THE GLOBAL STATE OF MANUFACTURING OPERATIONS MANAGEMENT SOFTWARE

Weaving Rapid ROI with the Digital Thread

LNS research

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Weaving the Digital Thread Across Industrial Value Chains

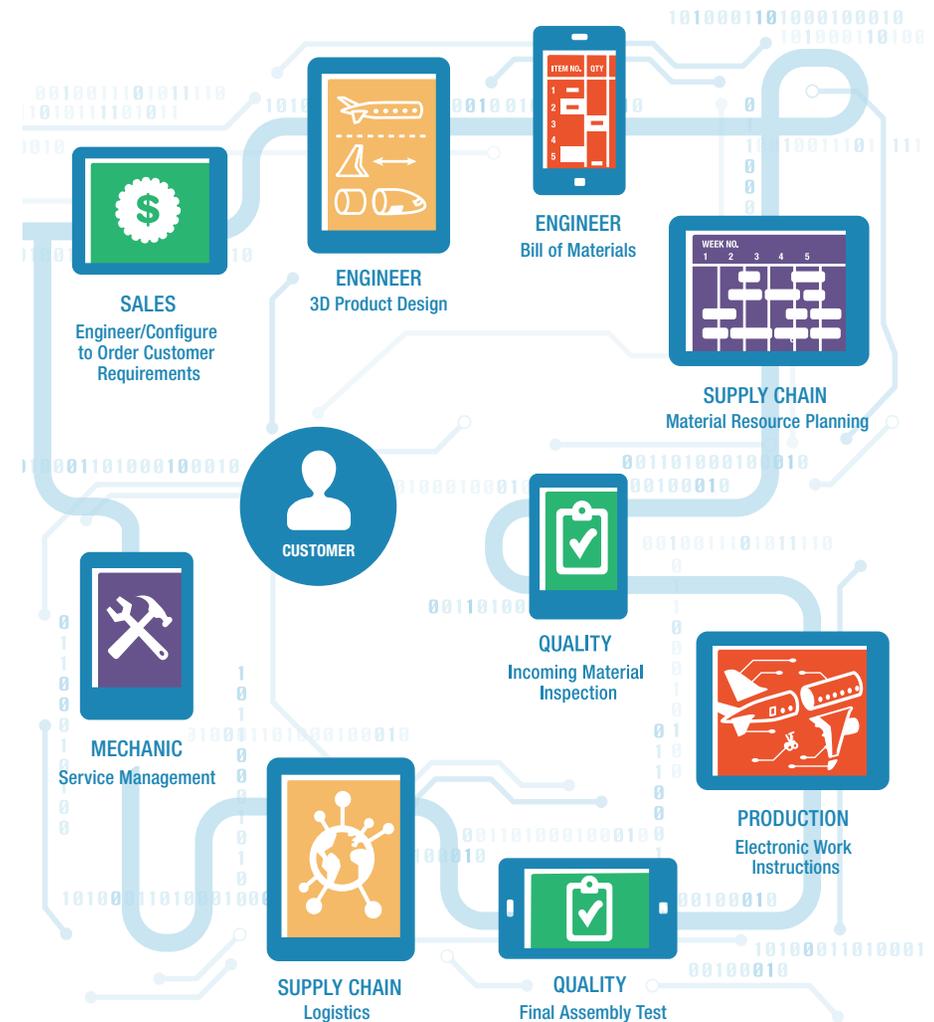## TABLE OF CONTENTS

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Introduction, Research Demographics, Industry Drivers, Challenges

Though industrial professionals have made great strides in improving the efficiency, profitability, and responsiveness of their companies' operations, many companies are still lagging in technology investments to support flexibly manufacturing operations. New pressures in the form of increased market demands, greater product diversity, growing supplier complexity, regulatory measures, and others have renewed interest in investments within the Manufacturing Operations Management (MOM) software.

Astute manufacturers are seeing new opportunities for streamlining processes across their value chains as an increasingly integrated approach to MOM software emerges. Coupled with new technologies, next-generation MOM solutions are offering the promise of, better, more immediate, and actionable information, and a fastening of the traditional seams between customers, suppliers, manufacturing operations, services, and overall business goals—what has come to be known as weaving the "Digital Thread."

Regardless of their industry or company size, readers of this eBook will gain an understanding of how MOM software is an integral part of the digital thread and how companies can best drive Return on Investment (ROI) for MOM software by using a digital thread strategy.

The 2013-2014 MOM survey examines these innovative new technology approaches to the complex landscape of manufacturing challenges and objectives industrial professionals are facing today; providing insights for manufacturers to advance the use of MOM software in support of Digital Thread strategies. Specifically, new data on deployment strategies, critical functionality, and ROI results for MOM software will be examined and used to highlight these new best practices.

SALES
Engineer/Configure
to Order Customer
Requirements

ENGINEER
3D Product Design

ENGINEER
Bill of Materials

SUPPLY CHAIN
Material Resource Planning

CUSTOMER

MECHANIC
Service Management

QUALITY
Incoming Material
Inspection

PRODUCTION
Electronic Work
Instructions

SUPPLY CHAIN
Logistics

QUALITY
Final Assembly Test

Research Demographics

The pie charts below provide background demographic information on the LNS Research MOM survey participants. As shown, the results depict a diverse set of Respondents. There were 60% from the discrete manufacturing industries, 10% from process manufacturing, 16% from food & beverage/consumer packaged goods, and 13% from life sciences. Nearly 65% of the executives surveyed were from Small to Medium businesses, with 35.6% from Companies with revenue greater than $1 billion.

Geographically, North American companies composed 44% of respondents; 32% were from Europe, 12% from the Asia/Pacific region, and 11% were from the rest of the world.
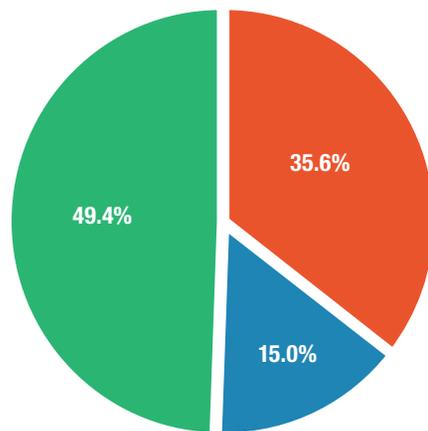
**COLOR BY
COMPANY REVENUE**

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

35.6%
15.0%
49.4%
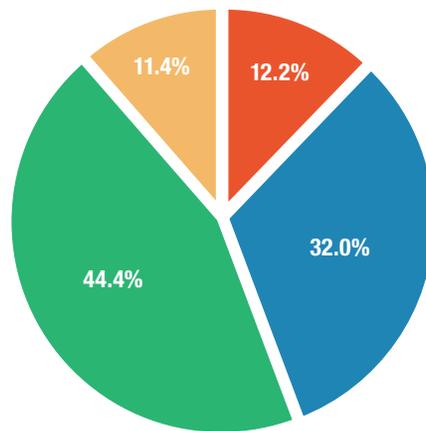
COLOR BY HQ LOCATION

- North America
- Europe
- Rest of the World
- Asia / Pacific

11.4%
12.2%
44.4%
32.0%
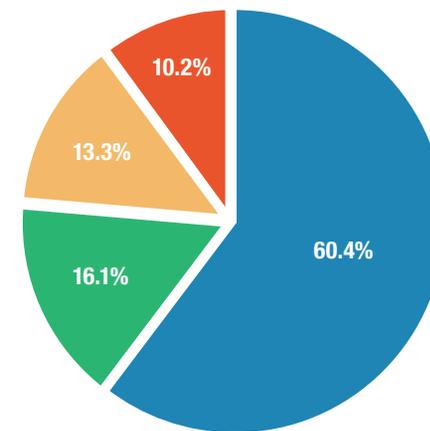
COLOR BY INDUSTRY

- Discrete Manufacturing
- F&B / CPG
- Life Sciences
- Process Manufacturing

10.2%
13.3%
16.1%
60.4%

Industry Drivers

The MOM survey data clearly shows that top strategic objectives for manufacturing industries are all related to serving customers. First and foremost is ensuring consistency of quality for products produced at 61%, followed by timely order fulfillment at 55%, and then 52% focused on increasing production capacity and capabilities. These areas of customer focus bode well for the industry, given that if customers are not being properly served and satisfied, then nothing else will matter for a manufacturing business in a rapid fashion.

The survey also indicated that there are many other strategic objectives that need to be simultaneously managed in order to have a successful business. These included the alignment of goals, innovating to get new products to market more quickly, and meeting regulatory compliance. The research data shows that there are multiple strategic objectives that are of some significant importance – all of which need to be considered holistically across the value chain to start weaving the Digital Thread.

Top Operational Objectives

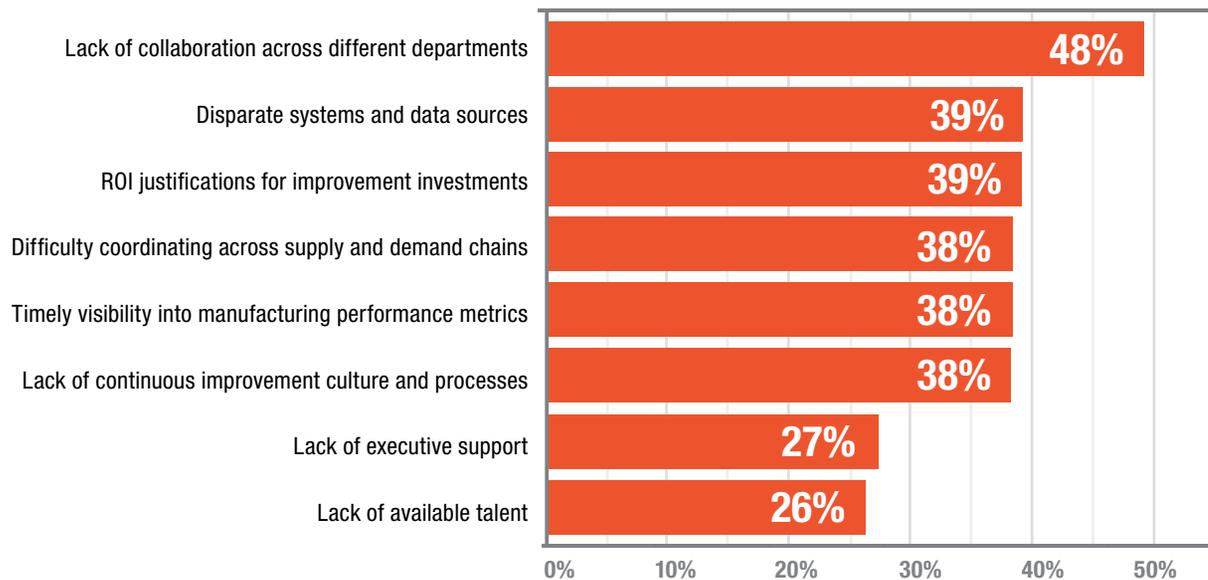| Objective	Percentage
Ensuring consistent quality of products	61%
Responsiveness to customer order demands	55%
Increasing production capacity and capabilities	52%
Getting new products to market faster	42%
Tighter alignment of business and manufacturing goals	39%
Regulatory Compliance	38%
Global alignment and standardization of manufacturing processes and reporting	38%
Improving environment, health, and safety performance	32%
Effective human resource skills and management	32%

Industry Drivers

Looking at the top associated operational challenges in meeting top strategic objectives, there are many simultaneous challenges that need to be addressed to achieve the value chain continuity and optimization that manufacturers are pursuing today.

At 48% of respondents, the top operational challenge is how to break down silos of organizations and departments and foster greater collaboration. This includes more social collaboration with customers to understand their "likes" and "dislikes," along with getting faster feedback from groups of customers on their requirements and reactions to new products and services. This also includes faster digital collaboration with suppliers to ensure rapid responses to materials, while ensuring quality and traceability requirements are being met. Companies that effectively address these challenges are in a much

better position to deliver superior products and services to customers and be more efficient in doing so. Communicating product and service information digitally across value chains, while openly sharing goals, objectives, and KPIs is a best practice LNS Research has observed to address these challenges.

At 39%, the next highest operational challenge is getting the necessary data and information out of the many disparate systems and databases that exist across plants and the enterprise. The ability to securely connect, federate, aggregate, and contextualize data into useful, timely, and shareable digital information across multiple sources is also key in optimizing the different areas of the value chain. Having digitized, automated capabilities in this realm is key in facilitating the path of the Digital Thread and integrating the extended value chain.

Top Operational Challenges

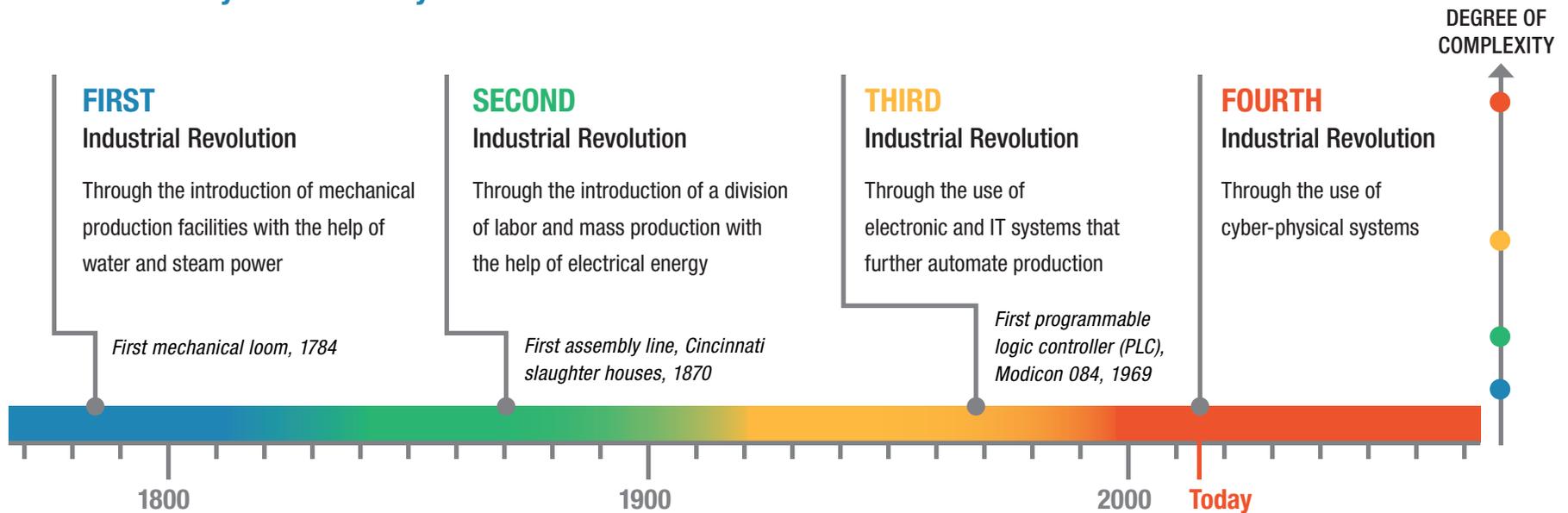| Challenge	Percentage
Lack of collaboration across different departments	48%
Disparate systems and data sources	39%
ROI justifications for improvement investments	39%
Difficulty coordinating across supply and demand chains	38%
Timely visibility into manufacturing performance metrics	38%
Lack of continuous improvement culture and processes	38%
Lack of executive support	27%
Lack of available talent	26%

Industry 4.0, The Move to Digitization, Understanding the Digital Thread

Industry 4.0 and Smart Manufacturing Initiatives

The German and U.S. governments both have next-generation manufacturing initiatives – Industry 4.0 and the Smart Manufacturing Leadership Coalition (SMLC), respectively. New technologies like MOM software, IoT, Big Data, and 3D printing are key elements of these strategies and initiatives. As proof of the future economic importance, these governments are investing a total more than $1 billion to help accelerate commercial success of IoT in order to advance manufacturing competitiveness.

Industry 4.0 is loosely defined as the next phase of industrial revolution (see figure below) whereby smart devices are intelligent enough to assume major control over our machines of manufacturing and distribution. This is a scenario in which all potential intelligent objects are equipped with unique identifiers that enable data transfer abilities over a network without human-to-human or human-to-machine interaction. By the year 2020, the number of connected devices in service is estimated to be anywhere from 25 to 100 billion.

From Industry 1.0 to Industry 4.0

DEGREE OF
COMPLEXITY

FIRST
Industrial Revolution

Through the introduction of mechanical production facilities with the help of water and steam power

First mechanical loom, 1784

SECOND
Industrial Revolution

Through the introduction of a division of labor and mass production with the help of electrical energy

First assembly line, Cincinnati slaughter houses, 1870

THIRD
Industrial Revolution

Through the use of electronic and IT systems that further automate production

First programmable logic controller (PLC), Modicon 084, 1969

FOURTH
Industrial Revolution

Through the use of cyber-physical systems

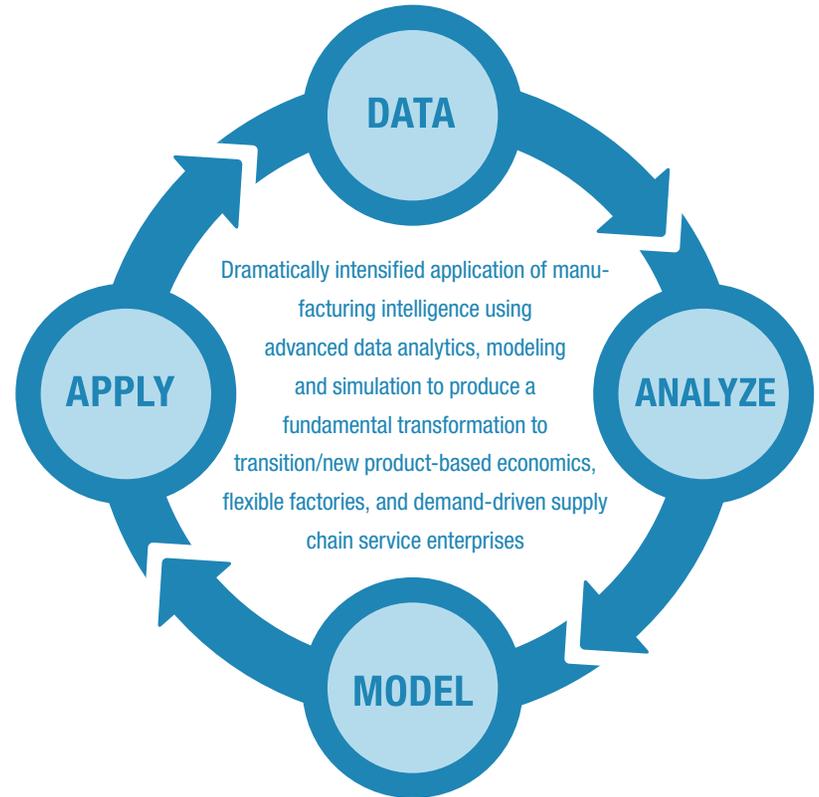1800   1900   2000   **Today**

© DFKI, 2011

Industry 4.0 and Smart Manufacturing Initiatives

The SMLC enables stakeholders in the smart manufacturing industry to form collaborative R&D, implementation, and advocacy teams for development of the approaches, standards, platforms and shared infrastructure that facilitate the broad adoption of manufacturing intelligence. SMLC is a non-profit organization committed to overcoming barriers to the development and deployment of 21st Century Smart Manufacturing systems (see figure to right). SMLC activities are built around industry-driven development, application, and scaling of a shared infrastructure that will achieve transformational economic-wide impact, manufacturing innovation, and global competitiveness.

There is much work to do in establishing new standards and interoperability across legacy and new technologies, as well as significant security challenges to consider and tackle. However these initiatives have broad and transformative potential in the manufacturing world with business value approaching trillions of dollars, and the market is beginning to respond.

Perhaps the ultimate manifestation of these initiatives down the road is the concept of the "smart enterprise" where each aspect of operations and the overall business is interconnected and continuously storing, contextualizing, and analyzing data to enable near-immediate, fully informed decisions across multiple roles.

While recent research from LNS Research recorded that more than 40% of respondents were still unsure of the potential of IoT and had yet to make any real investment, 21% of those respondents have begun to make initial investments, with many large manufacturers reporting a target of 2020-2030 as the target dates for having all production equipment connected in an intelligent network

A circular diagram showing four connected nodes: DATA, ANALYZE, MODEL, and APPLY, arranged around the center text: "Dramatically intensified application of manufacturing intelligence using advanced data analytics, modeling and simulation to produce a fundamental transformation to transition/new product-based economics, flexible factories, and demand-driven supply chain service enterprises"

21st Century Smart Manufacturing

- Demand-dynamic economics keyed on the intelligence of the 'customer'

- Coordinated enterprise responses throughout the entire manufacturing supply chain

- Predictive, preventive

- Integrated computational materials engineering

- Performance-oriented enterprise, minimizing energy and material usage and maximizing environmental sustainability, health and safety, and economic competitiveness

The Move to Digitization

The speed of market activity, combined with the increased number of product variations and increased product complexity, supplier dispersion, and rate of consumer interaction has created a scenario in which the traditional methods of manual information collection and dissemination to key stakeholders are unsustainable and producing rapidly diminishing returns.
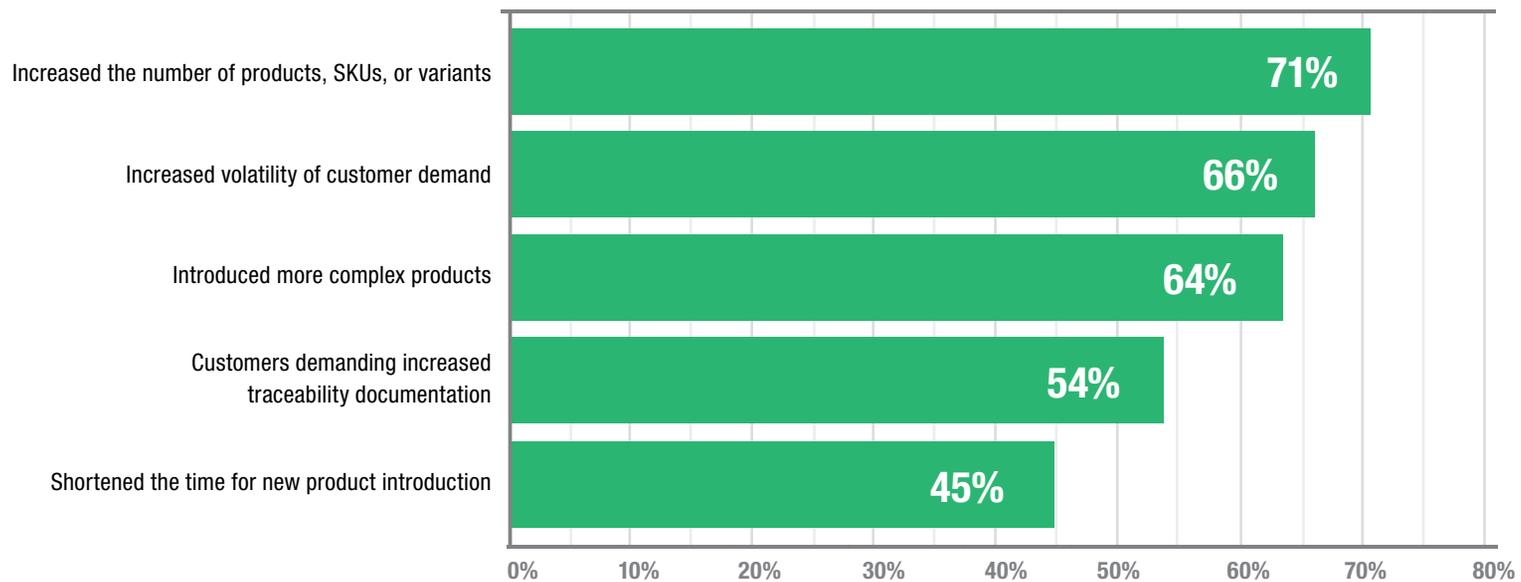
Today's technology capabilities are enabling the integration of information across the entire product lifecycle—from design, through engineering, manufacturing, delivery, and service—to a digital model that allows immediate and actionable information to reach the necessary departments and functions with greater speed, accuracy, and efficiency than ever before.

This trend toward complete digitization is occurring rapidly in forward-thinking industrial companies from many different industries. Manufacturing executives from Lockheed Martin have been publicly promoting a Digital Thread approach to manufacturing since 2010 and Procter & Gamble, the world's largest consumer products company, has an initiative to digitize everything from production systems to digital tools for sales pitches.

"The idea is to be digital from the laboratory molecule to the store shelf."

– Robert McDonald, *CEO, Procter & Gamble*

Changing Manufacturing Business Conditions - 2012 to 2013

Condition	Percentage
Increased the number of products, SKUs, or variants	71%
Increased volatility of customer demand	66%
Introduced more complex products	64%
Customers demanding increased traceability documentation	54%
Shortened the time for new product introduction	45%

Understanding the Digital Thread

The Digital Thread is a concept that harnesses this trend toward digitized information to the fullest. It is the concept of a single, unbroken thread of required information throughout the value chain that is accessible to all departments across the extended value enterprise and ensures complete traceability from design, through production, and to the customer.

With an unbroken flow of information, decisions stemming from any part of operations, such as quality issues, asset management, meeting supply, customer sentiment, and others, can be accessed and integrated to specific decisions among those respective departments and companies, leading to overall increases in productivity, quality, profit, and other Key Performance Indicators (KPIs).

The Digital Thread also speaks to many of the top challenges referenced earlier among manufacturers. This digital flow of information takes the place of duplicative databases that cause information confusion and bottlenecks.

SALES
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to Order Customer
Requirements

ENGINEER
3D Product Design

ENGINEER
Bill of Materials

SUPPLY CHAIN
Material Resource
Planning

QUALITY
Incoming Material Inspection

PRODUCTION
Electronic Work
Instructions

QUALITY
Final Assembly Test

SUPPLY CHAIN
Logistics
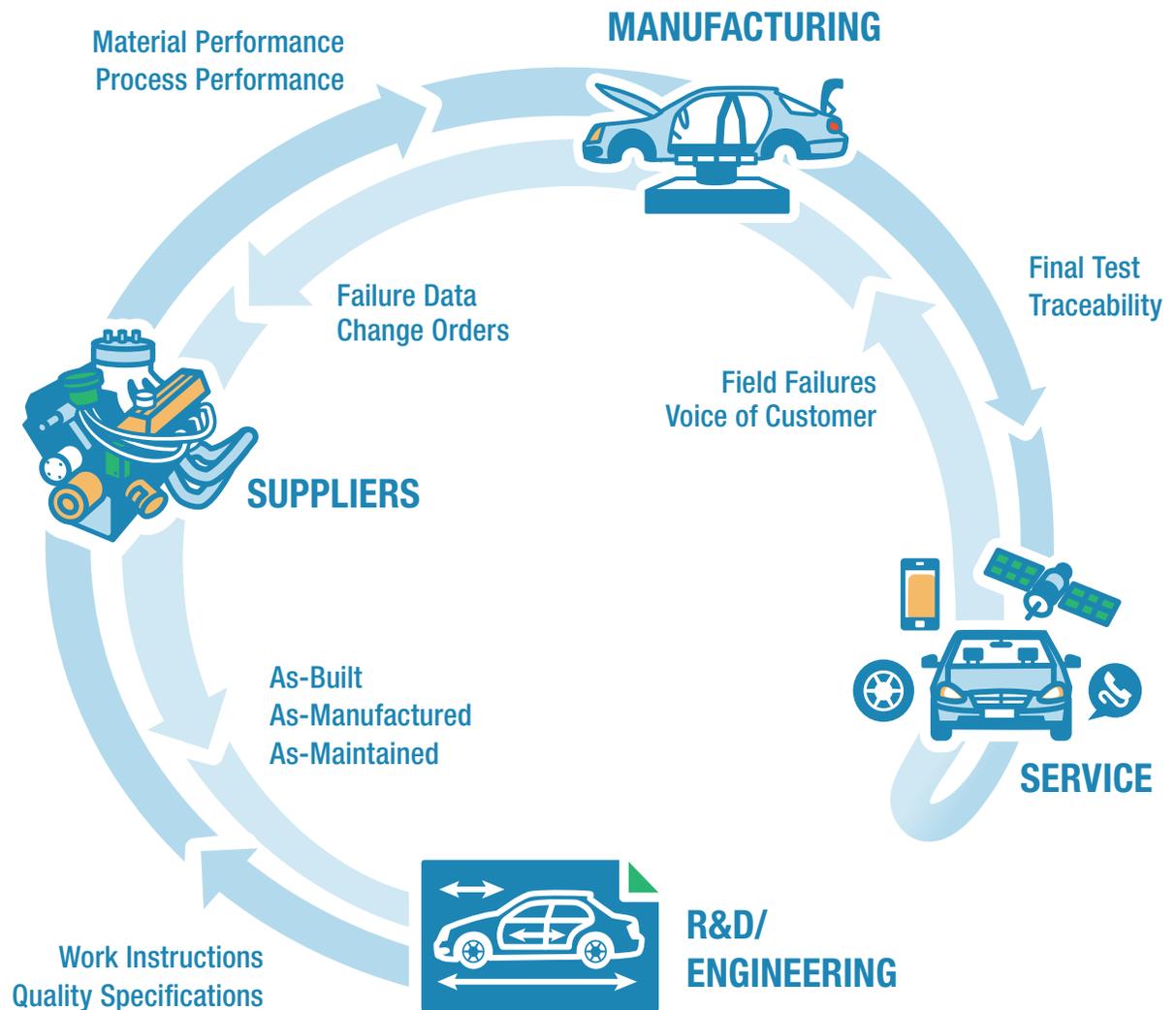
MECHANIC
Service Management

Supporting Closed-Loop Processes and Traceability

Leading organizations today are making a move from the traditional quality processes. The disparate quality data collected in silos across R&D, engineering, supplier quality, manufacturing, and service is being integrated into common data and workflows that facilitate a two-way flow of information and coordinated activity in order to "close the loop" on quality.

Integrated data analytics that can accompany closed-loop quality capabilities allow for greater visibility and collaboration between departments and much greater speed of decision making.

In effect, the Digital Thread has woven quality as a holistic responsibility into the business and operations processes where previously it existed as a set of disconnected and siloed departmental quality checks and processes.

MANUFACTURING

Material Performance
Process Performance

Final Test
Traceability

Failure Data
Change Orders

Field Failures
Voice of Customer

SUPPLIERS

SERVICE

As-Built
As-Manufactured
As-Maintained

Work Instructions
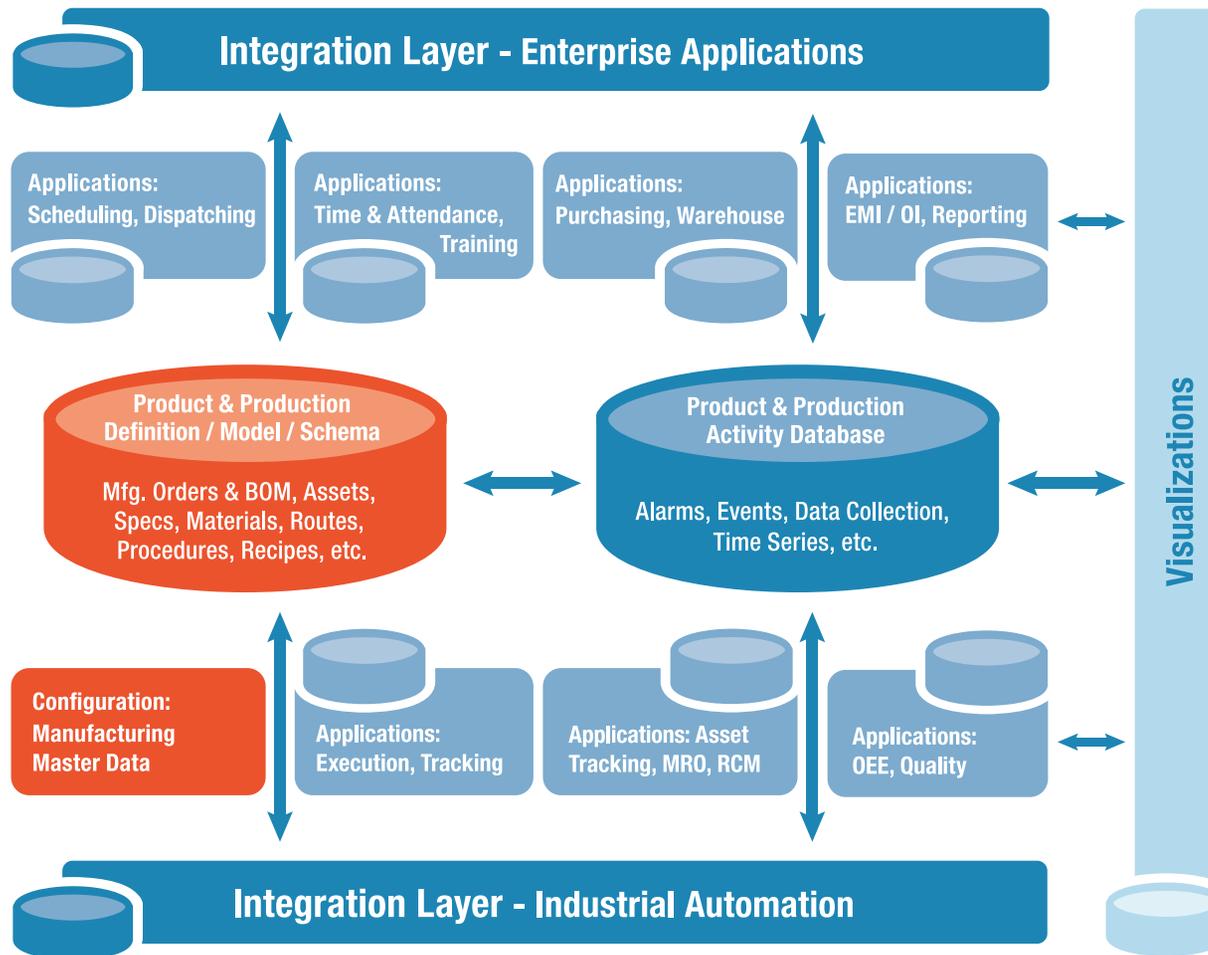Quality Specifications

**R&D/
ENGINEERING**

MOM Software – The Next Enterprise-Class Application

Traditional MOM Software Architectures

The challenges manufacturers face today stemming from increased customer demands, competition, and faster market activity have rendered traditional approaches to MOM software architectures obsolete. These legacy architectures are not agile enough to be adapted to rapidly evolving needs. With the number of production facilities many organizations have across the globe, the existence of legacy systems, multiple databases, costly integration, and manual process and data collection cause significant challenges in updating and adapting these systems in support of getting the digital information and processes to the right people at the right time.

Traditional Database-Centric Architectures

Integration Layer - Enterprise Applications

Applications: Scheduling, Dispatching

Applications: Time & Attendance, Training

Applications: Purchasing, Warehouse

Applications: EMI / OI, Reporting

Product & Production Definition / Model / Schema

Mfg. Orders & BOM, Assets, Specs, Materials, Routes, Procedures, Recipes, etc.

Product & Production Activity Database

Alarms, Events, Data Collection, Time Series, etc.

Configuration: Manufacturing Master Data

Applications: Execution, Tracking

Applications: Asset Tracking, MRO, RCM

Applications: OEE, Quality

Integration Layer - Industrial Automation

Visualizations

A Platform Approach to MOM Software

A platform approach to MOM software architecture simplifies and accomplishes many things; perhaps most broadly and importantly in supporting a move to being a capable enterprise-class application enabler that supports the trend toward digitization.

A next-generation, platform approach to MOM simplifies the architecture, eliminates duplication of systems and functionality, facilitates open integration with both legacy applications and new technologies like Cloud, Mobile, Big Data, and IoT, which are important strands of the Digital Thread.
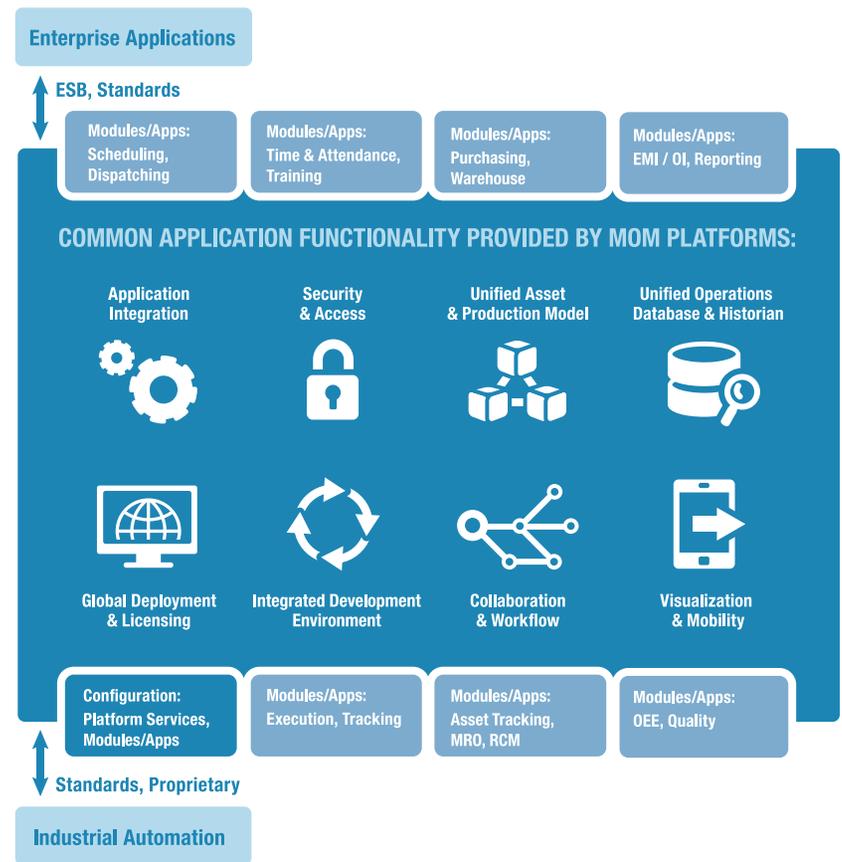
In addition, it includes common user interfaces for ease of use and comprehension, improved, role-based decision making, common collaboration and workflow management across the entire range of users. With the simplified security and single log-on, it scales much more easily to support the enterprise, and the multi-directional flow of interdepartmental information supports important initiatives manufacturers are facing today, such as: regulatory requirements and customer demands for full product traceability and closed-loop quality improvements.

It should be noted, this diagram represents LNS Research's future vision for a MOM platform architecture and even though there are solution providers that have developed a comprehensive MOM platform, no vendor to date has a solution encompassing all of these platform capabilities. On the bright side, this does not mean companies should not be starting to invest, in fact quite the contrary.

Investments in these areas are critical to addressing the market challenges faced. The key is choosing the right MOM platform that has the right roadmap for the future and can deliver today on the capabilities that will deliver the most business value , including production execution, quality, and analytics as described in the following sections.

Future - Integration & Collaboration Platforms

Enterprise Applications

ESB, Standards

| Modules/Apps: Scheduling, Dispatching | Modules/Apps: Time & Attendance, Training | Modules/Apps: Purchasing, Warehouse | Modules/Apps: EMI / OI, Reporting |

COMMON APPLICATION FUNCTIONALITY PROVIDED BY MOM PLATFORMS:

Application Integration

Security & Access

Unified Asset & Production Model

Unified Operations Database & Historian

Global Deployment & Licensing

Integrated Development Environment

Collaboration & Workflow

Visualization & Mobility

| Configuration: Platform Services, Modules/Apps | Modules/Apps: Execution, Tracking | Modules/Apps: Asset Tracking, MRO, RCM | Modules/Apps: OEE, Quality |

Standards, Proprietary

Industrial Automation

Current and Planned Adoption of MOM Software

The fact is 21% is still impressive growth and states the case for going comprehensive, enterprise-class to help support/drive consistent ability to deliver on the promise of Digital Thread.

Though LNS Research MOM survey data shows that current implementations are at 23%, it is noteworthy to see that 21% of respondents are planning to adopt MOM software applications within a year's time.

Those companies choosing to adopt new generation MOM software will enjoy the benefits that come with moving toward the Digital Thread: real-time, actionable information specific to role, integration with enterprise and automation applications, and visualizations that allow faster, more accurate decision making.

As adoption rates increase and modern MOM software platforms and applications become more widespread, those organizations that choose to stay with outdated and disparate systems will be in an increasingly disadvantaged position as the bar for performance and agility creeps continually and ever higher.

### Comprehensive Suite of MOM Applications Adopted

Not Planned	55%
Currently Implemented	24%
Planned within 1 Year	21%

0% 10% 20% 30% 40% 50%
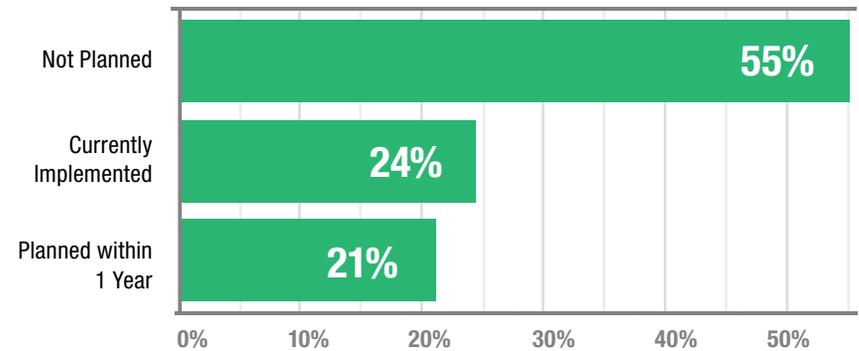
MOM Software as Enterprise vs. Plant Application

Today, most companies approach MOM above the plant level, as 68% see it as either a business unit or corporate level initiative, whereas the remaining 32% view it as a plant-by-plant initiative.

This shows a clear trend toward corporate level standardization of MOM platforms and applications. The holistic performance benefits afforded by taking an enterprise approach to MOM software are a critical step toward the future vision of weaving a consistent Digital Thread throughout the value chain.

Scope of MOM Software Implementation

Corporate Level	41%
Plant Level	28%
Business Unit Level	27%
Line Level	5%

0% 10% 20% 30% 40% 50%
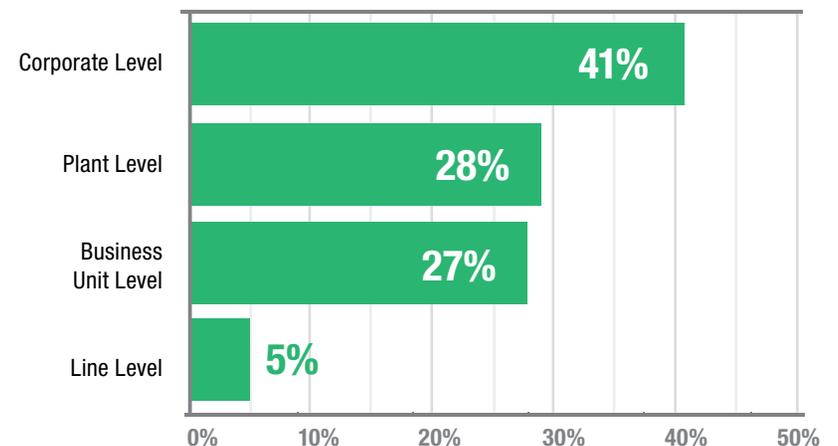
How to Select and Drive ROI with MOM Software

Top Selection Criteria for MOM Software

As the data shows, the functionality to support different and diverse users across the value chain is still the most important consideration for companies today, as 43% of respondents chose it as a top response. The second-most chosen response was software cost. While costs are always a concern with anything, it is important for organizations to evaluate the full lifecycle costs of new software technology rather than just the initial purchase price. Ongoing support, flexibility, adaptations, and the ability to scale are all critical in receiving full value, and technologies like Cloud, Mobile, Big Data, and IoT can have a huge impact on the total cost of ownership.
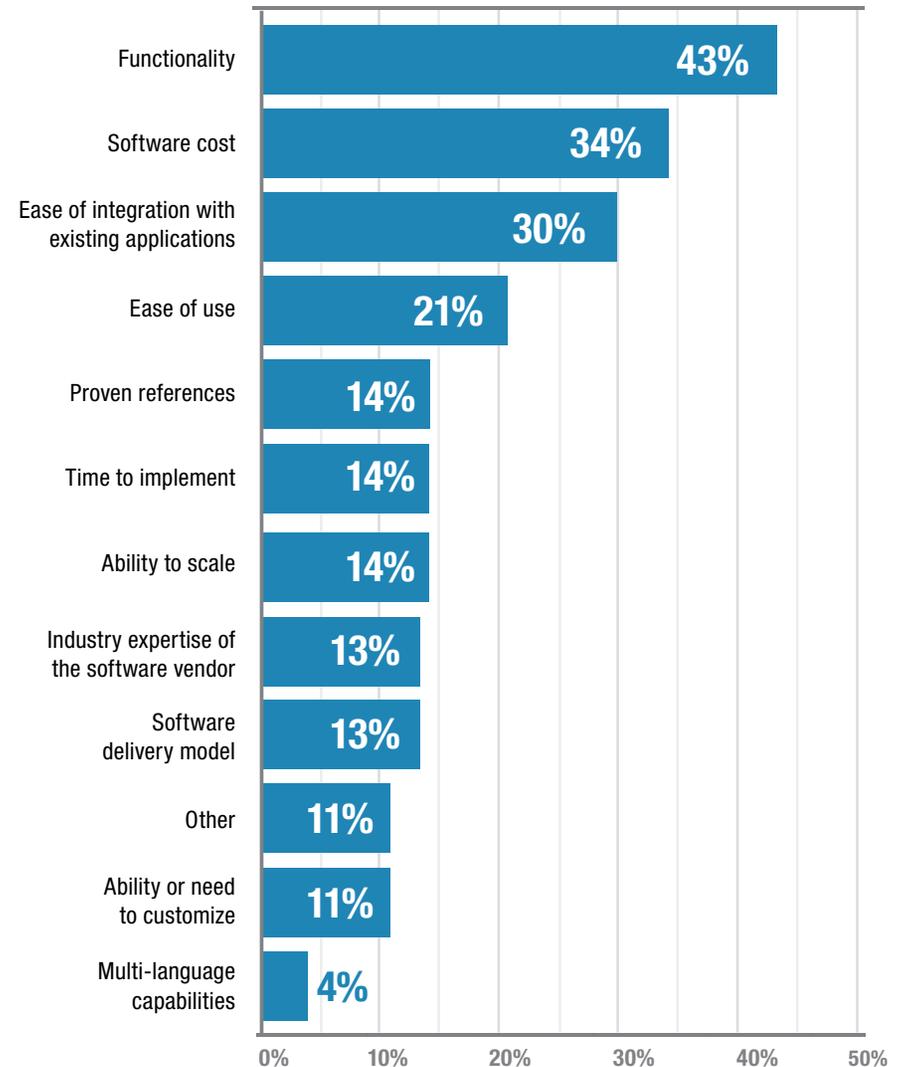
Ease of integration with existing applications was the third-most chosen response. Companies today need software that embraces both legacy applications as well as next-generation technology, and open MOM platforms can help with this.

Major examples of important MOM software integrations that support the Digital Thread include ERP and PLM for cost/supply chain information, and product and process information, respectively.

Functionality is still #1 MOM Software Decision Criteria, followed by cost at #2.

Delivery Model (cloud) is still well down the list with only 13% of respondents caring.

Most Critical Factors for Selecting MOM Software

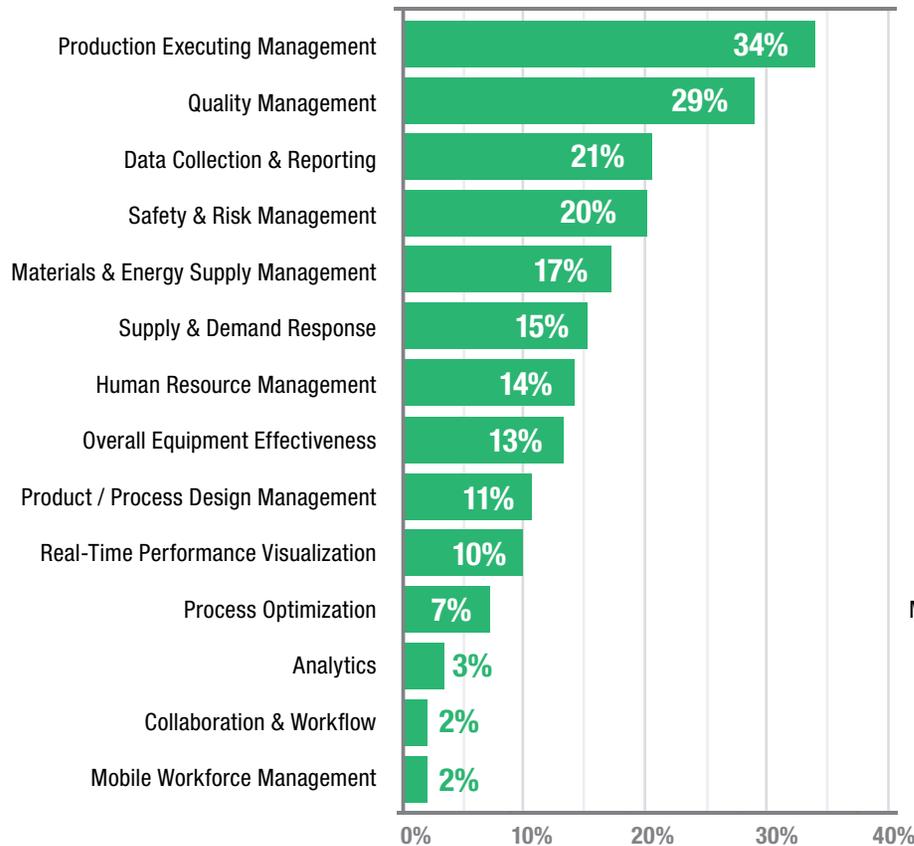| Factor	Percentage
Functionality	43%
Software cost	34%
Ease of integration with existing applications	30%
Ease of use	21%
Proven references	14%
Time to implement	14%
Ability to scale	14%
Industry expertise of the software vendor	13%
Software delivery model	13%
Other	11%
Ability or need to customize	11%
Multi-language capabilities	4%

Most Mature Areas of MOM Software

The most mature areas include production execution and quality management, which stands to reason, as these are critical areas to manage for successful manufacturing. Least mature is safety and risk management; however, it should be noted that these are aspects often managed in other systems such as ERP and EHS.

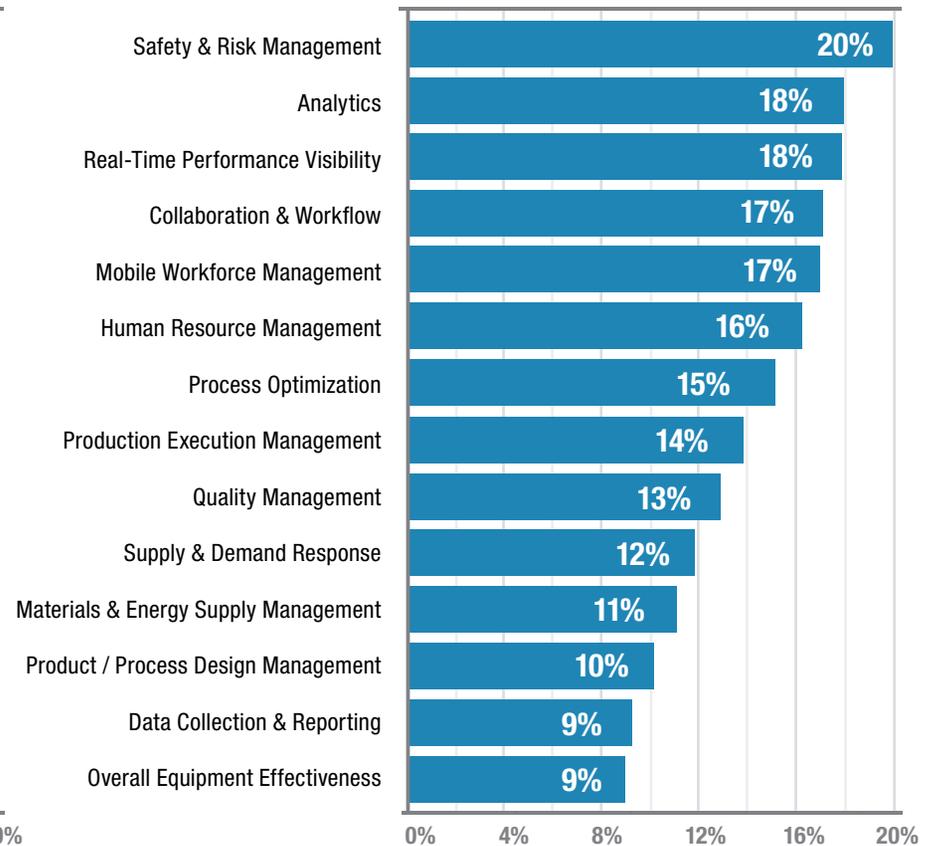What may come as a surprise is the immaturity of analytics, visibility, and collaboration identified in the survey, indicating that many MOM implementations are legacy systems that lack these more modern capabilities.

Additionally, there are new opportunities in the integration of design, optimization, data analytics, and collaboration across all roles and users of applications.

Most Mature Areas of MOM Software

Area	%
Production Executing Management	34%
Quality Management	29%
Data Collection & Reporting	21%
Safety & Risk Management	20%
Materials & Energy Supply Management	17%
Supply & Demand Response	15%
Human Resource Management	14%
Overall Equipment Effectiveness	13%
Product / Process Design Management	11%
Real-Time Performance Visualization	10%
Process Optimization	7%
Analytics	3%
Collaboration & Workflow	2%
Mobile Workforce Management	2%

Least Mature Areas of MOM Software

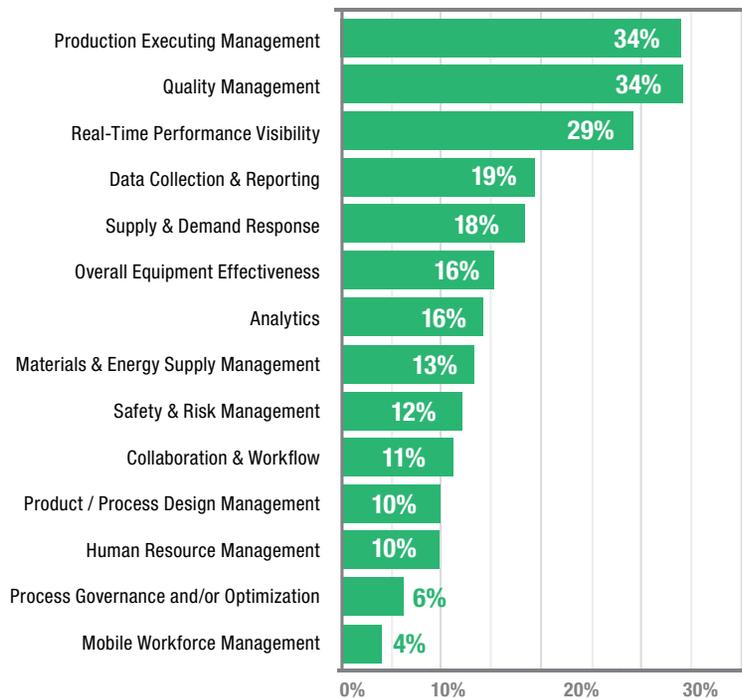| Area	%
Safety & Risk Management	20%
Analytics	18%
Real-Time Performance Visibility	18%
Collaboration & Workflow	17%
Mobile Workforce Management	17%
Human Resource Management	16%
Process Optimization	15%
Production Execution Management	14%
Quality Management	13%
Supply & Demand Response	12%
Materials & Energy Supply Management	11%
Product / Process Design Management	10%
Data Collection & Reporting	9%
Overall Equipment Effectiveness	9%

Areas of MOM Software Delivering Most Business Benefit

For the most part, there is strong alignment between the areas of MOM that are most mature and the areas that are delivering the most value, starting most notably with production execution, quality management, and data collection and reporting. One major divergence between maturity and business value, some companies claim real-time visibility as one of the least mature areas, but for many it is one of the areas delivering the most business value. Another surprise is that mobile workforce management is the top area being least critical for business success, even though we have seen great productivity gains being reported by individual companies that have deployed these types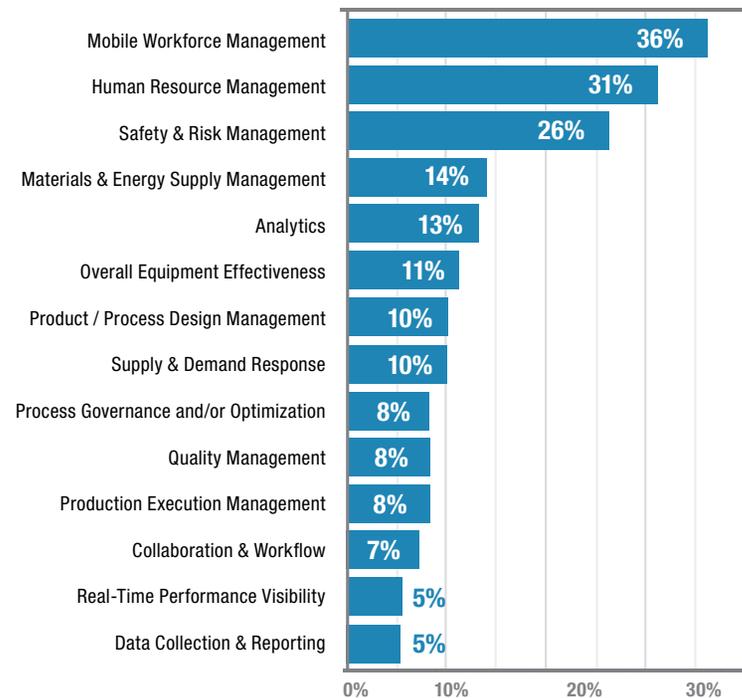 of solutions. There could be a number of reasons for this: a lack of data collection, analytics, and real-time information to deliver through the mobile device, a lack of mobile workers within manufacturing, and perhaps, many mobile workers, such as those involved in maintenance, using other legacy enterprise systems rather than MOM.

A final interesting point is that OEE is relatively high on the list for both most and least business value, another data point supporting the fact that OEE is only effective if used properly, i.e. put in context of broader supply and demand chain goals, used for benchmarking across common assets, and supporting root cause analysis, with drill down capabilities and real-time data.

Most Critical Areas of MOM Software for Business Success

Area	%
Production Executing Management	34%
Quality Management	34%
Real-Time Performance Visibility	29%
Data Collection & Reporting	19%
Supply & Demand Response	18%
Overall Equipment Effectiveness	16%
Analytics	16%
Materials & Energy Supply Management	13%
Safety & Risk Management	12%
Collaboration & Workflow	11%
Product / Process Design Management	10%
Human Resource Management	10%
Process Governance and/or Optimization	6%
Mobile Workforce Management	4%

Least Critical Areas of MOM Software for Business Success

Area	%
Mobile Workforce Management	36%
Human Resource Management	31%
Safety & Risk Management	26%
Materials & Energy Supply Management	14%
Analytics	13%
Overall Equipment Effectiveness	11%
Product / Process Design Management	10%
Supply & Demand Response	10%
Process Governance and/or Optimization	8%
Quality Management	8%
Production Execution Management	8%
Collaboration & Workflow	7%
Real-Time Performance Visibility	5%
Data Collection & Reporting	5%

Key Relationships: Software Use & Performance Improvements

Eighty-five percent of survey respondents also have process improvement programs in place such as ISO 9000/9001, Lean Manufacturing, Six Sigma, Operational Excellence, etc. Software or any technology alone will not deliver these kinds of benefits.

How can software technology support and impact metrics programs and financial performance?

Average Annual Improvements in:

TOTAL COST PER UNIT
13.1% Overall Average

24.1%
Users of **Operations Intelligence/Enterprise Manufacturing Intelligence** (OI/EMI)

22.5%
Users of **Manufacturing Execution Systems** (MES)

NET PROFIT MARGIN
10.4% Overall Average

19.4%
Users of **Comprehensive Manufacturing Operations Management Suite**

ON-TIME COMPLETE SHIPMENTS
12.5% Overall Average

22.0%
Users of **MES**

19.1%
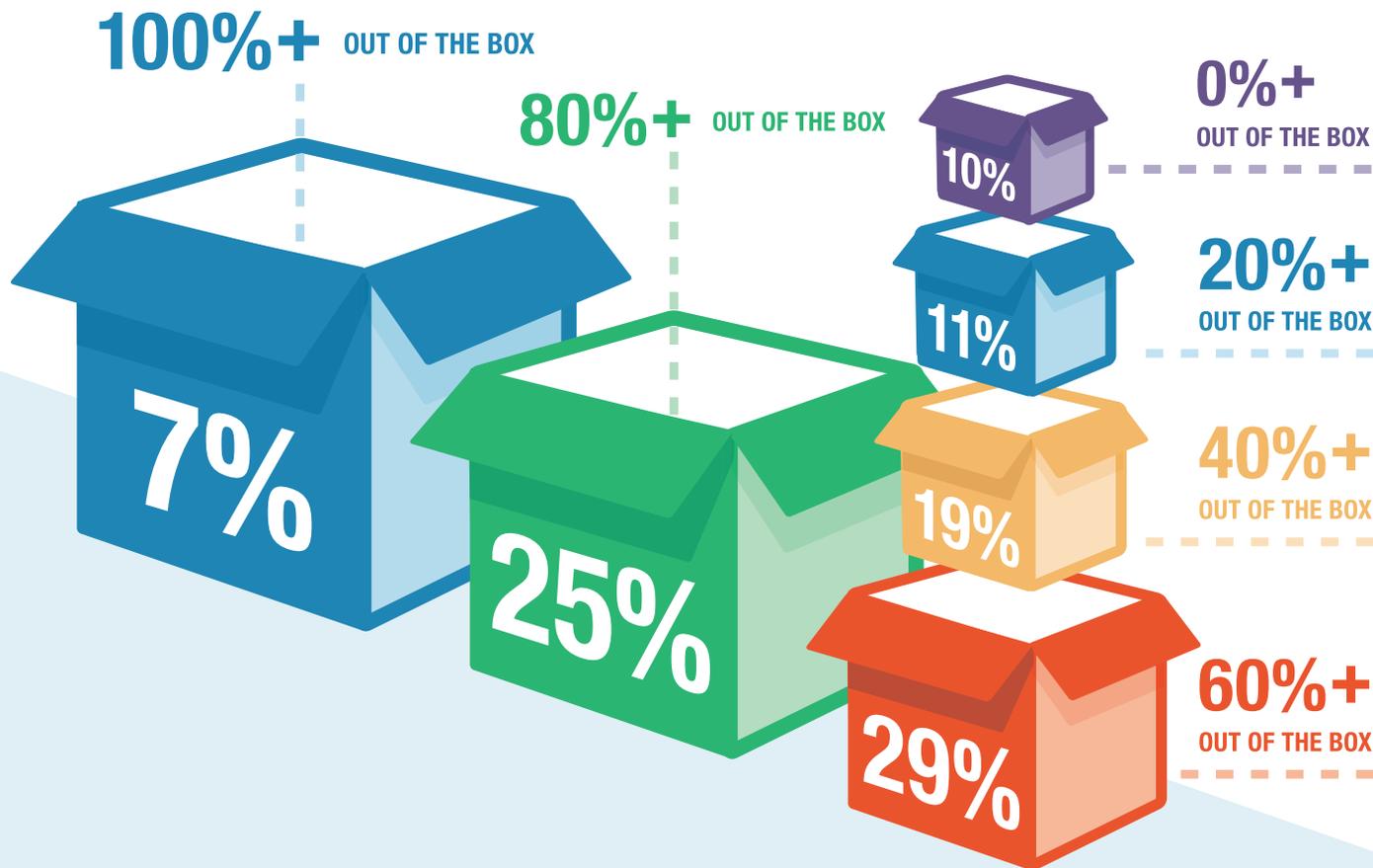Users of **Product Lifecycle Management** (PLM)

20.4%
Users of **Quality Management**

A Configurable Workflow Approach to MOM Software

A number of packaged MOM software providers are also providing pre-made application templates that contain best industry practices for given vertical industry (Automotive, Food & Beverage, Pharma, etc.). This approach can help reduce the time to deploy, while also providing a starting place for best practices; however; LNS Research is also finding that most of the marketplace is still in the 60%-75% range of using template, versus doing configuration and programming to customize their MOM solutions to meet their needs. This is an area of continued focus and development from some suppliers.

Over 30% of manufacturers report being able to support 80% or more of needed functionality out of the box. Although this is still the minority, it is a good target for any company implementing MOM software.

100%+ OUT OF THE BOX — **7%**

80%+ OUT OF THE BOX — **25%**

0%+ OUT OF THE BOX — **10%**

20%+ OUT OF THE BOX — **11%**

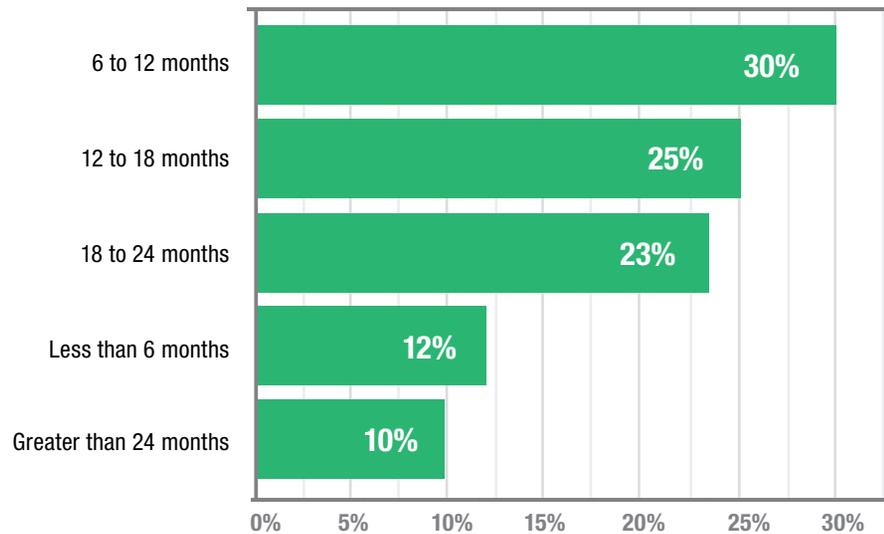**40%+** OUT OF THE BOX — **19%**

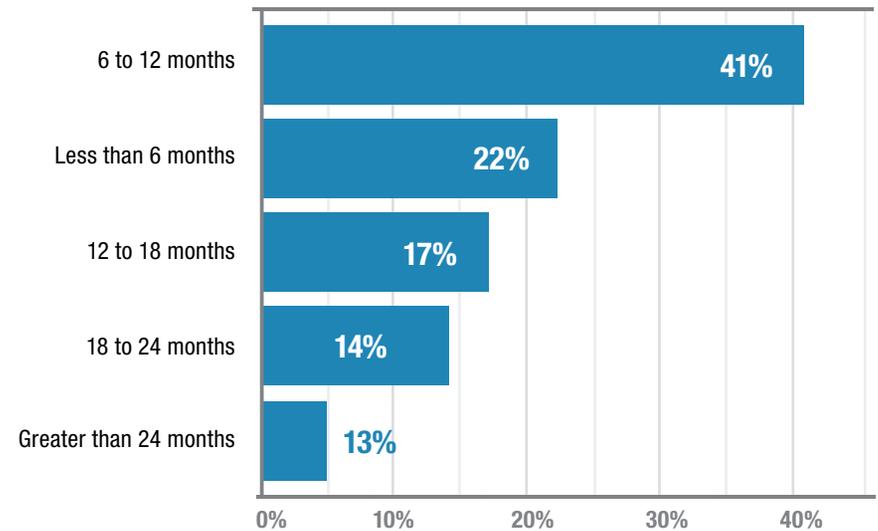**60%+** OUT OF THE BOX — **29%**

Time to Implement MOM Software

The average time for MOM software implementations is coming down thanks to easier open integration, new technologies, and more use of "out of the box" functionality and industry application templates. The data shows a notable reduction in subsequent implementations, and LNS Research is seeing more successful multi-plant rollouts.

Almost 2x as many companies can

deploy a MOM Software Suite in under 6 months

when comparing implementation times of first site to subsequent sites.

Time to Implement First MOM Software Site

Category	Value
6 to 12 months	30%
12 to 18 months	25%
18 to 24 months	23%
Less than 6 months	12%
Greater than 24 months	10%

Time to Implement Subsequent MOM Software Sites

Category	Value
6 to 12 months	41%
Less than 6 months	22%
12 to 18 months	17%
18 to 24 months	14%
Greater than 24 months	13%

Time to ROI for MOM Software

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THE GLOBAL STATE OF
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MANAGEMENT SOFTWARE

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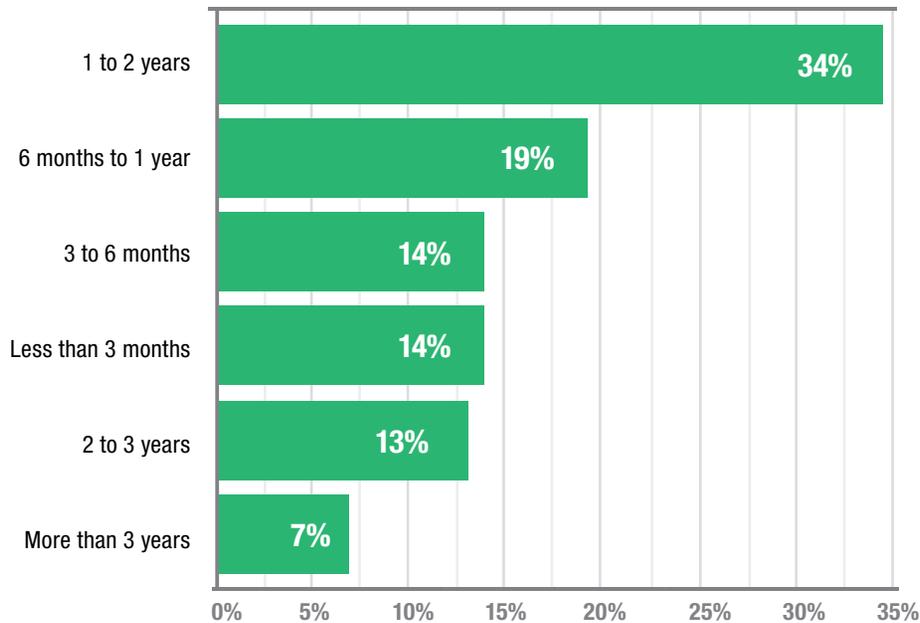
1 2 3
4 5

While ROI is an important criterion for any solution selection, MOM software is especially critical to day-to-day production operations, and is in competition with other potential capital improvements. Fortunately, MOM software helps sustain and improve the critical metrics in operations that drive a tangible ROI, including reduced scrap, reduced rework, on-time delivery, and others by optimizing an organization's existing assets and people productivity as the Digital Thread comes into focus.
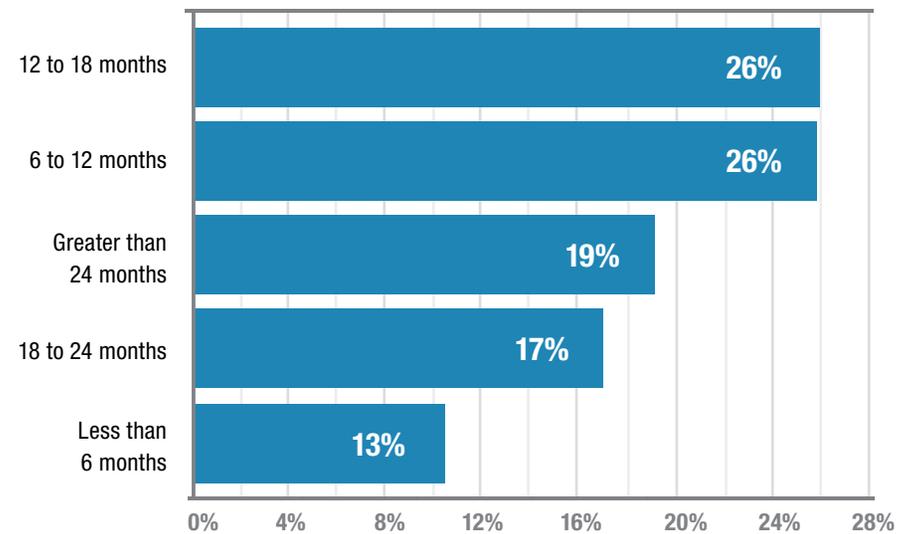
Also fortunate, most companies today have developed a realistic expectation with respect to ROI, with the majority of companies expecting 6-18 months and very few expecting less than 6 months.

The reality of the figures shows this is still on the ambitious side, but not by huge amounts, as the majority of actual ROI still falls in the 6 months to 2 years category. Also of note: the number of companies that experienced ROI in less than 6 months was nearly double the number that required it.

Time to ROI for MOM Software

Category	Percentage
1 to 2 years	34%
6 months to 1 year	19%
3 to 6 months	14%
Less than 3 months	14%
2 to 3 years	13%
More than 3 years	7%

ROI Time Requirement for MOM Software

Category	Percentage
12 to 18 months	26%
6 to 12 months	26%
Greater than 24 months	19%
18 to 24 months	17%
Less than 6 months	13%

Summary & Recommendations

Summary and Recommendations

As research has shown, the pressures facing the manufacturing industries at large are only poised to intensify as industry and customer drivers require increased agility, better product quality, and tighter compliance. Today's leading manufacturers understand the importance of progressing past manual data collection and information toward an automated, digitized model that facilitates:

- Faster time to market for new and improved product designs

- More accurate and actionable information in role-based dashboards for quicker reactions and proactive behaviors

- Closed-loop quality management

- Holistic operations coordination to optimize organizational resources across the enterprise manufacturing value chain

Next-generation MOM software platforms—and the emerging tech trends they employ—are enabling new data and process integration capabilities to organizations' operations that are accelerating ROI and progressing toward complete digitization of information across the value chain.

To support and progress toward this digitization, LNS Research recommends organizations evaluate their current MOM software landscape and ways to incorporate the new integration capabilities and technologies that next-generation MOM software is providing. As MOM application adoptions increase, creating competitive advantages in speed, quality and productivity, manufacturing, and production organizations that fail to do so will find themselves at an increasing disadvantage as time, technology, and customer expectations advance.

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