AITR SMART CITIES AND AI CHAPTER (AITRSC)

AITR Smart Cities and AI Chapter (AITRSC) aims to help cities of every size (not only in Turkey but globally as well) to become more livable and sustainable with a high quality of life by leveraging the power of AI and contributing to the development of economic, social and sustainable impact of the cities through thought leadership while supporting the development of smart and sustainable cities initiatives and projects by enhancing the network of collaborators and partners.
AITRSC will bring together the best practices collated from various cities on how to build an ecosystem where AI can be harnessed for the Public Good.

It is also a call to action to AITRSC members to not just learn from the experiences shared by others, but to build upon these experiences. AITRSC will welcome further contributions on a continuing basis from all its members through projects, events, competitions, ideation workshops and focus meetings.

The scope of the chapter covers all the domains of smart and sustainable cities such as mobility, energy, environment, water, safety & security and governance.

INTRODUCTION

Urbanization is progressing at an unprecedented rate, with 68 per cent of the world population expected to reside in urban areas by 2050. Ninety-five per cent of the urban expansion is expected to take place in the developing world, putting tremendous pressure on these regions to cope with the new human development challenges. It is important to address the rising challenges for urban governance including, but not limited to, economic inclusiveness, increased resource consumption, environmental deterioration, seamless and convenient mobility, surging housing needs, new physical infrastructure, and city resilience[1].

In this context, Artificial Intelligence (AI) is a frontier technology that can be leveraged to assist with decision-making to help address various urban challenges faced by cities across the globe. Increasingly, people and objects in cities are connecting to the internet and generating huge amounts of data thanks to digitalization. AI presents an unprecedented opportunity to learn to solve urban problems and, by capitalizing on algorithms and urban data, to automate decision-making at a speed and scale that is not possible for humans.

AI and machine learning (ML) can be used to:

- identify, address, and solve a myriad of municipal challenges and problems
- use data extensively and
- enable algorithms to be revised and to be improved over time by utilizing additional data as a learning mechanism as it becomes available.

AI as a frontier technology, is used in urban contexts to address various city challenges. These can include areas such as hiring, utilities, transportation, cybersecurity and tourism. Today, undoubtedly AI already facilitates the lives of people in various contexts and applications. However, as with all other technologies, it also brings its own risks and pitfalls.

[1]**Guiding principles for artificial intelligence in cities, U4SSC, ITU**
https://www.itu.int/en/publications/Documents/tsb/2024-U4SSC-Guiding-principles-artificial-intelligence-in-cities/files/downloads/2301175_U4SSC%20_Guiding-principles-artificial-intelligence-in-cities.pdf

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A vision to build AI-powered Smart and Sustainable Cities[2]

As the promise of Artificial Intelligence (AI) manifests, we are presented with new opportunities to shape tools and techniques that will help us address some of the major global challenges of our time and deliver solutions that translate into meaningful social and economic impact. In the quest to build smart and sustainable cities, SDG 11 of the United Nations Sustainable Development Goals (SDG) highlights the role of AI as the key that unlocks social benefits for billions. But are we there yet?

AI has the potential to support several of the 17 United Nations (UN) Sustainable Development Goals (SDGs) under its 2030 Agenda, particularly SDG 11, which focuses on Sustainable Cities and Communities. Today's cities face multiple challenges – one of the important ones is the mass migration of more than half the global population towards cities, with that segment projected to skyrocket to 60% by 2030. Overcrowding of urban environments leads to several adverse impacts such as greater pressure on limited infrastructure and resources. This, in turn, can increase the carbon footprint – and poses a serious concern for governments that are focused on achieving their Net Zero targets. So, how can governments ensure optimal conditions for a prosperous economy that promotes social equality and champions environmental sustainability?

One of the most efficient ways of achieving sustainable smart cities and communities and enabling cost-effective urban utilities and solutions is to bring AI into the mix. Technology has been known to enhance the quality of our lives and through leveraging sensors, data analytics, and other AI tools, it is now possible to scrutinize data to detect patterns, leading to better traffic management, and energy consumption, improved water and waste management, lower pollution and ambient noise, and greater supply chain efficiency, ultimately minimizing the carbon footprint.

AI-powered smart cities are set to play a prominent role in making urbanization inclusive and more sustainable. The sustainable cities of the future will be equipped with advanced features for people to live in, walk around, shop in – to enjoy a safe and more convenient life. AI-powered smart cities are setting new benchmarks in design, economics, infrastructure and beyond.

By leveraging AI, cities like Zurich, Amsterdam, Oslo, Copenhagen, and Singapore are already creating more sustainable and livable communities that are better prepared to meet the needs of their citizens.

The environment is front and center in urban planning in these sustainable cities. Singapore, for instance, has an autonomous fleet to help the elderly with restricted mobility get around. AI-powered chatbots are also helping the elderly by delivering useful information and keeping them from feeling lonely!

While smart cities aspire to become inclusive, safe, resilient, and sustainable, some challenges continue to exist. Data privacy concerns are crucial, as people are required to share important data or endure surveillance cameras at every street corner.

Security is another key concern, with IoT devices representing loopholes as we achieve increasing interconnectivity. Poor standardization and a lack of collaboration among key stakeholders is also causing some inconsistencies in maintaining the quality of smart infrastructure.

According to PWC, AI is forecast to contribute almost 14% of the national GDP by 2030, adding 33.5% growth to the UAE economy between 2018 and 2030. A published in 2019 also found that around 70% of double-digit growth companies in the UAE intend to use AI in the coming years to improve decision-making.

Countries like the UAE, Saudi Arabia, and Singapore have a distinct advantage over legacy tech hubs like the US because they are relatively new entrants and can therefore leverage the latest tech in crowd management.

So, the successful implementation of an AI-powered sustainable smart city depends greatly on the support of city authorities, key stakeholders, and the development of trust within communities. In order to develop sustainable smart cities that are well-aligned with SDG 11, it is essential for city authorities to inspire trust and support within their communities.

The collaboration between the industrial stakeholders, scientific community, and city authorities is vital for advancing these technologies and achieving the broader objectives of SDG 11. Without this collaboration, it will be difficult to effectively implement and utilize AI-driven sustainable smart city technologies to their full potential.

[2]A vision to build AI-powered Smart and Sustainable Cities, Ebtesam Almazrouei, Director of AI Cross Center Unit
https://aiforgood.itu.int/a-vision-to-build-ai-powered-smart-and-sustainable-cities-are-we-there-yet/

Benefits and Risks[3]

“Cities are increasingly at the confluence of the world’s most pressing issues: dealing with extreme weather events, managing migration, maintaining affordability and ensuring public safety. As the share of the population living in cities continues to grow, leaders are looking to technology to help them solve some of their most pressing issues.

By instrumenting critical systems with connectivity and adding sensors to existing infrastructure, cities can better understand their resource utilization, citizen behavior and service gaps. The advent of AI, and more recently, generative AI, has opened up a world of possibilities for expanding access to services and enhancing efficiencies. However, these advancements also create new risks.

Benefit: Digitizing infrastructure through connectivity and sensors allows for AI-powered resource visibility and optimization, preventative maintenance and data-driven decision making.
Risk: Connected critical infrastructure expands cities' threat surface, potentially leaving them more vulnerable to cyber-attacks.

Benefit: Digitizing information and improving data collection capabilities can equip government leaders with insights to better design and forecast future initiatives that improve sustainability, safety and resilience.
Risk: The collection of personal data raises concerns about citizen privacy, surveillance, and potential misuse of citizen data.

Benefit: Digitizing government services can reduce barriers to civic participation, promote transparency of data and improve access.
Risk: Without equity in mind, digital government could replicate or exacerbate existing inequalities.

As we navigate the transition to smarter cities, it is imperative for policymakers, industry stakeholders and communities to work collaboratively in addressing these challenges and ensuring that technological innovations are deployed ethically and inclusively. But by embracing a forward-thinking approach that prioritizes sustainability, equity and resilience, AI smart cities could usher in a new era of urban prosperity and well-being for generations to come.

AI comes into play in smart cities when AI capabilities are applied to existing or new datasets or streams. Whereas IoT applications collect the data, AI analytics can detect patterns, make predictions, unify data streams (data fusion) and enhance data quality. When examining the AI + IoT (AIoT) equation, use cases that emerge vary between applications and cities. Many IoT application providers offer AI analytics as part of the insights they deliver to customers, offering historical analysis and prescriptive insight into metrics like planned resource utilization and demand forecasting. AI governance, data quality and employee data literacy are chief considerations to make before procuring and deploying AI applications and a full-scale AI strategy within a city.

Smart cities could become even smarter through increased application of AI both in infrastructure development and analysis of data. Enhancing safety, sustainability, quality of life and resident experience are key benefits of urban areas becoming more AI-powered.

However, risks such as data privacy and critical infrastructure security are on the rise and add to the challenge for governments and public bodies to govern and contain.

Over the next five years, we expect AI/generative AI to impact cities through integration into digital government services, smart transportation and interactive digital twins".

[3]**The Rise of AI-Powered Smart Cities, S&P Global, 18 May 2024**
https://www.spglobal.com/en/research-insights/special-reports/ai-smart-cities

AI in Smart Cities[4]

The adoption of AI in urban settings brings its challenges. Ensuring data privacy and safeguarding against biases in AI algorithms are critical concerns that must be addressed to build trust in these technologies. Cities must implement robust data protection measures and design inclusive, transparent, and accountable AI systems to avoid exacerbating existing inequalities.

As cities continue to explore the possibilities of these technologies, it is essential to recognize both the immense promise and the inherent risks of AI. By thoughtfully navigating these complexities, cities can harness the power of AI to create more liveable, responsive, and equitable environments for their residents.

The transformative potential of AI in modern urban settings should not be underestimated, providing local governments critical support tools to garner insights, bolster decision making, and improve efficiency, all while helping to ensure data security. AI's ability to deliver personalized citizen experiences is already changing how cities interact with and serve their residents. By processing vast amounts of data to predict and meet individual needs, AI can tailor services ranging from public transport updates to healthcare reminders, greatly enhancing citizen engagement and satisfaction.

The case of Madrid's AI-powered virtual assistant exemplifies how personalized interactions can significantly improve visitor experiences. AI also helps to empower local government workforces by automating repetitive tasks and providing data-driven insights. This enables employees to focus on strategic, high-value activities, thus improving overall productivity.

The example of Stavanger Kommune in Norway demonstrates how AI can streamline data management and automate mundane tasks, freeing up resources for more critical functions. Next, AI optimizes local government efficiency by improving resource management and decision-making processes. AI-enabled predictive analytics can anticipate demands and adjust resources accordingly, ensuring cities operate more smoothly and sustainably.

Singapore's AI-driven water management system illustrates how predictive analytics can mitigate risks and enhance resource allocation. Finally, as cities adopt AI and cloud solutions, they must balance innovation with stringent data governance policies. AI can support governments in automating and enforcing these policies, ensuring data privacy and compliance with local regulations.

The example of Toronto's AI-powered data governance platform highlights how automated controls can safeguard sensitive information while fostering innovation. AI presents a new range of opportunities for cities to enhance services, streamline operations, and protect data privacy. By thoughtfully integrating AI technologies, cities can overcome current challenges and create more efficient, responsive, and equitable urban environments for their residents.

[4]Smart Cities World Trend Report, 2024
https://www.smartcitiesworld.net/trend-reports/artificial-intelligence-in-cities-trend-report-2024

GOVERNANCE, FRAMEWORKS AND TOOLS

Governance of AI: A critical imperative for today's boards[5]

In a new Deloitte Global survey of board directors and executives, almost 50% say AI is not yet on the board agenda. Is it time to step up AI oversight in the boardroom?

We are at an inflection point, not only for business and industry, but for society at large. Board members and executives alike are excited at the chance to shape a future powered by the latest technologies of the day, including artificial intelligence and generative AI. But this does not come without risk and responsibility. The decisions leaders make today will have pervasive impacts on both the organizations they lead and societies around the world. Infusing a mindset of trust and ethics from the start will be vital to shaping short-term and long-term adoption. While AI is not new, its scaled use in the enterprise and by employees brings the question of governance and oversight of AI and gen AI into sharp focus.

So how are boards navigating these opportunities and challenges? How are they balancing their time to help ensure all pressing boardroom topics get the time and attention they deserve? And how are they confident that AI implementation is transparent, safe, and responsible with the appropriate guardrails?

As Deloitte Global's research shows, it's complicated. What is resoundingly clear, though, is that boards are eager to spend more time on AI and gen AI, enhance their knowledge and experience, and accelerate the pace of adoption in their organizations.

This is a pivotal moment in the history of human invention—a moment future generations will certainly look back on. It's imperative we reflect on the legacy we are creating as we navigate the path forward.

Deloitte Global survey sparks meaningful conversations in the boardrooms and with the management teams—inspiring a fresh look at whether and how AI and gen AI can play a role in the organizations, all while keeping trust at the forefront.

As organizations prepare to move past the piloting stage to integrate AI more broadly into strategy and operations, how active are boards in overseeing their organizations' approach to AI? Are they providing the right level of stewardship to help the organizations' management teams balance the wide array of opportunities and risks that AI can introduce?

In June 2024, the Deloitte Global Boardroom Program surveyed nearly 500 board members and C-suite executives across 57 countries to understand how involved boards have been in AI governance. The survey explored sentiments about the current pace of adoption and the board's role in strategic oversight of this emerging technology.

While the survey asked respondents about both generative AI and artificial intelligence more broadly, interviews revealed that many business leaders are primarily focused on gen AI adoption right now.

Steps boards can take now to bolster AI oversight

The data shows that boards are eager to spend more time on AI and gen AI, enhance their knowledge and experience, and accelerate the pace of adoption in their organizations. But how can boards best navigate these opportunities and challenges? The following are a few immediate actions boards can consider taking to bolster AI governance.

1) Put AI on the board agenda—and make it strategic.
2) Define the governance structure.
3) Evaluate and enhance AI literacy.

[5]Deloitte Global, 2024
https://www.deloitte.com/nz/en/services/consulting/analysis/governance-of-ai.html

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AI Toolkit[6]

National League of Cities and Google want to address the risk of an "AI divide" being created in cities across the US.

The AI Toolkit is designed to help city governments in the US harness the power of AI to enhance public services and improve the quality of life for residents.

Karan Bhatia, vice president and global head of government affairs and public policy at Google, said governments across America and around the world are beginning to see how AI can help them continue to serve their citizens better and faster, while maximizing their limited resources.

"We've seen this happen at the federal level with initiatives charging cabinet agencies to deploy AI in new innovative ways. Increasingly, AI's potential is now also coming into focus for local governments. Whether tackling everyday needs more efficiently like fixing potholes or confronting complex challenges like addressing threats to public health, AI can significantly enhance the ability of local governments to fulfil their missions."

But not all cities are utilizing or have access to AI. "This has the risk of turning the digital divide that has plagued many cities into an 'AI divide,' with potentially even more profound impacts on communities," said Bhatia.

The AI Toolkit aims to make sure the opportunities of AI are widely accessible. With AI explainers, examples of how other cities have leveraged AI, and step-by-step guides to help cities interested in exploring AI strategies.

"Technology has always been an essential tool to help local governments respond to the changing needs of their residents," said Clarence Anthony, CEO and executive director of the National League of Cities that represents more than 200 million people and works to strengthen local leadership, influence federal policy and drive innovative solutions.

The toolkit builds on Google's work to deliver on its AI Opportunity Agenda, supporting governments in focusing not only on harms to avoid and risks to mitigate – but on opportunities to seize. "We are excited to partner with the National League of Cities, providing tools, resources, and expertise to help its members leverage AI in ways that meet the unique needs of their communities," said Bhatia.

[6]**Google and National League of Cities Develop AI Toolkit**
https://www.smartcitiesworld.net/news/google-and-national-league-of-cities-develop-ai-toolkit
nlc.org/AIToolkit.

Guiding principles for artificial intelligence in cities[7]

The U4SSC is coordinated by the International Telecommunication Union (ITU), the United Nations Economic Commission for Europe (UNECE) and the United Nations Human Settlement Program (UN-Habitat) along with the support of other 16 United Nations agencies and programs and has developed strategic guidelines and tools that aim to assist prospective smart sustainable cities in implementing the Sustainable Development Goals (SDGs).

The U4SSC Deliverable on Guiding principles for artificial intelligence in cities provides a broad set of suggested principles, enablers, governance methods, policy instrument alternatives and a simple methodology for instilling AI principles in cities.

This set of guiding principles is included to design, develop and deploy AI systems. These principles effectively manifest and express the values cities need to instill to achieve a trustworthy and safe AI based smart sustainable city services. The combination of target AI principles selected by cities constitutes a specific direction and focus for their AI systems. The successful implementation of AI principles may not be guaranteed, and cities will need to exert additional efforts to ensure their compliance in AI systems. However, these additional efforts will render AI systems more reliable and trustworthy in urban contexts.

This guidance:
- is intended to be used by city administrations that aim to develop and implement guiding principles for AI in their urban contexts. Therefore, it targets smart and sustainable cities and communities
- is NOT about identifying a comprehensive list of AI solutions in smart sustainable cities (SSCs). It is rather about providing principles-based guidance in using AI for SSCs. AI use case examples are mentioned in the document; however, it would be practically impossible to exhaustively identify all AI use cases in a city context
- can be used by all aspiring cities that aim to implement AI solutions regardless of their size and context
- is technology agnostic within the context of overall AI technologies; and
- is a framework document that can be adopted by cities and tailored to their own specific needs and contexts.

In addition to guiding principles, it also provides a non-exhaustive list of enablers, which can be used selectively by cities to accelerate the implementation of their AI principles. A short list of policy instrument alternatives and governance options are also included to help cities adopt AI principles.

The guide presents a principles framework that cities can use for their own AI systems. The framework is flexible to accommodate cities' particular goals and objectives by allowing them to select their own principles from a relatively rich set of potential principles. The implementation of these principles is important to achieve intended outcomes from AI systems in cities.

The AI principles framework developed in this guide aims to establish a list of AI principles as mutually exclusive and collectively exhaustive as possible. The first section provides a general overview of existing initiatives that have formulated AI principles. The second section synthesizes a list of AI principles for cities to use in the form of a framework.

Cities are either deploying or are planning to deploy AI systems to address their urban challenges. It is important to establish guiding principles for AI systems to ensure reliability and trust. Some of the conclusions from the framework and the real-life case studies in this deliverable are stated below:

- There is no "one size fits all" approach for guiding principles for AI in cities
- It is important for cities to consider implementation issues in order to successfully ensure compliance with their AI principles
- It would be beneficial for cities to segregate data and algorithms and individually consider both for principles compliance
- Urban challenges and priorities, city administrations' smart sustainable city strategies, inhabitants' urban requirements can act as a viable demand for AI principles as part of a broader context for AI implementations
- City administrators have a wide range of tools at their disposal to encourage and incentivize implementation of AI principles defined as enablers in this framework document (e.g., regulations, policies, awareness, start-up ecosystem)
- Exchange of knowledge at the local, regional, and international levels will help develop AI principles formulation and implementation and will also increase its sustainability in the long run
- Cities have a wide spectrum of policy alternatives depending on how flexible or obliging they want to be in their AI principles implementation
- Three governance options for the extent of centralization have been provided to cities in regulating, implementing, and assessing their compliance with respect to AI principles
- Guiding principles for AI is a relatively novel topic and may benefit significantly from capacity building and research and development (R&D) programs and
- Cities can capitalize on AI principles by turning it into a viable economic sub-sector, while simultaneously utilizing them in addressing and solving their own urban challenges.

The U4SSC Deliverable on Guiding principles for artificial intelligence in cities is complemented by the case studies for: Singapore; Hong Kong, China; Dubai, UAE; Copenhagen, Denmark; Buenos Aires, Argentina.

[7] **Guiding principles for artificial intelligence in cities, U4SSC, ITU**
https://www.itu.int/en/publications/Documents/tsb/2024-U4SSC-Guiding-principles-artificial-intelligence-in-cities/files/downloads/2301175_U4SSC%20_Guiding-principles-artificial-intelligence-in-cities.pdf.