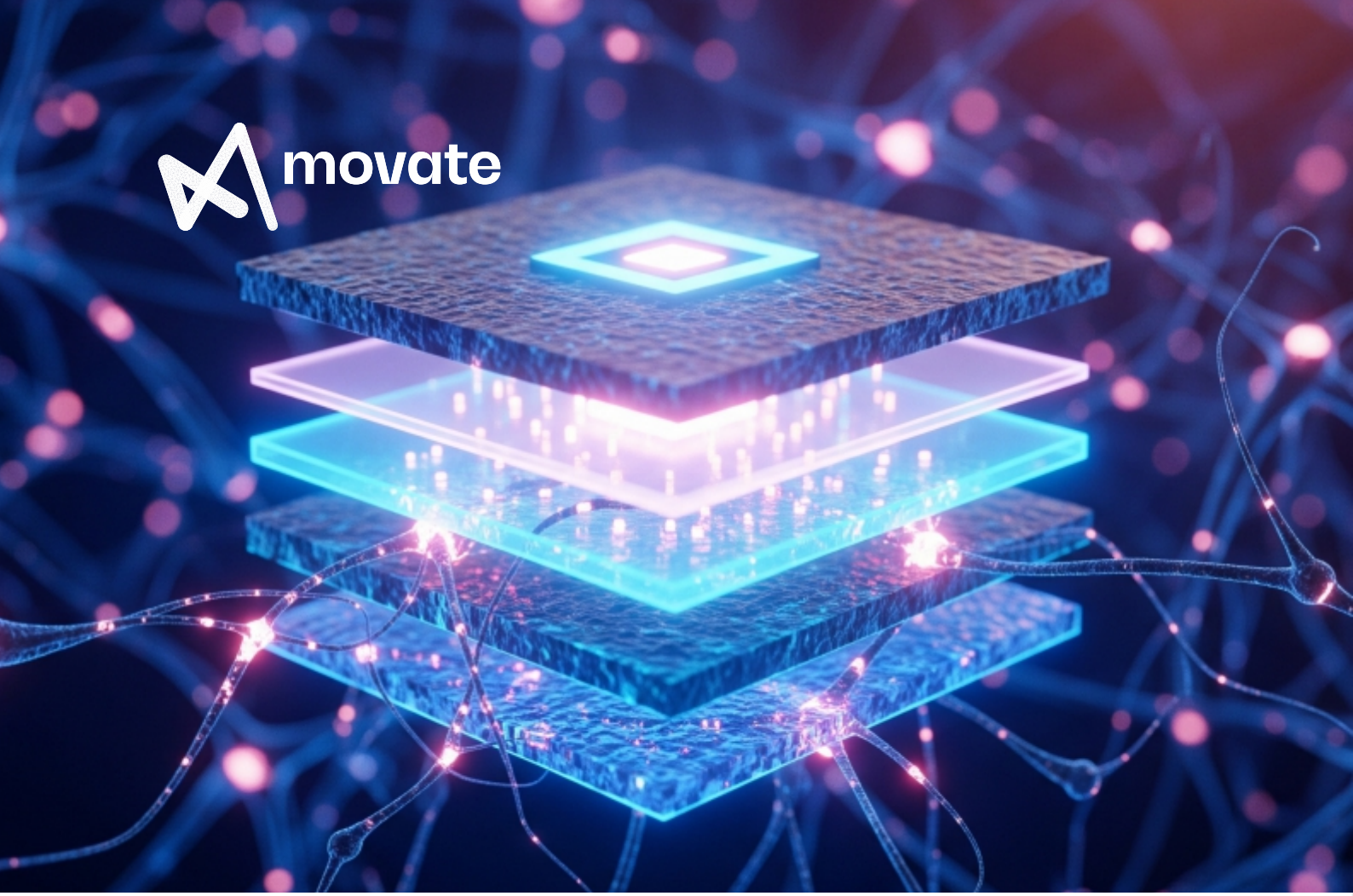


FROM SURFACE TO THE SUBSTRATE:

A PIVOT TO THE INTELLIGENCE LAYER, WHERE CRITICAL DECISIONS ARE MADE

A New Era: Moving from a deterministic customer experience to personalized intelligence.

Abstract: For years, Quality Assurance focused on testing the surface of digital products making sure screens, flows, and rules worked as expected. That approach no longer holds in an AI-driven world. Today, decisions are dynamic, personalized, and learned in real time. The real value lies beneath the surface in the intelligence layer of data, algorithms, and models that shape outcomes. When this intelligence fails, systems may still work but deliver biased, inaccurate, or risky results. AI Assurance redefines quality by shifting the focus from testing functionality to validating how systems think ensuring fairness, accuracy, and trust.

Table of Contents

For many decades, software design, product engineering, and quality assurance (QA) concentrated mainly on the Surface. QA teams verified that digital products appeared polished, that interaction links functioned properly, and that predefined journeys led users to expected results. Their focus was on testing the "what" users interacted with, assuming that business rules remained fixed and predictable. This period was known as the Era of Deterministic CX.

However, this approach had a core limitation: organizations often did not fully grasp or address what customers truly desired.

As customer expectations grew, the need for more advanced AI solutions beyond simple rules also increased.

According to McKinsey's Global AI Trust Maturity Survey,

organizations that prioritize responsible AI, including governance, transparency, and trust, are more prone to widespread AI adoption and greater resilience.

This highlights the essential role of QA in ensuring AI operates ethically, dependably, and with a well-defined purpose.

Innovative organizations are now rewriting this narrative. They deliver individualized experiences in real time, ushering in the **Era of Personalized Intelligence**. Fixed business rules are being replaced by embedded AI and Machine Learning (ML) models that continuously **reason, act, learn,** and **self-optimize**.

McKinsey research indicates that companies excelling in AI-driven personalization can achieve revenue increases of

10–15%,

while AI-enabled next-best-experience and personalization initiatives can enhance customer satisfaction by

15–20%.

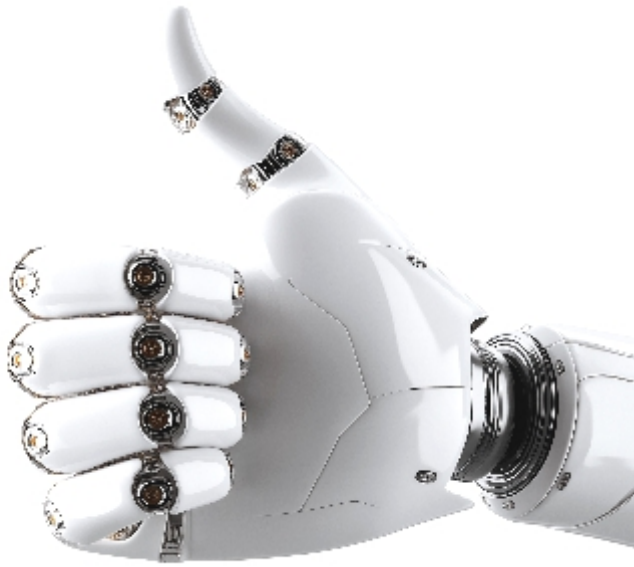
In parallel, governance and assurance have become critical success factors. IDC reports that enterprises with strong AI governance programs experience 30–50% fewer AI-related compliance and ethical issues, underscoring the importance of validating decision intelligence, not just execution paths.

The true value of modern digital technology is in "Substrate," which is the intelligence layer composed of pipelines, algorithms, and machine-learning models that provide continuous learning, insight, and intelligence to influence all choices. By moving from the prior model of testing, to the current one of assuring, the value of intelligence is shifting from the focus of the user experience (testing) to the continued development and support of the intelligent solutions being created.

01. **Assurance:** The New Mission of Quality

This change is essential and transformative, responding to the disruptive needs of real-world users. Welcome to the era of AI Assurance, where our focus has shifted from basic functionality checks to the vital validation of the Intelligence Layer.

Why? Because if the algorithm "thinks" incorrectly, complex underlying systems and interfaces can deliver poor, or even catastrophic, outcomes. We must ensure the AI is purposeful, fair, compliant, ethical, and accurate.



Consequently, the Quality Engineering (QE) landscape is being reshaped to stay relevant.

Assurance across the substrate must ensure:

Ethical Fairness and Bias
Does AI discriminate?

Hallucinations
Does AI make things up (perceptual errors)?

Explainability
Can AI tell us *why* it made a decision?

Novel Risk Mitigation
Protection of systems and people from the adverse impact of uncontrolled systems

The exponential growth of digital footprints among people has made Responsibility, Safety, and Ethics the new pillars for success in any modern application.

02. **Grounding the Shift:** Industry Use Cases

Here are industry sample use cases that demonstrate the focus shift in validation from the Surface to the Substrate:

	SURFACE	SUBSTRATE
Banking: Loan/Credit Application	Checking if the application form fields and 'Submit' button work correctly.	Algorithm Integrity. Validate the AI/ML model to ensure it doesn't display bias (tracking for Fairness and XAI).
Retail: Product Recommendations	Checking whether the "Recommended for You" widget loads and displays products.	Personalization Validation. Simulating millions of shopper patterns to verify that the recommendation algorithm maximizes conversions and profitability.
Travel: Booking & Availability	Evaluate the prospect's selected itinerary against competitors using real-time pricing and user review scores to highlight the best value and secure the booking.	Assess the APIs that gather dynamic pricing data and the NLP systems that analyze and normalize user review sentiment across all partner platforms for accuracy.

The common thread is that QE must now validate actual customer value, not merely functional delivery.

03. **The New Quality Strategy:** Probing beneath the Surface

"**Probing beneath the Surface**" highlights crucial areas to investigate the system's decision-making process. The goal of this investigation is to gain confidence that the underlying rationale for the system's recommendations or actions is accurate, trustworthy, and unbiased; this will assist in identifying defects not readily apparent by routine functional testing.

Some of the principal elements in evaluating the system include:

Model Behavior and Performance:

Assess the inherent capability of the model, its performance, scale, and throughput to ensure the model's performance and behavior hold up under real-world stress and diverse inputs.

The Data Quality conditions on which a model can be trained:

The data must be adequately anonymous, ethical, representative etc. otherwise fairness, accuracy and privacy of the generated output are at risk.

Contextual and Retrieval Quality Conditions (crucial for GenAI/RAG systems):

The system's ability to retrieve and utilize accurate and relevant referenced source information is paramount to avoid producing outputs which could be inaccurate or misleading.

Policy Boundaries and Governance Conditions:

Policy boundaries and governance measures implemented within the software must be adequate to prevent the generation of illegal, harmful and/or restricted content.

Safety and Responsibility Considerations:

Must evaluate the overall impact the solution has on the community at large and provide proactive measures to remedy and mitigate potential bias, inappropriate use etc.

04. Building Confidence and Trust in Engineering for the Future

The future is driven by intelligence, and so is quality. AI is transforming Quality into a strategic element. The shift from "Surface to Substrate" ensures that the intelligent systems supporting our world are not only functional but also accurate, fair, secure, and reliable. To achieve this, Quality must examine the substrate itself, leading to a Grounding Shift in strategy, tools, roles, and skills. In short, organizations should invest in developing their QE practices and talent to succeed in this AI-first era.

05. About the Author

Debraj Gupta

Debraj Gupta is a transformation leader who helps Fortune 100 and 500 organizations evolve from traditional engineering delivery to holistic, AI-driven assurance. Leveraging deep advisory, leadership, and problem-solving experience, he enables enterprises to shift from reactive controls to proactive, AI-enabled Quality Intelligence in optimizing risk, accelerating innovation, and building trust at scale.

His expertise spans AI-led Quality Engineering strategy, redesigning delivery models with AI at their core, infusing intelligence into engineering for predictable quality and faster delivery, and ensuring responsible, explainable, and safe AI systems end-to-end.

06. **Sources**

McKinsey

https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/next-best-experience-how-ai-can-power-every-customer-interaction

https://www.mckinsey.com/business-functions/growth-marketing-and-sales/our-insights/the-value-of-getting-personalization-right-or-wrong

https://www.mckinsey.com/capabilities/tech-and-ai/our-insights/insights-on-responsible-ai-from-the-global-ai-trust-maturity-survey

IDC

https://www.idc.com/

Gartner

https://www.gartner.com/en/customer-experience

About Movate

Movate is a digital technology and customer experience services company committed to disrupting the industry with boundless agility, human-centered innovation, and a relentless focus on driving client outcomes. Recognized as one of the most awarded and analyst-accredited companies in its revenue range, Movate helps ambitious, growth-oriented companies across industries stay ahead of the curve by leveraging its world-class talent of over 12,000+ full-time Movators across 21 global locations and a gig network of thousands of technology experts across 60 countries, speaking over 100 languages.

For more details, please mail us at info@movate.com

www.movate.com

movate®