2022年中荷智慧城市学术论坛

2022 Sino-Dutch Workshop on Smart City

持续演化发展的新型智慧城市

Evolutional New Smart City

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全球城市化发展进程与态势

Development process and trend of global urbanization

- 人类经济社会活动空间以城市为主

The city is the main space for human economic and social activities.

  - ✓ 联合国人居署：2021年世界城市化率为56%，到2050年将上升至68%

    UN-Habitat: 56% of the world was urbanized in 2021, rising to 68% by 2050.

  - ✓ 中国2021年城市化率为64.72%，2022年预计超过65%

    China's urbanization rate was 64.72% in 2021 and is expected to exceed 65% in 2022.

- 科技革命和产业变革推动城市化持续演进

Technological revolution and industrial transformation have promoted the evolution of urbanization.

  - 城市化演进：城市化-->郊区城市化-->再城市化（大都市、城市群、城市功能调整、城市更新）

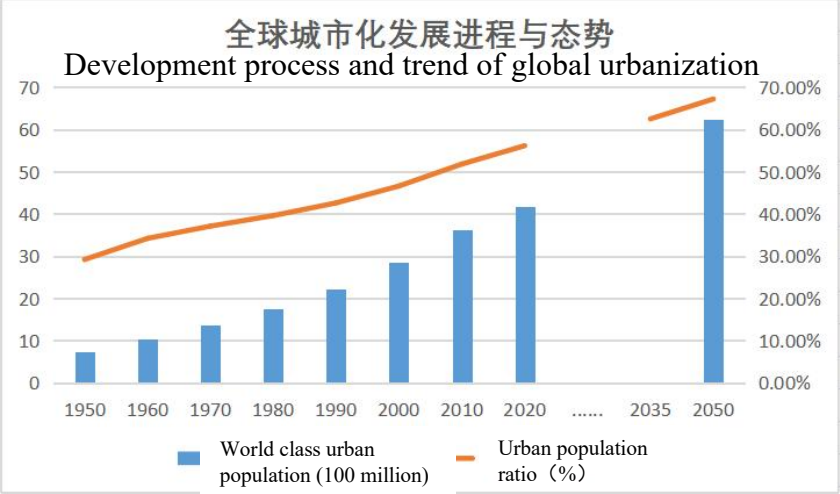
    Urbanization evolution: Urbanization --> Suburban urbanization --> re-urbanization (metropolis, urban agglomeration, urban function adjustment, urban renewal)

- 以信息技术为代表的新一轮科技革命赋予城市化新动力

The new round of technological revolution represented by information technology has given new impetus to urbanization.

  - 人类社会从工业文明向信息文明、生态文明转变导向智慧城市、生态城市等新模式

    Human society is shifting from industrial civilization to information civilization and ecological civilization to a new model such as smart city and ecological city.



城市发展理念、愿景和主题演进

Urban development concept, vision and themes

- 联合国城市发展理念(https://www.un.org/zh/conferences/habitat)

The United Nations Concept of Urban Development

  - 人居三（2016，基多）：建设可持续城市和人类住区。
  - Habitat III (Quito, 2016) : Building sustainable cities and human settlements.

- 联合国城市发展愿景（联合国人居三《新城市议程》）
  - 我们的共同愿景是人人共享城市，即人人平等使用和享有城市和人类住区，我们力求促进包容性，并确保今世后代的所有居民，不受任何歧视，都能居住和建设公正、安全、健康、便利、负担得起、有韧性和可持续的城市和人类住区，以促进繁荣，改善所有人的生活质量。
  - We share a vision of cities for all, referring to the equal use and enjoyment of cities and human settlements, seeking to promote inclusivity and ensure that all inhabitants, of present and future generations, without discrimination of any kind, are able to inhabit and produce just, safe, healthy, accessible, affordable, resilient and sustainable cities and human settlements to foster prosperity and quality of life for all.

- 国际城市发展主题（《国际城市蓝皮书：国际城市发展报告》2012-2022）

The development theme of world cities (Blue Book of World Cities: Development Report of World Cities 2012-2022)

  - 三大主题：国际城市2.0(2012-2016年)，丝路城市(2017-2019年)，新变局新态势(2020-2022年)

Three major themes: World Cities 2.0 (2012-2016), Silk Road Cities (2017-2019), New Changes and New Trends (2020-2022)

  - 10年间年度第一关键词的变化：发展/升级——创新/智慧——共享——节点——城市/区域——疫情/韧性。频率最高的第一关键词是：创新。

Changes of the first keyword of the year in 10 years: Development/Upgrading -- Innovation/Smart -- Sharing -- Nodes -- Cities/Regions -- Pandemic/Resilience. The first keyword with the highest frequency was innovation.

中国新型城镇化战略
New Urbanization Strategy in China

- 《国家新型城镇化规划（2014-2020年）》提出：城市发展要紧密围绕“宜居”这一最基本要求，走**“集约、智能、绿色、低碳”**的新型城镇化发展道路。

《The National New Urbanization Plan (2014-2020)》 puts forward that urban development should closely focus on the most basic requirement of "livable" and take the road of **"intensive, smart, green and low-carbon"** new urbanization development.

- “二十大报告”提出，促进区域协调发展，深入实施区域协调发展战略、区域重大战略、主体功能区战略、**新型城镇化战略**。

The Report of the 20th National Congress of the Communist Party of China (CPC) : We will thoroughly implement the coordinated regional development strategy, major regional strategies, the functional zoning strategy, and the new urbanization strategy. We will improve the distribution of the major productive forces and develop a regional economic layout and a territorial space system that complement each other’s strengths and promote high-quality development.

- “十四五”规划提出，**全面提升城市品质。推进新型城市建设。**

The 14th Five-Year Plan proposed to **comprehensively improve urban quality. To promote the development of new types of cities.**

✓ 开展城市现代化试点示范，建设宜居、创新、智慧、绿色、人文、韧性城市。

We will carry out pilot projects to demonstrate urban modernization and build cities that are livable, innovative, smart, green, humane and resilient.

✓ 提升城市智慧化水平，推行城市楼宇、公共空间、地下管网等“一张图”数字化管理和城市运行一网统管。

Make cities smarter by implementing one-map digital management of urban buildings, public Spaces and underground pipe networks and one-network management of urban operations.

✓ 建设**低碳城市**。Building **low-carbon cities.**

城市治理体系和治理能力现代化

The Modernization of Urban Governance System and Capacity

- 2015年中央城市工作会提出，完善**城市治理体系**，提高**城市治理能力**，着力解决**城市病**等突出问题，不断提升**城市环境质量、人民生活质量、城市竞争力**，建设**和谐宜居、富有活力、各具特色**的现代化城市。

In 2015, the Central Urban Work Council proposed to improve **the urban governance system**, enhance **the urban governance capacity**, focus on solving **urban diseases** and other prominent problems, constantly improve **the quality of the urban environment**, **the quality of people's lives**, **urban competitiveness**, and build a **harmonious, livable, dynamic and distinctive** modern city.

- 2020年10月，习近平指出：

In October 2020, Xi Jinping noted：

✓ 要树立**全周期管理意识**，加快推动**城市治理体系和治理能力现代化**，努力走出一条符合**超大型城市特点和规律**的治理新路子。

We should develop **a sense of full-cycle management**, accelerate the modernization of urban governance systems and capabilities, and strive to find a new way of governance that conforms to **the characteristics and laws of super-large cities.**

✓ 要注重在**科学化、精细化、智能化**上下功夫，推动城市管理手段、管理模式、管理理念创新，让城市运转**更聪明、更智慧**。

We need to make urban management **more scientific, refined and intelligent**, and promote innovation in urban management methods, models and concepts to make cities operate **smarter and smarter**.

信息科技革命与产业变革
Information Technology Revolution and Industrial Transformation

- 新一代信息技术日益成为创新驱动发展的先导力量
  - ✓ 网络信息空间已成为人们学习、工作、生活的新空间新平台
  - ✓ 互联网、大数据、人工智能等新一代信息技术不断催生新应用、新业态、新生产方式和管理方式
  - ✓ 大数据、区块链、社交网络、共享经济等驱动经济社会治理模式创新提升
  - ✓ 新一代智能化综合信息基础设施加速形成，主要特征有智能感知、高速宽带、泛在融合、算存协同、空天地一体、云-网-边-端体系化
- **The new generation of information technology is increasingly becoming a leading force for innovation-driven development**
  - ✓ The cyberspace has become a new space and platform for people to study, work and live.
  - ✓ The Internet, big data, artificial intelligence and other new-generation information technologies are giving rise to new applications, new forms of business, and new ways of production and management.
  - ✓ Big data, blockchain, social networks and the sharing economy are driving innovation and upgrading of economic and social governance models.
  - ✓ A new generation of intelligent and comprehensive information infrastructure is taking shape at a faster pace, featuring intelligent perception, high-speed broadband, ubiquitous integration, computing and storage collaboration, the integration of air and earth, and the systemization of cloud computing, networks, edge computig and terminals.

信息科技革命与产业变革

Information Technology Revolution and Industrial Transformation

- 以信息技术为核心的科技革命驱动新一轮产业变革
  - ✓以智能制造为主导的新一轮工业革命正在展开，如德国工业4.0、中国工业2025等
  - ✓数字技术和实体经济深度融合发展，以信息流促进技术、资金、人才、物资等资源流配置优化
  - ✓数字经济成经济高质量发展重要支撑，正在成为重组全球要素资源、重塑全球经济结构、改变全球竞争格局的关键力量
- **The technological revolution with information technology at its core is driving a new round of industrial transformation**
  - ✓ A new round of industrial revolution led by intelligent manufacturing is unfolding, such as Germany's Industry 4.0 and China's Industry 2025
  - ✓ Digital technologies are deeply integrated with the real economy, and the flow of information is used to optimize the allocation of technology, capital, human resources, materials and other resources
  - ✓ As an important support for high-quality economic development, digital economy is becoming a key force in restructuring global factor resources, reshaping the global economic structure and changing the global competitive landscape

推进新型智慧城市建设

Promoting the Development of New Smart Cities

- 2015年中央城市工作会明确着力打造智慧城市。

In 2015, the Central City Work will focus on building smart cities.

- 2016年7月，《国家信息化发展战略纲要》提出分级分类推进**新型智慧城市建设**。

In July 2016, the Outline of the National Strategy for Informatization Development proposed to promote the construction of new smart cities by classification and classification.

- 2016年12月，《"十三五"国家信息化发展规划》**提出"新型智慧城市建设行动"**。

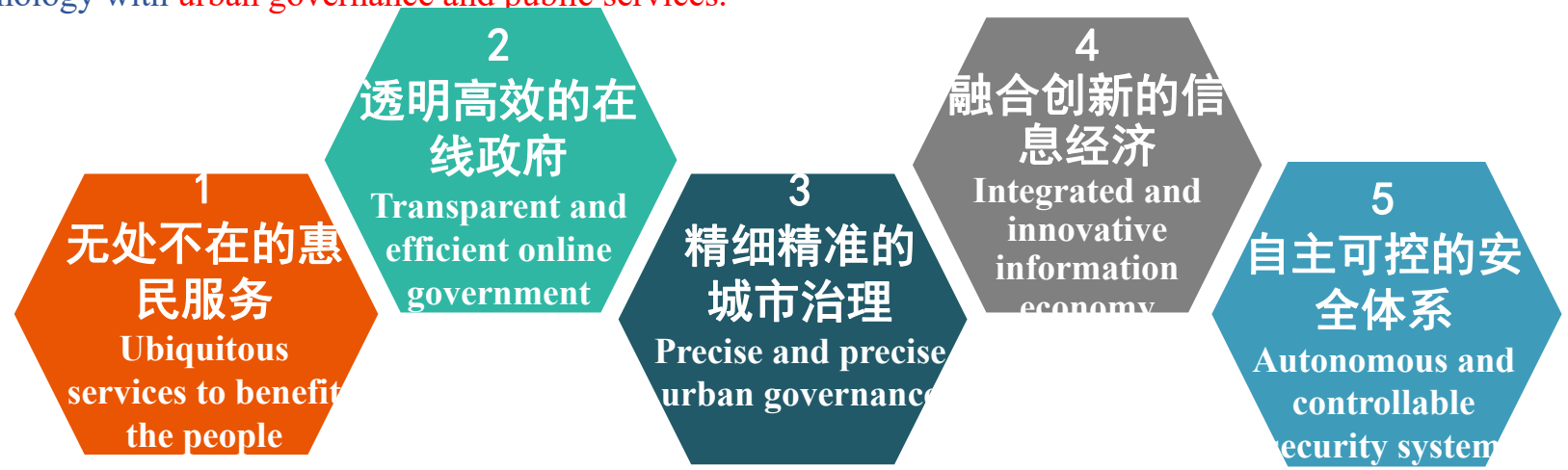
In December 2016, the 13th Five-Year Plan for National Informatization Development proposed "New Smart City Construction Action".

- 2017年1月，新型智慧城市建设部际协调工作组召开第一次会议明确内涵要求

In January 2017, the inter-ministerial Coordination Working Group on New Smart City Construction held its first meeting to clarify its requirements.

  - ✓ 要以提升城市治理和服务水平为目标，以为人民服务为核心，以推动新一代信息技术与城市治理和公共服务深度融合为途径

  We should aim to improve urban governance and services, put people at the core, and promote the deep integration of the new generation of information technology with urban governance and public services.



对科技革命和产业变革的布局应对

The layout response to the scientific and technological revolution and industrial transformation

- 中央政治局集体学习，习近平做重要讲话部署推进：

The Political Bureau of the CPC Central Committee studied together, and Xi Jinping made important speeches：

- 2017年12月8日：**实施国家大数据战略**

  Dec 8, 2017: Implementation of the National Big Data strategy

- 2018年10月31日：**人工智能发展现状和趋势**

  Oct 31, 2018: Development status and trends of artificial intelligence

- 2019年10月24日：**区块链技术发展现状和趋势**

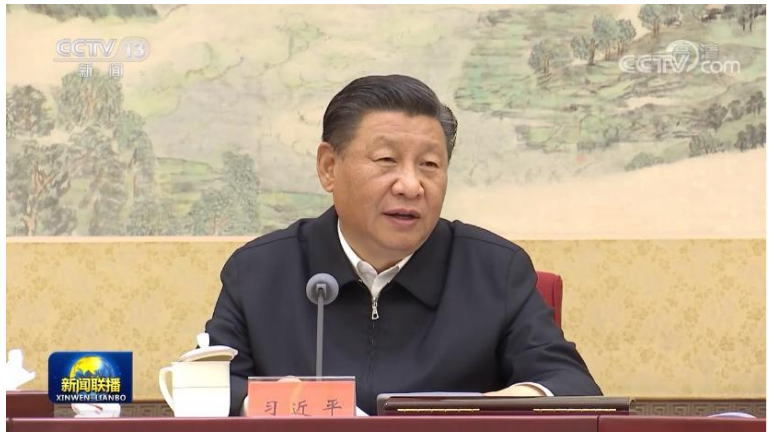
  Oct 24, 2019: Development status and trends of Blockchain technology

- 2020年10月16日：**量子科技研究和应用前景**

  Oct 16, 2020: Research and application prospects of quantum technology

- 2021年10月18日：**推动我国数字经济健康发展**

  Oct 18, 2021: Promote the healthy development of digital economy in China



*图片引自互联网络

The picture is taken from the Internet

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新型智慧城市的概念演进

The Concept Evolution of New Smart City

- 新型智慧城市是运用物联网、云计算、大数据、空间地理信息集成、人工智能、增强现实等新一代信息技术，与城市规划、建设、运行、管理和服务全面融合，支撑、促进和引领城市宜居、创新、智慧、绿色、低碳、韧性发展的新理念、新模式和新形态，是新型城市人文生态宜居环境。

A new smart city is a new concept, new model and new form that supports, promotes and leads the livable, innovative, smart, green, low-carbon and resilient urban development by fully integrating the new generation of information technologies such as the Internet of Things, cloud computing, big data, spatial and geographic information integration, artificial intelligence and augmented reality with urban planning, construction, operation, management and services. It is a new type of urban human ecological livable environment.

- 新型智慧城市 = 新一代信息技术应用+绿色低碳技术应用+新理念+新模式+新形态

  New smart city = application of next-generation information technology + application of green and low-carbon technology + new concept + new mode + new form

----参考《关于促进智慧城市健康发展的指导意见》

----Refer to 《the Guidelines on Promoting the Healthy Development of Smart City》

新型智慧城市：城市多维空间融合

New Smart City: Multi-dimensional Urban Space Integration

- **新型城市生态系统 New urban ecosystems**
  - 从人的智慧化生命“形态”(自然人+网络人+机器人/人机器融合形态)到城市的智慧化生态系统

    From human intelligent life "form" (natural person + network person + robot/human machine fusion form) to urban intelligent ecosystem
  - 生产、生活、生态、生命空间的融合统一

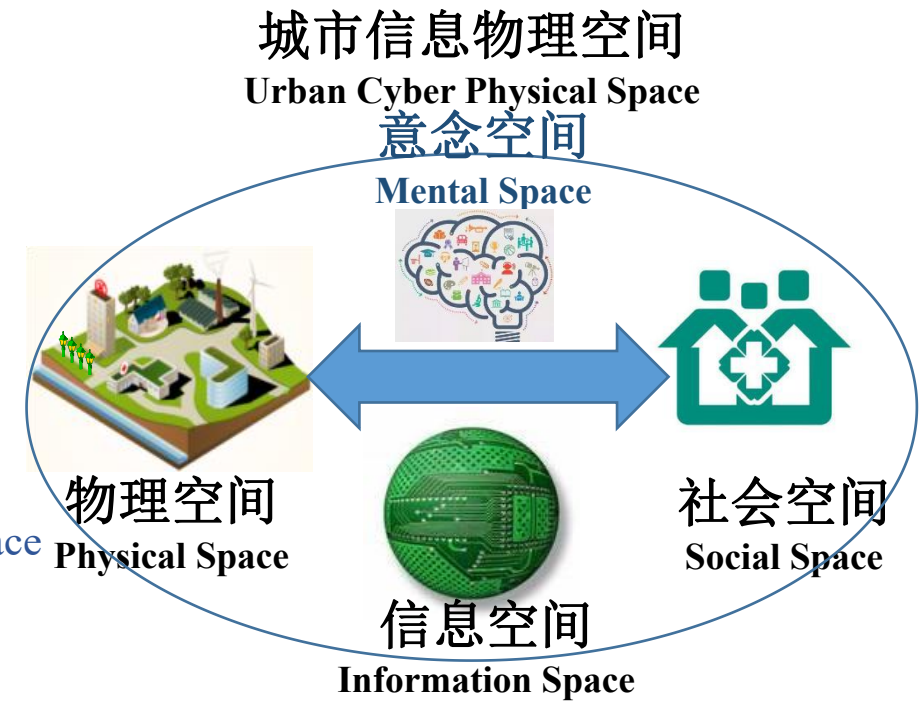
    The integration and unity of production, life, ecology and life space
- **城市信息、物理、社会和意念的多维空间融合体**

  Integration of multi-dimensional urban spaces including information space, physical space, social space and mental space
  - 从物理空间到网络数字虚拟空间

    From the physical space to the network digital virtual space
  - 从数字虚拟空间到信息物理空间融合----数字孪生空间

    From digital virtual space to information physical space fusion ---- digital twin space
  - 从数字孪生空间到元宇宙

    From digital twin space to metaverse



新型智慧城市：宜居、绿色、低碳、韧性

New Smart City: Livable, Green, Low-Carbon and Resilient

- 新型城市人文生态宜居环境 New urban human ecological livable environment
- 新一代信息技术、绿色低碳技术、新能源技术、节能环保技术等的集成应用

Integrated application of next-generation information technology, green and low-carbon technology, new energy technology, energy conservation and environmental protection technology, etc.

- 全面覆盖城市规划、建设、运行、生活/服务和管理的各环节

It comprehensively covers all aspects of urban planning, construction, operation, life/service and management.

绿色城市：既强调生态平衡、保护自然，又注重人类健康和文化发展。

Green city: Not only emphasizes ecological balance and nature protection, but also pays attention to human health and cultural development.

- 低碳城市：以低碳经济为发展模式及方向，市民以低碳生活为理念和行为特征，政府公共管理以低碳社会为建设标本和蓝图
- Low-carbon city: With low-carbon economy as the development mode and direction, citizens take low-carbon life as the concept and behavior characteristics, and the government's public management takes low-carbon society as the construction specimen and blueprint.
- 韧性城市：具备在逆变环境中承受、适应和快速恢复能力，城市安全发展的新范式，防范化解各类灾害风险的有力抓手和有效途径，促进城市可持续发展和保障人民生命健康安全。

Resilient cities: they are equipped with the ability to withstand, adapt and recover quickly in the contraband environment, a new paradigm of safe urban development, a powerful starting point and an effective way to prevent and resolve various disaster risks, promote sustainable urban development and protect people's life, health and safety.

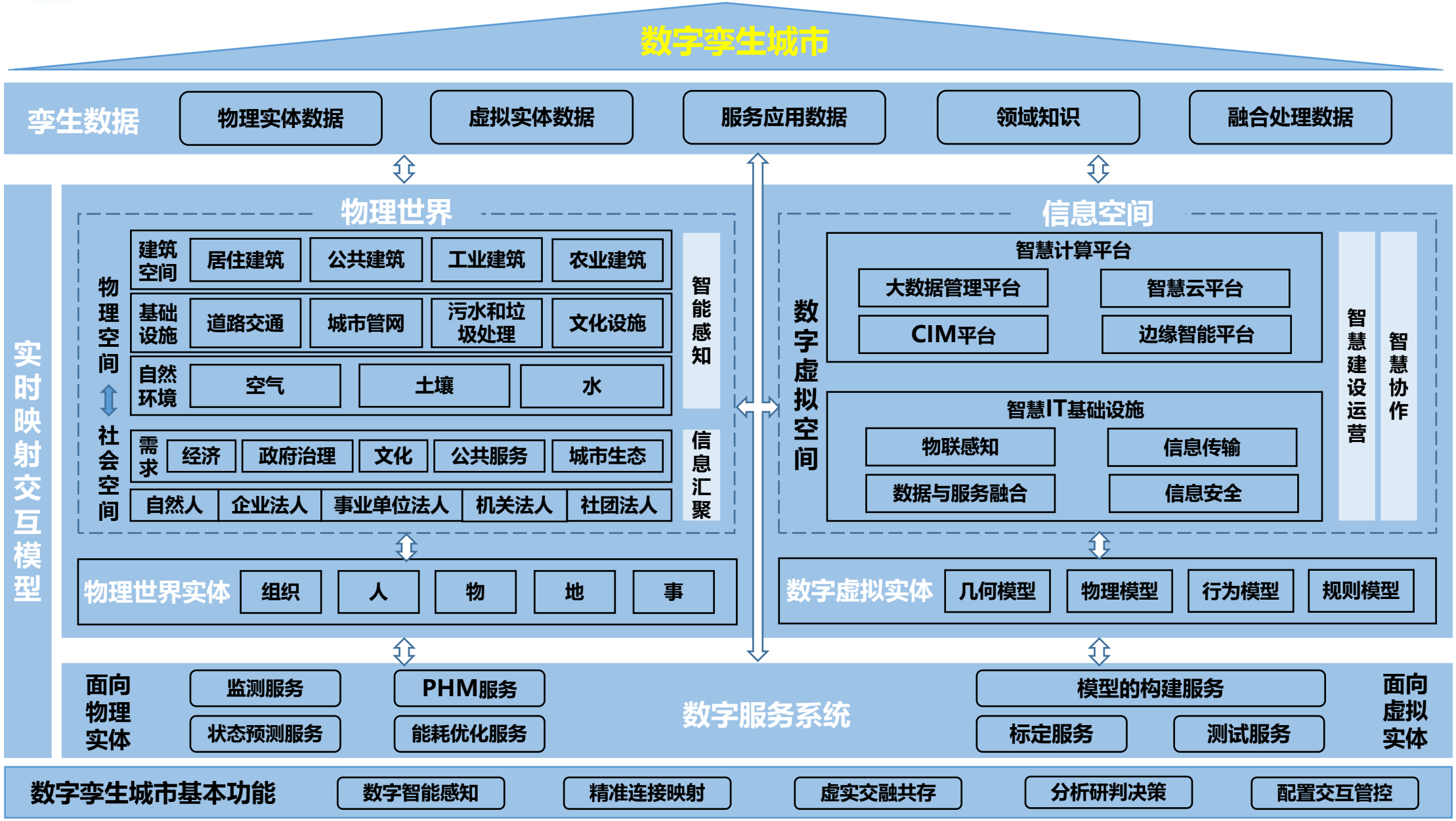
数字孪生城市架构
Digital Twin Architecture

- **数字孪生城市模型（七要素模型）Digital twin city model：**
  - 物理世界（物理空间+社会空间）+物理世界实体（组织/人/物/地/事） + 信息空间（数字虚拟空间）+数字虚拟实体 + 实时映射交互模型 + 孪生数据 + 数字服务系统（应用场景）

  Physical world (physical space + social space) + physical world entity (organization / person / thing / place / thing) + information space (digital virtual space) + digital virtual entity + real-time mapping interaction model + twin data + digital service system (application scenario)

- **数字孪生城市基本功能　Basic functions of digital twin city**
  - 数字智能感知，精准连接映射，虚实交融共存，分析研判决策，配置交互管控
  - Digital intelligent perception, precise connection mapping, virtual and real blending coexistence, analysis and decision-making, configuration of interactive control

数字孪生城市架构 Digital Twin Architecture



Web3.0技术架构 Web 3.0 Architecture

- **Web3.0重要特性/核心要素**
  - 万物互联Ubiquity/边缘计算Edge Computing
  - 开放链接/增强连通性Enhanced Connectivity
  - 对等网络P2P Network/去中心化Decetralized
  - 3D可视化3D Graphics
  - 语义网Sematic Web
  - 人工智能Artificial Intelligence

应用层 Application Layer	dApp浏览器 dApp Browsers	去中心化应用 Decentralized Applications	应用托管 Application Hosting	程序语言 Programming Languages		
服务和组件 Service and Optional Components	数据对接 Data Feeds	链下计算 off-chain Computing	治理 Governans/DAOs	状态通道 State Channels		
协议层 Protocol Layer	分布式共识算法 Consensus Algorithms	侧链 Side Chains	许可和无许可 Permissioned and Permissionless	以太坊虚拟机 EVMs		
网络层 Network Layer	RPLx	Roll Your Own	块传送网络 Block Delivery Networks	可信执行环境 Trusted Execution Environment	对等网络 Peer-to-Peer	
基础层 Infrastructure Layer	挖矿 Mining	网络 Network	虚拟化 Virtualization	节点 Nodes	通证 Tokens	存储 Storage

元宇宙技术架构 Metaverse Architecture

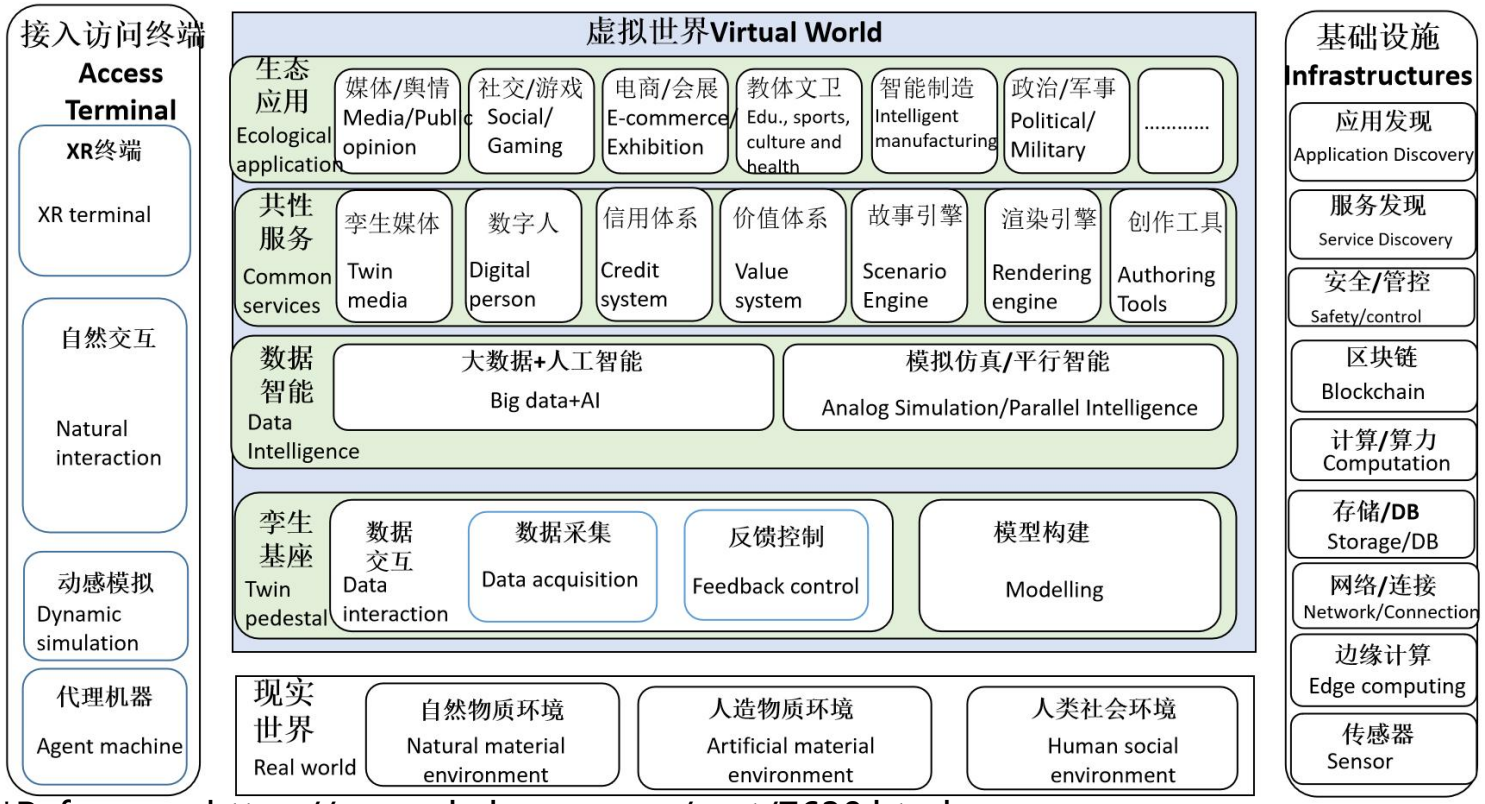
■ 元宇宙核心要素Metaverse Elements：

- 发现Discover，应用体验App Experience，社交体验Social Experience，空间计算Spatial Computing，经济系统Economic System，人机交互Human Interface，创作者经济Creator Economy，基础设施Infrastructure，Web3.0的核心要素

■ 元宇宙框架Metaverse Framework

- 应用层：数字化生存Digital Survive，数字化生产Digital Manufacture
- 激励层：数字货币Digital Currency，数字资产Digital Assets，数字通证Token
- 治理层：分布式Distributed，去中心Decentralized，自组织DAO
- 算法层Algorithm Layer：无代码开发Codeless Dev，AIGC，隐私计算Private computig
- 数据层Data Layer：万物互联Ubiquity，数字共生
- 物理层Physical Layer：VR、AR、MR、XR

元宇宙技术架构Mataverse Architecture



*Reference: https://www.ahchanye.com/cyxt/7630.html

新型智慧城市技术架构(扩) New Smart City Architecture (X)

业态

- 智能终端服务
- 场景应用
- 领域应用平台
- 公共服务平台
- 空间信息基础设施（天空地一体化）
- 网络基础设施与新能源互联网
- 新型基础设施（建筑、路、车、生命线、感知设施）

XR终端 | 自然交互 | 动感模拟 | 代理机器 | PC/NB | 智能手机 | Pad

光伏资源监测 | 节能减碳管控 | 零能耗低碳智能建筑 | 光能路面 | 潮汐车道 | 韧性智能红绿灯 | 低碳共享出行 | 韧性智慧灯杆 | ……

应急管理 | 城市管理 | 公共安全 | 交通出行 | 生态环保 | 农业农村 | 规划国土 | 住房建设 | 经济运行 | 市场监管 | 政务服务

孪生媒介 | 数字人 | 信用体系 | 价值体系 | 故事引擎 | 渲染引擎 | 创作工具

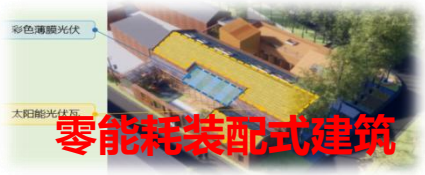
城市信息模型 | 城市数字孪生 | 城市智能运行 | AI算法模型 | 实景三维/XR

感知数据汇聚 | 数据共享交换 | 城市大数据 | 城市BaaS | 城市知识图谱

高精度导航地图 | 地理空间数据共享服务平台 | AI算力中心 | 大数据中心

卫星/航空/无人机遥感系统 | 导航定位系统 | 地理信息系统 | 地/水面/下感知测量系统

智能电网 | 能源微网/互联网 | 传感网 | 物联网 | 工业互联网 | 未来网络 | 4G/5G/6G | 卫星互联网



零能耗装配式建筑

光能路面

生命线综合管廊

新能源汽车充电桩

城际高速铁路

内容纲要

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一 时代趋势：城市化和信息科技革命

Trends of the Times: Urbanization and Information Technology Revolution

二 架构演化：数字孪生/Web3.0/元宇宙+

Architecture Evolution: Digital Twin /Web3.0/ Metaverse +

三 场景创新：数算赋能与跨界融合

Scenario Innovation: Data and Algorithm Enabling and Crossover Integration

新型智慧城市应用场景创新
New Smart City Application Scenario Innovation

- **动力机制　Dynamic mechanism**
  - 数据和算法赋能 Data and Algorithm Empowerment
  - 算力和存力协同 Computation and storage synergy
  - 多维空间融合 Multidimensional space fusion
  - 跨界交叉融合 Cross-border cross-integration
- **功能作用　Functionalities**
  - 宜居、创新、**智慧**、**绿色**、低碳、人文、**韧性**
    Livable, innovation, **smart, green**, low carbon, humanities, **resilience**

- **场景案例 Scenario cases**
  - **首钢园：绿色低碳的数字化生态系统，节能减碳智慧管控 Shougang Park : Green low-carbon digital ecosystem, energy saving and carbon reduction intelligent control**
  - **冬奥速滑馆：绿色低碳智慧场馆 Winter Olympic Speed Skating Stadium : Green Low Carbon Smart Stadium**
  - **乡村振兴：绿色低碳智慧乡村、绿色智慧乡居、光能智慧道路 Rural revitalization : green low-carbon smart village, green smart village, sola smart road**
  - **碳管理：基于Web3.0的光伏减碳评估监测 Carbon Management : Assessment and Monitoring of Photovoltaic Carbon Reduction Based on Web3.0**
  - 康养陪护：基于Web3.0和XR的康养数字人 Wellness Care : Wellness Digital Person Based on Web3.0 and XR

冬奥首钢赛区数字化生态自适应协同管控系统

- 实现：冬奥首钢园示范区数字化生态系统的智能公共设施、智能终端和智能传感器等的多终端多协议联网集成，多源异构数据的感知和汇集整合，智能设备集成化与场景自适应管控，整合服务

Realization : multi-terminal and multi-protocol networking integration of intelligent public facilities, intelligent terminals and intelligent sensors in the digital ecosystem of the Winter Olympic Shougang Park demonstration area, perception and integration of multi-source heterogeneous data, integration of intelligent equipment and scene adaptive control, integrated services.

- 实现节能降碳、用电安全、高效运行与便捷服务。

Achieve energy saving and carbon reduction, electricity safety, efficient operation and convenient service.

平台应用服务

- 数据汇聚管理
- 数据可视化展示

数据资产
Data Assets

用电数据智能分析Intelligent Analysis of Electricity Data

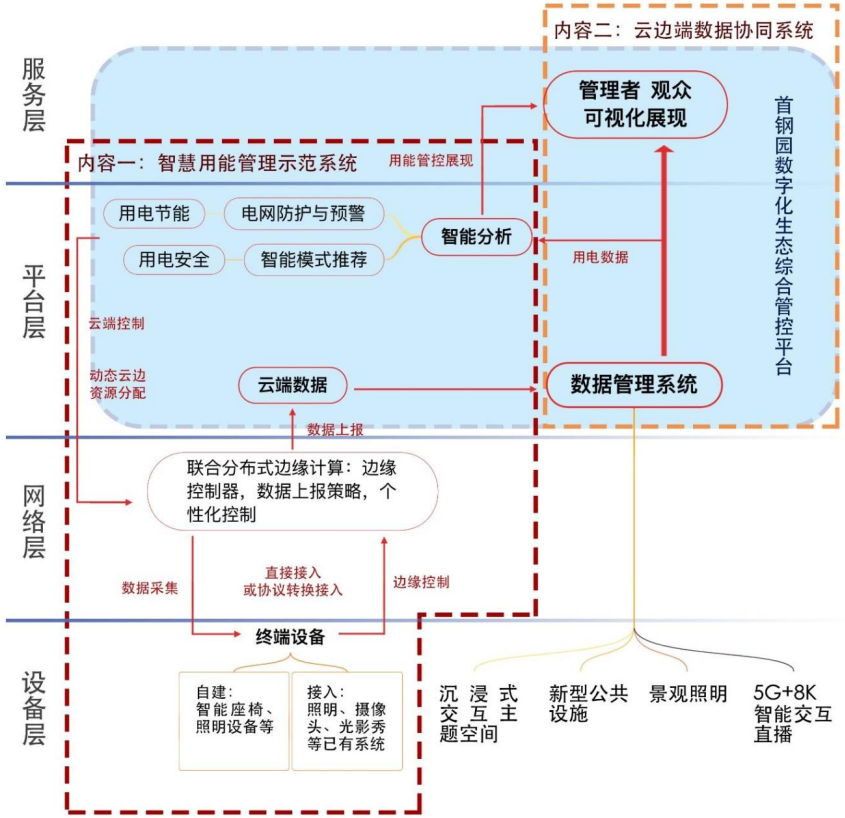
- 用电分析electricity consumption analysis
- 节能降耗energy conservation and decrease in material c
- 主动安全active safety
- 模式推荐Mode recommendation

控制成本
Monitoring cost

分布式边缘计算 Distributed edge computing

- 多源数据采集Multi-source data acquisition
- 灵活的强电开关控制Flexible strong electric switch control
- 高效传输与边缘控制Efficient Transmission and Edge Control
- 自适应边缘控制器Adaptive edge controller
- 分布式动态云边资源分配Distributed Dynamic Cloud Edge Resource Allocation

管控效率
Management & Control efficiency



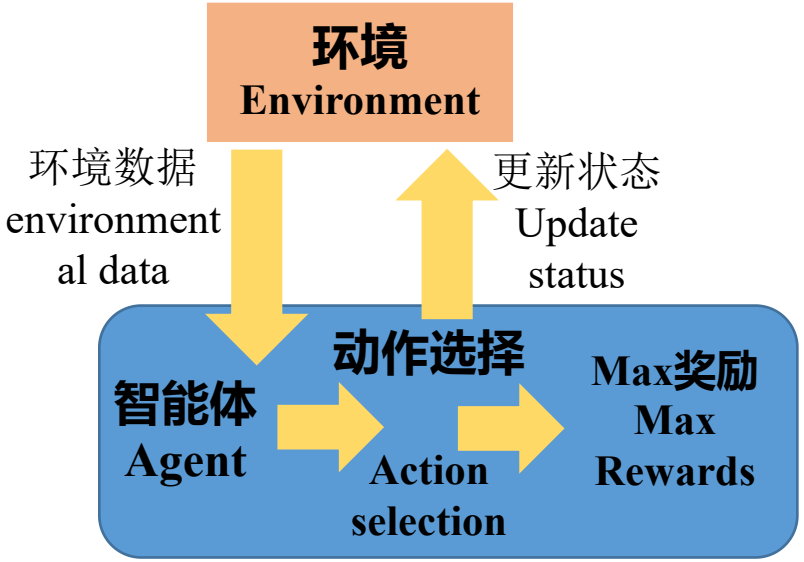
冬奥首钢赛区数字化生态自适应协同管控系统

Digital Ecological Adaptive Cooperative Control System

- 物联感知数据汇集和可视化展现。 IoT perception data collection and visual display
- **关键成果之一：基于环境感知与模式自适应融合的节能减碳控制模型**

One of Key Achievements : Energy Saving and Carbon Reduction Control Model Based on Environmental Perception and Mode Adaptive Fusion

- 达到30%以上节能 More than 30 % energy saving
- 不牺牲人体视觉舒适度 Without sacrificing human visual comfort
- 自适应控制 adaptive control



◆ **基于深度强化学习的照明节能控制模型**

Lighting energy-saving control model based on deep reinforcement learning

国家速滑馆智慧场馆：智慧场馆
Smart National Speed Skating Oval

系统应用

System application

观众/运动员
Spectators/Athletes

APP
运动员服务系统（Athlete service system）
冰上运动体验系统（Ice sports experience system）

机器人（robot）

场馆管理人员Management Staff

可视化运维系统（Visual operation and maintenance system）
全过程健康检测集成融合显示（Integrated fusion display of whole process health detection）
安防监控技术系统（Security monitoring technology system）

数字孪生平台（Digital Twin Platform）

应急预定系统（Emergency reservation system）

云平台

Cloud platform

智慧场馆信息化建设标准

Standards for informatization construction of smart venues

平台

platform

平台数据业务支撑（Platform data business support）

大数据平台（Big data platform）

数据汇集融合共享平台（Data collection, fusion and sharing platform）

基础设施

infrastructure

基于物联网的智能化集成管理平台
Intelligent integrated management platform based on Internet of Things

云-网-雾-端与泛在网络
Cloud network fog end and ubiquitous network

楼控系统设备
Building control system equipment

智能照明系统设备
Intelligent lighting system equipment

安防系统设备
Security system equipment

制冰机房设备
Ice making machine room equipment

其他数据机房
Other data rooms

其他设备
Other equipment

……

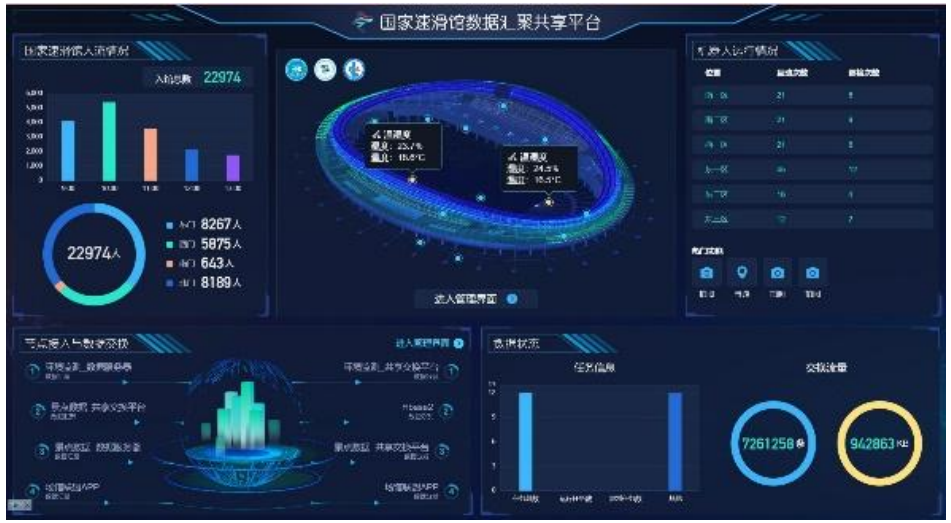
BEIJING INSTITUTE OF SMART CITY
北京智慧城市研究院

国家速滑馆智能化服务关键技术研究与应用

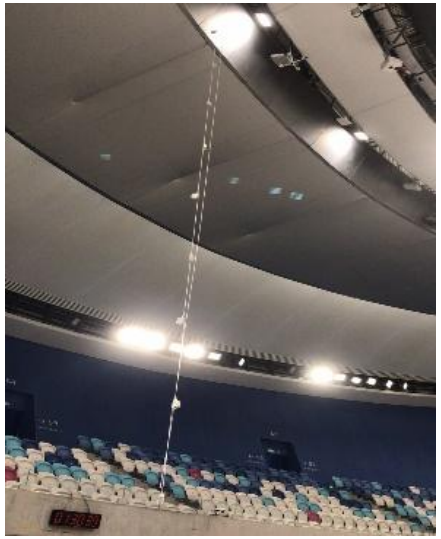
Research and Application of Key Technologies for Intelligent Service of National Speed Skating Oval

- 研究构建了国家速滑馆室内环境监控系统与数据汇聚共享平台。
- 实现场馆内观众区、冰面区域、消防区域、计时计分区域等室内温湿度、烟感、漏水、PM2.5、入座率和座椅异常等信息的实时监测、传输、交换共享和可视化展示。
- 形成了基于“云-网-雾-端”架构、多源数据汇聚融合的智慧场馆建设方案及示范。
- **节能减碳相关成果之一：基于深度学习的室内环境舒适度调节方法及系统**

基于“云-网-雾-端”架构的国家速滑馆室内环境智慧监控系统



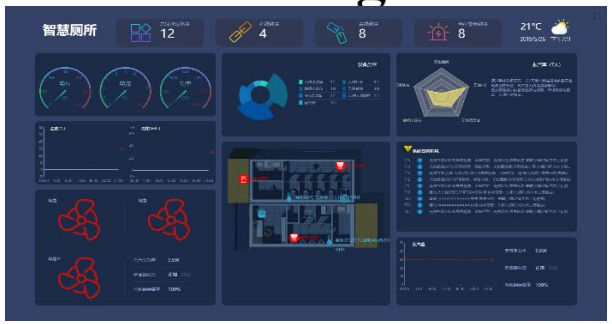
国家速滑馆数据共享交换平台



基于低功耗物联网技术的速滑馆大空间温湿度检测装置

绿色智慧乡村示范建设

Demonstration Construction of Green Smart Village



装配式近零能耗智慧乡居：零舍

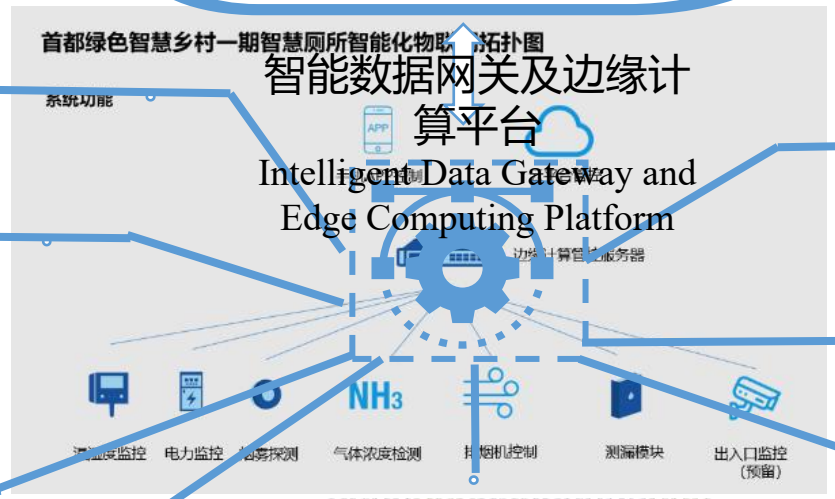
Assembled Near-Zero Energy Smart Bulding: Zero-Energy House

装配式低能耗绿色智慧乡居：草堂

Fabricated Low Energy Green Smart Buildig: Cottage

绿色智慧乡村数据管理平台

Green smart village data management platform



智能数据网关及边缘计算平台

Intelligent Data Gateway and Edge Computing Platform

智能停车场、交通路口、显示路面

Intelligent Parking, Traffic Junctions, Road Display

装配式智能生态厕所

Prefabricated Intelligent Ecological Toilet

智能垃圾桶

Intelligent Trash Can

智能路灯

Intelligent Street Light

光能道路发电

Sola Road

智能充电桩

Intelligent Charging Pile

光能路面及光能微网管理系统

Sola Road and Sola Energy Microgrid Management System

➢150平米健身广场低速轻载实验和示范路段，光伏组件设计功率 140W/平米，实际功率 100W/平米，年发电量 1.5-2万度

➢The low-speed and light-load experiment and demonstration section of 150m² fitness plaza, the designed power of photovoltaic modules is 140W/m², the actual power is 100W/m², and the annual power generation is 15,000-20,000 degrees.

➢采用新型Amber-I 1.3控件，实现周边路面照明等公共设施供电；实现周边配套充电桩充电， 支持村民用电动自行车等充电；实现光能道路离网、离并网两种组网技术

➢The new Amber-I 1.3 control is adopted to realize the power supply of public facilities such as the surrounding road lighting. Supporting peripheral charging pile charging, supporting villagers to use electric bicycles to charge; Realize the technology of off-grid and off-grid connection of light energy road

➢停车场低速重载实验和示范路段

➢Parking lot low speed and heavy load experiment and demonstration section

➢光伏智慧路面能源微网管理系统，示范路段能源数据、负载用电数据的采集管理及与绿色智慧乡村数据管理平台的对接

➢Photovoltaic smart road energy micro-grid management system, collection and management of energy data and load electricity data of demonstration road section and docking with green smart village data management platform

碳管理：基于Web3.0的光伏减碳评估监测

业态

- 智能终端服务
- 场景应用
- 领域应用平台
- 公共服务平台
- 空间信息基础设施（天空地一体化）
- 网络基础设施与新能源互联网
- 新型基础设施（建筑、路、车、生命线、感知设施）

XR终端 | 自然交互 | 动感模拟 | 代理机器 | PC/NB | 智能手机 | Pad

光伏资源监测 | 节能减碳管控 | 建筑屋顶光伏发电及减碳的潜力评估 | 建筑屋顶太阳能光伏改造决策支持 | 光能路面发电 | 光能微网 | 低碳共享出行

碳源碳汇评估检测 | 全周期碳数据管理 | 光伏智能网联道路及绿色低碳智能交通应用 | 光伏资源开发和减碳进程的监测评估应用

孪生媒介 | 数字人 | 信用体系 | 价值体系 | 故事引擎 | 渲染引擎 | 创作工具

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智能电网 | 能源微网/互联网 | 传感网 | 物联网 | 工业互联网 | 未来网络 | 4G/5G/6G | 卫星互联网

道路光伏PIPV发电降碳

建筑屋顶光伏BIPV

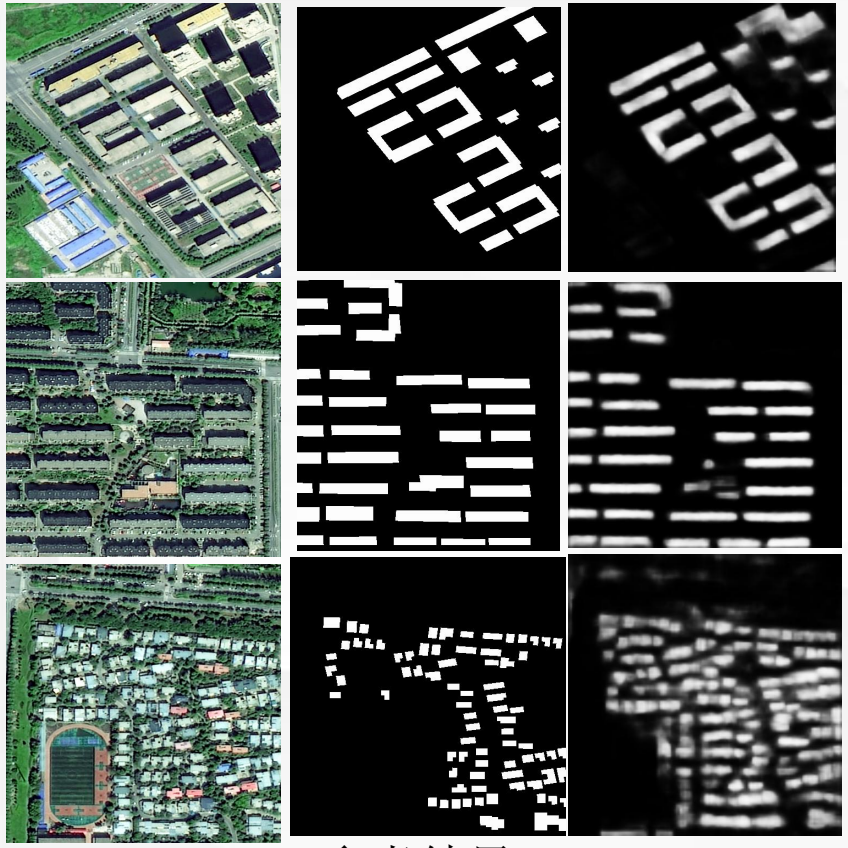
基于GF-2遥感影像和多源数据融合的建筑物屋顶太阳能光伏长时序碳减排量评估

结合北京市遥感数据专区建设与示范应用，以大兴区为例，研究评估屋顶太阳能光伏改造发电及降碳潜力。

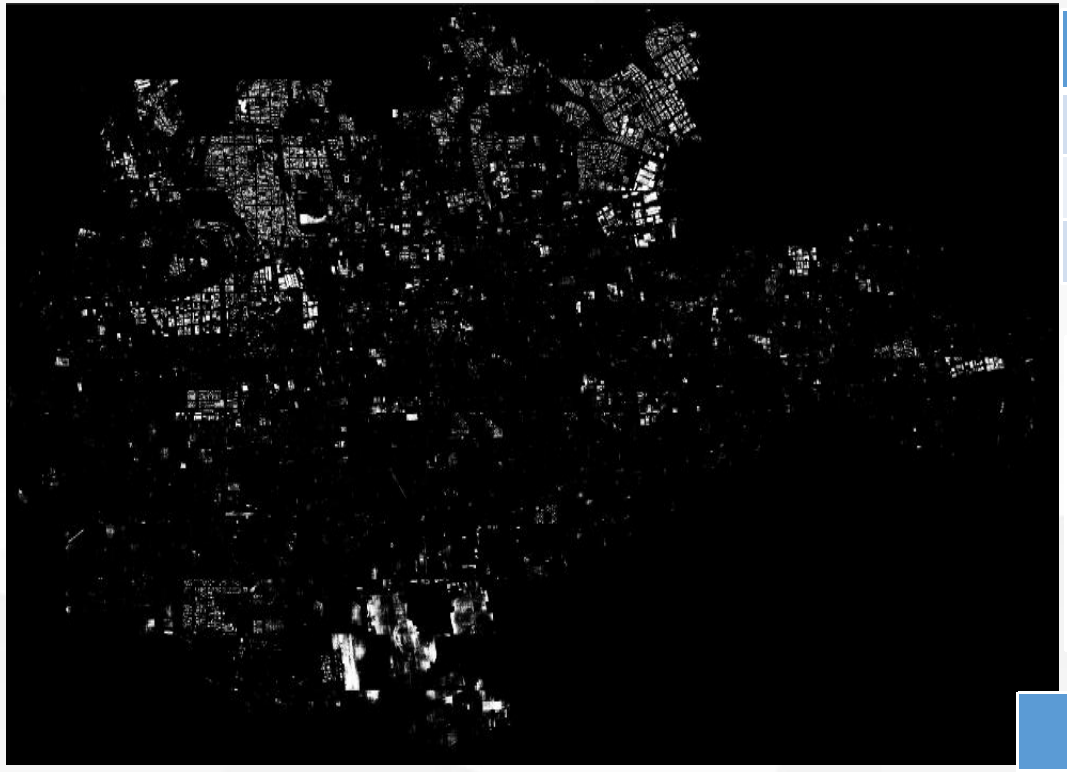
建筑屋顶光伏发电及减碳的潜力评估

建筑屋顶光伏改造决策支持

➢ 数据集（样本库数据规模为6564幅）



影像　参考结果　模型预测结果



大兴区整区的建筑物识别结果，白色区域为识别到的建筑物，识别精度为95.56%

可改造面积	较优	一般	较差
平屋顶(km2)	48.67	38.19	4.02
斜屋顶(km2)	3.64	2.78	0.28
总共(km2)	52.31	40.97	4.30

可发电量 (108 kWh)	较优	一般	较差
平屋顶	93.57	73.42	7.72
斜屋顶	8.54	6.51	0.66
总共	102.11	79.93	8.38

	较优	一般	较差
光伏可降碳量(10^4吨)	770.51	603.14	63.23

康养陪护：基于Web3.0和XR的康养数字人

HealthCare Accompany：HealthCare Digital Person based on Web3.0 and XR

场景应用
Scene Application

- 老年人远程照护 Remote care for the elderly
- 老年健康智能陪护 Elderly health intelligent companion
- 老年人数字身份及隐私保护 Digital identity and privacy protection for the elderly
- 老年精神健康分级评估与危机干预 Geriatric mental health grading assessment and crisis intervention

交互层
Interactive Layer

- 数字人合成显示 Digital human synthesis display
- XR终端/可穿戴设备 XR terminal/ wearable devices
- 语音语义识别处理 Speech semantic recognition processing
- 去中心化数字身份安全验证 Decentralized digital identity security verification

平台层
Platform Layer

- 智能采集建模技术 Intelligent collection modeling technology
- 基于AI引擎的数字人高效驱动方法 Efficient Driving Method of digital human based on AI Engine
- 云端实时渲染技术 Cloud real-time rendering technology

数据层
Data Layer

数据采集 Data Collection → 数据汇总 Data Summarization → 数据分析 Data Analysis → 数据融合 Data Fusion

基础层 Infrastructure Layer

感谢聆听！

Thanks for your attention!

林绍福 Shaofu Lin

2022.11.10