2. The Social Context for Community Resilience

2.1. Introduction

Achieving community resilience is a social process; hazard events can damage the built environment, making it difficult for the community to function. This framework provides communities with a methodology to plan for resilience by prioritizing buildings and infrastructure systems based on their importance in supporting the social and economic functions in the community. In other words, ***the social and economic functions of a community drive the requirements of the built environment.***

For the purpose of this framework, a community is defined as "people who live, work, learn, and/or play together under the jurisdiction of a governance structure, such as a town, city or county." However, it is acknowledged that "community" can also refer to groupings of people based on a number of other factors, including geography, demographics, values, common interests or goals, and economics. For example, the five frameworks within the National Preparedness Goal[1] define community as "groups that share goals, values, and institutions. They are not always bound by geographic boundaries or political subdivisions. Instead, they may be faith-based organizations, neighborhood partnerships, advocacy groups, academia, social and community groups, and associations." However, there is value in defining community by the presence of a local governance structure. It is within this structure that community leaders (both public and private) can come together to make decisions and take steps that improve the resilience of their community.

This chapter can guide community thinking on the social and economic drivers for community resilience of the built environment. This chapter describes the social dimensions of communities, highlighting the needs of community members and the ways in which communities can organize to meet these needs (i.e., via social institutions, or the pattern of beliefs and behaviors that meet basic individual and household needs), while acknowledging that any type of organizational system can foster inequalities among people within a community. This chapter discusses a process of prioritizing social institutions, and in turn, the built environment, when planning for resilience, by identifying the ways social institutions rely on each other and the built environment to function. In an attempt to help communities plan for resilience, this chapter also provides examples of communities that experienced extreme disasters and implemented their own prioritization processes for restoration, reconstruction, and recovery. The chapter concludes with a discussion of the importance of community engagement during the resilience planning process.

2.2. Social Dimensions of a Community

The term, community, as defined in this framework, is situated between neighborhoods (which are made up of individuals and families) and states, regions and/or provinces, and the nation. Figure 2-1 shows this organization. Although communities often interact with state, regional, and national entities, this chapter focuses on individuals and families who live within neighborhoods and interact with their local systems, services, and the entities that exist in their communities to meet their needs.

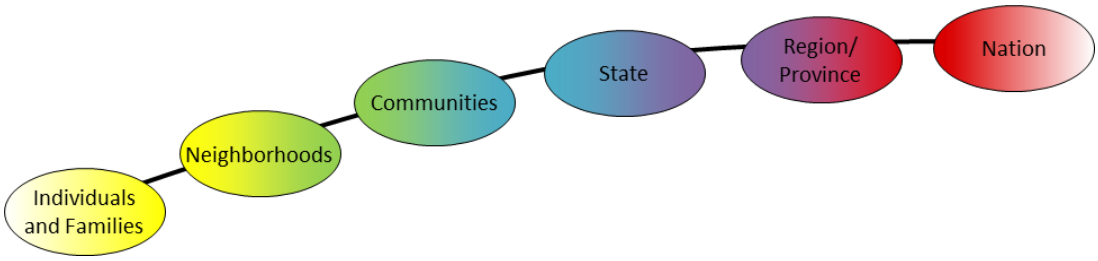

Figure 2-1: Levels of a Community (Adapted from John Plodinec, CARRI, redrawn here)

[1] https://www.fema.gov/national-preparedness-goal

2.2.1. Understanding Needs of Community Members

Individuals and households in any community have a set of needs they strive to meet on a daily basis. Figure 2-2 presents these individual/household needs in a hierarchical manner, showing the most fundamental needs at the bottom (survival).[2] Although there are more detailed conceptual models that discuss human needs (e.g., see Max-Neef 1991) this approach – adapted from Maslow's Hierarchy of Needs (1943) – captures the most essential dimensions with which this chapter is concerned.

The first and most fundamental need is that of survival. Survival includes necessary physical requirements, such as air, water, food, shelter, and clothing. If these needs are not met, the human body cannot sustain life – people cannot live longer than 5 days without water and 6 weeks without food (assuming inadequate water supply).[3] Survival also includes protection of life from the aforementioned disasters.

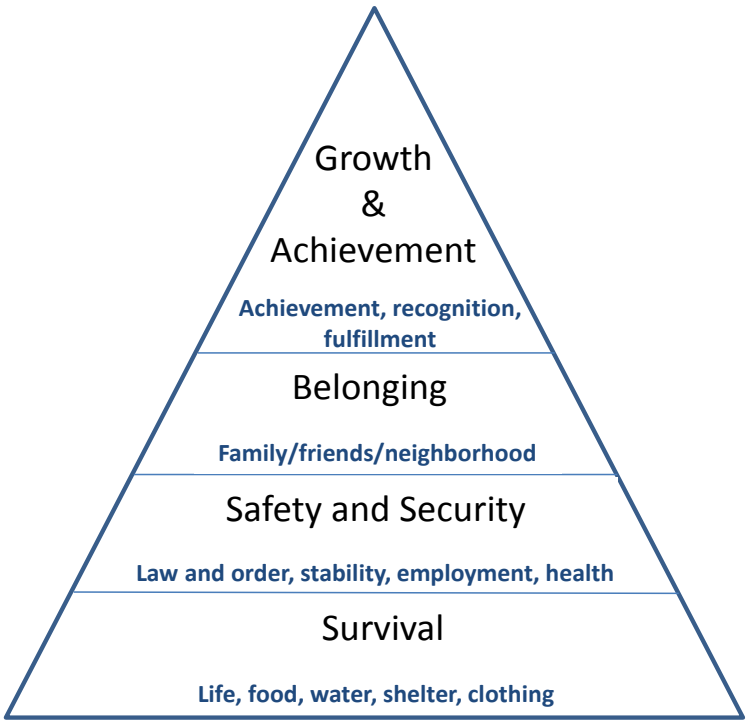

Figure 2-2: The hierarchy of human needs (Adapted from Maslow's Hierarchy of Needs – a psychological perspective)

The second need, safety and security, includes all aspects of personal, financial (economic) security, and health and well-being. People require safety and security in their personal lives from situations of violence, physical/verbal abuse, war, etc. They also must know their families and friendship networks are secure. Individuals need financial safety (e.g., job security, a consistent income, savings accounts, insurance policies, and other types of financial safety nets). Studies of disasters during the recovery phase[4,5] show that people are likely to relocate to another community in search of new employment[6] and/or economic gain (e.g., higher wages)[7], or because they lost access to their non-liquid assets (e.g., farm land or fishing boats).[8,9]

[2] Adapted from Maslow's Hierarchy of Needs – from a psychological perspective
[3] Scientific American. http://www.scientificamerican.com/article/how-long-can-a-person-sur/
[4] Dickinson, Simon Bernard. 2013. *Post-Disaster Mobilities: Exploring household relocation after the Canterbury Earthquakes*. M.S. Thesis, Department of Geography, University of Canterbury, Christchurch, NZ.
[5] Binder, Sherri Brokopp. 2014. *Resilience and Postdisaster Relocation: A study of New York's home buyout plan in the wake of Hurricane Sandy*. PhD Thesis, Department of Psychology, University of Hawaii, US.
[6] **Sanders, S., Bowie, S., & Bowie, Y.** (2003). Lessons learned on forced relocation of older adults: The impact of Hurricane Andrew on health, mental health, and social support of public housing residents. *Journal of Gerontological Social Work, 40* [4], 23-35; **Fraser, J. C., Doyle, M. W., & Young, H.** (2006). Creating Effective Flood Mitigation Policies. *Eos, 87*(27), 265–270; **Hunter, L. M.** (2005). Migration and Environmental Hazards. *Population and environment*, *26*(4), 273–302. doi:10.1007/s11111-005-3343-x.
[7] Belcher, J., & Bates, F. (1983). Aftermath of natural disasters: Coping through residential mobility. *Disasters, 7* [2], 118-128.
[8] Black, R., Kniveton, D., Skeldon, R., Coppard, D., Murata, A., & Schmidt-Verkerk, K. (2008). *Demographics and Climate Change: Future Trends and their Policy Implications for Migration.* Retrieved from http://r4d.dfid.gov.uk/PDF/Outputs/MigrationGlobPov/WP- T27.pdf.
[9] Gray, C., Frankenberg, E., Gillespie, T., Sumantri, C., & Thomas, D. (2009). *Population Displacement and Mobility in Sumatra after the Tsunami.* Retrieved from http://iussp2009.princeton. edu/papers/90318.

These studies emphasize the importance of providing employment and financial security to those within a community. Finally, people require safety from negative health conditions, so they can enjoy life and consistent well-being in their communities.

The third need is belonging, which can represent belonging and acceptance among various groups of people (e.g., family, friends, school groups, sports teams, work colleagues, religious congregation) or belonging to a place or location. In relation to groups of people, experts often discuss the concept of social capital within a community. Social capital describes the networks and relationships that connect members of a community[10], including the extensiveness and interconnectedness of social networks within the community, levels of civic engagement, and interpersonal, inter-organizational, and institutional trust.[11,12] Research into disaster recovery shows that the likelihood of people leaving a community increases when social networks are lost[9], showing the importance of a sense of belonging within a community.

In relation to place, disaster research demonstrates that individuals benefit from a strong sense of belonging to a place, which inhibits their desire to relocate after a disaster.[13,14] A strong place attachment or sense of belonging to a place can be influenced by, for example, home ownership or having strong, extensive social networks within the community.

[Note to reviewers: In a future draft, this section will be expanded, especially the importance of social capital within a community and what that might mean for different places around the U.S.]

The fourth need, at the top of Figure 2-2, is labeled "growth and achievement." Humans need to feel a sense of achievement and that they are respected in society. In the figure, this need is accompanied by a need for continual growth and exploration within society, including an individual's ability to realize his/her full potential – to accomplish all that he/she can – within his/her lifetime. Although these needs may seem less tangible than others, growth and achievement are as important as other needs, often being accomplished through educational achievement and/or participation in arts and recreation.

Maslow's hierarchy, supported by research studies from disaster recovery, identifies the functions of a resilient community.[15] For example, based on the hierarchy of needs, a resilient community: 1) safeguards human life; 2) delivers basic needs; 3) provides safety and security from a personal, financial, and health/well-being perspective; 4) facilitates human relationships and identification (with groups and to a place); and 5) supports growth and achievement. Communities perform all of these functions through social institutions.

2.2.2. Social Institutions Common to all Communities

A social institution is a complex, organized pattern of beliefs and behaviors that meets basic individual and household needs. Traditional studies identify five major institutions as common to all societies: 1) family, 2) education, 3) government, 4) religion, and 5) economy – each of which is overlapping and interdependent. Recent conceptualizations include broader notions of each institution, identifying additional types of social institutions. This chapter describes eight social institutions:

[10] Reference the work of Robert Putnam and Daniel Aldrich's book on the topic Building Resilience.
[11] National Research Council of the National Academies. 2006. Facing Hazards and Disasters; Understanding human dimensions, National Academies Press, Washington, DC.
[12] Aldrich, D.P. and M.A. Meyer. 2014. "Social Capital and Community Resilience" American Behavioral Scientist, Published online 1 October 2014.
[13] Groen, J. A. and A.E. Polivka. 2009. *Going Home after Hurricane Katrina: Determinants of Return Migration and Changes in Affected Areas*. Working Paper 428. BLS Working papers, U.S. Department of Labor, U.S. Bureau of Labor Statistics.
[14] Cutter, S.L., K.D. Ash, C.T. Emrich. 2014. "The geographies of community disaster resilience" *Global Environmental Change*, Volume 29, Pages 65-77.
[15] City Resilience Framework. April 2014. http://www.sciencedirect.com/science/article/pii/S0959378014001459.

1. Family and Kinship
2. Economic
3. Government
4. Health Care
5. Education
6. Community Service Organizations
7. Religious Organizations and Others that Support Belief Systems
8. Media

Generally, these institutions satisfy the basic needs of society by defining dominant social values, socializing individuals, establishing patterns of social behavior, and providing roles for individuals. In doing so, institutions contribute to the welfare of society by preserving social order and supporting other institutions.[16] Sections 2.2.2.1 through 2.2.2.8 summarize the socially-based purposes and functions each institution serves in communities, as well as the human needs they meet in the context of Maslow's hierarchy.

2.2.2.1. Family and Kinship

Family is the first institution to which we are exposed within a community. Within a family, an individual can learn about the world and the importance of love, care, and a sense of belonging. The family unit is typically defined as a relationship between two or more people who are related by birth, marriage, or adoption. However, it is difficult to define fully what is meant by the term "family," since our understanding varies across cultures and over time. We might consider only those within our family of origin as part of our family unit, even limiting the family unit to those living in the same residence.[17] More often, however, our definition of family broadens to include extended family members (e.g., grandparents, aunts, uncles and cousins), or even long-time friends, friends of family, or other individuals who are not related by blood or marriage. Tight, close-knit bonds are developed within family/kinship units that, among other factors, can determine a community's level of resilience in response to a hazard/disaster event.[18]

Proximity of family members to one another is also an important consideration. Family members may live within the same residence or different residences within the same community, providing larger numbers of close-knit groups within a community to respond and recover from an event. In other cases, family members may live in different geographical parts of the world. While such distance may decrease the opportunity for social capital, it provides additional sheltering options to family members who wish to evacuate a community that has been disrupted by a hazard event, either temporarily or permanently.

Family or kinship units exist to support all human needs in Maslow's hierarchy, from the very basic needs to the need for growth and achievement. It is the responsibility of the family or kinship unit to provide

[16] Notably, this description is primarily a functionalist characterization of social institutions, which may be met with some criticism. For example, the functionalist perspective tends to dismiss the role of human agency with respect to institutions and focuses on maintenance of the status quo – which are necessary in creating and supporting resilience. Readers are encouraged to consider social institutions to better understand which ways social needs are linked to and rely upon the built environment, rather than employing a strict functionalist approach.

[17] "The Concept of The Family: Demographic and Genealogical Perspectives" by Charles B. Nam: http://www.ncsociology.org/sociationtoday/v22/family.htm

[18] Aldrich, D.P. and M.A. Meyer. 2014. "Social Capital and Community Resilience" American Behavioral Scientist, Published online 1 October 2014. Ritchie, L.A. and Gill, D.A. Forthcoming. "The Role of Social Capital in Community Disaster Resilience." Invited book chapter for *The Resiliency Challenge: Transforming Theory to Reality*. Virginia Tech Center for Community Security and Resilience.

support and resources to meet survival, safety and security, belonging and acceptance, and growth and achievement needs.

2.2.2.2. Economic

Economic institutions facilitate the allocation of scarce resources across society. Producers and suppliers combine factors of production (e.g., land, labor, and capital) to create goods and services that meet the needs and desires of consumers. The availability of production factors, along with the demand of consumers, determines the final mix of goods and services produced, supplied, and consumed.

The economy is a mechanism by which most human needs are satisfied. While not all needs are provided for, the economy produces goods and services that fulfill some element of survival, safety and security, belonging, and growth and achievement from Maslow's hierarchy. Some needs are met through the direct consumption of goods and services (e.g., food and shelter). Other needs are satisfied as a result of a functioning economy. For example, employment affords individuals the means to provide, but also can afford opportunities for (career) growth and achievement. Further, many commercial and for-profit venues (such as colleges, shopping malls, barbershops, and restaurants) facilitate the social gatherings of individuals with shared interests and life experiences, providing people with a sense of belonging. It is obvious then, that the pursuit of economic interests also creates values that have no market; yet, these potentially large, non-market values are also vulnerable to disasters.

Good Production and Service Supply. Industries within the economy are classified by their production or supply role. Three economic sectors exist: primary, secondary, and tertiary.

- *Primary Economic Sector:* this sector includes producers of raw materials, such as the agriculture, forestry, fishing, and mining industries. In 2011, these industries represented 3.1% of U.S. gross domestic product.[19]
- *Secondary Economic Sector*: This sector includes producers of goods, such as the manufacturing and construction industries. In 2011, these industries represented 15.9% of U.S. gross domestic product.
- *Tertiary Economic Sector*: This sector includes suppliers of services, such as utilities, wholesale and retail trade, transportation and warehousing, information, financial activities, professional and business services, education services, health care and social assistance, leisure and hospitality, other services, and federal, state, and local government. In 2011, these industries represented 81.0% of U.S. gross domestic product.

Labor Supply. Of the 316 million people in the U.S. in 2013, approximately 144 million were employed, with around 11 million, aged 16 and over, unemployed (Table 2-1). Unemployed individuals are those that do not have a job, have recently looked for work, and are able to work. Industries that have low unemployment and high weekly hours might find it difficult to handle a disruption. For example, mining, quarrying, and oil and gas extraction has few unemployed individuals, who are likely spread out over a large area. Additionally, they work long hours compared to other industries. This situation might make it difficult for this industry to adapt to a disruption as few workers can fill in and the workers in place could not increase their hours by as much as other industries.

[19] Gross domestic product (GDP) is the market value of goods and services produced by labor and capital in a country. In 2011, U.S. GDP measured $15.1 trillion.

180 ***Table 2-1: U.S. Employment Characteristics, 2013 (Bureau of Labor Statistics, 2015)***

	Employed (Thousands)	Unemployed (Thousands)	Avg Wkly Hours		Avg Hourly Earnings	
Agriculture and related	2 130	141	-		-	
Mining, quarrying, and oil and gas extraction	1 065	64	43.90		29.73	
Construction	9 271	935	39.00		26.12	
Manufacturing	14 869	1 019	40.80		24.35	
Wholesale and retail trade	19 653	1 463	35.05	*	22.13	*
Transportation and utilities	7 415	406	40.45	**	28.77	**
Information	2 960	175	36.70		32.90	
Financial activities	9 849	424	37.10		30.15	
Professional and business services	16 793	1 284	36.10		28.52	
Education and health services	32 535	1 098	32.70		24.44	
Leisure and hospitality	13 554	1 379	26.00		13.50	
Other services	7 127	445	31.70		21.40	
Public administration/Government	6 708	851	-		-	
Self-employed, family, and other	-	1 774	-		-	
Total	**143 929**	**11 458**	-		-	

* Average of wholesale trade and retail trade
** Average of transportation/warehousing and utilities

181 *Source: Bureau of Labor Statistics. Current Population Survey. <www.bls.gov>*

182 ***Consumer Demand.*** In 2013, personal consumption expenditures amounted to $11.5 trillion or 68% of
183 GDP, while investment amounted to $2.6 trillion (16% of GDP). Government consumption amounted to
184 $3.1 trillion (19% of GDP), and net exports were $-508.2 billion. As seen in Table 2-2, approximately a
185 third of personal consumption expenditures went toward goods, while the rest went towards services.

186 ***Table 2-2: Consumption Expenditures as a Percent of Total, by Type of Product (2013)***

Goods	34%	Services	66%
• Durable goods	11%	• Household consumption	64%
▪ Motor vehicles and parts	4%	▪ Housing and utilities	18%
▪ Furnishings and household equipment	2%	▪ Health care	17%
▪ Recreational goods and vehicles	3%	▪ Transportation services	3%
▪ Other durable goods	2%	▪ Recreation services	4%
• Nondurable goods	23%	▪ Food services and accommodations	6%
▪ Food and beverages (off-premises)	8%	▪ Financial services and insurance	7%
▪ Clothing and footwear	3%	▪ Other services	9%
▪ Gasoline and other energy goods	4%	• Consumption expenditures of nonprofit institutions serving households	3%
▪ Other nondurable goods	8%		

187 ### 2.2.2.3. Government

188 Governments exist at the national, state, and local levels to write, execute, and interpret and enforce laws
189 and regulations. The government acts as a mechanism by which human needs are satisfied, many of
190 which are not provided for in the private market due to inefficiencies. The government's roles and
191 functions are typically divided across the executive, legislative, and judicial branches. Laws, regulations,
192 and services provided by the government protect life and property, preserve peace and well-being,
193 strengthen group identity and norms, and define social and economic goals for the future. In response to a
194 disaster, the government may provide for many of Maslow's needs, starting with the necessities of food,
195 water, and shelter and extending through safety and security. However, the governmental entity providing

service may shift during a disaster from federal to local, or even necessitate change from private to public, for example; and such shifts could alter local reliance on the built environment.

Local governments, which are the focus of this framework, are made up of general and specific purpose entities. General purpose entities include county, municipal, and township governments. Specific purpose entities are more singular in function, such as school districts. In 2012, there were 90,059 local governments, with 43% serving a general purpose.[20]

Community Development. Community development is a major issue for local communities. Community development largely consists of attracting and retaining businesses and jobs, enhancing local amenities, addressing poverty and inequality, and maintaining the quality of the local environment. Communities that cannot attract and retain businesses and jobs tend to fare more poorly after disasters than communities that can. Generally, a community that cannot attract and retain businesses and jobs is in decline.

For most cities, local revenue sources consist of some combination of property and sales tax. Sales tax revenue is increased by attracting commercial businesses and jobs. Property tax revenue is generally increased by rising property values. Improving disaster resilience can help increase property values, since a reduction in losses that a property owner will suffer increases the value of that property to the owner.

Poverty & Income Distribution. Poverty and income distribution are also a major concern of local communities. Many projects communities pursue are aimed at decreasing poverty in their neighborhoods; and many external funding sources available to communities are aimed at alleviating poverty. These issues intersect with disaster resilience in that the disadvantaged are often most vulnerable to disasters. Improving disaster resilience often starts with protecting the disadvantaged.

Local communities often hope to improve the quality of life for residents by developing and improving local amenities. Often communities hope that improving local amenities will indirectly attract and retain businesses and jobs. Providing local services is a core function of local governments. In particular, local governments typically supply schools, roads and public safety. Public safety and roads directly impact the resilience of a community in the face of hazards. Schools serve as an amenity that can attract jobs and businesses.

Sustainability. Local governments are interested in ensuring their communities are sustainable, via two distinct ideas. First, local governments hope to protect and improve their environments. Being "green" and maintaining a small footprint are important to local communities. In turn, these can impact disaster resilience. Second, local governments strive for a vibrant and thriving economy. Communities with weak economies tend to fare poorly, relative to those with stronger economies, after disasters.

2.2.2.4. Health Care

Health is a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[21] Health care is the social institution within a community that specializes in promoting, monitoring, maintaining, and restoring health.[22] According to the World Health Organization, regardless of how they are organized, all health systems have to carry out six basic functions: 1) provide health services; 2) develop health workers; 3) develop a functioning health information system; 4) provide equitable access to essential medical products, vaccines, and technologies; 5) mobilize and allocate finances; and 6) ensure leadership and governance.[22]

[20] http://www2.census.gov/govs/cog/g12_org.pdf
[21] Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.
[22] WHO framework: http://www.who.int/healthsystems/strategy/everybodys_business.pdf.

The health care institution primarily meets the survival, and safety and security needs of Maslow's hierarchy. However, a community may consider that, through obtaining a higher level of well-being for its members, a strong community-based health care system can assist with the need for belonging as well as growth and achievement.

Health care systems consist of a complex and diverse set of players. Many individuals and organizations are involved in the health care system, including educational and research institutions, medical suppliers, insurers, health care providers, payers (e.g., commercial insurers and employers), claims processers, and regulators/policy makers.[23] Within the health care system, many of these groups can fall under other institutions that are discussed in this section, including education, the economy, and government.

The different types of services delivered by health care providers within a community, however, are unique to the healthcare institution:[23,24]

- ***Preventative care*** – aims to prevent future injury or illness, including blood pressure, diabetes and cholesterol tests, cancer screenings, counseling on topics such as quitting smoking or losing weight, routine vaccinations, counseling, screening and vaccinations to ensure healthy pregnancies, and flu shots[25]
- ***Primary care*** – provides integrated health care services aimed at providing the patient with a broad spectrum of preventative and curative care over a period of time[26]
- ***Specialized care*** – provides specialized care by physicians trained in a particular field (e.g., neurology, cardiology, dermatology, etc.), usually upon referral from primary care[27]
- ***Chronic or long-term care*** – addresses pre-existing or long-term illness
- ***Sub-acute care*** – needed by a patients who do not require hospital care (acute care), yet need more intensive skilled nursing care[28]
- ***Acute care*** – addresses short-term or severe illness with a shorter timeframe (i.e., emergency care)
- ***Rehabilitative care*** – aids a person in restoring lost skills or function from an injury or illness (physical or mental)
- ***End-of-life care*** – care for those facing a life-limiting illness or injury
- ***Mental or behavioral health care*** – treating health conditions that "are characterized by alterations in thinking, mood, or behavior (or some combination thereof) associated with distress and/or impaired functioning."[29] Depression is the most common mental illness. Experts believe depression will be the second leading cause of disability throughout the world by 2020.[30]

An element of each of these services can include prescription of medication to patients, highlighting the increasing importance of pharmacy services and staff.

One important difference among all health care services is the urgency of care. Some services, for example, acute and chronic or long-term care (i.e., assisted living facilities, nursing homes, adult homes),

[23] Shi, Leiyu and Douglas A. Singh 2008. Delivering Health Care in America: A systems approach. Jones & Bartlett Learning, …
[24] Module 5: Healthcare Systems, US Healthcare Delivery Systems (Appropriate reference needed for this presentation), link: http://www.aptrweb.org/?page=module5.
[25] http://www.hhs.gov/healthcare/rights/preventive-care/
[26] http://www.medicinenet.com/script/main/art.asp?articlekey=5042
[27] http://www.hopkinsmedicine.org/patient_care/pay_bill/insurance_footnotes.html
[28] http://www.dhcs.ca.gov/provgovpart/Pages/SubacuteCare.aspx
[29] U.S. Department of Health and Human Services. *Mental Health: A Report of the Surgeon General.* Rockville, MD: U.S. Department of Health and Human Services; Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, National Institutes of Health, National Institute of Mental Health, 1999.
[30] http://www.cdc.gov/mentalhealth/basics.htm

provide patients with critical, life-saving care. Each community must assess health care services provided to its members and assign priority to those services rated as most critical.

2.2.2.5. Education

Education is the primary social institution dedicated to the transfer of knowledge, skills, and values from one individual or group to another. Typically, when one thinks of education, formal education comes to mind. Formal education can begin in nursery school, and continues through primary and secondary school – often referred to as elementary, middle, and high schools. Formal education also includes higher education in colleges and universities.

Formal education typically exposes young people to societal norms, customs, and ideologies; provides a means for cultural innovation and social integration; and facilitates their understanding of social roles. By its very nature, formal education serves the secondary, but equally important, functions of providing childcare for one-parent or two-career families and establishing social networks.

Knowledge, skills, and values transfer in other ways within the education institution, including adult education (or continuing education), special education, and informal education. Adult education provides educational programs or courses for adults who are out of the formal education system. Adult education ranges from basic literacy to personal fulfillment (e.g., culinary or language classes) to attainment of an advanced degree.[31] Special education provides "specifically-designed instruction to meet the unique needs of a child [or adult] with a disability."[32] Finally, informal education can include any other means of knowledge, skills, or value transfer, including visiting museums, reading books, attending book clubs, or participating in recreational classes or demonstrations.

The educational institution primarily meets the growth and achievement needs of Maslow's hierarchy. However, attending any of the forms of education, described in the preceding paragraphs, satisfies an individual's need for belonging. Additionally, formal educational institutions provide meals to children in nursery, primary, and secondary schools, meeting the survival need.

2.2.2.6. Community Service Organizations

Community service organizations (CSOs) are non-profit and non-governmental entities of varying sizes and missions that provide services to individuals around the U.S. It is important to note here that, while organizations such as the Red Cross and the Salvation Army – which are active in disaster-related response and recovery efforts – may be considered CSOs, this section also considers organizations that do not necessarily have a disaster-related focus as part of their missions. Generally speaking, these organizations tend to operate at a local level, often relying on volunteers to support minimal full-time staff. CSOs typically focus in the arenas of human services, natural environment conservation or restoration, and urban safety and revitalization.[33] At the most fundamental level, CSOs may assist individuals in meeting basic needs, such as shelter, food, and clothing, as well as provide emotional and mental health support. They may also enhance the overall quality of life in a community by engaging in work related to neighborhood revitalization, affordable housing, food security, accessible transportation, senior citizens associations, community sustainability, humanitarian/disaster response, medical relief funds, after school programs, youth homes and centers, skill building and education, and civic engagement.

With respect to Maslow's hierarchy, CSOs address human needs related to survival, safety and security, belonging, and growth and achievement. The nature of the needs met by any given CSO depends on its mission and the people it serves. In many cases, CSOs fulfill daily needs of survival, safety and security,

[31] http://adulted.about.com/od/whatisadultlearning/p/whatisadulteducation.htm
[32] http://idea.ed.gov/explore/view/p/,root,regs,300,A,300%252E39,
[33] http://eder671nonprofit.pbworks.com/w/page/18541471/CBOs%20-%20Introduction

belonging, and growth and achievement for the elderly, people living in poverty, racial and ethnic minority groups, people with disabilities, and those suffering from chronic debilitating illness. These needs may not otherwise be met by traditional family and kinship groups. Other types of CSOs, such as civic, social, and recreational clubs (e.g., Rotary Clubs, Boys and Girls Clubs, after school programs) are more likely to meet, on a regular basis, the needs associated with belonging and growth and achievement, rather than meeting basic needs. CSOs that comprise this social institution depend upon other social institutions, as well as on the built environment.

2.2.2.7. Religious Organizations and Others that Support Belief Systems

This section addresses social institutions, including religious organizations, as well as other groups that support various belief systems, such as philosophies, ideologies, and science. From a traditional sociological perspective, religion is one of society's fundamental institutions.

As an institution, religion involves shared patterns of beliefs and behaviors that bring people together, helping them to understand the meaning and purpose of life. Religion is additionally characterized as groups that provide a sense of solidarity and common purpose.[34] Generally, the institution of religion facilitates social cohesion, emotional support, and social control, in addition to serving as an instrument for socialization and providing answers for unexplained natural phenomena. Organizations, other than religious, that support belief systems serve a similar function.

As an institution, organizations that support belief systems primarily meet the belonging and growth and achievement needs identified by Maslow. In some cases, they also address basic survival needs by providing food and shelter.

2.2.2.8. Media

Mass media refers to the channels of communication that, in some way, disseminate information to large numbers of people. A channel or form of communication is often referred to as "one-to-many" in that one person (for example, the author of a book) communicates his/her information to an audience of many. The communication is one-way, as there is rarely an ability to provide feedback to the author.[35] Mass media requires a vehicle – often print media (e.g., newspaper, books, magazines), radio, television, cable, and telecommunications (e.g., internet sites).

Within the last 25 years, the opportunity for many-to-many communication was created with development of computer networks. Internet chatrooms, peer-to-peer networks, and social network media provide means for mass audiences to simultaneously interact and communicate with each other.

The mass media institution has four main functions and four additional sub-functions. The main four functions are: dissemination of information, education of the masses (directly or indirectly, via documentaries, interviews, etc.), entertainment, and persuasion. Additional sub-functions include surveillance (watching society to warn about threatening actions); interpretation (supplying data and facts, explaining and interpreting events and situations); linkages, joining together other types of social institutions (Section 2.5.1); and socialization or the transmission of culture.[36]

The media connects individuals with information from around the world, the nation, the state, and the local community. Most communities have local media outlets that disseminate information about local conditions on a daily basis, via local newspapers, websites, magazines, radio stations, and/or television. Additionally, some local communities house main offices or headquarters of world-, national-, or state-level news outlets. For example, CNN's world headquarters is located in Atlanta, GA.

[34] https://globalsociology.pbworks.com/w/page/14711247/Religion
[35] http://www.sociology.org.uk/media_defined.pdf
[36] http://theonlinemedia.blogspot.com/2012/06/functions-of-mass-media.html

When a hazard event occurs, information about the event can come from any level of mass media. Depending upon the hazard event's lead or warning time, all levels of news outlets often rush to the location provide coverage. For hazard events with little or no lead-time, local media broadcasters and writers are often first on scene; however, within hours or days, media outlets from around the world converge to cover the story. It is not until days – or even weeks – after an event, when all larger-scale media outlets have left the area, that the dissemination of response and recovery information falls solely to local media sources.

The media institution, at all levels, meets many of Maslow's hierarchy of needs. First, media meets safety and security needs, by providing information, interpretation and surveillance to the masses. Additionally, via its socialization function, it promotes belonging among its audience. Finally, the media institution meets the need for growth and achievement by educating and entertaining society.

2.2.3. Social Vulnerabilities and Disasters

In thinking about the roles of institutions in a community, it is important to recognize and address social vulnerability and inequity. Not all people use these systems and/or have access to community systems in the same ways. Therefore, the needs of everyone likely to be affected in a disaster (or on a day-to-day basis), such as the elderly, people living in poverty, racial and ethnic minority groups, disabled, and those suffering from chronic illness, may not be addressed. In addition, renters, students, single-parent families, small business owners, culturally diverse groups, and historic neighborhoods may not be adequately represented. [37] Therefore, interactions of individuals/households with community systems can introduce inequalities among certain subpopulations of a community.

These inequalities tend to worsen in the context of a disaster. Specifically, a large and growing body of empirical research on hazards and disasters shows that risk is not distributed or shared equally across all groups.[37] Pre-disaster vulnerability, inherent in social institutions, may negatively impact response, recovery, and resilience following a disaster event. For example, some individuals and groups face greater risks than others based upon where they are located in the community, the buildings in which they are located (e.g., inferior housing), or having to rely only on public transportation. These groups are also more likely to be marginalized from the political process, with little voice in disaster planning, response, and recovery activities.

[Note to reviewers: Additional text will be added here (i.e., Paton, Phillips Chapter 2, specifically noting that vulnerable populations bring resources to the table – e.g., Community and advocacy groups represent important sources of information and links to particular populations); Will also mention that community engagement and its importance is discussed at length later in this chapter.]

Vulnerability and inequity are mentioned here to ensure all community members and their resources (or lack of resources) are considered when planning for resilience. Community leaders should identify those populations who are most affected – not only in and after a disaster, but also on a day-to-day basis, to make resilience-based decisions that improve life-safety and the well-being of all community members. Communities can assess their social vulnerability using a variety of tools, including the Social Vulnerability Index,[38] and obtain further information on vulnerable populations here.[37]

2.3. Prioritization of Social Institutions and their Functions

The previous section (2.2) of this chapter discussed the social dimensions of a community, including individuals, families, neighborhoods, and the social institutions that exist to support the needs of community members. Additionally, Section 2.2.3 draws attention to the fact that not all community

[37] Phillips, Brenda. 2009. *Disaster Recovery.* Boca Raton, FL: Taylor and Francis CRC Press.
[38] Reference to the Social Vulnerability Index (University of South Carolina): http://webra.cas.sc.edu/hvri/products/sovi.aspx

members have equal access to social institutions. Overall, this chapter described eight social institutions in detail, including their functions, services, and the ways they meet particular needs from Maslow's hierarchy.

It is important to understand the types of social institutions present in a community, especially in resilience planning, because hazard events can interrupt the functions of these institutions. Hazards can damage the built environment, making it more difficult for the community, and in turn, its social institutions, to function. However, social institutions may not all carry the same weight within a community – in that they meet different needs of communities in different ways, and some needs (as shown by Maslow's hierarchy) are more urgent than others, especially immediately after an extreme event. Therefore, the community must decide which social institutions (or aspects of those institutions) are required to function without interruption after a disaster (e.g., critical health care), while others can withstand partial functioning for some previously designated period of time (e.g., education). These types of decisions are made by the community when planning for resilience.

To help communities prioritize their social institutions, functions, and, in turn, their buildings and infrastructure systems, communities must answer the following questions: 1) ***How do social institutions rely on the built environment to function?*** and 2) ***How do social institutions rely on one another to function?***

First, note that not all social institutions rely on the built environment in the same way. Some institutions rely more heavily on the built environment (for example health care via hospitals or other specialized buildings), while other institutions are less reliant. A religious congregation, for example, does not require a building in which to gather or worship.

Second, social institutions rely on one another to function as well. This reliance is called "interdependencies" among social institutions. Even within particular institutions, such as the economic or government institutions, industries/entities rely on each another to perform their functions. Communities should understand this interconnectedness when planning for resilience.

The following two sections discuss the ways in which social institutions rely on the built environment (Section 2.3.1) and each other (Section 2.3.2). In each case, for each social institution, we provide examples of linkages.

2.3.1. Dependence of Social Institutions on the Built Environment

The built environment supports many of the functions of social institutions within a community. It is important that a community's own social institutions identify the ways in which the built environment supports each institution's functions. Each of the following sections offers several examples of linkages between social institutions and the built environment, specifically buildings, transportation, water/wastewater, power/energy, and communication systems under normal circumstances. Additional examples are provided to explore additional linkages between social institutions and the built environment in the event of a disaster.

2.3.1.1. Family and Kinship

In meeting the needs of Maslow's hierarchy, members of the family unit rely on one another and other social institutions, as well as on the built environment. The family institution relies directly on the built environment for housing and protection to meet its survival needs. Members of the family unit also rely on the built environment to communicate with one another, to meet its safety and security, belonging, and growth and achievement needs.

Table 2-1 provides examples of the ways the family and kinship institution relies on the built environment on a regular, day-to-day basis. In a disaster, additional links between family and the built environment can be made, including the link between transportation and family for evacuation, or the link between

communication and family to establish situational awareness about family members' safety after a hazard event occurs. Additionally, transportation and communication can be used to reunite family members following an event.

2.3.1.2. Economic

The built environment is integral to the U.S. economy. For example, buildings house manufacturing facilities, raw material processing plants, office space, commercial retail sales points, the workforce, and consumers. Water and power systems are used to create goods and services. Transportation is used to distribute raw materials and intermediate goods to producers and final goods to consumers. Communication networks transmit supply and demand signals. Components of the built environment also represent some of the final goods produced from economic activity. The built environment supports functions of the economy *and* is owned and/or created by it.

Structures and critical infrastructure often play several roles in supporting economic activity. For example, roads support the transport of (1) raw materials to production facilities, (2) final goods to retail stores, and ultimately, to consumers, and (3) workers to their places of employment. Disruptions to individual components of the built environment have the potential to ripple through the economy.

Table 2-2 through Table 2-6 illustrate some of the ways the built environment supports economic activity. It is important to acknowledge the role many of these assets play during the response and recovery phases of a disaster. The availability of goods that support survival (e.g., food and water) is critical during the response phase, suggesting the importance of functioning stores, and the means to access them. Whereas, places of employment are vital during the recovery phase by keeping the labor force in place while maintaining the tax base.

2.3.1.3. Government

Structures and critical infrastructure often play several roles in supporting major government functions. The government functions are grouped by executive, legislative, and judiciary. Table 2-7 through Table 2-9 show their linkages with the built environment.

It is also important to acknowledge the role many of these assets play during the response and recovery phases of a disaster. Some assets may play an elevated role (e.g., emergency operation centers and police, fire, and EMS stations) while others may support an entirely different function than during ordinary times (e.g., schools to support government provided services, such as shelters).

2.3.1.4. Health care

The built environment supports many of the functions provided by the health care institution within a community. Table 2-10 provides examples of the ways in which the health care institution relies on the built environment on a regular, day-to-day basis. In a disaster, some functions may shift, increasing the importance of understanding the links between health and the built environment. One example is that particular health care buildings, like hospitals, could also be used as a shelter during a hazard event.

2.3.1.5. Education

The built environment also supports the functions of the education institution. In today's society, some of the ways in which we transfer knowledge, skills and values are done via the Internet or virtually, often without the need to congregate within the same building or structure. However, even in remote situations, where the need for a particular building is absent, we rely on communications systems to function.

Table 2-11 provides examples of the ways in which the education institution relies on the built environment on a day-to-day basis. In a disaster, some functions may shift, increasing the importance of understanding the links between education and the built environment. One example is that school

buildings could serve as shelters during and after an event. In the aftermath of disasters, school buildings, in particular, could also emerge as central meeting locations for response and recovery activities.

2.3.1.6. Community Service Organizations

Increasingly, faith-based and other community organizations provide more services to a greater number of community residents on a daily basis.[39,40] CSOs, particularly those that provide essential services, such as shelter, food, and basic medical services, rely upon the built infrastructure to meet the basic survival needs of those they serve.

Table 2-12 provides some examples of the ways in which CSOs rely on the built environment on a regular, day-to-day basis. In the event of a disaster, the role of CSOs, particularly those that provide essential services, becomes even more critical, and the importance of understanding the links between CSOs and the built environment increases. As noted by Ritchie et al. (2008) in a comprehensive study of disaster preparedness among community-based organizations:

> *After major disasters, frail elderly people living alone still will need meals and other services; low-income disaster victims will need assistance from community clinics; services for people with AIDS and for those with chronic mental illness will need to remain operational; and immigrants still will need aid and support from the same organizations that provide assistance during non-disaster times.*

In the event of a disaster, buildings are vital to the protection and safety of staff and clients. It is also critical that CSOs communicate with their staff, volunteers, emergency providers, as well as those they serve, to meet safety and security needs. Similarly, CSOs rely upon transportation to ensure that staff and volunteers can reach their facilities to maintain operations, and that clients can reach the facilities to obtain services during the days and weeks following a disaster event. In many cases, demands for the types of assistance provided by CSOs increase substantially following a disaster, as more people seek assistance. In post-disaster contexts, CSOs of almost any type may adapt and expand their roles and services to support community disaster response and recovery efforts.

In the long term, CSOs also provide settings in which Maslow's belonging and growth and achievement needs are met after a disaster. Apart from organizations that provide essential services, CSOs such as civic, social, and recreational clubs (e.g., Rotary Clubs, Boys and Girls Clubs, after school programs) become increasingly important in community recovery processes by providing opportunities and physical settings to draw upon, maintain, and to build social capital. For example, buildings that house CSOs may provide a place for recovery planning. This is an important consideration with respect to understanding the needs of CSOs as related to the built environment in terms of broader community resilience.

2.3.1.7. Religious Organizations and Others that Support Belief Systems

As mentioned earlier, religious organizations and others that support belief systems rely on the built environment to function, albeit not as heavily as other social institutions. Examples of linkages between the religious organizations and others that support belief systems and the built environment are shown in Table 2-13.

As with community service organizations, described in the previous section, the roles of religious and other organizations may change in the context of a disaster. For example, buildings regularly used for

[39] Ritchie, L.A., Tierney, K., Austin, D., Beres, M., Bevc, C., Gilbert, B., and Sutton, J. 2008. "Disaster Preparedness Among Community-Based Organizations in the City and County of San Francisco." Boulder, CO: The University of Colorado, Institute of Behavioral Science, Natural Hazards Center.

[40] Ritchie, L.A., Tierney, K, and Gilbert. B. 2011. "Disaster Preparedness among Community-Based Organizations in the City and County of San Francisco: Serving The Most Vulnerable." Pp. 3-39 in D.S. Miller and J.D. Rivera (eds.) *Community Disaster Recovery and Resiliency: Exploring Global Opportunities and Challenges*. Boca Raton, FL: Taylor and Francis.

worship and meetings might serve as evacuation shelters for congregants and members, as well as for residents from the broader community. In these cases, the buildings may also serve as places that protect vulnerable populations by continuing to or adapting to provide and house essential services such as food, water, and medical supplies; they may also protect and preserve religious and cultural artifacts and documents. In the aftermath of disasters, church buildings, in particular, tend to emerge as central meeting locations in the days and weeks during response and recovery activities.

2.3.1.8. Media

As with any institution, media relies on the built environment to serve its functions in one way or another. Table 2-14 provides some examples of the ways the media institution relies on the built environment on a regular, day-to-day basis. In the event of a disaster, some functions may shift, increasing the importance of understanding the links between the media and the built environment. For example, a functioning communication system will allow for communication with the public prior to, during, and after a disaster (to disseminate response and recovery information).

[Note to reviewers: A future draft will include the importance of situational awareness before, during and after a disaster.]

539 ***Table 2-1: Family and Kinship: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within the Family/kinship Institution	Provide a place to live, build a family, provide sustenance	Access to and from housing	Provide for safe source of water for drinking/eating, cooking, cleaning, cooling, laundry, fire protection; provide for the removal and treatment of waste	Allow for use of housing (lighting, heating, cooling), use of appliances, charging of electronics	Support communication within and outside of housing
How purpose is actualized through the built environment (examples)	Housing (single-family, multi-family, etc.)	Roads/bridges, airports, mass transit, sea ports	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Telephones (landline and mobile), computers, TV and radio media

540 ***Table 2-2: Production of Raw Materials: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within the Production of Raw Materials	Prepare materials for transport, store materials, house equipment and machinery	Distribute goods for processing	Production input, cool or heat to facilitate production process, fire protection, eliminate production waste	Ability to operate machinery, use building (e.g., lighting)	Obtain market signals, support production and safety activities
How purpose is actualized through the built environment (examples)	Processing facility, warehouse	Roads and bridges, airports, railways and rail stations, seaports, pipelines	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Telephones, computers, internet

541 ***Table 2-3: Production of Goods: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within the Production of Goods	Design and develop goods (buildings and manufactured products), process raw materials, production location, store goods, package and prepare for distribution	Obtain labor and capital, distribute intermediate goods, distribute final goods for sale	Production input, cool or heat to facilitate production process, fire protection, eliminate production waste	Ability to operate machinery, use building (e.g., lighting)	Obtain market signals, support production and safety activities, advertising
How purpose is actualized through the built environment (examples)	Commercial office, Processing plant, manufacturing facility, warehouse, goods (buildings and manufactured products) for sale	Roads and bridges, airports, railways and rail stations, seaports	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Telephones, computers, internet, TV and radio media

542 ***Table 2-4: Supply of Services: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within the Supply of Services	Point of sale, non-sale, service use area	Bring sellers (providers) and consumers together	Service input, equipment operation, eliminate waste, fire protection	Service input, power for machinery, lighting for the building	Obtain market signals, support production and safety activities, advertising, transmit and receive financial transactions
How purpose is actualized through the built environment (examples)	Stores, malls, restaurants, banks, commercial offices, hotels, schools and colleges, hospitals and medical facilities, arenas/stadia, salons and barbershops, internet cafes, online storefronts, gas stations, airports	Roads and bridges, airports, railways and rail stations, seaports	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Telephones, computers, internet, TV and radio media

543 ***Table 2-5: Labor Supply: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within Labor Supply	Location of employment, residence	Getting to and returning from work	Allow for safe use of structure/comfort (drinking, cooling, cleaning, eliminating personal waste), fire protection	Power for point of sale devices, lighting, heating and cooling	Offer and deliver services
How purpose is actualized through the built environment (examples)	Production facility, commercial office, warehouse, store, houses and apartments	Roads and bridges, airports, railways and rail stations, seaports	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Telephones, computers, internet, TV and radio media

544 ***Table 2-6: Consumption: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within Consumption	Point of sale, non-sale, service use area	Bring sellers (providers) and consumers together	Allow for safe use of structure/comfort (drinking, cooling, cleaning, eliminating personal waste), fire protection	Power for point of sale devices, power for point of non-sale, service use area, lighting, heating and cooling	Obtain information on goods and services available, process payments

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
How purpose is actualized through the built environment (examples)	Stores, malls, restaurants, commercial offices, schools and colleges, hospitals and medical facilities, arenas/stadia, salons and barbershops, internet cafes, online storefronts, gas stations, airports, houses and apartments	Roads and bridges, airports, railways and rail stations, seaports	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Telephones, computers, internet, TV and radio media

545 ***Table 2-7: Executive Function: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/wastewater	Power/energy	Communication
Purpose (or function) within Executive	Provide work and meeting space for leaders and staff, serve as a document repository, protect communication systems, house public safety and emergency response capabilities (people, equipment, vehicles), provide public spaces	Provide access to services, facilitates delivery of services (including emergency response)	Allow for safe use of structure/comfort (drinking, cooling, cleaning, eliminating personal waste), fire protection	Lighting, heating and cooling	Transmission of information, including emergency messaging, public access to government
How purpose is actualized through the built environment (examples)	Offices, police stations, fire and EMS stations, emergency operations centers (EOCs), military installations, jails and prisons	Roads, airports, railways, seaports, bridges, tunnels	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Telephones, computers, internet, TV and radio media, 911 call centers, reverse 911, social media, community alert and warning systems

546 ***Table 2-8: Legislative Function: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/wastewater	Power/energy	Communication
Purpose (or function) within Legislative	Provide work and meeting space for leaders and staff, serve as a document repository, protect communication systems, public spaces	Provide physical access to lawmakers and law-making bodies	Allow for safe use of structure/comfort (drinking, cooling, cleaning, eliminating personal waste), fire protection	Lighting, heating and cooling	Transmission of information, public access to government
How purpose is actualized through the built environment (examples)	Offices, government chambers	Roads, airports, railways, seaports, bridges, tunnels	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Telephones, computers, internet, TV and radio media, 911 call centers, reverse 911, social media

547 ***Table 2-9: Judicial Function: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/wastewater	Power/energy	Communication
Purpose (or function) within Judicial	Provide work and meeting space for leaders and staff, serve as a document repository, protect communication systems, provide public spaces	Provide physical access to legal venues	Allow for safe use of structure (drinking, cooling, cleaning, eliminating personal waste), fire protection	Lighting, heating and cooling	Transmission of information, public access to government
How purpose is actualized through the built environment (examples)	Offices, courts and courthouses, libraries and archives	Roads, airports, railways, seaports, bridges, tunnels	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Telephones, computers, internet, TV and radio media, 911 call centers, reverse 911, social media

548 ***Table 2-10: Health Care: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within Health Care	Provide a place for emergency, short- and long-term health needs (physical and mental); Storage for medical records, equipment, pharmaceuticals	Provide access to and from the facility for patients, staff	Allow for safe use of health care facility (drinking, cooling, cleaning, laundry, eliminating personal waste), and ability to use specific medical equipment that require water (e.g., dialysis), fire protection	Allow for use of facility, including technology, equipment, lights/electricity for all rooms/offices, computers and appliances	Communicate within facility, access information/ resources (e.g., medical records), communicate outside of facility
How purpose is actualized through the built environment (examples)	Hospitals, Clinics, Mental health agencies, clinics, hospitals, Urgent care centers, Poison centers, Dialysis centers, Rehabilitation centers, Hospices, Assisted living facilities, Nursing homes; Pharmacies	Roads/bridges, Vehicles - buses – public, subways, personal vehicles	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Internet, emergency communication system, phones (voice and text), email

549 ***Table 2-11: Education: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/wastewater	Power/energy	Communication
Purpose (or function) within the Educational Institution	Provide a place to learn, to interact/connect, storage for equipment and books	Provide access to and from the facility to students/parents, teachers	Allow for safe use of educational facility/comfort (drinking, cooling, cleaning, eliminating personal waste), fire protection	Allow for use of educational facility, including power to classrooms, computers, appliances, offices	Communicate within facility, access information/resources (e.g., online), communicate outside of facility
How purpose is actualized through the built environment (examples)	Schools, universities (campus and dormitories), educational offices, museums, libraries	Roads/bridges, Vehicles - buses – public, subways, personal vehicles	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Internet, emergency communication system, phones (voice and text), email

550 ***Table 2-12: Community Service Organizations: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within CSOs	Provide a place where basic needs can be met (in some cases, shelter and sustenance), facility where people can interact with others	Provide access to and from the CSO facility to clients/staff/ volunteers	Allow for safe use of CSO facility/comfort (drinking, cooling, cleaning, eliminating personal waste), fire protection	Allow for use of CSO facility, including lights/electricity, power for appliances	Communicate with clients/staff/ volunteers; between CSOs; outside the CSO facility
How purpose is actualized through the built environment (examples)	Housing and provision of sustenance	Roads/bridges, Vehicles – public transportation (buses, subways) personal vehicles	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Internet, emergency communication system, phones (voice and text), email

551 ***Table 2-13: Religious Organizations and Others that Support Belief Systems: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within Religious Organizations and Others	Provide place of worship, social interaction, education, daycare, and other basic services; Provide places to house and protect religious and cultural artifacts/ documents *(the buildings themselves may be considered sacred or have symbolic meaning)*	Provide access to and from the facility to organization leaders/staff/ congregation/ community members	Allow for safe use of religious/belief facility (drinking, cooling, cleaning, eliminating personal waste), fire protection	Allow for use of facility (congregation, community members), including lights/electricity to all rooms, power for appliances	Communicate with leaders/staff/ congregation/ community members; outside of the facility
How purpose is actualized through the built environment (examples)	Churches, synagogues, other places of worship, meeting places	Roads/bridges, Vehicles – public transportation (buses, subways) personal vehicles	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Internet, emergency communication system, phones (voice and text), email

552 ***Table 2-14: Media: Examples of Purposes with Links to the Built Environment***

	Buildings	Transportation	Water/ wastewater	Power/energy	Communication
Purpose (or function) within Media	Provide a place to disseminate news and information, protect all media technology and equipment	Provide physical access to and from facilities, also to news sites	Allow for safe use of facility (drinking, cooling, cleaning, eliminating personal waste), fire protection	Allow for use of facilities, allow for use of broadcasting/ media equipment	Communicate within facility, access information/ resources (e.g., online), broadcast information outside of facility (media function)
How purpose is actualized through the built environment (examples)	News and broadcasting stations, Television stations, Radio station, Newspapers/ magazine publishing, Publishers' headquarters, Offices, Equipment/ computer storage	Roads/bridges, Vehicles – public transportation (buses, subways) personal vehicles News/ broadcasting vehicles	Pipelines, pumps/stations, valves, fire hydrants, water and wastewater treatment facilities, storage tanks	Generation facilities, grids, substations, lines, pipelines	Internet, emergency communication system, phones (voice and text), email *Note to reviewer: Links will be made to Chapter 8*

In addition to relying on the built environment, social institutions also rely on one another to function. In turn, damage to the built environment may affect one social institution directly, which can have ripple effects on other institutions. The following section discusses the interdependencies of social institutions, to help communities think about prioritizing the built environment for resilience planning.

2.3.2. Dependence of Social Institutions on Other Social Institutions

A disruption in the built environment that affects one social institution will likely also affect others, since social institutions are linked with each other in many ways. It is important for a community to identify the ways social institution are linked with each other, referred to here as ***interdependencies***. Since each community is different, it is impossible to provide an exhaustive list of all of the ways social institutions can become dependent on one another. Instead, examples of interdependencies among social institutions are provided here[41]:

- *Government and economic institutions*: The longer it takes businesses to recover, the higher the potential for loss of local taxes (e.g., sales taxes); the longer it takes for law firms to recover, the higher the potential for courthouse delays[42].
- *Economic and family/kinship institutions*: The longer it takes for businesses to recover, the higher the potential for unemployment; Suppliers of goods and service (e.g., restaurants, staff) need a customer base and, at the same time, people need places to shop for goods and services[43].
- *Economic (labor), family/kinship, and education/government*: Without childcare, people may be unable to return to work and earn income, which may result in temporary or permanent relocation of the person/family.
- *Government and family/kinship*: People may encounter delays and/or difficulties in rebuilding (or may not wish to rebuild) due to new land use or zoning policies and building department policies (e.g., inspections or permitting).
- *Healthcare, education, economic, government, or media and family/kinship*: Each social institution needs staff and/or employees (e.g., doctors, nurses, medical technicians, billing, as examples for health care) to function
- *Government, economic, and family/kinship:* People may be unable to return to work without food and water at home, insurance appointments, and/or disaster assistance.
- *Government, media, and family/kinship*: The media serves as an intermediary between the government and the members of a community[44] and often works to link certain social institutions together.

Additionally, interdependencies also exist among services located within each institution. For example, industries located within a community (i.e., the economic institution) can depend upon each other to function.

Industries can be important drivers of the economy due to their size (e.g., contribution to GDP), proportion of the workforce they employ, and/or their importance with other industries (e.g., as producers and consumers of intermediate goods from other industries). A disruption to the built environment has the potential to affect several, seemingly unrelated industries across the economy through these inter-industry relationships. National and regional input-output models capture the inter-industry linkages.

[41] Holistic Disaster Recovery Document, Natural Hazards Center (PERI).
[42] Case study/example of this was Cedar Rapids, Iowa:
(http://blogs.mlmins.com/ruatrisk/?p=25)
(http://www.abajournal.com/news/article/cedar_rapids_law_firm_opens_offices_in_nearby_middle_school)
[43] Brenda Phillips Infrastructure chapter.
[44] http://theonlinemedia.blogspot.com/2012/06/functions-of-mass-media.html

Table 2-15 presents each industry's (1) size in millions of dollars of GDP, (2) percent contribution to total GDP, (3) 'impact per dollar demand,' and (4) 'impact of dollar supply.' The percent contribution of GDP shows the total flows from an industry as a percent of all flows in the economy. The impact per dollar demand is the value of GDP from other industries needed to produce one dollar of GDP from the listed industry – it shows what happens when flows to an industry are disrupted. The impact per dollar supply is the change in GDP that results from a dollar change in GDP from the listed industry – it shows what happens when the flows from an industry are disrupted. For example, the Wholesale and Retail Trade industry added $1.96 trillion dollars to the U.S. economy in 2011, which constituted 13% of U.S. GDP. To produce $1.0 million of GDP in Wholesale and Retail Trade, required $1.4 million of GDP produced by the other industries in the economy. To produce $1.0 million of GDP from other industries in the economy requires $1.94 million of GDP produced by Wholesale and Retail Trade.

Table 2-15: Industry size and inter-industry relevance (2011)*

Industry	GDP ($ million)	% GDP	Impact $/ Demand	Impact $/ Supply
Agriculture and Mining	466,194	3.1	1.74	1.92
Food, Beverages and Tobacco	221,187	1.5	3.36	2.48
Other Manufacturing	1,627,644	10.8	2.08	1.66
Electricity, Gas and Water Supply	246,896	1.6	1.21	2.62
Construction	549,011	3.6	1.69	2.70
Wholesale and Retail Trade	1,960,689	13.0	1.40	1.94
Hotels and Restaurants	473,854	3.1	1.71	2.68
Inland Transport	191,587	1.3	1.82	2.51
Water Transport	14,819	0.1	2.14	2.99
Air Transport	65,468	0.4	2.07	2.97
Other Supporting and Auxiliary Transport Activities; Activities of Travel Agencies	142,442	0.9	1.44	2.33
Post and Telecommunications	370,637	2.5	1.62	2.33
Finance and Real Estate	5,034,867	33.4	1.50	1.36
Public Admin and Defense; Compulsory Social Security	1,853,704	12.3	1.54	2.68
Community, Social and Personal Services	1,869,079	12.4	1.57	2.35

*Data sources: World Input-Output Database. http://www.wiod.org/new_site/database/wiots.htm;
Marcel P. Timmer (2012), "The World Input-Output Database (WIOD): Contents, Sources and Methods", WIOD Working Paper Number 10, downloadable at
<http://www.wiod.org/publications/papers/wiod10.pdf>

A smaller impact per dollar demand value implies a larger potential for an industry to be affected by disruptions in other industries. For example, the Electricity, Gas, and Water Supply industry is the most sensitive to production value changes from the rest of the economy. A smaller impact per dollar supply value implies a larger potential for other industries to be affected by a disruption from an industry (e.g., the economy is most sensitive to production value changes from the Finance and Real Estate industry).

The example in Table 2-15 details data on industry size and inter-industry relevance at a national level. This example can help communities think about the ways their industries, at the local level, interconnect and provide some guidance on how to quantify interdependencies, if the industry size and relevance data exists at the local level.

2.4. Community Examples of Recovery and Resilience

The process of resilience planning and prioritization is community-specific. Communities vary in size, social make-up (including social vulnerabilities), culture and traditions, and disaster history, which can influence a community's industrial composition (i.e., major industries), governance and regulations, social capital, economics/budgeting, and access to and types of built environment (assets). Therefore,

there is no one-size-fits-all approach for communities in the U.S. to think about planning and prioritizing institutions, services, and/or systems for resilience.

Examples in this section show the ways in which communities, who experienced extreme disasters, have thought about and prioritized for the restoration of the built environment. Although resilience priorities can and should be set by communities of all types, regardless of their experiences with disasters, examples are provided here of community priorities set directly after experiencing large-scale, extreme disasters.

Joplin, Missouri developed priorities/goals during their recovery from the EF5 tornado that devastated their city on May 22, 2011; a city of 50,000 residents that increases to over 200,000 people during the workweek. The 2011 Joplin, MO tornado, which left a path of destruction eight miles long and ¾ miles wide, claimed 161 lives and injured over 1,000 people, in addition to damaging city infrastructure, parks, and 7,500 structures.[45] In response to the disaster, Joplin, MO created the Citizen Advisory Recovery Team (CART) to provide community members with a platform to bring post-disaster recovery ideas to the table, form a consensus, and allow these ideas to be taken to the City Council for consideration. On November 7, 2011, after multiple public meetings, CART presented its recommendations to the City Council for consideration and adoption. The City adopted CART's report and created the Implementation Task Force (ITF) to be the lead public/private entity in the redevelopment. The ITF included leadership from the CART and representatives of the City of Joplin, Duquesne, Joplin Schools, and the Joplin Area Chamber of Commerce. The role of the ITF was to assign responsibilities and priorities to the plan. As a result, several projects were developed that fell under four main headings: housing and neighborhoods, schools and community facilities, infrastructure and environment, and economic development. As a way to summarize these projects, the ITF plan provided a list of recovery goals:[46]

- Replace lost residential housing, office, commercial, medical, etc.
- Create ties from the redeveloped area to downtown Joplin
- Expand opportunities for employment
- Create destination activity center(s)
- Establish a memorial to those lost in the storm
- Address other projects and goals as developed by the CART
- Use redevelopment efforts as a catalyst to build upon existing goals for development and redevelopment in Joplin, including a parkway or series of neighborhood parks supporting the recovering neighborhoods; develop a performance and visual arts center; create a community and/or event center; and extend the walk/bike paths.

In another example, ***Greensburg, Kansas*** prioritized sustainable development after a tornado hit their town on May 4, 2007, killing 13 people and injuring more than 60 others. The tornado destroyed 95% of the town's structures and seriously damaging the other 5%. Immediately after the disaster, 50% of the population relocated to other areas, and eventually, FEMA installed mobile homes that housed around 300 families.[47] Greensburg, KS is now the "world's leading community in LEED-certified buildings per capita."[47] With support from the community, the Greensburg City Council adopted the resolution that, "all large public buildings in Greensburg with a footprint exceeding 4,000 square feet must meet the LEED-platinum standards of the U.S. Green Building Council and utilize renewable energy sources." Reconstruction is almost complete, with the entire community powered by renewable energy and the

[45] http://www.joplincc.com/Joplin%20Pays%20It%20Forward%20-%20Community%20Leaders%20Share%20Our%20Recovery%20Lessons.pdf
[46] http://joplinmo.org/DocumentCenter/View/2687
[47] http://www.usatoday.com/story/news/greenhouse/2013/04/13/greensburg-kansas/2078901/

construction of six LEED-platinum certified buildings, including the city hall, the memorial hospital, and the K-12 school.

Additionally, one question that communities may ask even before setting priorities is whether their current geographical/physical location allows them to reach their recovery and resilience goals. Community members, from ***Christchurch, New Zealand***, for example, after their series of major earthquakes in 2010 and 2011 or ***Rockaway Peninsula in New York*** after Hurricane Sandy hit in 2012, are faced with short-term and long-term relocation decisions based on new land-use and zoning initiatives. In these cases, the first priority is relocation.

[Note to reviewers: In a future draft, this section will end with a paragraph relating to resilience, stating that in the same ways that communities are planning for and executing recovery actions, communities can plan for and execute resilience actions – differently – in ways that work for them.]

2.5. Community Engagement in Resilience

[Note to reviewers: In a future draft, this section will begin with a discussion on the social science evidence of the role and importance of social capital. Also, may link this section with the section on Social Vulnerabilities (2.2.3) – discussion on how community engagement can help to identify and offset community vulnerabilities.]

For communities to become engaged in the pursuit of resilience, there needs to be a collective belief in the potential threat from the hazard(s) and the value of investing in resilience. These beliefs and values also reflect the level of risk a community is willing to tolerate, which is usually based on experience and available science. Without direct disaster experience, communities rely on science to present hazard probabilities and design options for reducing or avoiding exposure to these endemic community hazards. Without direct experience, the effectiveness of science to engage communities depends on the trust established between scientists and decision makers in having a common understanding of purpose, roles, responsibilities, and limitations as they relate to potential disasters and the means to plan, detect, notify and respond to threats.

Communities may seek out opportunities to pursue resilience based on observed disasters at similar scales or levels of development as their own, which trigger changes in beliefs or values as to the merits of resilience. Another manner of engaging community decision makers may come from translating the value of investing in resilience into their performance goals of long-term growth and into the values of sustainability. Many communities have adopted sustainability as a goal for the sake of reducing the dependence on natural and other limited resources through efforts such as recycling, smart technologies, shared community resources and collective expectations of livability goals, such as the simplicity movement. These steps demonstrate a stronger and more dynamic interface between a built community and the natural environment – one that recognizes the interdependency between human systems and natural systems. The health of one affects the overall health and functionality of the other.

Resilience comes into play when communities understand how their forbears' decisions resulted in their level of risk (increased or diminished) from potential disasters as well as available opportunities to reduce future losses, either by directly mitigating risk and/or planning to recover in a more risk-averse fashion following a damaging event. Ideally, resilience, as a concept, should help communities demonstrate credible investments toward improved livability during and after expected hazards. It should also expedite recovery following extreme disaster events due to forward thinking, planning and prioritizing in advance, to take advantage of recovery and reconstruction opportunities. This pursuit of resilience should provide a competitive edge for potential business and residential prospects evaluating a location for investments.

Resilience, like sustainability, encourages a better understanding of interdependence between a community and its geographical setting. This understanding can be viewed as a starting point for community identity and belonging that relates to a sense of place and quality of life that starts with

community members feeling safer, more secure, and less likely to have their lives disrupted by hazards. They share in the beliefs and values of resilience and that the investments in resilience are worthwhile for their sense of growth and achievement.