Mapping Out the Sustainability and Resilience Process for Organizations and Communities

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"To the multiple valorizations of wild environments can be added mystery. Without mystery life shrinks. The completely known is a numbing void to all active minds. Even a laboratory rat seeks the adventure of the maze." Page 146, The Future of Life, Edward O. Wilson

Key Questions

The second chapter of the book is aimed at answering the following underlying assumptions and questions:

- Does an organization have a strategic plan, and what strategies are currently in place that may be viewed as sustainability- and resilience-related?
- What are the long-term goals, vision, values, and core mission of an organization pursuing sustainability and resilience?
- What sustainability and resilience programs does the organization have in place and how are they defined?
- What are the substantive sustainability and resilience efforts in the organization?
- Does the organization have a plan to reduce greenhouse gas emissions or to minimize the impact of climate change?
- Does the organization have a plan for recycling, energy efficiency, renewable energy, and waste minimization?
- What is the current budgetary and financial situation in an organization?
- What are the available internal resources, the capacity of the organization?
- How does an organization address its long-term planning; strategies for economic growth, social justice, and equity; environmental protection; good governance; and resilience?

Introduction

Building on the first chapter, the second chapter outlines and defines processes in determining the appropriate steps and resources in sustainability and resilience planning for organizations. The second chapter is intended to provide answers to the queries related to an existing strategic plan, long-term goals, vision, values, and core mission of an organization pursuing sustainability and resilience planning. It enables the readers to understand the external and internal dynamics of organizational commitment to sustainability and resilience, threats, and opportunities and to evaluate them in the context of budgetary and financial circumstances surrounding the organization. This chapter maps out the sustainability and resilience planning process for organizations and communities, determining the appropriate steps to be taken at each level of sustainability and resilience planning. The sustainability planning process includes the environmental scan, mapping out the current conditions and available internal resources, the capacity of the organization, and an analysis of opportunities that may exist in the community, region, state, and the nation. The purpose of the second chapter is to provide organizations with tools to recognize resources available within the organization, coupled with challenges and opportunities. It also

enables the leadership to understand and comprehend sustainability efforts already underway within organizations.

Leadership within an organization starts with vision and mission statements, review of current conditions and existing sustainability efforts, long-term goals, and the budgetary/financial condition of the organization. Many organizations, including local governments, have sustainability efforts in existence through recycling, composting, energy efficiency, waste management, bike lanes and biking programs, watershed protection, renewable energy, and other sustainability-related activities. However, often, organizations are not aware of the implications of sustainability and resilience activities or do not measure corresponding outcomes. A proposed approach to sustainability planning would be to use the Quadruple Bottom Line approach. Additionally, in light of climate change threats, many local governments develop climate action plans, enhanced emergency preparedness strategies to account for climate change threats, resilience plans, and climate mitigation and adaptation strategies. A thorough review of the existing plans is warranted, including the master plan, traffic safety plans, emergency preparedness plans, hazard mitigation plans, and other relevant programs, policies, and procedures, including the cities' budget and fiscal policies.

Sustainability Plan Staging and Quadruple Bottom Line (QBL)

Aligning the sustainability planning with the fiscal year, budget process and defining the benchmarks and baseline year is critical. Moreover, aligning benchmark data and targets with the existing plans and policies is essential to the longevity of sustainability and resilience in organizations. The plan needs to identify evolving sustainability priorities; guiding principles; key objectives and strategies in an era of organizational, community-wide, and climate-related initiatives; and transformation efforts. The goals and targets need to be outlined in the sustainability plan to equip local government officials to respond to future obstacles and opportunities in a

viable and coordinated manner. The sustainability plan acts as an adjunct to various city's plans and ideally expands the Triple Bottom Line framework into a Quadruple Bottom Line (QBL) structure. Quadruple Bottom Line (QBL) serves as the overarching themes of this plan: economic, social, environmental, and governance. The specific goals of a plan may be housed under one of the four themes, and specific targets are categorized under ten separate goals: economic opportunity, great neighborhoods, social equity, safe community, resilient systems, balanced transportation, sustainable assets, fiscally resilient, transparent and accessible, and good government.

For cities that already have an existing plan in place, the new sustainability plan expands on the previous ones. Most of the plans rely on the Triple Bottom Line (TBL) framework. However, a Quadruple Bottom Line (QBL) structure allows for governance and related efforts to be appropriately addressed in the sustainability plan. Also, drawing from the city's existing plans and aligning them with its goals, outcomes, and themes allow for consistency, continuity, and integrity of operations. The Quadruple Bottom Line provides the overarching pillars of this plan: economic, social, environmental, and governance. The potential themes of a citywide sustainability plan may be housed under one of the four QBL pillars. Each specific target is categorized under separate goals and outcomes, directly connected to the city's budgetary and fiscal plans:

1. Economic growth and opportunities
2. Resilient environment
3. Resilient and safe neighborhoods
4. Resilient assets: infrastructure, buildings, utilities, and balanced transportation
5. Good governance: accountability, transparency, accessibility, community input, and fiscal resilience

Accountability, transparency, and accessibility are vital to ensuring communities and city governments are more sustainable and resilient. Organizations, citizens, institutions, and businesses and decisions, actions, and activities they undertake have an impact on the overall resilience and sustainability of a community. It is the

responsibility of appointed officials and employees to contribute to the implementation of sustainability targets. Furthermore, staff assigned to be the target champions are responsible for leading and achieving specific sustainability targets outlined in this plan. This approach enables individual accountability and ownership for each goal and its effectiveness.

Organizations use a sustainability and resilience plan to further good governance and improve the operational efficiency. The plans can be utilized to address affordable housing opportunities, diversity, and inclusiveness, decrease energy consumption, intensify renewable energy production, minimize waste, support community outreach efforts, standardize the system processes, and partner with organizations, companies, and citizens to further spur growth while preserving natural resources. Local government employees track the progress of each target and create a public record outlining both the plans and actions that address the Quadruple Bottom Line (QBL). The sustainability and resilience progress reports are released to the public annually or biannually. Cities alone, however, cannot implement all of the strategies outlined in the plans and strive for a partnership with other organizations within community, region, or at state and national stage.

Strategic vs. Sustainability Planning in Cities

Certain local governments continue to utilize both the strategic plan and sustainability plan. An ideal situation would be to use the sustainability plan, with a set of specific, well-defined Quadruple Bottom Line targets. Figure 2.1 describes the process and the benefits of choosing the sustainability plan within an organization. Setting a defined, target-driven plan in place with a set of measurable outcomes enables local government administrators to deal better with ongoing demands for services, achieve long-term goals, and define a long-term vision for the future. Beyond simple strategic components, a well-defined sustainability and resilience plan-

ning effort enable consistency in service delivery, continuity of operations, and execution of long-term goals and objectives.

For instance, Michigan Meridian Township, which has a history of environmental stewardship, developed a climate sustainability plan, combining climate resilience and sustainability planning into one. By taking such approach, local government can constructively coalesce its planning efforts into a single visioning and guiding document, ensuring consistency in planning and reporting. As noted in the climate sustainability plan, the intended implementation goal of the plan is for Meridian Township to "contribute to the worldwide efforts to curb greenhouse gas emissions" and make the "community a more sustainable, resilient, affordable, and vibrant place to live" and to make "government operations more energy and resource efficient and better prepared to deal with the impacts of climate change" (Meridian Township 2017, pp. 2 & 16). In addition to listing the efforts of the township in addressing sustainability challenges to date, the authors of the report noted the township's commitment to Paris Climate Accord.

In response to frequent threats exacerbated by climate change and extreme weather, in addition to sustainability plans, cities formulate a climate action plan too. Boswell et al. (2012) claimed the climate action plans to be "strategic plans that establish policies and programs for reducing (or mitigating) a community's greenhouse gas (GHG) emissions and adapting to the impacts of climate change," seeing them as "visionary, setting broad outlines for future policy development and coordination, or they may be focused on implementation with detailed policy and program information" (p. 67). While they are undoubtedly essential documents, the scope and approach to resilience planning would include both the sustainability and climate action plan, with a broader view on the community's sustainability, climate adaptation, mitigation, and preparedness strategies. Climate action strategies and plans may be integrated into an existing sustainability or a resilience plan.

Sustainability as policy and programmatic framework is employed by organizations in both the private and the public sector. While there are
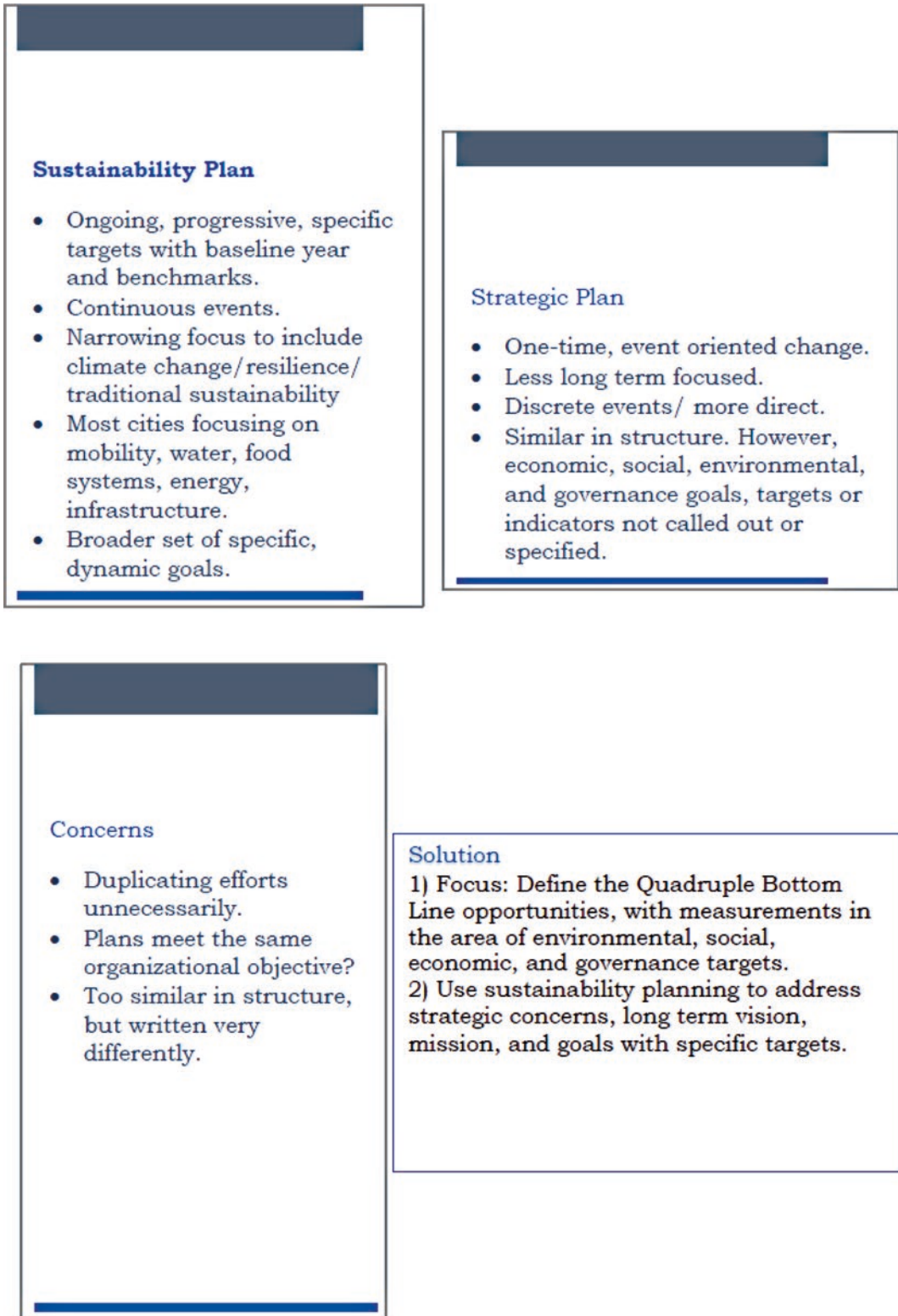
Sustainability Plan

- Ongoing, progressive, specific targets with baseline year and benchmarks.
- Continuous events.
- Narrowing focus to include climate change/resilience/ traditional sustainability
- Most cities focusing on mobility, water, food systems, energy, infrastructure.
- Broader set of specific, dynamic goals.

Strategic Plan

- One-time, event oriented change.
- Less long term focused.
- Discrete events/ more direct.
- Similar in structure. However, economic, social, environmental, and governance goals, targets or indicators not called out or specified.

Concerns

- Duplicating efforts unnecessarily.
- Plans meet the same organizational objective?
- Too similar in structure, but written very differently.

Solution
1) Focus: Define the Quadruple Bottom Line opportunities, with measurements in the area of environmental, social, economic, and governance targets.
2) Use sustainability planning to address strategic concerns, long term vision, mission, and goals with specific targets.

Fig. 2.1 Sustainability vs. strategic plan

conflicting opinions on the definition of sustainability, its impact on organizations, and the practicality and applicability of sustainability, the clarity of sustainability and resilience planning is embraced by many local governments. More importantly, existing sustainability and resilience planning enables the city administrators to apply the practical elements of Quadruple Bottom Line to its operations and service delivery. Sustainability and resilience planning is considered to be an innovative, original, and novel approach employed by organizations. Focusing on the organizational effectiveness and efficiency through the successful application of sustainability and resilience planning provides a better understanding of the practical implications of sustainability.

Cumo et al. (2012) implied in their research that "urban areas are in fact the places where the on-going transformation of environment, society, economy, and their complex impacts become concrete, need to be managed and must be taken into consideration for the present and the future generations" (p.29). When evaluating urban areas and their negative environmental impact, the issue of the exact definition of what constitutes the urban area comes into play. Kennedy and Sgouridis (2011) argued the difficulty of delineating the exact urban boundaries when determining the greenhouse gas emissions impact and how "this interconnectedness complicates the task of determining which emissions should be included in a city's" overall account of greenhouse gas emissions (p. 5261).

There are multiple steps involved in mapping out sustainability and resilience planning in organizations and then its auxiliary impact on a community. The first step to sustainability planning is defining a mission and vision statement, aligning them with the long-term organizational goals, determining the type of activities to be measured and what level, defining stakeholders, and prioritizing areas of responsibilities. The city's sustainability and resilience plan, while it relates to the city as an organization with its operations and resources, also focuses on the broader implication of sustainability in the region and impact on the community. A sustainability plan serves as a

guidance for organizational strategic initiatives. The sustainability plan serves as a long-term strategy. However, a more comprehensive plan relying on climate science and the study of extreme weather,creates a basis for the resilience plan.

Mapping Out Current Conditions and Resources

The external pressures on the built environment are best described using the Quadruple Bottom Line approach. The demographic changes and trends, the income level of the city population, and socioeconomic movements fall under the social and economic categories. Environmental factors include the quality of water, air, available natural resources, industrial pollution, and other determinants impacting the quality of the environment. Leadership plays an important role, including encouraging community engagement, accountability, transparency, fiscal responsibility, answerability, ethics, and integrity of the public service. Droege (2006) argued the importance of urban areas and cities in addressing the increase in fossil fuel-related emissions. Seeking sustainability-driven policies and practices in cities as they "are the most advanced but also the [riskiest] and fragile constructs ever devised by humankind" and therefore must be more proactive in addressing the risks of greenhouse gas emissions (Droege 2006, p. 142).

Moreover, Lindfield posited that (2010) "globalization and restructuring of national economies have resulted in the outsourcing of production and services" (p.108). In essence, this shift in economic growth created new challenges for cities, as urban centers became centers of economic activities and related adverse environmental impact on cities. On the other end of the spectrum, localities in the United States and Canada tackled the loss of manufacturing jobs amid a shift to new industries and outsourcing of production, without adequate infrastructure investments, and lack of support for education, to name a few. Sustainability and resilience plans are used as planning and strategy tools and poli-

cies adopted on local, national, and international levels for cities to successfully combat increasing threats and address risks of unsustainable planning policies and practices.

Cities are significant contributors to the overall greenhouse gas emissions (GHG). Measures to counteract the effects of GHG and global warming include energy conservation; waste minimization supported by reusing, repurposing, and recycling of materials; public transit; bicycling; pedestrian-friendly neighborhoods; quality of life; and a cleaner and greener community. Cities are continually seeking strategies to promote the integrity of the natural environment, including energy use decrease, climate protection, improved environmental quality and natural systems, sustainable land use, urban form, and transportation. By positioning sustainability and resilience planning through the Quadruple Bottom Line, local governments adequately and appropriately address ongoing threats. Furthermore, cities embrace opportunities, expressed in emergent practices, such as renewable energy production, electric vehicles, charging stations, tree planting, increasing the

availability of affordable housing options, and addressing social equity and other issues (Fig. 2.2).

Sustainability and resilience planning enables organizations to use a multifaceted, cross-sectoral approach for the betterment and operational efficiency of organizations. The primary drivers for successful sustainability programs are the needs and desires of communities and organizations to change and to adapt to the changes in the environmental, societal, and economic conditions surrounding them. Thorough sustainability and resilience planning enables organizations to create a transformational culture, allowing staff to embrace the mission and values of everyone for an organization. Moreover, sustainability and resilience enable administrators to integrate all elements of the system and holistically consider them.

Sustainability and resilience planning requires a detailed overview and analysis of the current conditions in the organizations, including a thorough review of risks and opportunities in the environment. Developing an accurate sustainability plan goals and objectives should at a minimum
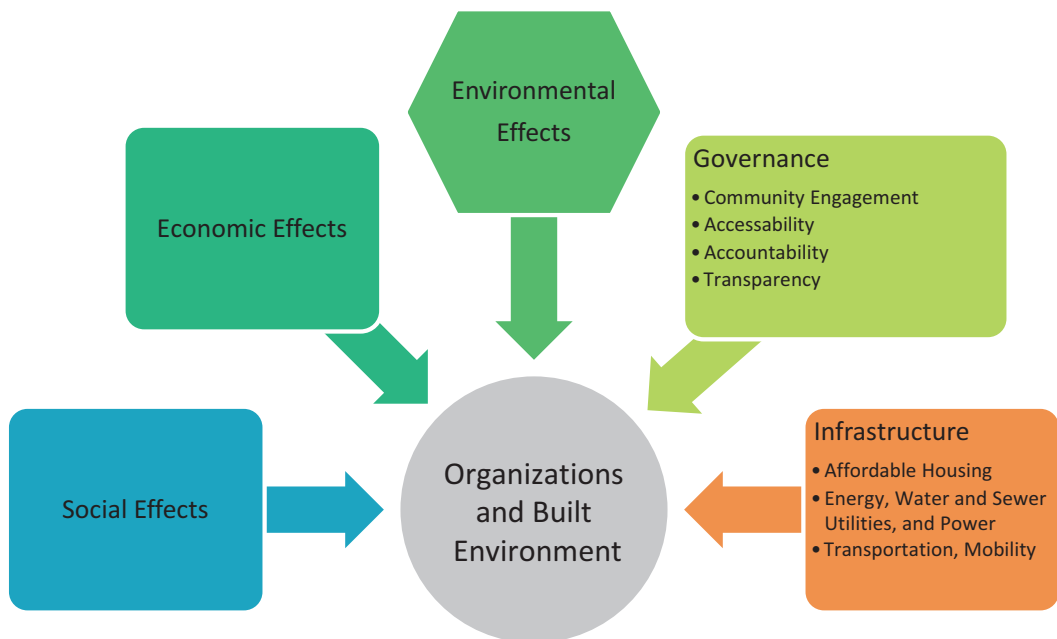

Fig. 2.2 The QBL and external pressures on organizations within built environment

include a vision statement and long-term and short-term goals and identify potential targets that the city could adopt. For example, various sustainability planning strategies involve conducting assessments, creating indicators, writing a plan, implementing initiatives, and reporting outcomes. However, more in-depth strategies and steps involved in the preliminary design of the sustainability plan should at a minimum include the following steps in the process:

1. The first step is a detailed analysis of the vision, mission, and goals, with broad objectives from long- and short-term planning perspective. Other documents such as master plan, traffic safety plans, parks and recreation plan, emergency preparedness plans, hazard mitigation plans, strategic plans, climate plans, and other reports need to be reviewed for alignment. A scan and analysis of the city's relevant documents, the past and current sustainability-related practices and policies, are a must for effective sustainability planning to frame preliminary recommendations for a sustainability plan. Select interviews with the elected officials and appointed officials need to be included in this process.

2. The second step includes a review of the budget, fiscal conditions, economic growth trends, and social demographics, including population trends, development patterns, and commercial and residential housing demands. The step needs to include a thorough understanding of the current budget. A city may have a 100% renewable energy target. However, cities need to take into consideration any associated costs with a switch to cleaner energy sources, including vehicles, equipment, or powering buildings and operations.

3. A thorough review of the existing energy use by the entire organization, including energy consumption and, in the case where cities own a power utility, energy production. Developing a detailed review of greenhouse gas emissions, and defining the outline for the emission target reductions as a result of the energy use and energy production. The purpose of the GHG inventories is to provide a baseline against a particular benchmark or base year so that activities may more accurately measure progress toward the reduction of its emissions. GHG emissions are represented in metric tons of carbon dioxide equivalent (CO2e) produced by energy consumption and other activities of the organization and the community.

The GHG inventory is customarily divided into three subcategories, such as direct city's operations, employees' caused emissions, and community-wide emissions. Each category is broken down into direct and indirect emission, with baseline year and the year from which data was collected. With a myriad of sources of data for energy use, demographics, and types of emissions, it can be time-consuming and confusing for cities to conduct the carbon footprint inventory. A more in-depth explanation for GHG emission or carbon footprint inventory is provided in the Tools and Resources Book Chap. 7.

4. Existing human resources; staff and supporting staff; community-wide resources, such as nonprofit, health, and human services; and community facilities.
5. A review of existing infrastructure, infrastructure needs and plans, capital projects, including transportation, mobility, roads, sewer and water utilities and facilities, power, and green infrastructure.
6. A review of environmental programs, water and air quality, ozone day programs, waste management, recycling efforts, river and waterways clean up, and other practices, programs that encourage environmental practices.
7. Finally, in the preparatory stage of the sustainability plan development, a scan and an analysis of the governance are in order. Additionally, a review of the local governments' public engagement, website information, announcement, communication strategies, neighborhood participation programs, partnership opportunities, and ongoing community networks.

Sustainability and resilience planning launches a method to identify the current state of

the organization, where it is going, and how it will get there. This scanning stage encourages the consistent decision-making, communication, and performance assessments and can create a sense of cohesiveness with the organization. In embracing these elements, organizations create a building block to ultimately enhance the outputs of the organization.

Sustainability "Plan-Do-Check-Act" Cycle

Sustainability planning management is a never-ending process that combines strategic planning and leadership with other management processes. As noted in Alibašić (2017), sustainability "may be defined as a set of effective and efficient actions taken by an organization, through good governance, to ensure the economic stability, growth, and financial success, with the most positive societal outcome and the least negative environmental impact" (p. 37). As such, in sustainability and resilience planning, organizations must take into consideration all four components and integrate them effectively into their long-term goals and objectives. The measurement of sustainability and resilience through regular reporting mechanisms allows organizations to track progress and enables them to use measures as a tool for refinements and loop. Similar to Lean, Plan-Do-Check-Act cycle, for planning, implementing, feedback, and reapplying and refining processes, sustainability and resilience planning has a never-ending loop function, intended for continuous improvement.

It is imperative for an organizational leadership team to use sustainability planning in response to the rapid changes occurring in the surrounding environment. Sustainability planning must be viewed as dynamic, ever-changing, all-hands-on-deck approach to every level of organizational governance, employed and deployed with maximum resilience in mind. In this light, the process of sustainability planning may be viewed as a force allowing organizations to substantially address the critical planning and avoid a crisis as a situation requires and on any

scale. Sustainability planning is a forward-thinking system of techniques, which involves evaluating and analyzing developing practices, opportunities, or perils to the organization and developing a comprehensive response, taking advantage of the existent internal and external resources. Organizations can respond to threats in a purposeful mode, with resilience and elasticity as ultimate goals.

Sustainability and resilience planning allows the executives and staff work together and to better enhance the fulfillment of the mission, goals, vision, and meeting of mandates, with continuous improvements, and the sustained performance. This package of structural definition allows an organization to function effectively. Similar to strategic planning, sustainability planning can start with the three what questions: what is the strategic position of the organization now, what does the organization strive to accomplish and achieve, and what resources does the organization have at its disposal to meet the goals and objectives. Answering specific sustainability "what" questions will conclusively lead to a change and path forward in mission, vision, and goals. While historical crises, such as financial recessions and resource shortages, recur with vigor, new challenges and opportunities, including but not limited to artificial intelligence, social media, and cyber warfare, have emerged to present nascent leaders with a more significant deal to contend with challenges of the contemporary, fast-paced, and technology-reliant world.

As local governments face continual scrutiny, sustainability initiatives provide administrators with new instrumentation to guide their organizations to a more predictable future with clear goals and understanding of purpose. The Quadruple Bottom Line assists organizations in establishing a path forward and a sense of direction for the organization. An essential aspect of sustainability and resilience planning as it relates to public sector organizations is the nurturing of the transformational and innovation culture within an organization, which links planning and implementation and continually challenges the notion of status quo. The Plan-Do-Check-Act (P-C-D-A) cycle applies specifically to public service

organizations, to foster an atmosphere and organizational culture where all members are focused on carrying out the mission and values of the organization with an understanding of the direction the organization is headed. The example of Plan-Do-Check-Act cycle from the city of Grand Rapids illustrates the significance of direct loop and feedback between the initial sustainability plan and the implementation, with the return on investment from sustainability initiatives connecting to the city's budget annually.

The P-D-C-A cycle enables the connection of and the assessment of existing plans, allowing organizations to measure progress using a sustainability or resilience plan. In this case, sustainability plan is not only used as a conduit but also as a report on the overall outcomes and investments made by the organization. The P-D-C-A cycle and Lean principles are efficiently fused with core operations, ultimately resulting in savings and process improvements (Fig. 2.3).

Resilient City Spotlight: Resilience of Local Communities, New Orleans

In 2015, the city of New Orleans released its first resilience strategy, which outlines steps for making and building a more resilient New Orleans. The process of resilience planning took years. Among many of the steps undertaken by the city of New Orleans was a development of the city of New Orleans Carbon Footprint Report. The report built on the previous carbon footprint reports, including 2001 report, with the baseline year of 1998. Very importantly, the city recognized the need to reset the carbon footprint data after the devastating effects of Hurricanes Katrina and Rita in 2005. As noted in the 2009 report, climate change and projected sea level rise continued to pose significant threats to the city unless current rates of greenhouse gas emissions are drastically curbed and reduced efficiently.
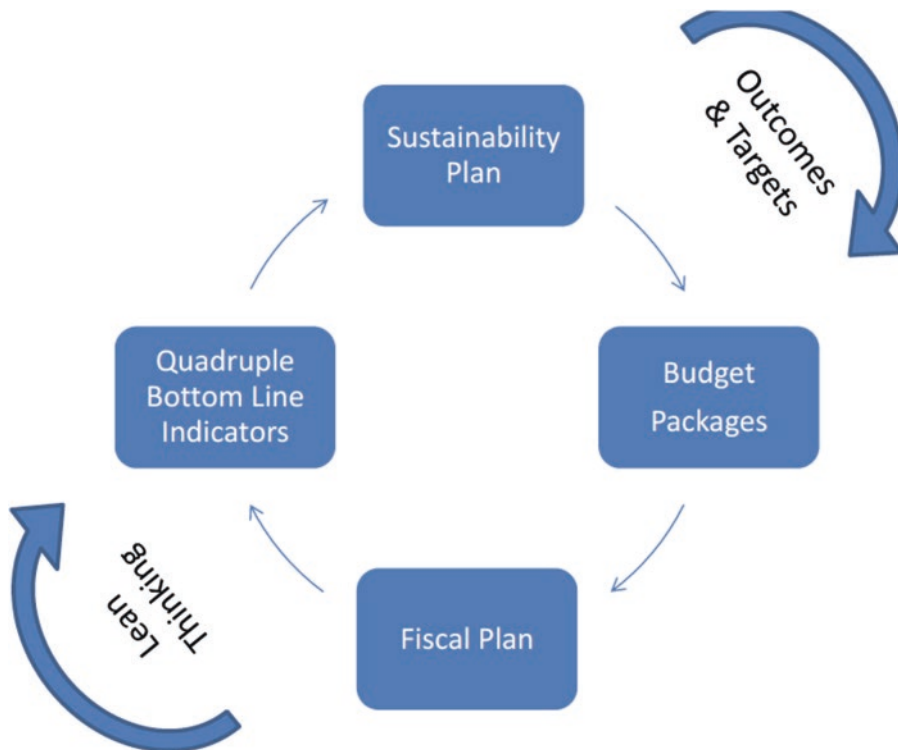

Fig. 2.3 Plan-Do Check-Act (PDCA). (Adapted from the City of Grand Rapids Sustainability Plan)

New Orleans' leaders recognized the disproportionate impact, vulnerabilities of the community, and the effects that global climate change has on the city. The report pointed out the impacts and threats of increased frequency and intensity of hurricanes, including the ultimate negative consequences to the city and the region, such as "higher prices and shortages of basic goods, such as food and energy; increased public expenditures on relief and rebuilding due to extreme weather events; a higher susceptibility to flooding; and a higher rate of infectious diseases and heat-related illnesses and deaths" (City of New Orleans 2009, p.4). Cities with unique threats must learn to adapt and mitigate the impact of their operations on the environment and the society. Consequences of not doing anything to reduce the carbon footprint are dire. In New Orleans alone, if "no actions were taken to reduce GHG emissions from the date the data were collected, the City of New Orleans would produce 6,451,399 tons CO2e in the year 2030, a 36.5% increase from 2007" (City of New Orleans 2009). Some of the adaptation and mitigation activities included in the New Orleans master plan are the rehabilitation and enlargement of the city's urban forest with a specific benchmark for a percentage of the citywide tree canopy by a certain year. Given the extent of the damage to the trees from hurricanes, this target addressed the adaptation and mitigation strategies. Besides, the city encourages and promotes tree planting, preservation on both the publically and privately owned properties.

Given the vulnerabilities to storms and loss of land area, New Orleans is particularly interested in establishing sustainable stormwater management practices and protecting environmentally sensitive areas, such as wetlands, from adverse impacts to enhance the city's water-storage capacity during storms and increase protection against storm surges. In more recent years, and with the development of city's resilient strategy, there is further recognition of the unending impact of climate change and persistent threats that exist in the coastal cities. In the Resilient New Orleans

report, in addition to the resilient strategies for regional transportation, promoting sustainability as a growth strategy, reducing redundancy and improving reliability of the power supply, integrating resilience into decision-making process, and investing in pre-disaster planning and post-disaster recovery, the city focuses on developing strategies and planning for resilience at neighborhood and business district level (City of New Orleans 2017). In looking at all the relevant aspects of resilience, the city also emphasized the issue of equity as an essential component to resilience:

> "Even as we look to the future, we cannot ignore past injustices. Racial inequity is present in every facet of our society- employment and income, education and health, violence and justice, housing and social mobility. To advance as a city, we must confront this reality collectively and seek meaningful ways to address its effects in our institutions, our communities, and our families. With a strategy that prioritizes racial equity, we will be stronger as a society and more capable of responding to adversity" (City of New Orleans 2017, p. 11).

Elkington (1997) defined sustainability regarding the "triple bottom line focusing on economic prosperity, environmental quality and the element which business has tended to overlook – social justice" (p.2). Social justice is often overlooked in local government sustainability planning. Defining it through the prism of a strategic resilience planning strengthens the organizational vision, mission, and goals.

Key to the success of an organization's attempt to sustainability and resilience planning is its ability to express its vision and goals for such preparation transparently. Integrating steps to increase resilience into city's sustainability and other plans is imperative to the success of implementation of such plans. Organizations also need to provide a consistent and transparent reporting mechanism to the public and share results while also creating opportunities for participation and involvement. The years ahead will be able to show how well the city of New Orleans performed in building the resilience of the community.

Vision for Local Sustainability and Resilience Planning

As cities complete their preliminary review and scan of the sustainability and resilience inventory, efforts in place, opportunities, and threats, they need to proceed with defining a vision for sustainability and resilience. According to Coyle (2011), critical elements of sustainability include the built environment, energy, water supply, wastewater, stormwater, natural environment, transportation, food production, farming and agriculture, solid waste, economics, public engagement, and education (p.29). Moreover, Coyle (2011) astutely pointed out the value and relevance of the public and stakeholders engagement in the process. Resilience planning is more comprehensive and expansive, and it ensures that organizations and communities continue to operate, function, and thrive after experiencing a disaster. Cities need to define a vision for sustainability and resilience planning while accounting for all the elements of the Quadruple Bottom Line. Some of the elements considered in the sustainability and resilience visioning process within built environment include the following:

1. Protection of natural resources and the environment
   - Adopt aggressive water conservation and waterways protection measures.
   - Reduce direct discharges to rivers, tributaries, and oceans.
   - Promote pollution prevention and reduce toxic chemicals entering waterways, including pharmaceuticals.
2. Carbon reduction and clean energy economy
   - Reduce dependence on carbon-based sources of energy.
   - Promote renewable energy generation, from wind and solar and geothermal for heating and cooling.
   - Improve efficiency of transmission and hardening of the power grid.
   - Reduce energy consumption and waste.
   - Minimize waste and increase composting, waste reduction, repurposing, and recycling.
   - Promote efficient and low-carbon transportation alternatives and invest in public transit.
   - Support green job creation, research, and innovation, small- and medium-sized business.
   - Promote eco-friendly tourism and local economy.
3. Resilient built environment
   - Adopt low-impact, high-density urban planning with walkable communities.
   - Require energy efficient, green building planning and design.
   - Plan for green infrastructure to reduce stormwater including green roofs, permeable roads, and other measures to reduce water runoff.
   - Design and invest in efficient public transit.
   - Invest in green infrastructure.
   - Provide quality public safety, supporting first responders and public health agencies.
   - Create opportunities for affordable housing and investment in local business and neighborhood districts. (Fig. 2.4).
4. Good governance, accountability, answerability
   - Ensure fiscal responsibility, accountability, and responsiveness.
   - Engage public and educate about all the aspects of sustainability and resilience and seek continuous feedback.
   - Relate and report to the public all the progress and failures.
   - Engage staff and community organizations, neighborhood and business districts, nonprofits, universities, and health institutions.

Practical Approach: From Sustainability Planning to Climate Resilience

Cities are already experiencing climate change impacts in multiple ways that may include:
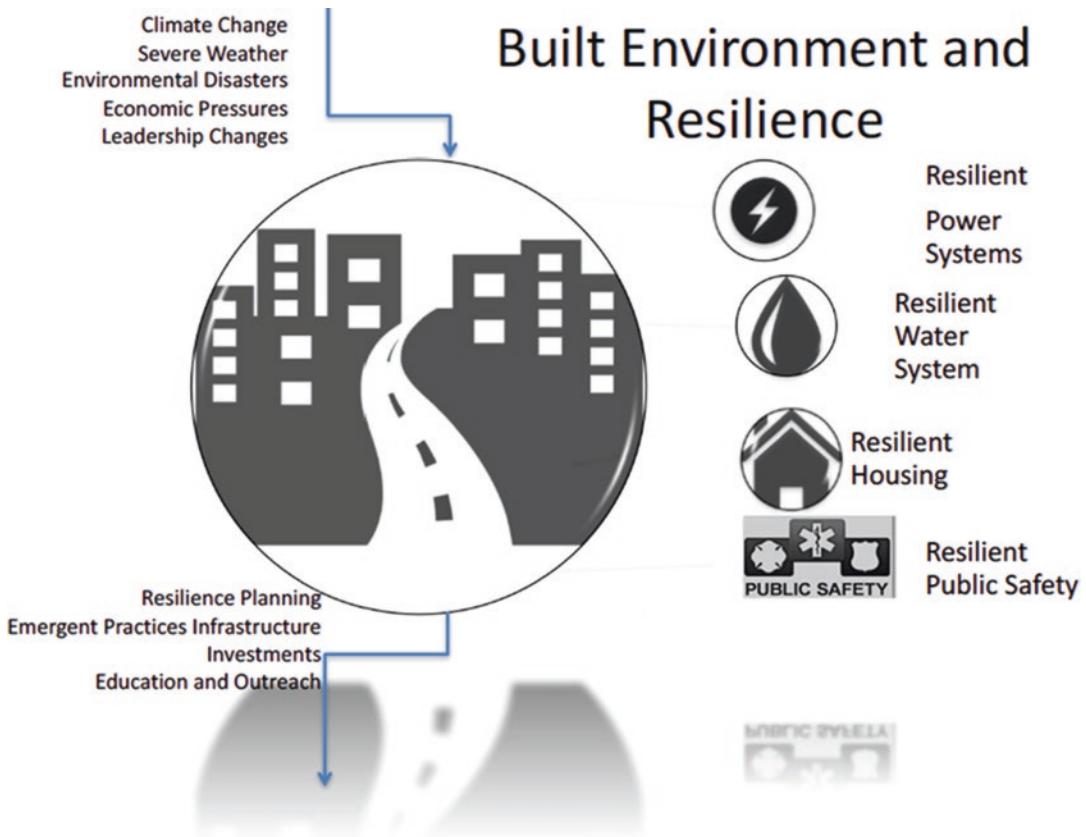
Fig. 2.4 Resilience and built environment

- Extreme heat waves putting the elderly, young, and socially disadvantaged at risk
- More frequent severe rain events, storms, and snowstorms that stress water, road, sewer, power, and other infrastructure
- Water shortages during frequent and intense droughts
- Increased smog, fire risk, and air pollution that exacerbate respiratory illnesses and other medical conditions
- Pests and disease risks

Using a system-wide approach to evaluate the climate change effects on the local community, West Michigan Environmental Action Council (WMEAC) in partnership with the city of Grand Rapids, developed the climate resiliency report with the localized climate change impact assessment. After over a thirteen months period of collaboration, interviews, and research, the report was first presented to the city commission and then made available to the public. The report was financed with a portion of the grant sponsored by Walmart for the city of Grand Rapids' 2012 US Conference of Mayors' Climate Protection Award, recognizing the city for sustainability planning and local climate protection efforts to reduce greenhouse gas emissions.

Notable aspects of the report included its focus on localization of climate change impact and a distinct list of suggestions for building resilience in the local community and strengthening disaster recovery and resilience of the local government. Notable goals of the resiliency report were to potentially initiate discussion and further enhance projects, policies, programs, and planning actions enabling Grand Rapids to mitigate the effects of climate change, to adapt to its impacts, and to utilize emerging sustainability opportunities (Alibašić 2013).

Local community partners in Grand Rapids also contributed to the report. Moreover, the report was built on a comprehensive set of 25 interviews of representatives from the public and public sectors from academic, first responders, regional planning, and utilities. Universities in Grand Rapids have partnered with the local government on sustainability and climate resilience planning for the community and the region. With the academic and research support from Grand Valley State University, the modeling software, Model for the Assessment of Greenhouse-gas Induced Climate Change with the Regional Scenario Generator (MAGICC/SCENGEN 5.2.3.) was utilized for analysis of Grand Rapids to the square area of 2.50 (175 miles) by 2.50 (175 miles).

System Approach and Localization of Climate Science

An essential element of combining resilience and sustainability planning is to take a systematic, holistic approach to organizational and community planning. As noted in the 2013 Grand Rapids climate resiliency report

> "Climate change impacts each sector in isolation, but it also impacts the interaction of each to others and the function of the system as a whole. Therefore, understanding the needs of the community, major relationships between sectors, and the ability of the sectors to provide those needs in a changing climate world is key to building resilience." (WMEAC 2013)

The report projected the climate change data of temperature and precipitation through the years 2022 and 2042, coinciding it with the city's 20-year master planning process. The annual and monthly baseline averages of temperatures and precipitation were compared to baseline data from 1961 to 1990. A sample of the analysis and findings from the report that describes climate change impact in Grand Rapids area:

- Average temperature and precipitation will increase by 1.1oC and 2.6%, respectively, by 2022, and further increase by 2.2oC and 8.5%, respectively, by 2042.
- Seasonally, the most substantial increases in temperature are projected to occur during the winter and the least in summer.
- The most significant percentage increase in precipitation is predicted to occur in the winter and spring months.
- Summer is the only season projected to become drier.
- The Great Lakes region can expect more variable and unstable weather. This volatile course could lead to more extreme weather events such as storms producing greater than 1 inch of rain in 24 h, increased recurrence of back-to-back days above 90° and 90% humidity, and more freeze-thaw cycles in winter and spring (WMEAC 2013).

Report Conclusions and Recommendations

The report includes conclusions and recommendations in the areas of process improvements as described in a sample of recommendations below.

- Under processes, organizations should use an economic, Triple Bottom Line cost-benefit approach in financing and implementation of notable projects. The city took a step further and adopted the Quadruple Bottom Line in its approach to sustainability.
- Under crime prevention, the authors of the report suggested the use of crime prevention tools through the environmental design of parks and public spaces and opening lines of communication with community and neighborhood organizations.
- The report concluded the city should seek to move from a centralized energy system toward a more distributed energy system, energy efficiency, and renewable energy systems.
- Continue to encourage the construction of best-in-class green building projects.
- Research and implement climate-resilient street maintenance and construction practices,

particularly for materials and physical infrastructure.

- Adopt a big urban tree canopy goal – at least 40% – and implement a forestry program addressing heat island, air quality, and other resiliency values delivered by a diverse, healthy urban tree canopy.
- Implement a forestry program addressing heat island, air quality, and other resiliency values delivered by a diverse, healthy urban tree canopy (WMEAC, 2013).

Future Work

The report was used to directly support and link to various aspects and targets of the city's sustainability plan. It provided an opportunity for regional and state-wide discussions on the impact of climate change but also for specific discussions on policies and tools to implement climate resiliency in communities and regions.

As concluded in the report, Grand Rapids needed an individual or organizations to own and champion climate resiliency in the community. In a broader sense, the resiliency report itself may serve as a template for similar reports for other local and regional governments. As indicated by Boswell et al. (2012) "climate action plans are becoming the primary comprehensive policy mechanism for the reduction of greenhouse gas emissions and management of risks posed by climate change" (p. 49). The first step to a comprehensive resilience planning is a thorough and well-thought-out climate resiliency report.

Table 2.1 features recommendations from the Grand Rapids climate resiliency report, translated into actionable targets used in the sustainability plan. The process used to embed resilience targets into sustainability plan ensures the longevity of such strategic planning beyond current political leadership. Each target is then quantified and measurable.

Table 2.1 Climate resilience report recommendations

Climate resiliency report recommendations				
Water	Energy	Built systems/ infrastructure	Transportation	Emergency preparedness
Strengthen the water use efficiency Capture the first flush Use critical climate infrastructure	Increase energy efficiency Reduce GHG emissions	Improve access to food sources Increase the number of certified sustainable buildings	Change transportation culture to one built around multi-modal, and vital streets for all residents	Analyze the effectiveness of resources used during extreme events, continue providing efficient response
Corresponding sustainability plan targets				
Water	Energy	Built systems/ infrastructure	Built systems/ infrastructure	Emergency preparedness
Reduce customer water consumption Reduce stormwater discharge Increase square footage of green roofs, pervious pavement, and parks	Reduce city's consumption of gasoline, diesel, and natural gas Achieve at least 30% renewable energy use Reduce direct and indirect GHG emissions	Increase access for development of community gardens Improve access to farmer's markets Increase the number of sustainable redevelopment projects, and certified buildings	Increase on-street bike lanes to 70 miles Develop new sidewalks Decrease total vehicle miles traveled by city employees	All city employees involved in the National Incident Management System will maintain 100% of the training requirements to ensure preparedness Regionalize emergency preparedness planning

Summary

As risks and threats from climate change and global economy are factored into a decision-making process, communities start planning for resilience and sustainability. The ability to communicate and implement a long-term vision for the organization is instrumental for an effective sustainability and resilience strategy. Moreover, sustainability and resilience planning assists in the integration of all the elements of the Quadruple Bottom Line, including the often-overlooked components of governance. Local governments are confronted with many challenges, obstacles, and threats, including the effects of globalization, fiscal uncertainties, increased demands for services, and changing demographics. Contemporary organizations design their systems using effective sustainability and resilience planning to withstand external and internal pressures for maximum resiliency in dynamic environments, including climate change, and growing economic, environmental, governance, and societal pressures (Alibašić 2018a). Furthermore, the local governments deploy sustainability as organizational strategy (Alibašić 2018b).

The geopolitical, financial, international, and socio-demographic trends, the evolving nature of technology, and a fundamental shift in values generate challenges and opportunities for organizations. A transformative, sustainable, and resilient organization focuses on continuous improvement while encouraging and enabling the learning. As organizations evolve and transform, they continually reinvent themselves, invest in their continuing development, and evaluate assets while identifying core competencies. In using Plan-Do-Check-Act cycle in sustainability and resilience planning, organizations facilitate a learning environment and continual development with the goal of growing and changing and becoming more resilient in a dynamic environment. In identifying external pressures and moving forward, local governments need to evaluate the necessity of having both the strategic plan and sustainability plan. Adopting a sustainability and resilience plan and using it as a strategic plan and guidance document increases synergies in implementing initiatives and executing the vision, mission, and goals.

Further Discussions

- Discuss the steps involved in setting the stage for sustainability and resilience planning within an organization.
- Evaluate plans that cities have in place to address climate change and climate preparedness and readiness.
- Analyze the resources in place to implement sustainability and resilience planning.
- Assess the cities' programs of environmental protection, social justice and equity, economic opportunities, and governance.
- Define the dissimilarity between strategic planning and sustainability planning.
- Analyze the benefits, opportunities, risk, and limitations of the sustainability and resilience planning process.
- Further align sustainability and resilience planning within organizations using the concepts of Quadruple Bottom Line (QBL).

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