KPMG

The Cities of the Future are Here

How Adoption of New Age Technologies are Transforming Mega Cities

—

2023

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A Glimpse of the Future

World Cup 2022 - New Age Technologies take Center Stage at Qatar

The FIFA World Cup in Qatar was one of the most talked about events in 2022. From record capital expenditures of over $200B to the controversial "no beer" in the stadium, there was significant press around this event.

The extensive use of new age technologies generated buzz at the 2022 World Cup. The event organizers effectively leveraged AIoT-based solutions, such as facial recognition, smart lighting, drone surveillance, and AI-powered stadium cooling systems, to seamlessly manage the entire event, ensure public safety, and enhance the overall experience for both fans and players.

The amplified use of AIoT-based technology solutions at the FIFA World Cup 2022, has opened pathways for the incorporation of diverse AIoT use cases in major sporting events to come.

The Line – A Blueprint of Future Cities

The Saudi Arabian government has started construction of one of its most ambitious smart city projects "The Line" – a 170 Km long, 200 m wide, and 500 m tall city located in Tabuk province. The Line will be a carbon neutral smart urban space with 100% of its energy coming from renewable resources and 95% of its land preserved for nature conservation. The city will be home to over 1M residents by 2030.
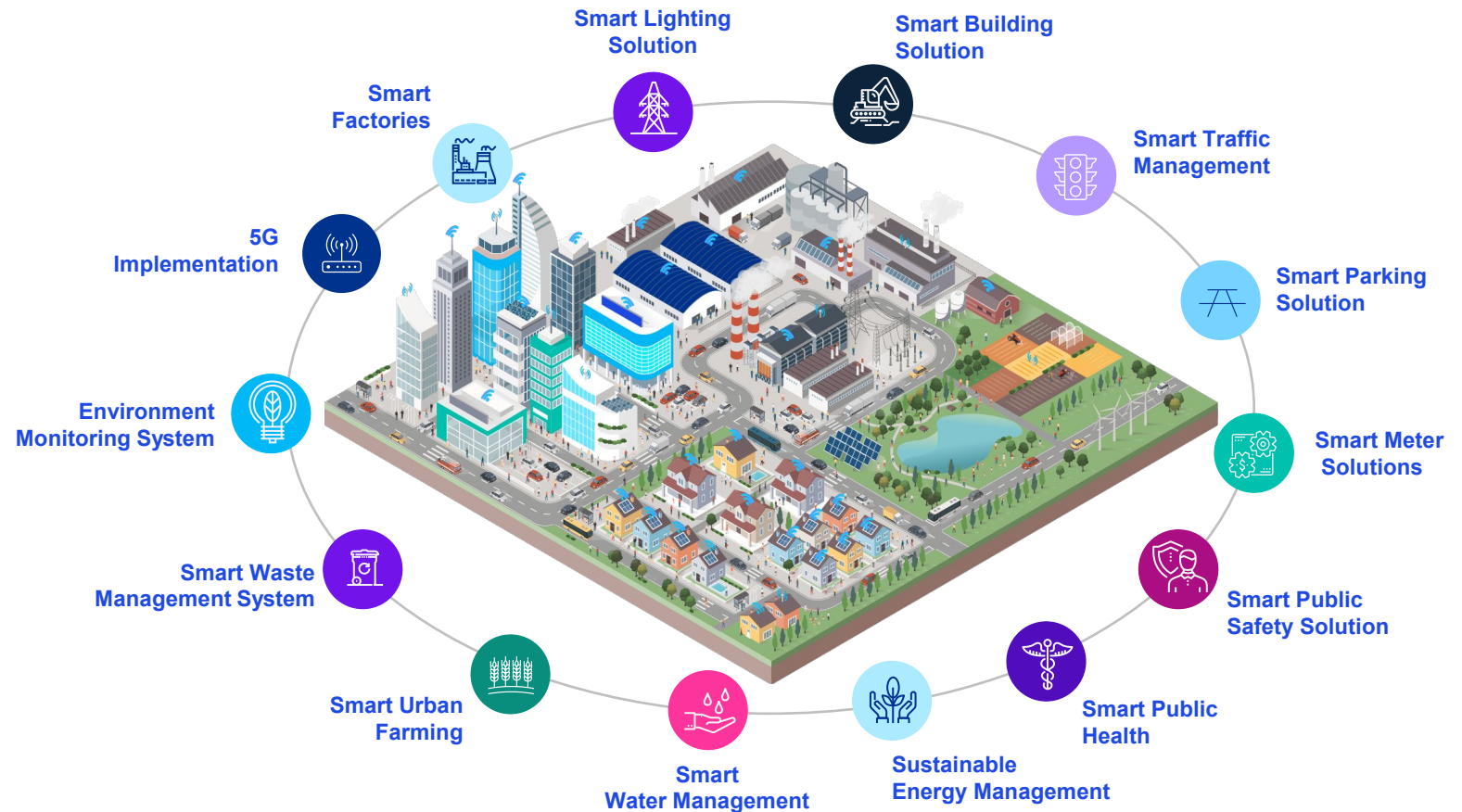
The Line will bring down the "15 Minute Smart City" concept to just 5 minutes, wherein all the key amenities required by residents will be just a 5-minute walk away from their doorstep. The Line through its advanced transit system will enable end-to-end transit in just 20 minutes.

The ability to harness more than 90% of data generated from residents and smart infrastructure will help the city to gather specific and real-time insights around urban development and governance related issues, which will be significantly higher as compared to just 1% of data collection capability of smart cities today.

Introduction

Smart Cities can be identified as technologically modern urban areas that use connected digital technologies such as sensors, cameras, and the cloud, to collect and share data about people and infrastructure driving automated processes. Cities today are becoming "smarter" to offer improved delivery and quality of services through continuous monitoring of residents and infrastructure with relatively instantaneous communication of suboptimal performance. Overall, this requires a strong reliance on automation, internet connectivity, and IoT. Citizens can engage with the smart city ecosystem in various ways using their mobile devices, connected devices, car, and home. Pairing devices with data from cities infrastructure allows for better services and improved sustainability.

Smart City Offerings

- Smart Factories
- Smart Lighting Solution
- Smart Building Solution
- Smart Traffic Management
- 5G Implementation
- Smart Parking Solution
- Environment Monitoring System
- Smart Meter Solutions
- Smart Waste Management System
- Smart Public Safety Solution
- Smart Urban Farming
- Smart Public Health
- Smart Water Management
- Sustainable Energy Management

How Smart Cities are Improving Urban Space

Key Challenges Faced by Cities

Rising Urban Population: According to the UN, by 2050, 68% of the total world population will live in cities which is significantly higher compared to 56% today
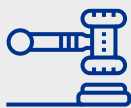
Urban Crime: In 2022, all major US cities have witnessed increases in violent crime rates. New York's violent crime rate increased by ~40% Y-o-Y during the same period

Growing Pollution Levels in Cities: In many megacities globally, pollutants increased between 8% to 14% Y-o-Y, which is up to three times as high as national or regional rates

Increasing Traffic Congestion: In 2022, an average US driver lost 51 hours per year due to congestion which was ~15 hours more than 2021

Health Hazards: Poor sanitation, water problems, and degraded environmental quality has increased the risk of diseases such as cancer, cardiovascular complications, and respiratory failure in urban residents
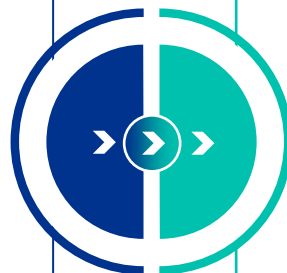
How Smart Cities Solve These Problems

The 15-minute City: Smart city concept that provides residents key amenities including living, working, shopping, medical provision, schooling, and recreation within 15 minutes of their doorstep

Surveillance and Predictive Policing: Facial recognition and video surveillance solutions for real-time danger detection and reduces response time for emergency services

Climate and Geospatial Technologies: Leverage climate and geospatial technologies driven by AI and data analytics to generate insights about pollution levels, climate change, and environmental quality

Smart Traffic Management: Utilization of AI, IoT devices, and sensors to monitor and control traffic flow in real-time with the aim to curtail traffic congestion

Smart Public Health: IoT and AI solutions such as drug monitoring, asset tracking, and remote patient monitoring supports healthcare providers to improve hospital utilization and reduce medical waste

How Smart Cities Space are Poised to Grow (1/2)

5G Connectivity

5G provides high speed internet with low latency to connect machines and sensors required to automate various urban activities. With the ability to connect ~1M devices per square km, 5G implementation has become a must for governments across the globe to implement their smart city initiatives

Market Size ($B)

CAGR: 25.3%

$107B (2022) → $331B (2027F)
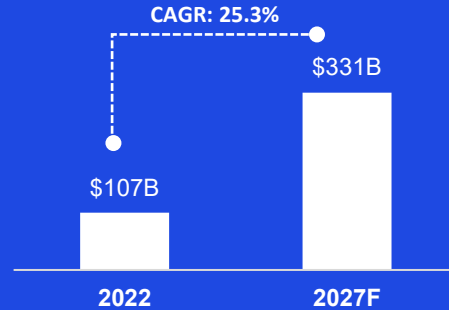
Smart Mobility Management

Problems including traffic congestion and pollution in cities have made developing sustainable and smarter mobility systems key priorities. Smart mobility solutions leverage new age technology to curtail traffic congestion, reduce emissions, and improve public transportation

Market Size ($B)

CAGR: 21.0%

$85B (2022) → $221B (2027F)
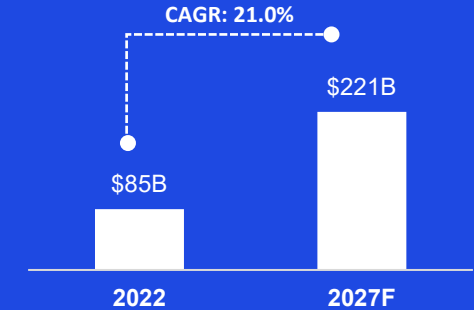
Smart Public Health

In the post covid world, adoption of smart healthcare solutions has undergone significant growth. Governments across the globe are heavily investing in new age technology to improve the efficiency of healthcare infrastructure and be better prepared to combat any future public health crisis

Market Size ($B)

CAGR: 23.1%

$143B (2022) → $405B (2027F)
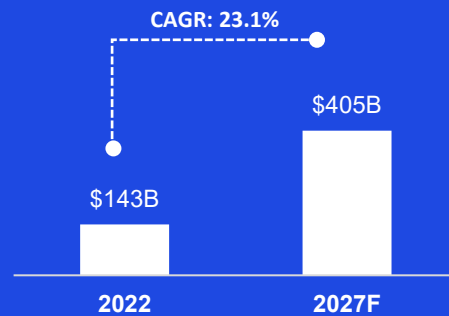
Smart Factories

Smart factories are a key focus area for smart city growth. There is a growing focus on organizations for zero waste, energy conservation, and carbon emissions reduction. This has resulted in increased adoption of smart technologies in factories. This push for increased efficiency in-turn will continue to reduce cities' carbon footprint

Market Size ($B)

CAGR: 9.7%

$323B (2022) → $514B (2027F)

How is Smart Cities Space Poised to Grow (2/2)

Smart Education

Smart education is a key aspect in smart city development. The smart campus is one of the most prevalent trends in this space which includes the implementation of solutions including smart microgrids, smart classrooms, and face recognition / smart cards-based student attendance

Market Size ($B)

CAGR: 24.4%

$162B — 2022
$482B — 2027F
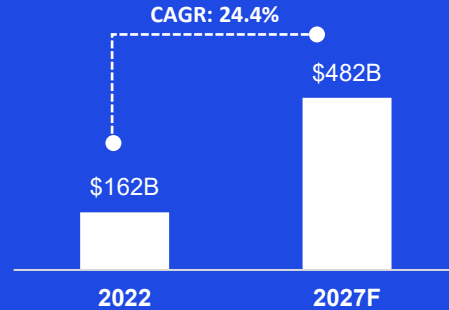
Smart Building Solution

Traditional buildings are responsible for nearly one third of all emissions in cities and are largely unoccupied for the majority of the day. Smart building solutions leverage AI software and IoT sensors to improve building utilization and optimize operations

Market Size ($B)

CAGR: 27.3%

$105B — 2022
$351B — 2027F
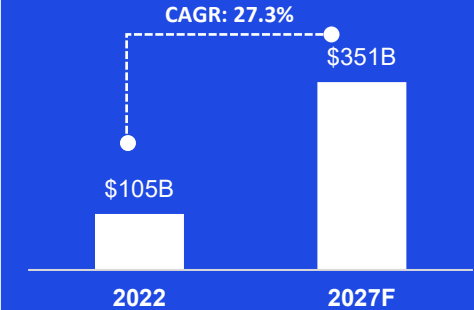
Smart Utilities

With the continuous expansion of cities, efficient distribution of basic utilities has become more challenging. To address these obstacles, cities have started deploying smart IoT solutions, such as smart metering, which supports citizens and providers to quickly identify and resolve delivery related issues

Market Size ($B)

CAGR: 20.2%

$148B — 2022
$371B — 2027F
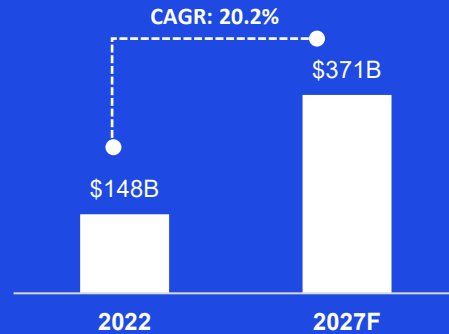
Smart Public Safety

The availability of AI and IoT tools, such as gunshot detection, smart surveillance, and AI-based predictive policing systems has increased the reliance of first responders on new age technology. Agencies have started to increase the adoption of these solutions to quickly identify and prevent emergencies

Market Size ($B)

CAGR: 22.2%

$93B — 2022
$253B — 2027F
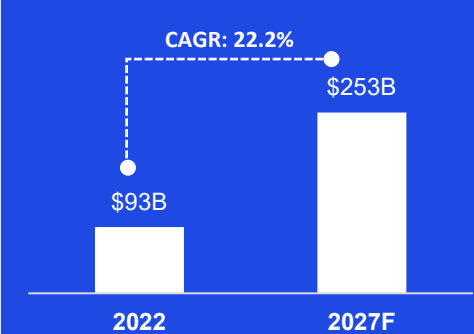
Source: 1) Smart Cities Market Report, Mordor Intelligence (2022)

Smart City Landscape

Adoption of Smart City Solutions by Mega Cities (1/3)

Miami

In March 2021, Miami began the installation of its Advanced Traffic Management System (ATMS). The project, estimated at $160M, will replace over 3,000 traffic controllers with the goal of optimizing traffic flow and reducing emissions

Smart Traffic Management Partner

YUNEX TRAFFIC

Las Vegas

Las Vegas has launched one of the most extensive Private 5G networks in the United States. The program has a wide range of use cases including intelligent monitoring systems to assist law enforcement in heavily congested areas

Private 5G Network Partner

NTT Group

Chicago

The Chicago Smart Lighting program will replace ~280K light fixtures with new energy efficient smart LED lights. The energy efficient bulbs will save the city an estimated $10M annually in energy costs and streamline future maintenance and repairs

Smart Lighting Partners

AMERESCO
Green · Clean · Sustainable

Itron

Boston

Boston began its trial for Vision Zero, a smart city solution, to address various issues including traffic management, traffic signaling and congestion, and public safety

Smart Traffic Management and Smart Public Safety Partners

verizon

Adoption of Smart City Solutions by Mega Cities (2/3)

Denver

Denver has implemented intelligent intersections, automated gunshot detection and response, and shared mobility by leveraging its partnerships with smart city specialists and large technology service providers

Smart Public Safety Partners

iteris lyft Panasonic
PARSONS kiwibot

London

London has implemented various smart city initiatives such as offering 5G to all residents, installing EV charging stations, implementing driverless rapid transit systems, developing smart traffic management, and launching smart meter programs

Smart Traffic Management, Smart Transit, and Smart Utilities Partners

ARUP neology Thames Water

New York

New York has adopted various smart technology solutions to improve services for its residents. These solutions include intelligent traffic management systems, automated meter reading system, and smart sensors for monitoring air quality and traffic flow

Smart Traffic Management and Smart Pollution Monitoring Partners

DIGI ring

Paris

Paris is focused on the deployment of smart city solutions to improve water, transport, energy, and waste management systems. The city has implemented smart park benches with the ability to provide insights about traffic and has installed ~280K smart streetlights

Smart Traffic Management and Smart Public Safety Partners

nodle GSL Groupe Saint Leonard Votre partenaire depuis 1959
Itron

Adoption of Smart City Solutions by Mega Cities (3/3)

Dubai

Dubai has been a front runner in the implementation of smart city planning. The city began its intelligent transport system project that aims to implement smart traffic systems to cut accident response times and traffic congestion

Smart Traffic Management Partner

Singapore

Singapore is amongst one of the smartest cities in the world. The city has adopted electronic road pricing systems that uses real-time traffic data to adjust toll rates and manage traffic congestion

Smart Traffic Management Partner

Sydney

In 2021, Sydney launched its next-generation automated driverless metro train between the Tallawang and Chatswood stations on the North-West Rail Link. The train is enabled with features such as automatic LED lighting, emergency intercom and CCTV cameras

Smart Transit System Partner

Hong Kong

Hong Kong has launched over 130 smart city initiatives under its Smart City Blueprint 2.0. The city under this blueprint also launched a smart mobility solution which will assist the information exchange among vehicles, traffic infrastructure, pedestrians, and networks in real time

Smart Traffic Management and Smart Public Safety Partners

International Perspective – UK & Wider Europe

The everchanging global dynamics related to technological, economic, and environmental nature have generated necessitated increased interest in smart cities. The European Union (EU) is striving towards its mission of achieving 100 carbon-neutral and smart cities by 2030.

UK Smart Cities Working Group dedicated to growing UK presence in the smart cities space

Focused on enhancing strategic relationships between suppliers and the public sector, building citizen trust in smart city tech, developing UK leadership in smart tech trade, and realisation of city-level climate and cyber resilience; initiated by £24m investment in Glasgow as the UK's first smart city followed by Manchester, London, Bristol, Hull and others

European Commission's push for digitalizing the energy sector

Investments are poised to grow in smart electricity grid, enhancement of cyber security of the energy systems, and digital innovations driving/engaging consumers

Smart mobility is at the crossroads of different industries: transportation, energy, and digital

The EU is working towards a fully operational, multimodal Trans-European Transport Network (TEN-T) for sustainable and smart transport with high-speed connectivity by 2050

Enhanced digital transformation and connectivity

Post the pandemic, the use of new technologies and the interconnectivity specific to smart cities has intensified. This transformation will further propel investments in ICT based 'smart' infrastructure with £50m investment by the UK Government in 5G connectivity technology throughout 2021 and 2022

Digital health service delivery is the way forward

Increased investment in AI enabled interconnected health and wellness ecosystem is driving smart cities' communities – health literacy, health system navigation, and health data digitalisation

Collaboration for IoT security considerations

Proposed 'Cyber Resilience Act' by European Commission will usher in an era wherein connected objects and software will comply with strong cybersecurity safeguards
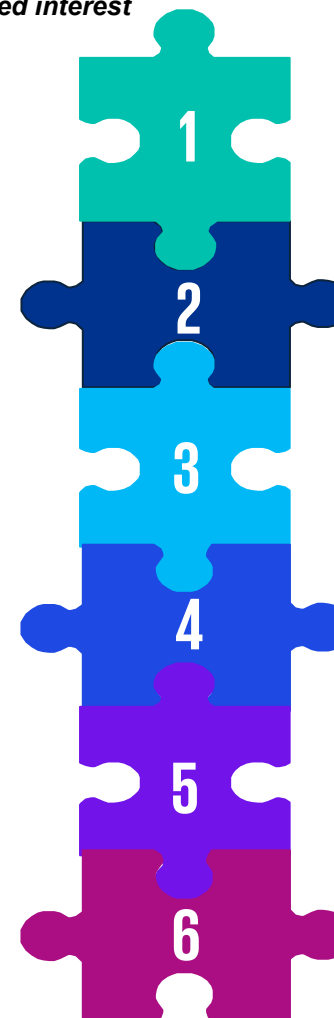
Source: BCS, 'Is the UK ready for smart cities?', BBC, APM

UK Business Spotlight: Humanising Autonomy

Pioneering Behavioural AI platform aimed at making human-machine interactions safe, efficient, and pleasant.

Founded in 2017

HQ in London

Founding Team
- Raunaq Bose
- Maya Pindeus
- Leslie Nooteboom

> **"Our technology is changing how machines understand people and how businesses can evaluate and extract insight from their video data."**
>
> **Raunaq Bose, Co-founder**

Technology

Humanising Autonomy's ethical Behavioural AI Platform processes, infers, and translates human behaviour into actionable insight that informs the decision-making process of any machine - or semi- to fully automated technology.

Applications

Mobility

Traffic Management

Meeting Analytics

Health & Safety

$17.2M

Funds raised till date

Globally Renowned Investors

BEACON

global brain

emellience PARTNERS

Recent Smart Cities M&A Activity (1/3)

ServiceNow	T-Systems	SMARTCTY	Miovision Technologies	Torc Robotics
Acquired	**Acquired**	**Acquired**	**Acquired**	**Acquired**
G2K Group	**GeoMobile**	**TrafficLand**	**GTT**	**Algolux**
Provides IoT and AI-based data analytics solution for the smart cities and retail space	Provides white-label product image recognition and related applications	Provides traffic tracking and video streaming SaaS, and APIs for federal agencies	Provides AI-based traffic control and sensing system, including hardware and SaaS	Provides AI-based autonomous vision SaaS for traffic light and sign detection
• May-23 • Deal metrics not disclosed	• May-23 • Deal metrics not disclosed	• Apr-23 • Deal metrics not disclosed	• Apr-23 • Total Deal Amount: $107M	• Feb-23 • Deal metrics not disclosed
Retail is just the beginning. This acquisition allows ServiceNow to create even greater simplicity and efficiency for our customers' growing needs across any industry.	*T-Systems is well established in the public transport sector. We hope the transaction will give us broader market access in the DACH region and synergies from joint product development.*	*With this merger SmartCTY Technologies will provide an affordable traffic management and data analytic system that can be easily integrated, aggregated, and distributed nationwide.*	*Becoming part of Miovision will give our customers access to an expanded suite of solutions for improving safety and optimizing urban transportation.*	*Algolux's technology, at the intersection of deep learning, computer vision, and computational imaging, will help Torc strengthen key capabilities.*
Karel van der Poel SVP and General Manager ServiceNow	**Dr. Michael Gerhard** CEO GeoMobile	**Steven Salsberg** Founder SMARTCTY	**Terry Griffith** President Global Traffic Technologies	**Peter Vaughan Schmidt** CEO Torc Robotics

Sources: Press releases, Beauhurst, Capital IQ, Mergermarket

Recent Smart Cities M&A Activity (2/3)

SolarEdge Technologies	Ouster	NextNav	Information Grid	Velodyne Lidars
Acquired	**Acquired**	**Acquired**	**Acquired**	**Acquired**
Hark Systems	**Velodyne Lidar**	**Nestwave**	**Aquicore**	**Bluecity Technology**
Provides energy analytics and IoT SaaS for energy consumption monitoring	Provides real-time 3D vision for autonomous vehicles, drones, and security	Provides LTE/5G-based geolocation systems and software for businesses	Provides corporate energy operation cost management SaaS and IoT-based sensors	Provides AI-based autonomous vision SaaS for traffic light and sign detection
• Jan-23 • Deal metrics not disclosed	• Nov-22 • Total Deal Amount: $256M	• Nov-22 • Total Deal Amount: $18M	• Nov-22 • Deal metrics not disclosed	• Oct-22 • Deal metrics not disclosed
" *Coupled with our smart energy solutions, Hark's advanced technological capabilities can provide enterprises with greater transparency and control of their energy usage and carbon emissions.* "	" *This is huge for the merger and for the strength of the combined business. Not only are we increasing the revenue base of the two companies by merging, but it's all positive margin.* "	" *The transaction will enable us to quickly scale our GPS resiliency capabilities in both the US and global markets sooner than previously anticipated.* "	" *We are thrilled to take the next step in our journey, joining forces with Infogrid to help bring our offering to a global audience and give real estate institutions the complete visibility needed to achieve net zero.* "	" *They are an exceptionally talented group of innovators with game-changing AI and analytics software that perfectly complements our lidar sensors and Vella software.* "
Zvi Lando CEO SolarEdge Technologies	**Angus Pacala** CEO Ouster	**Ganesh Pattabiraman** Co-founder and CEO NextNav	**Logan Soya** Founder Aquicore	**Ted Tewksbury** CEO Velodyne Lidar

Sources: Press releases, Beauhurst, Capital IQ, Mergermarket

Recent Smart Cities M&A Activity (3/3)

Various Investors	Beacon Capital & Emellience Partners	Nhood Holding France	European Connectivity Network	Fenice Spa
Investment in	Investment in	Acquired	Acquired	Acquired
Oxbotica	**Humanising Autonomy**	**Stereograph**	**Redexia Network**	**Citelum Italia**
Develops predictive AV technology using cameras and laser to sense and navigate the environment	Provides predictive AI and sentiment analysis delivering the global standard for human interaction with automated systems	Designs and develops a set of 3D tools for architectural visualization and infrastructure management	Operates Internet of things networks serving smart cities, logistics, transportation and smart buildings	Provides lighting, energy efficiency, and smart city services for the public administration sector
• Dec-22 • Amount Raised: $140M	• Oct-21 (further raise Feb-23) • Amount Raised: $11M	• Jan-23 • Deal metrics not disclosed	• Jun-22 • Deal metrics not disclosed	• Apr-22 • Deal metrics not disclosed
This landmark investment from world-class investors is a tremendous validation of our strategy to apply self-driving technology where there is persistent and urgent demand - in supply chains, industrial sectors and in decongesting cities	*We are delighted to work with our new partners Emellience and Beacon Capital in scaling our efforts in developing ethical technology built around people to ensure human/machine interaction is safer, more efficient, effective, and more human*	*Our acquisition of a stake in Stereograph marks an important milestone for Nhood. It reinforces our strategic plan to reinvent property management through digital innovation…and gives us the competitive edge to expand our client portfolio alongside Stereograph*	*Thanks to Netmore and ECN, we will be able to offer LoRaWAN in the 20 largest cities in Spain, allowing us to take the next step in deploying large projects with our customers…Netmore's technical expertise will provide our existing customers with increased support for their projects*	*The acquisition…will allow Fenice to expand its offer in the energy service business…to develop important synergies with Edison's business dedicated to energy services for the energy transition and decarbonisation of territories and cities towards the smart cities of the future*
Gavin Jackson CEO Oxbotica	**Maya Pindeus** Co-founder and CEO Humanising Autonomy	**Manuel Gomes** Founder and CEO Stereograph	**Alex Bryszkowski** CEO and Co-founder Redexia	Press release Edison SpA

Sources: Press releases, Beauhurst, Capital IQ, Mergermarket

We Are One of the Most Active M&A Advisors in IoT + AI*

Representative Transactions

Project Kent (Ongoing) — Sale of an AI digital transformation company serving brick and mortar retailers	**Talis Clinical** has been acquired by **GETINGE** — Healthcare IoT	**matrix TELEMATICS** has been acquired by **BRIDGES** Fund Management — IoT / Fleet Management	**LOCKMASTERS INCORPORATED** has been acquired by **DOMINUS CAPITAL** — IoT / Smart Building	**ACD TRADE / DiversiTech** a portfolio company of **PERMIRA** has been acquired by **BEIJER REF** — IoT / Smart Building	**ESC AUTOMATION** has been acquired by **AINSWORTH** — IoT / Smart Building	**Cognizant** has acquired **ZENITH TECHNOLOGIES** — Industrial IoT — *Technology Deal of the Year M&A Atlas Award*
Ubisense has sold its Smart Space division to **INVESTCORP** — Industrial IoT	**OSRAM** has divested **LEDVANCE** to **IDG 资本** IDG Capital Partners / **MLS** — Smart Lighting	**TRS Technologies** has been acquired by **TAYCA CORPORATION** — Sensor Technologies	**FREEWAVE** FreeWave has been acquired by its founder — Industrial IoT	**GREENCREATIVE** has been acquired by **Harbour Group** — Smart Lighting	**CLIFFORD THAMES** has been acquired by **OEConnection** a portfolio company of **PROVIDENCE EQUITY** — IoT / Connected Car	**3M** has divested its Smart Traffic and Tolling Technologies business to **NEOLOGY** — IoT / Smart Traffic
FINELITE Better Lighting has been acquired by **legrand** — Smart Lighting	**WABCO** Buyside financial advisory on an undisclosed fleet management company — Fleet Management	**ALPINE INVESTORS** has sold **Linx TECHNOLOGIES** to **ARGOSY CAPITAL** — IoT Platform	**PINNACLE ARCHITECTURAL LIGHTING** has been acquired by **legrand** — Smart Lighting	**lytx DriveCam.** Financial advisory on Lytx for an undisclosed bidder — IoT / Fleet Management	**KIOSK Information Systems** has been acquired by **POSIFLEX** — IoT / Embedded Computing	**Breathing Buildings** has been acquired by **volution group** — HVAC / Smart Building

(1) Refers to the global Corporate Finance practices of KPMG International's network of independent member firms

Let's Connect

Joseph Radecki
Managing Director & Head, TMT
Investment Banking
US KPMG Corporate Finance LLC
+1 312-655-4401
jradecki@kpmg.com

Hemu Narang
Director,
TMT Investment Banking UK
KPMG Corporate Finance
+44 (0) 7467-234854
hemu.narang@kpmg.co.uk

Patrick Reedy
Vice President,
TMT Investment Banking
US KPMG Corporate Finance LLC
+1 312-665-1240
preedy@kpmg.com

Francois Raymond
Associate,
TMT Investment Banking
US KPMG Corporate Finance LLC
+1 312-665-2309
fraymond@kpmg.com

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