

WHITEPAPER: THREE WAYS TO EVALUATE IOT PLATFORMS

Enterprises spend tremendous time and money evaluating Internet of Things (IoT) platforms. They complete this important task to ensure their chosen platforms will support the at-scale IoT solutions they intend to build, will properly integrate with existing systems, and will scale seamlessly.

Depending on the enterprise's stage of IoT solution development and the depth of analysis desired, an enterprise can choose 3 ways to evaluate IoT platforms or purchase evaluations from an experienced evaluation and testing company. See Figure 1.

In this short article we

- Define 3 IoT platform evaluation methods
- Identify when each should be used
- Outline the evaluation methodology
- Provide benefits and drawbacks of each



For more information about MachNation's IoT platform evaluation and testing services, please [contact us](#).

INTRODUCTION

There are 3 types of IoT platform evaluations that enterprises use to identify best-in-class platforms for their requirements. In this section, we describe these 3 types of evaluations and help enterprises understand the value and limitations of each.

FIGURE 1: IOT PLATFORM EVALUATION SELECTION RUBRIC

EVALUATION METHOD	TIMING		VENDOR	LEVEL OF INSIGHT		
	PRE-POC	POST-POC		TECHNOLOGY	FEATURE	SOLUTION
Industry survey	✓		✓	✓		
Functional evaluation	✓	✓		✓	✓	
Performance testing		✓			✓	✓

INDUSTRY SURVEY

Industry surveys are analyses that compare a technology offered by a set of vendors. The analyses are sometimes called ScoreCards¹, Magic Quadrants², Waves³, MarketScapes⁴, or similar. Enterprises buying an industry survey receive a report that provides a relatively high-level rating of vendors and their technology.

Enterprises use industry surveys to get high-level insights into technology that might require further investigation.

When should enterprises use it?

Enterprises use industry surveys to get high-level insights into technology that might require further investigation. An industry survey is best used prior to an RFP process and even prior to a proof of concept (PoC). An industry survey provides vendor- and technology-level information, but generally does not provide detail about a product's features and components. Therefore, an industry survey is not recommended if an enterprise wants a more thorough technology appraisal.



Methodology

While the methodology of an industry survey varies by research firm, it usually involves

- **Various vendor qualification criteria**, for example, product maturity, product originality, vendor's geographic reach, vendor size, and others
- **A questionnaire completed by a vendor** to capture information about the vendor's overall business, go-to-market strategy, and technology and business roadmaps.
- **A briefing from a vendor** to better understand the position of the product, to get details about the vendor's go-to-market strategy, and to ask clarifying questions based on the vendor's questionnaire responses
- **Calls with a vendor's customers** to better understand the strengths and weaknesses of the vendor's deployed product
- **Desk research** to gather additional vendor and third-party information about the vendor's product and directions for the technology ecosystem
- **A scoring rubric** used by the research firm to rate characteristics and sub-characteristics deemed important in choosing best-in-class vendors

The most in-depth industry surveys also request a live demo of each vendor's technology, although few industry surveys include this in their methodologies.

Benefits of an industry survey

Industry surveys are generally easy to inter-

pret. An industry survey presents its findings with easy-to-interpret graphics and concise text. The best documents have sufficient write-ups of vendors profiled in the industry survey and only include vendors that are comparable.

Industry surveys compare industries and companies at a high level. Industry surveys are valuable for enterprises wanting to understand a high-level view of a specific industry or technology sector.

Industry surveys are readily available. Available from many industry analyst firms, industry surveys are available from established analyst firms as well as emerging firms that have specializations in areas like IoT platforms.

Drawbacks of an industry survey

Industry surveys are based on a vendor's marketing rather than on actual capabilities. If the methodology for the industry survey does not include a live product demo, it is likely that the survey relies on a vendor's marketing to determine an IoT platform's capabilities. As vendors' marketing often exaggerates true capabilities of their products, an enterprise should be cautious in relying too heavily on the ratings in an industry survey.

Industry surveys are insufficient to determine product capabilities or performance. Even the finest industry surveys are incapable of determining true capabilities or performance characteristics of an IoT platform.

Industry surveys are not IoT use-case specific, so they consider relatively generic areas of comparison. Most industry surveys focus on industry-agnostic platform technology rather than specific IoT use cases such as connected vehicles, smart factories, and remote asset monitoring solutions. Therefore, enterprises should be cautious in applying the ratings in an industry survey to particular IoT use case requirements.

Results of industry surveys are valid for a short time and are quickly outdated. An industry survey is a snapshot of the state of an industry or product. The survey takes over a quarter to assemble and is usually updated annually, so results can be dated.

FUNCTIONAL EVALUATION

Functional evaluations are test lab-based, hands-on analyses of capabilities and usability of comparable technologies offered by vendors. The evaluations are conducted by researchers in test labs with the skills to use a given technology. Enterprises buying a functional evaluation receive a report containing detailed capability and usability ratings of vendors' technology.



When should enterprises use it?

Enterprises use functional evaluations for insight into technology at a microservices level. A functional evaluation can be used prior to or after a PoC. Testers simulate the hands-on

Functional evaluations are test-lab based, hands-on analyses of capabilities and usability of comparable technologies.

experience of users such as developers, operators, and admins, to understand the features and capabilities of technology. A functional evaluation is not recommended if an enterprise wants a more holistic go-to-market or strategy appraisal of a vendor.

Methodology

Functional evaluations typically involve

- **A functional architecture** defining components of a technology that serves as a foundation for the set of test suites and individual tests
- **A set of hands-on tests** that simulates the real-life tasks a user undertakes on the technology
- **A set of usability evaluations** that allows the tester to gauge the technology's usability including the quality of its developer documentation, developer portal, overall user experience (UX), integrations, and other technology-specific capabilities
- **A synthesis of capabilities grouped by**

relevant technology components for each vendor's product to allow enterprises to determine gaps in functionality and usability

- **A scoring rubric** used by the testing firm to score hands-on tests and holistic evaluations

The best functional evaluations provide enough technology comparisons to allow an enterprise to select vendors for use in a PoC or a pilot.

Benefits of a functional evaluation

A functional evaluation is an evaluation of a technology product's actual capabilities. Relying on hands-on tests and holistic UX evaluations of IoT platforms makes it possible to evaluate actual platform capabilities. This helps an enterprise make a more informed IoT platform decision than relying on a vendor's marketing literature.

A functional evaluation is an IoT platform feature-level comparison. Functional evaluations simulate an actual user's experience with an IoT platform, providing data for a refined and detailed comparison.

A functional evaluation is an evaluation of usability from multiple user personas. Functional evaluations simulate the experience of typical IoT platform users such as platform administrators, platform operators, hardware and systems developers, platform and backend developers, and UI/UX developers.. This provides rich insights into the overall usability of an IoT platform.

Drawbacks of a functional evaluation

A functional evaluation requires the tester to make informed assumptions about relevant capabilities and optimal user experience of an IoT platform. The firm behind the evaluation must have deep industry insight and product knowledge to craft a suite of tests that is consistent with market need.

A functional evaluation does not ensure that an IoT platform will be performant in a scaled deployment. The functional evaluation may overlook a platform's technical limitations that arise in a production setting.

A functional evaluation of an IoT platform is not use case specific. As a result, the evaluation may fail to consider capabilities that are unique to a certain use case like fleet management, smart factory, or connected building management.

PERFORMANCE TESTING

Performance testing of a technology assesses production-scale technical durability. The testing is conducted by test labs or specialty service providers with the skills to use a vendor's technology and software to complete performance testing. Enterprises buying a performance test receive a report detailing levels of quality-of-service and performance metrics achieved for each requirement tested.

When should enterprises use it?

Enterprises use performance testing to proactively stress-test technology to ensure acceptable at-scale performance. Once tech-

nology components have been selected, performance testing simulates peak loading on each component to ensure it remains performant. Once the technology stack has been assembled and each individual components is tested, full-stack performance testing is conducted to identify and remediate performance bottlenecks. An enterprises' growth projections for platform usage should be validated to make sure the solution handles anticipated scale-up. While a performance test provides meaningful information on system behavior in deployment, it does not provide feature-level

Performance testing of a technology assesses production-scale technical durability.

information about technology nor insight into a vendor's business. Therefore, a performance test is not appropriate if an enterprise is looking for a strategy appraisal of a technology vendor or is creating a vendor shortlist for PoC development.

Methodology

Performance tests typically include

- A set of key measurable metrics that quantify performance at different loads.
- A set of performance values indicative of acceptable performance at minimum, typical, and maximum loads.
- Test infrastructure capable of delivering

test loads to simulate real-world scenarios.

- **Performance testing software** to simulate intended work loads.

The best performance tests allow an enterprise to ensure an entire IoT deployment including its underlying services and applications will properly scale by measuring service degradation at deployment scale. This allows the enterprise to make performance enhancements and allocate adequate infrastructure to ensure an acceptable level of performance at ordinary and peak workloads.

Benefits of performance testing

Performance testing is the only kind of testing that can evaluate an IoT platform's scalability. Performance testing can simulate very large numbers of devices and data throughput while measuring performance degradation of the full-stack IoT solution as load increases. By running a system at-scale, developers can gauge problems that might occur between IoT devices, platforms, and applications. Testers can validate performance values for boundary conditions (i.e., testing at minimum, maximum, and

other key requirement levels) and pathological conditions (i.e., testing when performance values are outside a requirement level).

Performance testing allows enterprises to estimate costs of operating an IoT platform at scale. By simulating devices at production scale, an enterprise can determine likely operational costs of an IoT platform and ensure they meet ROI requirements.

Results of performance tests are applicable to a specific IoT use case. Performance testing is often completed using an IoT solution architecture that will be used in production, so test results are indicative of actual performance. Results give enterprises very refined insights into the performance and costs of the IoT use case at different work loads.

Drawbacks of performance testing

Performance testing is sometimes more expensive than other types of benchmarking. Enterprises and solution providers must engage with vendors that offer IoT platform performance testing or test labs that can provide the necessary testing services.

Performance testing requires an enterprise to know what to test. In order to understand performance characteristics, enterprises have to build and then test a fully functioning IoT deployment, not just connected devices or platform data ingestion. Performance testing also requires an enterprise to know IoT use case-specific performance metrics and acceptable results.



Results of performance testing are IoT use case-specific and do not directly translate to other IoT use cases that an enterprise may be considering. An enterprise will have to performance test each IoT application it is deploying, as performance test results from one IoT use case are not directly comparable to another.

Performance testing is more time consuming than other types of benchmarks. A performance test takes time to setup and must run for a period of time to provide enough data to simulate a true enterprise deployment. Both the run time and the analysis of the IoT system after the test require skilled teams that have experience running these types of simulations.

CONCLUSION

Depending on the enterprise's stage of IoT solution development and the level of IoT platform insight needed, an enterprise can choose 3 ways to evaluate IoT platforms. Each evaluation method can support an enterprise's careful assessment of IoT platforms and help the enterprise refine its alternatives. Carefully selecting a best-in-class IoT platform will maximize an enterprise's success rate and minimize PoC and IoT solution deployment costs.

For more information about MachNation's IoT platform evaluation services, please [contact us](#).

ENDNOTES

¹ MachNation ScoreCard is offered by MachNation, Inc.

² Gartner Magic Quadrant is offered by Gartner, Inc. and/or its subsidiaries.

³ Forrester Wave is a registered trademark of Forrester Research, Inc. and/or its subsidiaries.

⁴ IDC MarketScape is offered by IDC and/or its subsidiaries.

MachNation is the only analyst firm exclusively dedicated to testing and researching Internet of Things (IoT) platforms, middleware, and services. MachNation owns and runs MachNation IoT Test Environment (MIT-E), the industry's only independent, hands-on, benchmarking lab for IoT platforms. MachNation specializes in understanding and predicting IoT technologies including their impact on digitization, hardware, communication services, applications, and support. MachNation specialists have provided guidance to the majority of the world's leading IT and communications firms.



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