



SUPPLIER QUALITY MANAGEMENT: SQM'S RIGHTFUL ROLE IN YOUR ENTERPRISE

Playbook to Realize the Total Value of Quality

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SQM'S RIGHTFUL ROLE IN YOUR ENTERPRISE

Playbook to Realize the Total Value of Quality

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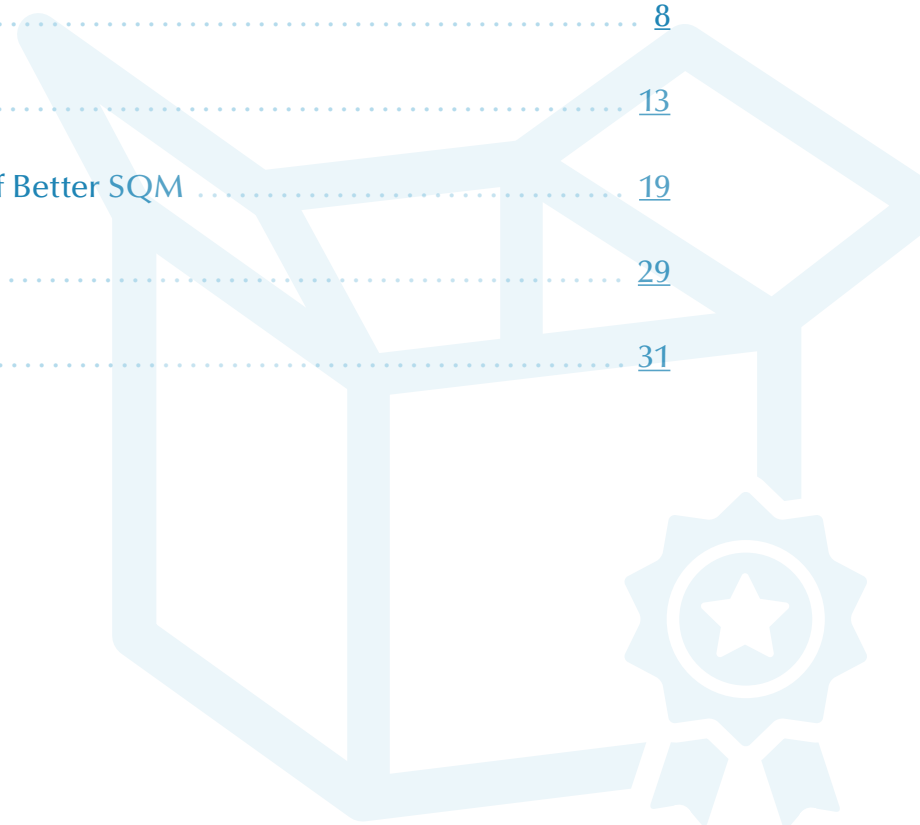
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SECTION 1

Executive Summary

Executive Summary

While there are many ways to define quality, the most important definition of quality is from the customer's perspective - perceived quality – as this impacts brand loyalty, revenue, market share and margins. When customers directly engage with a product, they consciously and subconsciously compare it to previous experiences with similar and dissimilar products. Indirect experiences also influence perceived quality, such as by brand image and social media.

Manufacturers can differentiate perceived quality through differentiated internal quality and supplier quality management (SQM). The supply chain has become increasingly important to the end product, and also has become inherently higher risk due to global sourcing, deep supply chains, increasing product mechatronics and software content, and regulatory traceability demands. While traditional customer expectations of price, delivery, and quality remain important elements of the customer-supplier relationship, leading companies have uncovered opportunities and avoided threats by re-imagining their supplier relationships, SQM processes, and technologies.

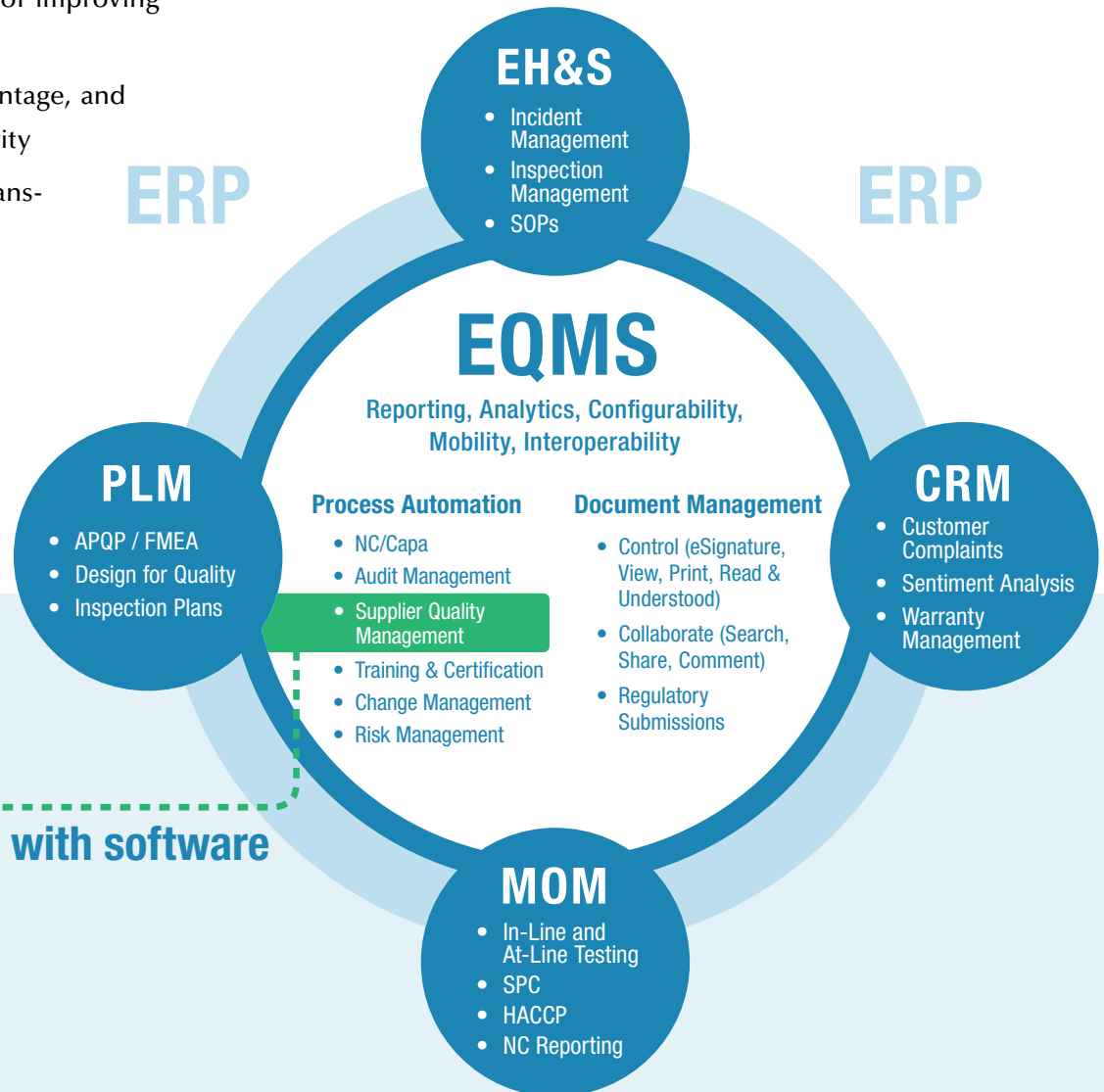
The supply chain can be an instrumental part of a company's sustained success, or it can cause crippling costs and brand damage. The difference lies in adopting SQM people, process and technology practices that are on par with the best across industry, and therefore drive high perceived quality. Today's quality leaders must be aware of new technology developments that improve collaboration, oversight, and engagement with the supply chain. They also need to understand the status of SQM practices across industry to understand what they must do to differentiate their SQM practice.



Executive Summary (Cont.)

SQM demands leadership attention and action. Readers will learn:

- The current state of SQM regarding practice adoption, industry, geography, and supply chain role
- How to gauge maturity of SQM, compare maturity to the rest of industry, and communicate the value of improving SQM maturity
- Which best practices provide the largest advantage, and which they should adopt at each stage of maturity
- What Digital Transformation is and why it's transforming Supplier Quality Management
- Competitive advantages gained through technologies like EQMS, Cloud, and IIoT
- Which SQM best practices are most effective to manage risks



ONLY **21%** automate with software



SECTION 2

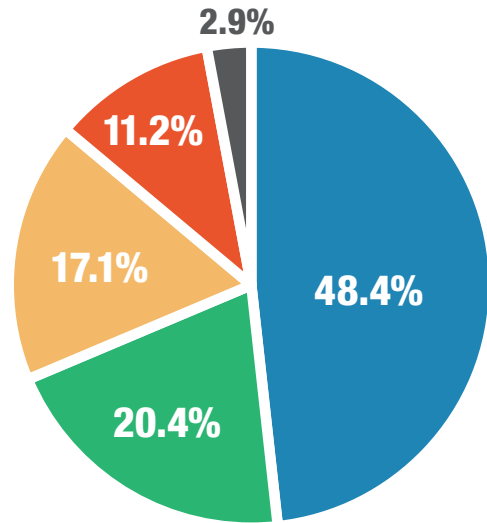
Demographics

Research Demographics

The LNS Research Quality Management Survey has been completed by over 700 executives and other senior leaders coming from a variety of company sizes and geographies across a range of industries. The survey questions drill down into the challenges and opportunities that companies face, strategic objectives data, and the most important goals currently being pursued around quality.

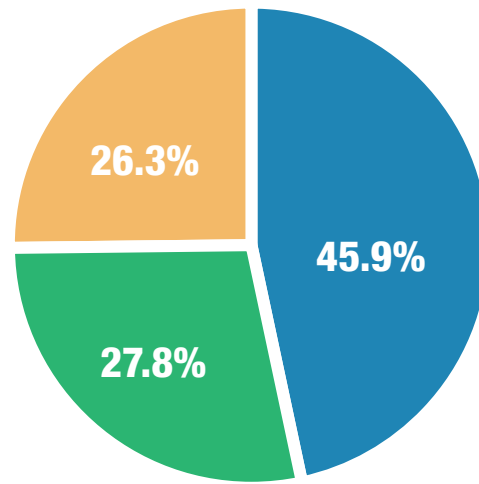
There were 54.3% of companies from Discrete Manufacturing

industries, with the remainder coming from Food & Beverage/Consumer Packaged Goods, Life Sciences, and Process Manufacturing. Just over half were from North America, followed by just under a quarter from Europe. Almost half, 46.8%, were from small companies, with 38.0% from large companies, and the remainder from mid-sized companies.



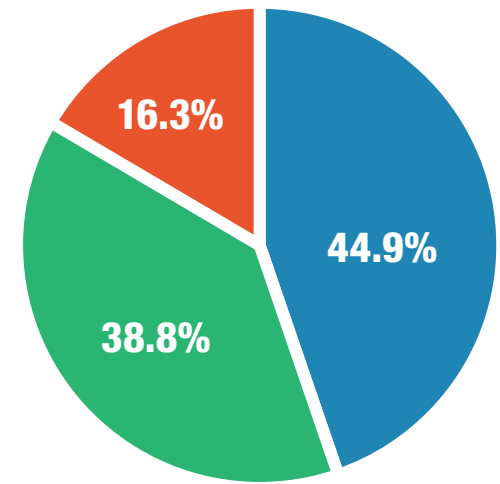
GEOGRAPHY
COLOR BY HQ LOCATION

- North America
- Middle East and Africa
- Europe
- Asia / Pacific
- Rest of World



INDUSTRY
COLOR BY INDUSTRY

- Batch
- Discrete
- Process



REVENUE
COLOR BY COMPANY REVENUE

- Small: \$0 - \$250MM
- Medium: \$250MM - \$1BB
- Large: \$1BB+



SECTION 3

State of SQM

Supplier Collaboration is a Hot Topic

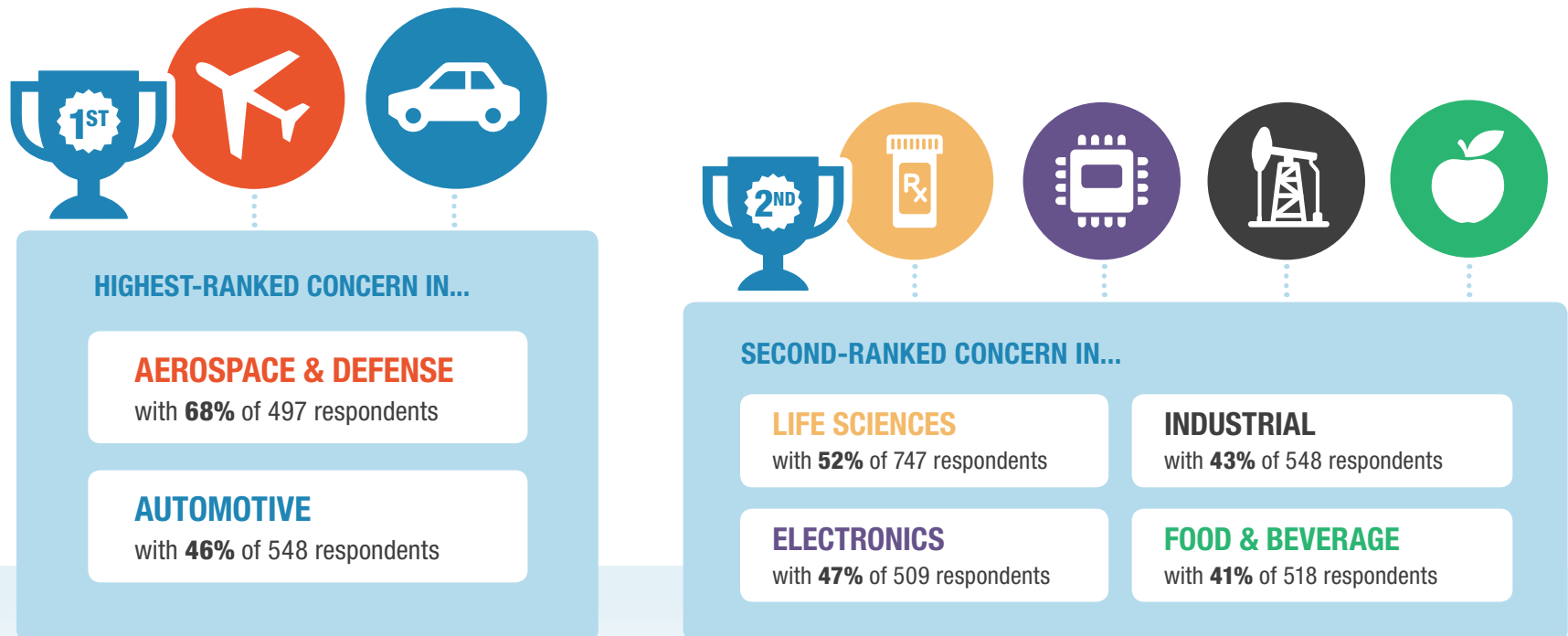
LNS Research surveys trend the importance of value chain collaboration across multiple industries. Given that collaboration with an increasingly complex supply chain ranks either first or second in all industries surveyed, the results clearly emphasize the perceived importance of the value chain collaboration.

Effective engagement with the supply chain is a top challenge that the market struggles to overcome. Supply chain visibility is a top challenge in addressing industry challenges, as reported by 24% of

respondents ($N=663$), and is also a leading roadblock to achieving quality objectives, reported by 21% ($N=693$) of respondents. It's even one of the biggest challenges in time to market, with 39% ($N=757$) in life sciences identifying supply chain optimization as one of their top concerns when speeding new products from R&D to patients.

In short, effective management of supply chain is closely tied to the success of the company, quality management, and product realization.

TOP TREND: Collaborating with Complex Supplier Networks



SQM Automation Remains Stubbornly Low

Given the importance of SQM, one might expect substantial investment in technology and automation. However, automation rates of SQM remain stubbornly low, with only 21% of respondents automating SQM with software (*N=610*). Low SQM automation rates impair internal quality management processes such as Audit Management (22%), Change Management (20%), Document Control (39%) and NC/CAPA (41%). Deploying internal quality management processes often comes before SQM. For instance, companies often prioritize automation of internal document control before automation of SQM processes such as Production Part Approval Process (PPAP), which would leverage document control and automate internal NC/CAPAs before automating Supplier Corrective Action Reports (SCARs).

Another cause for low automation rates is the maturity of SQM processes. There can be a substantial delay before low maturity processes are automated and industrialized. Process areas often improve in maturity through iterative process updates, training, etc. until deemed mature enough to automate with technology. For example, global harmonization of SQM across sites/business units can take multiple cycles to arrive at a flexible and unified process that can the organization can automate with software.

However, industry's readiness for SQM automation is improving. One clear indication of improving SQM process maturity is that 32% of respondents plan to automate SQM with software within the next 12 months, third highest behind NC/CAPA and Document Control.

Top 10 Processes Automated with Software (*N=610*)

- #1 Non-Conformances/Corrective and Preventative Action (NC/CAPA) **46%**
- #2 Document Control **44%**
- #3 Employee Training **35%**
- #4 Complaint Handling **31%**
- #5 Statistical Process Control (SPC) **26%**
- #6 Reporting **25%**
- #7 Audit Management **24%**
- #8 Change Management **24%**
- #9 Compliance Management **22%**
- #10 Supplier Quality Management **21%**

32% of respondents indicate that they **WILL ADOPT SQM WITHIN THE NEXT 12 MONTHS**, 3rd among tracked EQMS processes

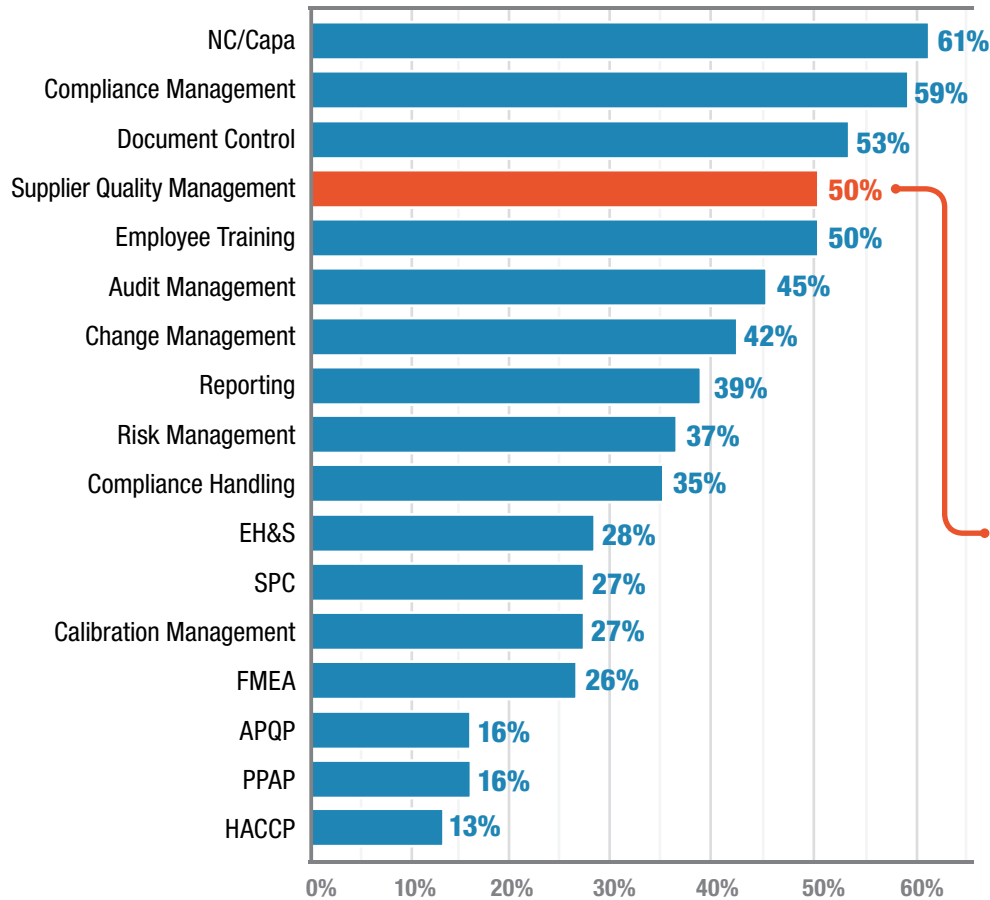
SQM: You're Not Walkin' the Talk

LNS Research surveys organizations about processes to determine which are considered to be most critical and least critical to a company's success. SQM stands out in this research, with 50% of respondents (*N=1089*) indicating that SQM is most critical to company's success. The importance of managing the supplier-customer relationship outpaces many other quality management processes.

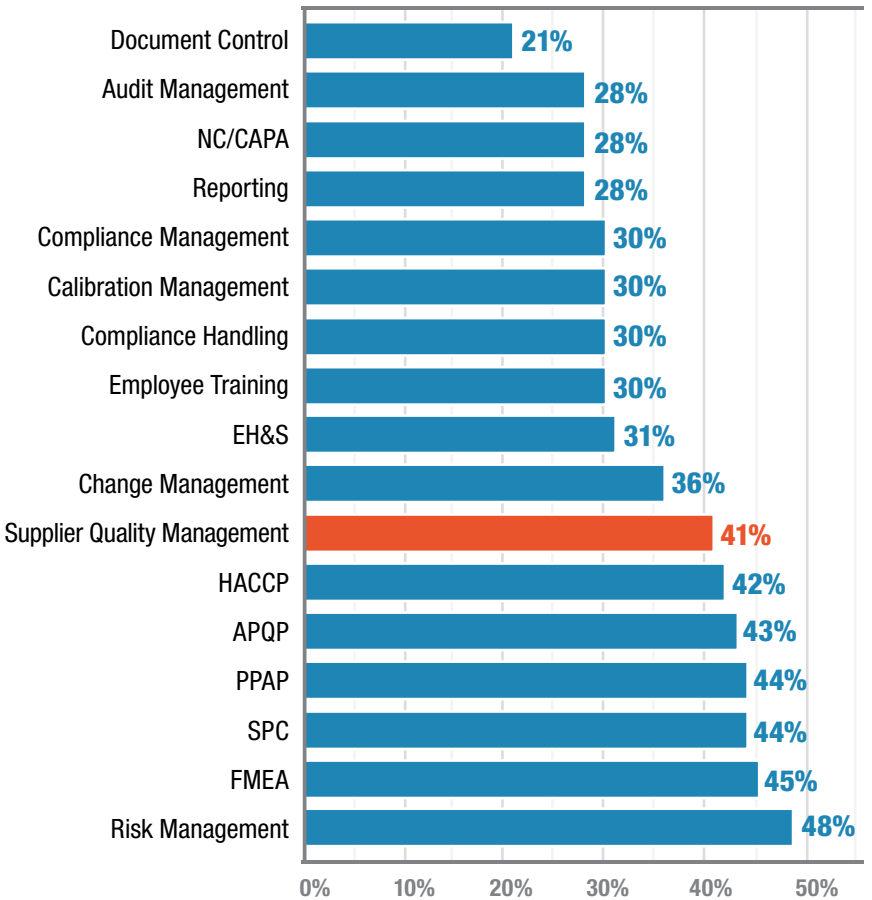
LNS also tracks processes which respondents consider to be least

and most mature at their companies. 41% of respondents singled out SQM as one of their least mature processes. This creates a substantial disparity between the importance of SQM to corporate success and maturity, as respondents cited lower maturity in SQM than many processes considered to be less critical to their success. Leaders should recognize this disparity and adjust priorities accordingly.

Quality Processes Most Critical to Company's Success (*N=1089*)



Quality Processes Considered Least Mature (*N=1078*)



SQM: Some Industries Do It Better

We find substantial variation in SQM automation across industries. Industries with regulatory requirements for traceability, complex supply chains, and/or manufacture products with high cost/high-value supplier inputs have adopted SQM automation earlier and at higher rates than those without. Paper (9%), Utilities (10%) and Packaging (11%) industries have among the lowest percentages of SQM automation of industries surveyed, whereas Aerospace & Defense (43%) and Life Sciences (29%) manufacturers lead in SQM automation.

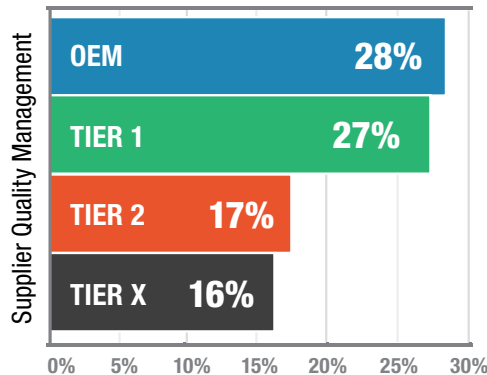
Additionally, SQM automation varies by role in the supply chain. OEMs and Tier 1 manufacturers are much more likely to automate SQM than those that are Tier 2 or below, with OEMs automating SQM with software nearly twice as often as Tier 'x' suppliers. Those at the top of the supply chain have inherently higher complexity SQM challenges, necessitating earlier adoption of SQM technologies. Of course, this creates a different but similar challenge for the suppliers who receive quality inputs from many customer portals. Additionally, 26% of

companies (N=84) require their suppliers to follow company-specific quality requirements. It is important for those at the top of the supply chain to manage supplier data, but those at the bottom need to invest in solutions to harmonize customer-specific quality requirements and consolidate customer-issued Supplier Corrective Action Reports (SCARs), Non-Conformances and other data inputs.

SQM Automated with Software

- Discrete **26%**
- All **23%**
- Process **22%**
- Batch **20%**

What is Your Company's Role in the Supply Chain?



SQM Automated with Software

- Aerospace & Defense **43%**
- Life Sciences **29%**
- Consumer Durable Goods **29%**
- Industrial Equipment **26%**
- Oil & Gas **26%**
- Automotive **25%**
- Chemicals **25%**
- Electronics **25%**
- Food & Beverage **25%**



SECTION 4

SQM in an IIoT World

Digital Transformation of SQM

Digital Transformation is the journey manufacturers undertake as they leverage disruptive new technologies such as cloud, mobility, big data analytics and the Industrial Internet of Things (IIoT) to transform product and service offerings for competitive advantage. Many companies are now on this journey: LNS Research showed that in 2016, 39% of respondents understood IIoT and saw value to their operations/customers, 33% were still investigating, and only 19% did not yet know about IIoT.

Quality leaders should exploit the potential for Digitally Transforming SQM to gain unprecedented insights and visibility. To fully realize the potential of Digital Transformation, leaders should identify how to converge data from connected devices with IT systems. This can be understood by overlaying quality, the value chain, and connected devices onto the ISA-95 model. This model can be used to understand the complete current state of quality including enterprise and functional quality data, and plan a roadmap to achieve business goals. LNS has conducted substantial research in this area. For additional information on Digital Transformation and Architecture, reference *IIoT and Big Data Analytics: How Manufacturing System Architecture is Being Transformed*.



ISA-95 TOTAL QUALITY STRATEGY

ENTERPRISE QUALITY

5 GOVERNANCE AND PLANNING  DECISIONS: <i>Months/Years</i>	<ul style="list-style-type: none"> Quality Management System (ISO compliance: roles, responsibilities, processes) Risk Management System (ISO compliance: roles, responsibilities, processes) Operational Excellence Knowledge Management
4 BUSINESS SYSTEMS  DECISIONS: <i>Days/Weeks</i>	<ul style="list-style-type: none"> CAPA, Audit, Supplier Quality, Training and Certification, Inspection Plans, Adverse Events, Product Quality and Reliability, SOPs/GXPs, Customer Complaints, Quality Materials Management, Lot Control, Quality Metrics Document Management System (control, collaboration, regulatory submissions)



FUNCTIONAL QUALITY

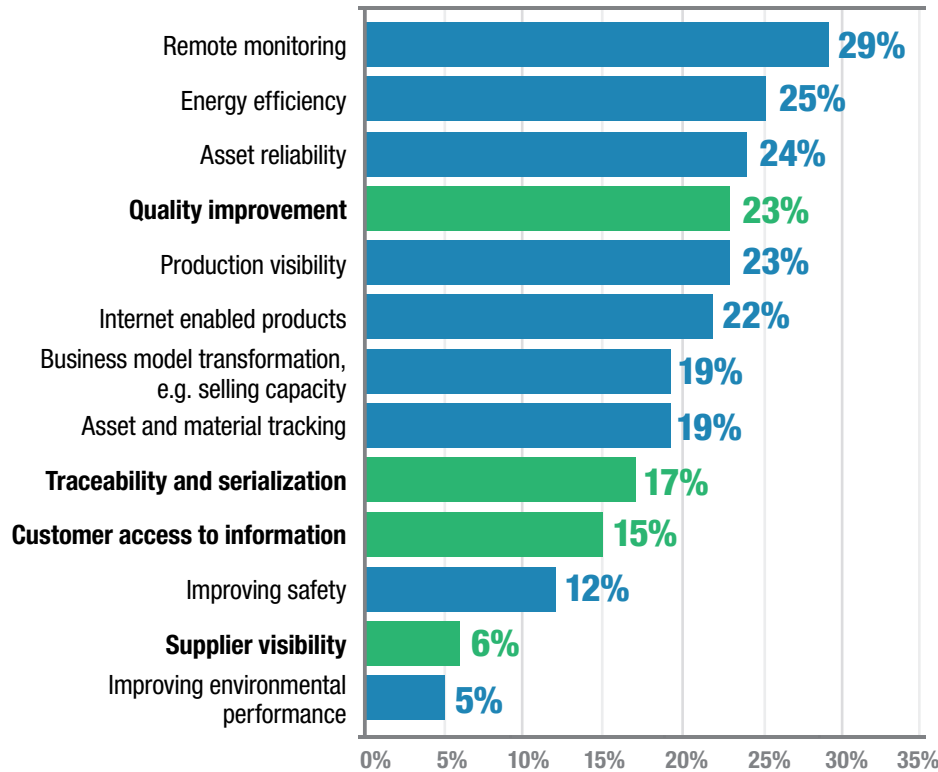
3 OPERATIONS MANAGEMENT  DECISIONS: <i>Minutes/Hours</i>	<ul style="list-style-type: none"> Electronic Lab Notebook LIS Design for Quality FMEA Non-Conformance Machine Learning 	<ul style="list-style-type: none"> Real Time Process Visibility Final Product Testing / Certificate of Analysis Non-Conformance Machine Learning 	<ul style="list-style-type: none"> In/At Line Quality Testing SPC EWI LIMS/LES Non-Conformance Serialization Machine Learning 	<ul style="list-style-type: none"> Real Time Process Visibility Non-Conformance Machine Learning 	<ul style="list-style-type: none"> Recall Warranty Management Non-Conformance Complaints Machine Learning
2 CONTROL AND ASSETS  DECISIONS: <i>Sub-Seconds</i>	<ul style="list-style-type: none"> Instruments Test Equipment Connected Devices 	<ul style="list-style-type: none"> Instruments Test Equipment Connected Devices 	<ul style="list-style-type: none"> Instruments Test Equipment Connected Devices 	<ul style="list-style-type: none"> Instruments Test Equipment Connected Devices 	<ul style="list-style-type: none"> Instruments Test Equipment Connected Devices

Use Case for SQM

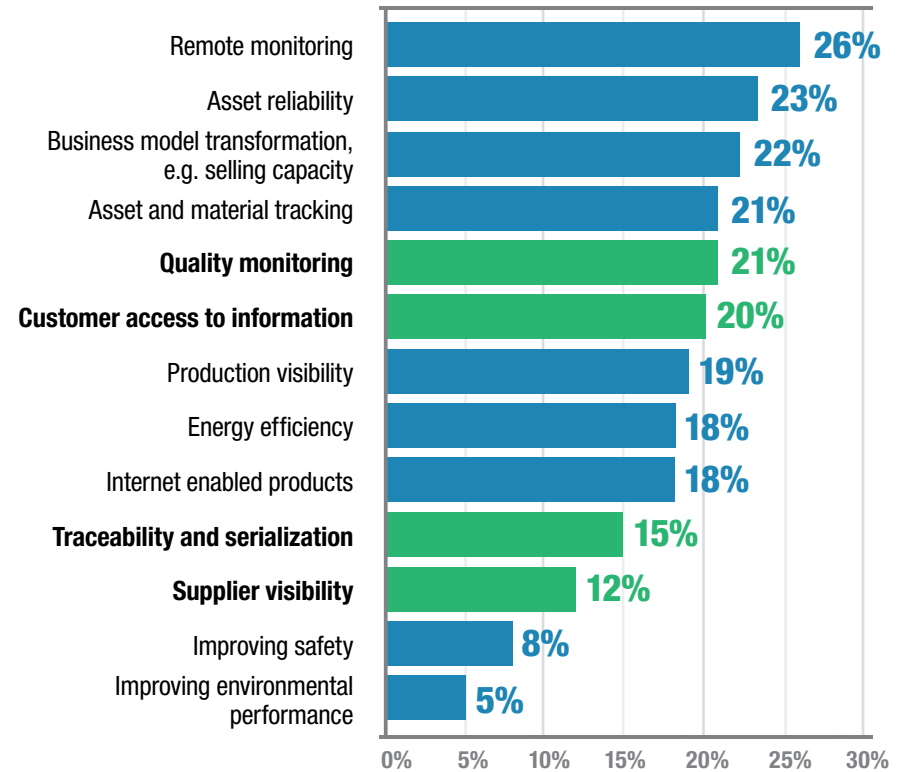
Quality has a prominent seat at the table in Digital Transformation discussions, and Quality leaders should take note this and capitalize on it. The market is pursuing Quality and SQM Digital Transformation use cases, with quality improvement and monitoring featured near the top of current and future use cases. Third-party collaboration factors into

many use cases as well, with use cases that exchange quality information with customers and suppliers more heavily weighted in future use cases. The market also plans to better address traceability and serialization requirements with the IIoT.

What are the top IIoT use cases your company is pursuing today? (N=252, all respondents)



What are the top IIoT use cases your company will start pursuing in the next year? (N=249, all respondents)



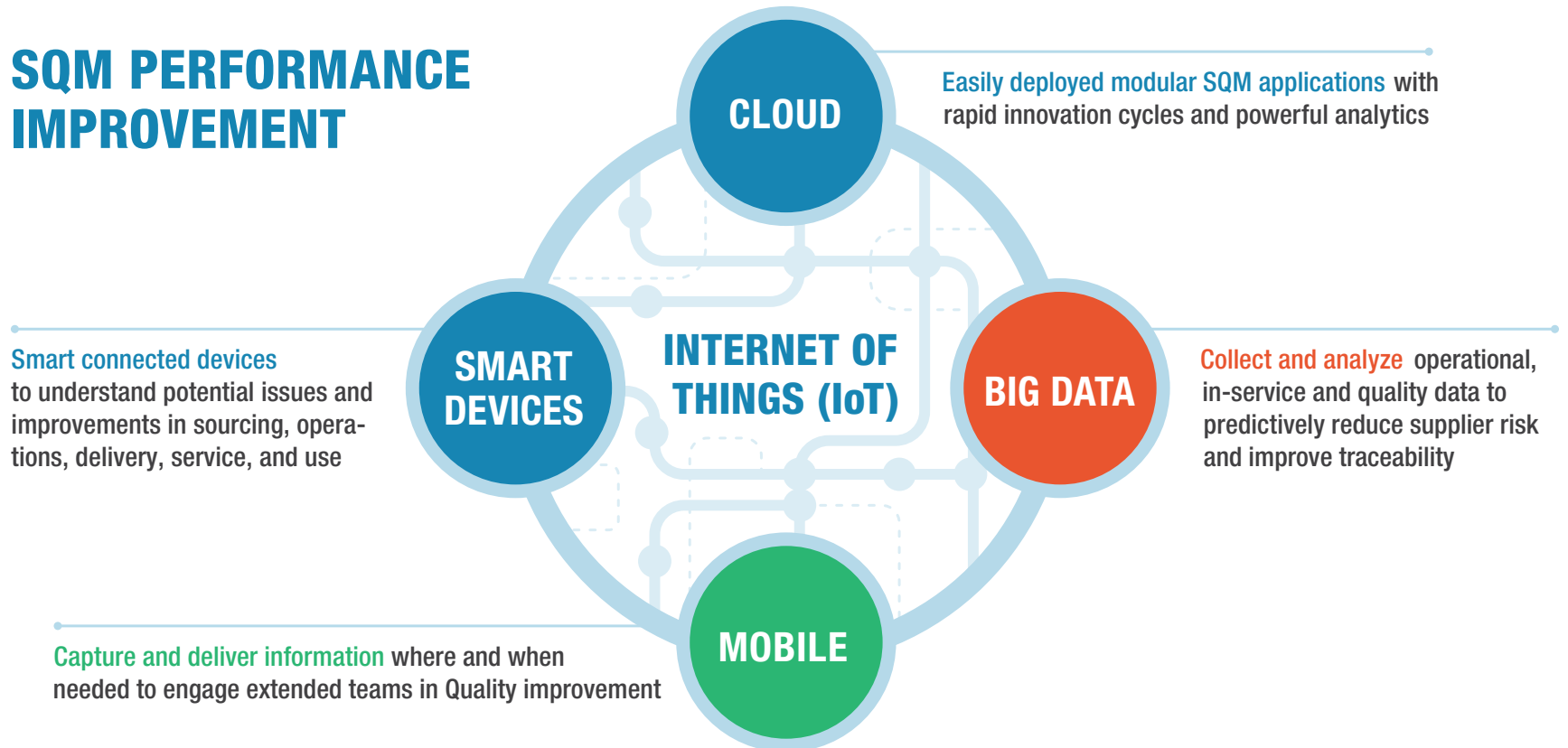
Use Case for SQM (Cont.)

Digital Transformation and analytics such as machine learning provide new insights into old questions and answers previously unanswerable questions. While machine learning can provide value for internal operations, it is arguably more valuable when interfacing with the increased complexity of data, product and services exchanged with many 3rd parties. In SQM, this could mean applying advanced analytics on incoming inspection data to find previously undetectable trends in supplier defects, detect these trends more quickly, or even detect them at the Supplier's sites. Industry leaders are applying analytics to parse supplier performance by part, by feature, by lot, or by previously unsuspected categorization. Yet, other SQM insights might

be possible by connecting performance of fielded connected products back to supplier-related causes.

This is very much a story of "the rich get richer," however. As shown in the modified ISA-95 framework earlier, the bigger picture includes Enterprise and Functional Quality, as well as connected devices and machine learning. Quality leaders should actively identify Digital Transformation initiatives underway at their companies, align quality with these strategic objectives, and guide executive leaders to understand this bigger picture. This approach is successful, as LNS has seen that some C-suite executives identify deploying Enterprise Quality and SQM as a critical piece of a Digital Transformation journey.

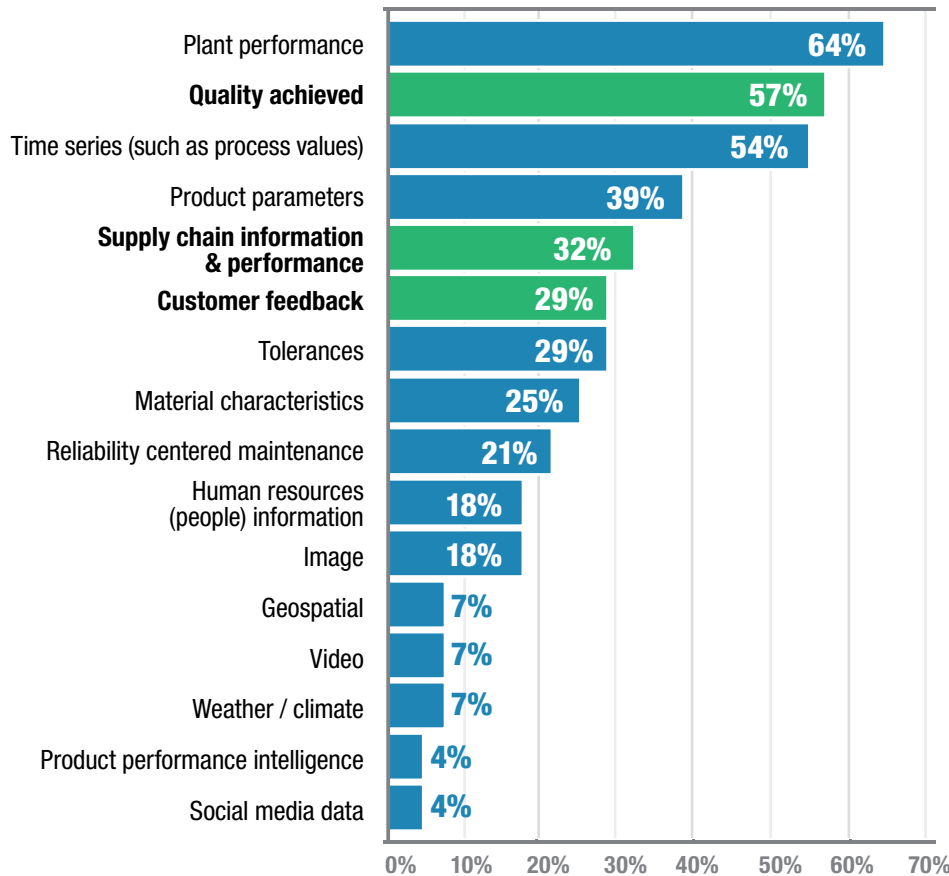
SQM PERFORMANCE IMPROVEMENT



Quality's Tough with Bad Data Quality

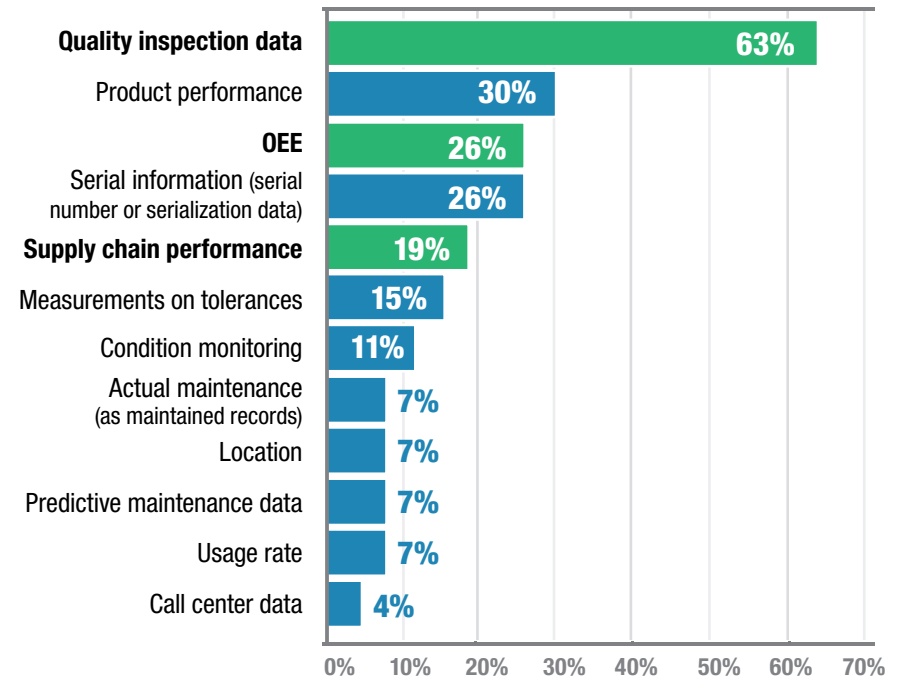
Quality data is the focus of both corporate analytics and smart connected product data collection. A majority (57% of respondents) indicate that they incorporate quality performance data in their enterprise analytics systems, and the most commonly gathered smart connected product data is quality inspection data. Additionally, supply chain performance and information are leading uses of enterprise analytics and connected product data.

What Types of Data are Used in Your Enterprise Analytics System?



Once again, this indicates a disparity between the importance of quality data to the enterprise, and the state of supporting IT systems. While quality and supplier data are critical to the enterprise and smart connected product applications, only 21% of companies have a centralized EQMS. Without solving the top quality management challenge - "disparate systems and data sources" - this both further complicates the IT environment by adding yet another system and also can propagate low veracity data. It is common for multiple systems to provide different results between systems, and there are often dozens of quality management systems in use. Analytics are important, but analytics that deliver inaccurate answers are worse than none at all.

Gathering Product Data



Don't Stop Short, Push Data Past Your Walls

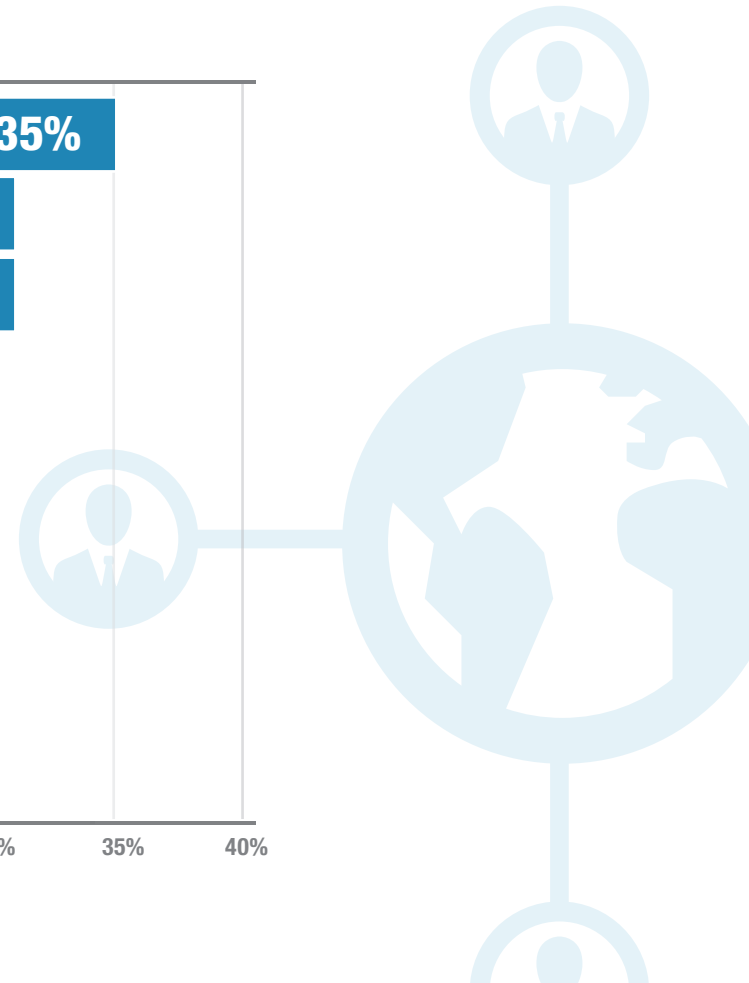
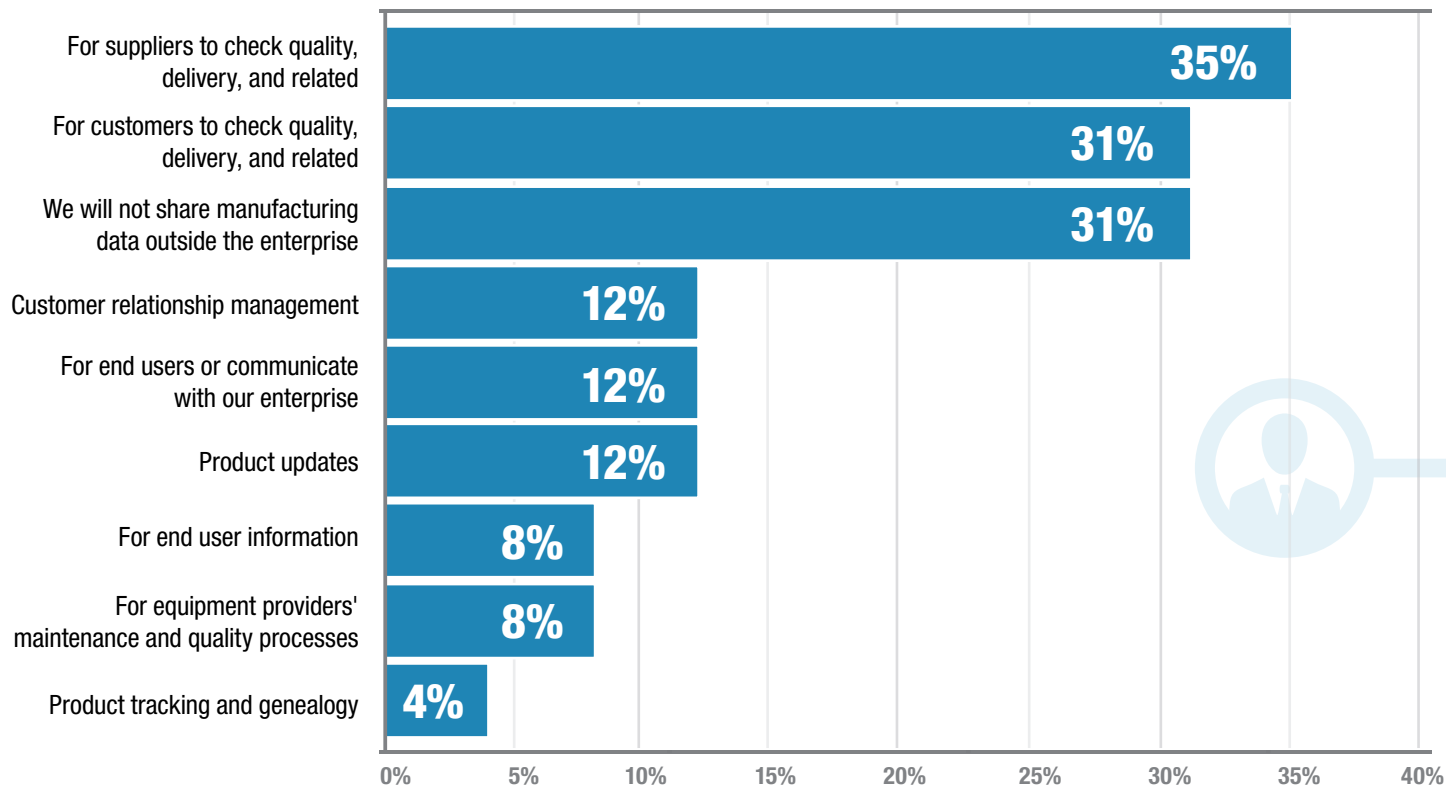
Many companies are planning to leverage cloud and IIoT technologies to share data outside the enterprise - in fact, only 31% of companies do not plan to share manufacturing data outside the enterprise. Company's top goals when sharing data are to improve collaboration with suppliers and customers regarding quality and delivery data.

Manufacturers have identified that sharing quality data with suppliers and customers are the top benefits of cross-company collaboration. Of course, they must do it with adequate security, both from

outside cyber security threats as well as in a manner that ensures supplier confidentiality. Suppliers may be partners in some projects and competitors within others. While security is critical, leading industry solutions have addressed this sufficiently to support highly complex security scenarios.

Quality leaders should be aware of industry's focus on quality and SQM use cases and data, and their importance in near term and future IIoT initiatives, analytics and cloud-based collaboration.

Sharing Data Outside the Enterprise





SECTION 5

Breakthrough Discovery: Quantifying the Value of Better SQM

What is Quality Maturity?

The research presented earlier highlights that quality and SQM are important ingredients in the market's Digital Transformation, analytics and collaboration plans. It also identifies that the market has low automation of SQM. Given that companies must consider an integrated Enterprise and Functional quality environment when pursuing Digital Transformation, companies planning to invest in IIoT for quality or supplier performance improvement should ensure that quality management is sufficiently mature to fully realize the potential for investments.

How can a company assess maturity? LNS Research recommends using an Operational Excellence-based maturity model to describe a company's as is state, and to determine the targeted future state. For instance, a company with Controlled (L2) maturity may have repeatable operational excellence within a specific site or business unit and sets a target to harmonize across the company, achieving Harmonized (L3) on its path to achieving Innovation Leader (L5).



The Quality Maturity Formula

Adoption of operational excellence best practices improves quality management maturity, and it is measured by the number of operational excellence best practices adopted. LNS tracks adoption of 46 people, process, and technology best practices through its quality management survey (see appendix for best practices selected). The best practices identify leadership' prioritization of quality, cross-functional quality culture, adoption of formal and compliant processes, risk and supplier quality management practices, and use of automation, integration, and analytic technologies.

LNS leveraged data from 1198 respondents to quantify practice adoption across the market, map practice adoption to maturity levels, correlate maturity levels with KPI performance, and provide roadmap guidance to quality leaders.

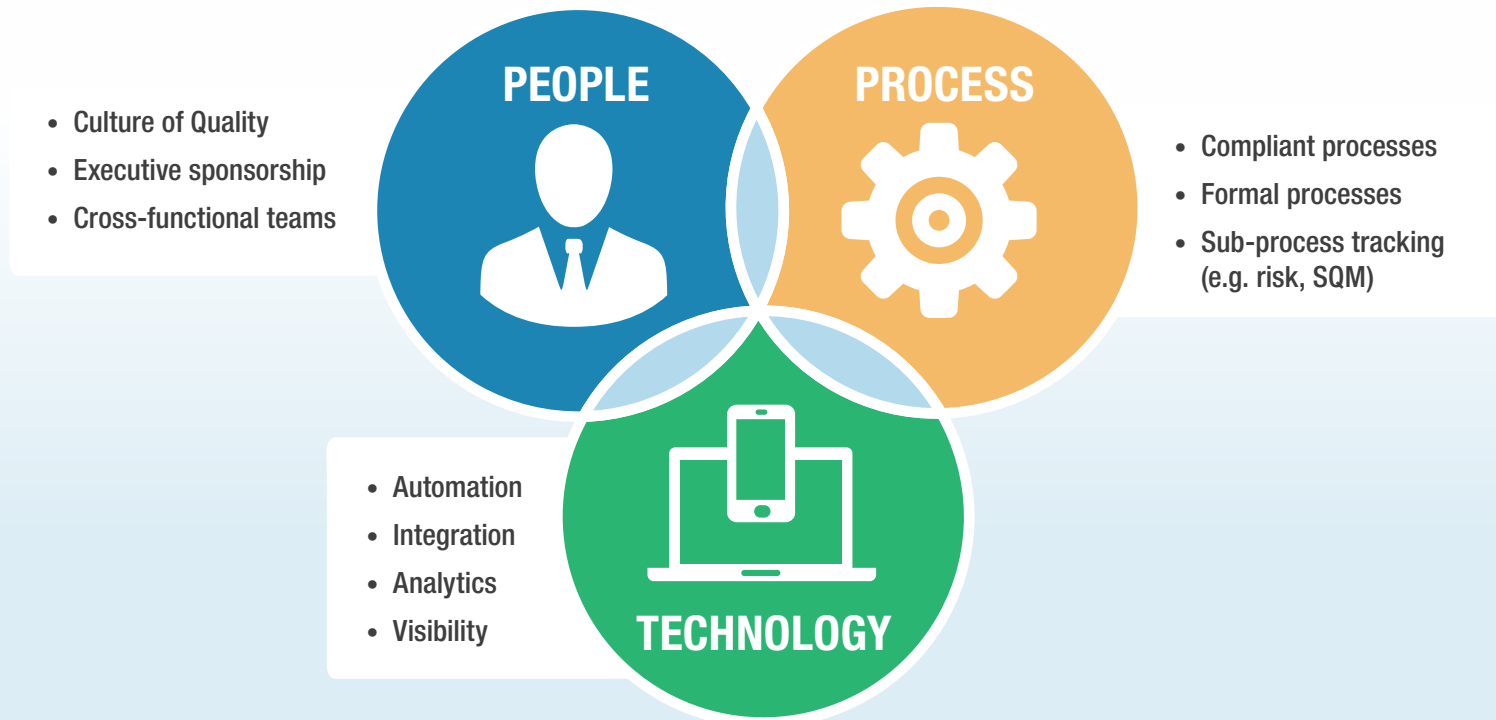
The **MEDIAN ADOPTION RATE ACROSS ALL 46 QUALITY BEST PRACTICES** is 22% of 1198 respondents



The **MOST ADOPTED BEST PRACTICE** is real-time visibility of Quality metrics in customer service (51%)



The **LEAST ADOPTED BEST PRACTICE** is automation of Advanced Product Quality Plan (APQP) with software (6%)



Quality Maturity by the Numbers

Quality maturity changes over time as the market and people, process and technology mature. The operational excellence framework put in place by Henry Ford in the early 20th century made Ford Motor Company an Innovation Leader at that time, but that same model would be antiquated today.

The best practice-based maturity model allows the maturity model to adjust over time, as the market matures and enables effective comparison of an individual company's maturity to market maturity. It is clear that much of the market has fairly low levels of quality management practice adoption – 40% of surveyed companies have adopted 6 or fewer best practices. Manufacturers adopt a median

of 9 of 46 quality best practices, with only 20% of 1198 respondents having adopted 18 or more best practices.

Elements such as Leadership & Culture, Organizational Capabilities, Business Process Excellence, Operational Architecture, and Performance Management & KPIs transform as maturity increases. Top executive sponsorship is particularly important to increasing maturity. Companies with top executive sponsorship for quality had adopted a median of 20 best practices which is Level 5 maturity. Those without top executive sponsorship had adopted a median of 8 best practices, slightly below the market median although still Level 3 maturity.



Quality Maturity Levels

INNOVATION LEADER Drives standards and expectations	L5
AGILE Evolved people, process, and technology across the enterprise	L4
HARMONIZED Flexibly unified at the organizational level	L3
CONTROLLED Repeatable within organizational, process, and/or technology boundaries	L2
AD HOC Unstandardized with significant variation	L1

Quality Maturity by the Numbers (Cont.)

Best Practice Adoption by Maturity Level

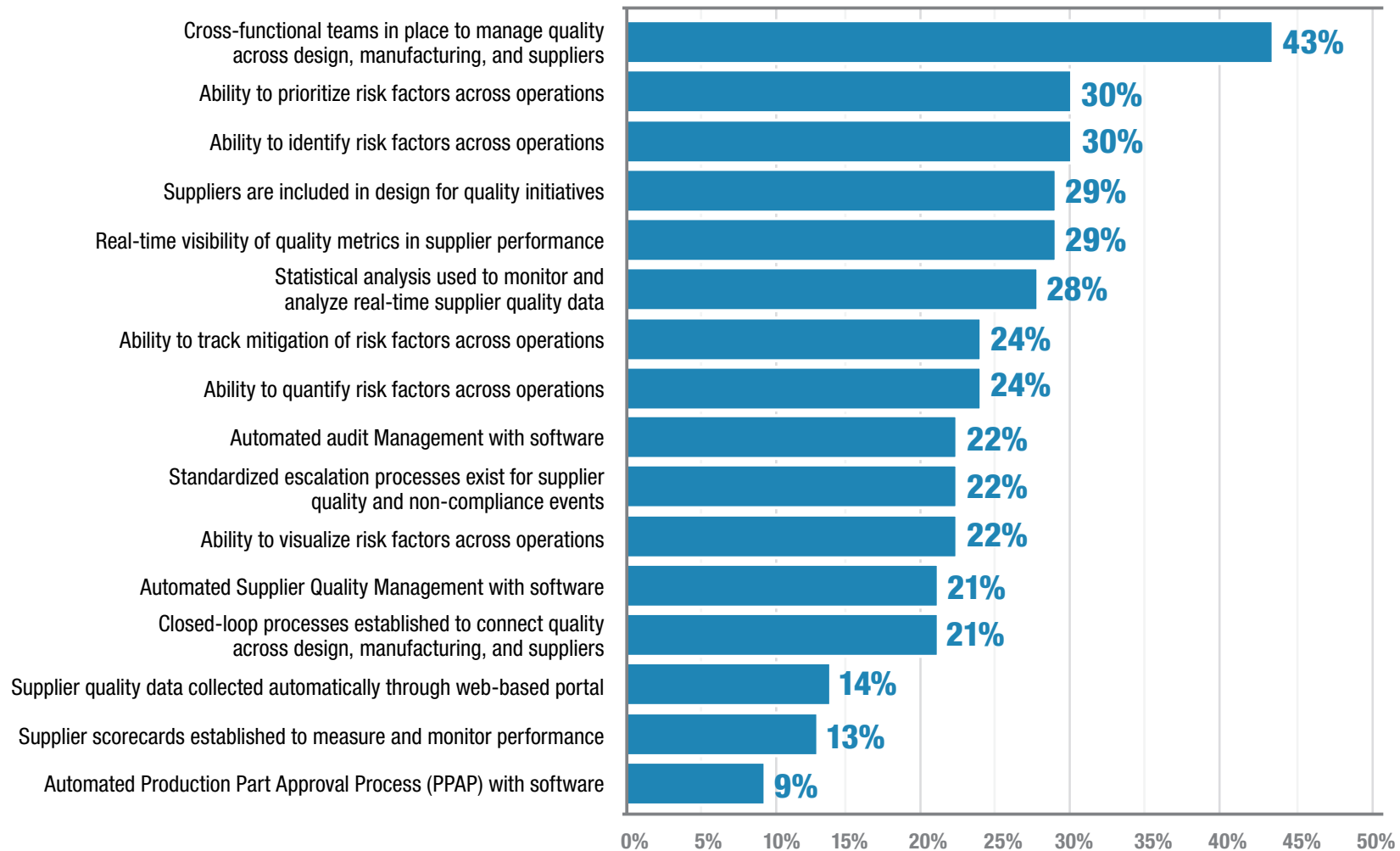
	AD HOC	Controlled	Harmonized	Agile	INNOVATION LEADER
46 Total Surveyed Best Practices	0-2 Total Surveyed Best Practices Adopted	3-6 Total Surveyed Best Practices Adopted	7-11 Total Surveyed Best Practices Adopted	12-17 Total Surveyed Best Practices Adopted	18-46 Total Surveyed Best Practices Adopted
PEOPLE	Quality is a department, is not in goals and incentives, and is distinct from corporate structure	0-2 Surveyed Best Practices Adopted	0-3 Surveyed Best Practices Adopted	0-3 Surveyed Best Practices Adopted	Quality is a responsibility led by the Quality department, and is integral to leadership, culture, strategy, corporate structure
4 Total Surveyed Best Practices	0-1 Surveyed Best Practices Adopted				0-4 Surveyed Best Practices Adopted
PROCESS	Processes are informal, ad hoc and disconnected. Processes are neither compliant with latest standards nor industry-leading	0-3 Surveyed Best Practices Adopted	0-7 Surveyed Best Practices Adopted	0-10 Surveyed Best Practices Adopted	Processes are globally integrated and Harmonized, compliant with latest standards and emerging capabilities
12 Total Surveyed Best Practices	0-2 Surveyed Best Practices Adopted				0-12 Surveyed Best Practices Adopted
TECHNOLOGY	Information and Operational Technology Architecture is disconnected and disparate. Manually generated metrics/KPIs performed infrequently, non-role-based, and disconnected from corporate goals	0-6 Surveyed Best Practices Adopted	0-11 Surveyed Best Practices Adopted	3-17 Surveyed Best Practices Adopted	Unified and connected information and Operational Technology Architecture unified and connected corporate-wide, leveraging new technology. Predictive, role-based, real-time metrics connected to corporate goals
29 Total Surveyed Best Practices	0-2 Surveyed Best Practices Adopted				6-30 Surveyed Best Practices Adopted

SQM Best Practices Need Love and Attention

As discussed earlier, the market clearly considers SQM important for success, with 50% of respondents identifying SQM as a quality process most critical to corporate success. SQM automation rates remain low at 21%, but how well adopted are SQM best practices? Is industry prepared to effectively meet trends and address initiatives?

Further analysis of 16 Best Practices that include SQM shows that the mean adoption rate of SQM Best Practices is 23%. The data identifies that much of the market employs personnel such as Supplier Quality Engineers (SQEs) to manage their SQM processes, without the benefit of automation or collaboration technology. This proliferates

Adoption of Supplier-Related Quality Practices (N=1198)



SQM Best Practices Need Love and Attention (Cont.)

disparate systems and data sources, preventing corporate-wide visibility and effective continuous improvement.

In contrast, industry leaders leverage automation, cloud-based portals, scorecards and analytics to ensure rich and real-time collaboration with suppliers. They can center this collaboration on documents and tasks - such as NCs and SCARs – or better, provide actionable statistical insights into supplier performance. This improved collaboration ensures they address efficiently, provide earlier visibility into potential issues, and can reduce time to market through change management.

The market has made progress in adopting best practices to manage SQM risk factors and incorporate these into supplier scorecards. A fairly universal challenge in SQM is maximizing the effectiveness of SQEs, who must prioritize many activities including supplier audits, Supplier Non-Conformances and Corrective Action Reports (SCARs). By adopting best practices to manage SQM risk factors, manufacturers can deploy risk-based supplier quality audits and increase the efficiency of SQEs and effectiveness of supplier oversight. In fact, 26% of respondents (N=76) intend to adopt risk-based supplier audits in the next 12 months.



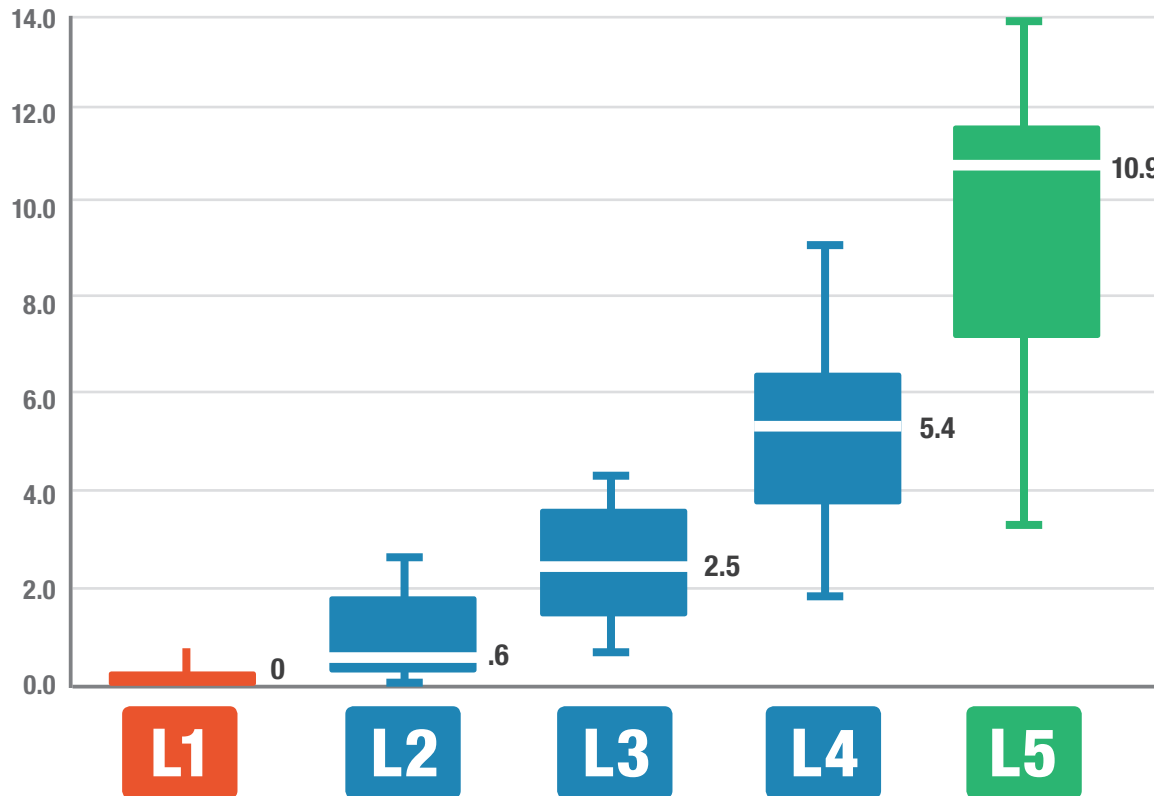
By adopting best practices to manage SQM risk factors, manufacturers can deploy risk-based supplier quality audits and increase the efficiency of SQEs and effectiveness of supplier oversight

What's Your SQM Number?

Innovation Leaders have a substantial SQM Operational Excellence advantage over all others, companies adopt SQM best practices at much higher rates with each increase in maturity level. Taking a maturity view to SQM provides a more meaningful picture of the market. It demonstrates that the adoption of practices increases dramatically from a median of 0.1 practices adopted at Ad Hoc (L1) to a median of 10.9 rates at Innovation Leader (L5).

While Innovation Leaders have a substantial advantage in SQM operational excellence, the continuum between L1 and L5 also demonstrates that SQM isn't an all-or-nothing proposition. Companies expand their SQM footprint as their maturity increases. However, a large portion of the market has hardly begun this journey.

Adoption of 16 SQM Best Practices



Case for Quality: Value is Hard to Miss

Innovation Leaders have adopted much more SQM best practices, but have these additional best practices improved the performance of the quality department, operations, and the business as a whole? Indeed, those at higher maturity levels have markedly higher performance across many metrics. A sample set of metrics is shown, comparing the performance of ad hoc manufacturers to innovation leaders.

A closer look at Cost of Poor Quality shows the strong correlation between increasing maturity and metric performance. Quality lead-

ers should note that the average operating margin for the S&P 500 is 12.65% (CSIMarket.com). In that context, the median Innovation Leader would report a 32% higher operating margin than the median Ad Hoc manufacturer.

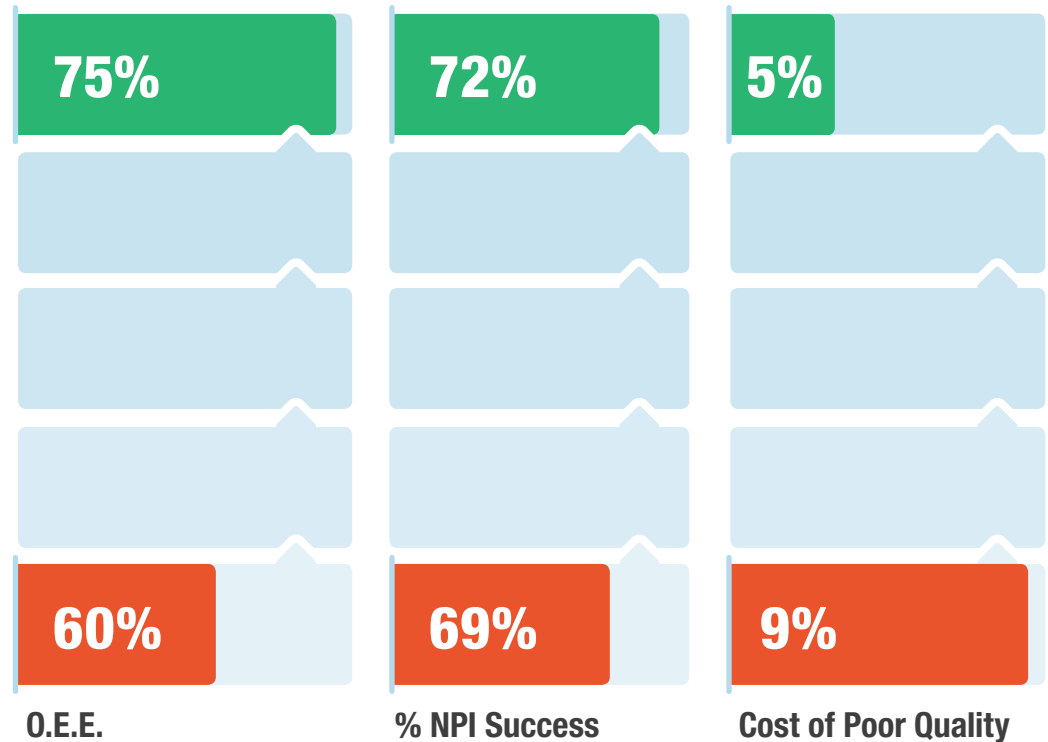
There is a correlation between INCREASING SQM BEST PRACTICES and METRIC IMPROVEMENTS

Maturity Correlates with Performance

Quality Maturity Levels

INNOVATION LEADER Drives standards and expectations	L5
AGILE Evolved people, process, and technology across the enterprise	L4
HARMONIZED Flexibly unified at the organizational level	L3
CONTROLLED Repeatable within organizational, process, and/or technology boundaries	L2
AD HOC Unstandardized with significant variation	L1

Business Performance



SQM Best Practices: A Deeper Look

Quality leaders have the burden of proving value, which can be challenging in organizations with a track record of delivering return on quality investments. How can those without that track record gain sufficient proof of value to begin the journey?

It is often easiest to select an individual best practice as a starting point. LNS recommends selecting this best practice based on its ability to support strategic objectives or address current SQM challenges,

as this will provide quicker and more noticeable impact. LNS has also prepared the enclosed table to compare the median supplier defect rate performance of those that had implemented selected supplier quality best practices to those who has not. While some organizations will achieve better results than the media and others will not reach the median level of performance, there is clearly a strong correlation between best practice adoption and improved supplier defect rates.

SUPPLIER QUALITY MANAGEMENT BEST PRACTICE	Reduction in Median Supplier Defect Rate when Adopted
Supplier scorecards established to measure and monitor performance	50%
Statistical analysis used to monitor and analyze real-time supplier quality data	43%
Supplier quality data collected automatically through web-based portal	33%
Automate Production Part Approval Process (PPAP) with software	33%
Suppliers are included in design for quality initiatives	25%
Ability to visualize risk factors across operations	25%
Closed-loop processes established to connect quality across design, manufacturing, and suppliers	17%
Ability to quantify risk factors across operations	17%
Ability to prioritize risk factors across operations	17%
Ability to identify risk factors across operations	17%
Ability to track mitigation of risk factors across operations	17%
Real-time visibility of quality metrics in supplier performance	8%

Manufacturers that report POOR VISIBILITY INTO SUPPLIER PERFORMANCE FAIRED FAR WORSE THAN COMPETITORS, with a median supplier defect rate more than double the remainder of the population.

SQM Roadmap: Market Lessons

Quality leaders must consider many factors, including regulatory requirements, industry challenges, and company-specific dynamics when building a roadmap to improved maturity. While there is no one-size-fits-all SQM adoption roadmap, LNS provides some guidance on industry trends in adoption by identifying the practices that are the most rapidly adopted at each level. For instance, adoption of cross-functional quality teams to manage quality across design, man-

ufacturing and suppliers increased by 16% between the L1 population and L2 population and 33% between L2 and L3, and has is the most rapidly adopted best practice at these levels of maturity.

The data shows that companies focus on teams and core processes at lower levels of maturity, and shift to risk-based best practices and closed-loop quality processes at higher levels of maturity, which matches observed practices in industry.

SQM Adoption Roadmap Guidance: Top 3 Best Practices with Greatest Increase in Adoption Rate Between Maturity Levels





SECTION 6

Conclusion and Recommendations

Conclusion and Recommendations

Manufacturers must adopt SQM best practices to address current and future industry trends. SQM in the age of digital transformation is a “rich get richer” story, with companies that have effective Enterprise Quality are positioned to capitalize on the latest trends and technologies such as cloud, big data, and the IIoT. This is reflected in core metrics and KPIs, as companies that have adopted SQM best practices have differentiated their quality and corporate performance.

For Quality leaders to effectively position their company for success, they must compare their capability and maturity to that of their competition, and understand the benefits of increased maturity. These are the important tools needed to build an adoption roadmap and enlist executive sponsorship required to capitalize on opportunities and minimize competitive threats.

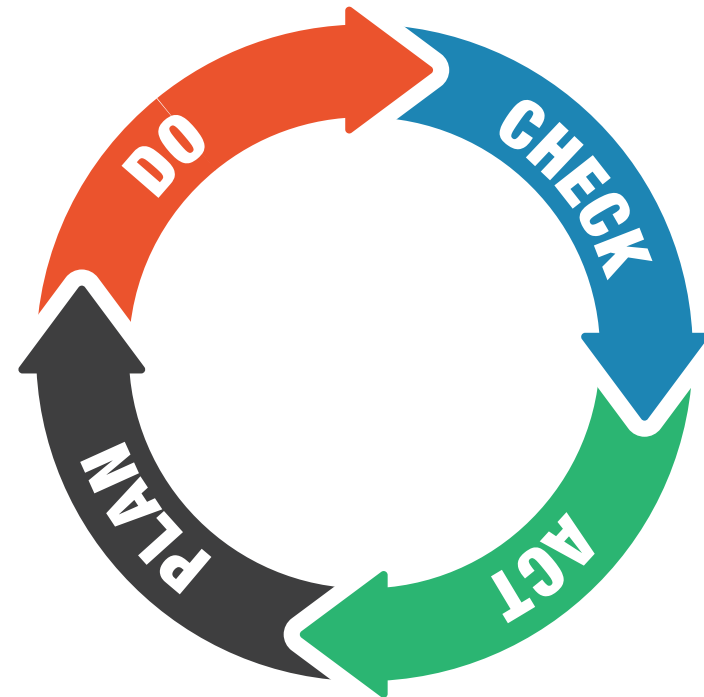
Applying the Deming cycle can be beneficial in determining a path forward:

PLAN: Immediately assess SQM practice adoption and Quality Maturity. Consider not just processes and teams, but a full operational excellence picture. While a well-analyzed portrait of the As Is state is valuable, don't let perfection be the enemy of good.

DO: Identify and address low hanging fruit from the Plan phase. Low hanging fruit is the problem that causes noticeable disruption in operations and are shorter term projects. Addressing low hanging fruit should provide momentum for future efforts. Engage related functions in determining the solution, and keep it simple to encourage adoption which drives success.

CHECK: Compare success metrics with projections and prior performance. Keep an open mind to feedback, drive efficiency, and focus on scalability.

ACT: Industrialize the process with technology, through automation, integration, and metrics. Don't confuse automation with technology that eliminates thinking – think in terms of process automation and centralized, connected data models that ease collaboration and continuous improvement. Technology is a necessary part of scalability, particularly with extended teams such as those needed in SQM.



Appendix: Quality Best Practices

BEST PRACTICE	CUMULATIVE ADOPTION RATE
Real-time visibility of quality metrics in customer service	51%
Formal NC/CAPA processes established across company	45%
Cross-functional teams in place to manage quality across design, manufacturing, and suppliers	43%
Automated Non-Conformances/Corrective and Preventive Action (NC/CAPA) with software	41%
Automated Document Control with software	39%
Formal risk management framework established	37%
Has your company considered or completed an Enterprise Quality Management Software (EQMS) implementation?	35%
Integration between EQMS and Product Lifecycle Management (PLM)	33%
Integration between EQMS and Customer Relationship Management (CRM)	32%
Ability to prioritize risk factors across operations	30%
Ability to identify risk factors across operations	30%
Automated Employee Training with software	30%
Suppliers are included in design for quality initiatives	29%
Real-time visibility of quality metrics in supplier performance	29%
Automated Complaint Handling with software	28%
Statistical analysis used to monitor and analyze real-time supplier quality data	28%
Integration between EQMS and Enterprise Sustainability Management (ESM)	25%
Real-time visibility of quality metrics in engineering	25%
Ability to track mitigation of risk factors across operations	24%
Automated Statistical Process Control (SPC) with software	24%
Ability to quantify risk factors across operations	24%
Automated Reporting with software	23%
Standardized escalation processes exist for supplier quality and non-compliance events	22%

Appendix: Quality Best Practices (Cont.)

BEST PRACTICE	CUMULATIVE ADOPTION RATE
Automated Audit Management with software	22%
Ability to visualize risk factors across operations	22%
Automated Supplier Quality Management with software	21%
Compliance processes are easily understood and documented	21%
Closed-loop processes established to connect quality across design, manufacturing, and suppliers	21%
Integrated with Manufacturing Operations Management (MOM)	20%
Automated Change Management with software	20%
Integration between EQMS and Supply Chain Management (SCM)	19%
Automated Calibration Management with software	19%
Automated Compliance Management with software	19%
Real-time visibility of quality metrics in manufacturing	18%
Supplier quality data collected automatically through web-based portal	14%
Automated Failure Mode and Effects Analysis (FMEA) with software	14%
Integration between EQMS and Enterprise Resource Planning (ERP)	14%
Automated Risk Management with software	14%
Automated Environment, Health, and Safety (EH&S) with software	13%
Supplier scorecards established to measure and monitor performance	13%
Quality is a top executive priority	13%
Process established to share compliance processes across functional areas	12%
Automated Production Part Approval Process (PPAP) with software	9%
Automated Hazard Analysis & Critical Control Points (HACCP) with software	8%
Formal audit management processes established to understand current compliance status and identify area for improvement	7%
Automated Advanced Product Quality Planning (APQP) with software	6%

SQM'S RIGHTFUL ROLE IN YOUR ENTERPRISE

Playbook to Realize the Total Value of Quality

Presented by:



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