FROST & SULLIVAN

Balbix

2018 North American Vulnerability Management Technology Innovation Award

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The dynamic and changing landscape of digital connectivity is affecting enterprises profoundly, arguably more than individual device users who themselves are more connected and digitally active than ever. Enterprise networks have witnessed phenomenal growth in terms of scale and the resultant complexity. A wide range of modern digital devices, including smartphones, Internet of Things (IoT) devices, and sensors, now operate as default endpoints of an enterprise network.

Frost & Sullivan observes how the increased complexity of enterprise networks has compelled cybersecurity providers to re-evaluate existing defense approaches to maintain their effectiveness against the ever-changing network landscape. Meanwhile, hackers are devising innovative ways of attacking their targets to access critical business assets and sensitive information that would devastate the breached companies. The possibility of inflicting greater damage to a company's infrastructure acts as a motivator for hackers to design more sophisticated attacks that circumvent the cybersecurity solutions used by enterprises today. As digital transformation picks up speed, Frost & Sullivan notes that the need has become critical to develop and deploy solutions that are designed for modern enterprise networks and able to keep up with the most advanced cyberattacks.

In recent years, cybersecurity solutions have evolved considerably to include advanced functionalities that can help thwart hacking attempts. However, Frost & Sullivan research shows that shortcomings still exist that clearly must be addressed to safeguard enterprise networks:

- Vulnerability assessment (VA) is no longer the all-pervasive approach to cybersecurity. A comprehensive breach prediction and avoidance approach needs to go beyond traditional VA and its focus on just unpatched software, and expand to identify the full range of risks arising from malware, poor passwords, phishing, and 200+ other attack vectors, as well as their business impact.

- A majority of the security solutions adopted by enterprises today are reactive in nature, focused on finding and mitigating breaches that have happened - rather than proactively working towards avoiding breaches and strengthening the security practices of the organization.

- Companies attempt to maintain sufficient control over the IT assets owned by them, but with growing adoption of the bring your own device (BYOD) trend, cloud adoption and IoT, they have lost visibility into which devices connect to their internal networks. More often than not, it is the unsecured devices beyond a company's control that act as the weakest link of an enterprise network.

- With the expansion of a company's IT infrastructure, security and IT teams are overwhelmed with tasks related to securing the vital assets of a network. In the

absence of automated risk assessment systems and processes, these teams find it impossible to prioritize and allocate appropriate resources to each task.

- Penetration testing has been proven to have limited effectiveness, as these tests are normally conducted at fixed quarterly or bi-annual intervals and only focus on a limited segment of overall enterprise IT assets. These tests generally fail to portray a clear picture of the reliance and strength of an enterprise network.

Frost & Sullivan points out that these existing deficiencies in cybersecurity solutions and approaches are making organizations even more vulnerable and helpless in securing their vital assets. There needs to be an evolution in cybersecurity methodologies to make companies more resilient by employing risk-based vulnerability management techniques designed for today's vastly complex networks and IT asset portfolios.

Technology Attributes and Future Business Value

Industry Impact

Balbix is a start-up focused on leveraging advancements in machine learning (ML) and artificial intelligence (AI) to help IT teams maintain visibility into enterprise networks and avoid breaches by providing continuous and real-time cyber-risk prediction and mitigation. Balbix follows an innovative approach to designing solutions from the ground-up, with a user-friendly view that helps IT teams predict the possibility of cyber-attacks. The company's unique BreachControl platform empowers IT teams with actionable insights on how to mitigate existing risk factors and prioritize the mitigations as per their business criticality. These actions are carried out in real-time, analyzing over 200 attack vectors for physical as well as virtual assets inside and outside the perimeters of the enterprise network spread across geographies.

Frost & Sullivan considers Balbix's solution an impressive step in reinventing cybersecurity practices, a move towards increased resilience to cyber threats - as opposed to the outdated practice of mitigating a security breach after it occurs. A preventive approach towards cybersecurity has become all the more important in light of major security breaches and attacks of recent years. Some companies that have faced major losses from cyberattacks in past had security systems that successfully managed to control the scale of the damage. Nonetheless, being a victim of an attack still proved disastrous for each company, emphasizing the need for proactive controls - rather than relying on reactive measures alone. Balbix's approach towards securing enterprise networks is accurately designed to avoid cyberattacks from happening, rather than simply controlling the scale of damage once they have occurred. As such, the scope of Balbix's technology has evolved beyond traditional vulnerability assessment to become a risk-based approach to overall vulnerability management.

Scalability

Lapses in implementation of security policies become more widespread and serious as

companies scale and their networks get increasingly complex; IT teams lose visibility and control over their company's diverse IT asset portfolios. As companies scale, the gap between mandated risk management practices and implemented practices on-network widens.

Considering the complexity of enterprise networks, Balbix designed its solutions to maintain visibility over all the kinds of devices, apps and users connected to an enterprise network. The BreachControl platform collects vital data regarding existing and emerging threats happening on the Internet/dark web to keep clients up to date on potential risks. The platform continuously evaluates the risk and resilience posture of the enterprise by cross-analyzing all this data. BreachControl's visual dashboard gives IT teams convenient means to evaluate the resulting risk exposure data and prioritized mitigation actions.

The BreachControl platform leverages a combination of software and hardware-based sensors equipped with AI and ML capabilities for the initial data processing and basic risk assessment. What makes this approach highly effective is that these sensors are deployed on both on-prem networks and cloud environments, near the data sources themselves, and feed data to the Balbix Brain running on the AWS cloud, which is replicated across geographical continents. Frost & Sullivan appreciates that Balbix's approach of using a combination of on-premises edge processing and cloud-based processing properly enhances the scalability of its solution to support rapidly expanding companies across geographies.

Visionary Innovation

Many of the innovations Balbix has implemented are centered on addressing the most pressing needs of security departments across enterprises. Cybersecurity solution providers generally assume that IT administrators are technically sound and can initiate appropriate action if the technical parameters are made available to them. While this assumption might hold merit in most cases, the manual work involved in mitigating presented threats often burdens IT departments and forces companies to maintain larger IT teams.

Balbix has taken a step ahead to ease the work of IT teams by designing an automated prioritized risk dashboard, which provides a heatmap of vulnerabilities existing in the network/cloud and advises on remediation measures needed to mitigate risk. One of the innovative features that contributes to the user friendliness of Balbix's solution is that the platform lets IT administrators search data using natural language questions such as "Where will the attack happen?" or "Which iPhones in the network are most vulnerable?"

Balbix's platform and its dashboard-based user interface were designed for use by the full range of a company's security stakeholders from SecOps analysts to C-level executives that need to obtain a clear picture of how breach-resistant their operations actually are. Towards this goal, a dashboard with actionable insights can be generated by Balbix in under two days of deployment. Balbix realizes the value of generating business-level

impact from technical insights and has developed its product to be enlightening for both security/IT teams and C-level executives.

Frost & Sullivan points out that the user interface innovations that clearly differentiate the Balbix platform also make it inherently easy to use. Moreover, the need for a robust user interface arises, as Balbix functions on a broad set of over 24 AI/ML algorithms that churn out a wide range of data measured from an extended network of sensors. These sensors measure and test vastly diverse devices, apps and users based on a number of parameters. Due to the deep nature of the AI/ML framework implemented at each stage of analysis, Balbix has also implemented a mechanism that verifies the derivations and insights generated from the algorithms against the actual observations on a network.

Frost & Sullivan firmly believes that Balbix has designed a highly advanced approach and has seamlessly blended ML and AI capabilities into a robust risk-based vulnerability management solution. Even more impressive is the fact that despite being a highly comprehensive solution running on elaborate algorithms, Balbix's solution is presented to the user with a simple-to-use and practical user interface (see Figure 1) that maximizes their productivity.

Figure 1: BreachControl Dashboard View

Application Diversity

The proliferation of cloud-based applications and the BYOD trend infuses an ever-growing number of devices into a company's network, which cannot be sufficiently managed by the enterprise's IT team. For instance, BYO smartphones and industrial IoT devices typically fall outside the perimeters of an enterprise network, and this means an IT team has very limited control over the vital activities occurring on them. Even most industrial control equipment is fairly opaque in nature. The operating systems or firmware on these devices

are not updatable by the users, and the providers rarely update them. This creates a scenario where even known threats and vulnerabilities remain unaddressed due to the opacity of the devices. While many cybersecurity solutions accept these devices as a grey area of enterprise cybersecurity, Balbix is nicely dedicated to circumventing opacity issues on these devices, using numerous approaches such as analysis of DNS look-ups and watching for telltale signs from the network traffic emerging from these endpoints.

Besides risk-based vulnerability management, Balbix is also leveraging its visibility around enterprise IT infrastructure to build solutions for compliance management and integrates ticketing systems with its core BreachControl platform.

Financial Performance & Human Capital

Balbix was founded by Gaurav Banga, a successful cybersecurity entrepreneur who was a co-founder and CEO at Bromium. Balbix has successfully attracted funding from notable venture capitalists in the cybersecurity industry. The company gained funding of $8.6 million from Mayfield in 2015 and raised a sum of $20 million in 2018 in a funding round led by Singtel Innov8, with investors including Mubadala Ventures, Mayfield and John Chambers' (ex-Cisco CEO) JC2 Ventures. As part of the funding, several industry experts, namely Pankaj Patel (ex-Cisco EVP & chief development officer), BV Jagadeesh (managing partner, KAAS Ventures), and Gary Gauba (ex-CenturyLink chief enterprise relationship officer), also joined as advisors to the company. Pankaj Patel also serves on the board of the company with Gary Gauba and Jeff Karras, managing director of Singtel Innov8.

Frost & Sullivan recognizes that the company has forged a robust team of industry experts who have worked on distinct pioneering innovations and developments in the world of networking and cybersecurity.

Conclusion

Frost & Sullivan appreciates how Balbix is innovating to reinvent the cybersecurity industry with its risk-based vulnerability management approach. The company's BreachControl platform was built from the ground up to leverage advancements in deep learning, AI, and ML that address cybersecurity issues in today's sprawling enterprise networks. Balbix has worked on the most complex processes of risk avoidance and built efficient, user-friendly, and scalable tools designed to make enterprise customers resilient to the most complex existing and emerging threats to their networks.

For its strong overall performance, Balbix has earned the 2018 Frost & Sullivan Technology Innovation Award.

Significance of Technology Innovation

Ultimately, growth in any organization depends upon finding new ways to excite the market and upon maintaining a long-term commitment to innovation. At its core, technology innovation, or any other type of innovation, can only be sustained with leadership in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.

Understanding Technology Innovation

Technology innovation begins with a spark of creativity that is systematically pursued, developed, and commercialized. This spark can result from a successful partnership, a productive in-house innovation group, or a bright-minded individual. Regardless of the source, the success of any new technology is ultimately determined by its innovativeness and its impact on the business as a whole.

Key Benchmarking Criteria

For the Technology Innovation Award, Frost & Sullivan analysts independently evaluated two key factors—Technology Attributes and Future Business Value—according to the criteria identified below.

Technology Attributes

Criterion 1: Industry Impact
Criterion 2: Product Impact
Criterion 3: Scalability
Criterion 4: Visionary Innovation
Criterion 5: Application Diversity

Future Business Value

Criterion 1: Financial Performance
Criterion 2: Customer Acquisition
Criterion 3: Technology Licensing
Criterion 4: Brand Loyalty
Criterion 5: Human Capital

Best Practices Award Analysis for Balbix

Decision Support Scorecard

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

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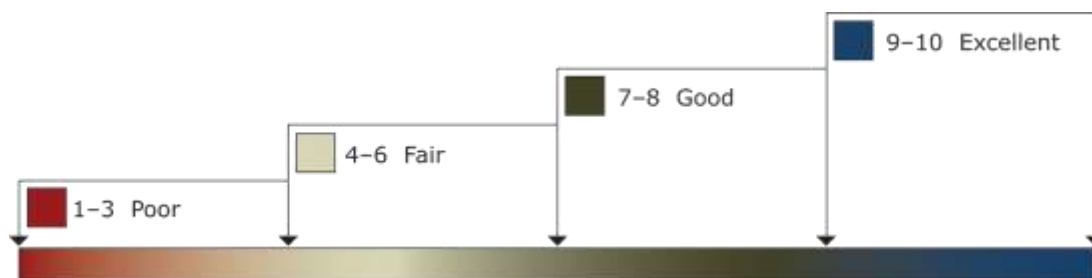
The Decision Support Scorecard is organized by Technology Attributes and Future Business Value (i.e., These are the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard.). The research team confirms the veracity of this weighted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

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key participants as Competitor 2 and Competitor 3.

Measurement of 1–10 (1 = poor; 10 = excellent)			
Technology Innovation	Technology Attributes	Future Business Value	**Average Rating**
Balbix	**9.0**	**8.5**	**8.75**
Competitor 2	8.0	5.0	6.50
Competitor 3	6.0	5.0	5.50

Technology Attributes

Criterion 1: Industry Impact
Requirement: Technology enables the pursuit of groundbreaking ideas, contributing to the betterment of the entire industry.

Criterion 2: Product Impact
Requirement: Specific technology helps enhance features and functionalities of the entire product line for the company.

Criterion 3: Scalability
Requirement: Technology is scalable, enabling new generations of products over time, with increasing levels of quality and functionality.

Criterion 4: Visionary Innovation
Requirement: Specific new technology represents true innovation based on a deep understanding of future needs and applications.

Criterion 5: Application Diversity
Requirement: New technology serves multiple products, multiple applications, and multiple user environments.

Future Business Value

Criterion 1: Financial Performance
Requirement: Potential is high for strong financial performance in terms of revenues, operating margins, and other relevant financial metrics.

Criterion 2: Customer Acquisition
Requirement: Specific technology enables acquisition of new customers, even as it enhances value to current customers.

Criterion 3: Technology Licensing
Requirement: New technology displays great potential to be licensed across many sectors and applications, thereby driving incremental revenue streams.

Criterion 4: Brand Loyalty

Requirement: New technology enhances the company's brand, creating and/or nurturing brand loyalty.

Criterion 5: Human Capital

Requirement: Customer impact is enhanced through the leverage of specific technology, translating into positive impact on employee morale and retention.

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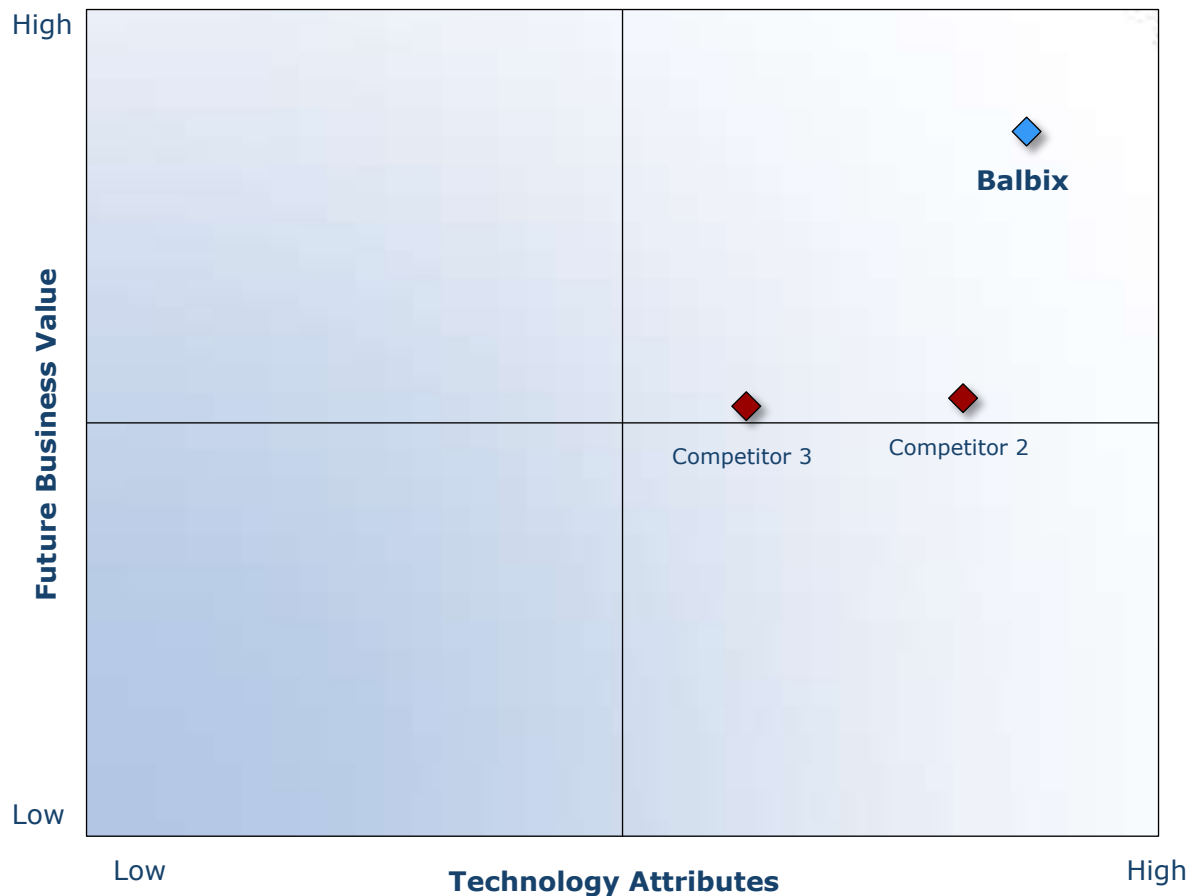
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

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

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

The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

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

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS

About Frost & Sullivan

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