



MANAGING WORLD

A Briefing Book for Decision-Makers in North Carolina

Benjamin Hitchings and David Rouse

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TABLE OF CONTENTS

Acknowledgments	\
Introduction	1

Drivers of Change Briefs

SOCIAL DRIVERS OF CHANGE

Aging Population	. 10
Health	. 12
Housing	. 14
Public Safety	. 16

TECHNOLOGICAL DRIVERS OF CHANGE

Artificial Intelligence	20
Digital Access and Equity	23
New Transportation Technology	26
Smart Communities	28

ECONOMIC DRIVERS OF CHANGE

Blockchain/Cryptocurrency	32
Circular Economy	. 34
Economic Restructuring	36
Workplace/Workforce Disruption	. 38

ENVIRONMENTAL DRIVERS OF CHANGE

Climate	42
Energy	
Food Security	
Water	50
Conclusion: Taking Action	53
Appendix A. Tools for Managing Disruption	58
Appendix B. General Resources	67

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ABOUT THE AUTHORS

Benjamin Hitchings, FAICP, CZO, is the Principal of Green Heron Planning, LLC, and a Fellow at the UNC School of Government. He has more than thirty years of experience working on planning issues and is the former planning director for the towns of Chapel Hill and Morrisville and the former land use program manager for the Triangle J Council of Governments (now Central Pines Regional Council). He serves on the American Planning Association (APA) Board of Directors and is the lead author of A Handbook for Historic Resilience Community Planning: Protecting North Carolina's History, Culture, and Economy from Natural Hazards (2023).

David Rouse, FAICP, ASLA, is a planning consultant, author, and educator with over forty years of experience. He is the former Research Director for the American Planning Association and was a principal at the firm Wallace Roberts & Todd (WRT) in Philadelphia, where many of his projects won awards for professional excellence. He has published widely on a variety of planning and design topics and is the coauthor of The Comprehensive Plan: Sustainable, Resilient, and Equitable Communities for the 21st Century (2022), available from Routledge Press.



SCHOOL OF GOVERNMENT Growing Practical Solutions for North Carolina

SUBJECT MATTER EXPERTS INTERVIEWED BY REPORT AUTHORS

- Dr. Jay Aikat, Vice Dean, School of Data Science and Society, UNC Chapel Hill
- Dr. Chris Baillie, Resilience/Climate Adaptation Coordinator, Eastern N.C. Sentinel Landscape, N.C. Coastal Federation
- Dr. Greg Brown, Professor of Finance, Director of Frank Hawkins Kenan Institute of Private Enterprise, Kenan-Flagler Business School, UNC Chapel Hill
- Ryan Brumfield, Director, Integrated Mobility Division, N.C. Department of Transportation
- Eddie Caldwell, Executive Director of the North Carolina Sheriffs' Association
- Jeff DeBellis, Director of Labor and Economic Analysis Division, N.C. Department of Commerce
- Jenny Dissen, Engagement Lead, N.C. Institute for Climate Studies, N.C. State University
- Cassie Gavin, Policy Director, N.C. Sustainable Energy Coalition
- Hamilton Hitchings, Software Engineer, ChatGPT Application Developer
- Bill Hollingsed, Executive Director, North Carolina Association of Chiefs of Police
- Lara Ingram, Executive Director, Feed NC
- Paul Inserra, Blockchain Expert
- Michelle Lovejoy, Senior Manager, Climate Resilient Coasts and Watersheds NC, Environmental Defense Fund

- Dr. Collin Lynch, Associate Professor of Computer Science, N.C. State University
- Joyce Massey-Smith, Director, Division of Aging and Adult Services, N.C. Department of Health and Human Services
- Erin Riggs, former Executive Director, Environmental Finance Center, UNC School of Government
- Gary Salamido, President and CEO, N.C. Chamber of Commerce
- Jessica Smith, W.R. Kenan, Jr. Distinguished Professor & Director, Criminal Justice Innovation Lab, UNC School of Government
- Michael Spink, APF, CUDE, Senior Vice President, Research + Development, Civic Federal Credit Union/Local Government Federal Credit Union
- Ray Starling, General Counsel, N.C. Chamber of Commerce
- Dr. Shannon Tufts, Professor of Public Law and Government, Director of Center for Public Technology, School of Government, UNC Chapel Hill
- Stephanie Watkins-Cruz, Director of Housing Policy, N.C. Housing Coalition
- Maggie Woods, Digital Equity Manager, N.C. Division of Broadband and Digital Equity
- Wendy Worley, Section Chief, Recycling Business Assistance Center, N.C. Department of Environmental Quality

INTRODUCTION

"It is time to face the world's predictable unpredictability. The pattern for the rest of the 2020s is not the familiar routine of the pre-covid years, but the turmoil and bewilderment of the pandemic era. The new normal is already here."

-THE ECONOMIST, DECEMBER 2021

North Carolina communities, like communities across the nation, are experiencing the effects of disruptive, accelerating change. Consider the impacts of the COVID-19 pandemic: Who, in the fall of 2019, could have anticipated that, only a few months later, communities would have to suddenly shift to remote operations, weather an instant economic crisis, support mass testing and vaccinations, help businesses and residents disproportionately impacted by the pandemic, and more? And who during the height of the pandemic could have anticipated the strength of the economic recovery, the surge in inflation and interest rates, the supply chain disruptions and labor shortages, and the emergence of new, technology-based ways of working and living?

The pandemic and its aftermath played out against a backdrop of social, technological, economic, and environmental trends that continue to impact North Carolina communities. Some of these trends, such as declining health outcomes and socioeconomic inequality, are longterm forces that were accentuated by the pandemic. Others, such as the digital economy and artificial intelligence, are developing trends whose ultimate impacts have yet to be determined. The effects of other trends, such as autonomous vehicles, may be experienced at some point in the future. A key question for local governments, then, is: how can we address the myriad of forces that are impacting us now or may impact us in the future?

This report is intended as a resource for communities across North Carolina—from the coastal plain to the Piedmont to the mountains, from rural to suburban to urban areas—to use as they begin answering this question. It has been prepared for Growing Practical Solutions NC (GPS NC), a UNC School of Government program coordinated by the ncIMPACT Initiative. Funded by Civic Federal Credit Union, this program works to foster a **culture of innovation** that increases the capacity of local communities to respond to disruptive change.

The report presents a framework structured around drivers of change, which are macro-level forces that impact local communities. Drivers of change are organized into four broad, interconnected categories: social, technological, economic, and environmental. Some of these drivers are well-established, with deep historical roots (for example, housing and health). Others have risen to the forefront more recently (for example, aging population and climate). Still others (primarily technological) are emergent, with their full impact to be felt in the future (for example, artificial intelligence and new transportation technology). The basic premise is that communities need to address these drivers in a proactive, integrated manner (rather than the reactive, piecemeal one that is the norm) if they are to successfully prepare for and respond to change.

The drivers of change framework can be used in multiple ways. It provides a tool to understand the many forces affecting a community or region and to determine those likely to be most impactful, either now or in the future. Depending on the local context, the drivers of change may be those shown in Figure 1 and/or others identified through a scan of issues and trends. Scanning can be done on an ongoing basis—for example, by a working group established to track "signals" of change or in a strategic planning process. Used in a strategic planning process, the framework can help prioritize key issues and develop solutions to address them. Its overarching purpose is to provide a vehicle for incorporating **strategic foresight** into planning, decision-making, and operations at the local and regional levels.

Figure 1. Drivers of Change Framework



(Adapted from: Hitchings, Benjamin and David Rouse. 2022. Triangle Trends Report: Tracking Disruption. Triangle J Council of Governments)

HOW THE BRIEFING BOOK IS ORGANIZED

The main body of this briefing book consists of **a series** of briefs on the drivers of change shown in Figure 1. The format is designed to allow busy decision-makers to quickly understand the drivers of change. Toward this end, each brief presents an overview of and key statistics for the driver in question; describes its implications for North Carolina and local communities; and identifies potential actions that can be taken to address challenges and take advantage of opportunities that come from disruptive change. Web links to additional resources are provided for those who want more detailed information.

The briefs were developed through extensive research and interviews with subject matter experts who are familiar with the issues involved. Because conditions are continually changing and new information emerging, it is important to note that the briefs represent a snapshot from 2023 (when most of the research for the report was conducted). The format allows for maintaining and updating individual briefs over time, as well as adding new ones to address additional drivers of change.

The drivers of change briefs are followed by the <u>Con-</u> clusion and two **appendixes**. The Conclusion describes a process that North Carolina communities can use to more effectively prepare for and manage the disruptive effects of change, which includes drafting and implementing a Community Readiness Plan. The Conclusion also makes recommendations on what various levels of government and relevant sectors can do to increase community readiness and resilience. <u>Appendix A</u> contains a series of tools that communities can use in this process. <u>Appendix B</u> contains references and links to additional resources related to managing change.

Strategic Foresight

The dictionary definition of foresight is the ability to predict what will happen or be needed in the future. We apply foresight in our everyday lives, using aids such as weather forecasts, transit timetables, and the like. Predicting further into the future, and moving from the individual to the societal level, is an exponentially more difficult and complex task. The conventional approach relies on interpreting trends and patterns from the past to extrapolate a single, likely future (Gidley 2017). In today's world, the accelerating pace and uncertainty created by drivers of change have made this approach obsolete. Depending on context and scale, a multitude of possible futures exist—some more likely than others (typically referred to as scenarios). Given this uncertainty, the Organization for Economic Cooperation and Development (OECD) defines <u>strategic foresight</u> as "a structured and systematic way of using ideas about the future to anticipate possible opportunities and challenges and better prepare for change." Simply stated, this means looking to the future in order to make more informed decisions in the present. The key takeaway for communities is to apply strategic foresight to operationalize a future focus in all local governmental activities.

How to Use the Briefing Book

We recommend that you start by reading the Introduction and familiarizing yourself with the drivers of change briefs, especially those that may be new to you. The <u>Conclusion</u> provides a step-by-step guide to preparing and implementing a Community Readiness Plan, which can help your community or organization work systematically and strategically to increase its resilience. The <u>"Taking Action at Different Levels"</u> section at the end of the Conclusion details a broader, multifaceted approach that strengthens resilience across organizations and businesses—at local, regional, and state levels—and provides tools to help them prepare for and manage disruption.

RECOGNIZING COMMUNITY AND REGIONAL VARIATIONS

North Carolina is a diverse state with significant variations across communities and regions. These variations can be characterized in many different ways. For example, the state is divided into three physical regions (Coastal Plain, Piedmont, and Mountains) and four ecoregions (Coastal Plain, Sandhills, Piedmont, and Mountains). Different areas can also be characterized based on their degree of urbanization. Considered a rural state for most of its history, North Carolina transitioned to majority urban during the 1990s as measured by the percentage of people living in incorporated municipalities. According to the U.S. Census, in 2020, two-thirds of North Carolina's population (6,964,727 people) lived in urban areas while one-third (3,474,661 people) lived in rural areas (Cline 2023).¹

From an administrative standpoint, North Carolina has about 550 municipalities, 100 counties, and 16 regional councils. The degree of urbanization varies across the state's counties and regions and within individual counties and regions. The North Carolina Rural Center defines urbanization based on population density.² According to the Center's definitions, 78 North Carolina counties are rural, 6 are urban, and 16 are regional city and suburban (i.e., urbanizing).

What impacts do the drivers of change have on these various communities and regions? The answer depends on multiple factors including geography, rural vs. urban characteristics, demographics, and economic wellbeing. For example, communities across the state are increasingly affected by extreme weather but the types of impacts (heat waves, flooding, wildfires, etc.) differ according to geographic context. In another example, new transportation technology is mostly impacting urban areas but has the potential to increase mobility for rural residents as well. The response to the drivers of change will differ based on local context and capacity. For example, rural and urban communities both experience a lack of affordable housing, food insecurity, and limited health-care access but rural communities typically have fewer resources to deal with these problems.

The drivers of change briefs address community and regional variations in several ways:

- The Relevance section notes how the impact of the driver varies in different contexts (e.g., rural vs. urban).
- The **Considerations for North Carolina** section explores these differences in more detail.
- The Potential Responses section includes a range of actions that can be applied in different community contexts.
- The **Example** sections of the briefs illustrate how specific communities across the state are responding to various drivers of change.

Although it may seem that some of the drivers are relevant only to certain places, their impacts will likely be felt throughout North Carolina—either directly or indirectly and all communities should consider their implications.

NORTH CAROLINA COUNTIES



COMMON THEMES

Irrespective of the contextual variations, these three common themes affect all parts of the state and recur throughout the drivers of change briefs: equity, resilience, and continuous learning.

Equity means reducing or eliminating outcome disparities between different groups based on structural barriers. For example, many North Carolinians in both rural and urban areas lack access to broadband service due to its cost and thus cannot participate in the digital economy. In another example, the average Black and Hispanic or Latino households in the U.S. earn about half as much as the average white household and own 15 to 20% less wealth (Aladangady and Forde 2021). To increase equity, communities need to consider how drivers of change disproportionately affect different

^{1.} Even with the increased percentage of urban population, North Carolina had the second-largest rural population of any state in the nation in 2020.

^{2.} Counties with an average density of less than 250 people per square mile are considered rural; counties with an average density of 250 to 750 people per square mile are considered regional city and suburban; and counties with an average density of over 750 people per square mile are considered urban (*Rural Representation in N.C. Election Districts*, North Carolina Rural Center n.d.).

residents and respond accordingly, thus building overall resilience to the disruptive impacts of change.

Resilience indicates the capacity to prevent, withstand, respond to, and recover from major disruptions, including both shocks and stresses. Natural disasters, severe economic recessions, and the COVID-19 pandemic are examples of shocks. Increasing socioeconomic inequality, digital restructuring of the economy, and population change (growth in urban areas and decline in rural areas) are examples of stresses. A key purpose of developing a <u>Community Readiness Plan</u> (described in the Conclusion) is to build resilience to shocks and stresses.

Continuous Learning at all levels—from individuals to organizations, private businesses to local, regional, and state government—is essential to secure the prosperity and well-being of North Carolina and its residents in a time of disruptive change. This concept, which was a consistent theme in the expert interviews conducted

"This is equity: just and fair inclusion into a society in which all can participate, prosper, and reach their full potential. Unlocking the promise of the nation by unleashing the promise in us all."

-THE EQUITY MANIFESTO (POLICYLINK 2018).

for this report, encompasses formal education (from K-12 to community colleges, universities, and beyond); workforce training, upskilling, and reskilling to prepare for twenty-first-century jobs; and a lifelong commitment to learning. For communities, continuous learning means building capacity to understand, monitor, evaluate, and adapt to the impacts of the drivers of change.

According to researchers at the Bloomberg Harvard City Leadership Initiative, the following three core capabilities are required to increase organizational capacity to respond to "big, thorny problems" like those that come with change: collaborative capability, data-analytic capability, and reflective-improvement capability (de Jong, Mayne, and Fernandez-Monge 2024). Collaborative capability means creating and benefiting from relationships within and across organizational boundaries. Data-analytic capability means generating the right data and information and putting them to use. Reflectiveimprovement capability means truly understanding a problem's complexity, generating a sound action plan, and adapting it over time based on what's working and what's being learned. By building these core capabilities, communities can foster a culture of innovation that will position them well to manage disruptive change. The goal of this report is to help you transform the way your community or organization prepares for the future. We hope it will support you on this vital journey.

Definitions of Key Terms in the Briefing Book

Community: A municipality (city, town, or village) or county.

Community Readiness Plan: A community or organizational plan designed to increase resilience and readiness to manage the disruptive impacts of change.

Disruption: Unanticipated impacts to the status quo caused by a driver or drivers of change.

Drivers of Change: Macro-level forces that impact communities and regions. Drivers of change are organized into four categories: social, technological, economic, and environmental, all of which are interrelated.

Equity: Reducing or eliminating outcome disparities between different groups.

Issue: A challenge or opportunity posed by a driver of change for a community or region.

Region: A group of counties covered by a regional council. Based on this definition, there are sixteen regions in North Carolina.

Resilience: The capacity to prevent, withstand, respond to, and recover from major disruptions, including both acute shocks and chronic stresses. Examples of acute shocks include natural or human-made disasters and disease outbreaks. Examples of chronic stresses include climate variability, persistent poverty, and structural discrimination.

Social Vulnerability: Demographic and socioeconomic factors (such as financial resources, access to quality schools, and transportation options) that adversely affect the ability of individuals and communities to successfully weather shocks and stresses (<u>ATSDR/CDC</u>).

Strategic Foresight: A structured and systematic way of using ideas about the future to anticipate possible opportunities and challenges and better prepare for change (OECD n.d.).

Trend: How the impacts of drivers of change and related issues are developing or changing over time.

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Drivers of change are like a meteor shower headed toward earth, with each issue in a different stage of approach. Our challenge is that we don't know which drivers will miss our community entirely, and which ones will land a direct hit.

DRIVERS OF CHANGE BRIEFS

The following pages present the drivers of change briefs, organized into four categories: social, technological, economic, and environmental. Each brief contains the following sections:

- **Overview:** Describes the driver of change and its societal implications.
- Relevance: Addresses the relative significance of the driver for North Carolina communities, based on four factors: degree of **impact**, degree of **certainty, timeframe** (immediate, emerging, or long-term), and community **context** (e.g., rural vs. urban).
- **Related Drivers:** Identifies four other drivers of change covered in this report with which the driver in question interacts (listed alphabetically).¹

- **Takeaways:** Summarizes major points readers should know about the driver.
- Considerations for North Carolina: Describes the implications of the driver for North Carolina as a whole and for communities within the state.
- **Potential Responses:** Identifies actions that North Carolina localities (municipalities, counties, or regions) could take to address the driver, divided into short, mid, and long-term timeframes. These generally correspond to the timeframes identified in the Cone of Uncertainty (described below).
- **Example:** Provides example(s) of how one or more communities are addressing the driver.
- References: Lists the references cited in the brief and additional resources to help readers take a deeper dive into each topic.

^{1.} Please note that the number of related drivers shown for each driver is limited to four for illustrative purposes.





CONE OF UNCERTAINTY

The briefs provide information on how to address the impacts of individual drivers of change. It is also important to consider the **collective** impacts of the drivers of change—for example, their interconnections (addressed in <u>Appendix A, Worksheet 2: Cross-Impact Analysis</u>) and their varying stages of arrival and impact, which will influence how your community will prepare and respond.

The Cone of Uncertainty is a strategic planning model and tool that can be used to help a community or organization prepare for change in an increasingly unpredictable world.¹ This tool integrates short-, mid-, and long-term thinking to deal with increasing uncertainty.

As indicated in the accompanying graphic, our strategies change as the drivers of change approach from the future. Long-term issues (say, five to ten years in the future), which are the most uncertain, require us to develop a broad **vision** and strategic **directions**. As uncertainty decreases and implications become clearer in the mid-term (say, two to five years in the future), our focus shifts to **strategies** that deal with the drivers of change while supporting our community's goals. In the short term (say, up to two years in the future), we shift our focus to **tactics**—concrete activities that advance our community's goals and objectives. A Community Readiness Plan (described in the Conclusion) that feeds projects into an organization's annual budget and work program helps accomplish this.

Two important points should be kept in mind when working with the Cone of Uncertainty model. The first is that the drivers of change are in varying stages of arrival and development, which will influence how communities respond to them across the three timeframes. Using the Cone of Uncertainty to plan housing actions, for example, might include implementing short-term tactics to address current issues, developing mid-term strategies for evolving needs, and setting a long-term direction that accounts for interactions with other drivers of change (such as shifting demographics and advances in technology). Conversely, actions that address autonomous vehicles (AVs), for example, might include implementing a short-term pilot program to test the technology, developing mid-term strategies (e.g., curb management) that anticipate potential impacts, and setting a long-term

^{1.} This model is adapted from Amy Webb, "<u>How to Do</u> <u>Strategic Planning Like a Futurist</u>," *Harvard Business Review*, July 2019.

7

goal to adapt infrastructure systems by the time AVs are fully deployed.

The second point is that an acute shock like the pandemic can occur at any time. The Community Readiness Plan helps prepare for this possibility.

The Potential Responses sections of the briefs generally follow the Cone of Uncertainty model. As a rule, short-term responses involve more concrete actions that tangibly address the driver of change. Mid-term responses typically involve developing and implementing strategies to overcome challenges and capitalize on opportunities associated with the driver. Long-term responses seek to bring about broader systems change consistent with a long-range vision, goals, or target. Monitoring of the potential implications and impacts of the different drivers of change should be done on an ongoing basis; this is particularly important in helping to anticipate what may be coming over the distant horizon.



SOCIAL DRIVERS OF CHANGE

AGING POPULATION

OVERVIEW

The increasing number of older adults as a share of the total population is a global phenomenon. According to the United Nations, by 2050, 1 in 6 people in the world will be over the age of 65, up from 1 in 11 in 2019. In the U.S., the <u>2020 Census</u> found that 1 in 6 Americans were over 65; in 1920, the proportion was less than 1 in 20. In 2019, the Census Bureau projected that by 2034, older adults will outnumber children under the age of 18 for the first time in U.S. history (Vespa/U.S. Census Bureau 2019).

Older adults encompass diverse population groups with differing abilities and needs, from the relatively healthy and self-sufficient "young old" (ages 65-74) to older

cohorts who often require special care. Persons living with Alzheimer's disease and related dementias make up an increasing share of the population, particularly among older age groups.

RELEVANCE

Impact: High (impacts local governments, service providers, communities, and the economy)

Certainty: High (an aging population is a well-established state, national, and global trend)

Timeframe: Immediate to Long-Term (per projections, impacts will grow over time)

Context: All areas (rural areas have a disproportionately higher share than urban areas)

TAKEAWAYS

- North Carolina's older (age 65+) adult population is projected to increase 50% over the next twenty years, with the fastest growth occurring in the 85+ age cohort.
- Challenges include increasing health-care costs; systemic inequities in health care, housing, and access to resources that increase as people age; and the need to adapt physical and social infrastructure to serve older adults.
- A major opportunity is to build cross-sectoral partnerships (e.g., public health, social services, transportation, planning, etc.) and leverage partner resources to create age-friendly communities.

CONSIDERATIONS FOR NORTH CAROLINA

North Carolina ranks in the top ten states in the U.S. for its share of people 65 and older. According to the <u>NCDHHS Division of Aging and Adult Services</u>, one in five North Carolina residents will be older than 65 by 2025; an estimated one in four adults over 65 live alone; and one in five adults identify as caregivers, with 62% of them caring for someone 65 or older. Associated issues include increasing health-care costs; inequitable access to resources; mental health and social

An Aging Na<u>tion</u> Projected Number of Children and Older Adults For the First Time in U.S. History Older Adults Are Projected to Outnumber Children by 2035 23.5% 22.8% Adults 65+ Projected percentage of population 19.8% Children under 18 CVESPA/U.S. Census Bureau, 2019 15.2% Projected 78.0 76.4 79.8 73.6 (millions) 49.2 .25 '30 '20 2035 '40 '50 '55 Census

isolation; ageism and elder abuse; the need for affordable and accessible housing and transportation; burdens on family caregivers; and caregiving workforce needs. To address these issues, North Carolina communities will have to adapt physical and social infrastructure and provide support services to meet peoples' needs as they age. A key opportunity is to leverage older adults' life experience and skills in a way that benefits the economy and society as a whole. The overall goal should be to enable older adults to lead healthy, engaged, and fulfilling lives while benefiting all community members.

North Carolina and fifteen communities within the state are part of the <u>AARP Network of Age-Friendly States and</u> <u>Communities</u>. <u>Executive Order No. 280</u>, signed by Governor Roy Cooper in May 2023, affirms North Carolina's commitment to building an age-friendly state by developing a Multisector

RELATED DRIVERS

Climate Health Housing Workplace/Workforce Disruption

Short-Term

- Conduct "audits" of barriers and opportunities to creating age-friendly communities (e.g., universal design standards).
- Join the AARP Network of Age-Friendly Communities and develop age-friendly action plans.
- Establish partnerships to implement North Carolina's dementia-capable strategic plan.
- Explore best practices and initiate pilot projects (e.g., age-friendly and intergenerational housing options).

Medium-Term

- Commit resources to Implementing the state's Multisector Plan for Aging.
- Revise community plans, ordinances, and standards to promote age-friendly communities.
- Develop and implement strategies to enable older adults to age in place (e.g., age-friendly housing options, walkable street networks, multimodal transportation options, supportive community facilities and services).
- Secure and maintain dementia-capable community designation.

Plan for Aging (scheduled for release in summer 2024). Issue areas highlighted by the Executive Order include bolstering the caregiving workforce, protecting vulnerable adults, providing nutrition services, improving access to outdoor spaces, expanding transportation options, and increasing broadband access and digital literacy for older adults.

KEY STATS

- North Carolina's 65 and older population is projected to increase 50% (from 1.8 million to 2.7 million) between 2021 and 2041. The 85 and older population is projected to increase 114% (from 198,000 to 423,000) during the same period (NCDHHS 2022).
- One in six North Carolinians (17%) were 65 or older in 2021. The 65 or older population varies from 10% for Onslow County (site of Camp Lejeune) to 33% for Transylvania County (NCDHHS 2022). Rural counties have higher percentages than urban counties like Mecklenburg (12%), Durham (13%), and Wake (13%).
- An estimated 180,000 North Carolinians who were 65 or older were living with Alzheimer's disease, a figure that is projected to increase 16% (to 210,000) by 2025. The number of caregivers for persons living with dementia was 356,000 in 2021 (Alzheimer's Association 2022).



EXAMPLE: NORTH CAROLINA AGE-FRIENDLY COMMUNITIES

As of July 2023, fifteen North Carolina counties and municipalities had joined the AARP Network of Age- Friendly States and Communities. In 2023, North Carolina became the eleventh state to join the network. Network members develop age-friendly action plans, which use AARP's eight domains of livability as a framework to make communities more livable for people of all ages.

Long-Term

· Plan for the long-term adaptation of

physical and social infrastructure

communities.

older adults.

to achieve the vision of age-friendly

 Address inequitable access to resources and other systemic disparities that affect

· Shift to a paradigm of physical, mental,

and brain-health promotion that actively

engages older adults in community life.

Monitor implications of other drivers of

change for the health and well-being

of older adults and their caregivers.

Matthews, Forsyth County, and Archdale are examples of the state's age-friendly communities. Matthews's Age-Friendly Action Plan is structured around four priority domains: outdoor spaces and buildings, transportation, housing, and community support and health services. The Forsyth County Action Plan for Aging Adults identifies six focus areas, each with indicators of progress: physical and mental health, financial health, housing and safety, accessibility and mobility, support network, and empowerment and engagement. Archdale's action plan is integrated with its comprehensive plan, which provides a framework for creating a more livable and inclusive community (one of four plan focus areas) around seven categories developed by AARP for its Livability Index.

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HEALTH

OVERVIEW

Despite spending far more per capita on health care than any other nation in the world, the United States is less healthy than many other countries. According to one survey, the U.S. health index score ranks sixty-ninth in the world in 2023 (Statista Research Department 2023). Contributing factors include the prevalence of chronic conditions and diseases such as obesity and diabetes; physical inactivity and poor diet; lack of access to health care; and health disparities related to race and income, all of which are interrelated. These factors are shaped by the "social determinants of health[, which] are the conditions in which people are born, grow, live, work and age" (Artiga and Hinton 2018).

RELATED DRIVERS

Aging Population Climate Food Security Public Safety

RELEVANCE

Impact: High (affects local governments, businesses, service providers, and communities, particularly poor, minority, and elderly populations)

Certainty: High (U.S. health-care spending is projected to increase from \$4.4 trillion in 2022 to \$7.2 trillion in 2031)

Timeframe: Immediate to Long-Term (per projections, impacts will grow over time)

Context: All areas (issues are similar, but rural areas have fewer resources with which to address them than urban ones)

TAKEAWAYS

- Mental health/substance abuse, health behaviors, and lack of access to health care (particularly in rural areas) are top-priority health issues.
- Health equity, as indicated by disparities related to race and geography, is an overarching issue.
- Addressing these issues requires collaboration between public health and other sectors involved with the social determinants of health.

CONSIDERATIONS FOR NORTH CAROLINA

According to America's Health Rankings, North Carolina was the thirtieth healthiest state in the nation in 2022 (United Health Foundation 2023). Its strengths include relatively low levels of frequent mental stress, black/white residential segregation, and air pollution. Its challenges include a relatively high premature death rate, a low supply of dental-care providers, and a high uninsured rate. In December 2023, North Carolina expanded Medicaid to make approximately 600,000 North Carolinians between the ages of 19 and 64 who make less than \$20,120 annually eligible for comprehensive health coverage. The North Carolina Department of Health and Human Services 2024-2026 Strategic Plan identifies five goals: improve health outcomes and reduce health disparities; promote child and family well-being; support behavioral health and resilience; build a strong and inclusive workforce; and achieve operational excellence (NCDHHS 2023).



Short-Term	Medium-Term	Long-Term
 Develop, update, and maintain Community Health Improvement Plans (CHIPs) detailing specific strategies, actions, and a monitoring program to address health priorities identified in Community Health Assessments (CHAs). Form cross-sectoral working groups to address identified health priorities. Research best practices employed by comparable urban, suburban, and rural communities in North Carolina and across the country. Implement pilot initiatives to address selected priorities, focusing on reducing health disparities and improving outcomes for disadvantaged populations. 	 Implement strategies and actions addressing identified health priorities. Scale-up and expand pilot initiatives, with a continued focus on improving health equity. Leverage partnerships and resources to address priorities that cut across traditional silos (sectors, jurisdictional boundaries, etc.). Use indicators/measures of success to track progress toward addressing health priorities. 	 Pursue coordinated action at the regional and local levels to realize a long-term vision of community health (universal access to health care; economic security and availability of well- paying jobs; decent, affordable housing for all; walkable environments; access to healthy foods, etc.). Monitor implications of other drivers of change (e.g., new technologies) for the social determinants of health in rural, eviburban and urban contexts.

KEY STATS

- The Centers for Disease Control and Prevention (CDC) estimates that 90% of the \$4.1 trillion spent every year on health care in the United States is for people with chronic and mental health conditions. Obesity affects 20% of children and 42% of adults, costing the U.S. health-care system nearly \$173 billion/year (CDC n.d.)
- North Carolina ranked as the thirtieth healthiest state in the nation in 2022. It ranked thirty-eighth in health behaviors; thirtieth in health outcomes; twenty-second in socioeconomic factors; and ninth in physical environment (air and water quality, housing, transit) (United Health Foundation 2023)
- North Carolina has significant racial and geographic health disparities. For example, in 2018, African American babies were 2.4 times more likely to die than white babies; African Americans were 2.3 more times likely to die from diabetes than whites; and life expectancy ranged from 73.1 years for Swain County to 82.1 years for Orange County (North Carolina Institute of Medicine 2020)

EXAMPLES: GRAHAM COUNTY, GUILFORD COUNTY

The third least-populous county in the state (with a 2020 population of 8,030), Graham County has been a leader among small, rural counties in developing and updating its CHA and CHIP on a regular cycle dating back to at least 2008. The County's 2013 CHIP provided a good model for identifying goals, strategies, action plans, partners, and indicators to address priorities identified in the 2012 CHA. Completed in 2023, the County's most recent CHIP identifies access to clinical care, behavioral health, and healthy lifestyles as the primary health priorities. The plan includes goals, objectives, strategies, barriers, and community resources related to these priorities. It also identifies a collaborative infrastructure of stakeholders and organizations to move forward with implementation of the strategies.

Guilford County completed its CHA in 2019. Partners engaged in this effort included UNC Greensboro, United Way, local health providers, and nonprofit health organizations. Priority health issues include Maternal and Child Health, Healthy Eating and Active Living, Behavioral Health (Mental Health and Opioid Misuse), and Social Determinants of Health (including Healthy Housing). Similar to Graham County, the Division of Public Health maintains a Healthy NC 2030 <u>Scorecard for Guilford County</u> that serves as its CHIP. For each health priority, the Scorecard provides a result statement, indicators of progress (linked to <u>Healthy NC 2030</u> indicators), <u>programs/activities, and performance measures</u> demonstrating impact.

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HOUSING

OVERVIEW

Decent and secure housing is a basic human need that is out of reach for a large portion of the nation's population. Three main factors are contributing to the national housing crisis: affordability, availability, and accessibility. Escalating prices are making housing unaffordable for people with a range of incomes, and the impacts are particularly severe for low-income households. There is an increasing gap between the demand for and the supply of reasonably priced housing options to meet the needs of a changing population. Finally, housing needs to be accessible to jobs, transportation, community facilities, and the like, and its design should enable independent living by seniors and persons

RELATED DRIVERS

Aging Population Energy Health Workplace/Workforce Disruption

with disabilities. When people are unable to secure affordable and accessible housing, they experience mental stress, declining health, and economic insecurity, as well as increased vulnerability to homelessness. According to *The 2023 Annual Homelessness Assessment Report to Congress*, the number of people experiencing homelessness increased 12% from January 2022 to January 2023, driven by factors such as rising rents, eviction filings, and the expiration of pandemic-related funding (HUD 2023). Urban, suburban, and rural communities experience similar impacts such as reduced spending in the local economy, a shortage of workers for local businesses, and a higher demand for support services and assistance programs.

RELEVANCE

Impact: High (the lack of sufficient affordable housing is considered a national crisis)

Certainty: High (driven by factors such as demographic change, limited housing supply, high interest rates, etc.) **Timeframe:** Immediate (43% of rental households in North Carolina are considered cost-burdened)

Context: All areas (rural areas have fewer resources to address housing needs than urban areas)



HOUSING COST BURDEN BY INCOME GROUP

TAKEAWAYS

- Addressing the housing crisis requires coordination and commitment of resources by the public, private, and nonprofit sectors and across levels of government.
- Renters are most likely to be cost-burdened (spend more than 30% of income on housing costs) or severely cost-burdened (spend more than 50% of income on housing costs).
- Key responses include conservation of existing affordable housing supply; increasing supply through regulatory reform, subsidies, and incentives to promote new housing types and units; funding and financing mechanisms (e.g., the North Carolina Housing Trust Fund); and renter protection, emergency housing assistance, and other support programs to provide stability for affected families and individuals.

CONSIDERATIONS FOR NORTH CAROLINA

A shortage of decent, secure, and affordable housing is impacting North Carolina's urban, suburban, and rural communities. In the fourth quarter of 2023, median housing prices in eight urban markets ranged from a high of \$461,200 for Raleigh to a low of \$233,200 for Fayetteville, compared to \$387,300 for the U.S. as a whole (National Association of Realtors 2024). Led by Raleigh-Durham (which NAR ranked as the sixth hottest of 300 U.S. metropolitan markets in 2022), all eight markets experienced significant price appreciation during the pandemic, as advantages such as relative affordability, economic strength, and quality of life attracted in-migration to the state.

Short-Term	Medium-Term	Long-Term
 Conduct municipal and county need analyses. Research comparable best practices (alternative housing types, funding tools, zoning and permitting, etc.). Assess publicly owned sites for new development opportunities and existing affordable units for preservation opportunities. Identify community partners engaged in local or regional development work (nonprofits, developers, lending institutions, etc.). Evaluate local resources available to support new affordable units for low- and moderate-income households, including land or sources of gap funding. 	 Develop regional housing plans to address housing needs at the regional scale. Implement universal design standards to make homes more accessible. Develop housing best practices toolboxes. Implement funding tools (housing trust funds, innovative financing mechanisms, etc.). 	 Incorporate goals such as net- zero emissions, multimodal transportation, economic security, and healthy communities into housing policy and investment. Monitor national housing trends, technological and market innovations, and their implications for local, regional, and state needs and solutions.

The gap between affordable rental-housing demand and supply is North Carolina's largest housing issue, one that is especially severe for low-income households. The most expensive areas are Asheville, Raleigh, Charlotte-Concord-Gastonia, Currituck County, and Durham-Chapel Hill. In many rural and urban counties, more than 50% of renters are cost-burdened. Housing issues in rural areas can be less visible and the resources to address them are less available than in urban areas. In attempting to address the housing crisis, local governments often find themselves caught between advocates of and opponents to housing and density reform (NCLM 2023).

KEY STATS

- 28% of North Carolina households are considered costburdened (spend more than 30% of income on housing). This includes 48% of rental and 19% of homeowner households (North Carolina Housing Coalition 2024).
- The average Fair Market Rent (FMR) for a two-bedroom dwelling unit in North Carolina is \$1,083 in rent and utilities per month. An annual household income of \$43,316 is required to afford this unit without paying more than 30% of income on housing (North Carolina Housing Coalition 2024).
- 71% of extremely low-income households (0–30% of area median income, or AMI) spend more than 50% of their income on housing. There is a statewide shortage of 195,821 affordable rental units available for these severely cost-burdened households (NLIHC 2024).



Affordable housing in Chatham County.

• The number of people experiencing homelessness in the U.S. increased 12% from January 2022 to January 2023, to approximately 653,100 or roughly 20 of every 10,000 persons. The number of North Carolinians experiencing homelessness was tabulated at 9,754 in January 2023, a 4% increase from 2022 (HUD 2023).

EXAMPLE: CHATHAM COUNTY

The Chatham County Affordable Housing Committee was formed in 2016 to focus on rental housing in Chatham County and the towns of Goldston, Pittsboro, and Siler City. The product of the Committee's work was the Affordable Rental Housing Report (2017). The report's housing needs assessment found that 66% of renter households making less than 80% of average median income were cost-burdened; the County had an estimated gap of 1,995 affordable rental units; a typical household spent 60% of income on housing (32%) and transportation (28%), less than the recommended threshold of 45%; and equity (age, race, etc.) was an important issue. The report set seven goals to address these issues. Desired outcomes, baseline data, targets, and metrics to measure progress were established for each goal. Implementation measures have included, among others, a Housing Trust Fund, an Emergency Housing Fund, and a dedicated sales tax for affordable housing.

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PUBLIC SAFETY

OVERVIEW

When we call 911 for help, we expect a response. Public safety provides the foundation for healthy and prosperous communities, and our residents insist on a fair and effective system. They expect perpetrators to be identified and prosecuted; taxpayer dollars to be allocated efficiently; and people-victims and those accused of crimesto be treated fairly. Law enforcement and the court system face a variety of existing and emerging challenges, including low clearance rates for solving crimes; mental health and substance use issues that the system is ill-equipped to handle; difficulty recruiting and retaining staff; racial disparities; high recidivism; and outdated tech**RELATED DRIVERS**

Artificial Intelligence Health Housing Workplace/Workforce Disruption

nology and information systems. However, stakeholders are addressing these issues with innovations, including alternative responder systems and the use of new data and technology tools.

With one in eight jails in North Carolina over capacity, law enforcement and community leaders are also starting to examine local jail populations more closely to see who actually needs to be incarcerated, recognizing that many people end up in jail on minor charges simply because they can't pay the money bond imposed in their cases or because they missed a court date.

Technology provides new tools that can help in solving cases and it also creates new challenges as Internet crimes increase. Access to better data and analysis can support smarter decisions on how to use law enforcement resources effectively. There is a growing understanding and appreciation not only of the traumas experienced by people who commit crimes and the people victimized by them but also of the mental health impacts for law enforcement staff and the importance of officer safety and wellness.

RELEVANCE

Impact: High (significant impact on individuals and communities)

Certainty: High (communities are experiencing behavioral health issues, staffing shortages, and technological changes) **Timeframe:** Immediate (many of the issues have already

arrived and are continuing to evolve)

Context: All areas (the opioid crisis has hit some rural communities particularly hard¹; behavioral health issues and staffing shortfalls are widespread)

TAKEAWAYS

- Attention to low clearance rates, especially for serious, violent crimes, is prompting conversations about the effective use of public safety resources.
- Interest in alternative responder programs is seen as a win-win approach, holding promise to address root causes of behavior and break the cycle of justice-system involvement, while freeing officers to focus on solving and preventing serious and violent crimes.
- Staffing shortfalls are causing law enforcement agencies to seek new methods for recruitment and retention and

new approaches for responding to service calls with non-sworn staff.

• The proliferation of new technologies, both to assist law enforcement and to perpetrate crimes, is challenging criminal justice organizations to keep pace with technological innovations.

CONSIDERATIONS FOR NORTH CAROLINA

Law enforcement agencies in North Carolina are actively exploring alternative responses to substance use, mental health issues, and homelessness, like police/behavioral health co-responder systems. Eighty-three percent of North Carolina police departments have at least one alternative responder program in place.² These initiatives can help to break the cycle of repeat system involvement by addressing root causes of behavior. To address widespread opioid addiction, agencies are also using tools like <u>Overdose Detection</u> <u>Mapping (ODMAP)</u>, promoting techniques like <u>public health/</u> <u>public safety partnerships</u> to share information and expertise across agencies, and testing strategies like the <u>Collective</u> <u>Impact Model (CIM)</u> to build a framework of ongoing support for the problem.

^{1.} Rory Howard, "<u>Rural Responses to the Opioid Crisis</u>," *Facts That Matter* blog (UNC School of Government, ncIMPACT Initiative, July 2022).

^{2.} Smith et al., *The Alternative Responder Project: Final Report* (UNC School of Government, Criminal Justice Innovation Lab, July 2023): 4, 6.

Short-Term

- Consider reallocating resources to solving and preventing serious and violent crimes, including conducting an <u>assessment of needs</u> and providing resources to support alternative responses to crisis calls.
- Build partnerships between public health and public safety agencies to more effectively combat the opioid crisis, tapping resources like the national Overdose Response Strategy.
- Consult criminal justice system data, including for various demographic groups.

Medium-Term

- Promote safety by <u>reducing recidivism</u> through efforts to help justice-involved people find stable employment.
- Promote retention by helping first responders manage job stress with resources like the N.C. Department of Public Safety's <u>Responder Assistance</u> Initiative.
- Partner with organizations like the <u>Criminal Justice Innovation Lab</u> to understand how local systems are performing and develop, innovate, and evaluate solutions.

Long-Term

- Engage stakeholders and community members to develop a strategic plan that identifies public safety priorities and actionable steps to achieve them.
- Consider using evidence-based evaluations to assess new law enforcement technologies or, if that is not an option, developing a "Pitch and Pilot" system for testing products and services at pitch events, piloting promising technologies, and scaling-up successful solutions.

Strategies to address staffing issues include creating new youth development programs to build the next generation of professionals, as well as making it easier for law enforcement professionals to make lateral transfers from other states. Some agencies are also working to maximize the use of non-sworn professionals, such as social workers and civilian traffic investigators.

KEY STATS

- Of the 1.3 million criminal charges in North Carolina in 2021, more than 1 million were for non-violent misdemeanors (UNC Criminal Justice Innovation Lab).
- Black people are incarcerated three times more than white people in North Carolina (UNC Criminal Justice Innovation Lab).
- Between 2015 and 2021, North Carolina saw a 270% increase in opioid deaths, from 11.6 per 100,000 to 43.3 per 100,000 (UNC Criminal Justice Innovation Lab).
- Research shows success with second chance hiring people with criminal records have longer employment tenures and lower turnover rates than those with no records (Couloute and Kopf 2018).
- The U.S. loses \$87 billion a year in economic output due to criminal records that impact employability (UNC Criminal Justice Innovation Lab).

EXAMPLE: SYLVA COMMUNITY CARE PROGRAM

To address increasing issues with behavioral health calls, the Sylva (population 2,600) Police Department in Jackson County worked with Western Carolina University (WCU) to provide a field intern from their master's program in social work. The Community Care Program allowed officers to make referrals to the field intern or co-respond in cases involving a behavioral health crisis. Through the partnership, Sylva added new capability at no cost. The program's success led to funding from the Dogwood Health Trust for a permanent Community Care Liaison position.³

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^{3.} Smith et al., The Alternative Responder Project: Final Report: 9.



TECHNOLOGICAL DRIVERS OF CHANGE

ARTIFICIAL INTELLIGENCE

OVERVIEW

Artificial Intelligence (AI) is the development and use of computer algorithms to simulate tasks commonly associated with human intelligence, such as reasoning and learning from past experience. Using machine learning and data analytics, AI systems have the ability to learn and adapt based on data patterns without following explicit instructions. ChatGPT, Google Gemini, and similar large language model (LLM) chatbots that use generative AI have sparked what some experts are predicting will be the greatest boost in worker productivity since the advent of the Internet by helping users to quickly

RELATED DRIVERS

Digital Access and Equity Economic Restructuring Smart Communities Workplace/Workforce Disruption

get informed answers to almost any question.¹ Other experts encourage users and organizations to develop an understanding of the limitations of these technologies, as well as their benefits, and to adopt appropriate policies before using them.² These tools are "multimodal," allowing not only text responses but also voice conversations and image generation through software such as DALL-E. But close approximations of human intelligence are still developing, and the current state of AI largely approximates that of a clever imitator with the ability to analyze large datasets quickly and cheaply and to perform functions such as pattern recognition, automation, and content generation. These capabilities have a broad range of implications for society, helping organizations conduct advanced data analysis, predict future outcomes, and support new capabilities such as autonomous vehicles and robotics.

Al can also improve the effectiveness of public service provision through infrastructure monitoring and assessment, public input analysis, and customer service improvements. At the same time, Al is heightening concerns about cybersecurity, privacy, and discrimination through algorithmic bias. Local governments will need to ensure that Al-powered services are accessible and equitable for all citizens, including those with disabilities or limited Internet access.

Al applications that live in the cloud often require clients to send data to a third-party service that may have uncertain availability and affordability in the future. A careful review of contractual arrangements is important to protecting client data privacy and ensuring data portability when switching to another service. Some experts believe clients should push for locally controlled Al to help reduce these concerns.³

An Al Lexicon

Algorithm: A set of specific steps to perform a well-specified task, with data inputs used to generate outputs.

Algorithmic bias: Systematic and repeatable errors in a computer system that create unfair outcomes, typically privileging one group of users over others.

Deep learning: A subset of machine learning that includes a neural network with three or more layers that attempt to simulate the behavior of the human brain, allowing it to "learn" from large datasets.

Digital twin: A digital representation of the built environment or system. A "smart city digital twin" can be updated with real-time data and analytics on interactions between humans, infrastructure, and technology to create a live digital representation of a city.

Generative AI: A type of AI model that can generate new data that resembles a given dataset, often used for image synthesis and text generation.

Hallucinations: Incorrect outputs generated by ChatGPT and other large language models. To rectify this, search results always need to be verified.

Large language model (LLM): A type of machine learning model that is trained to predict the likelihood of a sequence of words. It is used to understand and generate natural language spoken and written by humans. LLMs, which are typically trained on large sets of text data, can be used for a variety of processing tasks, such as text classification, machine translation, and speech recognition.

Machine learning: Algorithms based on applied statistical models that can learn without following explicit instructions.

(Sources: Wasserman and Flaxman 2022; IBM Think; Sanchez 2023)

^{1.} Benjamin Hitchings communication with Hamilton Hitchings, Software Engineer, ChatGPT Developer, May 25, 2023.

^{2.} Kristi Nickodem and Shannon Tufts, <u>"ChatGPT and Generative</u> <u>AI: What Do Local Governments Need to Know?</u>" Coates' Canons NC Local Government Law blog, August 4, 2023.

^{3.} Benjamin Hitchings and David Rouse communication with Dr. Collin Lynch, Associate Professor of Computer Science, North Carolina State University, May 3, 2023.

Short-Term	Ме	dium-Term	Long-Tern	n
 Conduct AI strategic planning to identify opportunities for appropriate use in your organization. Work with vendors to conduct demos to vet new AI applications. Select promising applications for pilot initiatives. Coordinate with groups such as <u>N.C. Local</u> <u>Government Information Systems Association</u> (NCLGISA) and N.C. Office of Privacy and <u>Data Protection</u> to share best practices on AI applications, cybersecurity, and data privacy. 	 Scale-up su community Promote st governmen to facilitate collaboratio Coordinate actions wit Smart Com Access and change. 	and regional level. andardization of local t processes and data cross-jurisdictional on and AI applications. Artificial Intelligence h those used for the imunities and Digital I Equity drivers of	 Track growth of Al busir Host annual forum on la applications in collabora academic, business, and partners. Host regional awards pr to recognize innovative government use of tech Coordinate with partners Al applications that adva goods and minimize neg 	tess sector. test Al ation with d institutional ogram local nology. s to promote ance social pative impacts.
Machine Learning Sentiment au Spam detect Recommend Predictive m Anomaly det	nalysis tion lation systems aintenance tection	Natural Langu	Virtual assistance Text analysis Content creation	ort 604
Neural Networks		Computer Vi	sion	AS Rep
Pattern reco	ognition ognition		 Object detection Object detection Image recognition 	Source: Thomas Sanchez, P.

The four main areas of Artificial Intelligence.

Al has great potential for spurring economic growth through new applications and vendor business development while also threatening jobs such as analysts and factory workers. It can also enable employers to backfill vacancies with technology. At the same time, recent advances in generative Al have the potential to increase the negative impacts on workers, especially those employed in knowledge-based fields.

RELEVANCE

Impact: High (AI is rapidly becoming useful in virtually every aspect of daily life)

Certainty: Medium (smaller governments may need less complicated systems but also may have greater resource deficits that AI can help address)

Timeframe: Emerging (widespread use of AI is growing rapidly)

Context: All areas (Al has considerable potential to improve service delivery at all scales and in all communities)

TAKEAWAYS

- Al has tremendous potential to improve operating efficiencies and provide new analytic capabilities.
- Vetting vendor claims through pitch events and piloting can help make sure AI products deliver good value.
- Many local governments may be unaware that they are already using AI, which may be embedded in their vendor software.
- Understanding how AI works, providing human oversight of output, and reserving final decision-making for people can help ensure its appropriate use (Nickodem and Tufts 2023).
- Developing clear policies and procedures for ensuring information technology (IT) system security and protecting data are essential.

CONSIDERATIONS FOR NORTH CAROLINA

Al has the potential to help communities large and small across North Carolina. Local governments can use Al technologies to increase productivity and save money. Examples

Enabling AI Applications

To facilitate the use of AI in planning and local government applications, the Planning Institute of Australia (PIA) recommends the following principles:

- 1. **Machine-readable digital content:** Collect and publish data in a digital format that is easily read by machines.
- 2. **Standardization:** Develop standards for processes and data to facilitate cross-jurisdictional collaboration.
- Open data: Make all nonsensitive public data available as open data, while developing standards and processes for protecting private information.
- Open rules: Publicly share computer code for automated or assisted public decision-making processes.
- 5. **Open-source code:** When public funding is used in the development of new digital tools, the tools should be provided as open source to enable reuse across different agencies.

(Source: Wasserman and Flaxman 2022)

include traffic signal management, property appraisal, and gunshot detection. Public and private efforts to use AI can be advanced by promoting standardized data and open data and through making new AI applications open source (with the source code freely available) to support their use by others.

In addition, AI holds considerable economic development potential by creating local job clusters. The Brookings Institution has identified the Raleigh-Cary metropolitan statistical area (MSA) as one of thirteen metro areas that are "early adopters" of AI technology, and the Durham-Chapel Hill MSA as one of twenty-one "federal research and contracting centers" for AI (Muro and Liu 2021). The Charlotte MSA is listed as a "potential AI adoption center," in part because of the presence of AI leader Honeywell. With its plethora of data scientists, software engineers, and other professionals, North Carolina is well positioned to support the development of this industry cluster. To help retrain workers whose jobs are vulnerable to AI, organizations like the Partnership on AI are developing tools for conducting AI job-impact assessments and sharing recommendations on how to maximize the benefits of AI while minimizing its threat to workers.

KEY STATS

- ChatGPT is the fastest growing app in history, reaching 100 million users within two months of launching.⁴
- Federal research and development expenditures on AI at U.S. colleges and universities grew by 45% in the past decade but still accounted for only 5% of total R&D expenditures at U.S. institutions of higher learning, suggesting this sector is both fast-growing and also early in its development (Muro and Liu 2021).
- Global GDP could be up to 14% higher in 2030 as a result of AI—the equivalent of an additional \$15.7 trillion—making it the biggest commercial opportunity in today's fastchanging economy (PricewaterhouseCoopers 2017).

EXAMPLE: GovAl COALITION

More than 250 local governments across the United States have joined the new <u>GovAl Coalition</u>, which was established in November 2023 to help communities shape the development of artificial intelligence in service to society. North Carolina members to date include the Town of Apex, Davie County, the City of Greensboro, Guilford County, the City of Hickory, and the City of Raleigh. Members commit to a series of guiding principles, which include the following:

- 1. using AI for social good,
- ensuring ethical, non-discriminatory, and responsible Al governance,
- 3. promoting vendor accountability,
- 4. improving government services, and
- 5. fostering cross-agency collaboration and knowledge sharing.

The GovAl Coalition and its working groups have prepared a number of resources to help its members use AI effectively and appropriately. These include an AI Policy Manual, AI Incident Response Plan, AI Fact Sheet, Vendor Agreement, Use Case Template, and Vendor Registry. These organizations are working together to improve the lives of their constituents through the responsible use and development of AI while protecting them from its risks.⁵

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^{4.} Dan Milmo, <u>"ChatGBT Reaches 100 Million Users Two Months</u> after Launch," *The Guardian*, February 2, 2023.

^{5.} GovAl Coalition, Open Letter, March 13, 2024.

DIGITAL ACCESS AND EQUITY

OVERVIEW

The Internet can connect us to the world from the comfort of our homes, but only if we have digital access. This requires not only a connection to broadband but also an affordable Internet subscription, a suitable device, and the skills to use it. Supporting this system is a digital infrastructure of sensors, hardware, and software called information and communication technologies (ICT) that collect, process, analyze, and store data and route it among users. Together, digital technologies can help us expand our knowledge, improve service delivery, and facilitate new capabilities like e-commerce, remote work, computer visualization, and artificial intelligence.

RELATED DRIVERS

Artificial Intelligence Economic Restructuring Smart Communities Workplace/Workforce Disruption

Digital access is essential for education and employment by facilitating distanced learning and remote work as well as student and worker safety during times of widespread pandemic. As a result, a growing number of communities are drafting digital equity and inclusion plans and working with Internet service providers (ISPs) and the state and federal government to help make sure everyone has affordable access to broadband.

Our growing data needs are also spawning new land uses such as data centers comprised of thousands of servers in giant warehouses that drive the Internet and cloud computing. The noise, energy consumption, and water consumption associated with these facilities is becoming an issue in some N.C. communities, so managing these impacts and ensuring appropriate facility locations may be important.

Interest in government transparency and expanding the uses of its data are driving a demand for open data. At the same time, increasing data availability is creating challenges with data security and privacy. Thus, as local governments develop their digital infrastructure to improve operations, they also need to draft policies and procedures to help manage data access and ensure its responsible use. Data collection and analysis can also perpetuate bias and facilitate discrimination, so monitoring and daylighting the assumptions used to collect, process, and analyze data is an essential function.

The growing functionality of digital technologies and public expectations about their availability pose significant opportunities and challenges for local government. Investing in information technology (IT) staffing as well as hardware and software is essential. Chief Technology Officers and other IT staff can help local governments maintain existing IT systems and also make sound enterprise IT investments, assess the total cost of ownership of new software, ensure the interoperability of different software programs, confirm the portability of data across platforms, and develop strong cybersecurity defenses to help protect against data theft and ransomware attacks. To do all this, experts suggest that local governments invest in IT at a level similar to the private sector (8–13% of the annual budget), as opposed to what they are currently spending (1–3% on average).¹ Some local governments are also turning to cloud-based solutions to avoid having to acquire and maintain all IT systems in-house.

1. Benjamin Hitchings communication with Shannon Tufts, Professor of Public Administration and Government, Director of Center for Public Technology, University of North Carolina at Chapel Hill, June 5, 2023.

Key Technology Considerations for N.C. Local Governments

- 1. Implementing cybersecurity measures
- 2. Protecting customer and employee data
- 3. Making sound information technology investments
- 4. Facilitating community broadband access

(Adapted from Tufts 2023)

RELEVANCE

Impact: High (widespread and profound societal importance of data access)

Certainty: High (current need demonstrated by the pandemic)

Timeframe: Immediate (virtually every local government and business in the state depends on a computer network and access to the Internet)

Context: All areas (organizations across the state depend on IT systems, although smaller communities have lower exposure to risk from malware attacks)

Short-Term	Medium-Term	Long-Term
 Draft/update local government technology plans, potentially in coordination with smart community strategic plans, to develop data policies, procedures, and apps. Prepare a digital equity plan for your community. Continue to support the "start-up ecosystem" through subsidizing coworking space, incubators, and networking events. Ensure local governments have up-to-date data privacy and protection policies and procedures. 	 Invest in developing and coordinating new data platforms and apps. Host pitch events to help local governments vet new data technologies. Select promising technologies for pilot initiatives. Scale-up successful pilots to the community and regional level. 	 Track state performance in data job creation and business development. Host annual forum on the latest developments in data science in collaboration with academic, business, and institutional partners. Host regional and state awards program to recognize innovative local government use of technology.

TAKEAWAYS

- Digital access is essential for many jobs, educational programs, and access to services.
- Most local governments should be investing more resources in IT to better serve constituents, improve internal operations, and protect data and internal networks.
- A growing number of local governments are drafting digital equity plans to help ensure all constituents have access to the Internet.
- Data centers are growing as a land use that can potentially impact neighbors and communities.

CONSIDERATIONS FOR NORTH CAROLINA

North Carolina is the first state in the nation to have an Office of Digital Equity & Literacy, dedicated to helping people and businesses across the state access the full potential of the Internet.² This office has released a State of North Carolina Digital Equity Plan (Feb. 2024), and maintains profiles on the broadband availability, needs, and investments in each county. In addition, it has funded the NCSU Institute for Emerging Issues to support each county in the state in drafting a digital inclusion plan. Overall, the U.S. Census lists the percentage of households in the state with a computer at 93.1%, and the percentage with a broadband Internet subscription at 87% (2018–2022). North Carolina is also a center for data sciences education, with more than twenty college and university academic programs for computer science and data analytics, providing a rich flow of worker talent. Programs range from UNC Wilmington's master's degree in data science to UNC Greensboro's master's degree in informatics and analytics to Wilson Community College's fiber-optic-technician certification. In turn, a wide variety of businesses, agencies, and organizations are tapping this talent to provide valuable data services throughout the state, such as access to computing power (Cisco and Red Hat), data analytics (IBM and SAS), government services (the National Institutes of Health and the U.S. Environmental Protection Agency), and extensive research (the Research Triangle Institute and its Center for Data Science and AI). The N.C. agricultural sector also needs

Key Internet-Related Needs of N.C. Residents

- 1. Access to affordable high-speed Internet
- 2. Access to devices that connect users to Internet
- 3. Digital skills to use devices
- 4. Access to quality technical support
- 5. Accessible online content (e.g., for disabled, non-native speakers)

(Source: N.C. Office of Digital Equity & Literacy)

good Internet access to conduct business, as documented by the N.C. Department of Information Technology.

Digital technologies provide local governments, organizations, and agencies across North Carolina with opportunities to improve service delivery, build greater cross-departmental cooperation, and achieve organization-wide economies of scale. At the same time, because of the growing organizational dependence on IT systems, taking preventive measures such as scrutinizing data contracts to address data access, use, and security is important. The <u>N.C. Local Government</u> <u>Information Systems Association</u> has tools to help with cybersecurity. In addition, developing a plan to ensure the continuity of operations if an IT system is damaged or ransomed is essential. It is also important to understand data breach notification requirements. State and federal grants are available to assist local governments with developing IT systems.

KEY STATS

- 91% of jobs in North Carolina definitely or likely require digital skills (National Skills Coalition 2023).
- 90% of farmers responding to an <u>Internet Connectivity</u> for Farmers survey conducted by the N.C. Broadband Infrastructure Office said that reliable high-speed Internet is "extremely important" or "very important" to conduct business (NC DIT 2020).
- From 2017–2021, 85% of households in N.C. were subscribing to the Internet (U.S. Census Bureau).
- 430,000 households in North Carolina don't have a PC or laptop (N.C. Office of Digital Equity & Literacy 2023).
- N.C. cyberattacks increased about threefold from 2019 to 2020 due to less secure computer systems associated with remote work (Hitchings communication with Tufts 2023).

^{2.} Benjamin Hitchings and David Rouse communication with Maggie Woods, Digital Equity Manager, N.C. Office of Digital Equity & Literacy, May 5, 2023.



EXAMPLE: FORSYTH COUNTY

Eleven percent of households in Forsyth County have no Internet, and nearly 30% don't have a broadband subscription (N.C. Department of Information Technology 2024). As a result, in 2021, Forsyth County drafted <u>Connecting Forsyth County</u>, a digital equity plan that provides a roadmap for achieving the County's vision of digital equality, which includes a robust digital infrastructure and a community that practices digital inclusion and is made up of digitally literate people. The plan includes solution-oriented action steps the County can take to combat poverty, improve health, and support educational attainment. To help implement the plan, WinstonNet and multiple partners received a \$2 million grant from the City of Winston-Salem to provide digital skills training and personal computers to 1,250 city residents and to build out two learning labs at the Martin Luther King, Jr. Community Center.



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NEW TRANSPORTATION TECHNOLOGY

OVERVIEW

Mobile technology (devices like smartphones and the wireless networks that connect them) is disrupting established transportation systems and practices. Examples of services enabled by mobile technology and real-time location data include ride hailing and car sharing; bikes, e-scooters, and other micromobility options; and fixed and flexible route transit services (for example, microtransit). Shared electric bikes (e-bikes) are a growing trend nationally. Collectively, these services are referred to as *new mobility*. A related concept, Mobility-as-a-Service (MaaS), is the integration of different travel options into a single mobility app. New mobility is an emerging concept that has been mostly confined to cities and metropolitan regions,

RELATED DRIVERS

Aging Population Artificial Intelligence Digital Access and Equity Smart Communities

driven in large part by private companies like Uber and Lyft. Potential benefits include, among others, reduced car dependency, improved air quality, and increased mobility for people who lack access to private vehicles (for example, in rural areas with limited transit service).

RELEVANCE

Impact: Medium (private automobiles remain the predominant travel mode for most trips)

Certainty: Medium (ultimate impacts of the emerging technologies are uncertain)

Timeframe: Emerging (impacts will play out over time and could be high in the long term)

Context: Urban/suburban (there is potential to improve mobility in rural areas)

TAKEAWAYS

- New transportation technology is disrupting established transportation services and practices.
- Challenges include adapting services such as transit and practices such as curb management while providing equitable, affordable access for all.
- Opportunities include providing mobility options for those who do not drive, in both urban and rural areas.



Research Triangle Park mobility hub concept design.

CONSIDERATIONS FOR NORTH CAROLINA

Led by the Integrated Mobility Division of the North Carolina Department of Transportation (NCDOT), the state is promoting the use of new transportation technology to achieve three goals: increase access, enhance quality of life, and ensure safety. The overall vision is for all North Carolinians to have equal opportunity to get anywhere in the state, with or without a car.

North Carolina's larger urban areas, including Charlotte, Greensboro, and Raleigh-Durham, offer the greatest range of new mobility services, including ride-hailing, dockless e-scooters, and bikesharing. Pilot projects are underway in small as well as large communities: Wave Transit launched a <u>MaaS pilot app</u> in Wilmington; an <u>e-scooter pilot</u> in downtown Albemarle was launched in 2022; and NCDOT is partnering with Cary on an autonomous shuttle through its <u>Connected</u> <u>Autonomous Shuttle Supporting Innovation</u> (CASSI) program.

New mobility services pose both opportunities and challenges for North Carolina communities. The biggest opportunity is to provide convenient, affordable options for those lacking access to automobiles or who choose not to drive. Additional benefits in urban areas include reduced traffic congestion and support for more walkable, bikeable communities. While rural applications are presently limited, services such as on-demand microtransit can improve mobility in areas with limited public transit. In 2022, the U.S. Department of Transportation announced a \$10.4 million award to NCDOT to provide on-demand transit services in eleven rural communities. Mobility hubs—centralized locations that provide multiple services such as public transit, rideshare, and bikeshare—can enable people to get where they want to go without using a car.

Short-Term	Medium-Term	Long-Term
 Address transportation technology/new mobility services in local and regional plans. Establish policies to maximize benefits and address challenges such as barriers to access by underserved populations (low-income, elderly, persons with disabilities, etc.). Create public-private partnerships to connect different mobility options. Initiate pilot projects (e.g., mobility hubs in urban areas; on-demand microtransit in rural areas with limited transit services). 	 Scale-up pilot projects and partnerships. Ensure equitable access for underserved populations as new mobility services increase in urban and rural areas. Monitor national and international trends and best practices to determine how they might be applied in different contexts in North Carolina. Initiate new pilot projects and programs (e.g., regional MaaS apps). 	 Coordinate new mobility services and applications across the state to achieve the vision of equal opportunity for people to get where they want to go, with or without a car. Monitor the development and deployment of new technologies (autonomous vehicles, urban air mobility,^a etc.) and their implications for North Carolina.
a -		

¹ The use of small, typically automated passenger or cargo-carrying air transportation services that operate in urban areas.

What Is a Mobility Hub?

A mobility hub is a place that brings together different transportation services, such as public transit, rideshare, bikeshare, and other means of traveling without a private automobile. By making transit options safe, attractive, and convenient, mobility hubs reduce automobile traffic. These hubs offer features such as shelters with realtime information and supportive infrastructure that helps people easily transfer from one mobility mode to another. In North Carolina, for example, the Research Triangle Park is developing a transportation network that integrates regional transit connectivity with a focus on mobility-hub siting and circulation to serve the new Hub RTP mixeduse development.

(Sources: Crozier and Nisenson 2022; Crowther 2022)

KEY STATS

- In the U.S., bikeshare programs have existed at scale since 2008. Shared e-scooters launched in late 2017 and quickly grew to nearly half of all total shared micromobility trips (Urbanism Next Center 2020).
- 136 million trips were taken on bike- and scooter-share systems in 2019, 65 million in 2020 (the pandemic lockdown year), and 112 million in 2021. They averaged 11 minutes in duration and 1.2 miles in length in 2021 (NACTO 2022).
- More than one million North Carolinians live in a household without a car or have other barriers that limit their ability to regularly use a vehicle (Brumfield 2022). New transportation technology can provide alternatives to private automobile use and create opportunities such as getting from home to transit stops and from transit stops to work.
- A survey of North Carolina residents found that 76% of respondents travel by car today. However, the importance of traveling by car decreases by 51% in the future, when 25% of respondents indicate a desire to travel by car, 24% by rail (compared to 0% who do so today), 16% by walking (2% today), 13% by bus (2% today), and 7% by bicycle (2% today) (NCDOT 2021).

EXAMPLE: CITY OF WILSON

During the pandemic, in September 2020, the relatively small, rural community of Wilson (population 48,000) launched the pilot of RIDE, an on-demand microtransit service intended as an alternative to the city's fixed-route bus system. Operated in partnership with Via, a private microtransit company, RIDE allows passengers to book van rides in real-time using a smartphone app, a website, or a phone number. The cost is similar to riding a bus (Shared-Use Mobility Center 2023). The results have been significant: previously, Wilson's fixedroute bus system served less than half of the city's area and averaged about 1,450 rides a week. Since 2020, RIDE has served increasing numbers of customers throughout the city, reaching a record high of 4,700 rides a week in April 2023.



RIDE microtransit vehicle

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SMART COMMUNITIES

OVERVIEW

Digital technologies and data analytics are changing the nature of social connection and service delivery. If used appropriately, smart city and smart community applications can equitably improve the quality of life for local residents, making it easier, for example, to monitor your water usage, get a parking spot, or engage in civic activities online. A smart community "ecosystem" includes network infrastructure such as highspeed Internet to facilitate the flow of data, sensors and software applications to capture and analyze the data, and plans and policies to guide the use of data. Some local governments may select smart technologies to use for a single application, such

RELATED DRIVERS

Artificial Intelligence Digital Access and Equity Economic Restructuring Workplace/Workforce Disruption

as automated street pavement assessment, while others may work to integrate multiple technologies. Smart street lights, for example, can use energy-efficient LED lights while also providing public Wi-Fi, counting pedestrians, and monitoring traffic conditions as part of a broader organizational strategy to cut costs and improve service delivery. As smart technologies grow in availability, governments and other users must sort through the dazzling array of shiny objects to find the jewels that will deliver real value for their communities. They can also use the opportunity to align their investments with local goals by identifying community priorities and preparing smart community strategic plans. The issue of digital equity is also becoming more prominent. Providing all residents with access to high-speed Internet—and to the skills and devices needed to use it—can benefit the community as a whole. Before making significant public investments in smart technology, however, local governments may want to research and vet potential vendors, conduct pilot initiatives, and develop strategic partnerships to share the costs.

Smart City "Domains"

Technology professionals often describe three domains of smart cities:

- "gov tech" uses digital technologies to improve government services;
- "civic tech" uses them to facilitate public access and participation; and
- "urban tech" uses them to improve infrastructure and the built environment.

Local governments can help build a smart community's "ecosystem" by adopting "dig once" policies to get fiber optic cables installed, development standards to require high-speed Internet connections, and digital equity programs to make sure everyone benefits.

(Source: Hurtado, Hitchings, and Rouse 2021)

RELEVANCE

Impact: Medium (smart community technologies are growing in availability, with the potential to improve many aspects of civic life)

Certainty: Medium (a limited number of N.C. communities are actively developing smart city or community programs, while more are using one-off technologies and software to improve system function and service delivery)

Timeframe: Short-term (the future is now, with many technologies currently available) **Context:** All areas (these technologies have the potential to improve service delivery in small towns and big cities and everything in between)

TAKEAWAYS

- Vendors are offering a burgeoning array of smart community technologies.
- Aligning public investments with community goals can ensure that public moneys are well spent.
- Careful evaluation and testing are essential to finding the particular technologies that will deliver as advertised.
- Prioritizing digital equity allows the benefits to be shared broadly.

CONSIDERATIONS FOR NORTH CAROLINA

Smart community technologies can help local governments and communities in North Carolina do more with less, broaden community engagement, and improve service delivery. Some smart community applications use artificial intelligence while others use more conventional algorithms. Moving more government and consumer functions online has been particularly important in the wake of the pandemic to increase public safety, ensure access, and improve convenience. Major institutional partners such as area universities and businesses can potentially share the costs of building dynamic smart communities' ecosystems. Demonstrating value,

Short-Term	Medium-Term	Long-Term
 Inventory existing smart community initiatives in N.C. Create a regional smart community learning network. Identify smart community funding. Encourage the development of local smart community pilot projects. Expand access to broadband using N.C. broadband planning tools. 	 Draft local smart community strategic plans. Draft a regional smart community strategic plan. Develop a digital inclusion plan using the NCDIT template. Develop a regional "pitch and pilot" program for smart community technologies. Support smart community partnerships. Scale-up successful smart community pilot projects. 	 Implement local smart community strategic plans. Hold an annual smart community showcase to feature projects. Conduct assessments of local and regional smart community needs to track progress.

identifying funding sources, and building cross-sector collaborations will be key for advancing smart community development. Numerous and varied partners can help create a rich learning network of organizations that will pilot smart community tools and applications for testing, refinement, and use. Appropriate scaling of technologies can help serve small towns as well as larger communities. A great resource for communities across the state is the N.C. Division of Broadband and Digital Equity.

KEY STATS

- Communities just starting to pursue smart community projects are making a return on investment (ROI) of 2.6%, while leading smart communities are achieving an ROI of 5.6% (ESI ThoughtLab 2019).
- The Orange Water and Sewer District's (OWASA) "Agua <u>Vista</u>" advanced metering infrastructure (AMI) system alerted customers to about 10,000 water leaks in 2019 and was projected to have an ROI of 4.8% (OWASA 2020; Don Schlenger and Associates 2016).
- The global smart cities market was valued at \$748.7 billion in 2023 and is expected to grow at a compound annual growth rate (CAGR) of nearly 26% from 2023 to 2030 (Grand View Research 2023).
- Smart buildings with integrated systems can save 30–50% of energy over regular buildings (<u>American</u> <u>Council for an Energy-Efficient Economy 2017</u>).

EXAMPLE: TOWN OF CARY Smart communities program

Riverine flooding is a problem throughout North Carolina. Advanced warning can make all the difference in reducing the impacts on life and property. As a result, the Town of Cary worked with Microsoft and SAS to develop an Internet of Things (IoT) solution to help it track floods in real time. Now, it is scaling-up the solution and creating a grid of rain gauges throughout the community to provide real-time public information and help stormwater and emergency management staff improve their situational awareness and deploy resources more rapidly to address flooding impacts. This is part of Cary's larger <u>Smart and Connected Communities</u> initiative.

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Local Approaches to Smart Communities

Local government approaches to using smart cities technologies range from a **"project-driven" approach**, which improves a particular community service with a smart community application, to an **"incremental" approach**, which uses a smart community pilot project to solve an immediate problem and develop a larger smart community capability, to a **"holistic-city" approach**, which establishes smart community goals and an integrated action plan to pursue them, to a **"regional-ecosystem" approach**, which links and augments local smart community programs to build a regional smart community support framework. Together, these approaches outline a smart communities continuum that each place can develop over time.



(Adapted from Hurtado, Hitchings, and Rouse 2021)

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ECONOMIC DRIVERS OF CHANGE
BLOCKCHAIN/CRYPTOCURRENCY

OVERVIEW

A blockchain is a digital, Internet-based ledger for recording transactions. Each record or "block" adds to a cumulative list of transactions or "chain." Because it is shared, decentralized, and cryptographically protected, a blockchain is broadly accessible, independently verifiable, and resistant to tampering. These features have enabled it to support digital cryptocurrency such as Bitcoin and Ether that don't require centralized intermediaries like banks. Some cryptocurrencies require complex verification, and individuals or firms compete to provide this service using computers in return for digital coins (known as cryptocurrency "mining" or crypto-mining). **RELATED DRIVERS**

Artificial Intelligence Energy **Smart Communities** Water

Blockchain technology is also being used to provide other services such as records storage, smart contracts, supply chain management, data protection, voting, and business process automation. It can help reduce transaction costs by removing the need for banks, accountants, and auditors to verify contracts or transfers of goods, services, and digital currency. It can also provide a secure and transparent location for sharing data, with potential local government uses such as storing property deeds. In addition, a blockchain can support the programming of smart contracts that automatically execute, for example, transferring digital currency between parties when the terms of a contract are met. The blockchain also supports the creation of a new collector's item-nonfungible tokens (NFTs). These unique digital objects such as photos and artwork are very difficult to fake because they are stored and publicly authenticated on the blockchain.

Blockchain technology is in its early stages of development, so conducting adequate due diligence is important before committing to a particular blockchain solution. Organizations such as the Government Blockchain Association (GBA) are helping

Distributed datab Crypto-Hashing* Sender Block transaction Sender creates a Transaction is distributed Transaction is committed Receiver gets transaction or a and validated via to blockchain and miners the transaction cryptographic hashing block are rewarded

The Blockchain Process

*Crypto-hashing is a way of comparing and securing data.

RELEVANCE

iMi Blockchain

Impact: Low (has potential to provide targeted solutions that don't appear to be broadly transformative at present)

Certainty: Low (potential uptake of this technology is unclear, with recent hiccups in cryptocurrency market increasing consumer caution)

Timeframe: Emerging (applications are available; broad uptake, especially in government, is uncertain)

Context: Selected areas with water and cheap energy (some N.C. communities are beginning to experience issues with crypto-mining)

TAKEAWAYS

· Blockchain has a significant presence in private business and potentially useful government applications, such as secure recordkeeping and smart contracts, also exist.

potential users assess promising applications (see Blockchain Maturity Model (BMM) Requirements) and offering

access to a government business blockchain platform for developing and deploying blockchain applications.

democratize investing and provide currency for residents

without bank accounts. Cryptocurrency mining often takes place in warehouses similar to server farms that use large amounts of energy (less harmful if it's renew-

able energy) and generate substantial electronic waste, as well as creating considerable noise from the HVAC

equipment needed to cool computer hardware. For these

reasons, some communities are developing special land

use regulations for data centers and crypto-mining to

Industry analysts note that cryptocurrency can help

- · Government uptake has been limited to date because of the uncertain, volatile nature often associated with the industry.
- Due diligence is essential when considering new blockchain applications.

help manage their negative impacts.

 Cryptocurrency mining may present limited economic development possibilities and potentially harmful land use, energy, and water impacts.

Short-Term	Medium-Term	Long-Term
 Coordinate with the <u>NC Blockchain Initiative</u> to access its directory of N.C. universities and businesses with blockchain programs. Explore potential government blockchain uses through organizations like <u>Government</u> <u>Blockchain Association</u> and other local government forums. Track N.C. community issues with crypto- mining. Track government blockchain pilot initiatives. 	 Engage Government Blockchain Association and similar organizations to evaluate potential government blockchain solutions. Include blockchain apps in vendor demos. Develop guidance and case studies on managing crypto-mining. Track impact of cryptocurrency on local government finance. 	 Track growth of blockchain and cryptomining as part of Al business sector. Track impact of blockchain development on local government services. Include blockchain in annual technology showcase. Partner with local governments, universities, and vendors to develop blockchain education program.

CONSIDERATIONS FOR NORTH CAROLINA

Blockchain technology is still developing but holds potential for delivering helpful solutions to common local government challenges, such as secure recordkeeping and providing convenient public access to public information. Helping to explore the possibilities is the <u>N.C. Blockchain Initiative</u> launched by the N.C. state government, which is dedicated to "education, innovation, and economic development for web3 technologies" (web3 is a new kind of Internet service that uses decentralized technologies like blockchain). Given the uncertainty associated with the technology, due diligence is important when considering blockchain solutions. Greater government oversight of the industry may be in store in the years ahead. In addition, the state is beginning to experience cryptocurrency mining activity, so this will be a trend to watch as a potential land use to manage.

North Carolina has a strong infrastructure of universities and businesses working on blockchain technologies, making it an important source of worker talent and business development in this sector: Duke University offers a Blockchain Applications Certificate; North Carolina State University has a Blockchain Lab; and businesses such as IBM, SAS, ZenLedger, and Divvy Health are developing blockchain applications. Tracking the capabilities of this technology and testing useful applications will be important in the years ahead.

KEY STATS

- The cryptocurrency market grew from \$96 billion in July 2017 to \$2.84 trillion in November 2021, dropped to \$795 billion in December 2022, and increased to \$1.13 trillion in June of 2023 (CoinMarketCap).
- Trade documentation alone can cost as much as 20% of the physical cost of transporting the more than \$4 trillion worth of goods shipped globally each year. By reducing supply chain barriers, global trade could increase by nearly 15% (World Economic Forum).
- Bitcoin cryptocurrency mining uses more energy per year than the entire country of Belgium (Cambridge University Bitcoin Electricity Consumption Index 2019).

EXAMPLE: HAYWOOD COUNTY Crypto-mining ordinance

In response to noise impacts experienced by residents from a cryptocurrency mining operation in nearby Cherokee County,

Haywood County adopted special ordinance provisions to manage the land use in its jurisdiction in November 2023. Though concerns with crypto-mining operations include its substantial energy and water use, generation of significant electronics waste, and limited job creation, the key issue for Haywood County was its potential noise. Residents in Murphy said the new crypto mine was like hearing a "never ending airplane engine" nearby.¹ As a result, Haywood County adopted updates to its High-Impact Ordinance that established substantial buffering and setback requirements for "Cryptocurrency Data Centers" and "Cryptocurrency Server Farms." A 100-foot vegetated buffer, fencing and screening, and a 750-foot setback are required between these uses and neighboring properties, with the distance extending to 1,000 feet near land uses with sensitive populations such as schools, hospitals, and assisted-living facilities. In turn, Jackson County has adopted ordinance provisions managing crypto-mining land use, and Buncombe County and Clay County have established temporary moratoria prohibiting the activity.

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CIRCULAR ECONOMY

OVERVIEW

Increasingly, one use is not enough. The goal of a circular economy is to move from a linear flow to a circular flow of raw materials and finished products, extending the productive life of finished goods, reusing and recycling their components, and reducing or eliminating waste. Examples of this concept, such as curbside recycling, are already part of daily life for many North Carolinians.¹ But opportunities abound for improving these systems, since only about a third of recyclable materials are currently being recovered from municipal solid waste in the state, and less than 20% of construction and demolition debris is currently being recycled.² Entrepreneurs are also developing zero-waste solutions to save resources and money.

RELATED DRIVERS

Climate Economic Restructuring Energy Smart Communities

In a circular economy, renewable materials like food byproducts are used as food, fertilizer, or fuel. Finished products like electronics are repaired, reused, and recycled. With thoughtful design, manufacturing processes can be structured to maximize the use of waste as feedstocks (raw materials) and to create products that are modular and easily disassembled to facilitate reuse. In so doing, companies and communities can move from a "take-make-use-waste" approach to a regenerative model that captures lost revenue, reduces environmental impacts, and creates jobs.

1. N.C. Department of Environmental Quality (NC DEQ), Division of Environmental Assistance and Customer Service, Presentation to NC DEQ Secretary's Circular Economy Council, June 6, 2023, and August 22, 2023.

2. NC DEQ, Division of Environmental Assistance and Customer Service analysis using the Recycling Partnership's 2020 State of Curbside Recycling Report.

RELEVANCE

Impact: Medium (more efficient materials use and recovery can increase jobs and reduce our environmental footprint) Certainty: Medium (the know how exists; the uncertainty lies in our willingness to organize ourselves to evolve our systems) Timeframe: Immediate (communities actively confront issues related to the circular economy today)

Context: All areas (circular economy initiatives exist in rural and urban communities alike across the state)

TAKEAWAYS

• As the population grows, our need for a more efficient use of finite resources increases.



Though construction and demolition debris is readily recyclable, it is often landfilled.

- With thoughtful policy support, we can reflect the true cost of products and highlight the financial benefits of more efficient use.
- North Carolina has a strong existing recycling infrastructure that we can build on through continuing public and private investment.
- N.C. entrepreneurs are developing new technologies and businesses to build more circular economies.
- Composting food waste and recycling construction and demolition debris provide two good local opportunities to move toward a more circular economy.

CONSIDERATIONS FOR NORTH CAROLINA

The N.C. Department of Environmental Quality (NC DEQ)'s <u>Circular Economy Council</u> found that North Carolina's "robust and multifaceted circular economy" offers economic opportunity for the state. Growing the state's circular economy will require cross-sectoral collaboration among academic institutions, industry, and government. Nonprofit organizations and local governments can promote environmentally responsible recycling policies. Entrepreneurs can develop innovative start-ups that provide zero-waste solutions. Consumers can patronize businesses that advance the circular economy. Corporations can share data and update their mission statements and operations. Local governments can fortify existing programs with enhanced circular economy efforts. State government can provide information, technical assistance,

Short-Term	Medium-Term	Long-Term
 Request a waste assessment for a business or community from N.C. Division of Environmental Assistance and Customer Service (NCDEACS) or Waste Reduction Partners. Partner with local, regional, and state organizations to build awareness and share examples of circular economy (CE) principles/practices. Promote use of NCDEACS's materials matching site and N.C. Recycling Markets Directory. Promote use of CE sites like the Freecycle Network. 	 Identify and launch a pilot materials reuse/recycling initiative. Coordinate with NC DEQ Secretary's <u>Circular Economy Council</u> to build regional participation in CE initiatives. Promote local government procure- ment policies favoring companies that use CE resources like Waste Reduction Partners' <u>N.C. Recycled Products Purchasing Toolkit</u>. Integrate CE with existing plans. 	 Scale-up pilot programs. Develop local/regional CE goals and a system that tracks participation, value of materials maintained, and net-zero-waste progress. Hold annual showcase of regional and state CE businesses. Develop regional CE recognition program. Explore state CE branding and promotional efforts like "<u>Got to</u> <u>Be NC</u>" for the agriculture sector.

and seed funding to help all communities create more circular economies and new jobs. The NC DEQ <u>Circular Economy</u> <u>Council</u> also highlighted the value of increasing the supply of high-quality collected materials. More recyclables could attract new companies seeking to use these materials to create new products.

KEY STATS

- Lifespan of a plastic bag: up to 1,000 years. Average time a plastic bag is used: 12 minutes (<u>Closed Loop Partners</u> 2020).
- The global economy was 7.2% circular in 2023 (Circle Economy 2024).
- If all the plastics in landfills in Charlotte were recycled, 936,329 barrels of oil would be saved per year while creating more than 1,300 jobs and \$35 million in revenue (<u>Circular Charlotte</u> 2018).
- Local government materials recovery through recycling in North Carolina has increased from 128 pounds per capita in 1992 to 284 pounds per capita in 2022 (NCDEACS 2020).
- North Carolina hosts 15,700 recycling-related private jobs, with an annual payroll of \$759 million (NCDEACS 2020).
- Food waste is the number one material that goes into North Carolina landfills (NCDEACS 2020).

EXAMPLE: NEW HANOVER COUNTY MATERIALS RECOVERY PROGRAM

Over the past decade, New Hanover County has developed a comprehensive approach to materials recovery.³ To extend the life of its landfill, it constructed a facility to recycle construction and demolition (C&D) debris, which comprised about 30% of landfill waste. This operation reduces about 60,000 tons from the landfill annually, which will extend the landfill's life by twenty years. Other efforts include food-waste composting and recycling programs for yard waste, household hazardous waste, and electronics. The County has also partnered with Sunoco Recycling to establish a Materials Recovery Facility (MRF) that processes 25,000 tons of recyclables a year. Together, these projects are helping the County save money, improve service, and protect the environment.

Taking Action

Here are six action areas for communities and businesses that want to move toward a circular economy.

Regenerate: Shift to renewable energy, restore ecosystems, and return recovered bioresources to the biosphere.

Share: Share assets such as cars, rooms, and appliances and repair and reuse items.

Optimize: Increase efficiency and performance, remove waste in production, and use automation and big data to help make this happen.

Loop: Remanufacture products, recycle materials, and compost waste.

Virtualize: Dematerialize directly (e.g., books, CDs) and indirectly (e.g., online shopping) by going digital.

Exchange: Apply new technologies (e.g., 3D printing) and choose new products and services (e.g., bikeshare).

(Source: Ellen MacArthur Foundation 2015)

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^{3.} New Hanover County, "Environmental Stewardship."

ECONOMIC RESTRUCTURING

OVERVIEW

The predominant trend in the U.S. economy since the 1950s has been restructuring from a manufacturing- to a service-sector base. Impacts include a decline in traditional blue-collar employment and increasing inequality between higher-paying jobs in the professional and technical sectors and low-wage, low-skilled jobs in the service sector. More recently, the rapid spread of digital technology and the Internet is spurring a new wave of economic restructuring. Key interconnected trends include e-commerce, the gig economy, and the subscription economy.

Digital restructuring of the economy is impacting communities, businesses,

RELATED DRIVERS

Artificial Intelligence Circular Economy Digital Access and Equity Workplace/Workforce Disruption

workers, and consumers. Accelerated by the pandemic, e-commerce impacts include a decline in commodity-based, bricksand-mortar retail in favor of omni-channel (physical and virtual) and experiential retail business models. Projected by global financial firm UBS to grow in size from \$650 billion in 2020 to \$1.5 trillion in 2025, the subscription economy is changing the relationship of businesses to consumers and impacting traditional in-store retail. These trends have also changed the movement of freight and goods. Examples include an increase in demands for warehouses and fulfillment centers near customers, neighborhood traffic, and drone deliveries. The gig economy is enabling 1) businesses to access talent while reducing costs and 2) workers to create flexible, location-independent work arrangements. Equity concerns include, among others, a lack of job security, benefits, and employment rights for lower-paid gig workers and the "digital divide" for people lacking digital skills and access to affordable broadband. Imparting these skills through K-12 education, workforce training, upskilling, and reskilling are essential for workers and businesses to succeed as digital technology continues to transform the nature of work.

RELEVANCE

Impact: High (accelerated by the pandemic) Certainty: High (digital restructuring is the predominant

macroeconomic trend of the twenty-first century) **Timeframe:** Emerging (the ultimate shape and impacts of digital restructuring will play out over time)

Context: All areas (rural areas have particular challenges and opportunities related to access to the digital economy)

TAKEAWAYS

- North Carolina's strong economy and quality-of-life assets position it for success in the digital economy.
- Issues to be addressed include, among others, geographic and population-based economic disparities and the need for investment in digital infrastructure and workforce training.

CONSIDERATIONS FOR NORTH CAROLINA

North Carolina's significant assets—its vibrant urban centers, scenic rural areas, established industries, and high quality of life—position it well for success as economic restructuring continues. In 2022, the state experienced record employment growth, wage growth, and low unemployment rates, including for historically disadvantaged populations (Harrington and Levy 2023). North Carolina has a strong

advanced-manufacturing base, with sectors including, among others, automotive, biotechnology, food manufacturing, and clean energy. The Site Selection Group ranked North Carolina as the second-best state for manufacturing in the nation (after South Carolina). The N.C. Department of Commerce notes that university research and development efforts in areas such as artificial intelligence, cloud computing, and industrial robotics position the state well to compete in the "4th Industrial Revolution" (Harrington and DeBellis 2023).

Despite North Carolina's overall economic success, disparities exist between growing urban areas and rural

Definitions

- E-commerce is the buying and selling of goods and services via the Internet, including business-tobusiness, business-to-consumer, and consumer-toconsumer (the sharing economy).
- The **gig economy** uses digital platforms to connect freelance workers with customers in order to provide short-term services.
- In the **subscription economy** (also referred to as "everything-as-a-service"), customers pay periodic fees to gain access to desired products and services using digital platforms.

Short-Term	Medium-Term	Long-Term
 Assess and monitor opportunities and challenges created by digital economic restructuring. Revise economic development plans to address trends in the digital economy. Identify coverage and affordability gaps in high-speed Internet service. Develop digital equity plans. Research case studies (e.g., <u>Homegrown Tools for Economic Development</u>). Initiate pilot projects combining asset-based and digital economic development strategies. 	 Partner with the NCDIT Division of Broadband and Digital Equity and Internet providers to address coverage and affordability gaps. Implement programs to empower disadvantaged residents to participate in the digital economy. Revise land use and transportation plans to account for the impacts of e-commerce. Implement strategies to repurpose obsolete retail and office space for productive new uses. Establish regional clearinghouses providing resources and information for freelance workers. 	 Position North Carolina, its regions, and communities—rural, suburban, and urban—as models of success in the twenty-first-century economy. Ensure accessible, affordable, high- speed broadband service for all residents in all parts of the state. Monitor trends in the digital economy and adapt economic development plans to address them. Adapt land use, infrastructure, and transportation systems to accommodate new forms of commerce.

areas with declining population and between high-income professional workers and low-paid service workers. Urban areas such as the Research Triangle Region are experiencing an influx of residents from elsewhere in the country who are drawn by the allure of job opportunities in a growing economy. This trend is impacting equity, housing costs, and infrastructure and service needs within these areas. Many rural communities have not experienced in-migration but can capitalize on local assets to enhance competitiveness in an economy in which workers can choose where to live. All areas need to address the impacts of emerging technologies on land use, infrastructure needs, and the local economy. Universal broadband access, education, and skills training are key to addressing economic disparities.

KEY STATS

- According to <u>McKinsey & Company</u>, the COVID-19 pandemic spurred the equivalent of ten years growth in e-commerce in just three months. E-commerce sales have since settled down from this temporary spike and resumed their long-term trajectory. <u>Forbes Advisor</u> projects that e-commerce sales will total 20.1% of all retail sales in 2024 compared to 15.5% in 2019; by 2027, 23% of sales are expected to occur online.
- In 2022, independent freelancers represented 39% of the U.S. workforce and generated \$1.35 trillion in annual earnings. While the number of highly educated freelancers is growing, it is becoming an appealing career choice regardless of qualification level. Freelancers report a higher level of satisfaction than non-freelancers (Upwork 2022).
- North Carolina was the sixth fastest-growing state in the nation from July 2022 to July 2023, adding an estimated 140,000 people (a 1.3% increase). About 77% of the increase was due to migration from other states (North Carolina Office of State Budget and Management 2023).

EXAMPLES: ASSET-BASED ECONOMIC DEVELOPMENT

Asset-based economic development builds on a community or region's existing natural, social, cultural, and other resources. Many North Carolina communities are using assetbased approaches to improve the local economy and enhance quality of life for residents. Examples include:

 Opened in 2000, the <u>Black</u> <u>Mountain Center for the Arts</u> has increased tourism, spurred development of arts-based businesses, and attracted new residents to Black Mountain and the Swannanoa Valley.



- Since the 1990s, Columbia and its neighbors in the Albemarle-Pamlico region have promoted a <u>regional ecotourism</u> strategy through the Partnership for the Sounds.
- <u>Bakersville and Hayesville</u> leveraged their rural heritage and cultural assets to build civic infrastructure, boost tourism, and revitalize the downtown areas.

Asset-based economic development can be combined with strategies capitalizing on opportunities created by the digital economy (e.g., e-commerce) to position communities for success.

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WORKPLACE/WORKFORCE DISRUPTION

OVERVIEW

Several interrelated trends are disrupting workplaces and the workforce, creating uncertainty for employers, workers, and communities. Short-term trends spurred by the COVID-19 pandemic include 1) the shift to remote work and 2) labor shortages across industries and professions known as the Great Resignation. As pandemic impacts have receded, hybrid work-from-home models have emerged as the "new normal," creating challenges for central business districts/office markets and opportunities for suburban and rural areas with amenities for remote workers. The Great Resignation peaked in 2022 when about 50.5 million people left their jobs. Reflecting uncertain economic conditions, the <u>quit rate</u> fell in 2023 to near

RELATED DRIVERS

Aging Population Artificial Intelligence Digital Access and Equity Economic Restructuring

pre-pandemic levels. While there was an increase in layoffs in 2023, the labor market continues to be tight and most North Carolina workers returned to work within three months of their lay-off date (Berger-Gross 2023c). Irrespective of these fluctuations, there is an ongoing gap between available jobs and workforce skills, highlighting the need for a pipeline of talented workers entering the workforce.

Automation (the substitution of human labor with work performed by machines) is a long-term trend that has been expected to primarily impact lower-paid, semi-skilled occupations like office administration, production, transportation, and food preparation (Muro et al. 2019). Powered by Large Language Models such as ChatGPT, recent advances in generative artificial intelligence (AI) have greatly expanded the range of tasks that can be automated. Potentially vulnerable occupations include language and literature teachers, writers, legal services, finance, insurance, and accounting (Felten et al. 2023).

RELEVANCE

Impact: High (accelerated by the pandemic)

Certainty: High (driven by a convergence of short- and long-term trends)

Timeframe: Emerging (ultimate effects of trends on workplaces and the workplace will play out over time)

Context: All areas (opportunities and challenges vary according to factors such as access to digital infrastructure, susceptibility to automation, etc.)

TAKEAWAYS

- Short- and long-term trends that are disrupting workplaces and the workforce include remote work, shortages of qualified workers, and automation.
- Responses include, among others, rethinking job and workplace models; accounting for generational differences; and preparing/reskilling/upskilling workers.

CONSIDERATIONS FOR NORTH CAROLINA

North Carolina has experienced a historically tight job market over the last several years as the nation emerged from the pandemic and unprecedented numbers of workers left their jobs. The labor market loosened in 2022 and the first half of 2023 as the Federal Reserve raised interest rates. The quit rate declined from an all-time high of 3.9% in 2021 to 2.98%

Generational Differences

Generations have different expectations of their workplaces. Gen-Z employees (born 1995-2012) value flexibility, opportunities to learn and grow, and environments that prioritize social responsibility and diversity. Millennials (born 1980–1994) value a fun and meaningful work environment, work-life balance, and expect their ideas to be heard. Gen-X employees (born 1965–1979) tend to be independent, practical, and hard-working. Often juggling family responsibilities, they value flexibility, health-care benefits, and financial security. Known for their goal-oriented work ethic, Baby Boomers (born 1946–1964) value work that is exciting and impactful, public recognition, and the opportunity to share their expertise. By understanding these differences, employers can attract talent and leverage the diverse abilities of a multigenerational workforce (Paychex 2024).

over the twelve months from April 2023 to April 2024. Nevertheless, North Carolina's labor participation rate remains low due to the aging of the state's population (Berger-Gross 2023a, b). Employers continue to have difficulty finding qualified workers, a problem that is particularly severe in the public sector.

The Labor Market Information (LMI) Institute's <u>automa-</u> tion exposure score shows that North Carolina has a slightly

Short-Term Medium-Term Long-Term · Establish cross-sectoral working • Expand TPM programs. · Monitor the long-term impacts of artificial groups to address workplace/ · Partner with schools, universities, workforce disruption. change on workplaces and the workforce. community colleges, and businesses to prepare/upskill/reskill workers. Assess strengths, weaknesses, and Develop lifelong education and training opportunities related to demographic, programs to instill the skills and mindset Develop amenities and infrastructure workplace, and workforce trends. to increase competitiveness in the economy. · Revise workplace models and job job market, building on local assets descriptions to attract workers from and opportunities. Position local communities, regions, and different generations. Establish regional workplace/ North Carolina as a whole as models for Initiate Talent Pipeline Management

(TPM) programs.

workforce resource hubs for local aovernments.

intelligence, automation, and other drivers of

- needed for workers to succeed in a changing
- workplace/workforce innovation in different contexts.

higher share of jobs that are vulnerable to automation than elsewhere in the U.S. Urban and suburban parts of the state have lower shares of employment in vulnerable occupations than in rural ones (Harrington 2023). While predictions regarding automation vary, a reasonable conclusion is that a shift in required job skills (toward cognitive, nonroutine tasks) rather than widespread job losses will be the end result. Education and training are key to equipping workers to adapt to these changes.

KEY STATS

- · During the pandemic lockdown, the percentage of persons working from home doubled in two weeks (from 31-62%) (Brenan 2020). In 2023, 12.7% of full-time employees worked from home and 28.2% worked a hybrid model. Ninety-eight percent of workers wanted to work remotely at least part of the time (Forbes Advisor 2023).
- The share of all workers in occupations with high exposure to automation in North Carolina ranges from a low of 26.1% in the Durham-Chapel Hill MSA to a high of 49.2% in the Hickory-Lenoir-Morganton MSA (N.C. Department of Commerce 2023b).
- · Thirty-five percent of businesses in 2023 have adopted artificial intelligence (AI) and 9 out of 10 businesses support its use for competitive advantage. By 2025, Al is projected to eliminate 85 million jobs and create 97 million new ones, for a net gain of 12 million (Webster 2023).

EXAMPLE: TALENT PIPELINE MANAGEMENT

Developed by the U.S. Chamber of Commerce Foundation, Talent Pipeline Management (TPM) is a demand-driven, employer-led approach that aims to close the skills gap by building pipelines of talent aligned to dynamic business needs. The North Carolina Chamber Foundation is expanding the TPM program across the state to help businesses in multiple sectors transform their workforce pipelines by using a curriculum organized around six strategies. Located in the Centralina Regional Council, Gaston County offers an example of the successful application of the program. Partnering organizations include the Gaston Business Association, Gaston County Economic Development Association and Workforce Development Board, Gaston County Schools, local colleges, businesses, and others.



Local leaders participating in the N.C. Chamber Foundation's TPM Academy

TPM strategies can be applied to public agencies as well as private businesses. Local governments can attract younger workers by emphasizing the value they bring to communities; offering benefits, flexibility, and job security; and providing training and career development programs.

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ENVIRONMENTAL DRIVERS OF CHANGE

CLIMATE

OVERVIEW

Washouts of NC 12 on the Outer Banks. Wildfires in Western North Carolina. Rising heat in the Piedmont's cities. Sound familiar? North Carolina has seen all of these events in recent years. What do they have in common? They are all intensified by a changing climate.

It's no secret. The planet is getting warmer. Increases in carbon dioxide, water vapor, methane, and nitrous oxide are driving this change, creating a greenhouse effect above the earth that prevents heat from escaping into the atmosphere. The result is that global temperatures are now more than 2°F warmer than they were in 1850–1900. 2023 was the hottest year on record globally (Copernicus Climate Change Service 2024). As the planet warms, the climate is changing, and this change is bringing a myriad of issues for our communities.

RELATED DRIVERS

Circular Economy Energy Health Water

Sea levels are rising. Weather is becoming more violent and unpredictable, with more powerful storms, shifts in rainfall, increased flooding, hotter summers, and more drought, leading to more wildfires. These changes are causing increasing human fatalities, infrastructure damage, property destruction, food shortages, and ecosystem changes. The most socially vulnerable human populations are often at the greatest risk from these forces, and growing numbers of people are being displaced by extreme weather events. Climate experts warn that time is running out to limit global warming to 2.0°C (2.7°F) and prevent large-scale negative impacts (IPCC 2023). Major emissions reductions will be needed across all sectors to cause global greenhouse gas discharges to peak before 2025 and be reduced by about 43% by 2030 (IPCC 2023). Some strategies focus on mitigation to lower greenhouse gas emissions and reduce the extent to which the climate changes. Other techniques focus on adaptation to reduce the harmful effects on our communities. Both approaches will be needed in the years ahead and can make our communities healthier, more equitable, and more resilient in the process.

RELEVANCE

Impact: High (this issue will significantly impact many aspects of community life)

Certainty: High (there is little disagreement on the existence of the issue; the question is how damaging the impacts will be)

Timeframe: Short- to medium-term (many N.C. communities are already experiencing climate effects, with impacts growing rapidly)

Context: Statewide (this issue affects all parts of the state in varying ways)

Adapted from NCEI 2019 2.0 1.6 1 MARINA A 1.2 Anomaly (°F) 0.8 0.4 0.0 -0.4 -0.8 1880 1900 1920 1940 1960 1980 2000 2020 Year

The temperature change? Just a small increase in average temperature is having a big impact on global climate.

TAKEAWAYS

- North Carolina communities will suffer a growing array of impacts from continued warming, including more violent hurricanes and other storms, sea level rise, increased flooding, more stifling heat, and more frequent and intense droughts (NOAA 2022).
- These forces will worsen human health, damage infrastructure, harm agricultural activities, and reduce economic prosperity, with the most economically and socially vulnerable populations in the state often experiencing the greatest impacts (U.S. Global Change Research Program 2023).
- Climate change also has the potential to significantly impact military readiness, a particular issue for North

i this change is

Observed Changes in Global Annual Temperature

Short-Term	Medium-Term	Long-Term
 Develop local climate action and resilience plans. Integrate climate action recommendations into local hazard mitigation plans and comprehensive plans. Set local and regional greenhouse gas reduction goals. Create local and regional climate action teams to support and track implementation. Create regional climate justice task force. 	 Coordinate with state and federal partners to implement climate-positive and climate-resilient development strategies and share best practices. Implement the measures in this report related to energy, water, food security, and circular economy. Track progress toward reducing greenhouse gas emissions. Track climate impacts and assistance to socially vulnerable populations. 	 Continue systematic reduction of local, regional, and state carbon footprints to achieve net-zero carbon emissions. Establish North Carolina as a leader in developing and implementing climate resilient solutions. Collaborate with educational institutions and employers to build a workforce skilled in climate solutions.

Carolina with its large number of military installations (USDOD; USDA 2022).

- At the same time, climate adaptation and mitigation measures can significantly reduce the negative effects of climate change on our communities (USGCRP 2023).
- Substantial, sustained action is needed at the local, regional, and state level to change the current trajectory of risks and losses and to improve readiness and resilience (USGCRP 2023).

CONSIDERATIONS FOR NORTH CAROLINA

Climate impacts vary across North Carolina, with the prospect of sea level impacting the coast, more intense hurricanes affecting the coastal plain, increased landslides and drought in the mountains, and more intense thunderstorms and flooding throughout. The challenge is exacerbated by rapid growth and development in the state, potentially putting more people and property in harm's way. In recent years, North Carolina has worked to establish a strong state framework for addressing climate change. In 2018, N.C. Governor Roy Cooper issued Executive Order Number 80 to catalyze a major new state effort to address the issue. This led to the preparation of the North Carolina Climate Risk Assessment and Resilience Plan: Impacts, Vulnerability, Risks, and Preliminary Actions in 2020 to summarize climate impacts and risks in the state and establish the North Carolina Resilience Strategy to address them. In addition, it designated the N.C. Office of Recovery and Resiliency (NCORR) as the lead state entity to implement resiliency measures.

North Carolina is also home to a variety of organizations that can help communities understand the challenges that a changing climate presents and improve their readiness and resilience to manage its impacts. For example, the N.C. Institute for Climate Studies is analyzing the climate changes in the state. The National Environmental Modeling and Analysis Center at UNC Asheville is preparing resilience plans for communities and regions to help them take constructive action. Nonprofit organizations like the Environmental Defense Fund are working to catalyze climate-positive measures like transitioning to a clean-energy economy and protecting the natural systems that communities depend on for food and flood control. The Eastern North Carolina Sentinel Landscape is using land conservation to protect the state's military mission, bolster local economies, and manage

climate impacts in thirty-three counties in the Sandhills and Coastal Plain. Building resilience across the state requires action within and across our organizations and communities to adapt to the impacts of climate change and reduce our carbon footprint.





KEY STATS

5

 After adjusting for inflation, North Carolina experienced 112 weather/climate billion-dollar disasters between 1980 and 2023, with an annual average of 2.5 events for the whole period, and 6.2 events a year over the last five years (NOAA).

Change in Number of Days

20 25 30 35 40 45 50

Institute for Climate Studies

N.C.



The new <u>U.S. Climate Vulnerability Index</u> developed by the Environmental Defense Fund, Texas A&M University, and Darkhorse Analytics shows which communities in North Carolina face the greatest challenges from the impacts of a changing climate.

- The sea level rose almost 8 inches at Wilmington from 1935–2018, and almost 7 inches at Duck from 1978–2018 (N.C. Institute for Climate Studies 2020).
- From 2016–2021, the United States experienced 177 weather-related disaster events that displaced 1.5 million people on average each year (IDMC 2022).

EXAMPLE: TOWN OF BEAUFORT RESILIENCE PROGRAM

The Town of Beaufort is taking a number of measures to increase its resilience, reduce its carbon footprint, and better protect itself from the growing impacts of climate change. These include working with the N.C. Department of Transportation to install stormwater bioretention cells along Cedar Street to capture and filter stormwater and developing a public-private partnership to fund a new downtown waterfront bulkhead designed to withstand water levels in 100 years. In addition, Beaufort adopted the Resilient Beaufort Plan that documents its vulnerability to flooding and identifies a number of additional implementation projects, such as building a living shoreline to intercept storm surges and launching a program to elevate historic structures. To reduce its carbon footprint, the Town is encouraging the adaptive reuse of existing buildings, like a former elementary school that is being converted to condominiums, to avoid emissions from the embodied carbon in new construction materials. In these ways, Beaufort is working to reduce its contribution to climate change and better protect itself from its impacts.

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As the planet warms, the climate is changing, and this change is bringing a myriad of issues for our communities.

ENERGY

OVERVIEW

Driven by the private market and public policy, renewable energy is the most rapidly growing segment of the U.S. energy industry. Between 2011 and 2020, solar power grew twenty-three-fold and wind power nearly three-fold as they became cost-competitive with other sources (Nick et al. 2021). Renewables are projected to continue displacing fossil fuels in the electric power sector due to declining costs, technological improvements (e.g., battery storage), and rising incentives. Electrification of the vehicular fleet will reinforce the shift away from fossil fuels. Energy-related carbon dioxide (CO2) emissions are expected to fall 25–38% below 2005 levels by 2030, depending on case assumptions (U.S. EIA 2023). By

RELATED DRIVERS

Artificial Intelligence Circular Economy Climate Housing

2030, the nation's goal under the Paris Agreement is to reduce CO2 emissions from all sources by 50–52% of 2005 levels. Dramatically reduced fossil fuel use, electrification, and a shift to renewable energy, among other actions, are needed to limit global warming to 1.5° C (2.7° F) below pre-industrial levels, which is the Paris Agreement target that will help to avoid the worst impacts of climate change. Achieving this target requires an annual deployment of 1000 GW of renewable power and net-zero emissions worldwide by 2050 (IRENA 2023). The clean energy transition will provide a host of ancillary benefits, such as increased security, reduced pollution, lower energy costs, and green business and job opportunities.

RELEVANCE

Impact: High (the shift from fossil fuels to renewable energy sources is a global trend)

Certainty: High (the shift is being driven by market forces and public policy to address climate change)

Timeframe: Emerging (renewable sources will replace fossil fuels over time)

Context: All areas (opportunities and challenges related to renewable energy use vary according to geography)

TAKEAWAYS

- North Carolina is well-positioned to be a national leader in the transition to clean energy, yielding significant environmental and economic benefits.
- Achieving state targets for CO2 emission reduction will require policy and regulatory changes, investments, and partnerships across sectors (including utilities) and levels of governments.

CONSIDERATIONS FOR NORTH CAROLINA

North Carolina ranks fourth in the amount of solar electric capacity installed through 2022 (8,179 MW), behind California, Texas, and Florida (SEIA 2023). Legislation passed in 2021 directed the North Carolina Utilities Commission to develop a plan for electric utilities (mainly Duke Energy) to reduce CO2 emissions 70% below 2005 levels by 2030 and to achieve carbon neutrality by 2050. Issued in 2022, <u>Executive Order 246</u> calls for registered zero-emission vehicles

(ZEVs) to increase to 1.25 million and for 50% of new vehicle sales to be ZEVs by 2030. Under the <u>Bipartisan Infrastruc-</u> <u>ture Law</u>, North Carolina can expect to receive \$109 million over five years to expand the state's electric vehicle (EV) charging network; the state is also eligible for grants from the \$2.5 billion allocated for EV charging (U.S. Department of Transportation 2022).

Unlike solar power, wind power is underdeveloped in North Carolina. There is one operating wind farm–104 turbines near Elizabeth City that power Amazon data centers. A second wind farm is being developed by <u>Apex Clean Energy</u> in Chowan County. While the state has great offshore wind potential, only one lease has been issued (to Duke Energy off the Brunswick County coast). Development of both wind and rooftop solar power are constrained by permitting issues.

While there are concerns regarding solar development on farmland, impacts have been limited to date. <u>Agrivol-</u> <u>taics</u> co-locates solar panels and agricultural uses and can yield economic returns for farmers. Grazing sheep in partnership with solar companies is an emerging practice in North Carolina.



Agrivoltaics in N.C.

Short-Term

- Work with Duke Power, electric cooperatives, and other partners (e.g., major institutional and business uses) to identify actions to meet state CO2 reduction targets.
- Take advantage of funding and incentives available through the Bipartisan Infrastructure Law, Inflation Reduction Act, etc.
- Pursue <u>Solarize</u> or other available programs to help residents and businesses reduce solar installation costs.
- Conduct policy and regulatory audits to identify barriers and opportunities to scale-up renewable energy deployment.

Medium-Term

- Expand local, regional, and state EV charging station networks through grant funding, public/private partnerships, municipal fleet investment, regulatory provisions for new developments, etc.
- Promote compatible renewable energy development in rural areas through approaches such as agrivoltaics.
- Develop <u>climate-positive</u> <u>development</u> programs to reduce energy use and carbon emissions.

Long-Term

- Position North Carolina as a recognized national and global leader in clean energy technologies.
- Establish renewable energy as a key economic development strategy and component of local, regional, and state economies.
- Monitor the development of emerging clean energy technologies (e.g., advanced solar and wind power, green hydrogen, marine energy, etc.).
- Track progress in achieving CO2 reduction targets and adjust action plans accordingly.

2

KEY STATS

- North Carolina ranked third in the nation (after California and Texas) for growth in solar electricity generation from 2011 to 2020 and tenth in the nation for overall clean energy progress (combined growth in solar, wind, and electric vehicles sold) (Nick et al. 2021). By 2022, the state had slipped to fourth (after Florida) in solar electricity generation (SEIA 2023).
- The total economic impact of clean energy development in North Carolina between 2007 and 2020 was estimated at \$40.8 billion, generating 292,000 full-time equivalent jobs (NCSEA 2021).
- In 2023, Governor Roy Cooper announced 14,114 new jobs in North Carolina generated by 134 clean energy industry projects. These projects represent \$12.9 billion of capital investment in the state (N.C. Department of Commerce 2023).
- A 2022 analysis found that utility-scale solar development occupied 31,125 acres of agricultural land in North Carolina (0.28% of the state's total agricultural land) (NCSEA 2022b).

EXAMPLES: RURAL AND SMALL CITY LEADERS IN CLEAN ENERGY

While North Carolina's renewable energy leaders tend to be the larger cities and communities in the Research Triangle region, there are many examples of rural areas and smaller cities benefiting from solar and other forms of clean energy investment. The five cities with the most residential solar photovoltaic (PV) systems per 1,000 people are Asheville, Fuquay-Varina, Holly Springs, Cary, and Durham (NCSEA 2022b). The five counties with the most registered EVs per 1,000 residents are Wake, Durham, Buncombe, Mecklenburg, and Union (NCSEA 2022b). Duplin, Robeson, Halifax, Edgecombe, Cumberland, Northampton, and Bladen Counties each had more than \$500 million in renewable energy investment from 2007 to 2020 (NCSEA 2022a).

North Carolina has twenty-six locally owned and operated electric cooperatives that provide energy to about 2.5 million residents of predominantly rural areas. These co-ops have been leaders among North Carolina utilities in implementing renewable energy programs. According to the <u>North</u>



Solar and battery energy storage site, Duplin County.

<u>Carolina Electric Cooperatives</u> website, eleven co-ops have installed nineteen community solar farms, and thirteen sites combining solar energy with battery storage technology serve co-op communities across central and eastern North Carolina. Other co-op programs include in-home demand reduction devices (e.g., smart thermostats), home solar energy systems, EV charging station installations, and more.

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FOOD SECURITY

OVERVIEW

Food security means access to sufficient, safe, and nutritious food to support an active and healthy life for all household members. Approximately 12.8% of American households (44.2 million people) experienced food insecurity at some point during 2022 because they had insufficient resources to obtain food (Rabbitt et al. 2023). This represents a sharp increase from 10.2% of households in 2021; contributing factors include inflation and loss of pandemic relief funds. Different groups are disproportionately impacted by food insecurity. According to Feeding America, 23% of Blacks, 20% of Latinos, and 20% of children experienced food insecurity in 2022; approximately 90% of counties with the highest food insecurity rates were

RELATED DRIVERS

Aging Population Climate Health Water

rural. Food insecurity negatively impacts health due to the mental and physical stress it causes. Children are particularly susceptible to these impacts because their brains and bodies are still developing. Older adults are also vulnerable.

RELEVANCE

Impact: Medium (while most people do not experience food insecurity, the impacts are high for the significant minority that do)

Certainty: High (while rates fluctuate, food insecurity is a persistent, ongoing problem)

Timeframe: Immediate (about 14% of North Carolina's population experiences food insecurity)

Context: All areas (food insecurity rates are higher in rural than in urban and suburban areas)

TAKEAWAYS

- · Equity is a key issue for food security, which disproportionately impacts poor and minority populations.
- Food security intersects with other basic needs such as health care, housing, and access to transportation and living wage jobs. For example, food insecure households may be forced to choose between purchasing food or medicine.
- · Building sustainable local food systems can reduce food insecurity while strengthening the economy and improving health.

CONSIDERATIONS FOR NORTH CAROLINA

About 14% of North Carolina's population, including 20% of its children, experienced food insecurity in 2022 (Feeding America 2024). All North Carolina counties are affected by food insecurity, with rates generally higher in rural than urban or suburban areas. Rural food insecurity is exacerbated by factors such as limited capacity, resources, and transportation options compared to urban areas. Addressing food insecurity requires both short-term assistance programs

(Supplemental Nutrition Assistance Program (SNAP), food banks, food pantries, etc.) and longer-term solutions to build self-sufficiency (education, addressing unemployment and housing affordability, increasing access to local foods, etc.). A sustainable local and regional food system that connects



Header image by Charlize Davids/peopleimages.com, stock.adobe.com

Short-Term

- Increase emergency assistance programs for the food insecure.
- Form partnerships to develop longerterm solutions to building food security (e.g., food-related workforce development).
- Increase resources and market access for small and minority farmers.
- Initiate pilot projects to address gaps in local food systems (e.g., mobile markets, community-scale nutrition hubs, home delivery programs, etc.).

Medium-Term

- Implement strategies to connect consumers to fresh, healthy, locally produced foods (e.g., farmers markets, community gardens, grocery stores, food "rescue"/harvesting programs).
- Implement education, training and other strategies to increase resilience and connect food insecure people to societal networks.
- Develop regional food security plans to coordinate local actions.
- Develop regional food hubs to support food aggregation, storage, processing, and distribution.
- Establish the key components of a sustainable, resilient regional food system (protected agricultural base, access to markets for producers and consumers, a pipeline of

Long-Term

- farmers, etc.).
 Address root causes of food insecurity (housing, transportation access, education, living wage jobs, etc.).
- Monitor impacts of other drivers of change on food security and the resilience of regional food systems.

consumers to healthy foods and reduces waste through collaborative production, processing, and distribution networks is key to increasing food security.

North Carolina has strong assets to address food insecurity. Feeding America identifies seven food banks, each serving multiple counties within the state. The N.C. Department of Health and Human Services' State Action Plan for Nutrition Security prioritizes access to healthy, safe, affordable foods for families and children and commits to decreasing the food insecurity rate to 10% by December 2024 (NCDHHS 2023). North Carolina has the third most diverse agricultural economy in the U.S.; the state ranks in the top ten nationally in twenty-one production categories (USDA-NAAS and NCDACS 2022). Community Food Strategies identifies thirty-five active food councils working to improve local food systems.

KEY STATS

- About 10.9% (1.2 million) of North Carolina's population, including 17% (394,000) of its children, experienced food insecurity in 2021 (NCDHHS 2023). According to Feeding America, these figures increased to 14% and 20%, respectively, in 2022.
- County food insecurity rates range from a low of 7.6% for Union County to a high of 18% for Robeson County. Only 11% of North Carolina counties have food insecurity rates under 10%: Union (7.6%), Wake (8.5%), Cabarrus (8.9%), Currituck (8.9%), Mecklenburg (9.1%), Camden (9.4%), Orange (9.5%), Durham (9.6%), and Chatham (9.7%) (Feeding America 2022).
- North Carolina ranks in the top ten nationally for the production of a variety of foods, such as sweet potatoes (#1), turkeys (#2), hogs and pigs (#3), cucumbers (#3), livestock, dairy, and poultry cash receipts (#6), blueberries (#7), and chickens (#8) (USDA-NASS and NCDACS 2023).

EXAMPLE: WAKE COUNTY

Wake County has the second-lowest food insecurity rate (8.5%) among North Carolina counties. It has devoted considerable resources to increasing food security, with the goal "to ensure that all residents have access to affordable, nutritious, and culturally relevant food." In 2015, the County Board of Commissioners funded development of Moving Beyond Hunger, a comprehensive food security plan led by the Wake County Food Security Working Group and Capital Area Food Network (the County's food council). Completed in 2017, the plan established five strategies (ensure food access, communicate and educate, develop a sustainable food supply, build economic opportunity, and lead through networks), five indicators of progress, and forty-one recommended actions to carry out over three years. In 2023, the County partnered with the North Carolina Cooperative Extension Service to complete Creating a Resilient and Equitable Food System, an update to the 2017 plan. The update lays out new strategies and investments to "transition our current food security model from food charity to food resilience."

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WATER

OVERVIEW

Our relationship with water varies with the circumstances. Communities often want more clean drinking water to catalyze economic development and serve new residents and businesses. At the same time, they want less polluted runoff and flooding from the growing number of rooftops and extreme weather events. As a warming climate generates more violent storms, flooding is damaging more lives and property. In many communities, the 100-year storm is becoming a regular occurrence.

RELATED DRIVERS

Climate Energy Food Security Health

Expensive infrastructure is needed to tap our water resources, maintain their quality and quantity, and help protect us from their harmful impacts during flooding. Aging facilities and rising

construction prices are driving up costs. New treatment facilities take years to design and permit. Paying for facility construction and ongoing operation and maintenance is a <u>continuing challenge</u>. The State of North Carolina has established a strict framework for setting rates and fees for these services. Many communities are also subject to <u>state and federal</u> stormwater management requirements to help protect water quality in the face of increasing development impacts.

New challenges are presented by microplastics and <u>per- and polyfluoroalkyl substances</u> (PFAS), the so-called "forever chemicals" used in a variety of consumer products that are harmful to humans and don't break down in the environment.

With greater demands and more uncertainty in the years ahead, many water resource managers are exploring a "<u>One Water</u>" framework that takes an integrated systems approach to water resources to serve broader community needs in a resilient manner. They are also using tools such as regionalization, which creates more efficient management systems, and new funding models, which help make sure all residents have affordable access to these essential resources. In addition, green stormwater infrastructure measures that use <u>natural solutions</u> are being implemented to reduce costs and provide environmental, economic, and social benefits.



RELEVANCE

Impact: High (water is an essential resource that is fundamental to supporting natural and human life across the state)

Certainty: High (virtually every community is already experiencing some challenges related to water, whether it be ensuring adequate supply, quality, or affordability or managing runoff and flooding)

Timeframe: Immediate (this long-standing issue will only increase in significance with population growth and greater disruption from extreme weather)

Context: Statewide (every community needs this resource and is affected by water's role in natural hazards)

TAKEAWAYS

- Providing adequate supplies of clean drinking water to meet the demands of a growing population requires significant planning and funding.
- Paying for water, wastewater, and stormwater management infrastructure is an ongoing challenge, with increasing impetus to collaborate regionally on solutions.
- Source water protection is essential to maintaining adequate drinking water and affordable rates.

Short-Term	Medium-Term	Long-Term
 Create a calendar for coordinating and updating water supply plans and wastewater management plans with neighboring communities. 	Consider developing a <u>customer</u> <u>assistance program</u> to ensure affordable access to water and sewer service.	 Promote utility coordination on <u>water</u> <u>conservation</u> measures. Explore creating a utility-funded watershed protection program.
 Create a water resources dashboard to track water quality, water supply, water conservation, watershed protection, and other topics 	 Study creating a comprehensive <u>septic</u> <u>system assistance program.</u> Consider pursuing a <u>grant</u> to conduct a 	Participate in an annual water resources symposium that shares the latest idea such as the one sponsored by the N.C.

- Explore taking a One Water approach to managing water resources.
- utility Merger/Regionalization Study.
- · Develop a water conservation program.
- · Explore creating a stormwater utility to better manage runoff and flooding.
- es as. Water Resources Research Institute.
- Develop a green infrastructure plan and promote integrated land and water management.



A multi-use framework for Falls Lake.

- · Meeting the needs of decentralized water and wastewater users is a continuing challenge.
- · Maintaining affordability for customers with limited financial resources is important.
- · More frequent and intense storms highlight the need for more resilience planning and mitigation.

CONSIDERATIONS FOR NORTH CAROLINA

North Carolina is blessed with considerable water resources. Average annual rainfall ranges from about 50 inches a year on the coast to up to 80 inches a year in the mountains, well above the U.S. national average of 30 inches a year (Encyclopedia Britannica; NOAA). At the same time, population growth is straining this capacity and degrading water quality, with a number of streams no longer supporting their intended use, reducing opportunities for swimming and fishing while increasing the cost of treatment for consumers.1 To protect their water resources, communities need to work from the headwaters to the tap to maintain water quality and quantity. In turn, flooding and hurricanes cause more than \$360 million in projected damage each year in North Carolina.² As a result, moving people and property out of harm's way is an essential undertaking.

Resources to assist communities with these issues include the sixteen Councils of Governments across the state, the UNC School of Government's Environmental Finance Center, the N.C. Water Resources Research Institute, the N.C. Department of Environmental Quality, the N.C. Office of Recovery and Resiliency, and a number of other university institutes, government agencies, nonprofit organizations, and consulting firms.

KEY STATS

- A typical town block generates nine times more stormwater runoff than a woodland area of the same size because of impervious surfaces such as rooftops and pavement (US EPA).
- A major flooding event in the Triangle could make more than 30,000 properties in Orange, Durham, Wake, and northeast Chatham Counties inaccessible to residents and emergency vehicles due to inundated roads (Rogers et al. 2018).
- Local utilities in North Carolina collectively face about \$10.7 to \$13.7 billion (in 2020 dollars) in water and wastewater capital projects over five years (Environmental Finance Center, UNC School of Government 2021).
- In 2019, the City of Raleigh predicted that water demand in the city and six towns it serves in eastern Wake County will nearly double to 98 million gallons a day by 2047.³

EXAMPLE: CLAREMONT/HICKORY UTILITY REGIONALIZATION

In 2016, the cities of Claremont (population 1,600) and Hickory (population 40,400) conducted a Merger/Regionalization Study with a grant from the N.C. Department of Environmental Quality to explore the benefits of collaborating on wastewater treatment.⁴ The study found that sending sewage to Hickory would enable Claremont to tap Hickory's staff expertise and create economies of scale that would save both communities

^{1.} N.C. Division of Water Resources, Water Quality Data Assessment. 2. Federal Emergency Management Agency, The National Risk Index.

^{3.} Richard Stradling, "Raleigh's Long Search for a New Water Supply Ends Back Home at Falls Lake," Raleigh News & Observer (May 17, 2019).

^{4.} Environmental Finance Center, UNC School of Government, Small Town Regionalization Case Study: City of Claremont, North Carolina," October 4, 2021.



Lake Rhodhiss serves as the water supply for the North Carolina communities of Granite Falls, Lenoir, Morganton, and Valdese.

money and reduce Claremont's wastewater violations. They then worked with the Western Piedmont Council of Governments and UNC's Environmental Finance Center to help structure the collaboration and develop sewer rates to pay for the physical interconnection that would enable Hickory to treat Claremont's wastewater. The communities expect significant annual cost savings when the project is completed in 2024.

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CONCLUSION: TAKING ACTION

Disruption comes from many directions, threatening to upset the social, technological, economic, and environmental systems we take for granted. Its array of disruptive forces—the drivers of change—is like a meteor shower headed toward earth. Our challenge is that we don't know which drivers will miss us entirely and which ones will land a direct hit, like the COVID-19 pandemic, and cause a major disruption to our lives.

So how do we reduce social vulnerability in our communities and increase our readiness to manage change? We have developed a six-step process to help you do this by preparing and implementing a Community Readiness Plan. This approach can be used by organizations (e.g., government agencies, businesses, nongovernmental organizations, academia) to address internal operations or by local governments to develop and implement community-facing programs and initiatives. Either way, it provides a way for you to identify and prioritize the drivers of change relevant to your context and to select effective implementation measures to address them.

What Is a Community Readiness Plan?

A Community Readiness Plan as we envision it is a future-focused, actionoriented strategic plan designed to help your community improve its resilience to manage disruption. Creating the plan can help you prioritize drivers and select implementation measures to address them. By using this plan to feed priority projects into your annual budget and work plan, you can resource and operationalize key implementation measures and inject more future focus into your daily operations. If you work systematically over time to implement the plan, you will increase the readiness and resilience of your organization or community.



We encourage you to customize the plan to best fit the circumstances in your community. Here is a summary of the six steps, followed by a more detailed description of each step:

COMMUNITY READINESS PLANNING PROCESS



By following this process, you can work systematically to inject more of a future focus in the daily operations of your organization and to improve the readiness and resilience of your community.



1. Scan this briefing book

The first step is to develop an understanding of the range of drivers of change that are relevant to your community, recognizing that this briefing book describes only a subset of the many that exist. Some drivers of change in the book will be very familiar; others will be less so. Focus on the ones that are most relevant to your community while identifying any additional drivers that may be missing.

2. Prioritize the drivers of change in
your community
,

Because the various drivers have different timeframes, levels of certainty, and impacts, and because your community may have different levels of readiness to address each of them, some drivers may be more important for your community to prepare for than others.

2A. Use Worksheet 1: Prioritizing Drivers of Change

to help identify the most relevant drivers of change for your community. The worksheet is structured for you to score each driver based on different characteristics. We encourage you to customize the worksheet as needed to include any additional drivers you identify. A more detailed description of this worksheet and how to use it is included in Appendix A.

	E/	TOTAL					
DRIVERS OF CHANGE	Potential Impact	Certainty	Timeframe	Readiness ¹	SCORE	PRIORITY	
Social							
Aging Population	3	3	3	1	10.0	н	
Health	3	3	3	2	11.0	н	
Housing	3	2	3	1	9.0	м	
Public Safety	2	2	3	2	9.0	м	
Artificial Intelligence	3	2	2	3	10.0	н	
Digital Access and Equity	3	2	2	2	9.0	м	
New Transportation Technology	2	2	2	2	8.0	м	
Smart Communities	2	2 2 1		2	7.0	L	
Blockchain/Cryptocurrency	1	1	1	2	5.0	L	
Circular Economy	2	2	2	1	7.0	L	
Economic Restructuring	3	2	3	2	10.0	н	
Workplace/Workforce Disruption	2	3	3	2	10.0	н	
Environmental							
Climate	3	3	3	2	11.0	н	
Energy	2	2	3	1	8.0	м	
Food Security	2	2	3	2	9.0	м	
Water	3	2	2	2	9.0	м	

- 2B. Either fill out this worksheet yourself, using this briefing book and other resources as a reference, or work with an organizational leadership team or a community stakeholder group to complete it.
- 2C. If you involve an organizational leadership team or a community stakeholder group, consider holding a workshop to provide an overview of the project and lead participants through the prioritization process. The final product should be a short list of key drivers that seem most relevant to your community, based on the information currently available to you and your colleagues and constituents.

2D. Once you have identified the priority drivers of change for your community, use *Worksheet 2: Cross-Impact Analysis* to understand the interconnections between drivers, which informs how they might be addressed in the action plan. A more detailed description of this worksheet and how to use it is included in Appendix A.





3. Identify effective actions

Now, it is time to identify the action steps that will address the key drivers for your community.

- 3A. Use <u>Worksheet 3: Action Identification</u> to assess different potential implementation measures for each of your priority drivers and select the most promising actions. This worksheet will help you evaluate potential actions based on their characteristics. We encourage you to add additional actions to the worksheet for any additional drivers that you have identified. A more detailed description of this worksheet and how to use it is included in Appendix A.
- 3B. The Cone of Uncertainty strategic planning model, described in the Introduction, can help you plan the implementation measures so that they are timed to respond to the drivers as they approach and as their specific characteristics and impacts come into focus.
- 3C. You can also review the "Potential Responses" included in each driver of change section for ideas on potential actions. These responses are organized into short-term, medium-term, and long-term measures, which are tied to each driver's stage of arrival and impact on your community.
- 3D. Compile the selected actions for all of your priority drivers in a customized Implementation Table, organized by short-term, medium-term, and long-term actions. Each action represents

an individual project that your organization and/ or its partners could pursue. A sample of this table, along with a more detailed description, is included in <u>Appendix A</u>.

3E. Review the Implementation Table to see if particular projects would help increase the readiness and resilience of your organization or community for the impacts of several drivers of change at the same time. Look for individual projects that could potentially yield co-benefits by achieving multiple objectives. Other considerations include public preferences, potential impacts, and available resources. A common challenge with implementation programs is keeping the number of active projects at a manageable level so that each project can be carried out successfully with the resources that are available.

ACTIONS		FACTORS	TOTAL	RELATIVE		
ACTIONS	Alignment	Feasibility	Impact	Connections ¹	SCORE	PRIORITY
	Short Ter	m				
Monitor evolution of driver of change						
Inventory and assess existing practices						
Document case studies and best practices						
Create a working group						
Conduct a community needs assessment for driver						
Develop a strategic plan for driver or integrate into other plans						
Develop an action plan						
Engage partners in identifying and developing effective solutions (regional + state govt., private sector, NGOs, and/or sacdemia) (e.g., invite vendors to pitch events to share their solutions)						
Identify potential funding sources for projects						
Initiate a pilot program to test implementation measures						
Support corresponding business development						
Identify vulnerable populations and ways to assist them						
	Medium Te	erm				
Scale-up successful pilot programs						
Identify key performance indicators						
Create a dashboard to monitor key performance indicators						
Coordinate efforts w/local, regional, state, and/or federal partners						
Build implementation capacity						
Implement the action plan						
Explore partnerships and leverage resources						
Secure funding						
Develop and distribute toolkits						
Recognize successful initiatives						
	Medium Te	erm				
Monitor long-term impacts						
Hold annual showcase						
Hold annual awards program						
Develop job training program for addressing driver						
Plan for long-term adaptation						
Identify additional actions to address the driver						



4. Compile and adopt a Community Readiness Plan

It is now time to compile the work you have done to date in a Community Readiness Plan.

- 4A. Start by preparing a write-up summarizing the work you have done in Steps 1–3.
- 4B. Conclude the plan with the Implementation Table that identifies key actions.
- 4C. A <u>sample Table of Contents for your Community</u> <u>Readiness Plan</u> is included in Appendix A as a reference.
- 4D. An alternative approach would be to include key actions in other plans adopted by your community, such as a Strategic Plan, a Capital Improvements Plan, and a Comprehensive Plan.

4E. The final step is to get public input on the plan and bring it to appointed boards and your governing board for review and adoption as official policy for your organization or community.



5. Implement the Community Readiness Plan

Once the plan is adopted, it is time to take the key short-term implementation actions identified in your Community Readiness Plan and turn them into active projects.

- 5A. For many projects, it may be helpful to begin by preparing a short Project Charter that summarizes key project information such as the project sponsor, project manager, project team, purpose, timeline, and key milestones. A <u>sample</u> <u>Project Charter</u> is included in Appendix A as a reference.
- 5B. For some projects, you may also want to prepare a scope of work, timeline, and budget, especially if the project requires special funding, so that you can request an appropriate allocation of resources.
- 5C. Projects that use existing staff resources and available discretionary funding can be included in the annual work program for the coming year.
- 5D. Other projects that require a special budget allocation can be submitted as part of the annual budget cycle to compete for the necessary funding.
- 5E. In some cases, projects may necessitate the development of partnerships with other organizations and/or the submittal of grant proposals in order to secure the necessary resources to move forward.



6. Monitor the drivers of change and track your progress on plan implementation

Once the implementation projects are underway, it is time to track their progress.

- 6A. Consider establishing a system for getting updates from project managers and supporting them in keeping projects moving forward to successful completion.
- 6B. It can also be very helpful to provide an annual update to upper management, appointed boards, and the governing board to highlight accomplishments, make course corrections, and discuss projects for the coming year. This can help maintain support for this work and pave the way for future funding.
- 6C. In addition, many drivers of change are constantly evolving, so a key function is to track their evolution to get the latest data and see if their relevance to your community is changing significantly. One approach is to create a standing committee to carry out this function

Taking Action at Different Levels

To manage disruption more effectively, action is needed at a number of levels within North Carolina. Here are some things that organizations at each level can do.

Municipalities

- Develop and implement a Community Readiness Plan.
- Engage with your county government and/or regional council to collaborate on tracking drivers of change, sharing ideas, and pursuing joint implementation projects.

Counties

- · Develop and implement a Community Readiness Plan.
- · Assist municipalities with preparing Community Readiness Plans.
- Track drivers of change at a county level.
- Work with your regional council to collaborate regionally on tracking drivers of change, sharing ideas, and pursuing joint implementation projects.

Regional Councils

- Work with municipalities, counties, and subject matter experts in other sectors to convene a regional team to track drivers of change and share the information broadly.
- Assist local governments with preparing Community Readiness Plans.
- · Share information on best practices to increase readiness and resilience.
- · Provide recognition for organizations that do outstanding work on building readiness and resilience.

State Government

- Collaborate with academia, regional councils, and other sectors to convene a state-level team to track drivers of change and share the information broadly.
- · Share information on best practices to increase readiness and resilience.
- · Provide technical assistance and subject matter expertise to help with this work.
- Provide funding to help with drafting and implementing Community Readiness Plans.
- · Provide recognition for organizations that do outstanding work on building readiness and resilience.

Academia, Nonprofit Institutions

- · Conduct research on effective policies and practices to manage disruption.
- Develop and provide subject matter expertise.
- Collaborate with state government, regional councils, and others to convene a state-level team to track drivers of change and share the information broadly.
- Assist local governments with preparing Community Readiness Plans.
- Train the trainers to help regional councils and others assist local governments with preparing Community Readiness Plans.
- · Share information on best practices to increase readiness and resilience.

Businesses

- · Provide subject matter expertise.
- · Develop tools to assist with tracking drivers of change.
- · Provide solutions to help communities increase their readiness and resilience.
- · Develop organizational readiness plans to improve the resilience of their own operations.

on an ongoing basis and report back to upper management. This tracking function can often be done more effectively and efficiently with the help of regional and/or state organizations.

- 6D. In some cases, the trajectory of particular drivers may change enough that you decide your organization or community needs to update the drivers of change it prioritized in Step 2. This can be a good activity to do prior to (or possibly as part of) your governing board's annual retreat, and/or before presenting your annual progress report on plan implementation.
- 6E. Any changes in priority may necessitate revisions to your Community Readiness Plan.

6F. Periodically, perhaps every few years, it may be helpful to do a more extensive update to the plan to reflect updated information about the different drivers and changing conditions in your community.

The future is filled with change. The extent to which these variations bring challenges or opportunities is partly up to us. Communities can work to reduce the vulnerability of their constituents and increase their ability to respond quickly and effectively to disruption. By taking concrete actions to enhance the resilience of our communities, we can develop a strategic advantage in competing for resources and investments now and in the future. In the process, we can better prepare our organizations and our communities to manage disruption in a rapidly changing world.

APPENDIX A. TOOLS FOR MANAGING DISRUPTION

All of the forms in this appendix—three worksheets, a project table, and a project charter—are available for download at <u>ncimpact.sog.unc.edu/managing-disruption</u>.

WORKSHEET I: PRIORITIZING DRIVERS OF CHANGE

As we work to manage disruption in a rapidly changing world, a key task is to identify which drivers of change seem most relevant to our community based on current information. This worksheet is designed to help you do this by guiding you through Step 2 in the Community Readiness Planning Process described in the Conclusion.

In **Task A**, you develop a list of the key drivers of change that appear most relevant to your community. Your community may already be starting to experience the impacts of some of these drivers while identifying others that may be coming. The worksheet includes the drivers described in this report but we encourage you to add others that are appropriate for your community.

In **Task B**, you confirm the factors that you will use in prioritizing the drivers of change for your community. We recommend these four factors:

- Potential Impact (of the driver on your community)
- Certainty (of the driver and whether its anticipated impacts will actually occur)
- Timeframe (how soon the driver will impact your community)
- Readiness (how prepared your community is currently to address the driver)

We encourage you to customize this approach and modify it as appropriate for your community. In **Task C**, you score each driver using information in this briefing book and in other resources. We recommend scoring the factor for each driver as high, medium, or low using this system:

- High (3 points)
- Medium (2 points)
- Low (1 point)

For Potential Impact, the greater the impact, the higher the score.

For Certainty, the more certain, the higher the score.

For Timeframe, the sooner the driver will impact the community, the higher the score.

For Readiness, the less ready the community is to address the driver, the higher the score.

One resource to help you in scoring the different drivers is the statewide preliminary assessment included in the "Relevance" section of each driver of change brief. The first three components of this assessment match up with the first three factors above: Potential Impact, Certainty, and Timeframe. Readiness to address a given driver (the fourth factor above) varies across organizations and communities and is something that local experts and staff often have more insight about, so we don't offer a state-level assessment. As always, you will want to customize the high, medium, and low ratings to the context in your community.

To help you with this customization, to the extent possible, it may be helpful to seek the input of Subject Matter Experts (SMEs) to provide input on appropriate scoring. Regional and state organizations may be able to help with this

as well. In many cases, available expertise may be limited, which means the project team will have to use its best professional judgment based on currently available information. We encourage you to do the best you can and not get bogged down by trying to be too precise.

In **Task D**, you add up the points to create a total score for each driver. Then you can rate each driver as high, medium, or low priority based on its score. If you use four factors, we recommend the following rating system:

- High (10, 11, or 12 points)
- Medium (8 or 9 points)
- Low (4, 5, 6, or 7 points)

This system can be adjusted if you have a different number of factors.

In **Task E**, you use the scores to confirm which priority drivers of change your community or organization will focus on at present. We encourage you to continue tracking all the relevant issues to see if any changes over time warrant a reassessment of priorities.

Now, it is time to continue with the Community Readiness Planning Process and complete Worksheet 2: Cross-Impact Analysis.

	FA	TOTAL				
DRIVERS OF CHANGE	Potential Impact	Certainty	Timeframe	Readiness ¹	SCORE	PRIORITY
Social						
Aging Population	3	3	3	1	10.0	н
Health	3	3	3	2	11.0	н
Housing	3	2	3	1	9.0	М
Public Safety	2	2	3	2	9.0	М
Technological						
Artificial Intelligence	3	2	2	3	10.0	Н
Digital Access and Equity	3	2	2	2	9.0	М
New Transportation Technology	2	2	2	2	8.0	М
Smart Communities	2	2	1	2	7.0	L
Economic						
Blockchain/Cryptocurrency	1	1	1	2	5.0	L
Circular Economy	2	2	2	1	7.0	L
Economic Restructuring	3	2	3	2	10.0	н
Workplace/Workforce Disruption	2	3	3	2	10.0	н
Environmental						
Climate	3	3	3	2	11.0	Н
Energy	2	2	3	1	8.0	М
Food Security	2	2	3	2	9.0	М
Water	3	2	2	2	9.0	М

Sample Worksheet 1: Prioritizing Drivers of Change

Key

Driver Scoring:	Priority:
High = 3	High = 10, 11, or 12
Medium = 2	Medium = 8 or 9
Low = 1	Low = 4, 5, 6, or 7

Download this worksheet at <u>ncimpact.sog.unc.edu/managing-disruption</u>.

1. The less ready a community is to address a driver of change, the higher the score.

WORKSHEET 2: CROSS-IMPACT ANALYSIS

Successfully managing the disruptive impacts of change requires a proactive, integrated approach that accounts for interconnections between individual drivers of change. Specific examples of these interconnections include:

- Aging Population (social driver) / Climate (environmental driver): Older adults are disproportionately impacted by natural disasters such as hurricanes, wildfires, and heat waves. For example, 70% of the people who died during Hurricane Katrina in 2005 were over 65; 73% of people who died during the 2023 Lahaina, Hawaii, wildfires were over 60; and the median age of people who died during the 2021 Oregon heat waves was 67. These impacts are projected to increase as the population ages and climaterelated impacts become more severe. However, these two drivers are addressed by separate professional disciplines that typically do not interact (Arigoni 2023).
- Artificial Intelligence (technological driver)
 / Climate (environmental driver): Artificial
 intelligence (AI) applications have the potential
 to make major contributions to climate action
 by reducing greenhouse gas emissions,
 guiding adaptation to climate impacts, and
 providing foundational capabilities for action.
 Conversely, AI poses risks that will need to
 be managed as applications are scaled-up to
 ensure a net-positive impact on climate. These
 risks include emissions from increased energy
 consumption, water use, and waste generation
 (Dannouni et al. 2023).
- Economic Restructuring (economic driver) / Workplace-Workforce Disruption (economic driver): These two drivers are inextricably connected. For example, remote work (a workplace-workforce disruption trend) is enabling more workers to participate in the gig economy (an economic restructuring trend). Implications include, among others, reduced demand for traditional office space and opportunities for communities outside metropolitan areas to attract workers based on quality of life-provided that high-speed broadband service is available. In another example, the increasing demand for fast and convenient package delivery (e-commerce, an economic restructuring trend) is expanding the market for autonomous last-mile delivery (a form of automation, a workplace-workforce disruption trend) (Such 2023).

The Cross-Impact Analysis Worksheet is a tool you can use to address interconnections between priority issues identified in a strategic planning process. These issues may include the drivers of change covered by this briefing book and/or others based on the local context. The cross-impact analysis consists of three steps:

- Identify connections between priority drivers of change. Sample Worksheet 2 shows identified connections among the sixteen drivers covered in the briefing book and can be used as a framework and starting point for this step.² To apply in a strategic planning process, imagine that this worksheet shows connections between a smaller set of priority drivers you identified using Worksheet 1.
- 2. Assess the relative strength of connections between priority drivers based on degree of impact (high, medium, or low). The Sample Cross-Impact Analysis Table provides an example of this step that assumes the five drivers of change discussed above have been determined to be priority issues.
- 3. Describe how the drivers are connected (particularly those rated high). In this step, you further define the nature of the connections (for example, aging adults are disproportionately impacted by climate disasters). This step should also consider the direction of impact, which can be predominantly one-way (climate impacts on older adults) or two-way (economic restructuring and workplace disruption, which are closely related and should be addressed through coordinated action).

The results of the cross-impact analysis (the number and relative strength of connections between drivers) can be used to score actions in the Connections column in <u>Worksheet 3</u>. For example, the following actions address the connection between Aging Population and Climate (based on Arigoni 2023):

- Actively engage older adults and their advocates in community readiness planning (for example, in setting up a working group).
- Address older adults' mobility and ability limitations (physical, financial, cognitive) in developing the action plan.
- Use communications systems that match the habits, abilities, and preferences of older adults in action plan development and implementation.

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^{2.} Please note that the number of related drivers shown for each driver is limited to four for illustrative purposes.

Environmental

Economic

cturing

currency

Disruption

Sample Worksheet 2: Cross-Impact Analysis

Dots (•) signify a connection (related driver)	
identified between two driver of change	
briefs.	

• means one of the briefs identifies a connection between the two drivers of change.

•• m conne conne dot, su analys	neans both briefs identify the ction. Two dots may indicate a stronger ction and/or higher priority than one ibject to conducting a cross-impact is as described in the text.	Aging Populatic	Health	Housing	Public Safety	Artificial Intellic	Digital Access 8	New Transport	Smart Commun	Blockchain/ Cry	Circular Econor	Economic Restr	Wkplace/Wkfor	Climate	Energy	Food Security	Water
	Aging Population		••	••				•					••	•		•	
cial	Health	••		•	••									••		••	•
So	Housing	••	•		•								•		••		
	Public Safety		••	•		•							•				
cal	Artificial Intelligence				•		••	•	••	•		••	••		•		
logi	Digital Access & Equity					••			••			••	••				
chno	New Transportation Technology	•				•	•		•								
Te	Smart Communities					••	••	•		•	•	•	•				
0	Blockchain/Cryptocurrency					•			•						•		•
omic	Circular Economy								•			•		••	•		
con	Economic Restructuring					••	••		•		•		••				
	Workplace/Workforce Disruption	•		•	•	••	••		•			••					
tal	Climate	٠	••					•			•				••	•	••
men	Energy			••		•				•	•			••			•
viron	Food Security	•	••											•			•
Env	Water		•							•				••	•	••	

Social

Technological

Download this worksheet at <u>ncimpact.sog.unc.edu/managing-disruption</u>.

Sample Cross-Impact Analysis Table (Step 2)

	•	•			
	Aging Population	Artificial Intelligence	Economic Restructuring	Workplace/ Workforce Disruption	Climate
Aging Population		Low	Low	Medium	High
Artificial Intelligence	Low		High	High	Potentially High
Economic Restructuring	Low	High		High	Medium
Workplace/Workforce Disruption	Medium	High	High		Medium
Climate	High	Potentially High	Medium	Medium	

WORKSHEET 3: ACTION IDENTIFICATION

Once Worksheets 1 and 2 have been completed and the priority drivers of change have been identified for your community, it is time to identify appropriate action steps to build your community's readiness and resilience. To help you do this, we have drafted Worksheet 3: Action Identification. This will help you complete Step 3 of the Community Readiness Planning Process described in the Conclusion.

In **Task A**, you develop a list of the potential actions that your organization might take to address each priority driver. We have identified specific types of actions in the "Potential Responses" section of this report's two-page briefs, and we encourage you to add others as appropriate for your community. These actions are not listed in any particular order within each timeframe.

In **Task B**, you use factors to confirm that the actions you have chosen to address each driver are the most appropriate for your community. We recommend these four factors:

- Alignment (with the goals of your community)
- Feasibility (for your organization to successfully implement the action)
- Impact (that the action will likely have in increasing your community's readiness and resilience)
- **Connections** (how the strategies help address the connections between drivers as identified in Worksheet 2: Cross-Impact Analysis)

We encourage you to customize this approach and modify it as appropriate for your community.

In **Task C**, you score each potential action using the information in this briefing book and in other resources that you obtain. We recommend scoring each factor for each driver as either:

- High (3 points)
- Medium (2 points)
- Low (1 point)

For *Alignment*, the greater the alignment of the action with the goals of your community, the higher the score.

For *Feasibility*, the more feasible, based on your organization's resources and expertise, the higher the score. This determination should include whether the tool is legal in North Carolina.

For *Impact*, the greater the likely impact, the higher the score.

For *Connections*, the greater the number and relative strength of connections between drivers, and the more

a given action addresses multiple drivers, the higher the score of the implementation measure. Complete Worksheet 2 first so that you can use it in assessing this factor.

To the extent possible, it may be helpful to seek the input of Subject Matter Experts (SMEs) to assist with appropriate scoring. In many cases, available expertise may be limited, in which case the project team will have to rely on its best professional judgment based on currently available information. We encourage you to do the best you can and not get bogged down by trying to be too precise.

In **Task D**, you add up the points to create a total score for each action identified to address each driver. Then you can rate each action as high, medium, or low priority based on its total score. If you use four factors, we recommend the following:

- High (10, 11, or 12 points)
- Medium (8 or 9 points)
- Low (4, 5, 6, or 7 points)

This system can be adjusted if you have a different number of factors.

In **Task E**, you use the scores to confirm the priority actions for each driver to pursue in your community.

Once you have identified your priority actions for each of the priority drivers, then it is time to compile these actions in an Implementation Project Table. We have provided the sample project table on page 64 as a resource. Sort the projects by the timeframe in which you will start them, either Short-Term (1–2 years after adopting Community Readiness Plan), Medium-Term (3–5 years after adoption), or Long-Term (6–10 years after adoption). Now you have a table to use in identifying implementation projects to consider for inclusion in your annual work plan and budget.

Once you are ready to start implementing specific projects, consider preparing a project charter that describes the project team, timeframe, budget, and other key project information for the initiative. We have provided a sample project charter as a resource on page 66.

Once the implementation projects are underway, make sure to monitor them regularly as they move forward, making adjustments as needed to complete them successfully. If the priority drivers change over time, the priority actions may need to be updated.

This process allows you to work systematically to increase the readiness and resilience of your community as it deals with change in a rapidly changing world.

Worksheet 3: Action Identification

	FACTORS TO SCORE				τοται	RELATIVE	
ACTIONS	Alignment	Feasibility	Impact	Connections ¹	SCORE	PRIORITY	
	Short-Ter	m					
Monitor evolution of driver of change							
Inventory and assess existing practices							
Document case studies and best practices							
Create a working group							
Conduct a community needs assessment for driver							
Develop a strategic plan for driver or integrate into other plans							
Develop an action plan							
Engage partners in identifying and developing effective solutions (regional + state govt., private sector, NGOs, and/or academia) (e.g., invite vendors to pitch events to share their solutions)							
Identify potential funding sources for projects							
Initiate a pilot program to test implementation measures							
Support corresponding business development							
Identify vulnerable populations and ways to assist them							
	Medium-Term						
Scale-up successful pilot programs							
Identify key performance indicators							
Create a dashboard to monitor key performance indicators							
Coordinate efforts w/local, regional, state, and/or federal partners							
Build implementation capacity							
Implement the action plan							
Explore partnerships and leverage resources							
Secure funding							
Develop and distribute toolkits							
Recognize successful initiatives							
Long-Term							
Monitor long-term impacts							
Hold annual showcase							
Hold annual awards program							
Develop job training program for addressing driver							
Plan for long-term adaptation							
Identify additional actions to address the driver							

Download this worksheet at <u>ncimpact.sog.unc.edu/managing-disruption</u>.

^{1.} Insert from Worksheet 2.

SAMPLE IMPLEMENTATION PROJECT TABLE

NO.	PROJECT	DESCRIPTION	STAFFING LEAD	EST. COST	FUNDING SOURCES	NEXT STEPS		
	Short-Term (1–2 years)							
1	Prepare a Digital Equity Plan	Prepare a community plan to identify local barriers to digital access and develop measures to increase availability of broadband, affordable Internet subscriptions, devices, and the skills to use them.	Information Technology Dept.	\$50k to hire consultant to prepare plan	General Fund; possible state and/or federal matching funds	 Prepare scope of work Add to annual work plan Draft Request for Proposals for consultants 		
2	Conduct a Waste Assessment	Conduct a waste assessment of your business or community to identify opportunities to recycle more and reduce environmental footprint.	Public Works Dept.	\$20k to contract with govt. partner to conduct assessment	General Fund; possible state and/or federal matching funds	 Prepare scope of work Add to annual work plan Draft service agreement 		
3	Create a Water Resources Dashboard	Develop a dashboard for your website that tracks water quality, water supply, water conservation, and other water resource topics.	Public Works Dept., Planning Dept., IT Dept.	Staff time	N/A	 Prepare scope of work Add to annual work plan 		
	Medium-Term (3–5 years)							
4	Develop "Pitch + Pilot" Program to Identify New Smart Community Technologies	Organize and conduct a pitch event for vendors with interesting technologies that could improve local service delivery to identify potential ones for pilot testing.	IT Dept., Planning Dept., Economic Development Dept.	Staff time	N/A	 Prepare scope of work Add to annual work plan 		
5	Adopt Enhanced Stormwater Management Requirements	Adopt enhanced stormwater management ordinance measures for new development to reduce community flood risks.	Planning Dept., Engineering Dept.	\$30K for consultant to draft ordinance language	General Fund	 Prepare scope of work Add to annual work plan Draft RFP for consultants 		
Long-Term (6–10 years)								
6	Launch Green Skills Workforce Development Program	Work with local educational institutions and employers to develop job-training program for green-economy skills like conducting energy audits or installing solar panels. Offer internships to graduates.	Economic Development Dept.	Staff time	N/A	 Identify roles and responsibilities Add participation to annual work plan Identify internship opportunities 		
7	Host Annual Resilience Technology Awards Program	Work with partners to develop awards program to recognize innovative uses of technology to make community more resilient.	Planning Dept., Economic Development Dept., IT Dept.	Staff time; \$5k to help pay for food, venue, and prizes	General Fund; sponsorships	 Identify project partners Prepare scope of work and timeline Add to annual work plan 		

SAMPLE TABLE OF CONTENTS FOR COMMUNITY READINESS PLAN

The Community Readiness Plan should explain the purpose of the initiative, describe the analysis conducted, display the prioritized list of drivers of change, present the prioritized list of implementation measures, and summarize the public involvement and feedback. Here is a sample table of contents:

Executive Summary

Summarize the contents of the plan and the key implementation measures.

Introduction

- A. Explain the purpose of the plan.
- B. Summarize the six-step process followed to develop the plan.

Chapter 1: Identifying Priority Drivers of Change

- A. Describe the analysis conducted in Step 2 to identify key drivers of change for the community using Worksheet 1: Prioritizing Drivers of Change.
- B. Describe the analysis conducted to identify key connections between the priority drivers using Worksheet 2: Cross-Impact Analysis.

Chapter 2: Selecting Implementation Projects

- A. Describe the analysis conducted to select key plan implementation projects using Worksheet 3: Action Identification.
- B. Present the Implementation Project Table listing the key implementation measures.

Chapter 3: Public Involvement

- A. Describe the process used to involve Subject Matter Experts and community stakeholders in the development of the plan.
- B. Present key themes from the stakeholder input received and explain how they shaped the analysis and implementation projects selected.

Chapter 4: Taking Action

A. Discuss next steps to operationalize the plan and track its progress.

Appendixes

Details pertaining to analysis and public input can be included in appendixes, which provide a place to share important and more complex information without impairing the readability of the plan itself.

SAMPLE IMPLEMENTATION PROJECT CHARTER

This form is designed to be completed at the outset of each plan implementation project by the project sponsor, such as the town manager, and the project manager, such as the planning director.

PROJECT CHARTER [insert name of project]						
Project purpose						
Project sponsor		Project manager				
Project cost		Projected funding source(s)				
Start date		Completion date				
Scope						
Key deliverables	1.		4.			
	2.		5.			
	3.		6.			
Key milestones	1.			Date:		
	2.		Date:			
	3.		Date:			
	4.			Date:		
Key assumptions	1.		3.			
	2.		4.			
Key risks/issues	s <u>1.</u>		3.			
	2.		4.			
Team	1.		4.			
	2.		5.			
	3.		6.			
Partners	1.		3.			
	2. 4.					
Success Indicators	1. 3.					
	2.		4.			

Download this worksheet at <u>ncimpact.sog.unc.edu/managing-disruption</u>.

APPENDIX B. General Resources

American Planning Association and the Lincoln Institute of Land Policy. 2022 Trend Report for Planners.

- ------. 2023 Trend Report for Planners.
- -----. 2024 Trend Report for Planners.

Association of Governmental Risk Pools (AGRIP) (n.d.). Framing the Future: A Guide to Strategic Foresight.

de Jong, Jorrit, Quinton Mayne, and Fernando Fernandez-Monge (2024). <u>Tackling Big, Thorny Problems: Building the</u> <u>Capabilities Your Organization Needs</u>. Bloomberg Harvard City Leadership Initiative.

Gidley, Jennifer M. (2017). The Future: A Very Short Introduction. Oxford, UK: Oxford University Press.

- Goodspeed, Robert (2020). <u>Scenario Planning for Cities and Regions: Managing and Envisioning Uncertain Futures</u>. Cambridge: Lincoln Institute of Land Policy.
- Hines, Andrew and Peter Bishop (2015). *Thinking about the Future: Guidelines for Strategic Foresight*. Hinesight Edition.
- Hurtado, Petra (2021). Planning with Foresight. American Planning Association, PAS Quicknotes 94.
- Hurtado, Petra, Benjamin G. Hitchings, and David C. Rouse (2021). <u>Smart Cities: Integrating Technology, Community,</u> <u>and Nature</u>. American Planning Association, PAS Report 599.
- Kaplowitz, Grace, Nico Larco, Amanda Howell, and Tiffany Swift (2020). <u>Covid-19 Impacts on Cities and Suburbs:</u> Impacts to the Urbanism Next Framework. Urbanism Next Center, University of Oregon.
- Moffitt, Sean and Louise Mowbray (2023). <u>Uncertainty: Making Sense of the World for Better, Bolder Outcomes</u>. Toronto: Cygnus Publishing.
- Rouse, David and Rocky Piro (2022). <u>The Comprehensive Plan: Sustainable, Resilient, and Equitable Communities for</u> <u>the 21st Century</u>. New York, N.Y.: Routledge.
- Stapleton, Jeremy (2020). <u>How to Use Exploratory Scenario Planning (XSP): Navigating an Uncertain Future</u>. Policy Focus Report, Lincoln Institute of Land Policy.

University of Houston Foresight Program (2020). NC Communities 2040, prepared for Civic FCU.

Webb, Amy (2019). "How to Do Strategic Planning Like a Futurist." Harvard Business Review 7 (July 30).

Wheeler, Tom (2019). From Gutenberg to Google: The History of Our Future. Washington, D.C.: Brookings Institution.


