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Building the Infrastructure of The Future Riyadh and NEOM

A Grant Thornton Perspective on the World Economic Forum's Emerging Technologies.

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Building the Infrastructure of The Future Riyadh and NEOM

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The World Economic Forum's (WEF) Top 10 Emerging Technologies of 2025 report provides a critical lens on the innovations that will define economies, societies and governance in the coming decade. From engineered living therapeutics to nanozymes, these technologies represent inflection points where scientific achievement meets practical potential. Yet, within this portfolio, two technologies stand out as particularly transformative for infrastructure and future urban environments: collaborative sensing and generative watermarking.

The former reimagines how distributed sensor networks, enhanced by artificial intelligence (AI) and edge computing, can transform mobility, resource management and public safety. The latter addresses one of the most significant vulnerabilities of the digital age, the erosion of trust in content by embedding authenticity at the very foundation of digital ecosystems. Together, they not only represent technological progress but also form the building blocks of cities that are adaptive, intelligent and trustworthy.

For Saudi Arabia, and particularly its flagship giga-projects, Riyadh's transformation into a leading global city and NEOM's creation as a cognitive, sustainable mega-city, these innovations are not abstract. They are practical tools to deliver Vision 2030. As global advisors and as Grant Thornton, our perspective is that these technologies are reshaping what "infrastructure" means. No longer confined to concrete and steel, infrastructure now includes data, trust, and intelligent systems embedded across physical and digital environments.

This article summarises the WEF findings on collaborative sensing and generative watermarking and then explores how Saudi Arabia can leverage these to create resilient, future-ready cities. It concludes with a strategic perspective from Grant Thornton on how policymakers, regulators, and investors can position Riyadh and NEOM as global benchmarks for 21st-century infrastructure.

Chapter 1:

Global Insights from the World Economic Forum.

Collaborative Sensing: Infrastructure That Thinks and Learns

The WEF report defines collaborative sensing as the networking of sensors embedded in homes, vehicles, infrastructure and devices, connected through AI-enabled systems. Rather than relying on isolated sensors, collaborative sensing connects data across platforms, enabling real-time situational awareness, predictive insights, and adaptive responses.

Globally, collaborative sensing is already reshaping mobility and logistics. For instance, connected vehicle-to-everything (V2X) technologies allow cars to “see” around corners, dramatically reducing collisions. Research suggests this could cut road accidents by up to 78% while improving traffic flow. In logistics, AI-driven collaborative sensing optimises fuel use, cutting emissions and costs. For cities, the benefits extend beyond efficiency: emergency response systems could be automated, traffic dynamically re-routed during crises, and energy grids adjusted in real-time to balance demand.

Yet challenges remain. The WEF highlights that 5G penetration is only around 55% globally, constraining the low-latency data transfer required for widespread deployment. Governance issues also arise: Who owns the data? How is liability shared when decisions are AI-driven? And how can societies ensure cybersecurity resilience against systemic risks?

Despite these hurdles, collaborative sensing is recognised as a cornerstone of future infrastructure. Its strategic outlook is clear: cities and nations that scale collaborative sensing will gain first-mover advantages in safety, energy efficiency and economic competitiveness.

Generative Watermarking: Rebuilding Trust in the Digital Age

If collaborative sensing provides infrastructure with intelligence, generative watermarking provides it with trust. The WEF report positions this technology as critical to addressing one of the most pressing global risks misinformation and disinformation.

Generative watermarking involves embedding invisible digital markers in AI-generated content to verify authenticity and origin. These watermarks are undetectable to users but can be validated by systems, offering proof of authorship and integrity. Global technology leaders are already deploying this: Google's SynthID, Adobe's Content Credentials, and TikTok's transparency initiatives.

The regulatory environment is also accelerating. The EU AI Act mandates watermarking for synthetic content, with penalties up to €35 million or 7% of global turnover for non-compliance. China has similarly required disclosure of AI-generated content, while US states like California are developing local frameworks.

But watermarking is not without risks. Watermarks can be stripped, standards differ across jurisdictions, and malicious actors could misuse "false" watermarks. The WEF stresses that its long-term potential will depend on robust global standards and alignment between governments and industry.

The implications extend well beyond media. In legal systems, watermarking could authenticate digital evidence. In insurance, it could underpin risk models. In commerce, it could differentiate trusted brands from counterfeiters. In short, generative watermarking forms the digital trust infrastructure upon which collaborative sensing and broader smart city systems can safely operate.

Chapter 2:

The opportunity in Saudi Arabia.

Saudi Arabia's Infrastructure Ambition

Saudi Arabia's Vision 2030 is not just an economic diversification programme; it is a redefinition of national infrastructure. Riyadh is being positioned as one of the world's top ten city economies by 2030, with mega-investments in transport, housing, and digital infrastructure. NEOM, by contrast, is envisioned as a new model altogether a cognitive city built from the ground up, integrating AI, renewable energy, and next-generation urban design.

Both Riyadh and NEOM are natural laboratories for applying collaborative sensing and digital watermarking. They combine ambitious budgets, political will, and greenfield development opportunities. Importantly, they also operate under a governance framework capable of setting global precedents for how future cities integrate intelligence and trust.

Collaborative Sensing in Riyadh and NEOM

In Riyadh, collaborative sensing can transform urban mobility. The Riyadh Metro, one of the world's largest public transport projects, could integrate V2X technologies with autonomous vehicle lanes, reducing congestion and dramatically cutting accident rates. Beyond safety, adaptive traffic management could reduce journey times and emissions, aligning with Saudi Arabia's environmental targets.

In NEOM, the possibilities are even broader. NEOM's Oxagon the world's largest floating industrial hub could deploy collaborative sensing across logistics chains, ports and factories, optimising efficiency and resilience. Emergency services in NEOM could be powered by AI-driven sensing networks, enabling drones and autonomous vehicles to respond to incidents in real-time. Environmental monitoring systems could track water scarcity, desert agriculture, and biodiversity, aligning with NEOM's ambition to be a sustainability showcase.

However, challenges specific to Saudi Arabia must be addressed. Data sovereignty is paramount, with the Kingdom unlikely to rely on foreign platforms for critical infrastructure. Integration across giga-projects will require unified standards, avoiding fragmented systems. Finally, a domestic talent pipeline of data scientists, cyber specialists and systems engineers will be essential to sustain innovation at scale

Generative Watermarking and Digital Trust in KSA

Watermarking could underpin the government's communication strategy, ensuring verified information flows during crises or major events. For NEOM, watermarking could be embedded from the outset into its digital ecosystems, from citizen services to entertainment, making it the first global "authenticity-first" city.

Legal systems in Saudi Arabia could recognise watermarked content as admissible evidence, providing courts and regulators with new tools for accountability. Commercially, Saudi Arabia's burgeoning creative industries, gaming, film, and AI-powered media, could gain premium global positioning by branding themselves as watermark-certified creators of trusted content.

At the same time, risks must be managed. Over-reliance on global watermarking standards could reduce sovereignty, while slow adoption could leave gaps for disinformation. To lead, Saudi Arabia must both align with global standards and set its own domestic benchmarks, positioning itself as a standard-setter in the region.

Chapter 3:

A Grant Thornton Strategic Perspective.

From Adoption to Leadership

From our perspective as advisors, the question for Saudi Arabia is not whether to adopt collaborative sensing and generative watermarking, but how to lead in their deployment. Riyadh and NEOM have a unique chance to showcase what future cities can look like when intelligence and trust are embedded at the core.

Economic Impact

The economic benefits are significant. Collaborative sensing can reduce accidents, lower insurance costs, and cut congestion, translating into billions of dollars of savings annually. For logistics hubs like King Salman Port and Oxagon, collaborative sensing could unlock global competitiveness, reduce inefficiencies and attract foreign investment. Generative watermarking, meanwhile, creates premium value for Saudi content industries, strengthens IP protection, and underpins investor confidence in digital ecosystems.

Governance and Regulation

Governance is the critical enabler. Saudi regulators must craft frameworks that encourage innovation while safeguarding sovereignty. For collaborative sensing, this means clarifying liability models and ensuring interoperability across giga-projects. For watermarking, it means establishing standards that are globally aligned but locally enforceable. Without clear governance, both technologies risk under-realisation.

Capability Development

Saudi Arabia's leadership will depend on building cross-sector capabilities. This includes:

- Data standards across transport, utilities and telecoms to ensure seamless integration.
- Cyber-resilience frameworks to protect infrastructure against systemic risk.
- Legal infrastructure that recognises and enforces digital trust.
- Public-private partnerships to pilot and scale collaborative sensing networks.
- Talent pipelines, developed through universities, partnerships, and secondments, to sustain innovation across engineering, data science and cybersecurity.

Grant Thornton's Role

Our role is to help structure these initiatives. This includes designing PPP models that balance risk and reward, creating regulatory compliance frameworks for digital trust, conducting economic impact modelling for technology adoption, and advising on talent strategies that align with Vision 2030. Our perspective is that success lies not in technology adoption alone but in ecosystem orchestration , bringing regulators, investors, operators and innovators together to co-create future-ready infrastructure.

The WEF's Top 10 Emerging Technologies of 2025 reminds us that infrastructure is no longer limited to roads, bridges and power lines. It is equally about networks of intelligence and systems of trust.

For Saudi Arabia, the stakes are high, but the opportunity is unparalleled. By embedding collaborative sensing and generative watermarking into the DNA of Riyadh and NEOM, the Kingdom can set new global benchmarks for how cities are designed, governed and experienced.

Future Riyadh and NEOM will be defined less by their skylines and more by their ability to harness intelligence, trust and adaptability. For leaders, the challenge is to move beyond adoption and step into global leadership.

Grant Thornton's perspective is clear: the future of infrastructure is hybrid, combining physical, digital, and cognitive elements. By orchestrating ecosystems where collaborative sensing and digital trust converge, Saudi Arabia can not only realise Vision 2030 but also shape the blueprint for the cities of the 21st century.

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