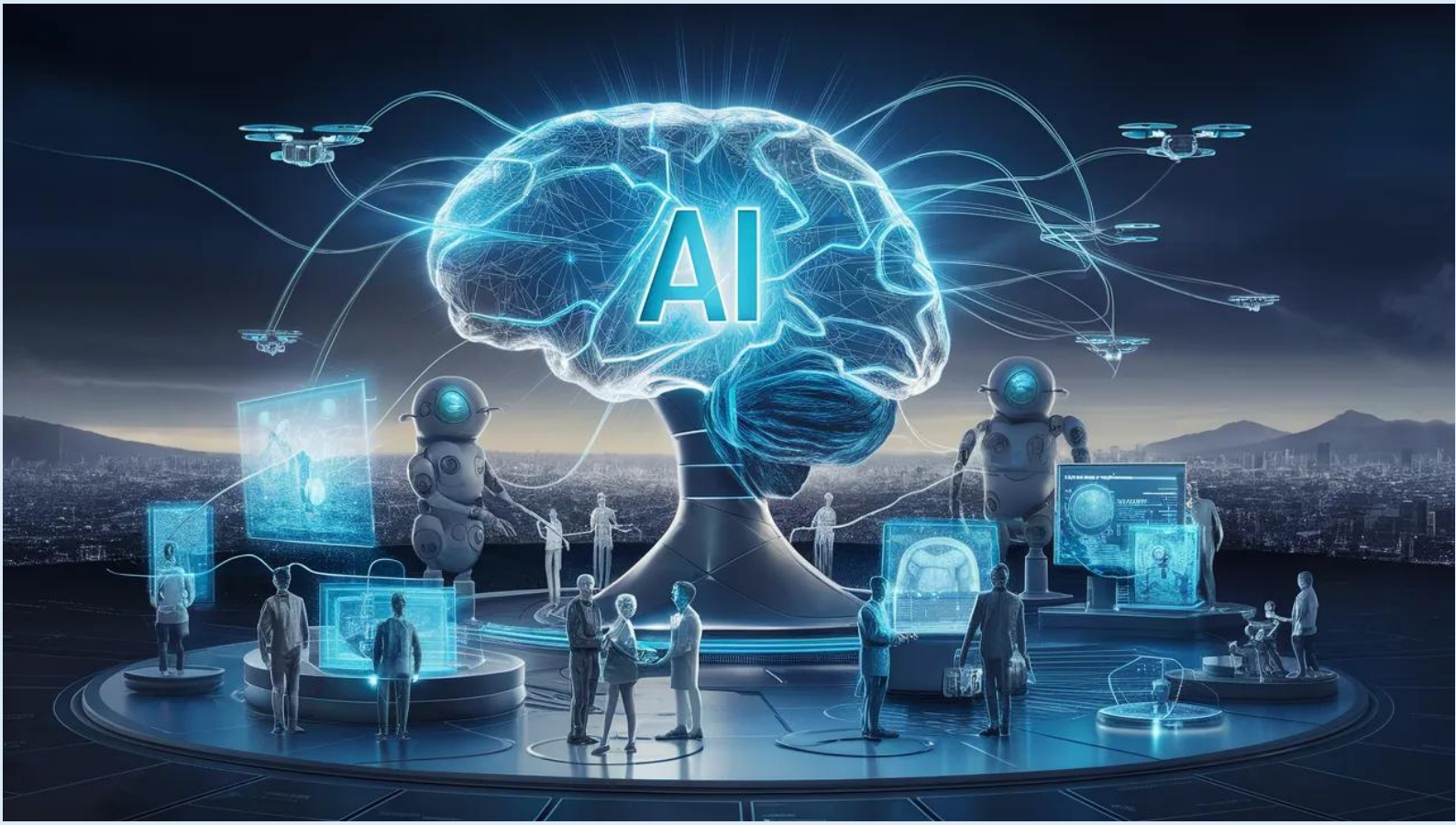
How AI is Shaping Saudi Arabia's Giga-Projects



Artificial Intelligence is the orchestrator of Saudi Arabia's giga-projects — transforming design, sustainability, and human experience into a living model of Vision 2030's paradigm shifts.

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Executive Summary

Saudi Arabia's giga-projects — including **NEOM, The Red Sea Project, Qiddiya, and Diriyah Gate** — are not only symbols of Vision 2030's ambition but also **living laboratories for artificial intelligence (AI)**. AI technologies are being integrated into urban planning, tourism, mobility, logistics, and cultural preservation, ensuring these projects are sustainable, efficient, and globally competitive.

While many countries use AI narrowly — often limited to consumer tools — Saudi Arabia seeks to **embed AI strategically** into the very design, construction, and operation of its giga-projects. From **predictive urban planning models in NEOM** to **AI-powered biodiversity monitoring in The Red Sea Project**, these initiatives are redefining how nations can deploy technology to achieve long-term development goals.

The significance extends beyond technology. By adopting AI as a **national enabler**, Saudi Arabia aims to:

- Accelerate project delivery with data-driven efficiency.
- Ensure sustainability through intelligent monitoring.
- Enhance visitor and citizen experiences via personalization.
- Build local AI talent and reduce reliance on external expertise.

These projects demonstrate that Saudi Arabia is not only implementing AI but is also **reframing its global role**: from energy exporter to a hub of **intelligent urban and industrial ecosystems**.

Key Takeaways

- **AI as a Strategic Enabler:** Artificial Intelligence is embedded at the core of Saudi giga-projects, not as a tool but as a driver of transformation.
- **Smart Urban Planning:** Predictive models and AI-driven infrastructure design ensures efficient and sustainable urban ecosystems.
- **Environmental Monitoring:** AI supports biodiversity protection, renewable energy integration, and long-term ecological balance.
- **Personalized Experiences:** From tourism to cultural attractions, AI enhances visitor and citizen engagement with data-driven personalization.
- **Efficiency and Cost Reduction:** AI accelerates construction, optimizes logistics, and reduces project delivery risks.
- **Building Local AI Talent:** Giga-projects act as training grounds to reskill Saudi professionals, reducing reliance on external expertise.

Key Takeaways – Executive Summary

- AI as a Strategic Enabler in Giga-Projects
- Predictive Urban Planning & Smart Infrastructure
- AI-powered Environmental Monitoring & Sustainability
- Enhanced Visitor & Citizen Personalization
- Accelerated Delivery & Cost Efficiency
- Building Local AI Talent for Vision 2030

Introduction

This whitepaper builds on the insights presented in our earlier publication, *The Industrial Renaissance: Leveraging Fourth Industrial Revolution Technologies in Saudi Arabia*. In that paper, we explored how the **Fourth Industrial Revolution (4IR)** — with its fusion of technologies such as robotics, IoT, blockchain, and quantum computing — is reshaping industries and societies.

Among these technologies, **Artificial Intelligence (AI)** emerged as the most transformative force: not just another tool, but a **strategic enabler** capable of orchestrating the entire ecosystem of 4IR innovations. While robotics builds, IoT senses, and blockchain secures, it is AI that interprets, predicts, and optimizes.

This second whitepaper, *How AI is Shaping Saudi Arabia's Giga-Projects*, highlights how AI applications are being embedded into the Kingdom's most ambitious national developments — from NEOM and The Red Sea Project to Qiddiya and Diriyah Gate. For readers who have not yet explored the first whitepaper, we invite you to do so for a broader perspective on how AI and its sister technologies together underpin Saudi Arabia's **Industrial Renaissance**.

By focusing here on AI, we demonstrate why its application is not optional but **crucial**: ensuring sustainability, accelerating delivery, personalizing experiences, and building local talent — ultimately making AI the **architect of Vision 2030's giga-projects**.

📘 **Related Reading**

The Industrial Renaissance: Leveraging Fourth Industrial Revolution Technologies in Saudi Arabia
Discover how robotics, IoT, blockchain, quantum computing, and AI are powering Saudi Arabia's transformation under Vision 2030.

👉 Download the Whitepaper *(Insert link to PDF/Download page)*

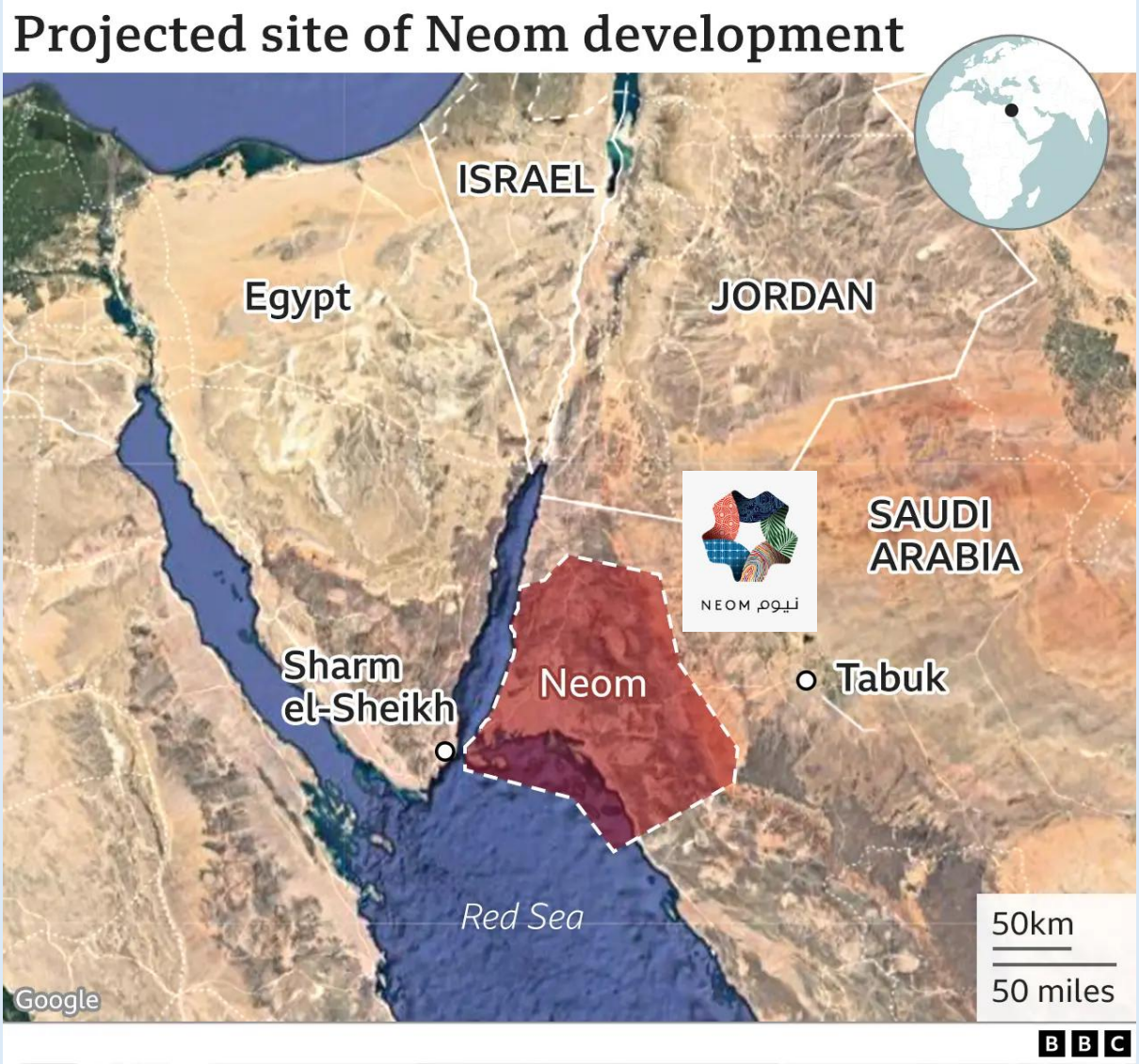
AI Across Saudi Arabia's Giga-Projects

Transforming NEOM, The Red Sea, Qiddiya, and Diriyah Gate into living laboratories of innovation and sustainability.

Saudi Arabia's giga-projects are not only ambitious infrastructure ventures; they are **testbeds for the future of human civilization**. Each project represents a distinct experiment in reimagining how societies live, work, and thrive — with **Artificial Intelligence (AI) at the core of their design and operation**.

This section explores how **NEOM, The Red Sea Project, Qiddiya, and Diriyah Gate** are leveraging AI to achieve their goals. From predictive urban planning and environmental monitoring to personalized visitor experiences and smart logistics, these initiatives illustrate how AI is transforming bold architectural visions into **sustainable, data-driven realities**.

By examining each project, the reader will see how Saudi Arabia is moving beyond the global norm of AI as a limited tool, positioning it instead as a **national enabler of Vision 2030** — driving sustainability, efficiency, and innovation on an unprecedented scale.



NEOM – The Smart City of the Future

Description

Located in the Kingdom's northwest along the Red Sea and the Gulf of Aqaba, **NEOM** spans over **26,500 km²**, an area roughly the size of Albania. Envisioned as a next-generation cognitive city, NEOM's mission is to become a global hub for innovation, sustainability, and AI-driven living. Designed to attract global talent, businesses, and investors, NEOM combines **renewable energy systems, smart urban planning, and advanced technologies** to pioneer a new model of human progress.

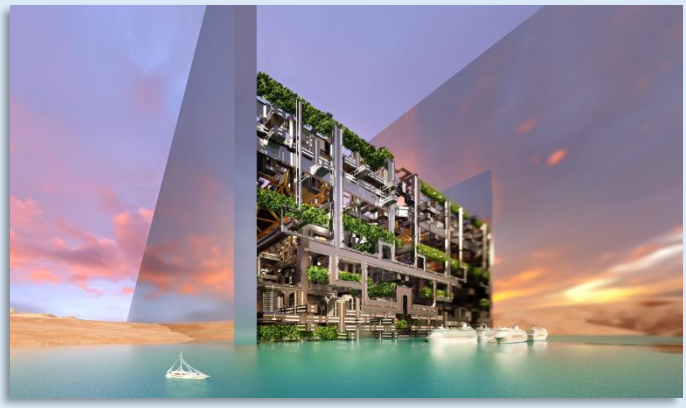
AI Applications in NEOM

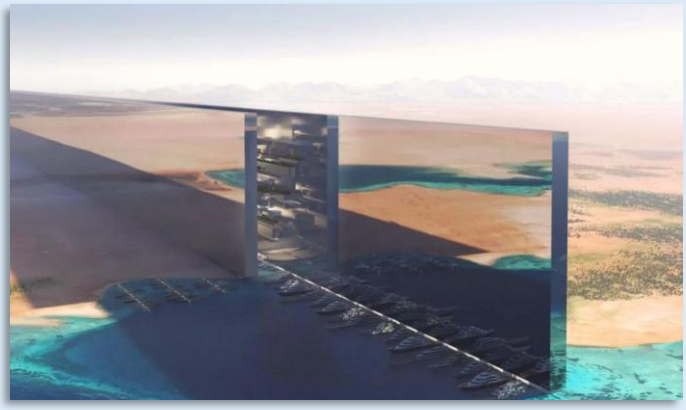
- **The Line**: A 170 km car-free linear city where **AI orchestrates urban planning**, autonomous mobility, and predictive energy management.
- **Oxagon**: The world's largest floating industrial hub, where **AI and IoT enable smart logistics, robotics-driven manufacturing, and advanced supply chain optimization**.
- **Trojena**: A mountain tourism hub, where **AI-driven climate and safety systems** ensure sustainable tourism and optimized visitor experiences.

- **Urban Digital Twin**: NEOM is developing a full-scale **AI-powered digital twin** to simulate and monitor city systems in real time, from utilities to population dynamics.
- **Healthcare & Education**: AI is embedded into **personalized healthcare and smart learning platforms**, building human capital while enhancing residents' quality of life.

NEOM – AI Applications

- The Line: AI-driven urban planning & mobility
- Oxagon: Smart logistics & robotics-driven manufacturing
- Trojena: AI-enabled tourism, climate & safety systems
- Urban Digital Twin: Real-time monitoring & simulations
- Healthcare & Education: Personalized AI-driven services





The Red Sea Project – AI for Sustainable Tourism and Environmental Stewardship

Description

Stretching across more than **28,000 km^2** of pristine islands, beaches, and desert landscapes along Saudi Arabia's western coastline, **The Red Sea Project** is envisioned as the world's most ambitious regenerative tourism development. Its mission is to balance large-scale tourism growth with the preservation of fragile ecosystems, ensuring that economic development and sustainability go hand in hand. Once completed, the project is expected to attract **one million visitors annually**, while leaving **95% of its natural environment untouched**.

AI Applications in The Red Sea Project

- **Environmental Monitoring:** AI-powered satellite imaging and machine learning track coral reef health, marine biodiversity, and ecological changes in real time.
- **Sustainable Tourism Management:** AI predicts visitor flows and optimizes transportation and energy use to reduce the environmental footprint.
- **Smart Hospitality:** AI-driven personalization enhances guest experiences through adaptive booking systems, intelligent concierge services, and customized leisure plans.
- **Renewable Energy Integration:** AI optimizes solar and wind energy storage and distribution across the resort, supporting a 100% renewable energy goal.
- **Waste & Resource Management:** AI-enabled systems monitor and reduce water and waste usage to align with circular economic principles.

The Red Sea Project – AI Applications

- Environmental Monitoring: AI satellite imaging & biodiversity tracking
- Sustainable Tourism: Predict visitor flows & optimize energy use
- Smart Hospitality: Personalized guest experiences with AI concierge
- Renewable Energy: AI-optimized solar & wind storage/distribution
- Resource Management: AI to reduce water & waste consumption

Qiddiya – AI for Entertainment, Sports, and Cultural Experiences

Description

Located just outside Riyadh, **Qiddiya** spans over **334 km²** and is envisioned as Saudi Arabia's **capital of entertainment, sports, and culture**. As part of Vision 2030's ambition to diversify the economy, Qiddiya will feature theme parks, sports arenas, cultural venues, and residential areas — creating over **17,000 jobs** and contributing significantly to the Kingdom's tourism and entertainment sectors. The project aims to attract millions of visitors annually and position Saudi Arabia as a global destination for leisure and creativity.

AI Applications in Qiddiya

- **Smart Theme Parks:** AI enhances safety, optimizes ride operations, and personalizes visitor experiences in real time.
- **Sports Analytics:** AI systems monitor athlete performance, injury prevention, and crowd safety in mega sporting events.
- **Cultural Engagement:** AI-powered platforms provide immersive museum and cultural experiences, including multilingual smart guides.
- **Smart Mobility:** Autonomous shuttles and AI traffic systems improve transportation efficiency and reduce congestion.
- **Hospitality & Retail:** AI personalizes customer interactions, optimizes staffing, and improves inventory management across hotels and retail hubs.

Qiddiya – AI Applications

- Smart Theme Parks: AI for safety, ride ops & personalization
- Sports Analytics: Athlete performance, injury prevention, crowd safety
- Cultural Engagement: AI museum guides & immersive experiences
- Smart Mobility: Autonomous shuttles & traffic optimization
- Hospitality & Retail: Personalized service & smart inventory

Diriyah Gate – AI for Cultural Heritage and Urban Living

Description

Located on the outskirts of Riyadh, **Diriyah Gate** is a $63 billion heritage and lifestyle destination centered around the historic **UNESCO World Heritage Site of At-Turaif**. Spanning over **7 km^2**, the project blends **cultural preservation with modern urban development**, featuring museums, cultural institutes, luxury residences, hotels, and retail spaces. Diriyah aims to welcome **27 million visitors annually**, positioning itself as Saudi Arabia's cultural capital while contributing to tourism, hospitality, and knowledge exchange under Vision 2030.

AI Applications in Diriyah Gate

- **Cultural Preservation:** AI-driven 3D scanning and predictive modeling preserve heritage sites and artifacts against environmental and human risks.
- **Smart Tourism:** AI guides provide personalized, multilingual visitor experiences through mobile apps and smart kiosks.
- **Urban Sustainability:** AI monitors energy consumption, waste management, and traffic flow to balance heritage with modern living.
- **Security & Crowd Management:** AI-powered surveillance and predictive crowd control ensure safety during large cultural events.
- **Knowledge & Learning:** AI-enhanced platforms support research, education, and immersive storytelling about Saudi heritage.

Diriyah Gate – AI Applications

- Cultural Preservation: AI 3D scanning & predictive modeling
- Smart Tourism: Multilingual AI guides & kiosks
- Urban Sustainability: AI for energy, waste & traffic balance
- Security & Crowd Management: Predictive surveillance & safety
- Knowledge & Learning: AI-driven research & immersive storytelling

National Support for AI in Saudi Arabia

Saudi Arabia has established multiple funding and infrastructure mechanisms to support large-scale deployment of AI, which align very closely with the needs of giga-projects. Among them:

- ***Humain***, established by PIF, is building key AI infrastructure (data centers, cloud, Arabic large language models) to support nationwide AI adoption.
- **The *Saudi Company for Artificial Intelligence (SCAI)*** provides funding, technical resources, and solution platforms across sectors such as smart states, energy, finance, and healthcare.
- **The National Strategy for Data & AI (NSDAI), led by SDAIA**, supports grants, policy frameworks, and talent development to ensure projects have both regulatory support and human capital.
- **A $1.78B investment announced at LEAP 2025** targets AI and digital talent development, including infrastructure expansion.

These support mechanisms help enable giga-projects' AI ambitions — in planning, monitoring, sustainability, personalization, and talent building. They reduce risks and create a clearer pathway for deployment on a scale.

Key National AI Support Funds / Initiatives

Initiative	Description	Relevance & Key Features
Humain (PIF)	Launched in May 2025 by the Public Investment Fund (PIF), Humain is a company covering the full AI value chain: data centers, cloud infrastructure, development of AI models (including Arabic LLMs), and other advanced AI applications.	Provides infrastructural backbone to support giga-projects' AI needs — e.g. data center capacity, AI models, cloud. Enables localization of AI development and deploying AI services at scale.
Saudi Company for Artificial Intelligence (SCAI)	Wholly owned by PIF, SCAI focuses on delivering AI and emerging technology solutions across prioritized sectors such as smart cities, energy, healthcare, and finance. pif.gov.sa	Acts as a resource/funding arm for AI projects; can support many of the AI applications in giga-projects (smart infrastructure, healthcare, etc.).
National Strategy for Data & AI (NSDAI) & SDAIA	The SA National Strategy for Data & AI, administered by the Saudi Data & AI Authority (SDAIA), includes financial and regulatory support for AI, data governance, talent development, and innovation grants.	This serves as foundational policy & funding framework. It is often referenced in call-for-proposals, talent programs, and other national level AI funding vehicles.
$1.78 Billion AI / Digital Talent Investment (LEAP 2025)	Announced at LEAP 2025, this investment is committed to advancing AI and digital talent. It includes funds for infrastructure like data centers and grants or support for startups or digital innovation.	Helps growth of human capital and infrastructure — critical for realizing AI usage in giga-projects (e.g. personalized services, monitoring).

National Support for AI Deployment

Saudi Arabia's ambition to become a global leader in Artificial Intelligence is not left to individual projects alone. It is backed by a **robust ecosystem of national funds, programs, and regulatory frameworks** that provide both financial support and technical infrastructure. Institutions such as the **Public Investment Fund (PIF)**, through HUMAIN, and the **Saudi Data & AI Authority (SDAIA)**, through the National Strategy for Data & AI, ensure that giga-projects have access to **capital, infrastructure, and talent pipelines**.

These initiatives not only reduce barriers to adopting AI at scale but also guarantee that deployments align with **Vision 2030's goals of sustainability, competitiveness, and national capacity building**. The following table highlights key AI support mechanisms and how giga-projects can leverage them to advance their digital transformation agendas.

Table: Key AI Support Mechanisms & How Giga-Projects Could Access Them

Mechanism / Program	Key Details & Eligibility	How Giga-Projects Can Leverage It
Humain – PIF's $10 Billion AI Fund	PIF's HUMAIN is launching a **$10B venture capital fund** (Human Ventures) targeting startups globally and locally. Also building data center infrastructure capacity of 1.9 GW by 2030, scaling to 6.6 GW in years following.	Giga-projects can partner with HUMAIN when procuring AI infrastructure (data centers, compute). Also eligible to attract investment through HUMAIN when developing proprietary AI applications or models relevant to giga-project needs.
SDAIA's National Strategy for Data & AI (NSDAI)	Under SDAIA, the NSDAI has objectives: • Transform workforce: +20,000 AI/Data specialists/experts. • Provide regulatory & policy enablers. • Support open data, ethical AI, AI adoption in government, health, education etc. • National Academic Framework for AI Qualifications guides programs aligning to global benchmarks. • National Occupational Standard Framework for Data & AI with defined occupations & competencies.	Giga-projects can align their AI-talent acquisition, training & certifications with SDAIA frameworks to ensure workforce eligibility, recognition, and support. They can use open-data programs, policy incentives under NSDAI, and possibly apply for grants or priority procurement that favor regulated, standard-aligned AI work.

Enabling AI in Giga-Projects

The availability of **dedicated AI funds, infrastructure investments, and talent development programs** ensures that Saudi Arabia's giga-projects are not operating in isolation. Initiatives such as **Humain's AI fund and data centers** or **SDAIA's regulatory and talent frameworks** create a **national backbone** that giga-projects can plug into.

For **NEOM**, this means access to scalable computers for its digital twin; for **The Red Sea Project**, AI-powered sustainability monitoring can draw on national R&D; for **Qiddiya**, talent reskilling programs ensure a pipeline of AI-ready professionals; and for **Diriyah Gate**, cultural preservation technologies can be benchmarked against global ethical AI standards.

Together, these mechanisms provide **financial, technical, and human capital support**, reinforcing Saudi Arabia's commitment to turn Vision 2030's ambitions into **tangible, AI-driven realities**.

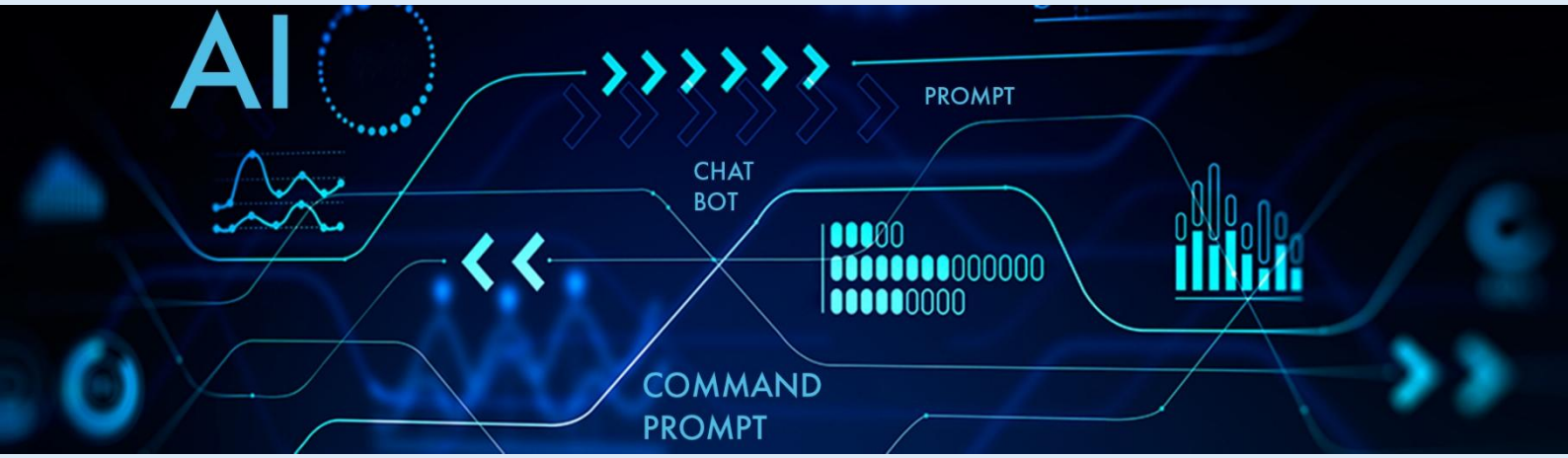
National AI Support Mechanisms

Humain (PIF) – $10B AI Fund & Data Centers
- Infrastructure backbone & venture funding for giga-project AI applications

SCAI – AI Solutions Across Sectors
- Provides applied AI platforms in smart cities, energy, finance, healthcare

SDAIA – National Strategy for Data & AI (NSDAI)
- Regulatory frameworks, grants, open data, and AI workforce development

LEAP Investments – $1.78B for AI & Digital Talent
- Investments in human capital & infrastructure to accelerate AI adoption



Conclusion: AI as the Architect of Saudi Arabia's Giga-Projects

The integration of Artificial Intelligence across Saudi Arabia's giga-projects demonstrates a **new paradigm shift in national development**. NEOM, The Red Sea Project, Qiddiya, and Diriyah Gate are not simply construction endeavors; they are **living laboratories** where AI is embedded at the core of design, sustainability, and operations.

From NEOM's **digital twin and autonomous infrastructure**, to The Red Sea's **AI-driven environmental monitoring**, to Qiddiya's **immersive sports and entertainment experiences**, and Diriyah Gate's **heritage preservation powered by advanced analytics**, each project highlights how AI is transforming ambition into **data-driven reality**.

Three key lessons emerge:

- **AI ensures efficiency and sustainability** by optimizing resources, monitoring ecosystems, and reducing costs.
- **AI personalizes human experience**, enabling tourism, cultural engagement, and lifestyle services that are tailored to individuals.
- **AI builds capacity and talent**, serving as a foundation for Saudi professionals to lead globally in innovation.

These giga-projects collectively showcase Saudi Arabia's strategy of **not imitating but innovating** — adapting global technologies to local needs while setting international benchmarks. Supported by national funds and regulatory frameworks, they demonstrate that **AI is not an accessory but the architect of Vision 2030's transformation**.

Final Takeaways – Lessons from Giga-Projects

- Efficiency & Sustainability: AI optimizes resources, monitors ecosystems, reduces costs
- Personalized Experience: AI enables tailored tourism, cultural & lifestyle services
- Capacity & Talent: AI builds local expertise, making Saudi a global leader

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