

THE EVOLVING ENTERPRISE

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Digital Transformation of the Enterprise

Talking Heads:

Focus on outcomes not technology,
says Aeris Communications

**What is Digital Transformation
and why is it worth \$5 trillion?**

Transforma Insights assesses the Solutions

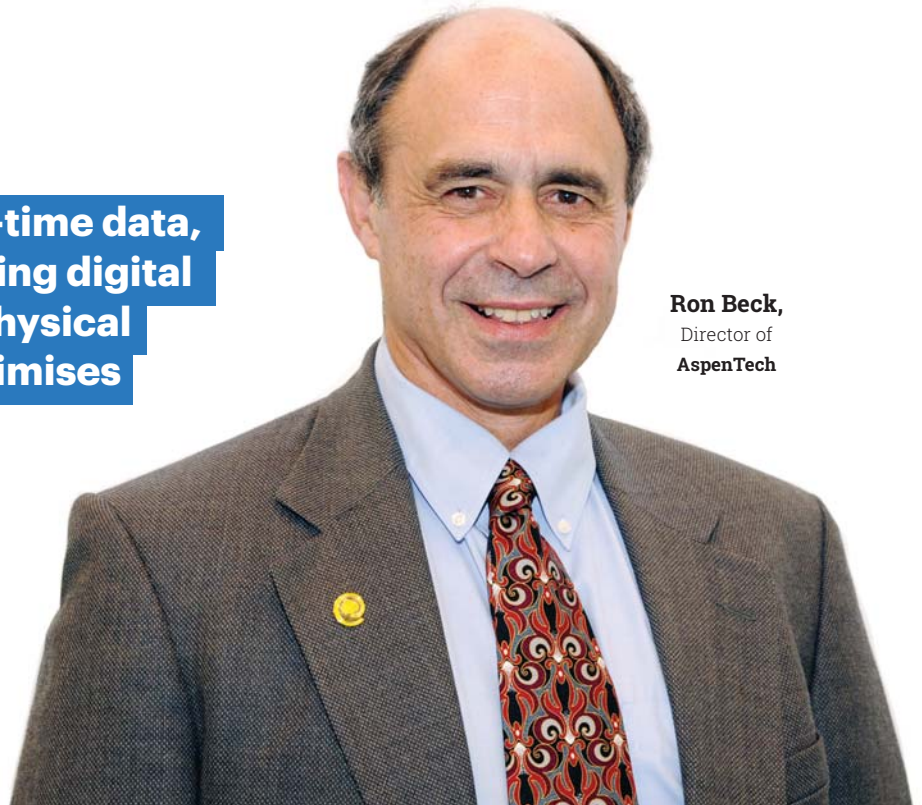
Artificial Intelligence revealed

3D Body Scans, Moneyball Moments as we
Shift to AI, and Managing Public Concerns

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Based on models and real-time data, the digital twin is an evolving digital profile of behaviour of a physical object or process that optimises business performance

Ron Beck,
Director of
AspenTech



Future-proof your assets with digital twinning

“The debate has ended. Not implementing artificial intelligence (AI) is no longer an option. Every company should have an effective AI strategy, not least because as the pace of innovation accelerates, such an approach will present them with new opportunities to transform their business.

The growing ability of businesses to employ streams of business and operational data to drive machine intelligence and access insights is driving AI's momentum. Currently, companies typically only use a small amount of the data they have collected. This provides huge potential for implementing digital

twins (virtual copies of a company's assets and processes,) which can unlock the potential value from all that data.

In 1984, “Neuromancer”, a scientific fiction novel by William Gibson, captured the imagination of readers –



as a prelude to the world of AI. Gibson envisioned the massive value and power that digital twins can bring and how they can change the world. More than three decades later, this vision is materialising in the enterprise world. Virtual copies of physical locations and activities provide an insightful way for companies to harness the true value of data, as AI helps humans access this massive world of multi-dimensional data. The power of AI and the interconnected industrial world to unlock critical insights via data mining and by leveraging domain expertise helps technology innovators create turnkey solutions for digital twins.

No longer dreamtime...

The reality is here with advanced technology available on demand. The golden question now is where to invest, as digital twins transform asset-intensive businesses, especially those in energy and chemical sectors. In today's volatile, uncertain, complex and ambiguous (VUCA) marketplace, the deployment of digital twins can help companies achieve sustainability and operational excellence.

Digital twinning technology provides a valuable model of the physical asset to help explore 'what-if' scenarios safely and provide forecasting capabilities and advice on degradation, asset failure events and more. This can be achieved using self-learning systems as well as by capturing the knowledge of experts. Digital twins also function as business models to optimise various business scenarios.

Based on models and real-time data, the digital twin is an evolving digital profile of behaviour of a physical object or process that optimises business performance. This provides important insights into system performance which, in turn, leads to actions in the physical world.

The digital twin takes advantage of asset data to stay updated and is increasingly made more intelligent by AI agents. First, the digital twin ensures that the process plant is modelled vigorously using engineering models, enhanced via AI techniques with embedded cost and risk models.

Second, the operational digital twin ensures that plant operations are modelled and viewed virtually as planning, scheduling, control and utility models. Areas covered include planning and scheduling, demand models, distribution models, energy demand and supply, as well as control and optimisation. We expect autonomously optimised production to be available soon in refining.

Third, the operational integrity digital twin provides tactical and strategic decision guidance around prescriptive maintenance and

real-time decision-making to maximise uptime, adjust production, minimise environmental impact and production losses, and prioritise safety. The digital twin also covers asset condition and sustainability. And can feed back to engineering to improve weak points in the asset.

Overall, companies need a future-proof digital reference architecture to structure the implementation of digital twins supporting collaboration and integration across business functions.

Powered by business value

Scaling up digital twins can deliver significant value for the enterprise. Unit level models, for example, can generate very high value returns for digital twins – involving process, asset condition, control and optimisation online models. Energy and utility models, refinery and bulk chemical planning, speciality chemical scheduling, debottlenecking and de-risking and emissions present high-value opportunities for plants to adopt digital twin models. A new but important area, enterprise-level visualisation tied to actionable work flows, allows rapid analysis of available enterprise profit opportunity options and effectively presents insights and operational status at the executive level.

Examples of success with digital twins include:

- **YPFB Andina**, a Bolivian upstream company, has increased yield by millions of dollars via an asset-wide digital twin model.
- **A major US-based international refiner** adopted machine learning digital twins to improve uptime and margins, saving tens of million dollars in avoided equipment degradation.
- **Bharat Petroleum (BPCL)** implemented an integrated digital twin and achieved 90% reduction in sulfur emissions and derived economic value from recovered sulfur for sale – all within six months.
- **A polymer producer** implemented a multivariate analysis-based digital twin approach which manages a wide range of speciality chemical applications, where product quality is key and often problematic.

Companies are progressing with new, advanced technology – but it is also necessary to be strategic and have a roadmap to get ahead. As businesses invest in digital twins, it is critical to observe at a high level how this technology will help them overtake the competition. Beyond technology, companies should also take note of their organisational change and evolution. Organisational adaption, enthusiasm and readiness must be managed regularly, as business value creation is a key driver of technology." ■