

A Design, Planning and Urban Administration Strategy for Sustainability

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ABSTRACT: Buildings, communities, cities and the use of the transportation systems that connect them account for more than seventy-five percent of the energy consumption and the carbon footprint of the developed nations. If one considers the addition of all other manufactured, human-made objects and products for sale and consumption, we quickly approach 100% of the source points for living in a non-sustainable world. Almost all of these products and environments are subject to design, planning, and administration. This paper presents a paradigm and a tool for guiding the designer, planner, or administrator through a lifetime of conservation-based, sustainable practices. The E/STEPSM methodology for assessments and the use of sustainability indicators is a service-marked process created by the Joslyn Institute for Sustainable Communities (JISC).

Key words: sustainable design, sustainable planning, sustainable urban administration

INTRODUCTION

The first international acknowledgement of the fact that the developed, "First World" nations were over-using the non-renewable resources of the earth appeared in the UN Bruntland Commission Report, 1987.³ It has taken twenty years for the discourse and debates about global warming and the disappearance of our non-renewable energy resources for the crises to reach the U.S. halls of public policy, at both the national and many of the local levels. In the meantime, globalization and the consumer-driven economies in the developed and rapidly developing nations (primarily in the northern hemisphere of the world) have continued to accelerate the depletion and fouling of all of the resources upon which human life and all ecological systems depend. Christopher Flavin, President of the Worldwatch Institute has written, "In the long run, it will become apparent that achieving generally accepted goals – meeting basic human needs, improving human health, and supporting a natural world that can sustain us – will require that we control consumption rather than allow consumption to control us."⁴

While consumption of human-made products, and the globalized trading of such goods and services has historically been the key driver of our economic systems, it is now becoming more clear that the major challenge of the 21st Century is, "*How will the major economies of the world sustain adequate jobs, compensation, accommodated life-styles, and essential maintenance and operation of our cities and communities, while also protecting the environment for the choices and enjoyment of future generations in a world of limited and diminishing natural resources?*"

Will the future of a rapidly urbanizing world be one of regression, conflict, and uneven, inequitable sacrifices?

Or will it be one of continuing progress of the human condition with supportive and equitable global economic conditions, of advancing and shared new discoveries and new technologies, fostering a growing appreciation of the arts and diverse cultures, achieving an equitable balance of uses of the limited natural resources – while concurrently, and cooperatively reversing the human-induced damage to planet earth? Can we imagine the means to such a future?

How can we, in any community or world-class city, as political leaders, as business leaders, as educators, professionals or citizens, mitigate against that unintended, but disastrous consequence of continuing our consumptive, economics-at-all-costs form of development?

First, we must believe that individual action matters greatly, and that sustainability is a rapidly developing set of principles and values that deserve our utmost, constant, and personal attention. In the literature on best practices, from around the globe, in both developed and developing societies there are numerous examples of individuals who influence their communities through projects of new enterprises, conservation action, green designs, creative governance and energy efficiencies.⁵ We need to lead by committed example, by knowledge and awareness, and through skill and leadership acumen.

Second, we must understand that the world is urbanizing at the most rapid rate in the history of humanity, and we must attempt to anticipate the consequence of such growth. It is estimated that the year 2050 will see a world of approximately 9 billion people, 70% of which will be living in urban agglomerations.⁶ Concurrently, we must seek to

understand all the interconnected and interdependent influences and opportunities of an urbanized world. In this sense of interdependence, we must appreciate and protect the natural value of the non-urbanized world, for the survival of the urbanized world, especially the agricultural and aquaculture production, and the small-to-mid-size communities that support the production of food and fiber for the nourishment and sustenance of all cultures. Without adequate diet and nutrition -- and adequate potable water resources -- economic, environmental, and social principles become moot.

THE CITY AND THE BUILT ENVIRONMENT

Equally, or perhaps as a more critical third priority, is the challenge to make the cities of the world, and especially the so-called mega-cities work as sustainable places, or at the very least, as agglomerations of many sustainable places. It is estimated that by 2050 there will be more than 30 cities of 10 million residents. Some metropolitan regions in Asia are expected to reach 30-40 million inhabitants.⁷ The cities have been identified as the major sources of air pollution (leading to climate change); of water contamination and depletion of supply (endangering the lives of millions of people and causing global conflicts); of excessive fossil fuel consumption (principally because of carbon-based electric power generation and the growth in personal automobiles); of the consumption of materials made from non-renewable resources; and, of the depletion of agricultural land through low density sprawl and expansive waste management. Even the projected depletion of forests and the endangerment of the oceans' coral reefs can be traced to the excessive consumption of building materials and food preferences in many of the cities of the world.

Today, the need for coordinated, holistic, visionary and sustainable management of the cities of the world has never been more critical. In the midst of new science and technologies that may, or may not lead to positive changes, the quality of the environment and the quality of life for residents is at risk.

As the communities get larger -- both in population and land coverage -- the expenses of development and maintenance are inflated. The financial support of new growth, and its sources, becomes more and more difficult to manage -- while the new growth at the edges drains resources for maintenance and rehabilitation from the older city sections. There are growing economic inequities, internal to the cities, amid dramatic influences from external migrations and informal, illegal settlements -- especially in the developing nations. It seems that the greater the economic success of a city/region, the greater the pressures become for social equity -- in all forms: health, housing, human services, employment, income distribution, education, environmental justice -- in general, a decent, quality of life for all citizens of the urban environment is difficult to achieve. Communities with extreme disparities are not sustainable.

Urban growth management and planning for sustainability have become the major challenges of the 21st Century for managers, planners, designers, and civic officials.

THE FIVE DOMAINS* OF SUSTAINABLE DEVELOPMENT: A Paradigm for Design, Planning and Urban Management

*("Domain" in this context is used to mean: "..... a field of human activity, with similar features, information or concerns.")

If we are to have a reasonable chance of managing the growth of the urban habitat, and at the same time achieve a balance of economic development with the conservation of the earth's natural systems, we must expand our definition of the principles of sustainability. We must see the problems in a systems context, rather than in a one-dimensional, single-issue context.

During the first official recognition of the concept of Sustainable Development by the United Nations' Brundtland Commission, it was stated that a principle of sustainable development was necessary to protect the natural systems of the earth, and that the principle should "..... ensure that development meets the needs of the present without compromising the ability of future generations to meet their own needs."³

Since the beginning of the concept and the subsequent studies on implementation, sustainable development has consistently been represented as having three domains -- *the environment, economics, and the social context* -- and, that they must be treated interdependently for a sustainable balance to occur. Many business and governmental leaders have been skeptical about placing any domain on a par with economics. Even those who, sooner or later, will adopt the values of living in balance with nature often find the tools and the reach within these three domains to be limited.

The limitations in achieving real sustainability exist whether the scale of the development is at the micro level (such as an individual building or neighborhood), or at the macro scale of habitat (such as a city or a region of urban habitats). The designer, the planner, the developer, the civic official, or the NGO leader who is genuinely interested in facilitating a sustainable solution in the urban context will not find all the networks or ingredients, or all the information, or all the tools and alternatives for solutions within only these three domains.

Consider, for example, a proposed new development which has all the finance necessary, a good environmental plan which protects and restores critical natural ecosystems, and it enhances and improves scores of lives of prospective occupants; but, under new limitations on automobile use, it provides no dependable means of affordable transportation to places of employment for the residents. The three domains of economics, environment and social criteria have been treated, but a fourth domain -- the technology of transportation -- is missing. In another hypothetical scenario, consider the same development successfully constructed, with adequate transportation technology and successfully inhabited and operated for some years; suddenly, a polluting industrial development is authorized for construction on an adjacent site, resulting in health hazards to the residents of the development. In this

case, the fifth missing domain is public policy, or, the regulatory context of the habitat that would have prohibited the conflicting land use.

Within these two additional domains – *technologies and policy* – there are numerous examples of human invention and/or intervention that can be noted to have either facilitated or retarded community progress toward sustainability. Two extreme, and debatable, examples are the automobile (technology) and the consequences of its use resulting in threats to the natural systems, and the principle of humans “owning” land (policy) and the consequential effect of economic speculation on the earth’s natural systems. Whether we individually value these conditions, or not, is not the key consideration. A fact of modern life is that technologies exist, that they are influential and have been historically important, and that they will continue to accelerate through human ingenuity. So too, will the rules and regulations for relations among us, and our access to the bounties of the earth. Both domains are pervasive and affective. The cause and effect relationships to the other three domains are inseparable from them.

A further limitation in the classic three-domain definition of sustainability is the often limiting, or limited, view of the “social” domain. In the context of globalized economics it is often the case that cultures, cultural histories, and/or public aspirations for maintenance of cultural distinctions are either accidentally or intentionally overlooked. From the beginning of the 20th Century, and continuing today at an accelerated pace, global cultures have become more homogenous and less distinct, nation to nation, than in any previous era of history. Architectural expressions have become more similar and “westernized”, and less respectful of distinct, historical cultures. Telecommunications and computer technologies have provided instantaneous exchanges of information among cultures, and the multitude of technologies fueling the engines of global economics have provided almost instantaneous access to goods and materials regardless of their place of origin or manufacture. Cultural images and symbols can now be instantly mixed, matched, modified and reformatted into virtual images that may or may not convey valuable, or lasting cultural information. But, the images nevertheless are highly influential. Not only have these systems of instant availability overwhelmed many indigenous cultural patterns, but they are also, in unintended consequential ways, overwhelming the natural systems of the earth.⁷

The social domain must always provide for a reminder -- and the tools for analysis -- of not only the quality of life of people, but also their cultural heritages, aspirations, and symbols. Thus the proposed, modified “*socio-cultural*” domain.

Therefore, on the basis of these and other examples of our continuing and widening gulf of separation between human systems and natural systems, the Joslyn Institute has developed project evidence that the Five Domains of Sustainability, for humanity, bio/eco-systems, communities, and the earth are:

- **Environmental** (natural and man-built),
- **Socio-cultural** (history, conditions, and contexts),
- **Technological** (appropriate, sustainable)

- **Economics** (the production of goods and services within a sustainable context, and the financial resources to support the production, trade, operations, and maintenance)

- **Public Policy** (government, or public rules/regulations) (Fig. 1)



Figure 1: The FIVE Domains of Sustainability

Further, in the city of the future these domains should be the organizing principles for urban administration, urban design and planning, urban growth management, and regional and urban sustainable development. The domains, and all the information contained within them, are interdependent, interactive, and affective, one in turn upon each of the other four. A systematic analysis of their interdependencies, in any developmental or operational situation, will reduce the potential of unintended, unanticipated consequences, at any scale of development.⁸

SUSTAINABILITY INDICATORS AND THE E/STEPSM TOOL

Measuring or projecting the improvement or decline of various quality of life factors over time is clarified using the E/STEPSM tool. Symbolizing the cyclical quality and interconnectivity of all living systems, E/STEPSM is an effective tool for plotting various sustainability indicators in three term, or time, ranges—short-term (S), medium-term (M), and long-term (L)—each divided into ten time frames that can be defined however the user chooses (i.e. one year, ten years, etc.). (Fig. 2)

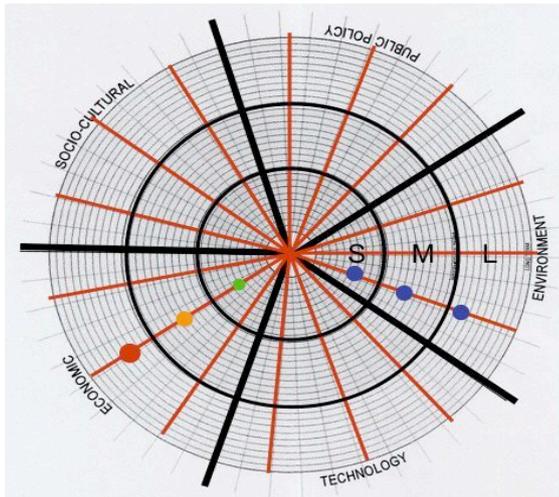


Figure 2: Tool for Measuring Sustainability

In an ideal world, an indicator (for example, water quality), plotted near the outermost ring of each term scale would be considered, or judged to be approaching the best possible outcome or condition for sustainability.

In this example, short-term conditions appear to be approaching optimal, yet the relative immediacy of medium and long-term measures indicate water quality challenges that lie ahead. For further detail, the dots plotted on the scale can be color-coded and sized according to the urgency or scale of the challenge of that particular indicator.

The E/STEPSM tool allows any user to assess hypothetical yet real life situations, or real conditions of design or planning intent, to assess the assumptions for consequences and trade-offs, and to communicate those situations to stakeholders and leadership. By incorporating all five domains the tool is effective both in gauging progress and in revealing the various and complex trade-offs that will occur between indicators.

This graphic representation of issues and conditions makes E/STEPSM an ideal tool for collaborative planning as well as for communicating to leaders and the public a region's progress toward a sustainable vision and quality of life goals. The Joslyn Institute has applied the tool to a diverse range and scales of built-environment projects, including individual buildings, neighborhood contexts, small communities, districts within cities, and to large regions.

By way of examples of the variety of applications of the tool, a September 2006 charrette brought together 150 architects, planners and regional stakeholders to identify growth challenges and opportunities and to envision a sustainable future for a rapidly growing metroplex region.

ENVISIONING REGIONAL DESIGN

Envisioning Regional Design is an ongoing initiative of the Joslyn Institute for Sustainable Communities to address growth challenges, and future conditions of sustainability in the "Flatwater Metroplex" of southeast Nebraska and southwest Iowa, USA. The metroplex area includes three major cities, more than 1.0 million total residents, and 119 communities that each accommodate 400 or more residents.

The Five Domains of Sustainability—*Environment, Society/Culture, Technology, Economics and Public Policy*—provided a framework for charrette-teams' organization, discussions, and for interpretation of the results of the one-day design/planning event.

Six charrette teams examined six environments, simultaneously, in the Metroplex region:

- **I-80 Interstate Highway Corridor Environs:** Examination of growth challenges and opportunities at various sites along the Interstate 80 Corridor between Lincoln and Omaha/Council Bluffs.
- **Communities in the Path of Growth:** The impacts/opportunities of growth in a small commuter town between Lincoln and Omaha.
- **Suburban Conservation Community:** Proposal for a conservation community near Bennington (exurban Omaha).
- **Transformation of a Regional Shopping Mall:** Outdated suburban retail area in a mid-sized Metroplex community.
- **Near Urban Core Neighborhood:** Continuing the revitalization of the Drake Court district near downtown Omaha, based on other JISC recent studies and improvements in this historic neighborhood.
- **Urban Core Center:** An examination of opportunities for revitalization in downtown Lincoln associated with the Downtown Master Plan, Antelope Valley Project, and other work and studies.⁸ (Fig. 3)



Figure 3: Six Regional Case Studies
(full report @ www.ecospheres.com)

These distinct environments are models for the many types of rural and urban communities that require evaluations and design/planning for new conditions of sustainability. Challenges and solutions identified in this report are readily transferable to any community facing growth and change. Several themes emerged from the charrettes that could be applied to a range of urban and rural conditions along the I-80 Corridor and throughout the Metroplex, and elsewhere:

- **Lack of a Shared Vision** of preferred regional growth patterns, land use policies, or economic goals. Lack of coordination, and/or competitive tensions lead to inefficiencies and hamper efforts to improve quality of life. Lack of communication and public input leads to mistrust and misinformation.

- **Outmoded, Conflicting Policies.** Municipal, county and state governments have different, conflicting approaches to planning. Policies and jurisdictions designed to address 19th century conditions are not suited to the global challenges of the 21st century.

- **Infrastructure** lags behind growth pressures due to a lack of coordinated planning and transportation alternatives. With commuter traffic expected to increase eightfold in forty years, alternatives are needed to current transportation networks and funding methods.

- **Ecological Threats.** Economic growth will not occur, and quality of life will diminish, without a consensus on the region's most fragile natural, social and historic environments and strategies/mechanisms to protect these environments.

- **Land Conversion.** Rural/urban interests are in conflict as farmland and fragile natural environments are lost to sprawl and acreage-style development. There is a critical need to foster understanding of the interdependencies of all communities and natural systems through the creation of food-based coalitions.

- **Energy and Natural Resources.** Valuable natural resources (water, wind, soils, 4-season solar climate) are underutilized or misallocated. Incentives are needed to increase the use of clean, alternative energy and to make energy efficiency a priority through building code improvements and incentive programs.

- **Healthy Living.** New policies are needed to encourage healthy, walkable communities that offer transportation and housing choices in mixed-use developments, preserve urban centers, and promote vibrant public spaces and neighborhood identity.

Five elements of the Earth's resources—Land, Water, Materials, Energy and Food—define areas most affected by growth management issues in the Flatwater Metroplex. These elements are common to both rural and urban interests and serve as a basis for discussion and, ultimately, the formation of urban/rural coalitions that are essential to building sustainable communities.

As previously noted, the prevalent, current ways of planning and development are neither cost-effective nor sustainable even for the near future, and continued inaction will lead to extreme consequences as huge growth demands are put upon natural resources and infrastructure. Flatwater Metroplex stakeholders must coalesce into a single economic, cultural, environmental and civic entity if they hope to maintain or improve the qualities of life. They need to discover

and adopt tools and means to address the source of problems rather than the symptoms. To achieve this goal, Metroplex stakeholders and their leaders need to consider policies and initiatives that are being enacted by other metro regions in the US and elsewhere:

1. Adopt state policies that clarify and prioritize land uses, protect the most arable and fertile rural lands for food production, and protect natural, historic and cultural resources. The state should coordinate reviews of water-related policies to ensure equitable access to clean water for human, agricultural, industrial and wildlife uses. Water is perhaps the most significant element; if the state and region does not get a handle on water policy, economic prospects will fall flat.

2. Establish regional cooperative planning through a voluntary set of regional partners. Transportation networks, watersheds, natural resources and cities extend beyond jurisdictional boundaries and are not effectively managed by outdated, piecemeal or conflicting approaches. Sustainable development is only achieved through connected, coherent regional policy.

3. Initiate an effective planning process. Conduct regular conferences, meetings and workshops that give every stakeholder an opportunity at the table. Establish a series of councils and investment zones representing diverse rural and urban interests, identify and publicize best practices, and establish a consensus of the region's most fragile, natural, social and historic environments. Based on a series of indicators, planning should promote safe, walkable communities, food-based rural/urban coalitions, and energy conservation while protecting the most fragile natural, social and historic environments.

APPLYING SUSTAINABILITY INDICATORS TO THE E/STEPSM MODEL

Selecting relevant and measurable indicators from each of the five domains is the key to the metrics of sustainability. Wherever possible each indicator should have a data set and a topology of information by which the condition, event, or circumstance can be described, and, the source of the data and information should be available for comparative purposes over time.

We have selected one of the Envisioning Regional Design Charrettes, the revitalization of an urban commercial district, i.e. the Drake Court District in Omaha, Nebraska, as a case study to illustrate the use and conditions of the sustainability indicators. The fifteen indicators (three for each of the five domains) were selected by the JISC staff, following the charrette team's completion of their design and planning recommendations. As noted above, each team, with the assistance of a professional facilitator worked

through the five domains to identify strengths, weaknesses, opportunities, and threats to the existing urban district. The discussions and the body of text, drawings, and illustrations produced by the charrette team served as the foundation for indicators:

1. Environment

- Increase green and public open spaces/increase green streetscapes
- Enhance conditions for walkability and bikeability/connectivity to adjacent districts and pedestrian destinations
- Upgrade the building stock/give the district a distinct visual and socio-cultural identity

2. Socio-cultural

- Develop new mixed uses/create a character of an "urban village"/emphasize mixed-income housing, with commercial facilities to accommodate daily needs
- Create safe streets and public gathering places/create a new downtown Civic Plaza for Omaha
- Emphasize and accommodate public facilities/extend the Arts Corridor along 20th Street

3. Technologies

- Begin planning for a new multi-modal transit and transportation system for the district and downtown
- Make WIFI electronic access available throughout the district
- Develop feasibility plans for a "district" energy and utilities system

4. Economics

- Create city government incentives for the development of infill and new development for the district
- Emphasize the economics of affordable and low-income housing/connected to development incentives for daily needs shops and stores
- Give priority to developments with locally owned businesses

5. Public Policies

- Incorporate a new "Sub-area Plan" for the district into the City's Comprehensive Plan
- Develop an overlay plan for the district designating the district as a "Green by Design District"
- Create a district "Citizen's Development Coalition, with members from property owners, stakeholders, businesses, institutions, and residents in the district.

The following E/STEPSM graphic illustrations (Fig. 4, Fig. 5) show the fifteen indicators and our assessment of existing/near-term, medium-term, and long-term prospects of contributing to a more sustainable condition for each of the fifteen indicators over the three time scales.

Drake Court, Omaha, Nebraska

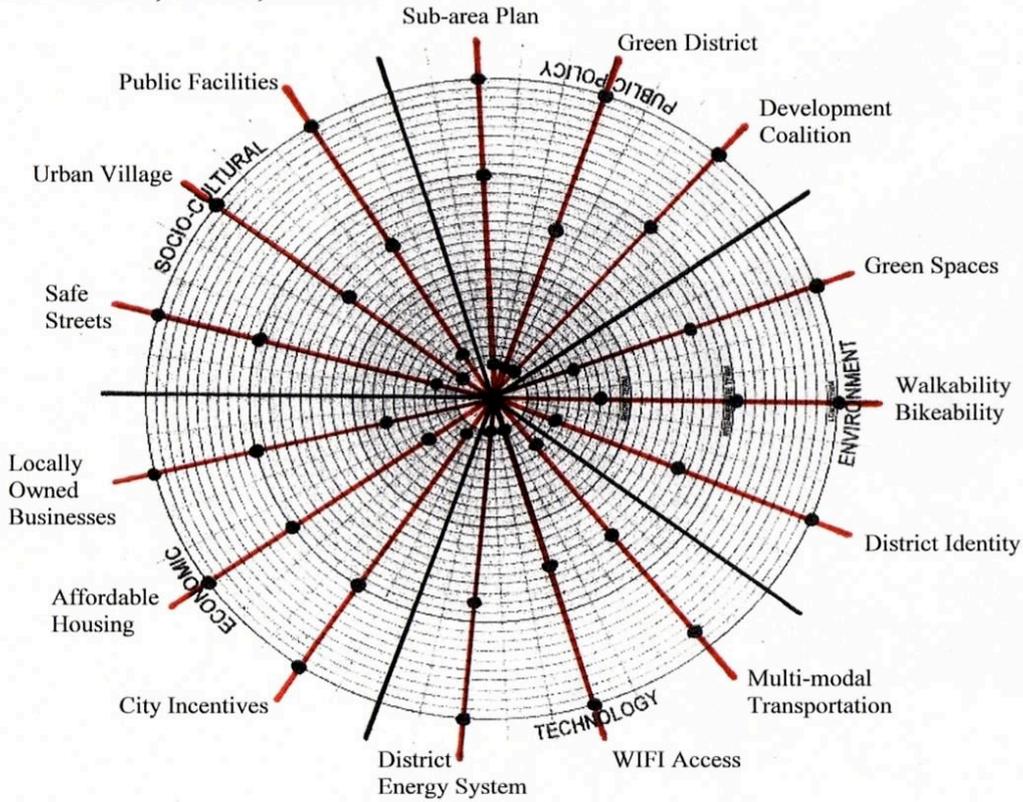
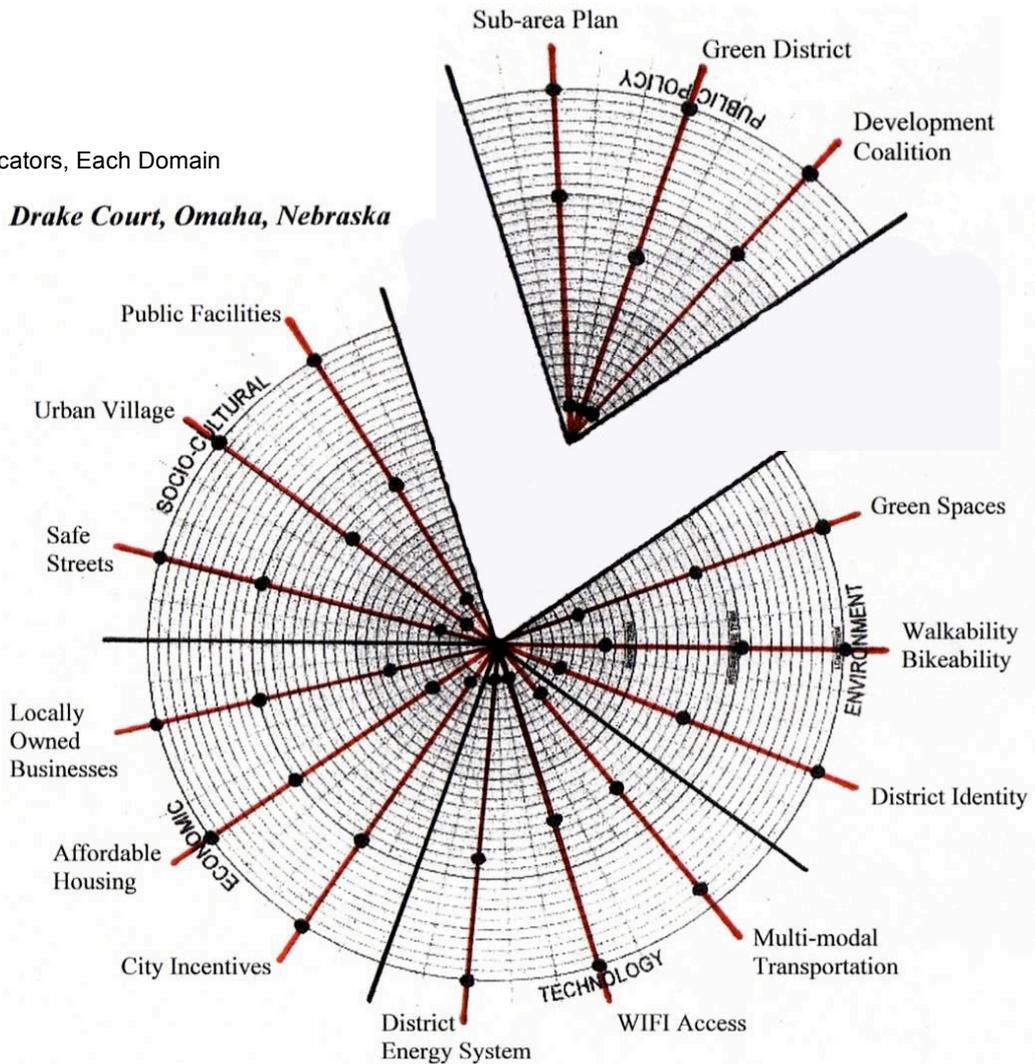


Figure 4: Metrics of Sustainability Indicators

Figure 5: Three Indicators, Each Domain

Drake Court, Omaha, Nebraska



CONCLUSION

Within this recommended methodology for designers, planners and urban administrators it is imperative that the user adopt the Five Domains Principles of Sustainability. This cognitive framework will prompt the user to consider a more thorough brief on the limitations, information and interdependent opportunities for the goal of creating sustainable products, places, and habitats.

Viewed aggregately and measured annually (or on any regular time cycle), the E/STEPSM tool can be used: a) in design/planning for the district by professionals, b) as an organizing mechanism for a interdisciplinary team, c) as a information vehicle between city administration and the district stakeholders, d) as a public information vehicle for annual progress reports, and e) as a post-occupancy evaluation instrument for specific projects and developments as they are completed in the district.

Our society's objective for the life styles of future generations should not necessarily be the reduction of consumption, but the reduction of the consumption of non-renewable resources. However, this goal requires a new conservation-based ethic and new practice methodologies for the way we make goods, places and products. A pervasive E/STEPSM strategy for Sustainable Design, Planning, and Urban Administration can result in a balance of the five domains, and thus real sustainability.

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