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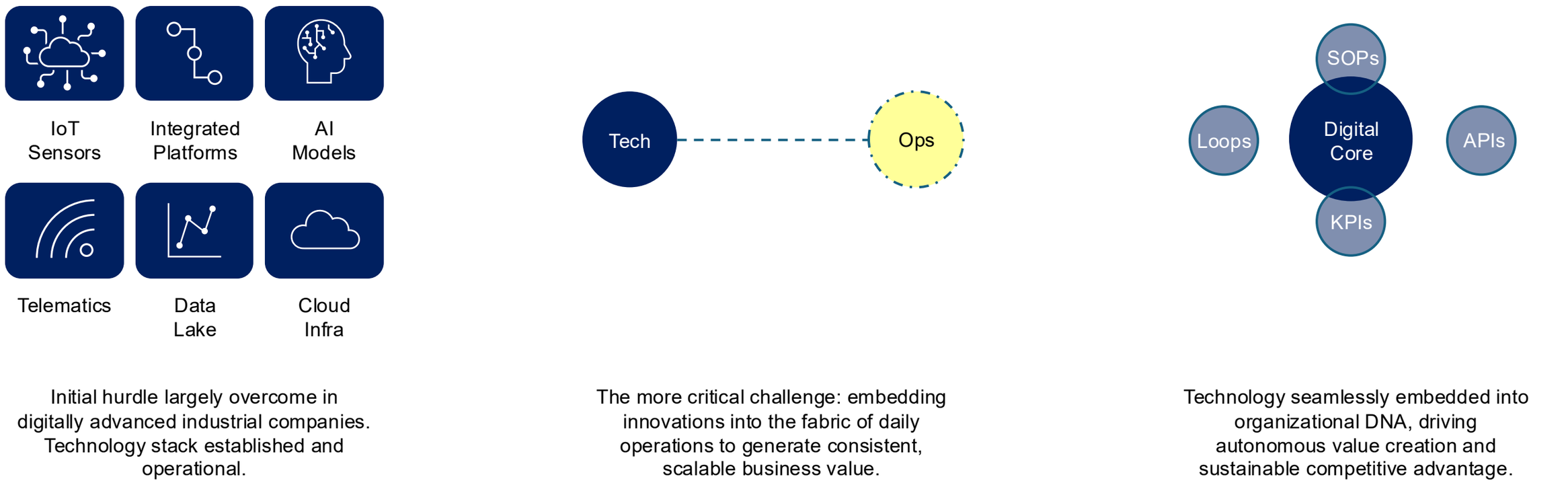
The execution-velocity paradox constrains digital transformation in complex industrial enterprises, and requires adaptive real-time orchestration

June 2025

Digitally mature organizations advance from technology acquired to operationalizing complex, connected digital systems

In a digitally advanced industrial enterprise, the first hurdle of technology acquisition - whether IoT sensors, telematics, or AI models - is primarily behind them. They have communicated value, measured value, started pilots deployed pilots, and now the real challenge (and focus) is to embody these technologies by integrating them into daily operations to generate sustainable, scalable business value.

Exhibit 1



Key Strategic Insight

The transition from technology deployment to technology mastery requires four operational integration levers: (1) SOP integration for automated workflows, (2) API-first architecture eliminating manual handoffs, (3) real-time KPIs embedded in frontline tools, and (4) continuous feedback loops via digital liaisons. This approach transforms innovation from an occasional fix into an organizational norm.

To fully and properly operationalize digital maturity, we recommend that industrial enterprises take the following steps thoroughly and diligently.

1

Establish digital outputs directly into the existing standard operating procedures

This means changing the work process so that the trigger of a digital signal pulls only the action that has been standardized and recorded. For example, if integrated platforms detect a failure about to happen, it generates a service order that is automatically sent to the nearest qualified service center, with parts already allocated. Molding digital processes into existing SOPs takes the innovation from an occasional fix and solidifies it into an organizational shape.

2

Develop strong, event-driven, API-first data architectures

Develop integrated tools which will can connect the telematics platforms, maintenance management systems, inventory systems, and service portals with a high degree of reliability and with zero human intervention. Removing human mediated handoffs or duplicative data entry reduces error and information lag, but it also creates a high-fidelity operational backbone that speeds up decision cycles and execution speeds across the network.

3

Integrate real-time KPIs and predictive analytics straight into frontline tools

For example, frontline technicians could be given dynamic role-specific dashboards that provide live visibility into their own contributions to fleet uptime, reductions in repair cycle times, or overall service consistency. The dashboards should also connect to performance-based compensation plans—both at the individual level and team-based compensation plans—to ensure they are really taking ownership, being operationally accountable, and being motivated at the ground level to continuously improve throughput and quality.

4

Systematically create continuous feedback loops for operations through integrated ‘digital liaison’ roles in service networks and field service teams

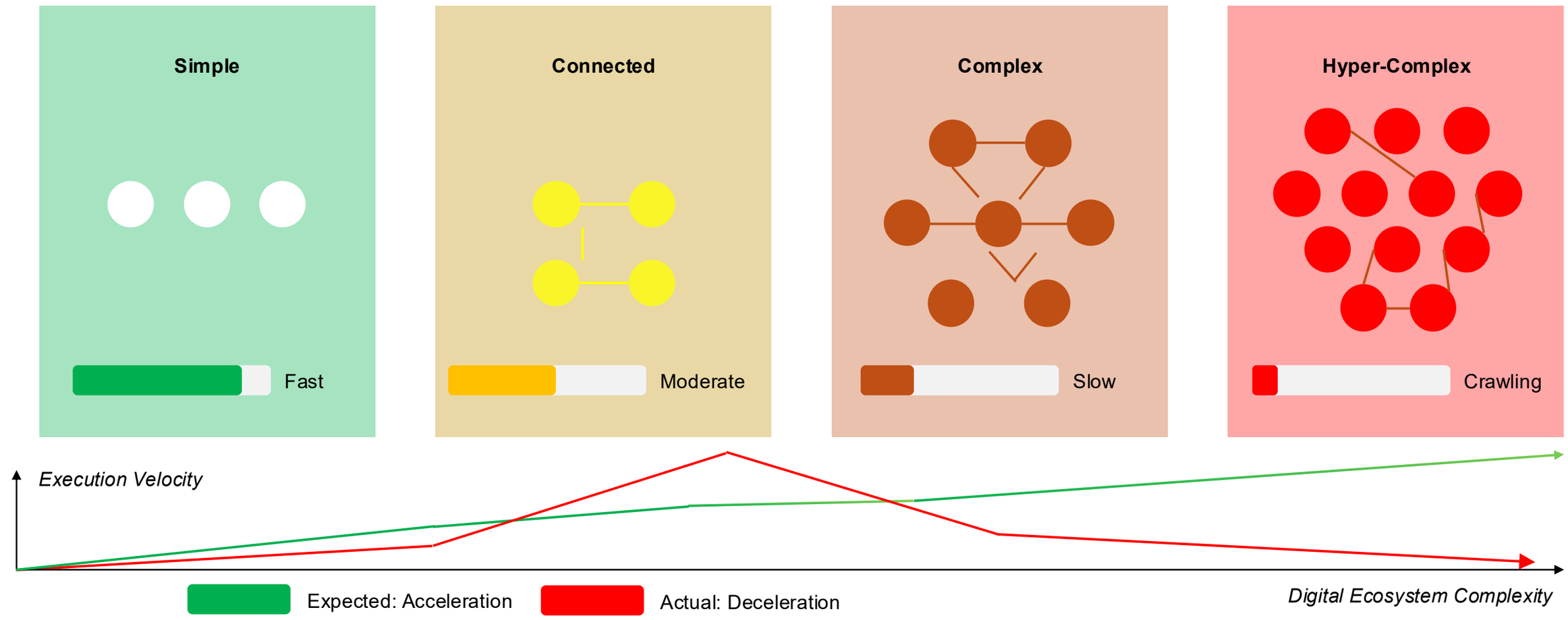
These liaisons are active conduits between engineering teams and customers as they aggregate issues from on-the-ground users, elevate system-level pain points, and enable corrective action quickly enough to make a difference. Therefore, the changes to digital capabilities ensure a congruence with how things operate in practice.

As digital ecosystems grow, execution speed paradoxically slows when faster delivery is essential to realize value

Increased interdependencies across technologies and teams exponentially increase complexity in the organization. Under the pressures of this increased complexity, siloed, or linear execution models are straining under the weight of managing dependencies in an increasingly interconnected environment creating “the execution velocity paradox.”

Exhibit 2

Execution-Velocity Paradox



As digital maturity rises, agility and throughput must increase disproportionately but instead stall due to coordination. Overcoming this requires 5 key considerations.

1 **Adopt execution as a continuous orchestration discipline rather than linear project delivery**

This may mean introducing AI-enhanced workflow engines with real-time task dependency tracking, risk assessments, and pre-emptive resource reassignment. These systems will allow for on-the-go adjustments, negating the impacts of cascading delays typically seen in siloed handoffs.

2 **Create “mission control” hubs that give leadership daily, granular check-ins on overall wellbeing of a project**

Move beyond weekly or monthly reporting cycles. This transparency creates proactive governance and rapid decision-making.

3 **Champion decentralized decision-making authority within guardrails**

Empower cross-functional squads with the autonomy to resolve impediments, while supporting them via compliance and risk-related ‘guardrail dashboards’. In this regard there are still both elements of choice and control of behavior.

4 **Use an internal social network analysis to pinpoint and improve team collaboration patterns**

Spot communication channels left underutilized and isolated teams and build structures or workflows to better connect teams and the flow of knowledge across units.

5 **Integrate dedicated “agility coaches” into the team**

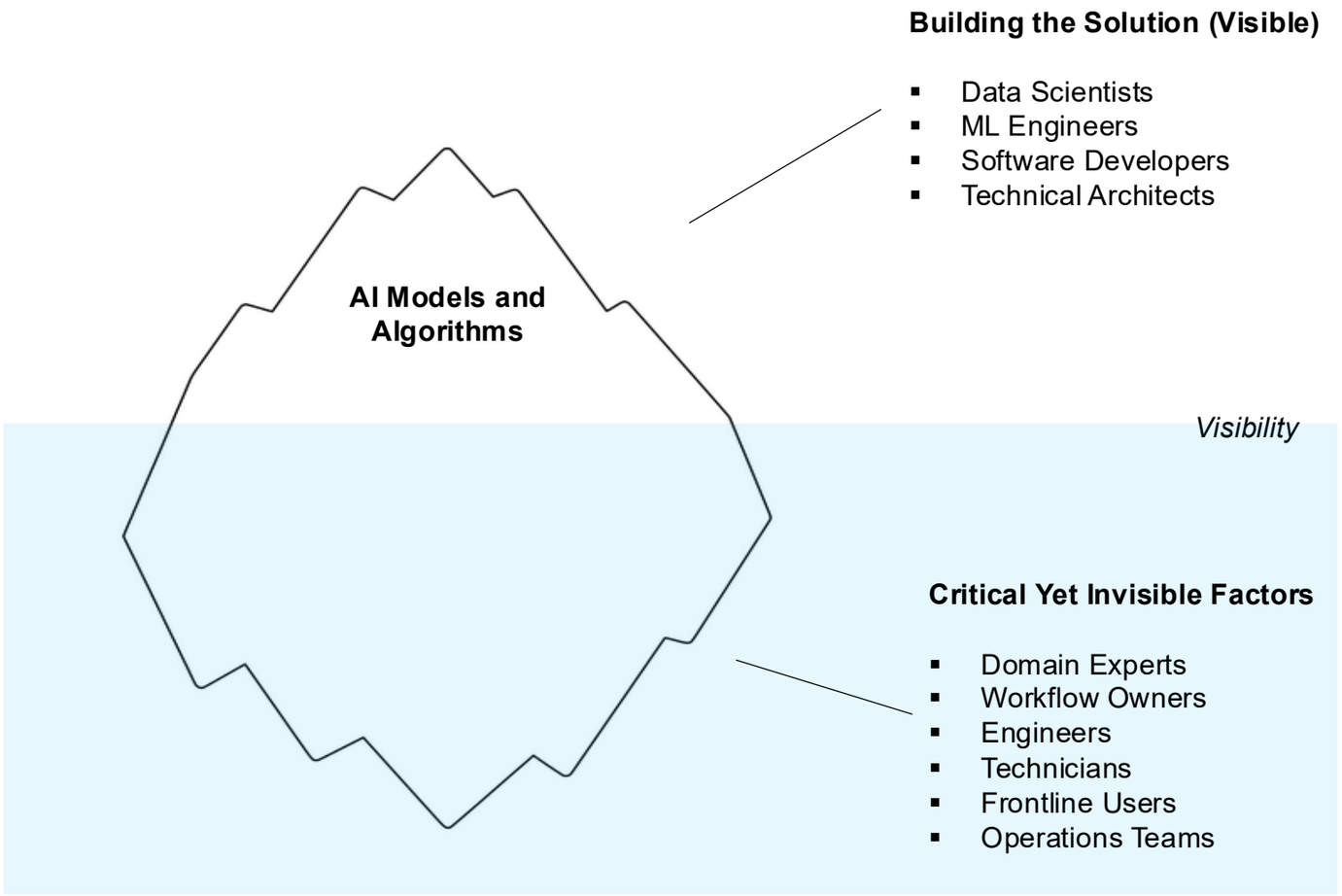
These are experts whose only job is to improve the speed of decision-making while removing bureaucratic barriers and fostering a more adaptive mindset in ambiguity in fast moving, complex environments.

Embedding AI requires iterative validation with domain experts and frontline users to ensure relevance and adoption

A great many AI projects fail to scale when developed in isolation from operational realities or without end-user involvement. Successful programs co-develop AI models with engineers and technicians, iteratively refining algorithms based on real feedback. A global manufacturer scaled predictive maintenance across multiple plants by combining executive sponsorship with local training programs that built frontline confidence and standardized processes; Early wins in detecting failures before they occur fueled broader adoption.

Exhibit 3

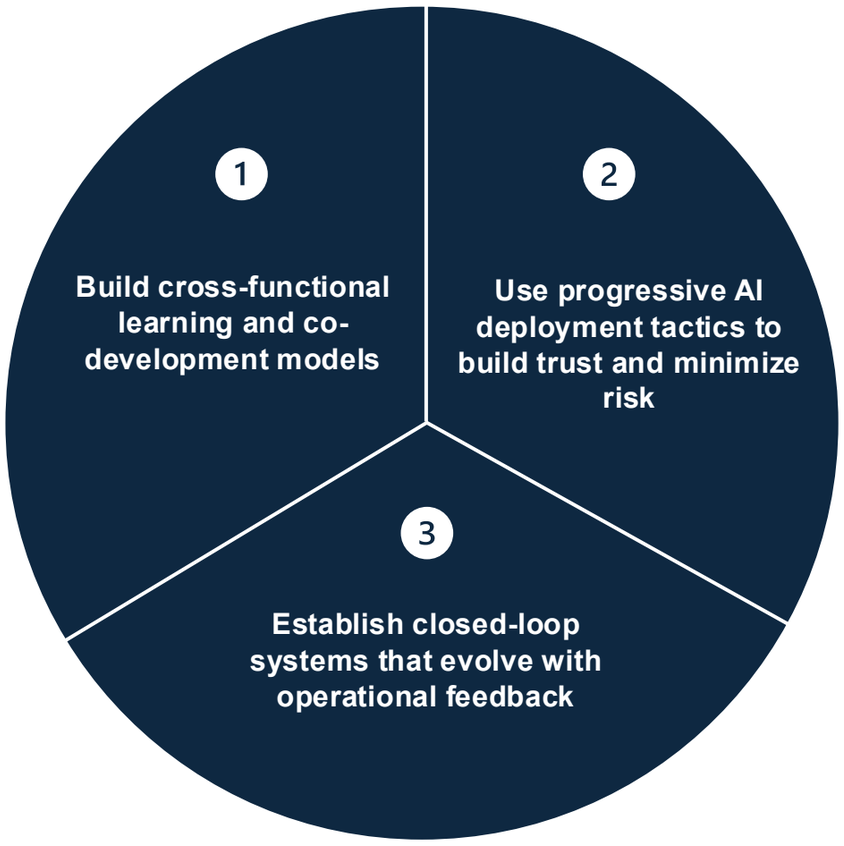
Artificial Intelligence Development 'Iceberg'



Divorcing tool development without proper, continuous input from all factors will result in failed scale and poor adoption

How AI Teams Work	Reality of Operations
✓ Data-Driven Optimization	❖ Context-Driven Decisions
✓ Controlled Build and Test Environment	❖ Messy Reality
✓ Technical Excellence as Paramount	❖ Practical Value
✓ Linear Problem-Solving	❖ Complex Systems Thinking

In short, AI and predictive analytics projects often fail to scale because they remain disconnected from the operational context and lack frontline user buy-in. To avoid this, we recommend enterprises like PACCAR employ a 3-pronged model.



1

- Embed data scientists within operational teams to internalize tacit domain knowledge that is essential for modeling accuracy
- Establish mutual education tracks ("AI readiness" programs) so technicians understand AI tools, and data scientists understand real-world constraints
- Foster a shared vocabulary and problem-framing approach to reduce translation errors and enhance model refinement

2

- Start with simple rule-based or heuristic models to demonstrate early wins and gain buy-in
- Deploy models in "shadow mode" first—advising rather than automating—until reliability is proven
- Leverage these early stages to gather validation data and refine operational thresholds before full automation

3

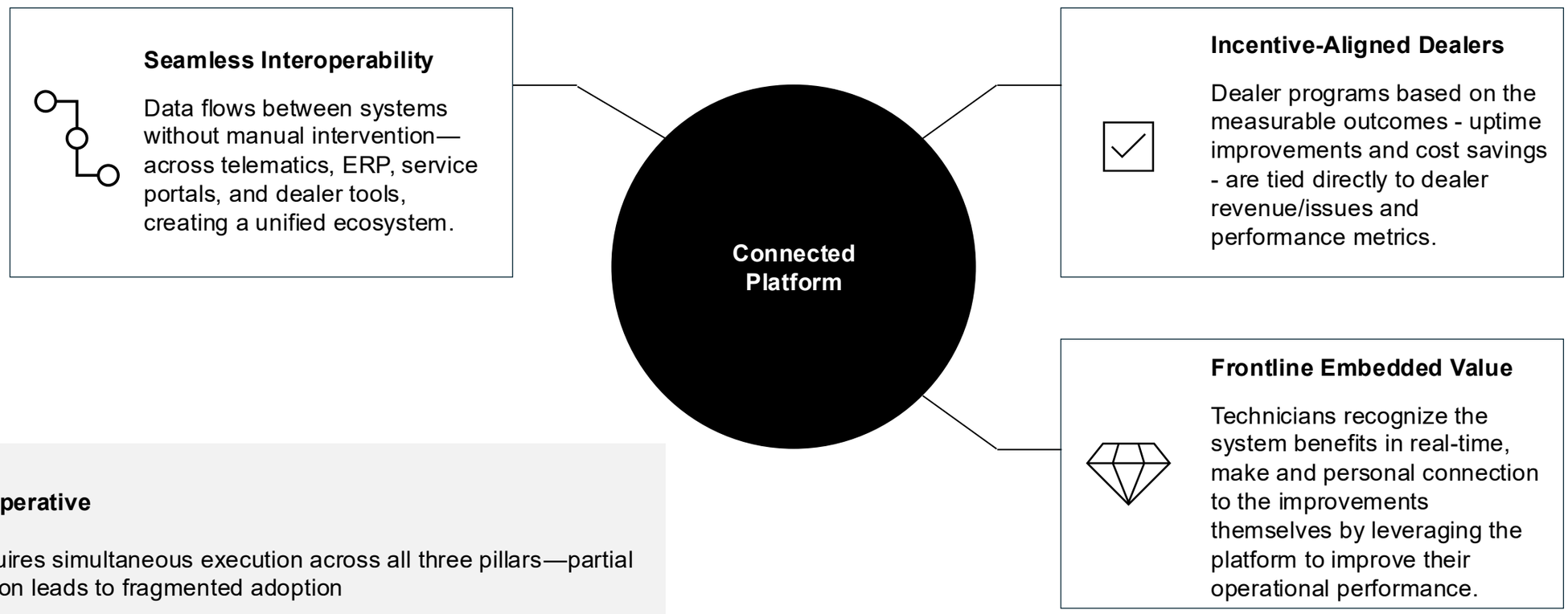
- Introduce active learning loops that allow frontline staff to approve, reject, or annotate AI predictions.
- Use real-time feedback to continuously retrain models in production, ensuring relevance and contextual accuracy.
- Incorporate technician interactions directly into performance dashboards to create a system of accountability and iterative learning.

Connected platform adoption depends on seamless interoperability, dealer engagement, and clear demonstration of operational impact

Leading firms embed connectivity as a factory standard, removing adoption barriers. Coordinated dealer programs integrate telematics alerts with maintenance workflows, demonstrating uptime improvements. Evidence shows clear business outcomes drive technology adoption.

Exhibit 4

Connected Platform Adoption



Strategic Imperative

Success requires simultaneous execution across all three pillars—partial implementation leads to fragmented adoption

Technology adoptions stalls if the entire ecosystem is not aligned. PACCAR’s connected vehicle platforms must succeed across engineering, IT, dealer networks, and fleet customers. We recommend 4 key actions.

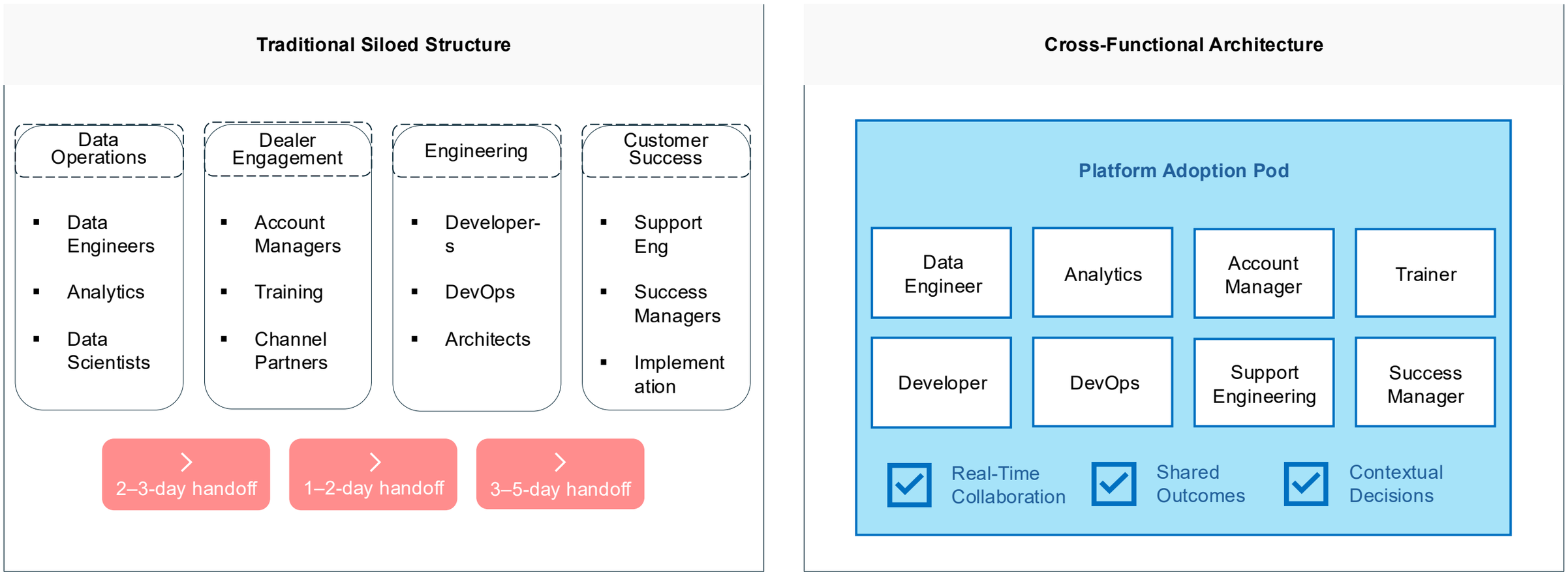
Layer	*Description*
1 Strategic Alignment	▪ Design open APIs and middleware to connect vehicle telematics, dealer DMS platforms and fleet maintenance systems without needing any custom code. ▪ Create standardized data sets and exchange protocols to ensure data integrates seamlessly with PACCAR's internal systems, and any tools from an external partner. ▪ Create retrofitting kits and OTA update capabilities to be able to bring legacy fleets into the ecosystem without significant operational burden.
2 Governance and Controls	▪ Launch structured enablement tracks with clear incentives related to KPIs tied to the platform link, such as uptime gain and service revenue per unit. ▪ Provide dealer toolkits with local content, such as existing embedded ROI calculators, diagnostics visualizations, and objection handling prompts. ▪ Create real-time league table and dashboards to display dealer performance and create healthy competition among dealers.
3 Institutionalize Transparent Performance Feedback Across the Value Chain	▪ Conduct deeply scoped co-development pilot tests that incorporate KPI-bound success thresholds and A/B comparison groups ▪ Use phased roll-outs, feature toggles, and OTA pathways to slowly scale and incrementally socialize the adoption not to mention de-risk failure ▪ Publish anonymized case studies to illustrate the ROI in operational terms: how much uptime was saved, how much faster the diagnosis time was, or parts accuracy lift.
4 Pilot with Precision and Scale with Credibility	▪ Run tightly scoped co-development pilots with KPI-linked success thresholds and A/B comparison groups. ▪ Use phased rollouts, feature toggles, and OTA pathways to incrementally scale adoption while de-risking failure. ▪ Publish anonymized case studies to demonstrate platform ROI in operational terms: lower downtime, faster diagnostics, or parts accuracy lift.
5 Build an Operating Model that Treats Software as a Fleet-Wide Product, not a feature	▪ Form a cross-functional team that encompasses product, sales, support, and engineering to steward platform adoption the entire way across. ▪ Embed software usage metrics into quarterly business reviews with large fleet customers to emphasize digital as integral to the contracting renewal plan. ▪ Put SLAs in place for support tickets, product release cadences and uptime to build trust in digital like it is infrastructure. ▪ Train regional executives and dealer managers to manage their software like inventory; stocked, marketed, measured and monetized.

Cross-functional teams empowered with comprehensive authority reduce handoff delays and improve solution fit

When operational efforts, especially those related to the adoption of digital platforms, are dispersed into siloed departments, the pace of execution stalls. Decision-making becomes diluted, handoffs pile up, and incentive misalignment leads to a series of failures in the path to successful adoption. However, with organizations that deploy a cross-functional, outcomes-oriented team with end-to-end accountability from strategy through execution, velocity improves, feedback loops tighten, and implementation success rates are dramatically higher. By integrating support functions like data operations, dealer engagement, engineering, and customer success into one team, organizations facilitate the resolution of blocker sin real time and ensure every output is derived from operational context over theoretical alignment.

Exhibit 5

Organizational Velocity Framework



Traditional digital projects often falter due to handoff bottlenecks, unclear ownership, and fragmented accountability across functions. To overcome these barriers and sustain momentum across adoption cycles, we recommend that industrial enterprises take five key actions.

1 Outcome-Aligned Mission Structuring

- ✓ Formulate specific, measurable, and time-bound objectives (e.g. “Reduce unscheduled downtime by 15 percent within 12 months”) to give teams actionable operational priorities
- ✓ Connect pilot success metrics to real business results, not fungible functionality or feature delivery
- ✓ Socialize mission statements across engineering, operations, and leadership teams to align and share accountability

2 Integrated Co-Location and Enablement

- ✓ Co-locate or virtually embed cross disciplinary team members on collaborative platforms that allow for real-time collaboration and sharing of dashboards
- ✓ Enable teams to have rapid feedback loops and informal, continuous digital and physical proximity to make decisions
- ✓ Create collaborative working environments that provide visibility, integration of planning, task management, documentation, and better remove communication siloes

3 End-to-End Authority with Guardrails

- ✓ Provide squads, autonomy, and funding authority for scoped initiatives to reduce upward dependencies
- ✓ Outline clear risk and compliance boundaries that preserve the integrity of the institution, but allow for decentralized actions; and
- ✓ Allow squads to fully own the escalation paths and tradeoff decisions to continue the acceleration of resolution and to enhance accountability

4 Embedded Support Function Integration

- ✓ Have legal, compliance, security, and risk representatives onboard as embedded resources that are engaged on a daily basis and not just as passive reviewers
- ✓ Include support functions in planning sprints and decision checkpoints to facilitate alignment
- ✓ Move away from traditional review cycles to real time advisories from liaisons who have the context of the team and urgency

5 Cultural and Systemic Retrospectives

- ✓ Establish consistent retrospectives that focus on not only project issues, but also organization-wide issues
- ✓ Identify cultural friction points (i.e., inertia driven by hierarchy, conflicting incentives), and develop intentional corrective action
- ✓ Turn learning into institutional change through the formal assignment of responsibility for the outcomes from the retrospective and governance around formal follow up

Hybrid governance frameworks enable both speed and control in complex enterprise transformations

Organizations like PACCAR are pursuing increasingly complex digital initiatives, like predictive maintenance or supply chain visualization or connected platforms. Managing to balance speed and safety with creativity and alignment will become more challenging. In typical PMO approaches, control and reporting are prescribed. If PMOs overemphasize compliance, to the extent that organizations can't mobilize or deliver at speed, then they impair progress. On the flip side, agile teams often build without governance, which can lead to miss-alignment with the business, or risk that is unwarranted. A "hybrid" approach to governance will allow for lightweight, adaptive controls in empowered, cross-functional teams that have the organizational structure and focus on continuous alignment or outcome-based decision rights, so transformation leaders can scale experimentation as the organization addresses oversight and alignment.

Exhibit 6

Hybrid Governance Framework

Traditional PMO		Hybrid Governance		Pure Agile	
Heavy controls and rigid processes prioritize compliance over speed		Lightweight, flexible governing protocols prioritize speed of execution with alignment		Max speed and creativity at execution; acute risk of misalignment with business goals	
Control	95%	Control	80%	Control	95%
Speed	35%	Speed	85%	Speed	35%
Innovation	25%	Innovation	90%	Innovation	25%
Risk	Low	Risk	Managed	Risk	Low

In a world of expanding digital initiatives across business units, traditional governance around pre-planned and prescriptive projects slows down execution unnecessarily via traditional cabinet style. In addition, agile teams working without governance or oversight may lose their focus on strategic priorities or take on unforeseen risks. Hybrid governance frameworks mitigate this the embed a level of lean oversight within empowered delivery teams. They help enable rapid iteration while still enabling strategic direction in order to keep execution fast, focused, and in line with enterprise objectives and outcomes.

1

Implement milestone-based funding to highlight projects with identifying business value

Governance models should follow the same logic as a venture capital model. Rather than giving away an entire budget up front, tranches can be released only based on demonstrated progress and verified results. The identification of business value will limit wasted time and resources, and allow adjustments to be made sooner if a project becomes irrelevant or value exceeds the execution effort.

2

Employ tiered governance that clearly delineates strategic framework, coordination, and delivery

Establish an executive steering committee with clearly defined roles that will set a vision for the organization and remove systemic blockers. Treat the transformation office as an integrator that helps resolve dependencies between teams, and give the agile delivery teams the authority to make decisions within scope so that day-to-day decisions can be made without delays, while still maintaining upward visibility

3

Design easy and quick dashboards that connect execution metrics to business impacts

There are so many opportunities to move beyond basic project tracking to also include indicators of the future like improvement in uptime, velocity to adopt, and financial impact. These dashboards should enable you to make decisions at every dimension spanning strategy, operations, and delivery, based on data, not just static reporting.

4

Regularize and normalize structured cancellation and pivot to options that drive portfolio flexibility

Create conditions where projects with relatively low impact are terminated quickly and amicably. Ingrain structured post-mortems, exit criteria, and resource redeployment playbooks; not only does this avoid wasting valuable capital and focus, but it also creates a safe space for accountable experimentation.

Sustained transformation depends on cultural change, continuous upskilling, and systematic change management

Scaling digital capabilities involves much more than simply putting the tools and infrastructure in place. It requires the right cultural context, or people capabilities, along with structure and engagement at the right time. Even with intentioned design, organizations may not achieve their intended impact if they don't have the right people and cultural context to put well-designed systems to use. So, if leaders expect organizational level change to occur, they must emphasize structuring engagement at all roles of organization, including upskilling in data literacy, systems thinking, and collaboration in new ways (e.g., agile). In addition to upskilling, organizations must develop communications and change sponsorship approaches and continuously monitor adoption of new ways of working to reinforce them. This integrated focus on human systems means that digital tools are continuously trialed, adapted, and then embedded as to engage the tools towards committee outcomes for future cycles of change.

Exhibit 7

The Human Systems Gap in Digital Transformation

Technology

Tools and Infrastructure

- Digital Platforms
- Cloud Systems
- Automation Tools

Process

Workflows and Processes

- Standard Procedures
- Governance Models
- Performance Metrics

Culture and People

Human Systems Foundation

- Digital literacy
- Change readiness
- Leadership commitment
- Collaborative mindsets
- Continuous learning

Organization Symptoms

- Teams revert to legacy processes despite new tools
- Low adoption rates across digital platforms
- Siloed data usage and decision-making
- Resistance to agile collaboration methods
- Initiative fatigue and change skepticism

Leadership Blind Spots

- Assuming technology deployment equals transformation
- Underinvesting in systematic capability building
- Inconsistent change communication and sponsorship
- Neglecting ongoing adoption monitoring
- Focusing on tools rather than behavioral change

Transformation cannot happen just by adopting technology sustained impact requires behavior change, alignment of culture, and the ongoing human enablement at all levels of the organization. For industrial enterprises, the fate of any digital initiative will ultimately be dictated not by the capabilities of the platform, but by whether teams achieve consistency, correctness, and conviction in their use. This is driven by embedded leadership priorities, bespoke capability-building, and fast feedback loops that make transformation adaptable and resilient. Operationalizing this requires four key steps.

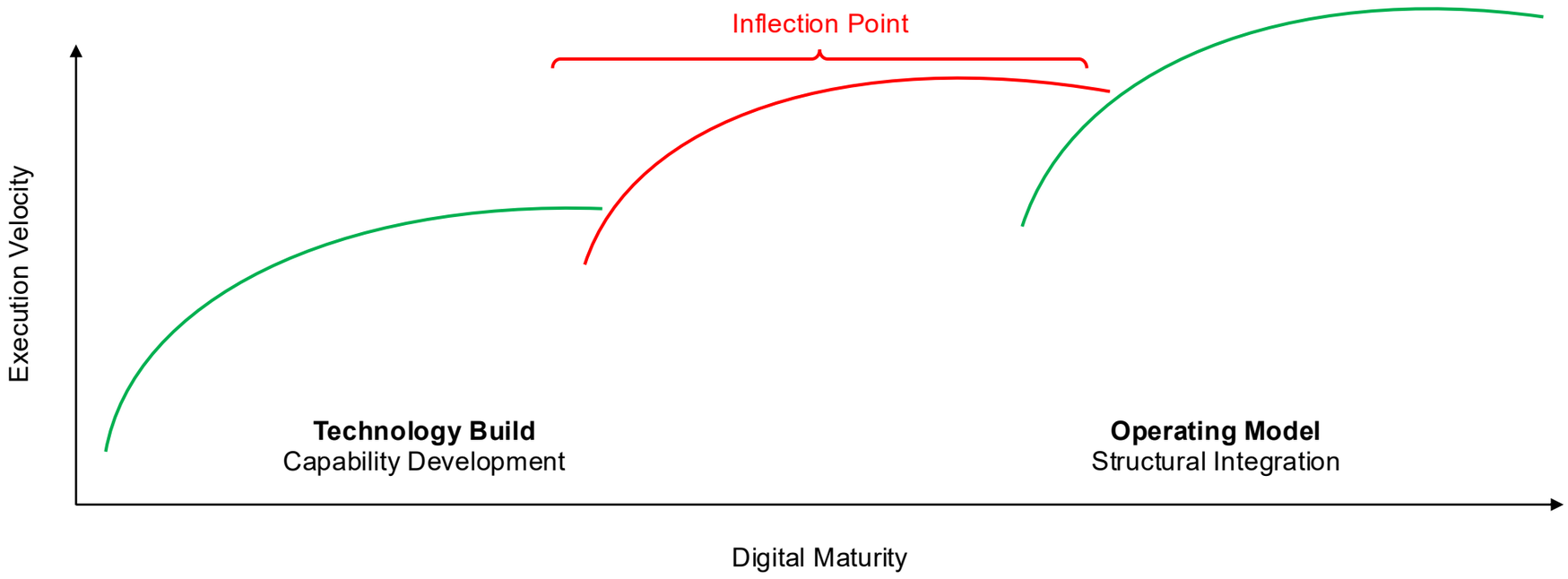
1 Tie transformation outcomes to leadership incentives, operational KPIs, and promotion criteria to embed accountability from the top down	When digital adoption impacts what leaders get paid, promoted on, and measured on, it becomes part of their operating rhythm. Make system engagement, uptime improvement, and enabling and using the technician a measurable outcome connected to bonus pools and tangible advancement opportunities. Cascade, cultivate, and hold leaders accountable to these expectations down the org chart so adoption would be seen as a line-owned and led metric, not a function or staff issue.
2 Deploy role-specific, continuous capability building for technicians, managers, and executives based on their unique system touchpoints	People across the organization interact with digital systems differently – training should correspond to each's perspective. Technicians need diagnostic literacy, shop floor workflows, and repair documentation using a tablet. Managers need to learn how to staff and escalate based on real-time analytics. Executives need fluency on how their digital investments influence EBITDA. Carry out the training in short cycles, integrated into workflows, and supported by useful tool sets.
3 Use embedded change champions across facilities and dealer groups to drive peer-led adoption, identify friction early, and localize solutions	Transformative cultural change originates from the bottom. Spotlight high-trust, high-competence operators and transform them into agents of transformation. Provide them with just-in-time talking points, as well as FAQs and escalation support so they can resolve problems faster than a centralized business. These champions act as early-warning systems, credibility anchors, and translators in the field—creating local, fast, and resilient adoption.
4 Track both behavioral and technical metrics to monitor transformation fidelity and course-correct rapidly	Track and analyze more than just uptime and feature deployments. Track who is signing in, what kind of alerts are being disregarded, how teams interact across silos, and where support tickets are experiencing a spike. Pair this with short-form pulse surveys to determine if blockers are related to clarity, competence, or misaligned incentives and make surgically precise interventions to solve by retraining realigning, and/or reprioritizing.

Industrial enterprises may encounter execution friction as digital initiatives scale without corresponding operating model evolution

Many industrial enterprises are developing portfolios of connected platforms, AI-assisted diagnostics, and predictive fleet intelligence suggest a clear commitment to digital transformation. However, as complexity expands, many industrial organizations will reach a discreet inflection point: progress stops not due to technology failure, but to friction associated with the operating model. If there is no parallel redesign of legacy workflows, functional silos, or limited support functions then even well-performing digital systems can miss their marks. Organizations may already be working through these dynamics internally, but it may take strong commitment to better integrate collaborative execution structures, simplified governance paths, and AI-augmented decision models directly into operational workflows to sustain momentum for transformation. The goal is not to add-on digital tools to existing practices, but rather to ensure that they stimulate and accelerate how work is practically accomplished.

Exhibit 8

Potential Digital Transformation Velocity Curve



Technology Constrained Phase

- Platform development and deployment
- AI-assisted diagnostics phase
- Connected fleet intelligence systems
- Digital tool integration challenges

Potential Operating Model-Constrained Phase

- Legacy workflow dependencies
- Functional silos and handoff friction
- Constrained support function capacity
- Governance complexity and decision latency
- Misalignment between tools and workflows

As industrial firms expand their digital architectures across connected diagnostics, predictive maintenance, and AI-informed service platforms, their operating models may become increasingly complex in terms of coordination. In similar industrial settings, slowing speeds of execution tend to be less about technical constraints and more about where decision issues reside, ownership is fractured, or integration is limited and siloed. Many enterprises may already be considering these types of issues, but the following actions may help to maintain momentum and inertia, and minimize friction in operation as the various initiatives mature:

1 Establish a coordination layer to expose friction and alignment of priorities

Through a lean oversight structure—a primary lead by the Chief Digital or Technology Officer—leaders across product, engineering, IT, and business functions can come together. This structure exposes hidden dependencies, can preclude unaligned initiatives, and can help teams stay focused on common outcomes, without a heavy governance structure.

2 Use real-time orchestration tools and embedded field liaisons

Incorporating tools to track execution latency, see dependency risk, and identify workflow blockers can give leaders an ongoing view. Coupled with embedded dealer- and service-facing liaisons, the combinations create feedback loops making it easier to identify early adoption challenges and respond.

3 Utilize adaptive roadmaps that can adapt and change based on operational signals

Planning with a rigid milestone focus can misalign with the evolving needs in the field. If you prioritize the business outcome (ranging from reducing service cycle time to increasing technician productivity), it allows teams to shift resources without any wasted effort and will make a more responsive digital platform to operational needs.

In Closing

As industrial enterprises advance their digital systems, perhaps the greatest leverage lies not in what should be constructed next, but in how to structure execution to support and scale what is already created. Orchestration will inevitably become the limiting factor, and marginal gains often come from rethinking how teams coordinate, how tools embed into workflows, and how decisions flow through an organization. Rather than layering digital tools on legacy processes, there may be an opportunity to reframe execution itself as a purposeful design surface. Through the right operating model, organizations can transform their digital infrastructure into a base of sustained operational advantage.

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