Amdocs Recognized for

2021

New Product Innovation

Global Next Generation OSS
Excellence in Best Practices

FROST & SULLIVAN

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Background and Company Performance

Industry Challenges

5G represents a fundamental shift in communication network architectures that will accelerate revenue generation through innovative services facilitated via 5G-enabled smartphones, tablets, laptops, and Internet of Things (IoT) devices. It will deliver a potent combination of network capabilities and flexible options for network deployments to improve the ability of communications service providers (CSPs) to deliver a differentiated, customized, and scalable wireless experience. Frost & Sullivan predicts that 5G adoption in the US will increase from less than 6 million connections in 2019 to 200 million connections by 2025, achieving a penetration rate of over 50%. Globally, 5G connections are expected to reach over 2.5 billion in 2025.

In addition, CSPs increasingly leverage advances in network virtualization, SDN and SD-WAN technologies, to transform and innovate their managed network services to enterprises, creating a more flexible, customizable next generation network services that best suits their clients' needs, giving enterprises more control, visibility and agility.
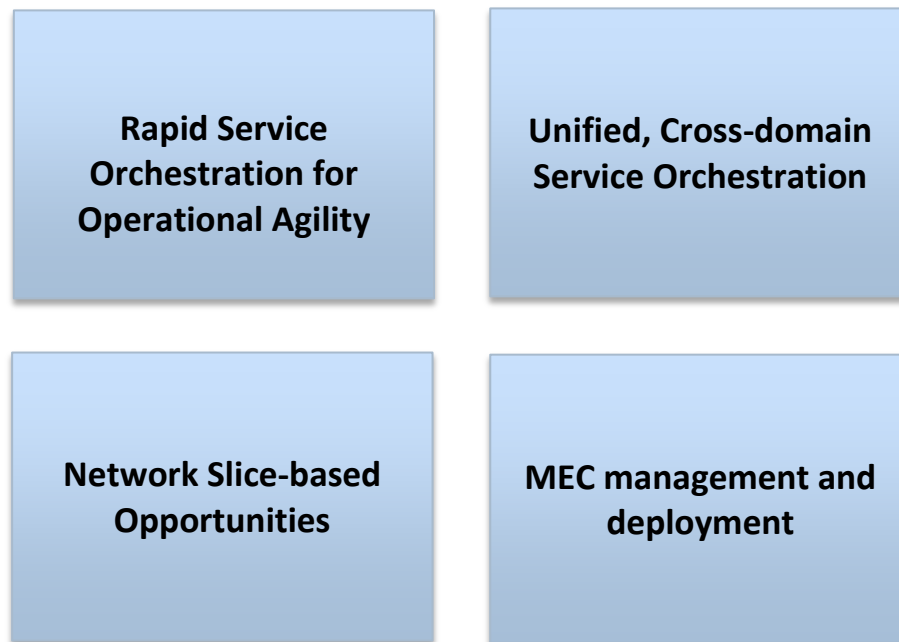
Resource elasticity, 5G slicing, and edge and cloud computing are essential to support differentiated 5G experiences and the future managed network services. However, an optimized network is just the first step. The power of a programmable network, and the monetization promise of next-generation network investments, will not be realized unless the appropriate service management and automation capabilities are in place. The journey to network modernization will be distinct for each operator; different network components will virtualize at different rates. The move to the future-state network architecture will not occur instantly; a wide range of hybrid and cross-domain deployments will have to be supported as CSPs go through an incremental journey to digital transformation.

As CSPs look ahead to the distributed, 'ecosystem-powered' networks of the future (such as SD-WAN, 5G, IoT and SDN/NFV), it is important to sustain hybrid network operations to manage physical and virtual network components. Successful operations of hybrid network will require an evolution of existing operations, systems, and processes as they advance towards the virtualized networks of the future. The new mode of operations will be digital-centric, include end-to-end service orchestration and closed loop fulfillment and assurance across hybrid network stacks.

In order to support innovation, meet customer expectations, stay competitive, and tap into new revenue streams CSPs must take control of complicated network architectures and service environments with orchestration. They must have the ability to automate provisioning and assurance across their networks, including multivendor devices, orchestrators, software-defined networking (SDN) controllers, and virtualized infrastructure managers (VIMs). Moreover, CSPs must focus on agile network operations and adopt a DevOps mentality to accelerate innovation and support a fail-fast approach.

Exposing service ordering and co-management capabilities to customers through various digital interfaces or channels is another key focus for CSP offering evolution. Nevertheless, the customer engagement interface can only ever be the tip of the iceberg. It cannot operate without digital-to-network automation covering service lifecycle management and orchestration.

The exhibit below depicts the key technological imperatives for next-generation networks operations for both enterprise and consumer customers services.

| Rapid Service Orchestration for Operational Agility	Unified, Cross-domain Service Orchestration
Network Slice-based Opportunities	**MEC management and deployment**

Source: Frost & Sullivan

- **Rapid service orchestration for operational agility**. The ability to assemble and reassemble network resources for dynamic services in near real-time is central to 5G and managed services innovation. The traditional ways of decomposing orders into individual network configuration tasks – sometimes manually – and then performing these tasks over several days or months is simply unacceptable in the era of 5G and cloud.

- **Unified, cross-domain service orchestration**. The key to automation is to shorten the time taken for implementing services in procedural workflows by relying on artificial intelligence (AI) and machine learning (ML). Unified and active inventory with near real-time update capabilities are also important for dynamic service setup and cross-domain (physical, virtual, cloud) service orchestration.

- **Network-slice based opportunities**. Accelerating 5G slicing deployments through open-source and open standards-based implementations is part of the essential technical evolution for OSS. Supporting the 5G slice management functional architecture comprised of the Communication Service Management Function (CSMF),

Network Slice Management Function (NSMF), and the Network Slice Subnet Management Function (NSSMF) is also an important requirement for next-generation wireless operations. [1]

- **Multi-access Edge Computing (MEC) management and deployment opportunities**. MEC and OSS evolution must go hand-in-hand. The various requirements for OSS to allow operators to manage edge-computing based deployments– including network resources and content applications – in an automated and unified manner will play an important role in defining the architecture of the next-generation wireless OSS solutions.

The exhibit below depicts the essential capabilities for active inventory, cross-domain end-to-end orchestration and closed-loop operations in next-generation OSS.
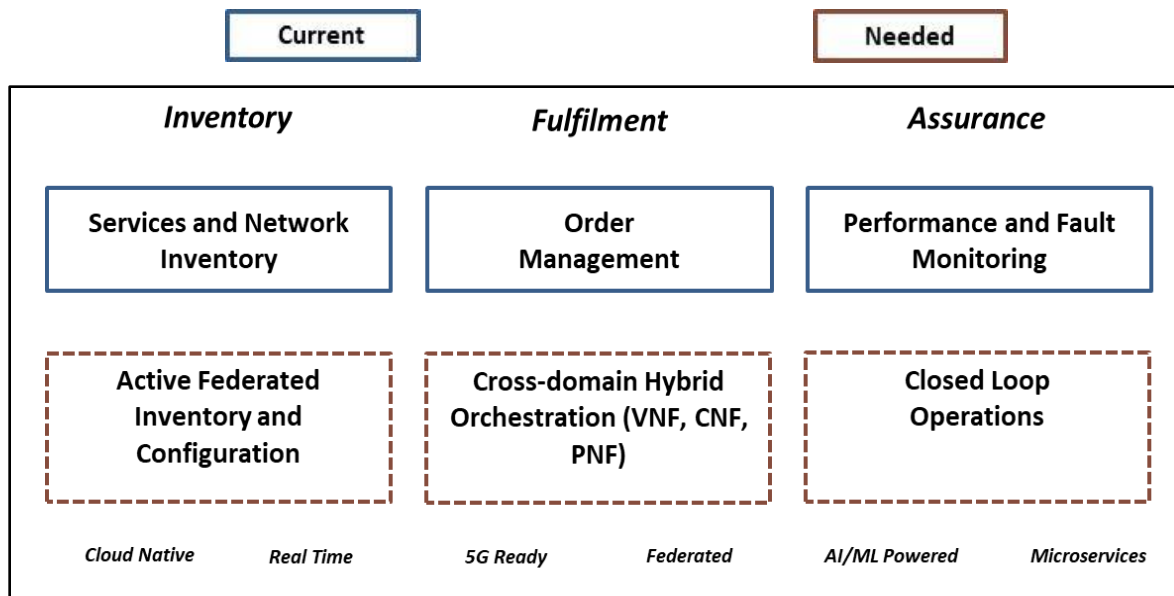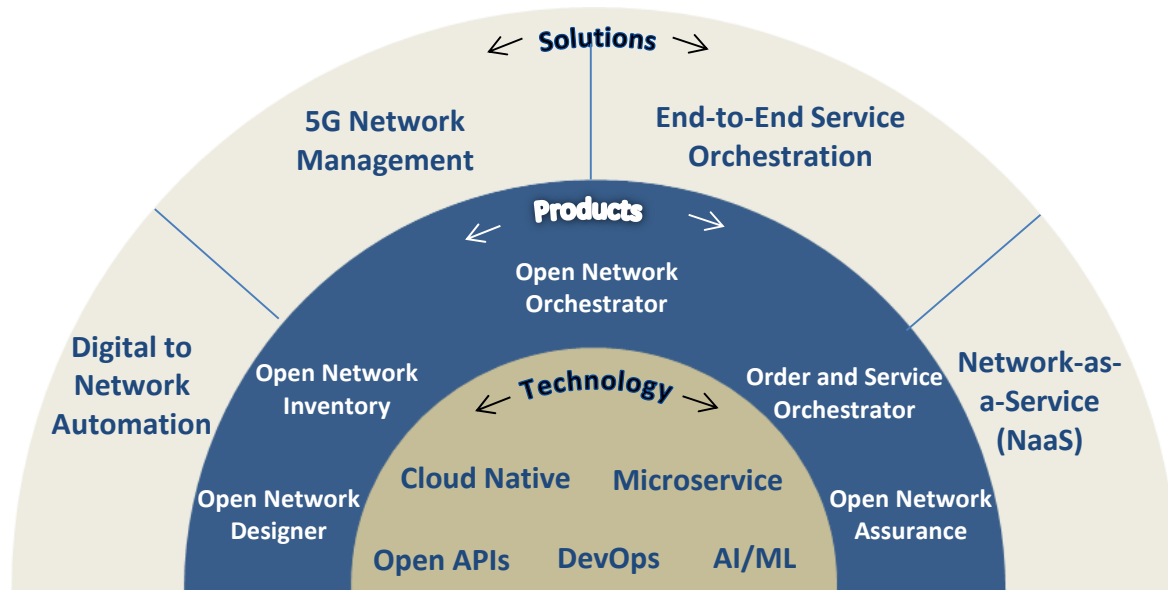

Source: Frost & Sullivan

New Product Attributes and Customer Impact

Amdocs is a leading provider of software and services for more than 350 communications, entertainment and media industry service providers in developed countries and emerging markets. With more than 120 CSP customers globally, Amdocs is at the forefront of helping CSPs modernize, consolidate and optimize their operations management systems. The company has evolved its proven operations technology (OT[2]) capabilities into a unified Service & Network Automation solution, called NEO, which can manage and orchestrate hybrid networks, incorporating both traditional OT and the newer NFVO capabilities.

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[1] 3GPP: Management, Orchestration and Charging for 5G Networks: https://www.3gpp.org/news-events/1951-sa5_5g

[2] Operations technology (OT) is a term used to represent all operations and management support systems for services and networks, including operational support systems (OSS).

The exhibit below shows the Amdocs NEO Service and Network Automation Platform.

Source: Amdocs, Frost & Sullivan

New Product Attributes

Amdocs's vision for network automation and operational technology transformation recognizes the importance of managing hybrid networks along with automating end-to-end service orchestration spanning separate network domains, distributed infrastructure and heterogeneous environments. Highlights of Amdocs NEO include:

- **Modern technology foundation**. Amdocs NEO is cloud-native, public-cloud/private-cloud deployable, AI-driven and micro-services based. With NEO, Amdocs is building on the success of cloud native microservices achieved with its BSS offerings. The company is committed to adopting open APIs and supporting the DevOps model. For example, Amdocs has already implemented DevOps for a Tier-1 North American CSP where regularly scheduled product updates are delivered to upgrade product functionality.

- **Unified capabilities**. With NEO, Amdocs has eliminated the bifurcation that existed between the various OSS stacks used for managing physical and virtual network functions. As CSPs head into the world of hybrid network operations, Amdocs is prepared to address their need through unified Service Designer, Inventory, Network Orchestrator, Order and Service Orchestrator and Assurance solutions to help realize and operate open, programmable networks.

- **Automated network operations and service delivery**. Amdocs can support a diverse range of CSP network operations automation requirements and deliver end-to-end service orchestration and fulfillment. For example, Amdocs Digital-to-Network enables CSPs to automate the fulfilment and activation of services which customers can

order and co-managed through digital channels. They can also support 5G slice and edge computing service management needs, including slice design, orchestration and assurance.

- **Network-as-a-Service capabilities**. The decoupling of the network from the IT systems delivers enhanced agility to business units within a CSP for functions such as offer creation. It also allows CSPs to expose NaaS capabilities to enterprise customers to allow them to construct their own enterprise communication networks and manage them. The movement towards internal and external-facing NaaS is a compelling event that is driving investment in automation capabilities.

Customer Impact

The Amdocs NEO Service & Network Automation platform provides a pragmatic and seamless path for CSPs moving from physical through hybrid to open cloud networks. As CSPs continue to shift to multi-vendor environments and increasingly adopt open, flexible approaches to building next-generation networks, Amdocs offers a diverse set of OSS product features, a commitment to innovation, and offers vendor-neutral deployments with superior customer value for CSPs to support their network transformation initiatives.

Frost & Sullivan firmly believes that CSPs must work with specialized providers such as Amdocs for mission-critical, always-on complex OSS (as opposed to building software solutions in-house). Not only does it require a completely different set of skills to build and run software organizations, it is also expensive to maintain and upgrade software solutions in a sustained consistent manner. By partnering with Amdocs, CSPs can focus on product differentiation, the customer experience, and go-to-market strategies, while relying on Amdocs to implement and manage solutions for network operations support.

The exhibit below highlights the important benefits of Amdocs NEO platform components.

Open Network Designer	Open Network Inventory	Open Network & Service Orchestrators
Industry Challenges • Lengthy service innovation cycles of more than 9 months • Ochestration does not address service creation beyond VNF instantiation	**Industry Challenges** • Existing inventory systems can't support real-time network view • CSPs work with partial network views - physical or hybrid	**Industry Challenges** • CSPs need to go beyond simple service instantiation • Events response in dynamic networks • Awareness to service intent, PNF/VNF/CNF behavior
Business Value • Acceleration of service design, test and launch – from months to weeks • Lower design costs - re-use of service templates via catalog • Reduce risk - automated test and debug loop	**Business Value** • Increased visibility & control over all network elements • Faster time to market through accurate orchestration & fulfillment processes • Reduced network operations costs - network rollout, modernization, service deployment, fulfilment and assurance	**Business Value** • Rapid multivendor innovation - multiple supported use cases with partner ecosystem • Self-healing, policy-based approach for continuous fulfillment of the service • Reduced OPEX - impacts and enables 'service ready network'

Source: Amdocs, Frost & Sullivan

Key Differentiators

Amdocs continually enhances product and service offerings, and has adopted and monetized new technologies and methodologies in the marketplace. The company has gone through an internal transformation to enhance the training and technical skill sets of its workforce in order to become proficient in cloud-native technologies. In the recent years, the company has made several acquisitions, including the fiscal 2016 acquisitions of Vindicia, Brite: Bill and Pontis; and the fiscal 2017 acquisition of Kenzan. This acquisitions have enabled Amdocs to expand its digital offerings and technological expertise in areas such as digital transformation, platform-as-a-service and cloud-native application development using DevOps and microservices.

In an average quarter, Amdocs introduces well over 80 major productions to completion, which is a success rate unmatched in the industry. Post-delivery, Amdocs is engaged by customers to provide managed services for these systems once the transformation is complete, leveraging technologies and methodologies such as DevOps, site reliability engineering, automation, and artificial intelligence. The strong growth in managed services business year-over-year confirms the success of Amdocs' growth strategy.

While competing providers claim to have developed transformative OSS solutions, the reality is that most of these solutions are focused on modernizing a relatively smaller set of functionality within the entire OSS framework. Competitors have struggled to introduce truly cloud-native solutions as well. Limited managed services capabilities and the inability to offer NaaS to help CSPs monetize B2B services are among the key challenges faced by Amdocs' competitors.

Conclusion

Next-generation OSS can help CSPs realize and manage open, programmable networks with high levels of agility. Amdocs NEO allows CSPs to successfully address their hybrid and software-defined network operation needs and deliver superior integrated, digital experiences to consumer and enterprise customers. With its strong overall performance, Amdocs has earned Frost & Sullivan's 2021 New Product Innovation Award in the Next Generation OSS Industry.

Significance of New Product Innovation

Ultimately, growth in any organization depends on continually introducing new products to the market and successfully commercializing those products. For these dual goals to occur, a company must be best in class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.

Understanding New Product Innovation

Innovation is about finding a productive outlet for creativity—for consistently translating ideas into high-quality products that have a profound impact on the customer.

Key Benchmarking Criteria

For the New Product Innovation Award, Frost & Sullivan analysts independently evaluated 2 key factors—New Product Attributes and Customer Impact—according to the criteria identified below.

New Product Attributes

Criterion 1: Match to Needs
Criterion 2: Reliability
Criterion 3: Quality
Criterion 4: Positioning
Criterion 5: Design

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 Amdocs

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 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

9–10 Excellent
7–8 Good
4–6 Fair
1–3 Poor
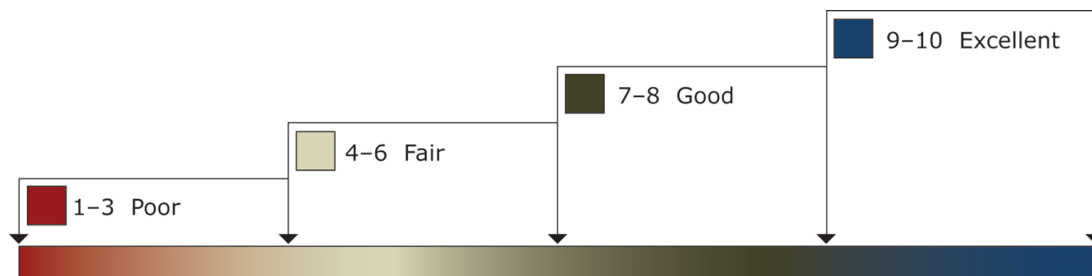
The Decision Support Scorecard considers New Product Attributes and Customer Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard). The research team confirms the veracity of this weighted scorecard through sensitivity 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, Frost & Sullivan has chosen to refer to the other key participants as Competitor 1 and Competitor 2.

Measurement of 1–10 (1 = poor; 10 = excellent)			
New Product Innovation	New Product Attributes	Customer Impact	**Average Rating**
Amdocs	**9.5**	**9.5**	**9.5**
Competitor 1	8.5	8.5	8.5
Competitor 2	8.5	8.0	8.3

New Product Attributes

Criterion 1: Match to Needs
Requirement: Customer needs directly influence and inspire the product's design and positioning.

Criterion 2: Reliability
Requirement: The product consistently meets or exceeds customer expectations for consistent performance during its entire life cycle.

Criterion 3: Quality
Requirement: Product offers best-in-class quality, with a full complement of features and functionalities.

Criterion 4: Positioning
Requirement: The product serves a unique, unmet need that competitors cannot easily replicate.

Criterion 5: Design
Requirement: The product features an innovative design, enhancing both visual appeal and ease of use.

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 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.
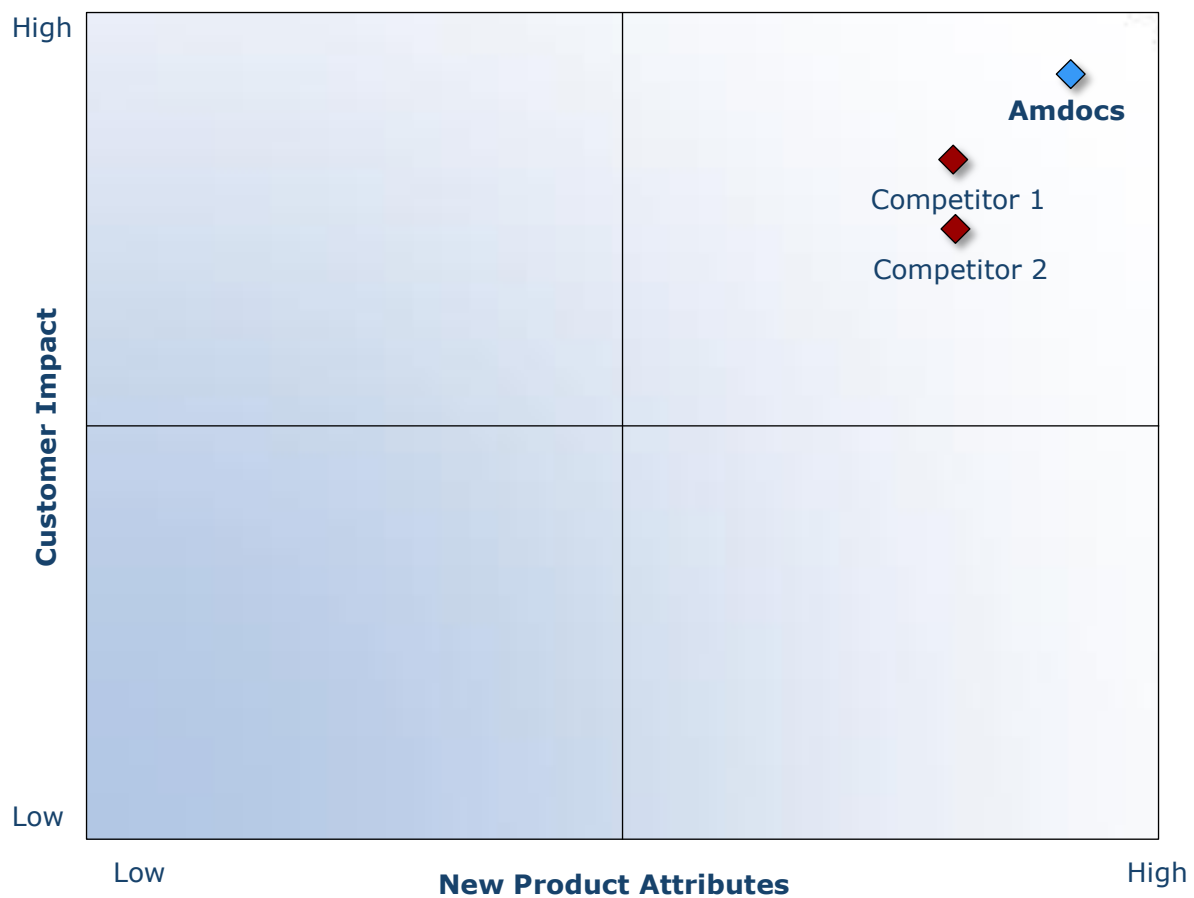
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate award candidates and assess their fit with select best practices 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 world	• Conduct in-depth industry research • Identify emerging industries • Scan multiple regions	Pipeline of candidates that potentially meet all best practices 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 practices criteria • Rank all candidates	Matrix positioning of all candidates' performance relative to one another
3 **Invite thought leadership in best practices**	Perform in-depth examination of all candidates	• Confirm best practices 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 practices 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 practices award recipient	• Review analysis with panel • Build consensus • Select recipient	Decision on which company performs best against all best practices criteria
9 **Communicate recognition**	Inform award recipient of recognition	• 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 is able to share award news with stakeholders and customers	• Coordinate media outreach • Design a marketing plan • Assess award's role in 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 the 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, resulting in 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, helps clients 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 practices models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages nearly 60 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on 6 continents. To join Frost & Sullivan's Growth Partnership, visit http://www.frost.com.