The Power of Test

2023 Test Leadership Research









Evolving Engineering Complexity



Reduction of Available Talent



Change of Test Strategy.



- USB-C
- BT 5.0 3 processors
- 2 buttons
- 2 Duilon 2 LEDs
- 4 MEMS Mics
- IP55
- Battery
- Accelerometer



[We must] reduce test development from months to weeks despite a 2.5X test coverage increase on new products

"

CHRISTIAN WOLF TEST MANAGER, GN AUDIO

"

High starting salaries for software engineering graduates disincentivizes specialization in electrical engineering

"

BRITTNEY OUTLAW ACADEMIC ADVISOR, UNIVERSITY OF TEXAS



ff We

If we don't invest, we won't be able to deliver to the customer, and this business will be in trouble in a couple of years time

"

PAUL KILBRIDGE NPI MANAGER, EI ELECTRONICS



Survey Methodology



In partnership with



This research report was produced by FT longitude, the specialist research and content division of the Financial Times Group. The views expressed in this report are those of NI.



Test Teams are Failing

Less than half of organizations say they're performing well across most of their important metrics.

Most important metrics for senior leadership	versus	Percentage of organizations performing well against them	
83%	Product quality and reliability	44%	
64%	Speed of test/ throughput	38%	
60%	Time to market/ project schedules	36%	
37%	Customer satisfaction	59%	
30%	Cost of test (CapEx and OpEx)	37%	
28%	Hiring and retention	47%	

Q: What are the most important metrics for senior leadership at your company today? N=200 Rank 1-3 summary. Q: How is your company performing against the following metrics? (above or well above expectations) N=200

U

Data is a Prioritized Investment

Strong focus on data supports NI's previous findings that companies with advanced data strategy outperform across every metric Test data and system management software 66% Cloud-based data storage 65% Third-party consultants or outsourcing 51% Test systems (hardware and software) 45% Enterprise software tools 38%

Q: What are the top three investments you would like to make in order to meet your testing goals? Rank 1-3 N=200 (total)

Expected improvement in next 12-months 60% 63% 62% 50% 53% 51% 52% 50% ESUI 42% 40% 30% 33% **Overall Speed** Employee Level of Market Innovation Share to Market Productivity

Companies with advanced data strategies

Corporate-wide infrastructure with good connections between product lifecycle stages.

Companies with limited data strategies

Siloed infrastructure that fails to encompass engineering data from design, validation, and manufacturing.



Initiative Sponsorship

Test teams are pressing ahead on important initiatives over the next 12 months

However, outcomes may suffer if prioritization cannot be defined

	Adopting more test automation	15%	74%	12%
AUTOMATION	Adopting COTS test hardware or software	23%	66%	12%
	Adopting integrated test and simulation techniques	18%	71%	12%
	Process and technology reuse between teams	15%	74%	12%
STANDARDIZATION	Adopting standardized test platforms	18%	71%	13%
	Scaling established best practices across the wider organization	23%	62%	16 ⁹
	- Connecting test systems and enabling remote management	15%	75%	11%
DIGITAL TRANSFORMATION	Better utilizing test data across the company	14%	73%	14%
	Implementing analytics to provide insight	15%	61%	25%
ata may not total 100% due to rounding Not yet planning to implement Planning to implement Already implementin				

What initiatives are you currently implementing, or looking to implement, over the next 12 months? N=200

Decentralized, **Connected Future**

Shifting to a decentralized cloud-based instrumentation model promises simpler software maintenance and the ability to scale compute and storage up and down based on user need.

This is likely to be adopted first in validation, as manufacturing groups with more predictable coverage needs prioritize remote access to improve reliability. Top 5 commercial technologies likely to become part of test systems in next 5 years



Top 3 break out by application

Production and manufacturing		Design, Validation & Verification	
 Remote Advance Decention 	e Access and Control	1.	Decentralized Processing
	ced Automation	2.	Advanced Automation
	tralized Processing	3.	Artificial Intelligence





Budgetary Competition

56% of test organizations expect their spending on test hardware, software, and personnel to increase in the next 12 months

BARRIERS TO TEST INVESTMENT



Q6: What are the biggest barriers preventing you from making investments in the test function overall? Rank 1-3 N=200



Learning from Best-in-Class Organizations





Leaders Advocate Consistent Incremental Spending

PHILIPS

Increasing spending in next 12 months

73% 51% Best Everyone <u>Performers</u>

of this group **do not** plan to **significantly** increase their test budget

"

The ability to articulate the business value that a test organization could deliver was critical. We forecast the exponential development and sustaining costs in-line with increased product complexity. A vision of breaking the relationship between product complexity and test-system cost provided executive buy-in

"

NEIL EVANS Test Manager, Philips



Software is Central to Leader's Test Strategy

Value in AI/ML

Twice as many leading organizations than the rest rate **advanced analytics as the most important** data investment, they'd like to make in the next two years (48% vs. 21%)

Increased Simulation

Broad adoption of **software centric test methodologies** is called out as a key contributor to accelerated design and test schedules

System Connectivity

All organizations rate **remote access and control a priority**, but leading groups are accelerating faster to meet globalization challenges.

Commercial technologies that leading test organizations are LEADING likely to embrace in the next five years vs. the rest				
<u></u>	Artificial intelligence/machine learning	79%		
		59%		
사용 Integrated 사용 (e.g., model base embedd	Integrated test and simulation techniques	75%		
	embedded software test, digital twin)	61%		
Remote a	Remote access and control of test systems and	73%		
	instrumentation	63%		
Decentralized (i.e., moving measuren edge to	Decentralized measurement processing	71%		
	edge to a centralized server)	70%		
Enterprise data and s	Enternaise data and sustant managements	67%		
	Enterprise data and system management	63%		
р	Microservice-based software architectures for test	65%		
	(e.g., hardware and measurement abstraction frameworks)	54%		
/>	Open source measurement libraries and programming languages	63%		
		55%		

Report Conclusion

- The increasing pace of product innovation is forcing changes in methodology across the development lifecycle.
- Leading test teams are rapidly educating company leadership as to the differentiating business value they can deliver, fueling investment in people, process and tools.
- Connecting test insights into other engineering functions is critical in unlocking the true power of test. This leads to test team leaders becoming business leaders by driving the adoption of new technology.



Harness Technology

The test function must expand its impact within the organization by implementing an intentional and software-connected test strategy



Automation: Increasing test coverage with software-connected and model-based test methodologies directly impacts product quality and creates the data foundation upon further investment depends.

Standardization: Efficiency and quality benefits from harmonizing process, systems and software compound in line with the scale of adoption. Also centralizes technical governance and product decisions.

Digital Transformation: Harnesses standardized test and operational data to direct product development. Insights build from real-time process course correction to complex AI/ML derived product improvement.



