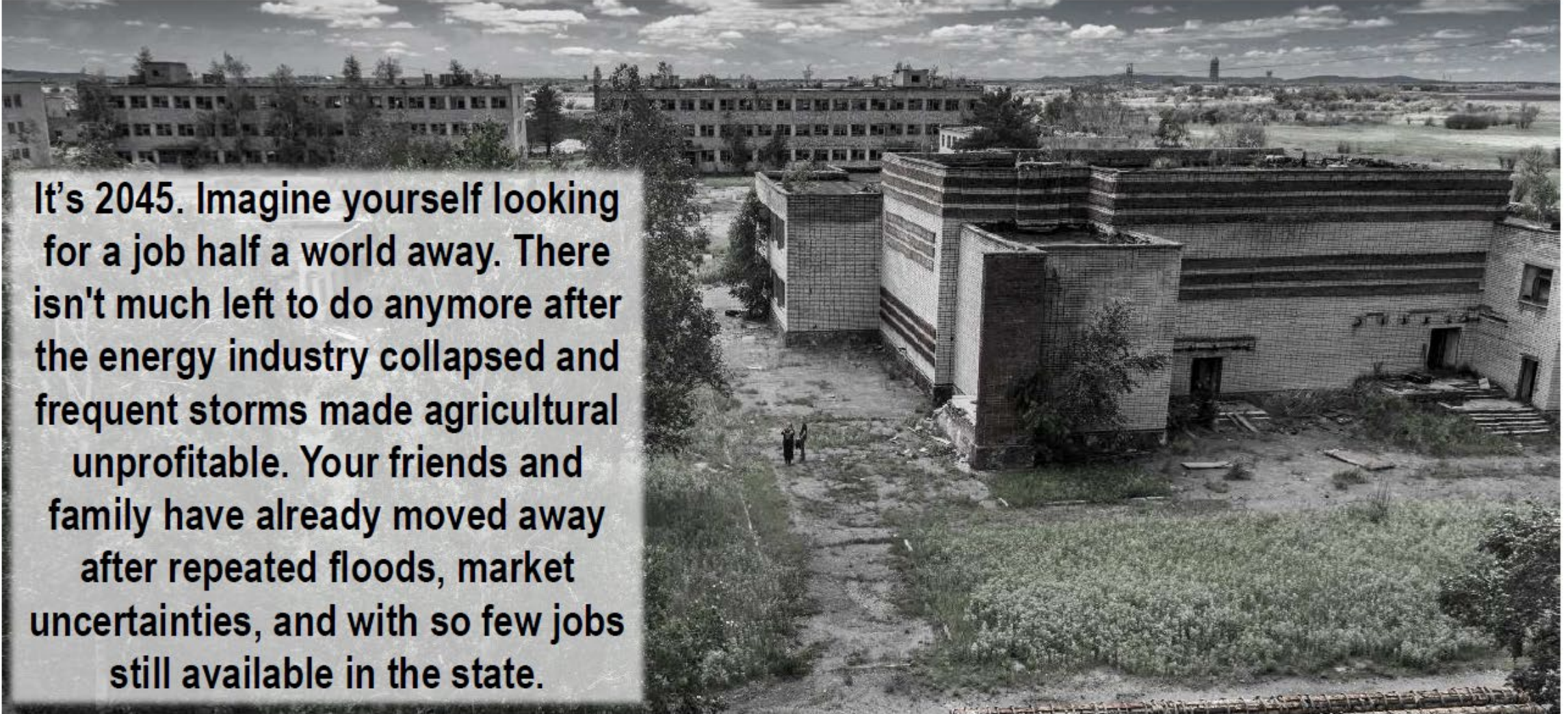
Rural Renaissance Freight Discussion

- Rural high tech cottage industries will still need to move raw materials and goods to market
- Urban areas will become freight “hubs” for rural area “spokes” (like the current airline model)
- Existing modes (trucking, rail, air) and future models (drones, CAV) will be needed to provide freight mobility.
- Road and rail will experience greater volumes and increased congestion
- Increased truck traffic will result in safety concerns/at-grade rail crossings
- Our climate will pose risks and challenges to increased freight movement
- Limited truck and rail access will be a challenge for increased freight activity in rural areas

Ghost Towns

What if North Dakota's economy collapses and quality of life changes dramatically?

It's 2045. Imagine yourself looking for a job half a world away. There isn't much left to do anymore after the energy industry collapsed and frequent storms made agricultural unprofitable. Your friends and family have already moved away after repeated floods, market uncertainties, and with so few jobs still available in the state.



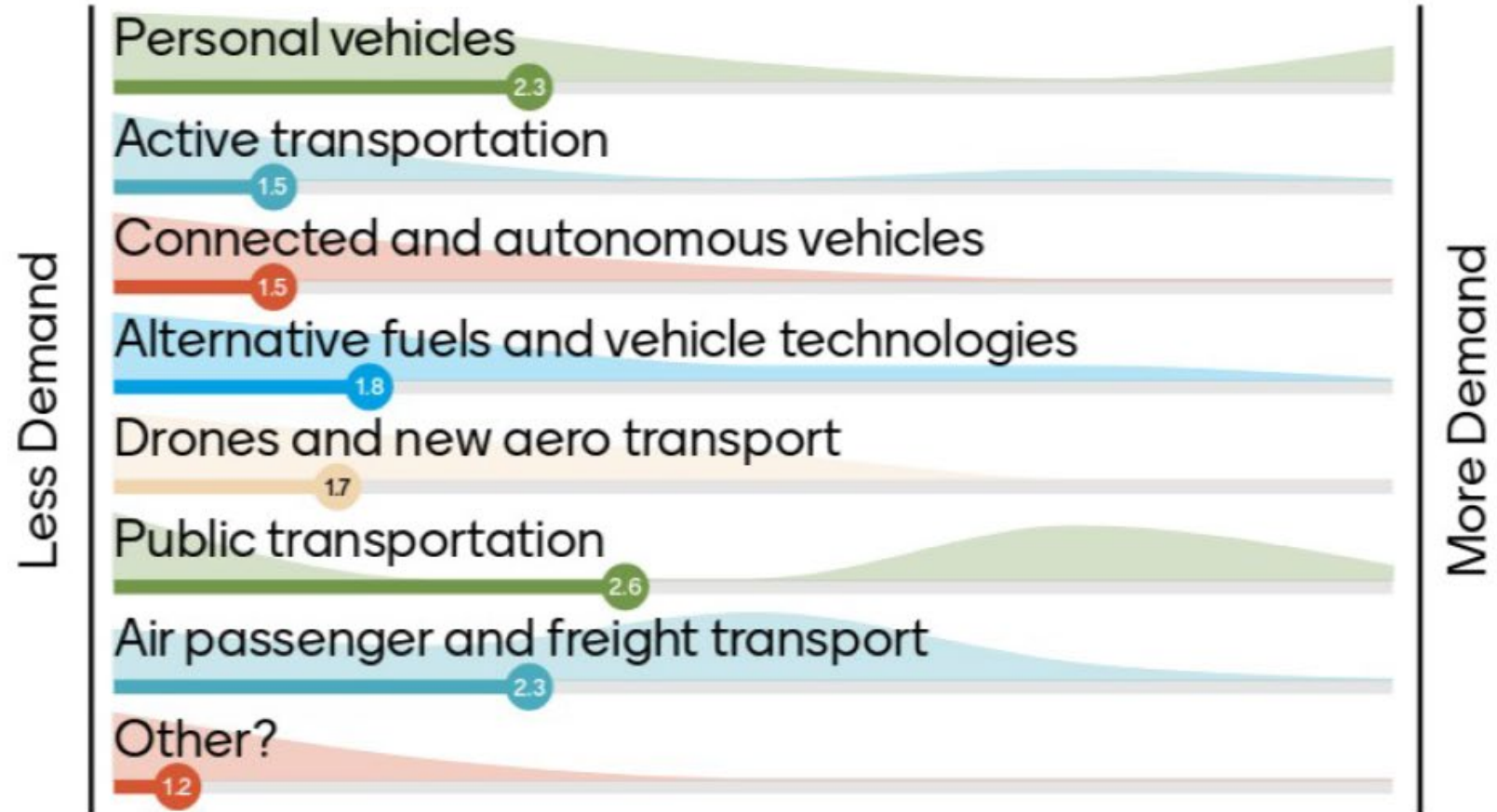
Ghost Towns

What if North Dakota's economy collapses and quality of life changes dramatically?

- Population declines across the state as residents move away
- Communities age more quickly as younger residents seek job opportunities elsewhere
- Energy and agricultural industries decline due to policy changes and international trade disruption
- Limited business investment slows the adoption of new technology and innovations
- Increasingly severe and frequent storm events decimate infrastructure



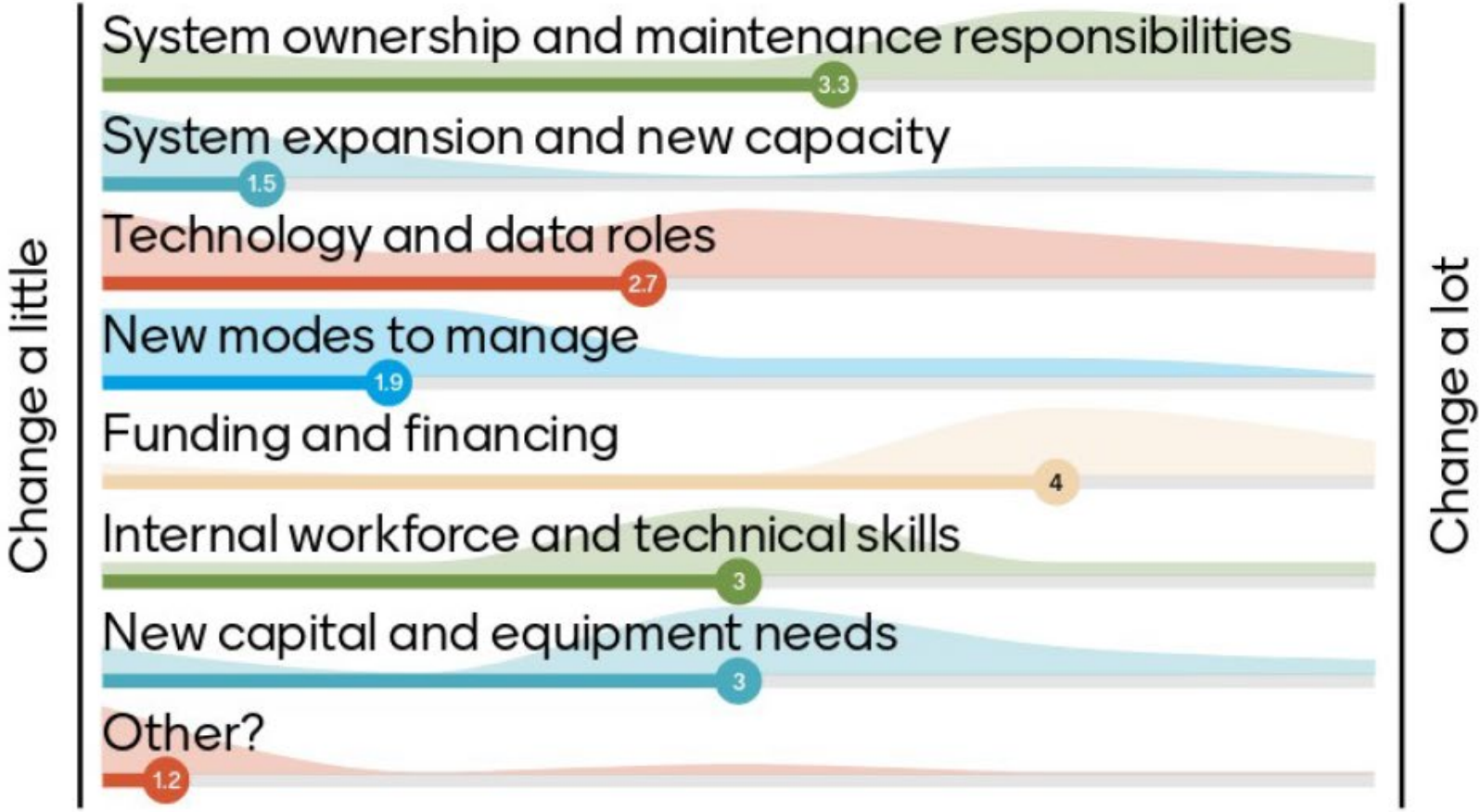
How might North Dakota's transportation systems and services change in the Ghost Towns scenario?



How might North Dakota's transportation needs change in the Ghost Towns scenario?



How might NDDOT's roles and responsibilities change in the Ghost Towns scenario?

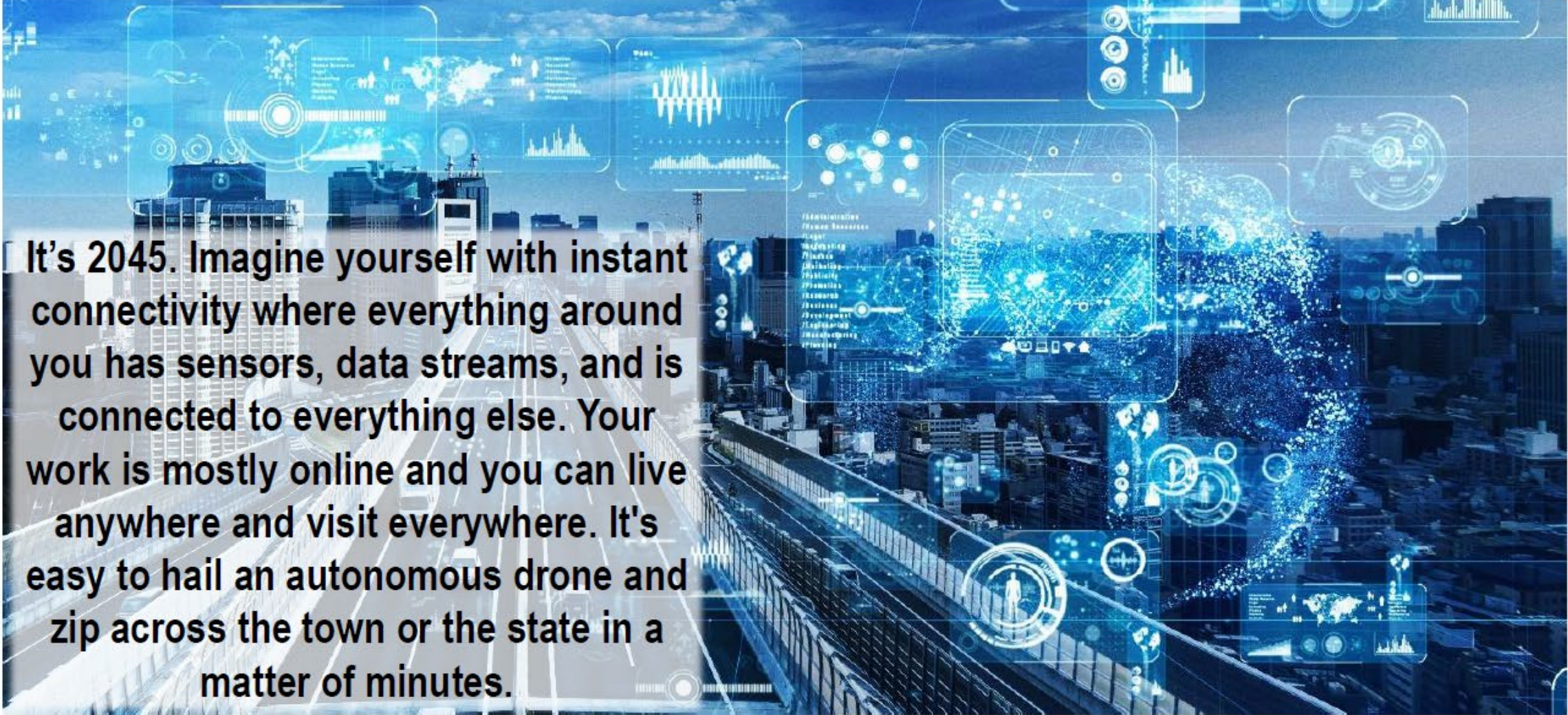


Ghost Towns Freight Discussion

- Redirected border traffic due to flooding
- Near sourcing of critical supplies
- Hardening/consolidation of infrastructure
- Tax revenue would drop as people left
- Stranded infrastructure
- Higher percentage of pass-through freight traffic (cost but no benefit)
- Truck parking issues from blizzards
- Empty Back haul challenges
- Hardening of rail spurs to keep small rural towns alive
- More flood diversion projects
- More air flights out as people leave
- Businesses unable to supply as frequently or reliably as in the past

Smart and Connected

What if innovations accelerate and we live in a tech-driven future?



It's 2045. Imagine yourself with instant connectivity where everything around you has sensors, data streams, and is connected to everything else. Your work is mostly online and you can live anywhere and visit everywhere. It's easy to hail an autonomous drone and zip across the town or the state in a matter of minutes.

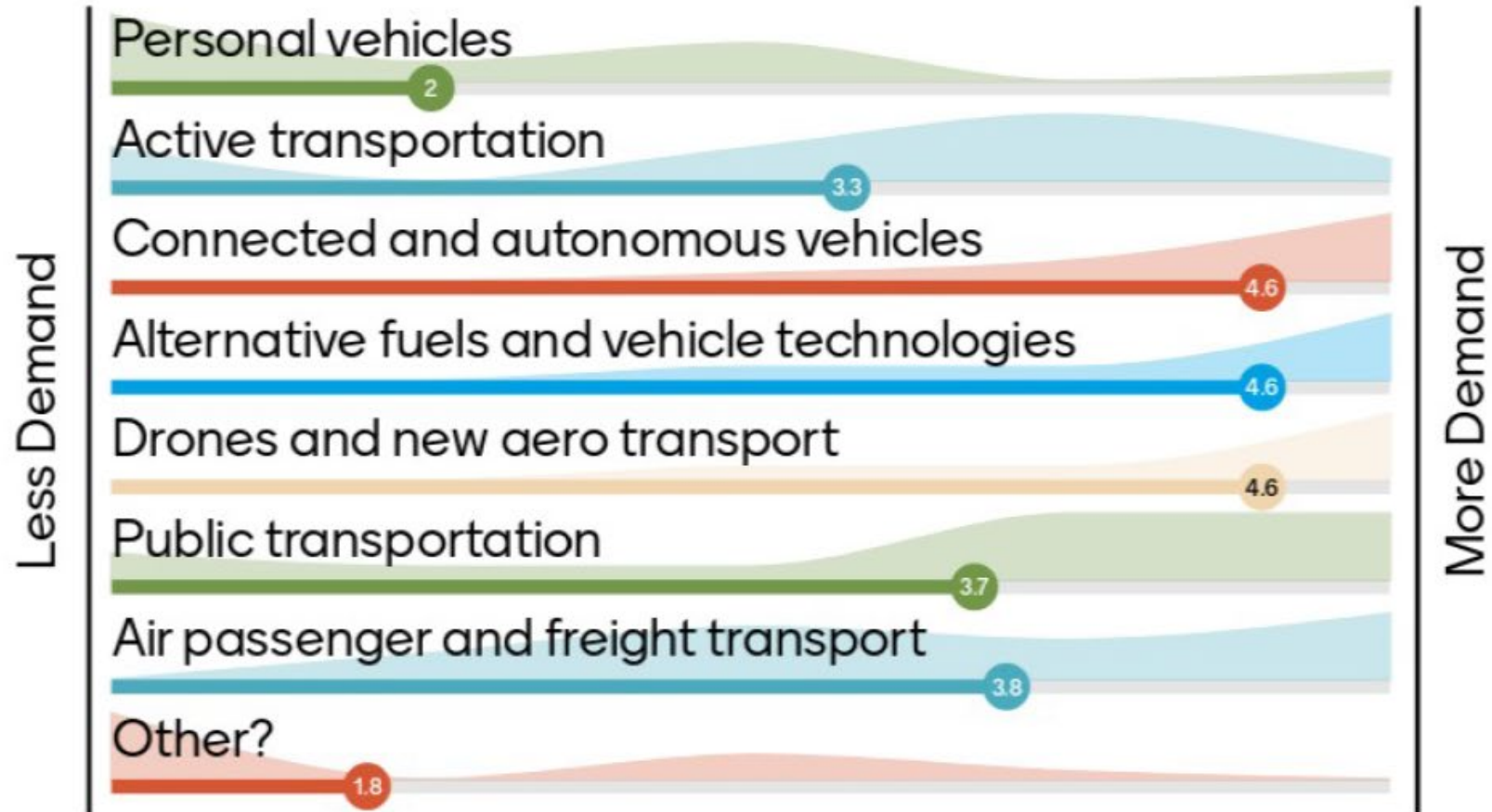
Smart and Connected

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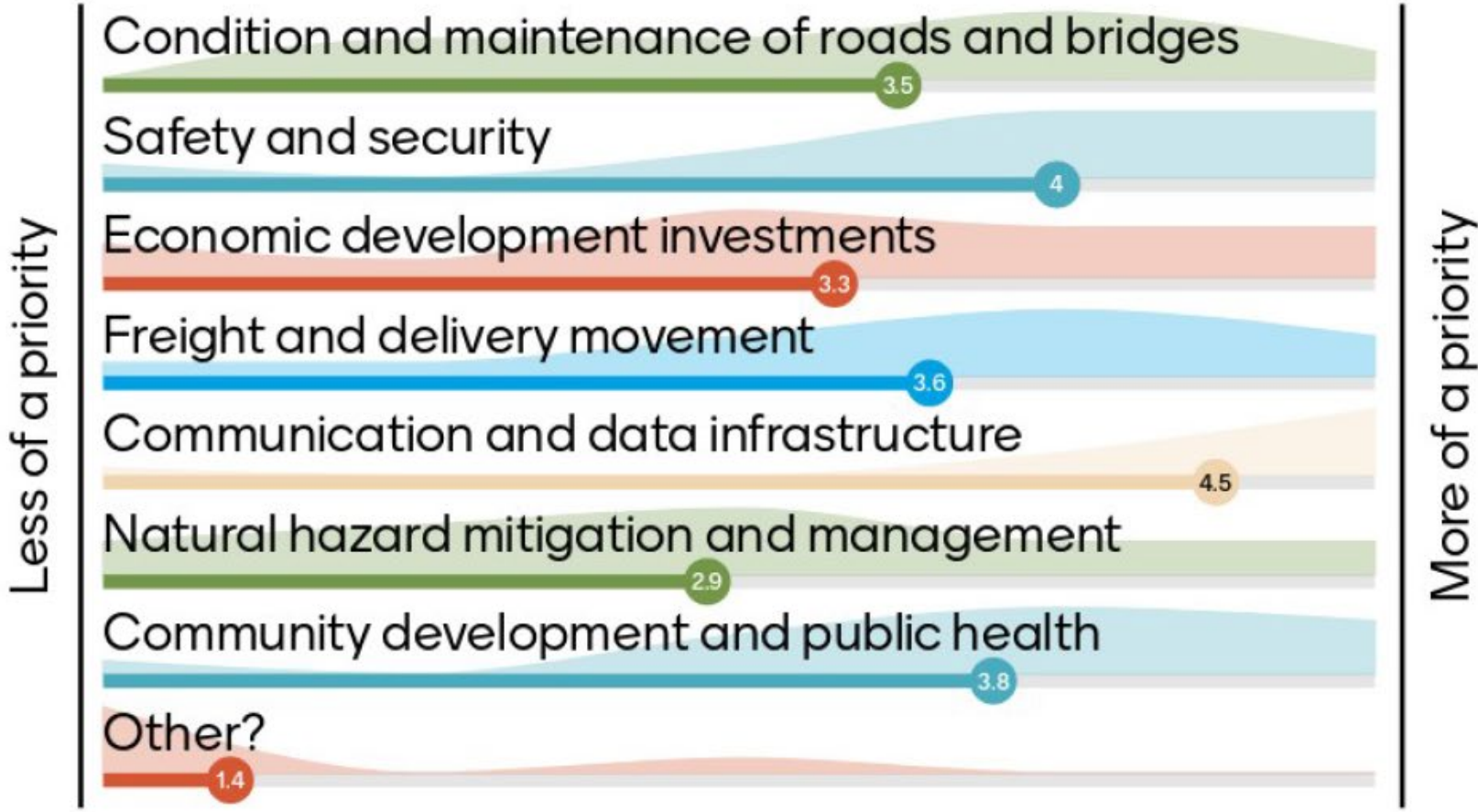
- New residents move in and spur growth in diverse communities around the state
- Technology and innovation spurs job opportunities in new industries
- Online work and remote jobs grow significantly
- Energy and agricultural industries rapidly automate and become tech-driven
- Big data and smart infrastructure connect North Dakota to the world
- New technology is rapidly adopted
- Natural hazard risks and shared land uses increase as the state is rapidly developed



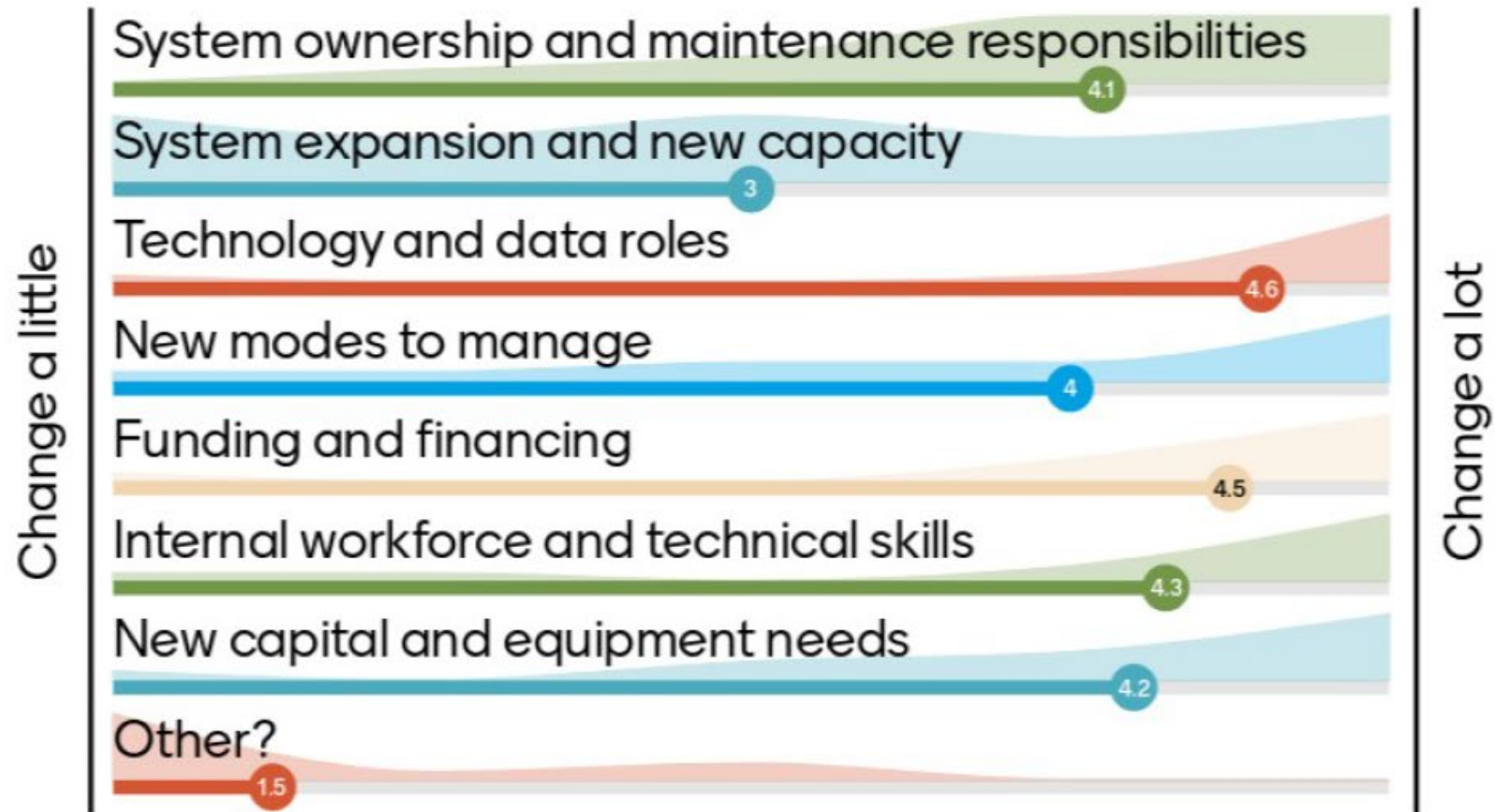
How might North Dakota's transportation systems and services change in the Smart and Connected scenario?



How might North Dakota's transportation needs change in the Smart and Connected scenario?



How might NDDOT's roles and responsibilities change in the Smart and Connected scenario?



Smart and Connected Freight Discussion

- Businesses will not be limited by geography
- A highly mobile workforce can operate from anywhere – urban or rural
- Highly connected systems have safety/security concerns
- Need for back-ups/cybersecurity
- Our climate can pose risks to certain technologies – maybe harden infrastructure or build underground
- Technology can allow for 24/7 border operations – no need for CBP to check every truck or train

What factors are common across all four scenarios we should plan for? Some examples.....

- Funding
- Condition and Maintenance of Bridges
- Natural Hazards
- Technology and Data
- Safety and Security
- Freight Movement
- Economic Development

Cities	Rural	Ghost	Tech	Avg
4.1	3.9	4.0	4.5	4.13
2.8	3.8	2.8	3.5	3.23
3.0	3.2	2.7	2.9	2.95
4.3	4.0	2.7	4.6	3.9
4.2	3.7	3.1	4.0	3.83
4.3	4.4	2.6	3.6	3.73
3.8	3.2	3.3	3.3	3.4

Wrap-up

Thank You!

Additional Resources:

Long Range Transportation Plan -- Appendix A – Trends and Scenarios --
https://www.dot.nd.gov/projects/lrtp/Appendix_TrendsScenarios.pdf

State Freight and Rail Plan – Chapter 6 (page 6-11 to 6-15)
<https://www.dot.nd.gov/projects/frp/>

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