Simulation Digital Twins
Tackling energy utility challenges
Electricity networks stand on the edge of a new era: a future where the digitalization of energy and the energy transition accelerating, just as the new tools to control systemic risks and uncertainty of this future are being developed and deployed.

Cosmo Tech 360° Simulation Digital Twins already are in the hands of major energy actors to help them drive short-, medium- and long-term grid transformation, while remaining continuously synchronized with the real world.

They bring a new way of understanding and managing organizations and electricity systems. Simulation Digital Twins provide unique visibility into the effects of decisions to anticipate the future, whether applied to day-to-day operations or strategic considerations, while considering the cascading effects of unforeseen events.

Energy players will increasingly need to simulate their system, as well as their ecosystem, and 360° Simulation Digital Twins will play a central role in enabling them to react in a faster and more agile way, and in providing the visibility and understanding needed to make optimized choices at each stage of the network transformation.

These technologies are not intended to replace operator expertise. On the contrary, they will augment it, providing operators with additional scope to adapt in real time in response to changing needs. They will provide considerable support to public or private energy managers for them to become agile drivers of change and to lead with more confidence in the complex and uncertain environment that has become their new normal.

Hugues de Bantel
Co-Founder & CEO,
Cosmo Tech
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TOP 5

Digital Twins are one of the Top 5 Strategic Technology Trends to watch in 2021
Source: Accenture

$86B

The global digital twin market is expected to exceed $86 billion by 2028
Source: Grand View Research

%86

of respondents from power utilities mentioned digital twins as significant for their operational excellence initiatives
Source: Verdantix
TECHNOLOGIES TO MEET ENERGY CHALLENGES

Many players have already invested in big data and the Internet of Things (IoT). Consumer data is available through smart meters, and network data is also more accessible.

The use of artificial intelligence (AI) is also progressing in the management of the electrical system, with the development of AI assistants to simplify the work of operators for thousands of repetitive tasks (for example, testing a switchgear) by automating the sending of work orders and the retrieval of information.

**The digital twin ecosystem is now growing rapidly in the energy sector.**

A digital twin is a virtual representation that serves as the digital counterpart of a physical object or process. As the trend towards adoption of digital twins gains momentum and the digital twin ecosystem rapidly expands, a new class of digital twins has appeared. Drawing on the power of simulation to accurately predict the future state of complex systems, they are known as Simulation Digital Twins.

**Addressing the systemic challenges of electrical networks, this new generation of digital twins incorporate three fundamental advances to provide prediction and prescription capabilities in the context of uncertainties:**

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**360° MODELING OF COMPLEX SYSTEMS**

Digital Twins were initially developed to virtually replicate an asset or a process. Simulation digital twins can now virtually replicate, in a single model, an entire organization, in the context of its environment.

**DYNAMIC SIMULATION OVER TIME**

Integrating simulation capabilities, the digital twins allow users to project the evolution of the electrical network, in both the short and long term.

**CONNECTED & SYNCHRONIZED IN REAL TIME**

These digital ecosystems offer the opportunity to be connected to the real world they represent, and synchronized in real time, from previously disparate devices and systems.
Simulation Digital Twins give a truly 360° view of the organization to track the past, monitor the present, simulate its future behavior and take action even under conditions that have never occurred before.

To do so, the technological approach is different from existing AI solutions. The modeling is not only based on historical data, but also on network processes and constraints determining the interdependencies and causality rules between the elements of the simulated system. The structure and dynamics of the organization is thus replicated in all its complexity.

Simulation Digital Twins provide three levels of understanding: the description of what exists and what is happening, the prediction of possible futures, and finally the prescription of optimization and action paths.

By combining these levels, Simulation Digital Twins help industrial organizations to move from reaction to anticipation, then to better control and even to achieve a certain level of automation of overall performance.

These simulation digital twins have a holistic approach to the network and consider all the diversity and heterogeneity of the real system such as assets, teams, environmental and regulatory policies, investment budget constraints, as well as external events such as weather conditions, external supplier constraints or the evolution of prosumer demands.

The more the digital twin allows companies to understand and optimize their decision making (horizontal axis) in a systemic way, considering all the complexity of the considered reality and its constraints (vertical axis), the greater the understanding and the holistic value provided.

1. A prosumer refers to a network user with a decentralized electricity production facility that is likely to inject and withdraw electricity from the network.
With a Simulation Digital Twin, strategic and operational network decision makers can run thousands of simulations to predict and test the future state of their system and get recommendations to take actions.

1/ SIMULATE POSSIBLE FUTURES AND OPTIMIZE

These simulations can project the evolution of the system for the next 30 minutes or 30 years, depending on the needs of the decision maker and the specific use case.

The holistic simulation and optimization capacity of Simulation Digital Twins represent a significant advance for network managers over traditional tools in determining optimal network management and transformation plans, considering their feasibility and robustness to changing conditions.

Conventional optimization tools can already determine optimal power system management policies but provide no assurance that these policies are feasible. An optimal policy might be to replace all aging assets in the same year, for example, although this is not practically possible when you consider outage capacity on the grid.

Simulation Digital Twins also predict more reliable results than machine learning tools that are based exclusively on past data, especially as the timeline for action extends further into the future.
Since they reproduce the behavior of the network, Simulation Digital Twins offer the advantage of testing possible evolutions of the network and optimizing its robustness to change. Connected and synchronized to the real world through IoT and disparate devices and systems already in place, they enable energy actors to track the past, monitor the present, predict the future, and point to the optimal way forward.

2/ INCREASE NETWORK ROBUSTNESS IN THE FACE OF UNCERTAINTY

Uncertainty can be controlled and robustness optimized by quantifying the consequences of that uncertainty. For example, the impacts of coastal weather conditions on the aging of metal towers as well as the impact of storms can both be considered in scenario simulations.

The robustness of maintenance and asset renewal strategies can be optimized according to potentially large variations in the evolution of the network (for example, transformation of electricity flows mean secondary power lines may become essential in fifteen years to supply wind farms).

3/ MONITOR, PREDICT AND ACCELERATE ACTIONS AND ORGANIZATION AGILITY

Simulation Digital Twins can be connected to the ecosystem they represent in a bidirectional way.

- The digital twin is in line with the actual situation and serves as an accurate representation of the current operational state of the system. The organization is thus assured that the decisions taken for the future correspond to the realities of the moment.

- A feedback loop, sends the optimization results back to the real-world system. This connection allows a company to automatically action recommended actions for validation or to automate certain decisions, thus allowing teams to focus on higher value tasks.
RTE REINVENTS ITS INDUSTRIAL ASSET MANAGEMENT

By announcing the strengthening of its partnership with Cosmo Tech, RTE is proving that the choices they made a few years ago regarding simulation have paid off. The French electricity transmission system operator aims to further improve the management of its industrial assets and their maintenance. Gabriel Bareux, Director of R&D and Serge Blumental, engineer and head of RTE’s asset management program, provide the details.

How did a company like RTE become interested in digital twin technologies?

Serge Blumental: RTE has a large network, with many kilometers of high voltage power lines, which was built in a few big waves during the last century. This means we need to absorb a growing technical debt, whilst continuously investing in the network. This is a major challenge in our strategic plan, because if we do not change the size of our renewal policies, we will find ourselves facing an insurmountable financial obstacle. Historically, our industrial assets, such as towers, conductors, electrical substations, etc., were considered independent from one another, as if they didn’t overlap. However, the demands of network maintenance intersect with human, financial and technical constraints and issues. This is why we have decided to model this reality using a digital twin.

Gabriel Bareux: Our problem is the confrontation of short and long term trade-offs between OPEX and CAPEX. From a technical point of view, it seems obvious, for example, that our towers, need to be repainted regularly to protect them from corrosion and extend their lifespan. But when a company needs to make savings, it tends to focus on the short-term and reduce these items of expenditure. And we don’t always know how to find the right balance. With the use of modelling, we were able to demonstrate that doubling or even tripling the effort in terms of painting to prevent corrosion was much more cost-effective in the long run. Alternatively, we were able to determine when it was more cost-effective to simply replace certain classes of towers. We were able to unfold the possible strategies, with supporting evidence, in order to discuss practical scenarios with the regulator (the Commission for Regulation of Energy, or CRE – ed.).

To what extent does the use of a digital twin for modelling change your business?

S.B. Modelling is a comprehensive and difficult exercise, which requires us to ask questions that we have not necessarily asked ourselves in the past. So yes, it implies a change in our practices, especially as, beyond this project on corrosion prevention, the CRE has asked us to extend this use to other asset management policies. A good example is the maintenance of gas insulated substations.

We were able to unfold the possible strategies, with supporting evidence.
The insulating gases we use can end up leaking out, contributing to an increased greenhouse effect, so it is our responsibility to ensure that our maintenance practices are the most suitable to prevent this.

G.B. In the long term, all the equipment is potentially concerned: all the overhead lines and the electrical substations, whether it be the structure, the transformers or the control elements. This overall management policy is interesting precisely because it leads to a cross-reflection. Should we act by whole items? By large units? Should a single technology be replaced everywhere at once? **What are the consequences of each choice?** We must be able to choose **our battles** because we are facing one of the most complex global systems ever built by man, as the Academy of Sciences in the United States has pointed out. If we want to succeed in decarbonizing our economies, we must review all these fundamentals in the next 30 years. This is a huge challenge, and one that we had better not get wrong.

So it’s not just about costs: **what indicators do you look at?**

S.B. Indeed, we have a public service mission which obliges us to look at more than just the financial impact. We therefore ‘value’ the other aspects of the problem: we assign a high cost to the energy that is not distributed, if the network is faulty, for example. The same goes for safety risk: a cable falling on the ground is a danger to people that we have to quantify. We also quantify the dangers for the environment: greenhouse gases, pollution from the products used, the consequences of a fire, etc. We are increasingly expanding this consequences reference system in all areas.

In your opinion, what are the prerequisites for a company to really benefit from such a technology?

G.B. Industrialisation, that is the generalization of the approach, implies two challenges. Firstly, an IT challenge, that is, moving from R&D to ownership by the IT teams. The other challenge is ownership by the business teams, which requires suitable support. Then, from a data point of view, it should be pointed out that RTE has made great efforts since the beginning of the 2000s to describe its network and its assets in detail. This is our legacy data. It is not perfect because much of it has been entered by hand. It will therefore be necessary to transcribe the data into the tool but above all, to manage imperfections or omissions: to be tolerant of errors, to detect them and to correct them. However, it is not necessary to have only perfect data to run a simulation! We can tolerate some imperfections. Especially since our tool does not only integrate asset data: there is also data on the skills and availability of the teams, on the strategic importance of the work. We need this rich raw material to fully capitalise on modelling.
RTE is one of the largest high and extra-high voltage electricity transmission networks in Europe. It is also among the most advanced in terms of thinking about asset management strategy and the use of simulation. Since 2015, RTE teams have been using Cosmo Tech’s Simulation Digital Twins to transform their approach to asset investment planning and optimize network maintenance and investment.

Two key steps have enabled RTE to concretize their new approach: the definition of the 2020-2035 investment plan, the 15-Year Network Development Scheme (SDDR), and then that of the 2021-2024 electricity tariff case (TURPE6). Derived from the budget trajectories presented in the SDDR, the tariff case is, in practical financial terms, approximately 90% of RTE’s revenue. As a result, making a well-supported and argued SDDR and tariff case is essential to the continued management.

Meeting the challenges of tomorrow’s network requires massive investments today. We must have visibility of the impact of our decisions both short-term and long-term in order to direct these investments. It is also essential to know if the choices we make are robust in the face of some potentially very different evolutionary scenarios. Cosmo Tech’s Simulation Digital Twins allow us to do that.

Jean-Louis Muscagorry, RTE’s Project Director of Asset Management 2025.
HOW RTE CHANGED THE CONVERSATION ON ENERGY TRANSMISSION ASSET MANAGEMENT

In 2014, RTE’s R&D team shared a conviction: traditional asset management approaches will not be sufficient to cope with the aging network and the increasing complexity of its business environment.

“Our asset management choices determine the network’s ability to meet tomorrow’s challenges. We acknowledged at that time that traditional methods based on norms were not effective to know the long-term impact of our choices” explains Serge Blumental, head of RTE’s R&D asset management program.

Re-questioning its practice, RTE transformed its asset management approach by relying on Cosmo Tech’s technology. With their 30 years of experience in simulation, RTE’s teams were convinced that complex system simulation could help them to overcome the limits of traditional methods and take into account the complexity of their short and long-term issues.

In 2020, the French regulatory authority confirmed RTE’s approach, as Thierry Wourms, RTE’s head of Asset Management team, and Philippe Claude, R&D asset management expert, explain.

THE FOUNDATIONS OF THE APPROACH

Two goals helped RTE to structure their new approach and guided their technology choice:

- They wanted to enable a short and long term holistic view of the asset management strategy and operations, considering maintenance and renewal interactions, integrating all stakeholder values, resources, and constraints involved.
- They wanted to support a transparent discussion around the scenarios they assessed, showing causality, chains of events, and allowing both fine grained focused analysis and macro KPI assessment to quantitatively support conversations with stakeholders.

“At the core of our approach there was the will of the company to re-question itself on its asset management and its transformation. Cosmo Tech’s Simulation Digital Twins were a key tool to lead this reflection,” says Wourms.
Able to represent the behavior of an organization and its evolution over time, Cosmo Tech’s Simulation Digital Twins allowed RTE teams to have better knowledge of their network.

“As soon as we integrated our data we saw things appearing” said Claude.

By testing uncertainty, RTE was able to identify the sensitive levers that have the most impact on the network, and decide on additional investments accordingly.

“Simulation has accelerated decision making. For example, it confirmed our need for a tower diagnostic plan worth 3 million euros,” he explained.

The use of long-term simulation for strategic studies reinforced RTE’s approach.

“The simulations clearly showed us what the impacts would be if we did not react,” said Wourms.

Decision-makers and field experts came to two conclusions:

1. Without a change, the aging of assets accelerates over time. It represents an investment wall that will grow from 0.5 to 1 and then to 2 billion euros in 30 years time.

2. By taking a de-siloed approach to asset management, optimization paths can be identified to both slow the growth of this investment wall and strengthen the performance and robustness of the network.

CHANGING THE CONVERSATION

With its new approach, RTE changed the conversation about asset management both internally and with its regulator, the “Commission de Régulation de l’Energie” (CRE).

RTE shared its method with the CRE when validating its 15-year business plan known as the SDDR, and again when making its tariff case. Two asset management plans produced for the SDDR (the Tower Anti-Corrosion Plan and the Gas Insulated Substation Plan - see overleaf), allows RTE to illustrate, explain and justify its simulation-based approach.

“We had two needs: first, we needed to justify our budget trajectories and the staffing for asset renewals, and second, we needed to be able to be robust when it came to aligning the budget with the volume of the work we proposed,” explained Claude.

“Above all, we needed to illustrate how a short-term action could obtain tangible results in 10, 15, or 20 years.”
RTE prepared a presentation of their Simulation Digital Twin for CRE, providing strong, demonstrative proof to support their plan.

“We initially presented some fairly global contextual elements such as the challenges of asset management and the principles of modeling and simulation giving a global view of the capabilities of Simulation Digital Twins “ said Claude.

RTE focused on the cost and benefits of asset renewal, explaining that it might be possible to avoid or postpone renewal investments thanks to appropriate and consistent actions, including painting of towers.

RTE was able to demonstrate that expenses for tower refurbishing could be avoided if investments in painting were made at the right time, in the right amounts, and with the right scope. This approach requires a robust model of the overhead line lifecycle, composed of the corroding steel lattice, painting with chemical properties and protective relationship to the tower health. In addition, there was a modelling challenge to connect the physical degradation model with the asset lifecycle financials.

“We could show the regulator that we could spend more in the short term painting the towers to maintain and extend their life cycle, and recover the investment – and more – over the long term by not having to replace the aged towers,” explained Claude.

The Simulation Digital Twins allowed RTE to test different lattice tower management strategies and choose the one with the highest potential for long-term economic gain.
AN ENHANCED DIALOGUE WITH THE REGULATOR

RTE leveraged their Simulation Digital Twin to enhance their dialogue with the regulator. They demonstrated their holistic vision for asset management and asset investment, demonstrating the impacts on and contributions of changes in technical policies on the network and the control of long-term investments. Together they questioned the OPEX/CAPEX balance that had been in place for several decades.

RTE was able to show the expected gains of the proposed approach by comparing the results of different scenario simulations and the regulator understood not only the impacts of the proposed strategy but also the reasons behind the requested spend.

Sharing objective data showing that increasing the maintenance budget would lead to substantial savings in the medium term, the regulator granted RTE a 15% increase in their total OPEX maintenance budget. This approach allowed the CRE to grant a 100% increase in the budget allocated to the painting of lattice towers over the next tariff period and even a 100% increase more over the following tariff period 2025-2028.

Indeed, so convinced was the CRE with RTE’s new approach based on Simulation Digital Twin, in its public report, it requested that RTE “apply this approach to all its policies for renewal of assets (disconnectors, transformers, conductors, etc.)”

In transforming its asset management practice, RTE not only made a commitment to transparency but also enhanced dialogue with stakeholders like CRE. RTE was able to showcase its plan, explain all of the functional capabilities of the Simulation Digital Twin, communicate all of the simulation results, and fully explain its rate case clearly and holistically.
**TOWER ANTI-CORROSION PLAN**

**Initial Objective:**
Define the budget trajectories of painting, refurbishment and replacement of lattice tower expenses, to prevent premature aging on overhead lines, especially in coastal and polluted areas.

**Long Term Objective:**
Maintain the quality of service at the lowest cost.

**Simulation Digital Twin in Action:**
Simulate several different repainting, refurbishing and replacement strategies to obtain the best OPEX / CAPEX balance.

**Results:**
Confirmed a necessary increase in painting expenses, +100% between 2021-2024 and +100% more from 2025. Without this change in strategy, RTE could show that there would be an increase in maintenance expenses of €700 million by 2050.

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**GAS INSULATED SUBSTATION PLAN**

**Initial Objective:**
Compensate for the degradation of sealing in gas insulated substations in order to limit both the environmental risks of a sulfur hexafluoride (SF6) gas leak, and security of supply risk of component failures.

**Simulation Digital Twin in Action:**
Simulation and testing of the different maintenance and renewal strategies for the substations.

**Results:**
Confirmed the need to accelerate the implementation of the gas insulated substation rebuild plan for **630 million euros by 2035**. This investment would deliver an environmental dividend in the shape of a reduction of nearly 13 tons of SF6, the equivalent of a reduction of more than **300,000 tons of CO2**.

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**RTE SIMULATION DIGITAL TWIN BY THE NUMBERS**

Integrating all of RTE’s business knowledge and expertise, the model is the most complete and accurate model of a national electrical transmission network ever developed.

<table>
<thead>
<tr>
<th>1M</th>
<th>30M</th>
<th>30 to 100</th>
<th>Daily use</th>
</tr>
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<tbody>
<tr>
<td>assets components integrated in the Digital Twins</td>
<td>planned operations per scenario</td>
<td>years time frame</td>
<td>use</td>
</tr>
</tbody>
</table>
Simulate an asset’s physical lifecycle
Simulate the effect of time, physical degradation, loss of functional integrity, and the emergence of defects or failures.

Simulate an asset’s financial lifecycle
Evaluate the financial value of an asset throughout its lifecycle and assess the capital impact, including interest charges and depreciation allowances, on the balance sheet for each asset.

Simulate an asset sustainment plan
Simulate a complete asset management plan, including maintenance and renewal policies, in compliance with financial resources, workforce and outage capacities.

Test unlimited what-if scenarios
Design and simulate scenarios to predict the impact of strategic decisions on a single asset, a network of assets, or an entire organization.

Extract how-to optimization plans
Prescribe the optimal operational strategy for a network in the short term, and an optimal strategic plan for the long term to achieve organizational KPIs.

Undertake sensitivity analysis
Test a strategy’s robustness to unexpected events to mitigate risk and improve the business plan.
IN PRACTICE

TENNET, EXPLORING POSSIBILITIES TO OPTIMIZE MAINTENANCE OF ELECTRICITY TOWERS

TenneT is a leading European grid operator in the Netherlands and Germany. It is one of Europe’s major investors in national and cross-border grid connections on land and at sea, bringing together the Northwest European energy markets and driving the energy transition.

Challenges

TenneT transports electricity over a network of approximately 23,500 kilometers of high and extra-high voltage lines with a fleet of more than 12,000 towers in the Netherlands. Optimizing the maintenance and life cycle of these assets, while minimizing costs and risks, is therefore an essential asset management strategy for TenneT.

Mastering the complexity of this task is beyond the reach of traditional tools. It requires integrating, in a single tool, knowledge of the state of the tower life cycles, availability of dozens of different subcontractors, all in conjunction with the use of new technologies and the impact on the environment.

The Approach

TenneT has explored Cosmo Tech Asset on a part of its grid, a digital twin simulation solution already proven in the asset-intensive utility industry.

When modeling the asset management system, Cosmo Tech integrated all of the resources, processes, and other mission-critical factors into the digital twin to address TenneT’s challenges: from the tower life cycle, including corrosion development factors, all the way to work schedules, financial projections and the impact of planned service outages.

Cosmo Tech provided TenneT with a unified view and a 360-degree simulator of the steel tower maintenance process. TenneT teams can better understand the current and future critical needs of their organization and thus can optimize security ensuring a continual supply of electricity to 42 million customers.
Results

By leveraging both predictive and prescriptive analytics and targeting the KPIs of asset management as a whole, the simulation software enables TenneT to find new ways to optimize maintenance and augment the robustness of its operational execution in face of unexpected equipment failures.

+12%

increase in the security of network supply with a constant workforce

"The exploration with Cosmo Tech software shows good potential to allow us to confidently meet our network reliability challenges, taking into account the changes in our environment and the incorporation of future digitization into the business. The simulations showed us the potential of reduction of operational risks by 12%, keeping the same resource allocation."

Shima Mousavi Gargari
Asset Strategist - TenneT
Based in the region of Fribourg, Groupe E is one of Switzerland's largest grid operators. They serve businesses and nearly half a million people in the cantons of Fribourg, Neuchatel, Vaud and Bern. Like other Swiss grid operators, the company's activities include electricity generation, distribution, and retail.

Challenges

Groupe E faced challenges familiar to grid operators everywhere. They needed to improve their investment decisions while simultaneously taking performance metrics into account. They needed to optimize the total cost of ownership without impacting the reliability of the grid, increase energy efficiency and promote the adoption of renewable energy.

In addition, Groupe E was involved in the development of Switzerland’s 2050 Energy Strategy. This Strategy, a revision of the Switzerland Federal Energy Act and validated by the Swiss electorate, demanded a transformation of the grid over the course of the decades ahead and the justification of investment plans that did not diminish safety or reliability standards.

The Approach

Groupe E chose Asset Electrical, the asset management solution of Nexans and Cosmo Tech based on the latter’s Simulation Digital Twin technology.

This would enable Groupe E to centralize all of their data on their assets and the processes used to manage (inspect, maintain, renew) them. This data could be integrated into a single platform - the Simulation Digital Twin - which was a high-fidelity digital model of the entire Groupe E network.

Groupe E users could test hypotheses and simulate unlimited strategies that look decades into the future. Dashboards made it easy to explore scenarios and share the results inside the organization. As the Nexans and Cosmo Tech solution was cloud-based and delivered as a PaaS, or Platform as a Service, users could access the Simulation Digital Twin from anywhere and not just the office.
Results
The return on the investment was clear and immediate with financial forecasts showing gains in the order of three and four times the cost of developing and implementing the solution.

“In my opinion, one of the major advantages of Asset Electrical is that we can factor in external constraints as well as internal ones. For the first time, it was possible for us to plan network equipment renewal with an optimized risks mitigation approach across all network levels.”

Aurelien Lair
Lead, Strategic Asset Management
Groupe E

This case study is an example of how Nexans supports its customers in their business transformation. Nexans is a global player in energy transition. Providing customers with advanced cable technologies for power and data transmission. Today, Nexans goes beyond cables to offer customers a complete service that leverages digital technology to maximize the performance and efficiency of their critical assets.
A Simulation Digital Twin is a Hybrid AI technology. Its modeling is not only built with data-based AI but also defined by knowledge-based AI. The way the system evolves - its dynamics with its causal rules, constraints, the interactions of its components - is shaped through human expertise. Predictions are more reliable compared to data-only approaches which are often incomplete and exclude infrequently occurring scenarios. Simulation Digital Twins can simulate scenarios that have never happened before, detect edge cases that would otherwise never be found, optimize action plans for any time scale (for the next minutes or the next 50 years) with the right sequence in which to execute these plans.

Simulation Digital Twins don’t require the exhaustive data that AI-based data technologies demand to produce a reliable simulation of the replicated organization. Modeling embeds only the data that is necessary to complement the structure of the dynamics. This requires far less time to be invested compared to solutions that require data exhaustivity. Simulation Digital Twins can also identify the critical data that have the most impact on the organization, giving directions to complement simulation.
Simulation Digital Twins can be used by, for example, producers of renewable energy and wind farm managers. Connected to IoT sensors and external conditions, Simulation Digital Twin technology helps power generation operators to optimize the efficiency of their energy production and the planning of wind farm maintenance over the coming weeks, months and years. In addition to monitoring, Simulation Digital Twins also help to predict asset degradation over time and account for operational constraints, weather forecasts and market opportunities in order to optimize operations and maximize overall profit and safety.

With Simulation Digital Twins, one energy firm realized a clear and immediate economic return in the range of three to four times the cost of developing and implementing the solution. Another energy company saw double-digit improvements in operational efficiency, 10% reductions in OPEX and CAPEX, and a 20% reduction in operational conflicts. Users benefit from the technology’s capacity to align different stakeholders strategically and operationally, improving the agility of the organization and reinforcing a shared vision. As robust planning can be automatically generated, Simulation Digital Twins bring an important increase of planning productivity. What usually takes 2-3 weeks in a manual process can be achieved in a couple of minutes.

Developed to tackle Asset Management energy challenges, Simulation Digital Twins are ready-to-deploy and can easily be configured and customized to relevant use cases without any significant mobilization of client resources. The platform provides a very high level of modeling flexibility to adapt to new requirements or changes without starting over from scratch. As a result, you can start small to meet an initial business challenge with an 8-week implementation, and over time easily adapt and quickly expand the scope of the Simulation Digital Twin when adoption is approved by stakeholders.
Investments in IoT have added significant value to organizations of all types over the last 20 years. IoT has helped inform decision makers about what has happened and the present state of almost every part of their business. Connecting these IoT devices to a Simulation Digital Twin, however, unlocks enormous additional trapped value and generates a real return on the investment in data. Thanks to Simulation Digital Twins, the IoT data is not only useful for understanding the past and the present of an organization, but also instrumental in the prediction and optimization of the future via the generation and leveraging of synthetic data.

Simulation Digital Twins are designed to integrate smoothly with other asset management solutions. Advanced planning systems, Enterprise Asset Management (EAM) and Asset Performance Management (APM) solutions, computerized maintenance management systems (CMMS) and even traditional digital twins can all be connected to a Simulation Digital Twin which then generates the in-depth insights required by decision makers in complex and uncertain asset management contexts. Cosmo Tech delivers pre-packaged pipelines and connectors that enable this integration.

Simulation Digital Twins do not require investment in data expertise. Nevertheless, customer expertise in data science multiplicates the value and facilitates robustness of scenarios config and post treatment. The software is user-friendly and offers an easy-to-configure platform and readable dashboards. They offer both a high level of configuration as well as ready-to-use “what-if” scenarios and “how-to” optimizations. Out of the thousands of possible parameters, the interface presents only the key parameters to be modified in order to automatically launch an optimization. Resources (Physical Assets, HR, Finance, etc) can be viewed by type, to allow each stakeholder to be a part of the process. All these features make the technology usable for specialists and non-specialists alike.
COSMO TECH PROVIDES A 360° SIMULATION DIGITAL TWIN PLATFORM

We offer an innovative approach to predict all possible futures of an organization, to solve the most complex industrial problems and lead enterprise decision making.

Industrial companies in manufacturing, energy & utilities and mobility rely on Cosmo Tech to better understand the impact of their decisions and ensure a future that is robust, resilient and sustainable.

Holistic, dynamic and connected digital replicas to simulate entire business ecosystems

Our Simulation Digital Twin platform leverages both predictive and prescriptive analytics. Decision makers have a 360° view of their process. They can run unlimited scenarios to better understand the current behavior of their complex organization, anticipate all possible situations even under conditions that have never occurred before, and gain optimization of all levels of enterprise planning.

$27 million
Series A and B venture capital funding

2010
Cosmo Tech founded

Gartner
2020: Sample Vendor for Digital Supply Chain Twin Technology in Supply Chain
2019: representative Vendor of Digital Twin of an Organization