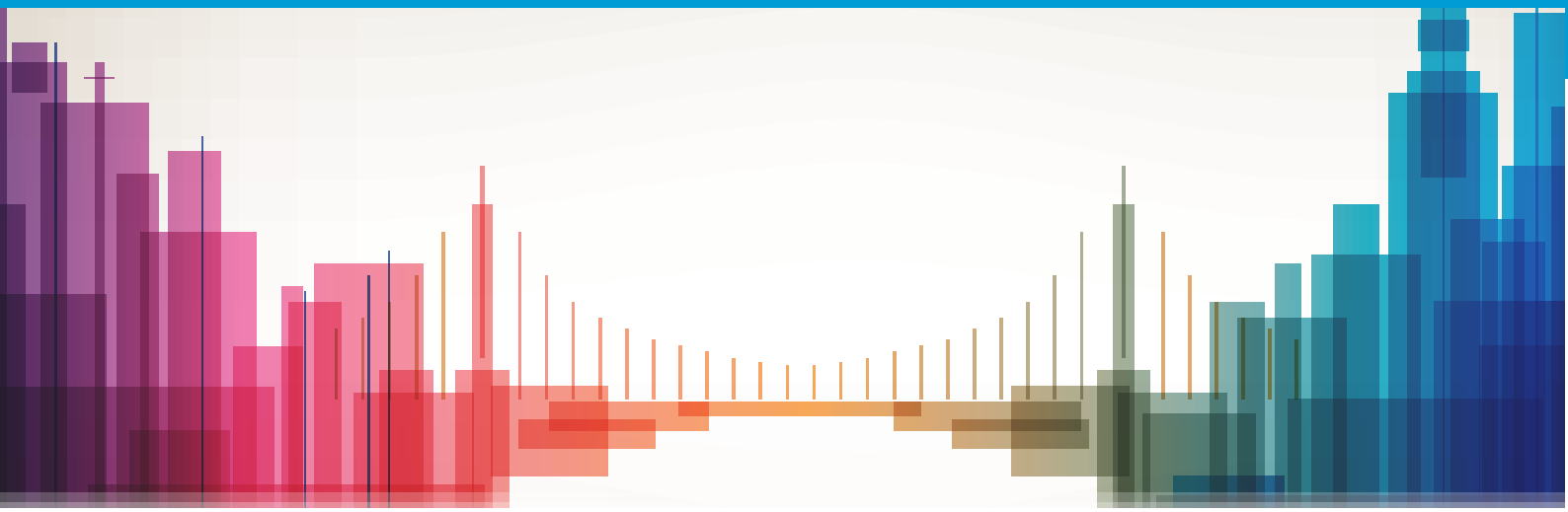
Shanghai, China (People's Republic of)

Case study of the U4SSC Guide to Digital Wellbeing



Convention on Biological Diversity

United Nations ECLAC

Food and Agriculture Organization of the United Nations

UNIDO

ITU

UNDP

United Nations Economic Commission for Africa

UNECE

UNESCO United Nations Educational, Scientific and Cultural Organization

UN environment programme

UNEP FINANCE INITIATIVE

United Nations Framework Convention on Climate Change

unitar United Nations Institute for Training and Research

UN-HABITAT FOR A BETTER URBAN FUTURE

United Nations Department of Economic and Social Affairs

UN 4 PARTNERSHIPS

UNU EGOV

UN Tourism

UN WOMEN

WORLD METEOROLOGICAL ORGANIZATION

Shanghai, China (People's Republic of)

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Foreword

This publication was developed within the framework of the United for Smart Sustainable Cities (U4SSC) initiative.

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Disclaimer

The opinions expressed in this publication are those of the authors and do not necessarily represent the views of their respective organizations or U4SSC members. In line with the U4SSC principles, this report does not promote the adoption and use of Smart City technology. It advocates for policies encouraging responsible use of information and communications technologies (ICTs) that contribute to the economic, environmental and social sustainability as well as the advancement of the 2030 Agenda for Sustainable Development and the Pact for the Future and its Global Digital Compact.

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Contents

Abbreviations and acronyms

Abbreviation	Full Form
AI	Artificial intelligence
EV	Electric vehicle
ICT	Information and communication technologies
IEC	International Electrotechnical Commission
IoT	Internet of Things
LED	Light-emitting diode
SDG	Sustainable Development Goal
U4SSC	United for Smart Sustainable Cities

1 Case Study 1: Shanghai AI+ Community

1.1 Abstract

Shanghai, a global metropolis, is rapidly advancing as a leader in urban technology, particularly through its "AI+ Community" initiative. As part of its smart city development plan, Shanghai focuses on digitally transforming communities, especially in areas with aging populations and diverse service needs. The Beixinjing Street community in Changning District serves as Shanghai's first "AI+ Community" demonstration point, integrating technologies like AI, Internet of Things (IoT) and big data to enhance residents' daily lives. This initiative includes 12 AI application scenarios such as health care, transportation and property management, leading to significant improvements in residents' quality of life. The initiative has achieved widespread recognition and success, establishing a model for digital community construction in Shanghai reflecting their digital wellbeing intervention and initiatives. Moreover, with changing demographics, ongoing updates are necessary to meet new demands. The structured implementation of two "Three-Year Action Plans" has provided a framework for sustained growth, with potential for scalability to other cities while requiring local adaptations.

1.2 Introduction

Shanghai, a global metropolis known for its dynamic blend of tradition and modernity, is swiftly becoming a leader in urban technology. With its digital technology- driven strategic vision, Shanghai is transforming into a smart city that harnesses the latest advancements in AI to enhance the quality of life for its residents.

1.3 Background and context

Shanghai has set the digital transformation of communities as a key objective in its smart city development plan. To address the high proportion of old communities, the evidential trend of an aging population and the diverse needs of community services, the Shanghai Municipal Commission of Economy and Informatization and the Changning District Government of Shanghai jointly established an "AI+ Community" in the Beixinjing area. As the first smart community construction demonstration point in Shanghai, this initiative has created a model of digital community construction that reflects the unique characteristics of Shanghai communities in digital wellbeing. This model can serve as a reference for the digital community construction throughout the city, offering insights for replication, promotion and further enhancement of digital wellbeing intervention.

1.4 Digital Wellbeing Intervention

Beixinjing Street has leveraged the development advantages of the "Digital Shanghai" industry cluster to actively explore the empowerment of grassroots governance and public services through digital technology. As Shanghai's first demonstration example of "AI+ Community," it has developed 12 artificial intelligence application scenarios focusing on areas related to residents' daily lives such as health care, property management, cultural activities, government affairs, finance, transportation and commerce relevant to digital wellbeing initiatives. The construction of "AI HOME" aims to achieve high standards, optimization, integration and efficiency as ways of digital wellbeing intervention.

Taking the Xinjing Street community as an example, the integration of new-generation information technologies and advanced concepts such as the IoT, big data and artificial intelligence has significantly transformed the lives of the community residents. The development of smart, inclusive application scenarios in the community has truly changed residents' lives. Through the 24-hour intelligent consultation machine, residents can purchase medicine independently and obtain remote medical consultation services from certified doctors. By linking with the "Fitness Cube" project, residents using community fitness equipment can access their health records and exercise data. The "One-Click Ride" service has made travel more convenient for the elderly and is also popular among younger residents. On average, in the Beixinjing Street community, every 300 metres, or a 3-minute walk, there is a "One-Click Ride" smart screen, covering residential areas throughout the district. Additionally, there are 24-hour unmanned basketball courts, 24-hour business services, 24-hour shared vehicle charging stations and 24-hour digital judicial offices.

1.5 Implementation of the Digital Wellbeing Intervention/Initiative

Since the end of 2018, Beixinjing Street has been the experimental site for Shanghai's exploration of smart communities, conducting a preliminary three-year exploratory plan. In 2019, Beixinjing Street became the city's first "AI Community" showcased at the World Artificial Intelligence Conference, realizing that digital transformation is not merely about piling up technologies but about addressing the needs of residents. The various projects for building the AI community have effectively improved residents' quality of life in areas such as health care, transportation and cultural entertainment. These initiatives have a promoting and exemplary role in advancing urban sustainable development goals, particularly in the areas of Good Health and Well-being (SDG 3) and Industry, Innovation and Infrastructure (SDG 9).

The construction and promotion of the AI community have made significant progress and have been widely recognized by the residents. However, as the community's age structure continues to change, new demands will arise, necessitating ongoing updates and improvements to the AI community. To keep up with residents' needs, from 2021 to 2025, a total of 66 construction projects have been planned, with 43 projects completed and 23 projects currently underway.

1.6 Results and outcomes

After implementing two consecutive "Three-Year Action Plans" over six years, a relatively complete organizational operation system has been formed. Digital technology-enabled community governance has not only made the work of staff more efficient but has also provided convenient services that meet residents' needs, so earning greater recognition from the community. In recent years, the street has been awarded titles such as the first batch of "Shanghai Smart Community Construction Demonstration Sites" and "Shanghai Artificial Intelligence Demonstration Application Scenarios." It has also been recognized by the Ministry of Industry and Information Technology as a leading area for AI innovation application. This has played a demonstrative role in promoting the construction of smart communities across the country.

1.7 Conclusion

The development of Shanghai's "AI+ Community" has been driven by several critical success factors, including strategic planning, technological integration, a resident-centred approach, recognition and support and a comprehensive organizational system. The implementation of two consecutive "Three-Year Action Plans" provided a structured framework, while advanced technologies like IoT, big data and AI significantly enhanced community services and governance efficiency. By focusing on residents' needs in health care, transportation and entertainment, the community saw increased acceptance and satisfaction. Looking ahead, the challenges include adapting to evolving demographics, ensuring sustainability and scalability of AI solutions, balancing privacy and security and efficiently allocating resources to complete ongoing projects. The Shanghai model shows potential transferability to other cities, with core principles of technological integration and resident focus being universally applicable. However, local adaptations are necessary.

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List of Discussion Partners/Interviews

- **Government Officials**
  - Officials involved in the Shanghai "AI+ Communities"
  - Representatives from the Beixinjing Street Communities Administration
- **Industry Experts**
  - Expert from technology companies involved in the "AI+ Communities" project
  - Developer of the "AI+ Communities" demonstration project of showcased Beixinjing Community Street at the World Artificial Intelligence Conference
  - INESA
- **End-Users**
  - Residents of the Beixinjing Street area served by the "AI+ Communities"

2 Case Study 2: Shanghai Smart Lamppost

2.1 Abstract

Shanghai, a global leader in smart city development, is advancing urban management through its "Smart Lamppost" project, part of a comprehensive smart infrastructure plan led by Shanghai INESA. By transforming traditional streetlights into multifunctional smart lampposts, the city aims to enhance energy efficiency and urban safety, while supporting sustainability goals. This initiative replaces high-consumption sodium lamps with Light-emitting diode (LED) lights, thereby reducing energy use and potentially saving up to 300 million yuan annually. The smart lampposts integrate LED lighting, surveillance, electric vehicle (EV) charging and Wi-Fi hotspots, enabling intelligent urban functions like adaptive lighting, real-time monitoring and public safety improvements. Through this project, Shanghai has created a scalable model for urban infrastructure enhancement, aligning with broader smart city goals and positioning the city as a pioneer in sustainable, connected urban living.

2.2 Introduction

Shanghai's commitment to becoming a leading smart city is highlighted through its Smart City Integrated Solution, spearheaded by Shanghai INESA. This initiative, known as the "Smart Lamppost" project, aims to optimize urban management using advanced lighting infrastructure integrated with monitoring, data transmission and various smart functions, thus contributing significantly to sustainable urban development.

2.3 Background and context

As part of its smart city vision, Shanghai has recognized the potential of transforming the city's streetlight infrastructure. Shanghai's 620 000 streetlights consume an estimated 500 million yuan in electricity annually. Traditional sodium lamps, which each consume between 200-400 watts, are being replaced with energy-efficient LED lights, which use only half the power to achieve similar lighting outcomes. If all streetlights in Shanghai were to be replaced with LEDs, the city could save close to 300 million yuan annually in energy costs. This substantial upgrade aligns with Shanghai's digital transformation goals by promoting energy efficiency, improving urban management and supporting sustainable practices.

2.4 Digital Wellbeing Intervention

The "Smart Lamppost" project by Shanghai INESA integrates various functions, including LED lighting, surveillance cameras, 4G micro base stations, multimedia information screens, EV charging stations and Wi-Fi hotspots, into streetlamp infrastructure. Leveraging IoT, data communication and lighting control technologies, data collected from these smart lampposts are transmitted to a centralized "Smart Lighting Software System Platform." This platform enables key urban

management functions like intelligent lighting, smart transportation and real-time information dissemination.

The advanced LED lighting adapts to environmental changes, offering responsive lighting that conserves energy. For instance, during overcast days that might affect visibility, the LED lights automatically adjust to enhance illumination, so ensuring safe pedestrian and vehicle passage. Late at night, when traffic is sparse, the system can dim lights to reduce power consumption further, maximizing energy savings.

2.5 Implementation of the Digital Wellbeing Intervention

The implementation of Shanghai's smart lampposts serves as a benchmark for urban infrastructure enhancement. Integrating EV charging stations into these lampposts provides a highly cost-effective solution, as demonstrated by the city's goal to construct 210 000 EV charging stations by 2020. Located in strategic areas like transport hubs and residential neighbourhoods, these charging stations offer 24/7 security through integrated surveillance and connect seamlessly to Wi-Fi networks, enabling real-time monitoring and personalized services for users.

The adoption of smart lighting also facilitates advancements in public safety. The lampposts' integrated security systems provide 24-hour protection for EV charging stations, while the networked Wi-Fi capabilities ensure constant communication with the central monitoring platform.

2.6 Results and outcomes

The Smart Lamppost initiative has successfully laid a foundation for Shanghai's comprehensive smart city infrastructure. The integration of LED technology, smart surveillance and data management platforms has improved energy efficiency, public safety and convenience for residents. This approach has demonstrated Shanghai's commitment to a greener, more digitally connected city, promoting the transferability of this model across other urban centres.

Through this project, Shanghai has taken significant strides in promoting sustainability, safety and accessibility, aligning with the broader goals of the 13th Five-Year Plan to enhance the city's EV infrastructure. Shanghai INESA's subsidiary, Shanghai Feilo Acoustics Co., Ltd., is actively involved in upgrading street lighting across Shanghai's districts, setting a model for smart city lighting management.

2.7 Conclusion

The Smart Lamppost project exemplifies Shanghai's strategic vision for smart city development. Key success factors include adopting energy-efficient LED lighting, integrating multifunctional urban services and focusing on data-driven urban management. This solution supports sustainable practices by reducing energy consumption, lowering operational costs and improving urban safety. With the ongoing evolution of Shanghai's urban infrastructure, the city is poised to establish a comprehensive smart city model that can be replicated in other cities with local adaptations.

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- **Industry experts**
  - Expert from technology companies involved in the "Smart Lamppost" project
  - Developer of the "Smart Lamppost" demonstration project of showcased INESA
- **End-users**
  - Residents of the Shanghai served by the "Smart Lamppost"

3 Case Study 3: Shanghai Smart Water Management Platform

3.1 Abstract

Shanghai, a global metropolis, is rapidly advancing as a leader in urban technology through its "Smart Water Management Platform". Developed by Shanghai INESA in partnership with Shanghai Chengtou Water Group, this initiative is part of Shanghai's broader smart city development plan aimed at enhancing urban water resource management. The platform utilizes IoT, cloud computing and big data to optimize the city's water supply system, providing real-time monitoring, leak detection and water quality assessment to ensure efficient and safe water use. The integration of these technologies has reduced water waste, improved supply reliability and ensured high-quality standards for residents. This smart water initiative has garnered widespread recognition, positioning Shanghai as a model for sustainable water management. However, as urban infrastructure and population needs evolve, continuous updates will be necessary to maintain effectiveness. The platform's structured deployment also establishes a scalable model that could be adapted by other cities, supporting sustainable water management solutions worldwide with adjustments for local contexts.

3.2 Introduction

As a global metropolis, Shanghai's rapid development has raised the bar for refined urban management. Water resource management and safety have become critical issues in urban governance. Shanghai INESA Holding Group Co., Ltd. (hereinafter referred to as "Shanghai INESA") and Shanghai Chengtou Water Group have collaborated to develop the "Smart Water Network Intelligent Metering Management System," based on the architecture of "IoT + Internet + Cloud Platform." This system optimizes the city's water supply network by implementing intelligent management, ensuring the safe supply and efficient utilization of water resources.

3.3 Background and context

Shanghai's water supply system has a long history, dating back to 1883, when the first surface water-based water plant was established in Yangshupu, Shanghai. This marked the beginning of safe drinking water for Shanghai residents. With the city's rapid urbanization, the water supply system faces increasing challenges, including aging infrastructure, leakages and the need for quality monitoring. To address these issues, Shanghai INESA and Shanghai Chengtou Water Group developed the Smart Water Network Intelligent Metering Management System. The goal is to achieve efficient management and real-time monitoring of the water supply network through IoT and big data analysis.

3.4 Digital Wellbeing Intervention

Shanghai's Smart Water Management Platform integrates IoT sensors, communication technology and a cloud platform to cover the entire water metering management process, including metering equipment management, remote data transmission, data analysis and supply-demand discrepancy (unaccounted-for water rate) analysis. The system provides real-time data on water supply from various zones and, through big data analytics and forecasting, helps water companies quickly identify leak points for timely repairs, reducing water waste and enhancing supply efficiency.

Additionally, Shanghai INESA introduced a water quality monitoring solution under the "River Chief System," which includes shoreline stations, water quality monitoring buoys and on-site water quality testing kits. Through data collection and big data analysis, the system provides real-time water quality alerts and decision support for management personnel, helping authorities take immediate actions to ensure water safety.

3.5 Implementation of the Digital Wellbeing Intervention

As a member of the National Smart City Standardization Overall Committee, Shanghai INESA has extended its smart water management practices beyond domestic applications to the international stage. In January 2018, Shanghai INESA presented the smart water system topic at the International Electrotechnical Commission (IEC) SyC Smart Cities Committee meeting in Dortmund, Germany and was appointed as the lead of the IEC Smart Water Task Force, responsible for developing relevant international standards. The standard, based on China's experience in smart water management, focuses on the safety of water resources and aims to promote global applications of smart water management through IoT, cloud computing, big data and artificial intelligence.

3.6 Results and outcomes

Since its implementation, Shanghai's Smart Water Management Platform has significantly improved the city's water supply management, optimizing water resource utilization and enhancing management efficiency. By leveraging intelligent metering and analysis, water departments can swiftly identify and address leaks, reducing water loss. Additionally, the introduction of the "River Chief System" water quality monitoring has enabled more precise and intelligent water quality monitoring, ensuring the safety of urban water for residents.

The smart water system by Shanghai INESA has received widespread recognition, establishing a benchmark for Shanghai's smart city initiatives and providing a "Shanghai model" for global smart water management practices.

3.7 Conclusion

The success of Shanghai's smart water system stems from innovative technology, cross-departmental collaboration and a precise focus on urban needs. Moving forward, Shanghai INESA will continue to enhance the smart water system's technology and promote it internationally, striving to provide solutions for global urban water resource management. The successful implementation of this project not only supports sustainable urban development but also demonstrates the vast potential of smart water management in enhancing urban governance efficiency.

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