

Pixellot

2018 Global Automated Video Production
Entrepreneurial Company of the Year Award

FROST & SULLIVAN

2018 BEST PRACTICES
AWARD

GLOBAL AUTOMATED VIDEO PRODUCTION
ENTREPRENEURIAL COMPANY OF THE YEAR AWARD

2018
BEST PRACTICES
AWARDS

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Background and Company Performance

Industry Challenges

As the world embraces new digital frontiers, businesses find themselves investing in innovative and promising technologies such as artificial intelligence (AI) for computer vision. Computer vision is the key to enhancing machine learning in image recognition technologies, which could truly transform industries, e.g., healthcare for diagnostic purposes such as radiology, autonomous-vehicles for navigating traffic, or media production and distribution.

A typical digital media broadcast for a sports game (such as soccer) requires more than five cameras to cover an entire field, with workers on each of those cameras and production personnel pulling all of the feeds together to create the broadcast. This process is not only costly for smaller sports leagues like minor league soccer and hometown baseball teams needing to buy their video production equipment but is also only properly enabled by a workforce with the necessary confidence and expertise to run the entire video workflow. As a result, broadcasting these smaller sports events occurs infrequently, or lacks the familiar flow akin to a professional broadcast. Problems include missed plays by camera error, shaky views, or a hard-to-watch feed for viewers. These problems are frustrating for loved ones watching from their mobile device overseas, or provide suboptimal viewing for a coach remote scouting a player through a live feed of a softball game.

As more and more content arises from small-scale sports games harnessing video to broadcast feeds via social media or a video streaming websites, Frost & Sullivan points out that there is an exciting opportunity for artificial intelligence (AI) to come into play for automating processes in the broadcast video workflow that are typically done manually. The power of AI—combined with a marked shift to the cloud—and software-based workflows in the over-the-top (OTT) video production and distribution industry—will result in distinct benefits for providers delivering these capabilities in an agile and scalable model.¹ Automation of workflows and operations is an ongoing process, with companies investing in software-based infrastructure to ensure a connected and consistent system with an integrated view of the operations. Automating a sporting event broadcast frees up cameras and allows production teams and sports fans to concentrate on what is truly important - the game. Live online video streaming, especially sports and events, along with immersive technologies such as 360-degree video, virtual reality, and augmented reality will be a part of the product innovation strategy for forward-looking market participants.²

¹ European Over-the-top (OTT) Video Equipment Market Outlook 2018: Personalisation, Automation, and Improving Quality of Experience are the Major Focus Areas for the OTT Video Equipment Ecosystem, (Frost & Sullivan, January 2018).

² European Over-the-top (OTT) Video Equipment Market Outlook 2018: Personalisation, Automation, and Improving Quality of Experience are the Major Focus Areas for the OTT Video Equipment Ecosystem, (Frost & Sullivan, January 2018).

Entrepreneurial Innovation and Customer Impact

Israeli start-up Pixellot, established in 2014, sits at the apex of the trends Frost & Sullivan believes will change online video production and distribution. Utilizing cloud-based AI to analyze high-quality video, Pixellot empowers sports teams and educational institutions to broadcast sporting events which would otherwise not receive coverage due to their incompatibility with traditional broadcast media and the costs associated with professional broadcast equipment and workflow.

A Complete Production System for the Everyday Sports Fan

Geared toward smaller sports events and the consumers who love them, Pixellot's solution consists of a fixed video recording device, with two or four cameras, and a cloud-based analytics and production platform, including a basic editing program and coaching module in specific Pixellot product series. The Pixellot rig stacks cameras atop of each other, facing multiple parts of the playing field. The ingenious design of the Pixellot system allows for a panoramic view of a playing field through a combination technique, called stitching, of the two to four camera lenses capturing content in 6K resolution. Pixellot distributes video feed via the company's white-label mobile application or social media, depending on the client's preferences, e.g., a high school sports website or a live feed on Facebook or Twitter.

Capturing Every Moment for a Great Game

With Pixellot productions, the viewer gains freedom of choice to personalize their stream by choosing to watch the game either in an automated way that simulates a TV-like experience, or to watch the entire field, and manually follow a particular player or a section of the court or pitch. Pixellot designed and programmed its AI to track an object in fast action sports, such as a soccer ball or ice hockey puck, even when it travels over a dark-colored advertisement on the ice or the zone lines. The system has also learned to identify the movements of the player who is about to pass the ball in soccer, football, ice hockey, or in any other sport. The camera starts "moving" two seconds before the player makes the pass, to ensure that the ball or puck is always in focus, similar to how a manned camera operator would position a camera. The AI can also nicely compensate for changing lighting and weather conditions.

In addition to 2 types of viewing options, sports fans can enjoy real-time commentary and graphics, highlights, and team and individual stats on their video feed, similar to a professional broadcast. Even more impressive, the AI component captures highlights such as baskets and goals automatically and saves them as clips for replay purposes. Pixellot works for producing both live and video-on-demand broadcasts.

Compensating for Slower Internet Connections

A significant challenge faced in broadcasting, especially on a non-professional level, stems from Internet connections and broadband speeds. While video processing technologies on the production side can ease video resolution problems or lags in a broadcast, the consumer's Internet connection can still negatively affect the stream.

Pixellot clearly recognized this challenge and designed the AI component that sits atop the analytics and production platform to communicate with the stream and automatically adjust video feeds for any lag due to the limited internet connection of the viewer.

An Untapped Goldmine of Sports Production Opportunities

Pixellot enables underserved organizations to capture and leverage content effectively. To date, Pixellot has produced 150,000 live hours from 2,400 systems that were sold around the world, including (but not limited to) football, ice hockey, soccer, basketball, lacrosse, and volleyball. In January 2017, the company produced 723 hours, and with impressive growth in January 2018, it generated 17,136 hours; Pixellot expects that the monthly production in 2018 will reach 35,000 hours. Millions of sporting events take place annually; however, according to Pixellot's estimation, 99% are not broadcast. These events range from high school football in the United States (US) to lower league handball in Europe and women's soccer in Latin America. While some educational institutions have entrusted the production of games to the internal media department, these departments often lack the technical know-how and equipment to produce and distribute a professional grade broadcast. For example, schools might only have one camera, thus capturing a limited section of the field. Most high schools use two systems—one system for the indoor sports, such as basketball, and an additional system outside for various sports, including soccer, field hockey, and volleyball. Due to the ease of use and low-cost of broadcasting events via Pixellot, some schools use the system to produce a sporting event in wrestling, even though is not a sport covered by Pixellot; the company offers the ability to capture the action from multiple mats simultaneously. This capability offers schools a way to broadcast multiple matches that are held at the same time. Instead of using all of the ball and player tracking capabilities of Pixellot, the school, due to local interest, simply switches on the system and lets the camera run.

Similar to Tier 1 professional broadcasts, a school or amateur league can sell advertisement space on the screen through Pixellot's digital advertising options; for instance, by generating revenue from added in-field advertising graphics to the video stream as well as pre-rolls to the video and virtual advertising. Additional potential revenue streams include subscription-based viewership, sponsorships of uniforms, and field boards.

Pixellot cooperates with local partners that handle the licensing rights and the technical installation, giving the company the ability to enter markets that would otherwise be beyond reach. In addition to using local partners to handle implementing the cameras, Pixellot engages with federations and sports organizations which hold broadcasting rights for content from their country. Pixellot operates according to a software-as-a-service model. US service monetization is mostly subscription, and Europe and APAC monetization models are mostly advertisements, sponsorships, and premium services.

Reducing Production Costs for Everyday Sports Lovers

Pixellot's proprietary AI software is the catalyst for the company's success in bringing professional broadcast quality video feeds of smaller sports events to consumers. Since it

enables event broadcasts with hardly any human involvement, the system reduces the production costs to a fraction of the price of a manned operation. As a result, educational institutions are now able to broadcast games and maintain contact with alumni networks, or lower league European soccer teams can connect with their worldwide fans to follow practice games and scrimmages on mobile devices or desktop computers. The significant reduction in production costs opens up a world of possibilities for a sporting event that in the past would not have reached a wider audience, for distribution to a worldwide audience in a professional quality broadcast.

Conclusion

Pixellot's artificial intelligence solution and state-of-the-art camera system enable broadcast-quality sports video production via a fully automated process captured in 8K and broadcast in HD, and its distribution platform allows sporting events that traditionally seemed unprofitable to be broadcast online. Users ranging from American high-schools and colleges to lower league soccer and ice-hockey teams in Europe can distribute their games in professional grade broadcast quality via Pixellot. The company experienced significant growth, with hours produced increasing from 723 in January 2017 to 17,136 in January 2018, and expects to hit 35,000 hours produced per month by December 2018.

With its impressive growth built on the innovative application of artificial intelligence and video production capabilities, Pixellot earns the 2018 Frost & Sullivan Global Entrepreneurial Company of the Year Award.

Significance of Entrepreneurial Leadership

Ultimately, growth in any organization depends upon customers purchasing from a company and then making the decision to return time and again. In a sense, then, everything is truly about the customer—and making those customers happy is the cornerstone of any long-term successful innovation or growth strategy. To achieve these dual goals (customer engagement and growth), an organization must be best-in-class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



Understanding Entrepreneurial Leadership

Demand forecasting, branding, and differentiation underpin an entrepreneurial company's journey toward forming deep relationships with customers and permanently altering the market with their actions.

Key Benchmarking Criteria

For the Global Entrepreneurial Company of the Year Award, Frost & Sullivan analysts independently evaluated two key factors—Entrepreneurial Innovation and Customer Impact—according to the criteria identified below.

Entrepreneurial Innovation

Criterion 1: Market Disruption

Requirement: Innovative solutions that have genuine potential to disrupt the market, obsoleting current solutions and shaking up competition

Criterion 2: Competitive Differentiation

Requirement: Deep understanding of both current and emerging competition to create and communicate strong competitive differentiators in the market

Criterion 3: Market Gaps

Requirement: A clear understanding of customers' desired outcomes, the products that currently help them achieve those outcomes, and where key gaps may exist

Criterion 4: Blue Ocean Strategy

Requirement: Strategic focus on creating a leadership position in a potentially "uncontested" market space, manifested by stiff barriers to entry for competitors

Criterion 5: Passionate Persistence

Requirement: A deep belief in the "rightness" of an idea and a commitment to pursuing it despite seemingly insurmountable obstacles

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 most 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.

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 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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>.