Keysight Technologies

Frost & Sullivan
2017 Global Electronic T & M Software Competitive Strategy Innovation and Leadership Award

Article Reprint
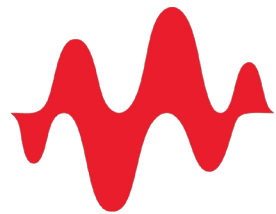
KEYSIGHT
TECHNOLOGIES

FROST & SULLIVAN

KEYSIGHT
TECHNOLOGIES

2017 Global Electronic Test & Measurement Software Competitive Strategy Innovation and Leadership Award

Contents

Background and Company Performance
Industry Challenges

Historically, the major share of revenue for companies in the test and measurement (T&M) industry was tied to hardware. Although 85 to 90% of T&M vendor revenue comes from hardware today, software sales are growing faster and hardware is getting commoditized. This is because software is increasingly becoming central to unlocking measurement insights and analyzing data to offer businesses actionable insights. For some customers, the share of software in their T&M spending is approaching 30% while it was just 10% a decade ago.

The emergence of digital transformation trends such as Internet of Things (IoT) and autonomous cars is exponentially driving the complexity of systems. Traditionally strong end-use markets such as communications are witnessing significant technological advancements to systems, such as with 5G cellar network capabilities, thereby increasing the complexity of associated testing solutions. For example, the complexity of 5G systems is astronomical with respect to processing power, working frequencies, data volumes, and signal processing. Still, hardware remains a critical part of complex measurements like 5G and in both automotive and aerospace and defense (A&D) tests, but for many others, such as IoT, simple measurements may suffice. Despite its being commoditized, hardware used in complex measurement is expensive; therefore, customers are looking to optimize its use, which is a major challenge for T&M vendors.

Furthermore, applications in the A&D, automotive, and communications industries require solutions with very high throughput rates, which, in turn, emphasize the need for robust testing solutions. Hence, T&M vendors need to focus on delivering software that is both robust and caters to the customer requirement of creating solutions rapidly. Also, security remains an integral part of applications in A&D and is a growing concern across applications in more and more industries, including communications, automotive, and IoT.

Finally, the once standard business model of software sold with hardware is no longer aligned with current customer requirements, which demand more engineers to access the software across the different phases of product lifecycle. In today's changing landscape, vendors are now moving to offer end-to-end visibility through software to facilitate transitions and data sharing between phases. To succeed and get the most out of this new business model, therefore, vendors must be bold and proactive about innovating wisely and complementing their value proposition by leveraging strategic acquisitions.

Strategy Innovation and Customer Impact

Keysight's Background & Performance

Founded nearly a century ago and distinguished by its Hewlett Packard and Agilent legacy, Keysight Technologies (Keysight) has grown into the world's leading electronic measurement company and today enjoys a dominant position in the traditional instrumentation space and a growing presence in modular instruments. Keysight offers the industry's most comprehensive hardware and software portfolio. Its software business encompasses integrated, programmable, and turnkey solutions. A customer base that spans industries including communications, A&D, automotive, industrial, and education—

comprised of companies of various sizes—is central to the company's consistently profitable performance.

Keysight's performance in 2017, in fact, witnessed year-to-date (YTD) growth of revenue by 7% and orders by 11%, and it continues to dominate the market for T&M software. One major success in 2017 (April) was Keysight's acquisition of IXIA, which it positioned as a separate business unit named IXIA Solutions Group (ISG). ISG contributed $120 million in the third quarter of 2017 with 6 active joint projects. Previously, the acquisition of Anite in 2015 enabled Keysight to achieve double-digit growth for its software business in 2016 and considerably expanded its presence in Europe, particularly so in the United Kingdom.

As market leader in the T&M software space, Keysight accounted for approximately 23% of the global market revenue in 2016. Its performance in 2017 surpasses 2016 achievements, and the company is well situated to maintain its leadership position going forward.

Growth Strategy

Empowered by nearly a century of success in the T&M industry, Keysight delivers solutions that provide flexibility, ease of use, and security at optimum pricing. With its proactive inorganic growth approach, the company is considerably ahead of competitors in terms of industry-leading technology and holds several patents for its innovations. Keysight earned its credentials in T&M solutions by aptly addressing the physical layer and is focused on expanding into the networking stack. With innovations in communication network design happening in the higher levels of the protocol stack, Keysight is focused on extending its expertise through the entire protocol stack (layers 1–7).

In fact, its keen focus on acquiring companies to capitalize on the growing opportunities in the 5G space means Keysight is shifting from a product-centric hardware company to a software-centric solutions leader. Although the company has a long history of successfully selling its software in conjunction with hardware, its deep understanding of where the industry is headed has led it to reposition the software independent of the hardware. For example, ThinkRF, a leader in software defined signal analyzers, uses Keysight's vector signal analyzer (VSA) software, which is industry standard, in conjunction with third-party hardware.

Strategy Effectiveness

Keysight had been offering traditional bench as well as PXI-based modular and portable instruments with software. However, changing customer requirements have driven a shift in strategy in recent years. As part of its growth strategy, Keysight is addressing customer needs along the product lifecycle by taking an end-to-end approach that encompasses design, prototyping, prototype verification, system-level validation, manufacturing, and optimization. For example, Keysight's electronic design automation (EDA) design/simulation has the ability to run compliance tests for USB, PCIe, and DDR in the virtual environment, before a prototype has been built, using the exact same measurements that are made by the oscilloscopes on the physical prototype later

In doing so, the company is delivering more value to its customers and helping them address the challenge of increasing system complexity.

The other facet of this strategy is enabling multi-vendor connectivity. For example, ThinkRF was the first third-party vendor to connect its hardware with the Keysight 89600 VSA software. This end-to-end approach and multi-vendor connectivity demonstrates the significant shift in Keysight's growth strategy from being a product-centric hardware company to software-centric solutions leader.

Ultimately, today's testing environment involves manual and automated measurements that generate massive volumes of data coming from multiple vendors, platforms, and sites—all of which customers want to process, analyze, and report to enable informed decision-making. Use of legacy systems, however, is time consuming and inconsistent. Keysight is investing heavily in data analytics to address these challenges, which reduces redesign costs and increases productivity.

As a part of its growth strategy, Keysight acquired Anite and IXIA in 2015 and 2017, respectively. Anite, a leading UK-based software solutions vendor in the wireless communications business, complemented the Keysight portfolio by bringing capabilities such as software layer design validation for mobile devices and network testing that expanded its position in the wireless design and validation market. Additionally, Anite brought Keysight data analytics capabilities through its acquisition of Xceed.

In today's world, the emergence of IoT is paving the way for virtualization and cloud computing amongst an increasing threat of attacks on networks and assets, thereby emphasizing the need for stringent security solutions. Security is a core part of Keysight's software strategy, as confirmed by the acquisition of IXIA. In fact, IXIA complements Keysight's portfolio by bringing IP network assessment expertise and a software-centric business team. Through the addition of IXIA, Keysight enhances its software solutions and engineering capabilities in alignment with its strategy to broaden its reach within the communications development and operations lifecycle. The combined solutions are targeted at markets such as 5G, IoT, security, and cloud.

Strategy Execution

As new applications emerge, customer requirements for software are witnessing a gradual change in every phase of product development, from design to optimization. As systems grow in complexity, software is becoming central to testing. Keysight is focused on developing software that goes beyond the physical layer and provides end-to-end visibility to its customers. Through this approach, its software provides a holistic view of and data sharing among the various processes across the product lifecycle.

To grow its software aptitude further, Keysight partnered with the Georgia Institute of Technology in October 2016 and launched a software design center in Atlanta. Georgia Tech is regarded as a top engineering program in the United States, and this partnership enables Keysight to gain access to the brightest minds in the software domain.

Essentially, the core of Keysight's long-term strategy is investing in next-generation technologies. To this end, the IXIA acquisition increased Keysight's software research and

development (R&D) engineer count by 65%, and, the previous year (2016), the company expanded its investment in R&D by 10%. Both moves demonstrate to Frost & Sullivan the company's committed vision to offer the best value possible to its customers and shareholders alike.

Customer Purchase Experience

Historically, Keysight/Agilent was organized into product divisions (i.e., oscilloscopes, signal analyzers, signal generators, etc.) that worked in silos, and each of these divisions would sell to customers across vertical markets (e.g., A&D, communications, and automotive). However, the future-focused company has restructured the organization into solutions groups focused on key industry segments, namely wireless communications, A&D, industrial, and education, to focus on customers' specific needs as opposed to focusing on specific products.

Applications such as IoT and autonomous cars occupy the two extreme ends of the spectrum with respect to costs and complexities. System complexity and cost are high in autonomous cars due to stringent regulatory and human safety requirements, yet the demand to create solutions more rapidly is increasing. This intensifies pressure on T&M vendors and emphasizes the need for software solutions that address these challenges. Keysight meets this need by taking a modular approach towards building the software architecture. On the other hand, IoT devices require simple measurements and the associated costs are low, despite being available in huge volumes. In such cases, customers are trying to optimize the use of hardware to fit their requirements. Keysight's approach to this challenge has been to empower customers with the tools needed to interface their hardware with Keysight's software while still providing traditional value in terms of measurement expertise and intellectual property. Also, in using open standards, Keysight enables re-use of software across different equipment.

Furthermore, the company offers trial licenses of all software packages across the end-use markets to help customers make informed purchase decisions, and it provides real-time fixes to all software products. Real-time issue resolution is achieved through feedback modules that are embedded within the products and prompt customers to provide feedback that is directly delivered to marketing engineers. The engineers liaise with customers to address the issue promptly.

One of Keysight's core strengths is the focused attention it pays to changing customer dynamics, and its keen eye for delivering comprehensive customer value is truly commendable. For instance, Keysight offers flexible client-based licensing models such as node-locked, transportable, floating/network, and enterprise. The time-based and floating licensing models enable increased asset utilization for customers. The enterprise licensing model enables customers to select software based on their requirement and only pay for what they need. This model was proactively introduced by Keysight as the company witnessed a change in customer behavior towards demanding enterprise-level software agreements, which is a new trend in the T&M market. In offering software solutions with flexible licensing models, the company provides customers the flexibility to scale as they need and pay as they use.

Brand Equity

Enterprises are increasingly moving towards software-based business models, which invariably increase the likelihood of cyberattacks and a need for more robust security. Keysight's strategic acquisition of IXIA rightly enhanced its footprint in network security. Through this acquisition, Keysight obtained a core security technology, which it will leverage across its business.

With automotive being the next big trend in testing, automotive Ethernet is increasingly becoming the backbone of communication networks. In this area, Keysight released 5 new automotive Ethernet solutions at the Automotive Testing Expo 2017 that enable automatic execution of tests and supply engineers with reports that are flexible and cater to their specific needs. Keysight's solution enables simple testing and interpretation of data and offers 4 different software options, listing it among the leading automotive Ethernet solutions in the market.

Conclusion

Keysight's strategy to excel in the T&M software industry is noteworthy. Its razor-sharp eye for innovation and proactive approach towards acquiring companies that complement its suite of products align perfectly with its growth strategy. In essence, the company made organic software investments and inorganic acquisitions. Having gathered huge accolades from the wireless communication industry, Keysight's recent acquisitions augment its strategy to become a leading software-centric solution provider.

The technical supremacy of its solutions portfolio, its user friendliness, flexible business models, and ability to satisfy customers across a broad spectrum indicate this agile company's preeminence over the competition.

With its strong overall performance, Keysight has earned Frost & Sullivan's 2017 Competitive Strategy Innovation and Leadership Award.

Significance of Competitive Strategy Innovation and Leadership

Any successful approach to achieving top-line growth must (1) take into account what competitors are, and are not, doing; (2) meet customer demand with a comprehensive, value-driven product or service portfolio; and (3) establish a brand that resonates deeply with customers and stands apart from other providers. Companies must succeed in these three areas—brand, demand, and positioning—to achieve best-practice levels in competitive strategy.

- Shift Competitors Customers
- Increase Renewal
- Increase Upsell
- Improve Profitability
- Improve Win/Loss Ratio

- Increase Equity
- Improve Recognition/Recall
- Inspire Customers
- Create Differentiated Messaging
- Communicate Brand Value

DEMAND

BRAND

Competitive Strategy Innovation and Leadership

COMPETITIVE POSITIONING

- Carve Out New Market Opportunities
- Pull Away from the Competition
- Establish Differentiated Position
- Increase Market Share
- Improve Profitability

Understanding Competitive Strategy Innovation and Leadership

As discussed above, driving demand, brand strength, and competitive differentiation all play a critical role in delivering unique value to customers. This three-fold focus, however, must ideally be complemented by an equally rigorous focus on Strategy Innovation and Customer Impact.

Key Benchmarking Criteria

For the Competitive Strategy Innovation and Leadership Award, Frost & Sullivan analysts independently evaluated two key factors—Strategy Innovation and Customer Impact—according to the criteria identified below.

Strategy Innovation

Criterion 1: Strategy Effectiveness
Criterion 2: Strategy Execution
Criterion 3: Competitive Differentiation
Criterion 4: Executive Team Alignment
Criterion 5: Stakeholder Integration

Customer Impact

Criterion 1: Price/Performance Value
Criterion 2: Customer Purchase Experience
Criterion 3: Customer Ownership Experience
Criterion 4: Customer Service Experience
Criterion 5: Brand Equity

Best Practices Award Analysis for Keysight Technologies

Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows our research and consulting teams to objectively analyze performance, according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation. Ratings guidelines are illustrated below.

RATINGS GUIDELINES
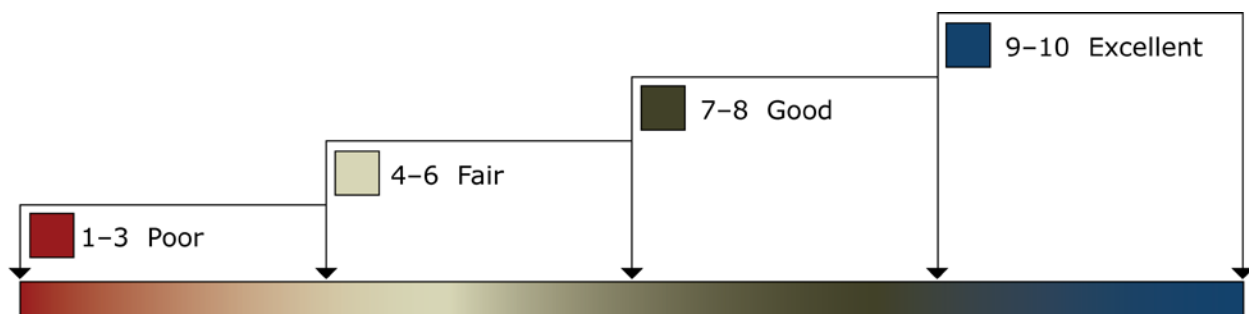
The Decision Support Scorecard is organized by Strategy Innovation and Customer Impact (i.e., these are the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard.). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key participants as Competitor 1 and Competitor 2.

Measurement of 1–10 (1 = poor; 10 = excellent)			
Competitive Strategy Innovation and Leadership	Strategy Innovation	Customer Impact	**Average Rating**
Keysight Technologies	**8.9**	**9.6**	**9.3**
Competitor 2	8.5	9.2	8.9
Competitor 3	8.0	8.6	8.3

Strategy Innovation

Criterion 1: Strategy Effectiveness
Requirement: Strategy effectively balances short-term performance needs with long-term aspirations and vision for the company.

Criterion 2: Strategy Execution
Requirement: Adoption of best-in-class processes supports the efficient and consistent implementation of business strategy.

Criterion 3: Competitive Differentiation
Requirement: Unique competitive advantages with regard to solution or product are clearly articulated and well accepted within the industry.

Criterion 4: Executive Team Alignment
Requirement: The executive team is aligned along the organization's mission, vision, strategy, and execution.

Criterion 5: Stakeholder Integration
Requirement: Strategy reflects the needs or circumstances of all industry stakeholders, including competitors, customers, investors, and employees.

Customer Impact

Criterion 1: Price/Performance Value
Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

Criterion 2: Customer Purchase Experience
Requirement: Customers feel they are buying the most optimal solution that addresses both their unique needs and their unique constraints.

Criterion 3: Customer Ownership Experience
Requirement: Customers are proud to own the company's product or service and have a positive experience throughout the life of the product or service.

**Criterion 4: Customer Service Experience**

Requirement: Customer service is accessible, fast, stress-free, and of high quality.

Criterion 5: Brand Equity

Requirement: Customers have a positive view of the brand and exhibit high brand loyalty.

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.
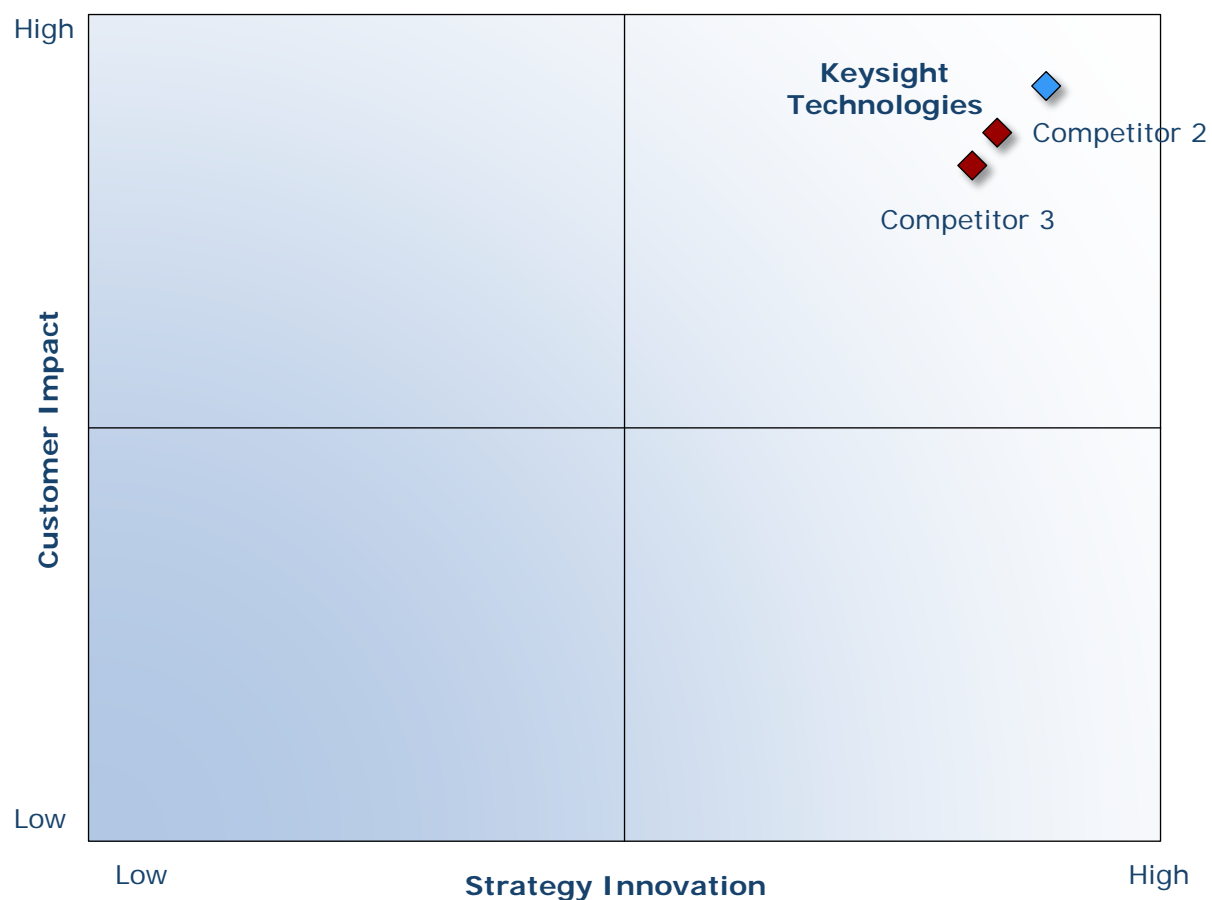
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate Award candidates and assess their fit with select best practice criteria. The reputation and integrity of the Awards are based on close adherence to this process.

	STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1	**Monitor, target, and screen**	Identify Award recipient candidates from around the globe	• Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies	Pipeline of candidates who potentially meet all best-practice criteria
2	**Perform 360-degree research**	Perform comprehensive, 360-degree research on all candidates in the pipeline	• Interview thought leaders and industry practitioners • Assess candidates' fit with best-practice criteria • Rank all candidates	Matrix positioning all candidates' performance relative to one another
3	**Invite thought leadership in best practices**	Perform in-depth examination of all candidates	• Confirm best-practice criteria • Examine eligibility of all candidates • Identify any information gaps	Detailed profiles of all ranked candidates
4	**Initiate research director review**	Conduct an unbiased evaluation of all candidate profiles	• Brainstorm ranking options • Invite multiple perspectives on candidates' performance • Update candidate profiles	Final prioritization of all eligible candidates and companion best-practice positioning paper
5	**Assemble panel of industry experts**	Present findings to an expert panel of industry thought leaders	• Share findings • Strengthen cases for candidate eligibility • Prioritize candidates	Refined list of prioritized Award candidates
6	**Conduct global industry review**	Build consensus on Award candidates' eligibility	• Hold global team meeting to review all candidates • Pressure-test fit with criteria • Confirm inclusion of all eligible candidates	Final list of eligible Award candidates, representing success stories worldwide
7	**Perform quality check**	Develop official Award consideration materials	• Perform final performance benchmarking activities • Write nominations • Perform quality review	High-quality, accurate, and creative presentation of nominees' successes
8	**Reconnect with panel of industry experts**	Finalize the selection of the best-practice Award recipient	• Review analysis with panel • Build consensus • Select recipient	Decision on which company performs best against all best-practice criteria
9	**Communicate recognition**	Inform Award recipient of Award recognition	• Present Award to the CEO • Inspire the organization for continued success • Celebrate the recipient's performance	Announcement of Award and plan for how recipient can use the Award to enhance the brand
10	**Take strategic action**	Upon licensing, company may share Award news with stakeholders and customers	• Coordinate media outreach • Design a marketing plan • Assess Award's role in future strategic planning	Widespread awareness of recipient's Award status among investors, media personnel, and employees

The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often, companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS

About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best in class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.