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NextGenDC – Application of AGI R&D Solutions in Next Generation Data Center

August 2025

INTRODUCTION

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The digital economy is entering a new era in which data has become the most valuable strategic resource—often compared to the “new oil” or “fuel” of the 21st century. With the rapid rise of Artificial Intelligence (AI), the Internet of Things (IoT), and the advent of quantum technologies, the demands placed on data infrastructure are growing at an unprecedented pace.

Traditional data centers, which were once designed primarily as static storage and processing facilities, can no longer keep up with this dynamic evolution. They are increasingly reaching their limits in scalability, energy efficiency, automation, and security. Outages, inefficiencies in cooling, and insufficient integration with modern computing architectures are becoming critical barriers to innovation and competitiveness.

STRATEGIC CONTEXT

The NextGenDC+R&D project was conceived as a response to several converging global megatrends that are reshaping the demand for digital infrastructure.

1. **Exponential data growth** – the volume of processed data is expected to exceed 350 ZB by 2031, putting unprecedented pressure on capacity and flexibility.
2. **Artificial Intelligence and Edge Computing** – new applications demand low latency, high performance, and robust security, which traditional data centers cannot fully deliver.
3. **Sustainability and ESG** – data centers are among the most energy-intensive facilities and face increasing regulatory and societal pressure to reduce carbon footprints, improve energy efficiency, and adopt renewable sources.

OUR SOLUTION

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NextGenDC is our answer to these challenges. The project is designed not just as another data center, but as a new global standard that redefines the very concept of digital infrastructure. At its core, NextGenDC integrates AI-driven autonomy, edge computing, quantum-ready architectures, and predictive security systems into one coherent platform. This ensures not only the ability to handle massive workloads in real time but also to operate with near-zero downtime, reduced energy consumption, and built-in resilience to cyber and climate threats.

PROJECT OBJECTIVES

NextGenDC focuses on four areas:
Strategy: building global leadership in AI-driven data centers and expanding into the EU, USA, and Middle East & Asia.
Technology: developing predictive scheduling systems, new algorithms, and an edge computing platform.
Economics and ecology: reducing operational costs by 30% and energy consumption by up to 40%.
Innovation: establishing test laboratories, educational hubs, and open APIs for partners.

VISION

The vision is bold yet practical: to build a fully autonomous and sustainable digital ecosystem in Slovakia that will serve as a catalyst for innovation across Europe and beyond. Through close collaboration with universities, startups, and global technology leaders, NextGenDC will be both a production facility and a research hub—bridging the gap between cutting-edge R&D and real-world infrastructure needs.

MILESTONES

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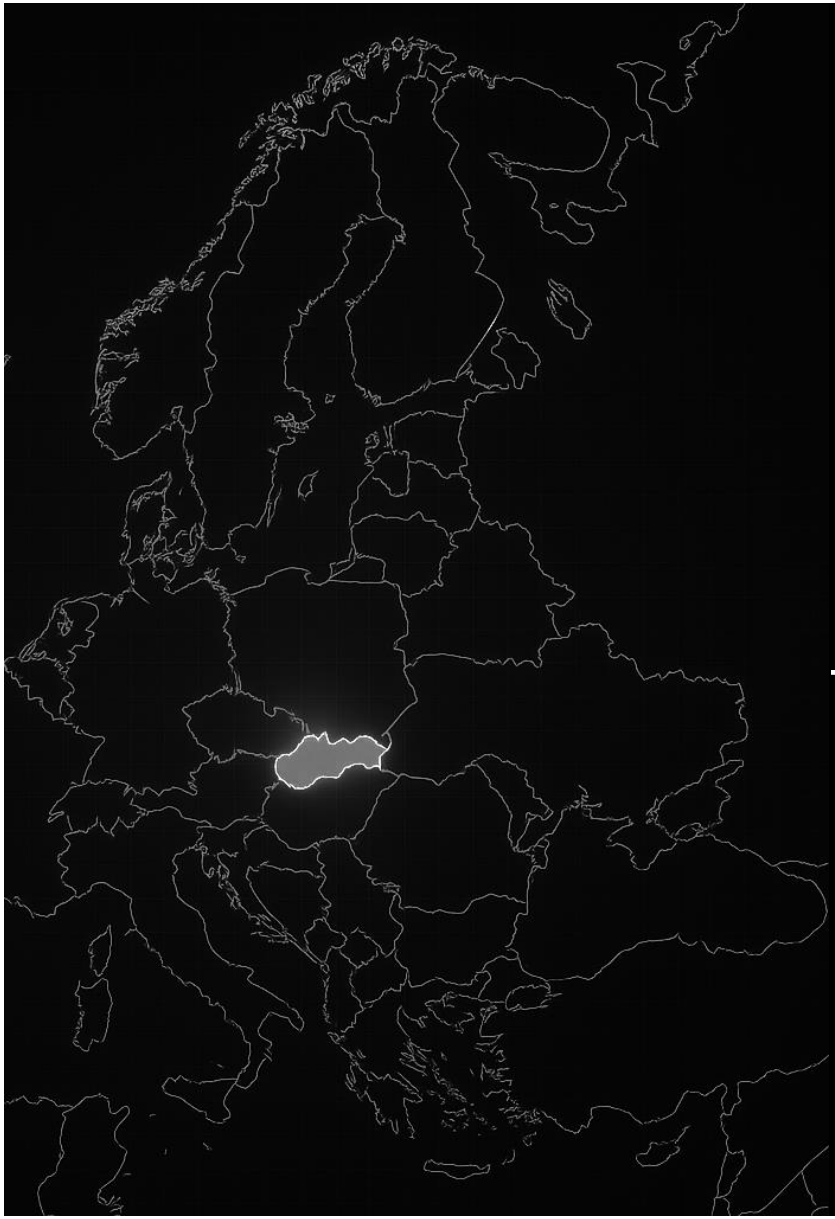
2025–2027: construction, installation of core infrastructure

2028: pilot operations, first client contracts

2029–2031: break-even achieved, commercial expansion

2032–2035: scaling across Europe and globally



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PROJECT LOCATION

The project will be built in Kostolné Kračany, Trnava Region, Slovakia—just 40 minutes from Bratislava and less than an hour from Vienna and Budapest. The location offers excellent transport and energy infrastructure, space for future growth, and minimal negative impact on residents due to its industrial-logistics setting.

TECHNICAL INFRASTRUCTURE

The site already has full utility coverage—water, sewage, electricity, gas, and fiber optic connections. A new 22 kV transformer station, battery storage, and backup generators will be built. Dual optical connections to the global internet backbone will ensure high availability and no packet loss during outages.

BUILDINGS AND FACILITIES

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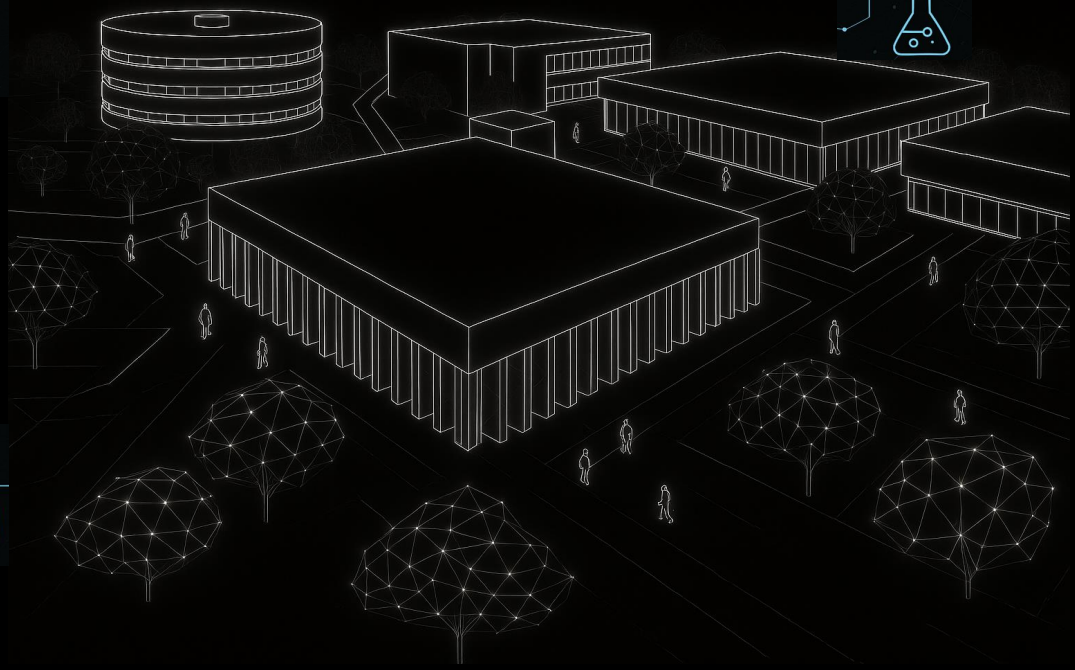
BO 04 – R&D Block: 2,900 m², labs for algorithm development, AI testing, digital twin simulations.

BO 05 – Administration: 1,200 m², offices, helpdesk, customer facilities.



BO 02 – Energy Core: 2,500 m², HV/LV substations, UPS systems, backup generators (diesel/gas with transition to hydrogen/biogas). Total power 50 MW.

BO 01 – Server Halls: 4,000 m², IT load 15 MW, rack density 40–50 kW/rack.

BO 03 – Cooling Center: 1,800 m², free cooling, immersion cooling, COP > 6.5, target PUE < 1.25.

TECHNOLOGY

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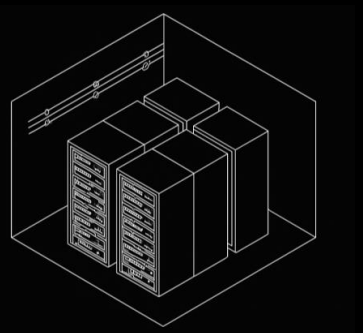
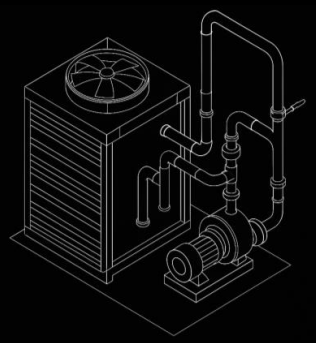
IT Infrastructure

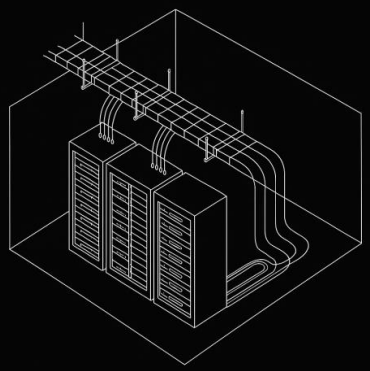
- Compute: 480 blade servers (Intel Xeon Sapphire Rapids), 72 GPU nodes (NVIDIA H100).
- Storage: NVMe SAN, hybrid arrays, LTO-9 tape libraries.
- Networking: 400 GbE core switching SDN, full redundancy (A/B).
- Security: NG firewalls, IDS/IPS, AI-enhanced SIEM.

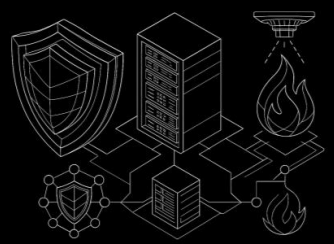




Power Infrastructure

- Transformers 22/110 kV, modular UPS, backup generators (48 h autonomy).
- Smart grid integration with the ability to feed power back into the grid.
- Transition strategy toward renewable fuels.





Cooling

- 6 × 1.5 MW water-cooled chillers, 4 × 1 MW air-cooled backup chillers.
- CRAH and in-row liquid cooling for HPC racks.
- More than 600 sensors for AI-driven dynamic thermal control.

Security

- Multi-layer protection (biometrics, RFID, mantraps, AI CCTV).
- Redundant fiber connections with separate providers.
- Fire protection with VESDA and inert gases (Novec, Inergen).

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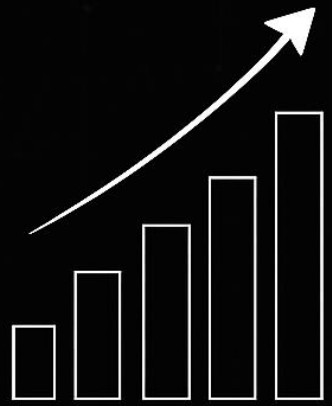
MARKET OPPORTUNITY

The market for data centers is rapidly evolving. The AI-driven data center segment is projected to reach $40 billion by 2030, edge infrastructure over $150 billion, and AI security agents around $70 billion. Even a small market share represents multi-billion-dollar opportunities for NextGenDC.

COMPETITION

The largest players operate in hubs such as Frankfurt, London, and Amsterdam, but often struggle with high carbon footprints. Nordic “green” data centers focus on sustainability but lack strong R&D components. NextGenDC combines both: high performance, sustainability, and an innovation ecosystem.



R&D COMPONENT

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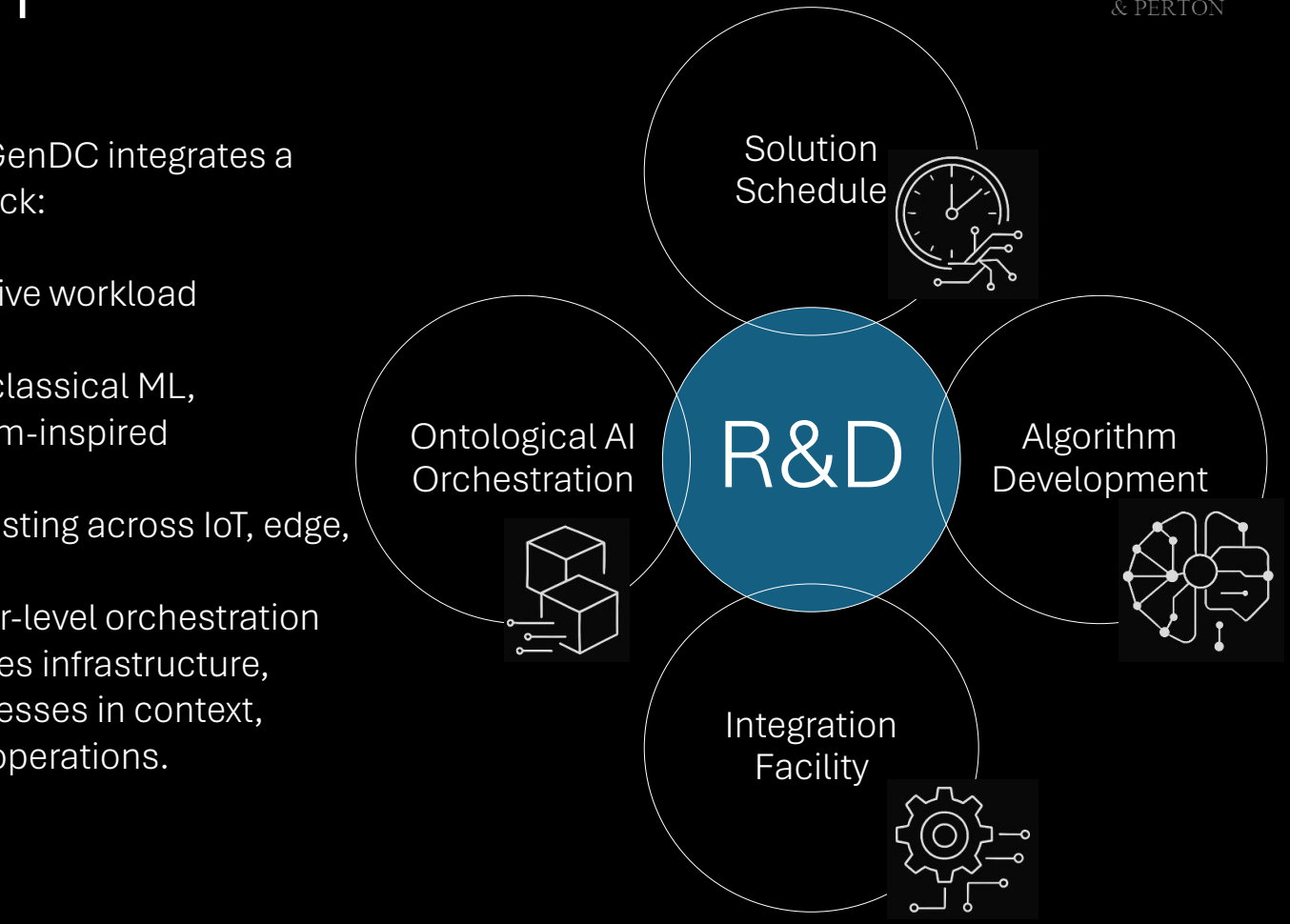
Unlike conventional data centers, NextGenDC integrates a dedicated Research & Development block:

- Solution Schedule: AI tool for predictive workload orchestration.
- Algorithm Development: combining classical ML, neuromorphic methods, and quantum-inspired approaches.
- Integration Facility: interoperability testing across IoT, edge, and cloud systems.
- Ontological AI Orchestration: a higher-level orchestration system that understands and manages infrastructure, workloads, energy, and security processes in context, ensuring autonomous and adaptive operations.



R&D SOLUTION PILLARS

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The strength of NextGenDC lies in its ability to combine cutting-edge research with real-world implementation. At the heart of the project are three interconnected pillars of research and development, each addressing a fundamental challenge of modern data center operations.

1. Intelligent Scheduler

Traditional data centers struggle with unpredictable workloads and peaks in demand. Most scheduling is still manual, which leads to wasted resources, delays, and unnecessary costs. The Intelligent Scheduler developed within NextGenDC introduces predictive, AI-driven task management that can dynamically allocate resources based on current and forecasted demand. It also integrates Continuous Integration and Continuous Deployment (CI/CD) pipelines, allowing new services and software updates to be rolled out without downtime or manual intervention. This capability not only improves efficiency but also ensures uninterrupted innovation cycles for clients.

2. Algorithm Development

At the core of an autonomous data center are algorithms that can learn, adapt, and respond to changing conditions. In this pillar, NextGenDC develops a new generation of intelligence by combining machine learning, neuromorphic models inspired by the human brain, and quantum computing techniques. These algorithms will optimize energy consumption, predict system failures before they occur, and instantly counteract cybersecurity threats without the need for human intervention. This represents a fundamental shift from reactive management to proactive, self-healing infrastructure.

3. Integration Facility

The third pillar provides the essential framework that connects everything into one coherent ecosystem. The Integration Facility ensures seamless cooperation between IoT devices, edge computing nodes, cloud layers, and the underlying hardware. It functions as a testbed where new technologies can be validated in realistic conditions before deployment. By simulating load scenarios and testing interoperability, the facility guarantees that the infrastructure remains scalable, adaptable, and ready for the technologies of tomorrow—whether in manufacturing plants, logistics hubs, or hyperscale cloud environments.

SUMMARY OF FINANCIAL PLAN

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Investment Proposal
Required investment: **€746 m**
Use of funds: construction, IT infrastructure, R&D, expansion.
Exit options: IPO, strategic sale, or long-term yield asset.

Financial Indicators (2025–2035)
Revenues: €4.81 bn
EBITDA: €4.56 bn
Net Cash Flow: €3.54 bn
CAPEX: €979 m
ROI: from 2028, payback within 6 years

Valuation and Returns
IRR: significantly above WACC (8–9%).
EVA: €8.71 bn cumulative.
DCF Equity Value: €16 bn (adjusted for risk €13.6 bn).

SWOT ANALYSIS

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Strengths

- Unique combination of infrastructure and R&D.
- High autonomy and AI orchestration.
- ESG-compliant design, low PUE.
- Strategic location in Central Europe.

Opportunities

- Double-digit growth in AI and edge markets.
- Lack of local capacity in Central Europe.
- EU programs supporting green and digital infrastructure.
- Strong partnerships with telecoms and academia.

Weaknesses

- High upfront CAPEX (€0.76 bn).
- Complexity of managing both DC operations and R&D.
- Dependence on long-term partnerships.
- Rapid technological change may outpace certain components.

Threats

- Entry of global players (Equinix, Digital Realty).
- Energy price volatility.
- Geopolitical and regulatory risks.
- Fast pace of technological obsolescence.

SUMMARY

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The feasibility study confirms that NextGenDC is not only technically viable but also strategically positioned to become a benchmark for the next generation of data centers. Its design addresses the most pressing market challenges: exponential data growth, the global energy crisis, rising cybersecurity threats, and the lack of automation in traditional infrastructure.

From a technological perspective, NextGenDC stands out with its modular architecture, predictive AI scheduling, neuromorphic and quantum-ready algorithms, and an advanced Integration Facility that unifies cloud, edge, and IoT. The site in Kostolné Kračany offers strong logistical advantages, robust energy and network connections, and room for expansion. Operational resilience will be ensured through Tier III/Tier IV certification, ESG-compliant practices, and full digital twin integration for real-time monitoring and optimization.

Economically, the project is aligned with multi-billion-dollar global markets: AI for data centers, edge infrastructure, security AI agents, and sustainable energy optimization. Even a conservative 1–2% market share represents potential revenues in the billions of dollars by 2030. Moreover, the dual model of NextGenDC—providing both infrastructure services and commercializing R&D solutions—offers diversified income streams and reduced investment risk.

The technical assessment of CAPEX is conducted on an annual basis and is oversized compared to the pace of technological progress in the DC sector. Ontological AI Orchestration is currently addressed within R&D; however, due to the conservative approach of the Feasibility study, it was deliberately not included in the revenue projections. Its implementation could shorten the investment payback period by up to two (2) years.

THE END OF PRESENTATION
THANK YOU FOR YOUR ATTENTION

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