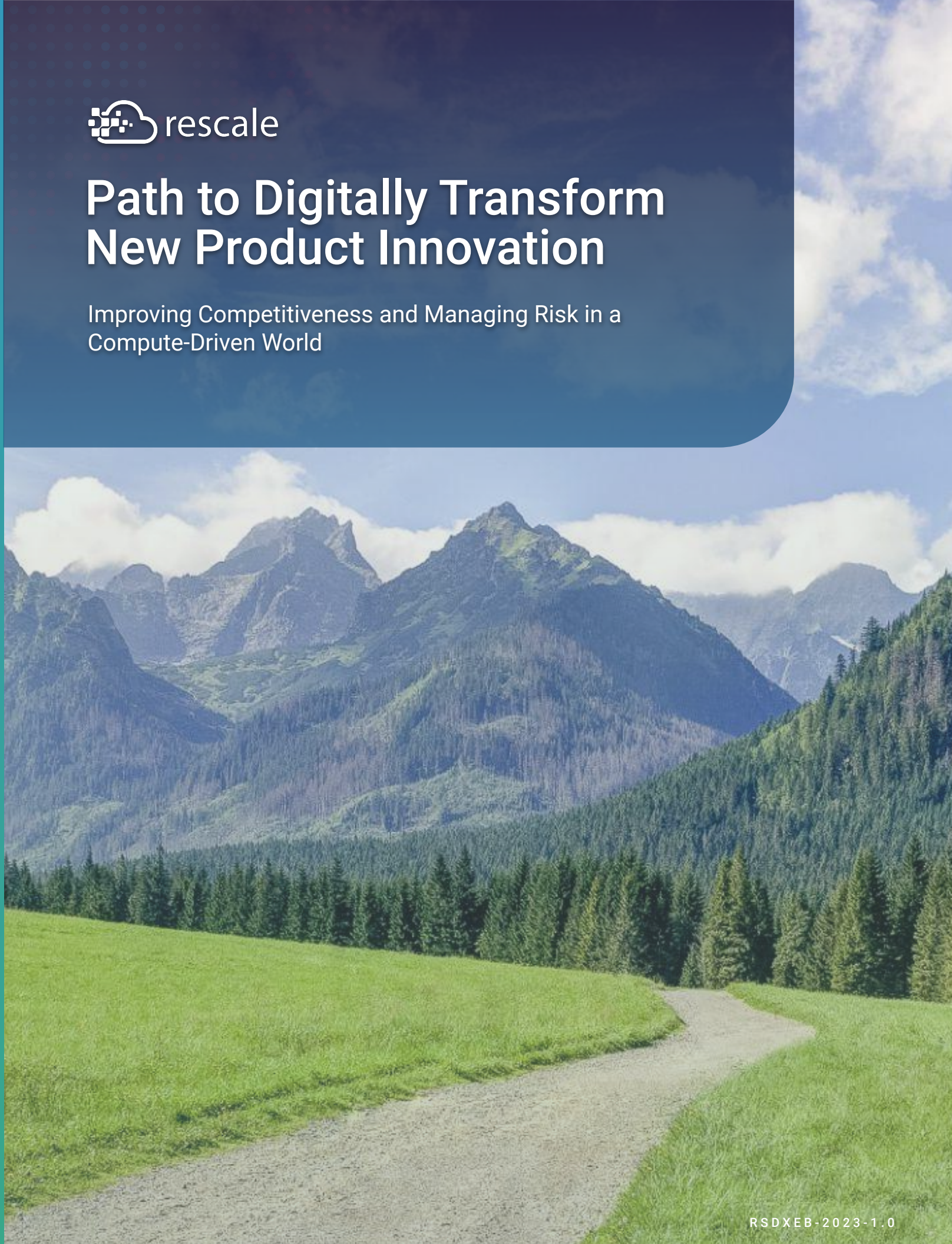
rescale

Path to Digitally Transform New Product Innovation

Improving Competitiveness and Managing Risk in a Compute-Driven World



RSDXEB-2023-1.0

Introduction

In the last two decades, enterprises have seen dramatic changes in business processes enabled by virtualization, cloud services, and machine learning. But most engineering and R&D-driven companies have yet to bring cloud-enabled digital transformation to product development.

Today, leading engineering-driven organizations are digitally transforming new product development processes using cloud high performance computing (HPC), and adopting new digital engineering practices and artificial intelligence to improve their competitiveness. Rescale serves many of these leaders, including the majority of top aerospace, automotive, and life sciences companies.

This report describes the patterns that Rescale has identified while working with our customers to transform their R&D capabilities. This journey includes three stages:

1. Cloud-enabled R&D
2. Unified Management
3. Digital Transformation

In this report, you will learn the key challenges organizations are addressing at each stage, what outcomes they are looking to achieve, as well as Rescale's approach in helping our customers get to these outcomes.

Digital transformation is a top priority for **74%** of organizations

Source:
Flexera, Tech Spend Pulse 2022

Only **35%** of digital transformation efforts are successful

Source:
Boston Consulting Group, Performance and Innovation are the Rewards of Digital Transformation

Computing Powers New Product Commercialization

New product innovation is the lifeblood of today's leading engineering-driven companies. Across industries, innovative leaders now integrate advanced computing into nearly every stage of new product development, from creating personalized medicines to autonomous driving systems.

Today, approaches like digital twin, artificial intelligence, and cloud-based collaboration are driving a new wave of product innovations by making better use of data and empowering engineers with data-driven and AI-enabled breakthroughs. Commercializing new engineering breakthroughs is more difficult than ever, according to 90% of R&D leaders surveyed by Gartner (Source: R&D Leadership Council Survey 2021). Today's R&D technology stacks span broad sets of computational tools, including simulation software, specialized computing architectures, and supporting middleware data management and workflow tools.

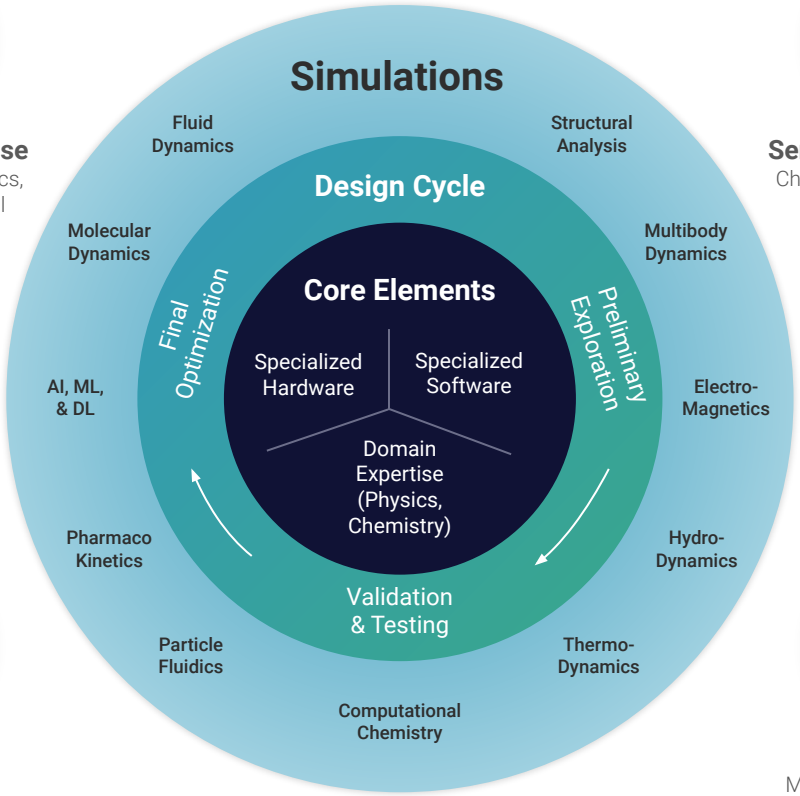
While most organizations have adopted digital methods of product development like computer-aided design (CAD) and engineering (CAE), for many, legacy systems, data silos, and the increasing complexity of engineering challenges often inhibit further R&D process improvements.

Exhibit 1 - Landscape of Computational Science and Engineering

Aerospace & Defense
Propulsion, Aerodynamics, Acoustics, & Structural

Automotive
Crash Safety, Advanced Driver Assistance Systems, Battery, & Combustion

Life Sciences
Genomics, Drug Discovery, & Bioinformatics



Semiconductor & EDA
Chip Design, Verification, & Classification

Energy & Earth Sciences
Climate & Weather Modeling, Drill & Pipeline Safety, Seismic & Reservoir

Manufacturing
Materials Testing, Waste Reduction, & Factory Optimization

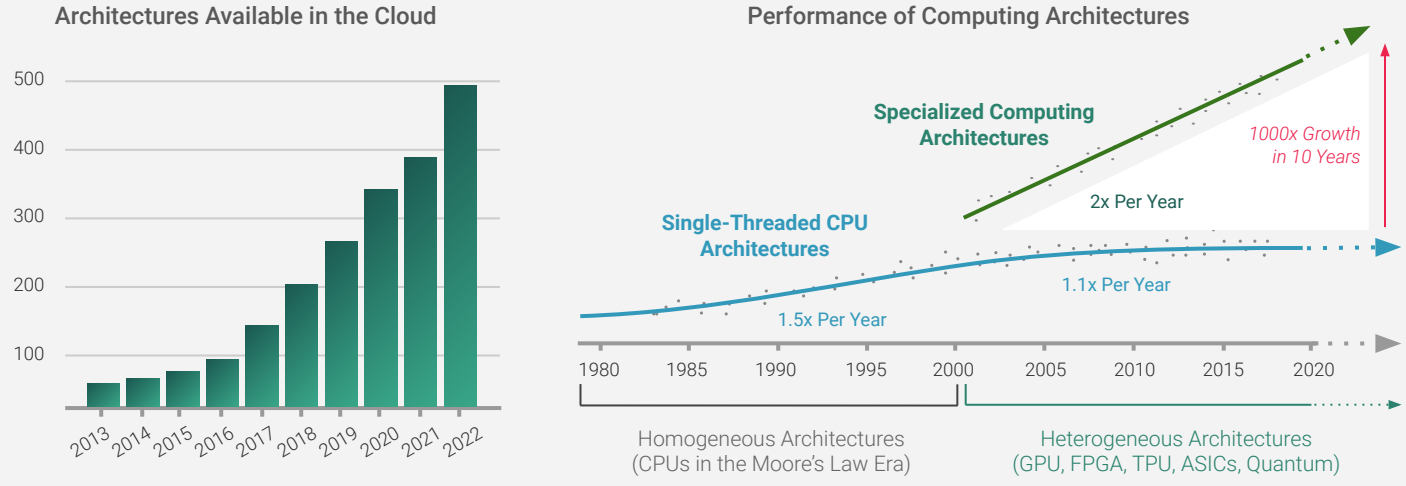
Market Trends Impact Engineering and R&D Decisions

Democratization of HPC and AI Has Increased Competitive Pressure

Growth in cloud HPC, open-source applications and container portability has democratized access to technologies once reserved for only the largest R&D organizations. This opens the door for startups to compete and commercialize disruptive new products. A wave of "digital native" new entrants is creating urgency for incumbent innovators to transform their R&D capabilities and remove the constraints of legacy systems and processes.

Companies that can become more digitally mature and data-driven will achieve new levels of operational efficiency and reduce repetitive, non-value-adding engineering tasks, which frees engineers to focus on innovation and achieve industry breakthroughs faster.

Exhibit 2 - Shift to Specialized Computing Architectures in the Cloud



Explosion of Computing Architectures Complicates Planning

The end of Moore's Law means that companies can no longer expect continued computing performance gains without disproportionate increases in cost computing hardware or power consumption. This has led to a Cambrian explosion of new specialized computing architectures optimized to specific workloads. Examples include GPUs, ASICs, and RISC architectures like Arm, each with advantages for tasks like graphics rendering, AI training, and physics simulations.

But taking advantage of these specialized architectures comes with its own challenges. Organizations can no longer sign multi-year commitments for homogenous hardware - and planning ahead for the type and quantity of specialized hardware needed is highly impractical.

A just-in-time approach is needed, which is only possible with cloud computing. When organizations continuously take advantage of the latest architectures as they become available, they can achieve significantly better performance than with on-premises systems.

Mainstream Cloud Adoption for Engineering and R&D

Cloud HPC adoption is now mainstream, with growth of cloud HPC and AI projected to continue outpacing on-premises investments: 85% YoY in the cloud,* versus single-digit growth on premises. Today, 78% of organizations have used the cloud for science and engineering workloads, and more than half, 53%, use the cloud consistently.**

Public cloud infrastructure offerings are increasingly cost competitive, with cloud infrastructure now generally at financial parity with full-loaded data center costs. In addition to consumption-based pricing, cloud providers also provide reserved instances consistent with CapEx budgets.

Migrating to cloud has been shown to deliver significant ROI, including a 37% decrease in operational expenses, a 391% return on investment within three years, and an annual revenue increase of $139 million per organization.*** Additionally, by using public cloud, companies can use the latest computing architectures as soon as they become available, without having to wait for hardware refresh cycles.

Managing Growing Technical Complexity and Skills Gaps

Business users expect on-demand access to an ever-growing technology stack from anywhere in the world. Often, IT teams are challenged to meet these needs. Additionally, IT teams are dealing with new security challenges in a hybrid and multi-cloud world. Doing this in today's evolving ecosystem requires their IT organizations to upskill their teams and take advantage of automation.

Sources: Intersect 360 2022 Market Data *
Rescale 2022 State of Computational Engineering Report **
IDC, The Business Value of Migrating and Modernizing to Microsoft Azure***

78% of organizations have used the cloud for science and engineering workloads,

53%

use the cloud consistently

Organizations using the latest computing architectures can increase application performance by

160%

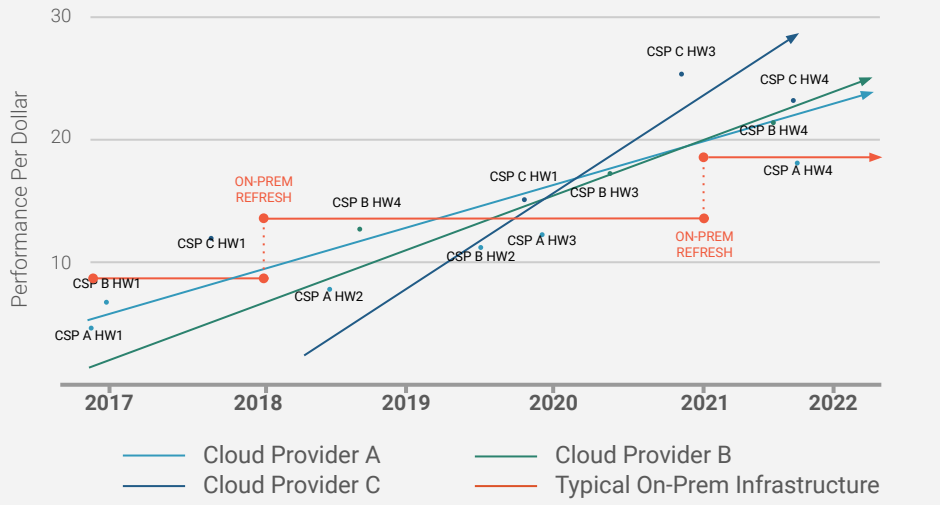
and achieve year over year increase in performance of

30%

Exhibit 3 - Architectural Flexibility Delivers Increased Cost-Performance

Cost-Performance of New Cloud Hardware (HW) Across Cloud Service Providers (CSP)

Source: LS-Dyna Car2Car Crash Test Run on Rescale

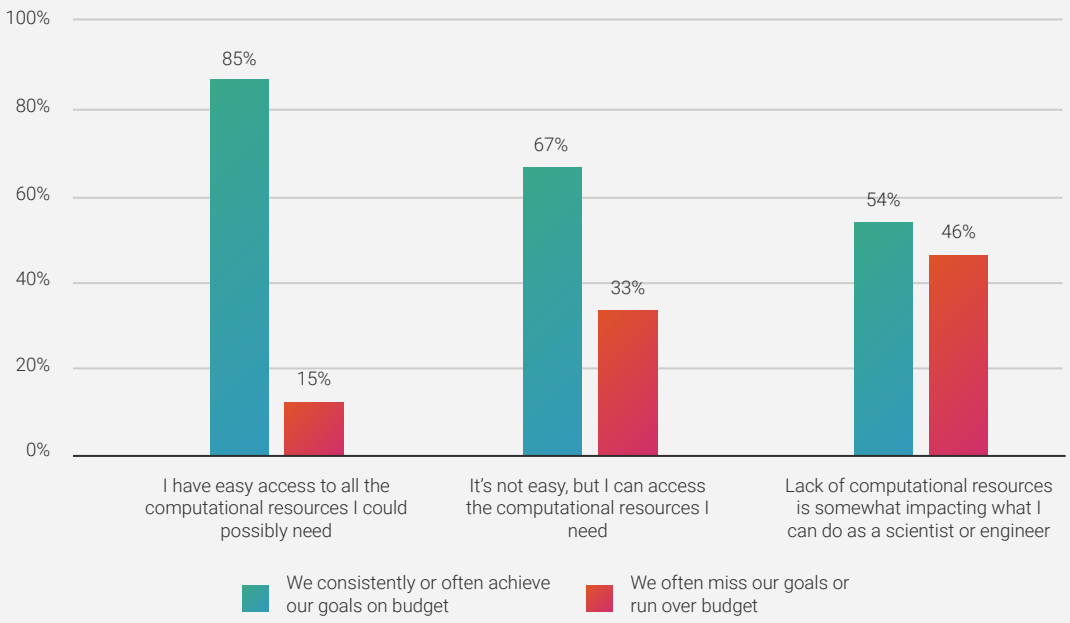


The Need to Digitally Transform New Product Innovation

Digital transformation is made possible by digital technologies driving process improvements. For example, CAD improved manufacturing collaboration and information management, and CAE reduced the need for physical testing and improved design cycles.

Today, leading companies are taking the next step by adopting new levels of automation combined with cloud and AI to further empower the engineer or researcher. The goal is to accelerate innovation velocity, manage risk, and improve business competitiveness.

Exhibit 4 - Impact of Computational Tools on Project Success



Source: Rescale 2022 State of Computational Engineering Report

Organizations that cannot provide easy access to computing at scale are

3X

more likely to see projects fail

User-centric Automation Has Measurable Impact on Project Success

Engineers and researchers rely on computing to evaluate new product designs, requiring a full R&D technology stack from simulation software, to data analytics packages, to HPC hardware at scale.

Organizations that understand the critical role computing has on new product innovation have adopted cloud computing for not only computing at scale, but also to maximize performance and lower costs. Additionally, these companies are using this opportunity to make computing resources easily accessible, as this plays a critical role in a project's success. Organizations where computing resources are difficult to use are twice as likely to see projects fail, and those that cannot provide sufficient resources are three times more likely to see projects fail.

Computational Pipelines and AI Will Improve Business Competitiveness

Enterprises commonly use data pipelines to automate and streamline the process of data extraction, transformation, and aggregation. Computational pipelines are nascent by comparison, but their impact is likely to be far more dramatic than data pipelines in defining how competitive an enterprise can be.

By using computational pipelines on a cloud-based control plane for hybrid and multi-cloud operations, organizations can define, automate, and version control entire product development processes. This has the effect of not only dramatically accelerating new product development, but also supporting digital threads, to provide a continuous and integrated flow of data and information that connects all aspects of a product life cycle, from concept and design, through manufacturing and operation.

Artificial intelligence is increasingly used in data-driven businesses for predictive modeling of customer interactions, but a more recent development is the use of machine learning (ML) in applied science & engineering. Typically this falls in two use cases. The first is using physics-informed neural networks in the place of running actual simulations. The goal here is to reduce simulation costs and get to approximate answers quickly. The second is to develop ML models on the process by which different product designs perform across conditions, helping organizations accelerate identification of optimal designs.

By adopting computational pipeline automation and machine learning, organizations are able to accelerate new product innovation, and improve business competitiveness.

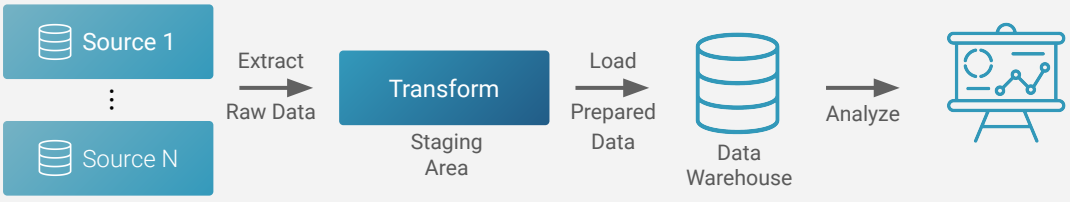
72% of pharmaceutical executives believe that digital transformation is critical to achieving R&D imperatives

***Source**: Accenture & BioIT*

Exhibit 5 - Data Pipelines vs Computational Pipelines

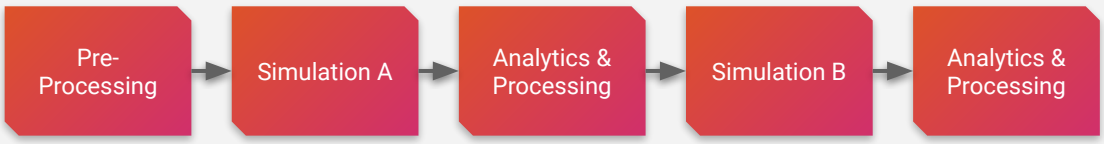
Data Pipelines

Support business processes & data services



Computational Pipelines

Power new physical product development processes



Path to Digitally Transform New Product Innovation

Rescale's work with leading global engineering and R&D-driven companies has enabled us to identify three common patterns of how organizations are transforming R&D.

Cloud computing is a prerequisite for successful enterprise R&D transformation for three reasons. First, being user and workload-centric requires on-demand access to software, hardware, and computing capacity. Second, supporting R&D process improvements requires establishing a loosely coupled toolchain from a broad set of ecosystem technologies. Third, enabling worldwide R&D collaboration requires connectivity. In some cases, data center resources can also be used to support a hybrid cloud operating model.

Exhibit 6 - Path to Digital Transformation of New Product Development

Phase 1
Cloud-Enabled R&D

Challenge

R&D velocity constrained by lack of computing capacity or legacy hardware

Outcome

Accelerated product development with secure access to computing at scale enabled by full-stack cloud automation

Phase 2
Unified Management

Challenge

IT challenged to onboard more teams & support growing portfolios of software, hardware, & tools

Outcome

Increased R&D efficiency and reduced financial and compliance risk enabled by unified visibility and policy-driven control

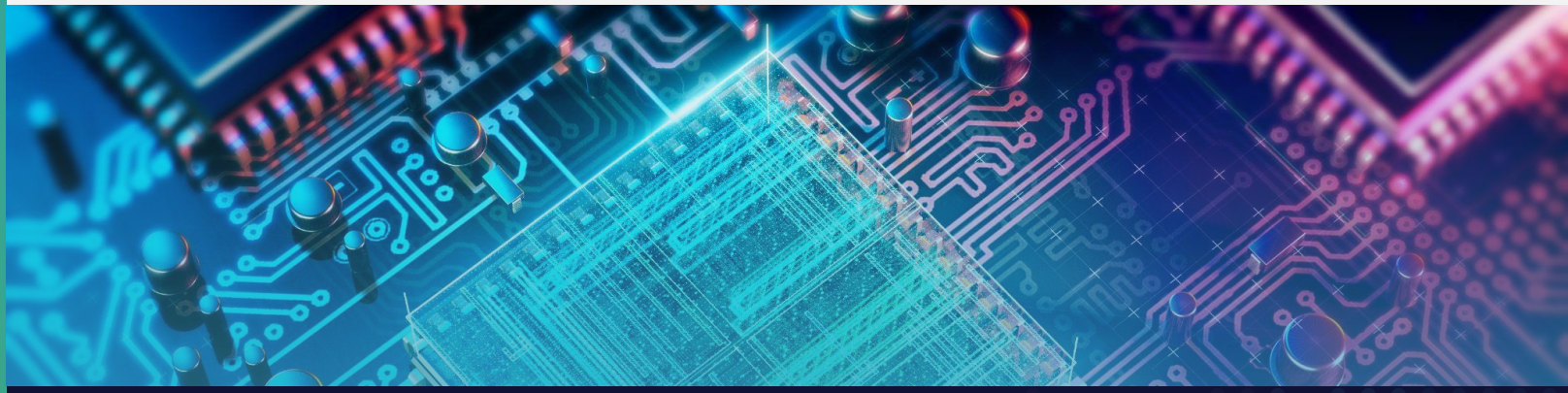
Phase 3
Digital Transformation

Challenge

Business competitiveness & R&D innovation constrained by legacy product development processes

Outcome

More competitive products brought to market faster enabled by seamless collaboration and data integration



1 Phase 1: Cloud-enabled R&D

Traditional data center approaches to HPC focus on multi-year hardware procurements and driving high utilization, even as engineering teams are bottlenecked on the lack of computing resources.

Eliminating System Constraints to Innovation Velocity

Computing capacity and performance of legacy systems can constrain R&D innovation velocity, compelling technology leaders to explore cloud computing. As product innovation becomes increasingly compute-driven, cloud offers instant access to advanced computing capabilities without expensive, time-intensive upfront investment.

Cloud provides not only similar economics to data center infrastructure, but also reliable access to new specialized architectures that may be difficult to procure due to supply chain disruptions and global shortages. Supporting business continuity is an additional benefit.

Given cloud's advantages, the challenge for organizations is how to help their engineering and R&D organizations to be cloud-enabled, which can be difficult given many HPC organizations are still new to cloud computing. HPC-as-a-Service provides a viable approach.

Phase 1
Cloud-Enabled R&D

Challenge
R&D velocity constrained by lack of computing capacity or legacy hardware

Outcome
Accelerated product development with secure access to computing at scale enabled by full-stack cloud automation

Accelerated Computing Through Cloud Automation

HPC-as-a-Service (HPCaaS) builds on the common Infrastructure-as-a-Service (IaaS) model of cloud computing. However, unlike IaaS, which provides virtual machines on demand to developers, HPCaaS delivers the entire HPC stack to engineers or researchers. This stack may include HPC hardware clusters including storage, simulation software, analytics packages, virtual desktops, and more.

Sensatek Accelerates Speed to Market with Cloud-enabled Design and Simulation

To compete in competitive and highly regulated industries, Sensatek evaluated ways to accelerate the R&D of new sensor technologies for aerospace, energy, and government applications. They needed a flexible solution that could be implemented quickly without significant IT resources. Sensatek selected Rescale as its R&D platform to test new product designs under a variety of harsh conditions with greater fidelity and performance in the cloud. By automating complex HPC application and hardware, Sensatek was able to meet tight product development milestones and focus on solving bigger R&D challenges without complexity.

1 Phase 1: Cloud-enabled R&D

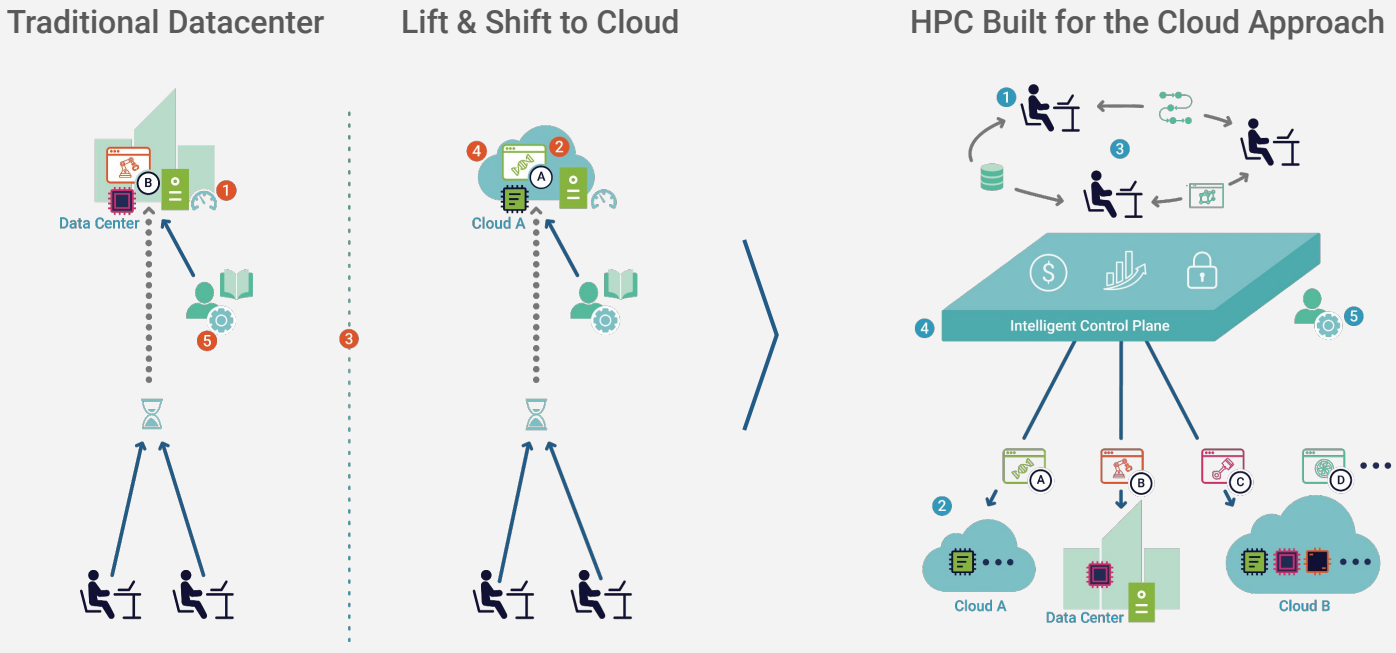
Rescale's Cloud-based Control Plane Approach

Rescale is a cloud-based platform for computational engineering and R&D, delivering the entire HPC stack to users from a cloud-based control plane. With Rescale, engineers can run any application on their cloud of their choice, with over 1,000 pre-installed applications and the largest global cloud network of the latest computing architectures, fully supported by Rescale.

Unlike traditional datacenter or "lift-and-shift" approaches to cloud, there is no infrastructure or application to maintain, as these resources are instantiated only when users submit a request to run a simulation or analysis. To mitigate risk from broader tech stacks, data sources, and cybersecurity threats, Rescale hardens public cloud environments to ensure full-stack security, extending coverage beyond the common shared responsibility models of cloud providers.

Rescale's cloud-based control plane delivers benefits to both IT and business users, with SaaS-like simplicity and self-service governed consistent with IT policies.

Exhibit 7 - Traditional HPC vs HPC Built for the Cloud



1. **Hardware-centric** - Focused on HW utilization
2. **Inflexible** - Predefined HW, SW and fixed capacity
3. **Siloed** - Isolated islands of analysis
4. **Static** - One-time tuning with stagnant configs
5. **Manual** - Script-based, complex operations

1. **User-centric** - Intuitive with SaaS-like simplicity
2. **Unlimited** - Any scale, any architecture, any application
3. **Connected** - Seamless, secure, global collaboration
4. **Intelligent** - Continuous performance optimization
5. **Automated** - Policy-driven control & end-to-end workflows

1 Phase 1: Cloud-enabled R&D

Secure and Accelerated New Product Development

Shifting R&D operations to the cloud can bring new levels of agility and flexibility. Catalysts for cloud adoption can vary. In some cases, time-sensitive projects cannot wait for new hardware to be acquired. In other cases, project requirements exceed the capacity of on-prem data center infrastructure, requiring bursts to cloud. Lastly, some organizations have a declared cloud strategy, developing a comprehensive approach to cloud security, compliance, operations, and performance.

Rescale's cloud-based control plane approach enables IT teams to define and operationalize automated policies, without the complexity of rebuilding bespoke environments. This approach dramatically increases the probability of successful cloud projects for those traditionally operating on prem. By automating steps and reducing the complexity to run workloads in the cloud, organizations can focus on their core competencies instead of cloud infrastructure configuration and management.

IT teams leverage Rescale to flexibly scale and secure consistent computing environments across any cloud for any R&D application with self-service to end users, removing the obstacles to innovation. As technology portfolios continue to proliferate, automating infrastructure, applications, and security end-to-end is a competitive advantage in speed-to-market and de-risking mission-critical computing operations.

Common Patterns in Phase 1: Cloud-enabled R&D

Initiatives

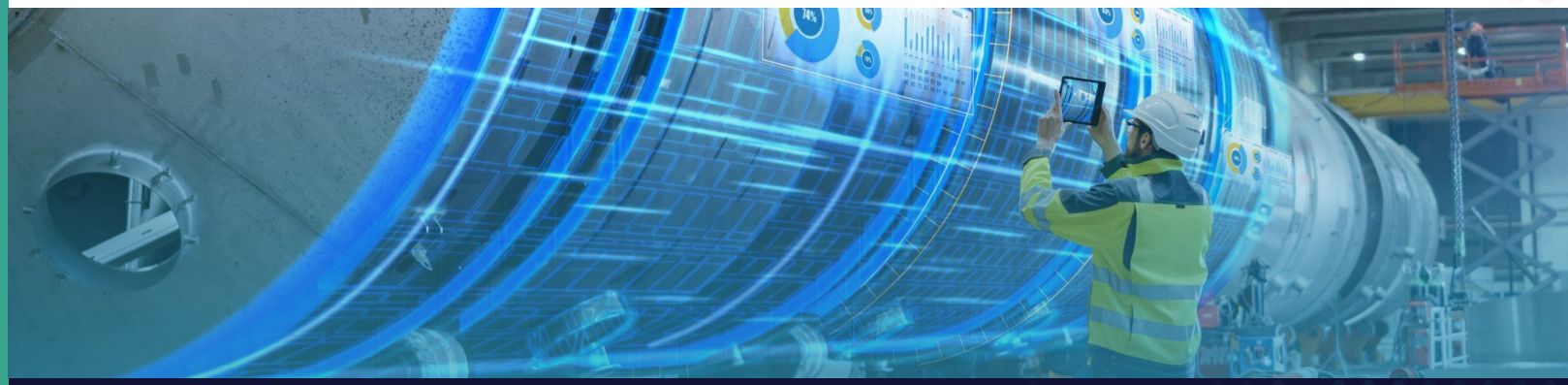
- High-priority R&D projects
- Realize cloud-first strategy
- Shift from CAPEX to OPEX
- Disaster recovery and business continuity
- Eliminate vendor lock-in across cloud and software providers

Capabilities

- HPCaaS for full-stack automation
- GPU acceleration
- Cloud bursting demand peaks
- Hybrid, multi-cloud orchestration
- Application lifecycle management
- Infrastructure redundancy / failover
- Self-service IT support

Outcomes

- Accelerated innovation velocity
- Financial flexibility
- Increased productivity of R&D teams globally
- Enhanced cybersecurity
- De-risked computing operations
- Increased IT responsiveness



2 Phase 2: Unified Management

As organizations adopt cloud HPC more broadly, needs around visibility, control, and establishing a multi-cloud posture become a priority.

Managing Operational Complexity

IT teams are always challenged to manage ever-increasing portfolios of technologies and teams, while being under pressure to control spending. Adding cloud can sometimes further complicate this challenge.

First, some organizations that have adopted cloud can find it difficult to understand where the spend is going and whether budgets are being used effectively. Cloud providers have multiple regions, and instance types, each of which have their own price points.

Second, understanding which instance types to use for each application can be quite complex requiring benchmark investigations. Third, R&D teams are increasingly distributed, further complicating the necessary infrastructure footprint. Fourth, IT organizations must manage data sovereignty considerations and make sure data stays in specific geographies. For some companies, quantifying their sustainability posture is an additional consideration. Furthermore, adding multi-cloud operations adds an additional dimension to these challenges.

Phase 2
Unified Management

Challenge
IT challenged to onboard more teams & support growing portfolios of software, hardware, & tools

Outcome
Increased R&D efficiency and reduced financial and compliance risk enabled by unified visibility and policy-driven control

Policy-based IT Control with Intelligent Automation

For IT to be an effective partner to the business, and enable successful R&D teams, they need comprehensive visibility and control with automation to deliver resources on demand. Intelligent automation in this context means automating the provisioning of resources based on pricing, application-specific hardware performance, capacity, and other intelligence. This information enables IT to operationalize policies to improve security, manage risk, comply with data locality requirements, and meet broader business objectives.

90% of R&D leaders say "accelerating speed to maturity for technologies in the R&D portfolio" is a top priority while only **45%** are confident that they can solve this challenge within 12-18 months

Source: *Gartner, Top R&D Priorities 2023*

2 Phase 2: Unified Management

Rescale's Intelligent Automation Approach

Rescale's intelligent automation approach to managing computing resources starts with providing transparency across software licensing availability, hardware performance, costs from hardware and software, global infrastructure capacity and maturity, and compliance. Automation can also be used to extend on-premises environments via schedulers for hybrid operations.

With a unified view of these resources, IT administrators can make informed decisions about the best configuration of resources based on the goals of the business. With granular and continuous visibility of utilization, performance, and cost, business leaders can more accurately forecast future resource needs and prevent budget overruns.

As new projects drive increased collaboration and resource demands around the world, policy-based automation can enforce strict data access and locality requirements while ensuring users can access only approved hardware and software.

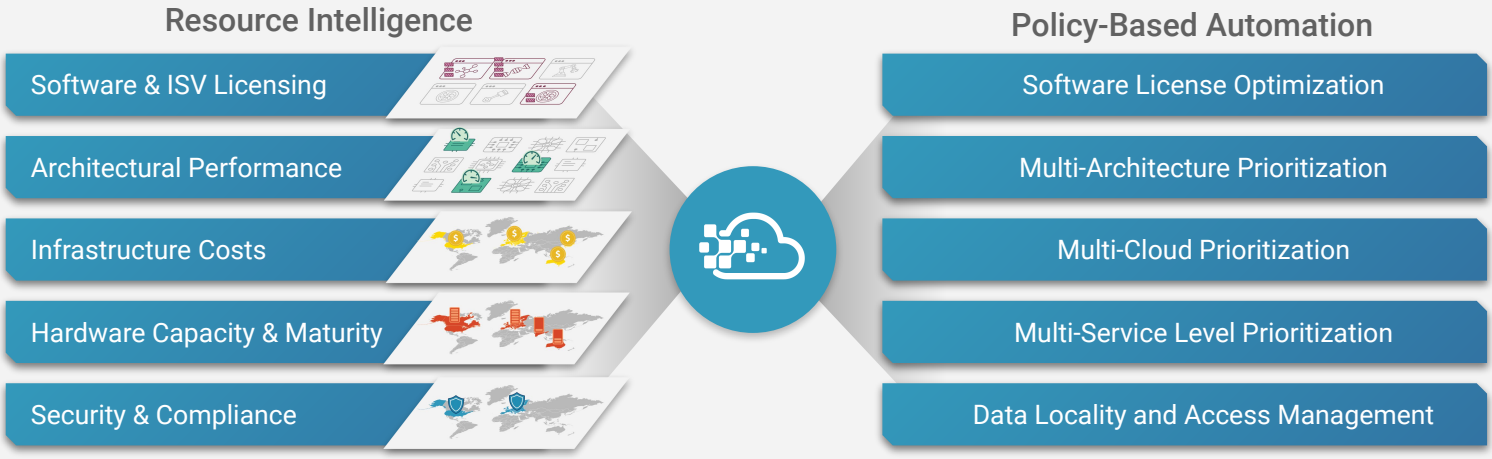
89%

of respondents agree that security is the most critical determinant of success for a cloud strategy, and this is exacerbated by multi-cloud environment complexity

31% ranked complexity as the most significant internal challenge to cloud security

Source: *Forrester, Unlocking Multi-cloud's Operational Potential*

Exhibit 8 - Rescale Intelligent Resource Automation Simplifies Multi-Cloud Operations



2 Phase 2: Unified Management

Optimizing Performance and Managing Risk with Policy-based Controls

With comprehensive visibility control, IT leaders can balance business-level initiatives and user-level efficiency gains. For example, Rescale customers have flexibility to optimize for reduced computing costs, increased computing performance, or a balance of the two.

Reducing or optimizing costs requires a full picture of workload economics, including commercial SW licensing costs combined with infrastructure, SLA, and architectural configurations. By combining data from past workload performance and economics with Rescale's unique performance intelligence, customers can create standardized best practices that control costs and maximize engineering performance across the organization.

Policies can also be standardized to enforce data locality requirements, which, when combined with enhanced cloud security, can reduce cybersecurity risk.

Common Patterns in Phase 2: Unified Management

Initiatives	Capabilities	Outcomes
• Multi-cloud optimization • Cost management • Centralize and standardize best-practices • Reduce emissions from business operations • Acquisition integrations • Meet strict industry compliance	• Intelligent resource automation • Granular budgeting and spend traceability • Cost model flexibility • Policy-based automation • Continuous performance optimization • Multi-team management • Sustainable infrastructure prioritization	• Reduced TCO in R&D computing • New business with strict compliance requirements • Increased resource utilization • Increased engineering performance • Increased energy efficiency & sustainability

NOV Unlocks Engineering Productivity & Business Growth with Unified Cloud HPC

Global leader in oil and gas and renewable energy, NOV, leverages cloud-enabled simulation to develop and deploy new energy technologies across multiple regions and business units, from subsea oil and gas to offshore renewables.

NOV relies on a variety of R&D applications to get accurate predictions of safety, durability, and economic viability of new products before they reach production. As the company expanded, the increased complexity of IT management required more visibility and control. This led NOV to select Rescale as to unify and optimize their broad portfolio of workloads and increase their engineering agility.

3 Phase 3: Digital Transformation

Organizations that have successfully transitioned to cloud operations are positioned to further drive transformational R&D process improvements.

Phase 3
Digital Transformation

Challenge
Business competitiveness & R&D innovation constrained by legacy product development processes

Outcome
More competitive products brought to market faster, enabled by seamless collaboration and data integration

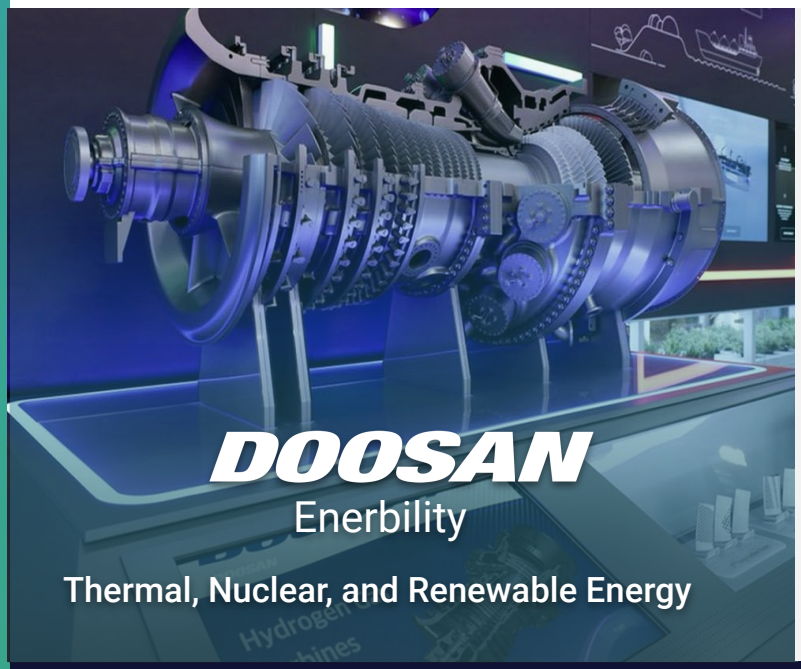
Constraints of Legacy R&D Processes

Legacy processes for product development, including manual steps for running simulations, and siloed data analysis and decision-making, constrain innovation velocity. Leading engineering companies recognize that staying competitive requires R&D process modernization taking full advantage of cloud, automation, collaboration, and AI.

Foundational Components to Successful Transformation

Successful digital transformation of engineering and R&D is predicated on three prerequisites. First, is starting from the user, and providing them instant access to the full technology stack from hardware, to software, to data. Second is automating entire R&D processes, which may include user or event-triggered tasks, and requires automating a loosely coupled toolchain from a broad set of ecosystem technologies. Third, is supporting seamless user-to-user collaboration.

These foundational components enable transformational improvements in the product development process, including the adoption of AI/ML in R&D. The combination of these technologies is revolutionizing the way research and development is conducted, increasing efficiency and accuracy while reducing time and costs. Lastly, because R&D projects often involve cross-functional teams, external collaborators, and regulators, organizations need to implement automated governance of data flows and permissions consistent with IT policies.



Doosan Enerbility Deploys AI for Increased Quality Control and Optimized Operations

Doosan Enerbility, a global leader of energy and desalination plants, needed to accelerate the development of more sustainable and efficient solutions. This required new technologies to design, test, and monitor products. Doosan partnered with Rescale to transform their R&D capabilities and deploy AI-enabled simulation to detect defects and predict maintenance. This resulted in being able to operate critical energy systems and infrastructure more effectively, safely, and sustainably.

3 Phase 3: Digital Transformation

Rescale's Computational Pipeline Approach

Rescale enables the digital transformation of engineering and R&D organizations by providing an intelligently automated and extensible R&D computing backbone with several key capabilities.

First is a user-centric experience for running simulations, analysis, and visualizations, including cloud-based virtual desktops. Second is a cloud-based control plane that automates hardware and software across hybrid and multi-cloud. Third is full-stack performance intelligence, enabling organizations to optimize costs, time-to-solve, ensure business continuity, and meet objectives around data locality, compliance or security policies. And lastly, an event-driven and automated computational pipeline that provides seamless integration between each of the steps and tools used in the product development process.

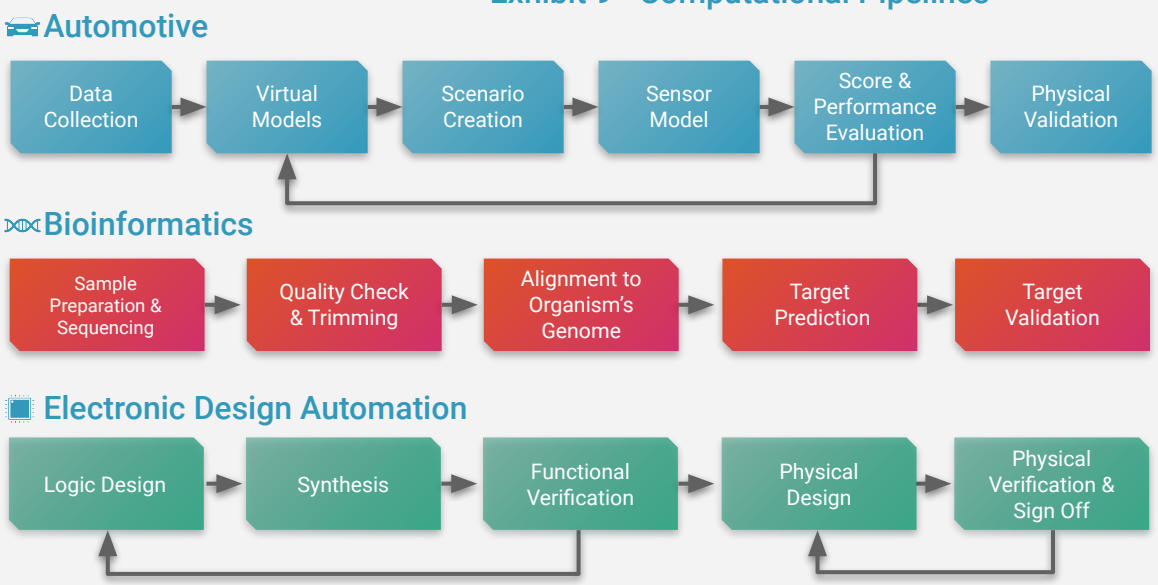
A computational pipeline is a series of sequential or parallel processing steps that are connected to form a complete workflow for solving a particular computational problem. The steps in a pipeline can include tasks such as data preprocessing, feature extraction, model training, and evaluation. Each step in the pipeline produces an output that is fed as input into the next step, allowing for the automation and efficient execution of the entire workflow. Computational pipelines are commonly used in fields such as scientific computing, machine learning, and bioinformatics to manage and simplify complex data analysis tasks.

These capabilities facilitate the implementation of modern digital R&D use cases, including digital twin, digital thread, AI-assisted engineering, real-time collaboration, and workflow automation.

Digital thread increases the supply chain efficiency by **16%**, and enables delivery of new products to the market **20%** faster for manufacturing companies

Source: *RGBSI & LNS Research*

Exhibit 9 - Computational Pipelines



Computational pipelines power new physical product development processes

3 Phase 3: Digital Transformation

AI-assisted Engineering Can Deliver More Competitive Products

After many years of running simulations, many R&D-driven companies are realizing that simulation data can not only help product development, but can also help define the entire process by which different designs may interact with their environments. By applying machine learning to a broad set of design and simulation data across a range of conditions, organizations can develop an institutional understanding of how variants of the product may perform. This helps organizations move from traditional "intuition-led engineering" toward "AI-assisted engineering."

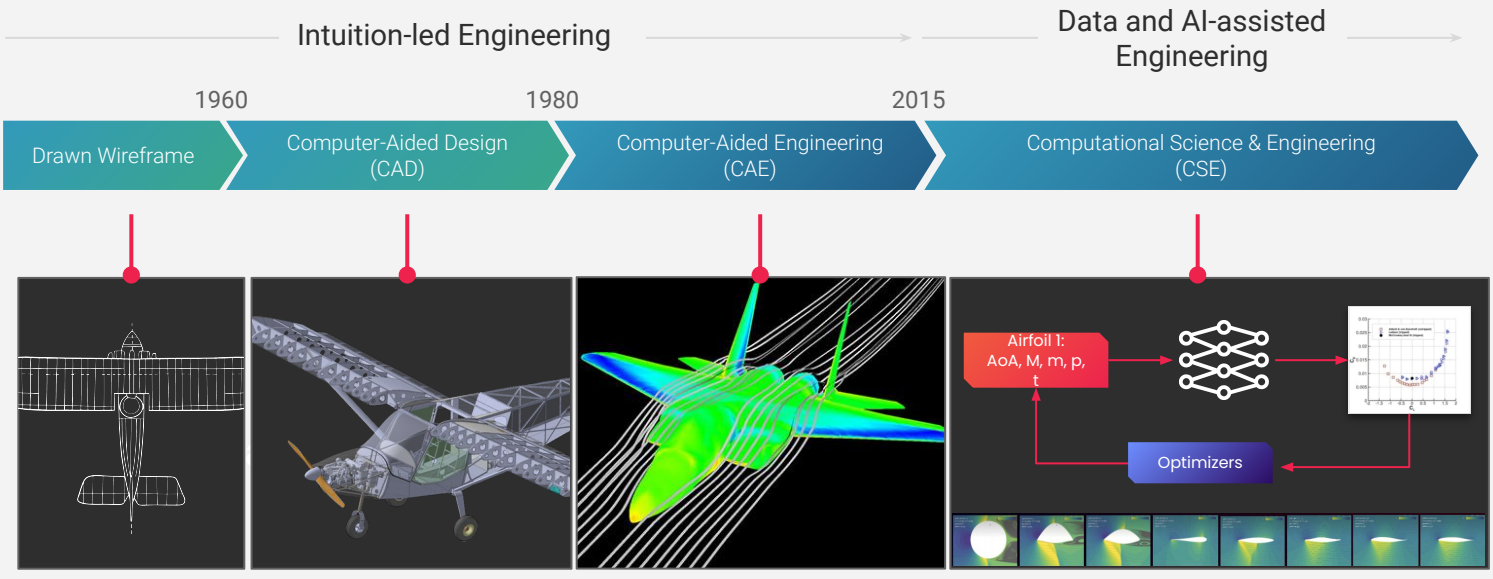
- ***Intuition-led Engineering*** - Engineers use their experience to hypothesize potential designs, and further refine them with simulation and physical testing

- ***AI-assisted Engineering*** - Engineers leverage ML models to identify potential design candidates that are likely to meet desired performance characteristics, and further refine those candidates with more detailed simulation and physical validation

In this scheme, the "product" of the company is the model itself, an intellectual property of the organization. And what's being manufactured and shipped are instances of this model. Organizations seeking to leverage AI in this way believe they are able to respond more quickly to their customers, and provide guidance to customers on what's possible from upcoming product designs.

With **AI-assisted** engineering, the "product" is the model itself; what's being manufactured and shipped are instances of this model

Exhibit 10 - Milestones Toward Computational Science & Engineering



Source: Big Compute 2022 Keynote

3 Phase 3: Digital Transformation

Accelerated Commercialization of More Competitive Products

Digital transformation improves the speed, efficiency, and quality of new product innovation by empowering R&D end users, while enabling IT to be a strategic partner to the business.

This transformation is only possible by connecting the latest technologies and systems of insight across the digital thread to reduce the time it takes to bring ideas to market. By reducing manual steps in the product development process, R&D teams become more efficient and effective.

As competition for talent heats up, organizations that create environments and cultures geared for innovation will attract, retain, and empower their most valuable asset: their people. By freeing up their time and delivering the necessary resources, digital transformation enables R&D teams to focus more on innovation and stay ahead of the competition.

Engineers spend as little as **50%** of their time on actual development due to administrative and manual work

Source: *Harvard Business Review, Where Tech is Headed in 2023*

Common Patterns in Phase 3: Digital Transformation

Initiatives

- Adopt AI/ML for accelerated new product development
- Integrate platforms and data sources
- Distributed & remote workforce
- Talent retention / engagement
- Process automation
- Industry 4.0, digital twin, and industrial metaverse, etc.

Capabilities

- Interactive simulation visualization
- Real-time collaboration
- Automated computational pipelines
- Composable & templated workflows
- Multidisciplinary design optimization
- Design of Experiments
- Ecosystem integration (e.g., AI/ML ops, PLM, CAD, CAE)
- Data warehouse & data lake

Outcomes

- Accelerated commercialization of new products and business models
- Increased IT and R&D productivity
- New product insights
- Process innovation
- Technical talent attraction and retention

Conclusion:
Planning Your Digital Transformation Journey

As product-driven companies race to deliver innovation, successful digital transformation initiatives will accelerate how they commercialize new product innovations.

This ebook provides practical steps to R&D transformation that organizations can use to identify their own stage of digital maturity and plan further steps they can take to remove constraints to innovation and efficiency.

Key recommendations for business leaders to digitally transform new product innovation include:

- Identify desired outcomes and technical approach to digital transformation
- Improve user experience and invest in training to maximize talent & productivity
- Automate complexity out of tech stack configuration, maintenance, and security
- Establish visibility and controls to increase efficiency and reduce risk
- Unify silos of data and analysis for seamless collaboration between R&D teams
- Integrate AI/ML, digital twins, and additional tools to further drive business impact

As trends such as cloud, AI, and digital twins impact how engineering and IT teams work with each other, organizations that work together to build a holistic transformation strategy will increase their chances of success.

Rescale empowers the majority of industry-leading companies to accelerate new product breakthroughs and achieve their digital transformation goals with cloud-enabled R&D, unified management for IT, and connected digital thread. Our team of multi-disciplinary technology and industry experts is ready to help you achieve your most ambitious engineering goals.

High Performance Computing Built for the Cloud

Digital Engineering

Workload Optimization

Intelligent Automation

Security & Compliance

About Rescale

Rescale is high performance computing built for the cloud to empower engineers and scientists with AI-enabled simulation and modeling, while giving IT security and control.

From supersonic jets to personalized medicine, industry leaders are bringing new product innovations to market with unprecedented speed and efficiency with Rescale, a cloud platform delivering intelligent full-stack automation and performance optimization.

IT leaders use Rescale to deliver HPC-as-a-Service with a secure control plane to deliver any application, on any architecture, at any scale on their cloud of choice.

Learn more about high performance computing built for the cloud:

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