
Integrated Urban Development: A Survey on Living Circle Perspective and Community Planning

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Abstract

This survey paper explores the integration of the Living Circle Perspective, New Time Geography, age-friendly cities, and related concepts into urban development strategies. Emphasizing inclusivity, adaptability, and sustainability, these frameworks collectively foster environments responsive to diverse resident needs. The Living Circle Perspective highlights community engagement and ecological integration, enhancing urban resilience and sustainability. New Time Geography offers insights into spatial-temporal dynamics, optimizing urban infrastructure and mobility. Age-friendly principles ensure accessibility and social inclusion, vital for aging populations. Case studies illustrate successful implementations, underscoring the importance of participatory design and cultural integration in urban planning. Technological advancements, including predictive models and dynamic community detection methods, enhance urban resilience and resource distribution. By leveraging innovative geographic concepts, urban planners can achieve equitable redistricting and effective spatial interaction planning. The survey concludes that integrating these methodologies promises more resilient, equitable, and dynamic urban environments. Future research should focus on enhancing community engagement, technological integration, and adaptive planning strategies to further these goals.

1 Introduction

1.1 Relevance of the Living Circle Perspective

The Living Circle Perspective offers a transformative approach to urban development by integrating social, economic, and environmental dimensions in community planning. This perspective is crucial for addressing the complexities of contemporary urban environments, necessitating adaptive, inclusive strategies that cater to diverse resident needs. It emphasizes community engagement in decision-making processes, enhancing urban resilience and sustainability [1]. Such engagement is vital for developing frameworks that bolster community resilience against climatic hazards, underscoring the urgency of resilient urban development strategies [2].

Furthermore, the Living Circle Perspective informs modern planning strategies by improving the prediction of emergency events in urban settings, which is essential for effective emergency management [3]. This predictive capability supports the creation of intelligent infrastructure that addresses national challenges, including pandemics, natural disasters, and social justice [4]. Additionally, it aligns with innovative planning methods that evaluate the layout of community amenities based on the interaction between virtual and physical spaces, thereby enhancing urban adaptability [5].

Incorporating the Living Circle Perspective into urban planning necessitates recognizing the equity of micro-location allocation for green spaces, ensuring accessibility and alignment with community preferences. This approach furthers the broader objective of promoting sustainable urban development and fostering mutual respect among diverse demographic groups. Through urban planning research focusing on the equitable distribution of park green spaces within community life circles, the Living

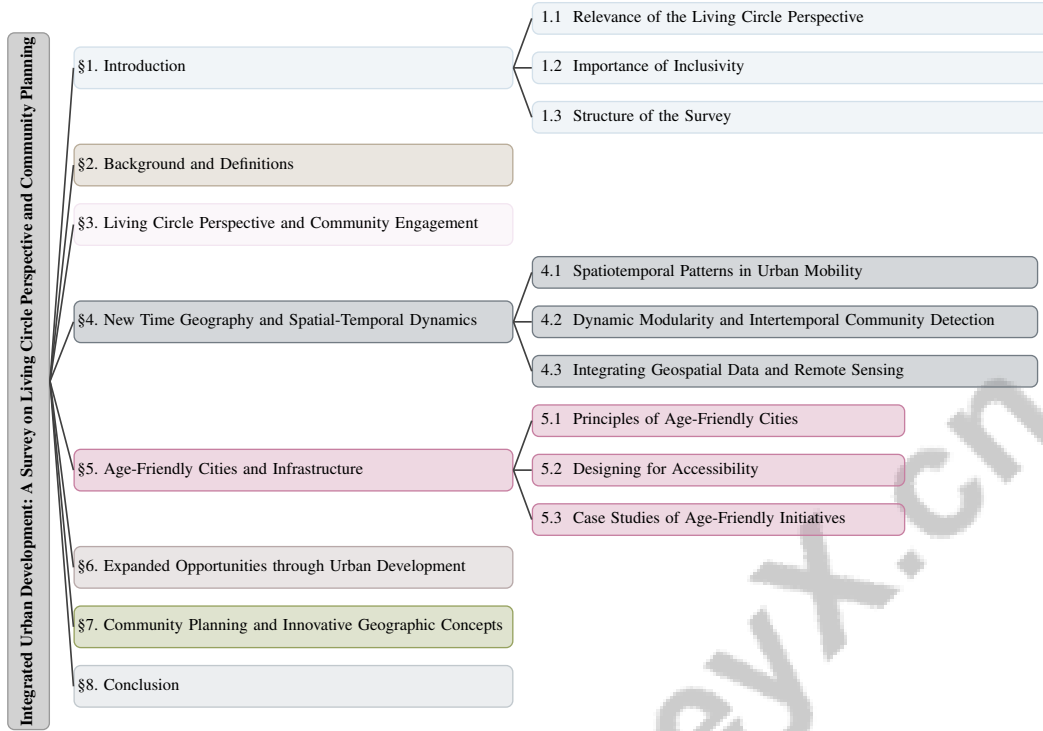


Figure 1: chapter structure

Circle Perspective emerges as a crucial framework for fostering inclusive and sustainable urban environments that enhance community well-being [6, 7].

1.2 Importance of Inclusivity, Sustainability, and Adaptability

The necessity for inclusivity, sustainability, and adaptability in urban development is accentuated by the increasing complexity of modern cities, which demand responsive and equitable planning strategies. Inclusive planning approaches, exemplified by the Clarkston ArGateways project, empower marginalized communities by integrating diverse narratives, including those of refugees, into public art and urban spaces [8]. This inclusivity extends to stable housing solutions that accommodate both local residents and refugees, fostering social cohesion [9]. Moreover, current research highlights the significance of incorporating marginalized voices in AI development to create more representative and culturally sensitive AI models [10].

Sustainability in urban development is increasingly realized through innovative frameworks that enhance resource efficiency and environmental stewardship. Decentralized market mechanisms for energy transactions among community members promote economic efficiency while adhering to sustainability goals within defined environmental limits [11]. The integration of virtual services into community planning is also essential for improving service efficiency and accessibility, reflecting the necessity of sustainable urban planning [5]. Intelligent infrastructure technologies play a pivotal role in enhancing urban resilience, safety, and economic growth, reinforcing the importance of sustainable urban planning [4].

Adaptability is a critical element of urban planning, illustrated by frameworks that facilitate the co-creation of virtual environments, fostering community engagement and ensuring urban spaces evolve in response to user needs [12]. The evaluation of senior living facilities in Shanghai underscores the importance of adaptable infrastructure to accommodate an aging population, ensuring accessibility and quality of life for all residents [13]. Localized and adaptive practices in urban development are essential for addressing unique community challenges, as emphasized by the concept of third spaces [7].

The challenges of modeling diverse community preferences further highlight the necessity of inclusive, sustainable, and adaptable planning, requiring flexible frameworks that accommodate varying utility

functions [14]. Addressing transportation noise and its racial and ethnic disparities necessitates comprehensive planning approaches sensitive to all community members' needs [15]. Ultimately, structured yet flexible planning approaches, informed by continuous community input, are vital for developing urban environments that are resilient, equitable, and responsive to changing societal needs [16].

1.3 Structure of the Survey

This survey is structured to comprehensively explore integrated urban development through the Living Circle Perspective and related concepts. It begins with an introduction to core themes of integrated urban development, emphasizing the significance of the Living Circle Perspective in modern urban planning strategies. This is followed by a discussion on the importance of inclusivity, sustainability, and adaptability in urban environments, setting the stage for subsequent sections.

The second section provides a background and definitions of key concepts, establishing a foundational understanding of terms such as Living Circle Perspective, Community, Expanded Opportunity Living Circle, New Time Geography, Age-Friendly Cities, Urban Development, and Community Planning. This section aims to trace the origins and evolution of integrated urban development and highlight the relevance of New Time Geography.

The third section examines the Living Circle Perspective in detail, focusing on its role in fostering community engagement. It includes an exploration of community-centered perspectives, ecological considerations, and the interaction between socioeconomic systems and community engagement, as well as the impact of participatory design in empowering communities within urban development contexts.

The fourth section investigates New Time Geography and its application in understanding spatial and temporal dynamics in urban environments, covering urban mobility patterns, dynamic modularity, intertemporal community detection, and the integration of geospatial data and remote sensing technologies.

The fifth section is dedicated to age-friendly cities, emphasizing the importance of designing urban infrastructure that accommodates all age groups. It outlines strategies for accessibility and presents successful case studies of age-friendly initiatives worldwide.

The sixth section analyzes how urban development can expand opportunities for residents, focusing on economic, social, and environmental aspects, including community-centric approaches and equitable resource distribution.

The seventh section explores the role of community planning in integrating innovative geographic concepts into urban development, examining the use of geographic concepts in urban redistricting and spatial interaction planning, the integration of technology in enhancing community planning processes, and the importance of participatory and inclusive planning in addressing urban challenges.

The survey concludes by synthesizing key findings and offering insights into the implications of integrating the examined concepts into urban planning and development. This comprehensive overview emphasizes the potential for fostering inclusive, sustainable, and adaptable urban environments, highlighting the importance of equitable access to community amenities and considering demographic factors in the planning process. By addressing these elements, the survey informs stakeholders of innovative strategies that can enhance urban life quality and meet diverse resident needs [13, 5, 6, 4, 17]. The following sections are organized as shown in Figure 1.

2 Background and Definitions

2.1 Conceptual Framework of Integrated Urban Development

The conceptual framework of integrated urban development combines theoretical and practical methodologies to create cohesive, sustainable, and adaptable urban spaces. It leverages social network structures and demographic correlations to classify social places within urban landscapes, aiding in the understanding of interactions and supporting inclusive planning for diverse communities [17]. A key component is the use of cognitive heuristics in community detection, such as the Cognitive-Inspired Community Detection Algorithm (CICDA), which emulates human decision-making to

identify community structures [18]. This approach enhances adaptability and responsiveness in urban planning, aligning with decentralized governance models that emphasize user engagement [12].

The framework recognizes the diversity of social behaviors and preferences, as evidenced by micro-location principles that categorize research based on community needs [6]. This diversity presents challenges, such as insufficient facility types and unclear configuration standards, necessitating integrated policy and practical implementation [13]. The integration of geospatial datasets with large language models (LLMs) offers a novel perspective on urban dynamics [19]. Optimizing geo-temporal graphs from trip data identifies prime locations for infrastructure, like bike-sharing stations, enhancing urban mobility [20].

Dynamic operating envelopes are crucial for understanding energy communities' regulatory constraints, highlighting the need for adaptable frameworks that accommodate evolving demands [11]. This adaptability is further demonstrated by the multimodal deep learning framework AOITR, which detects areas of interest boundaries and assesses their reliability, informing urban planning [21]. Addressing racial and ethnic disparities, the Fair Share Ratio assesses noise annoyance, enabling comparative analysis of exposure versus population share [15]. Models considering both inhabitants' and refugees' preferences contrast previous models focused on one group [9].

The concept of thirdspaces integrates adaptive practices and transformative changes, offering a holistic view that incorporates diverse perspectives and fosters innovation [7]. Through these contributions, the conceptual framework of integrated urban development emerges as a dynamic approach to shaping urban environments that respond to all residents' needs.

2.2 Understanding New Time Geography

New Time Geography provides a transformative lens for urban planning, emphasizing the dynamic interplay between spatial and temporal dimensions. It is crucial for addressing modern urban challenges, balancing location privacy with effective environmental monitoring [22]. Spatial-temporal community detection methodologies, which analyze clusters of significantly connected nodes in time-series networks, are vital for understanding fluctuating connectivity trends [23].

The impact of virtual services on residents' activities and community spaces highlights New Time Geography's relevance, necessitating adaptable planning strategies that accommodate both physical and virtual spaces [5]. By incorporating these insights, urban planners can create resilient and responsive environments that meet the evolving needs of diverse populations, ensuring urban spaces remain inclusive and sustainable amid rapid technological advancements and societal shifts.

In recent studies, the importance of community engagement in ecological initiatives has gained significant attention. The Living Circle Perspective serves as a framework that encapsulates this engagement, illustrating the interconnectedness of ecological, socioeconomic, and participatory design elements. As depicted in Figure 2, this figure illustrates the hierarchical structure of the Living Circle Perspective and Community Engagement, categorizing the integration of community-centered perspectives with ecology, socioeconomic systems, and participatory design. The chart highlights the relationships and challenges within each category, emphasizing ecological integration, socioeconomic dynamics, and community empowerment. This visual representation not only enhances our understanding of these complex interactions but also underscores the necessity of an integrated approach to fostering sustainable communities.

3 Living Circle Perspective and Community Engagement

3.1 Community-Centered Perspectives and Ecology

Community-centered urban planning integrates ecological considerations to foster sustainability and resilience. Decentralized governance models enhance community engagement, empowering residents to influence their environments [12]. The CHATMAP method, utilizing large language models to interpret geospatial data, supports this approach by embedding ecological elements into planning frameworks [19]. Wang et al. emphasize the importance of accessibility and coverage in categorizing community facilities, which ensures ecological considerations are integral to sustainable urban development [13].

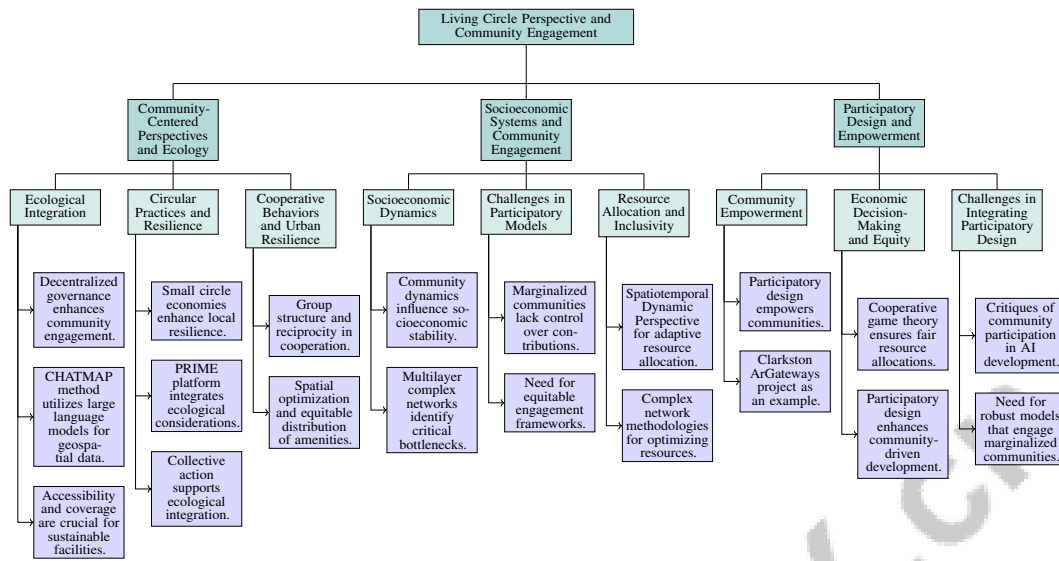


Figure 2: This figure illustrates the hierarchical structure of the Living Circle Perspective and Community Engagement, categorizing the integration of community-centered perspectives and ecology, socioeconomic systems, and participatory design. The chart highlights the relationships and challenges within each category, emphasizing ecological integration, socioeconomic dynamics, and community empowerment.

As illustrated in Figure 3, the key components of community-centered urban planning are highlighted, showcasing decentralized governance, ecological integration, and resilience and cooperation as primary categories. Each category encompasses specific methods and practices, such as empowering residents and fostering cooperative behaviors, which contribute to sustainable and resilient urban environments. Small circle economies, as discussed by Manolchev et al., illustrate the potential for circular practices to enhance local resilience, promoting community engagement through sustainable practices [7]. The PRIME platform facilitates community-centered approaches by enabling analysis and visualization of disaster resilience, integrating ecological considerations into urban planning [2]. Initiatives that empower individuals and foster collective action further support ecological integration in community-centered perspectives [1].

Murase et al. highlight the role of group structure and reciprocity in cooperation outcomes, emphasizing ecological considerations in fostering cooperative behaviors that enhance urban resilience [24]. This integration of ecological considerations, supported by decentralized governance, advanced geospatial technologies, and systematic organization of community facilities, addresses spatial optimization and equitable distribution of amenities, particularly in urban green spaces. By leveraging these innovations, urban planners can align community services with local demands, fostering a sustainable and inclusive urban environment [6, 25, 17, 5].

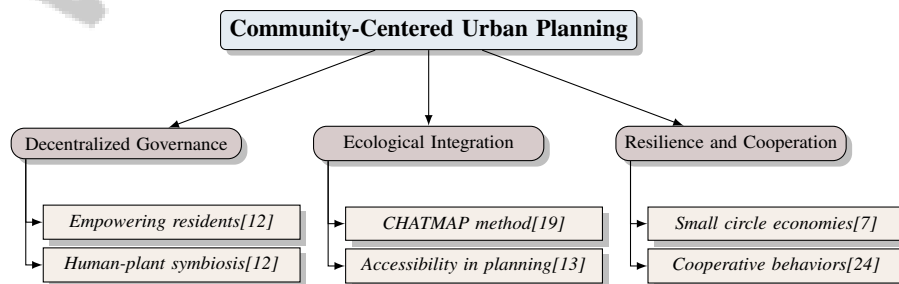


Figure 3: This figure illustrates the key components of community-centered urban planning, highlighting decentralized governance, ecological integration, and resilience and cooperation as primary categories. Each category encompasses specific methods and practices, such as empowering residents and fostering cooperative behaviors, contributing to sustainable and resilient urban environments.

3.2 Socioeconomic Systems and Community Engagement

The relationship between socioeconomic systems and community engagement within the Living Circle Perspective is pivotal for urban development strategies. This interaction reveals how community dynamics influence socioeconomic stability, while socioeconomic conditions affect community participation. Utilizing multilayer complex networks, researchers identify critical bottlenecks and opportunities, informing strategies that promote social and economic well-being, especially in developing regions. "Third places" serve as social hubs, reinforcing existing relationships and facilitating new connections [17, 1, 26].

A significant challenge is the extractive nature of participatory models, where marginalized communities often lack control over their contributions, leading to further marginalization [10]. This calls for innovative frameworks ensuring meaningful and equitable engagement. The Spatiotemporal Dynamic Perspective emphasizes adaptive resource allocation based on resident behavior, fostering equitable and sustainable environments [5]. Social interaction restrictions, as noted by Murase et al., highlight the need for socioeconomic systems promoting inclusivity and cooperation [24].

Incorporating these insights into urban strategies requires understanding the interactions between socioeconomic systems and community engagement, particularly through complex network methodologies that optimize resource allocation. This is vital for addressing diverse community needs in evolving urban landscapes shaped by physical and virtual spaces [17, 6, 5, 26]. By fostering equitable resource distribution and inclusive participatory models, urban planners can enhance community engagement and contribute to resilient and sustainable urban spaces.

3.3 Participatory Design and Empowerment

Participatory design is a transformative approach in urban development, empowering communities through inclusive processes. This method prioritizes active community involvement, ensuring urban environments reflect inhabitants' needs. The Clarkston ArGateways project exemplifies participatory design's potential by engaging refugees in co-design processes, fostering empowerment and inclusivity [8].

Participatory design intersects with cooperative game theory in economic decision-making, ensuring fair resource allocations through Lindahl equilibria computation [14]. This enhances equity in resource distribution, strengthening community influence on urban outcomes. Moreover, participatory design facilitates community-driven development responsive to feedback and adaptation [16].

However, integrating participatory design into urban development presents challenges. Dalal et al. critique community participation in AI development, where existing frameworks may inadequately capture marginalized groups' benefits and harms [10]. This highlights the need for robust participatory models genuinely engaging marginalized communities, ensuring their voices are heard and contributions valued.

4 New Time Geography and Spatial-Temporal Dynamics

4.1 Spatiotemporal Patterns in Urban Mobility

Method Name	Spatiotemporal Analysis	Behavioral Insights	Predictive Frameworks
CA-LSTM[27]	Spatiotemporal Distribution	Individual Preferences	Predictive Models
OGTGC[20]	Spatiotemporal Patterns	-	Community Detection
ICD[23]	Time-series Networks	Socio-economic Dynamics	Significance-testing Framework
DDEM[28]	-	Social Relationships	Evolutionary Game Theory
NBR-EEP[3]	Spatial Features Collected	Individual Preferences Impact	Predictive Models Development

Table 1: Comparison of various methodologies in spatiotemporal analysis, behavioral insights, and predictive frameworks for urban mobility. This table highlights the specific contributions of each method, including context-aware demand prediction, community detection, and evolutionary game theory, to enhance urban infrastructure and mobility planning.

Analyzing spatiotemporal patterns in urban mobility through New Time Geography offers profound insights into optimizing urban infrastructure, notably within shared mobility systems like bike-sharing networks. Sardinha et al. underscore the significance of examining the spatiotemporal distribution of

check-ins and check-outs to achieve effective station balancing and bike relocation [27]. Roantree et al. further highlight the role of spatiotemporal analysis in identifying optimal locations for new bike-sharing stations to enhance operational efficiency [20]. Tan's genealogy graph evaluation provides a framework for understanding community emergence and evolution, offering predictive insights into future growth patterns crucial for urban mobility planning [29]. He et al. demonstrate the utility of spatiotemporal analysis through intertemporal community detection, leveraging bikeshare and taxicab data from cities like Chicago and New York to comprehend urban mobility trends [23]. Table 1 presents a comparative analysis of different methodologies employed in the study of spatiotemporal patterns, behavioral insights, and predictive frameworks relevant to urban mobility.

Incorporating behavioral insights, Lee's sociological tests using dyadic data reveal the impact of social relationships on mobility patterns [28]. Cass et al.'s mathematical framework involving rough differential equations models population dynamics and individual preferences, emphasizing the intricate relationship between social factors and mobility [30]. These methodologies highlight the need for adaptive urban planning strategies. Sharma et al.'s evaluation of emergency event prediction models underscores the importance of mobility in effective emergency management [3]. Small's analysis of mobile communication data during extreme events reinforces the necessity of understanding human behavior in emergencies for resilient urban mobility planning [31]. Murase et al.'s theoretical perspective, based on evolutionary game theory, enriches this discourse by examining cooperative behaviors driven by direct reciprocity within group-structured populations, influencing urban mobility patterns [24].

4.2 Dynamic Modularity and Intertemporal Community Detection

Dynamic modularity and intertemporal community detection are pivotal for understanding the evolving nature of urban communities and their temporal interactions. Wang's introduction of dynamic modularity addresses edge volatility and temporal properties, providing a framework that diverges from traditional methods by incorporating temporal fluctuations [32]. He et al.'s intertemporal community detection method refines this understanding by identifying clusters of nodes with significant connectivity trends, enabling nuanced analysis of human mobility trends [23]. The spatial-temporal compressive sensing framework CSWA represents an innovative approach to community detection, operating without centralized data aggregation, enhancing real-time dynamics capture [22]. Kruse et al.'s interaction ratio (IR) evaluates how electoral districts capture communities of interest, providing comparative analysis of intra-district versus inter-district population flows [25]. Roantree et al. showcase dynamic modularity's potential in optimizing urban infrastructure through novel algorithms within graph-based frameworks, identifying new station locations for shared mobility systems while accounting for spatiotemporal dynamics [20]. The AOC method enhances the IKC approach by enabling overlapping community detection, accommodating overlapping community boundaries [33].

4.3 Integrating Geospatial Data and Remote Sensing

Integrating geospatial data and remote sensing technologies is crucial for analyzing urban dynamics, offering insights into spatial and temporal patterns that characterize modern cities. The CSWA framework, utilizing a decentralized non-negative matrix factorization algorithm, facilitates understanding spatial-temporal community structures without centralized aggregation, supporting responsive urban planning strategies [22]. CHATMAP exemplifies the integration of geospatial data with linguistic models, fostering nuanced understanding of urban environments [19]. Remote sensing technologies, combined with dynamic features from human mobility as seen in the AOITR framework, generate accurate areas of interest (AOI) boundaries, informing development and infrastructure planning [21]. Advanced machine learning models, including the serial composition of LSTM components, enhance predictive capabilities of urban mobility systems by processing multivariate inputs, optimizing resource allocation [27]. Wang's evaluation of fairness in generative mobility models underscores the importance of equitable resource distribution in urban planning, promoting inclusivity and social equity [34].

5 Age-Friendly Cities and Infrastructure

5.1 Principles of Age-Friendly Cities

Age-friendly cities are designed to accommodate the diverse needs of all age groups, with a focus on enhancing the quality of life for older adults. A key aspect is the development of community senior living facilities that prioritize accessibility and equitable service distribution. Research from Shanghai highlights the necessity for improved facility coverage and equitable distribution of amenities, emphasizing inclusive spaces that support seniors' daily activities [13, 5, 6, 4, 1]. Accessibility is fundamental, ensuring urban infrastructure supports individuals with varying mobility levels through barrier-free pathways, accessible transportation, and age-sensitive design.

Promoting social participation and inclusion is another core principle, encouraging older adults' engagement in community activities and decision-making. Creating environments that foster social interaction and mitigate isolation enhances the quality of life for older residents. Community centers, intergenerational programs, and inclusive public spaces are crucial for fostering social equity and community cohesion, providing essential resources and opportunities for interaction among diverse groups [6, 10, 4, 17, 1].

Safety and security are emphasized, with urban environments designed to protect residents from harm while promoting well-being. Enhanced street lighting, pedestrian-friendly crosswalks, and emergency response systems tailored to seniors' needs improve safety and accessibility, addressing daily requirements and enhancing quality of life [6, 13, 4, 5].

Health and wellness are critical, necessitating accessible healthcare services, active lifestyle promotion, and robust mental health support systems. In cities like Shanghai, where aging populations are significant, developing senior living facilities that cater to daily life needs is essential. Comprehensive facility coverage and accessibility promote both physical health and social engagement among seniors [6, 1, 13]. This includes integrating healthcare facilities within urban areas and creating recreational spaces that encourage physical activity and social interaction.

Adaptability is crucial, emphasizing flexibility in urban design to meet the evolving needs of aging populations. This involves creating community spaces and facilities that accommodate current requirements while anticipating future demographic changes, ensuring equitable service provision [6, 1, 13, 5]. Continuous evaluation and modification of urban policies and infrastructure are necessary to adapt to demographic shifts and emerging aging trends.

Implementing these principles aims to cultivate inclusive, supportive, and sustainable environments that enhance the quality of life for all residents. Studies in Shanghai underscore the importance of accessible community senior living facilities in improving seniors' daily lives. Optimizing the layout and availability of these facilities bridges gaps in care and services, ensuring urban spaces are livable, equitable, and responsive to the diverse needs of aging residents [13, 5, 6, 4, 1].

5.2 Designing for Accessibility

Designing accessible urban infrastructure for diverse age groups requires addressing physical, social, and technological barriers to ensure inclusivity and ease of use. Central to this is incorporating universal design principles, creating environments inherently accessible to individuals with varied abilities [13]. This includes barrier-free pathways, ramps, elevators for physical disabilities, and tactile and auditory signals for sensory impairments.

Strategically placing community facilities within service circles enhances accessibility, ensuring essential services are easily reachable [13]. This is complemented by virtual services, expanding access to resources and information, enabling residents to engage with urban infrastructure remotely [5]. Advanced geospatial technologies, such as those in the CHATMAP method, support designing accessible urban environments by providing planners with detailed insights into spatial dynamics and resident needs [19].

Intelligent infrastructure technologies play a pivotal role in enhancing accessibility by optimizing transportation networks and improving service delivery [4]. These technologies enable adaptive systems that respond to real-time data, ensuring urban infrastructure remains responsive to diverse age groups' needs.

Social inclusion is critical in accessible urban design. Initiatives like the Clarkston ArGateways project highlight the importance of integrating diverse narratives and cultural elements into urban spaces, fostering welcoming environments for all residents [8]. Participatory design processes engaging community members in planning ensure infrastructure reflects users' diverse needs and preferences [16].

Designing accessible urban infrastructure requires integrating physical, social, and technological elements to foster inclusive, adaptable, and responsive environments for all age groups. This approach leverages intelligent infrastructure technologies to enhance safety, resilience, and efficiency while addressing sustainability, social justice, and equitable access to community amenities. Focusing on the interaction between virtual and physical spaces, urban planners can optimize service amenities' layout to meet evolving resident demands and contribute to urban life quality [6, 4, 5]. Prioritizing universal design principles, strategic facility placement, intelligent infrastructure technologies, and participatory processes ensures cities remain accessible and welcoming to all residents, regardless of age or ability.

5.3 Case Studies of Age-Friendly Initiatives

Examining successful age-friendly urban initiatives offers insights into effective strategies for creating inclusive environments for older adults. Shanghai's comprehensive evaluation of senior living facilities categorizes them into medical, care, commercial, living, transportation, and cultural sectors, ensuring comprehensive coverage and accessibility within service circles [13].

The Clarkston ArGateways project in the United States exemplifies integrating diverse narratives, including those of refugees, into public art and urban spaces, emphasizing social inclusion and cultural representation in age-friendly urban planning [8]. This project demonstrates how participatory design can empower marginalized communities and foster a sense of belonging among older adults.

In Europe, the development of small circle economies showcases the potential for creating dynamic ecosystems that enhance local resilience and sustainability [7]. These economies promote community engagement and circular practices that are ecologically sustainable and economically viable, contributing to urban environments' resilience and sustainability for all age groups.

The PRIME platform facilitates age-friendly initiatives by enabling communities to analyze and visualize disaster resilience based on empirical data [2]. This platform empowers older adults to assess their resilience against environmental hazards, promoting proactive planning and sustainable development strategies tailored to their specific needs.

These case studies underscore the importance of integrating accessibility, social inclusion, and sustainability into urban planning to create age-friendly environments. Incorporating diverse community narratives, utilizing advanced information and communication technologies, and promoting active participation from local residents demonstrate cities' capacity to adapt to and thrive amid changing demands from aging populations. This approach enhances planning and optimization of community services through the interaction of virtual and physical spaces, emphasizing existing community structures in fostering new connections and cultural narratives, leading to more inclusive and responsive urban environments [8, 29, 10, 5].

6 Expanded Opportunities through Urban Development

6.1 Community-Centric Urban Development

Community-centric urban development is pivotal in fostering inclusive and adaptable environments that resonate with local contexts. The triadic closure mechanism, which emphasizes the integration of diverse community portfolios, is crucial for the emergence of new structures and sustainability [35]. This approach nurtures diverse talents and skills, catalyzing urban growth. The AOC framework further aids in identifying overlapping clusters, highlighting the interconnectedness of community structures and enhancing urban interaction understanding [33]. Recognizing that individuals often belong to multiple communities is essential for growth and opportunity potential.

Miszczak's 'design-on-demand' methodology stresses long-term community engagement, ensuring urban strategies remain responsive to evolving needs [16]. Knop et al. advocate considering both inhabitants' and refugees' preferences to promote stable housing and social cohesion [9].

Community education, as highlighted by Gilchrist, empowers individuals, enhancing opportunities within communities [1]. Dalal et al. emphasize restructuring engagement practices to ensure marginalized communities have agency in urban development outcomes [10].

Leveraging advancements in ICT, community-centric approaches optimize amenity layouts to align with interactions between virtual and physical spaces, enhancing service access and community participation [6, 1, 5]. Through diverse methodologies, these approaches empower communities to shape their environments, ensuring development aligns with residents' needs and aspirations.

6.2 Innovative Mobility Solutions

Innovative mobility solutions enhance urban connectivity, accessibility, and sustainability. Context-aware demand prediction models, such as those by Sardinha et al., optimize shared mobility systems by predicting demand patterns, improving resource allocation and user experience [27]. Graph-based optimization techniques, demonstrated by Roantree et al., identify optimal locations for new infrastructure, ensuring responsive mobility networks [20]. Spatiotemporal analysis by He et al. provides insights into human movement dynamics, enabling planners to adapt infrastructure to changing demands [23].

Incorporating behavioral insights into mobility solutions, highlighted by Lee, emphasizes social factors influencing patterns, enabling targeted strategies for diverse needs [28]. Sharma et al. evaluate emergency event prediction models, underscoring mobility's role in effective management through predictive analytics for enhanced preparedness and resilience [3].

6.3 Equity and Resource Distribution

Equitable resource distribution in urban development is complex, especially in diverse socio-economic contexts. Kruse et al. highlight spatial interaction measures as a strategy for enhancing equity in urban planning, enabling fairer representation and resource distribution through spatial interaction communities [25]. Wang's study on generative mobility models reveals trade-offs between accuracy and fairness, with the Deep Gravity model excelling in performance while the traditional Gravity model offers greater fairness across socio-economic themes [34]. Balancing accuracy and equity in mobility solutions is crucial to prevent disproportionate benefits.

The challenges of equitable resource distribution are further complicated in refugee housing contexts, as emphasized by Knop et al., advocating for considering both host community and refugee preferences for stable arrangements [9]. Strategies must be informed by spatial dynamics, socio-economic disparities, and demographic diversity. Utilizing advanced spatial interaction measures and integrating fairness metrics into mobility models, planners can balance accuracy and equity, addressing marginalized groups' needs and mitigating geographic disparities, fostering equitable urban environments [6, 34].

7 Community Planning and Innovative Geographic Concepts

7.1 Innovative Geographic Concepts in Redistricting and Spatial Interaction

Innovative geographic concepts are pivotal in refining urban redistricting and spatial interaction strategies, offering sophisticated methodologies for precise community delineation. Kruse et al. emphasize the integration of spatial interaction measures to overcome the limitations of traditional proxies, ensuring accurate representation of communities of interest (COIs) [25]. This approach supports equitable redistricting outcomes, reflecting the spatial dynamics and social fabric of urban settings.

The AOITR framework illustrates the power of these concepts by leveraging multimodal data for detailed boundary detection, essential for responsive spatial interaction models [21]. These concepts enhance both redistricting precision and spatial interaction planning, elucidating connectivity and interdependencies within urban communities. By employing spatial interaction analysis and community life cycle frameworks, urban planners can promote equity, addressing diverse population needs and optimizing community amenities and resources distribution [5, 6, 25, 34, 21].

7.2 Technological Integration in Community Planning

Technological integration is transforming community planning, enhancing urban development through improved engagement and decision-making. The CHATMAP method, utilizing large language models (LLMs), offers urban planners profound insights into spatial dynamics by interpreting complex geospatial data [19]. This advancement supports more informed and responsive planning decisions.

The ReCom algorithm is instrumental in generating valid redistricting plans based on spatial interactions, ensuring coherent district outcomes [25]. Such innovations anchor community planning in accurate spatial data, reflecting genuine urban interactions. Comprehensive evaluation frameworks incorporating utility and fairness metrics, as proposed by Wang, ensure model performance is equitable across demographic groups [34]. This dual focus on equity and inclusivity addresses diverse urban population needs.

Rough path theory, explored by Cass, provides insights into community systems' evolution shaped by individual differences, informing adaptive strategies reflective of local contexts [30]. Integrating advanced ICT enhances the accuracy, equity, and adaptability of planning processes, fostering urban environments that meet diverse resident needs. Dynamic evaluations of community service amenities, informed by virtual and physical space interactions, can address service disparities and align resources with local demands [5, 6, 10, 4, 21].

7.3 Participatory and Inclusive Planning

Participatory and inclusive planning is essential for tackling urban challenges, ensuring equitable resource distribution, and fostering public trust. The DeGov4VC framework emphasizes user involvement in decentralized governance, promoting participatory planning that empowers communities in urban development [12]. This approach is crucial for creating urban environments responsive to diverse needs.

Participatory budgeting methods, as proposed by Fain, establish frameworks for fair allocation, ensuring equitable outcomes [14]. This enhances public trust and engagement by granting community members a direct voice in resource distribution, fostering transparency and accountability.

Incorporating local community and refugee preferences, as outlined by Knop et al., enhances participatory planning through social cohesion and inclusivity in housing decisions [9]. This dual focus aligns urban development strategies with residents' needs, fostering harmonious communities. Gilchrist highlights the importance of inclusive practices in community education, aligning with participatory planning goals in addressing urban challenges [1]. Such initiatives empower communities, boosting their well-being and development potential.

Future research should explore alternative participation models prioritizing community ownership and equitable compensation, as suggested by Dalal et al. [10]. These models should implement protective measures against potential harms, especially in AI contexts, ensuring inclusive and protective participatory planning.

The interplay between group structure and reciprocity, as explored by Murase et al., provides insights into conditions favoring or hindering cooperation within participatory frameworks [24]. Understanding these dynamics is vital for fostering cooperative behaviors and ensuring participatory planning success.

8 Conclusion

This survey underscores the transformative potential of incorporating the Living Circle Perspective, New Time Geography, and age-friendly city concepts into contemporary urban planning. These frameworks collectively advocate for the development of urban spaces that are inclusive, adaptable, and sustainable. An analysis of intelligent infrastructure initiatives across various sectors, such as disaster management and sustainability, highlights the diversity in their effectiveness and implementation strategies, emphasizing the importance of robust evaluation frameworks to integrate virtual services into community planning efficiently.

The integration of cultural elements into urban planning is illustrated by projects like Clarkston ArGateways, which demonstrate how participatory design can enhance cultural appreciation and

spatial justice, thereby fostering community engagement and empowerment. Additionally, the role of predictive models in strengthening urban resilience, particularly in emergency management, is highlighted, showcasing the utility of advanced analytical techniques in resilience assessments and community preparedness.

Furthermore, the application of overlapping community detection methods, such as the AOC method, provides valuable insights into urban dynamics, facilitating the identification of complex community structures. This is complemented by the triadic closure mechanism, which serves as a crucial predictor for the emergence of new community networks, underscoring the significance of diverse community interactions in urban development. Together, these findings advocate for a holistic approach to urban planning that integrates technological, cultural, and community-driven elements to create resilient and vibrant urban environments.

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