2015 European Wearable Interfaces
New Product Innovation Award
Contents

Background and Company Performance ................................................................. 3

Industry Challenges .............................................................................................. 3

New Product Attributes and Customer Impact of MUV Interactive .................. 3

Conclusion ............................................................................................................. 7

Significance of New Product Innovation ............................................................. 8

Understanding New Product Innovation ............................................................. 8

Key Benchmarking Criteria .................................................................................. 9

Best Practice Award Analysis for MUV Interactive ........................................... 9

Decision Support Scorecard .................................................................................. 9

New Product Attributes ....................................................................................... 10

Customer Impact ................................................................................................ 10

Decision Support Matrix ....................................................................................... 11

The Intersection between 360-Degree Research and Best Practices Awards ........ 12

Research Methodology ........................................................................................ 12


About Frost & Sullivan .......................................................................................... 14
Background and Company Performance

Industry Challenges

Technology innovations have both dramatically simplified and sophisticated human-machine interactions. As such, the evolution of advanced electronics and information and communication technologies has enabled effortless and touchless interactions with machines. However, a few significant challenges to human-machine interactive solutions have restricted their use and adoption.

The most profound industry challenges faced by user-input solutions are performance and accuracy. Innovators in this space are still striving to obtain and deliver optimum performance and an optimal input solution. In addition, accuracy is a challenge that all innovators in this space are trying to address, as it is a critical factor in generating positive user experience. Aside of these, coverage in space is always a challenge.

When it comes to remote touchless interactivity, traditional solutions have limited interactivity features. These solutions offer generic controls and interactivities that restrict the scope of applications. These solutions fail to offer support for sophisticated micro-gestures which are essential to obtain optimum interactivity.

The price of these solutions is another key challenge; the larger the interface, the more expensive the interaction solution becomes. As big interfaces and complex environments require high-end and expressive solutions, it limits the affordability of these solutions for wider market adoption. Low-end solutions, on the other hand, indeed have a low cost of ownership yet with limited interactive capabilities, thereby delivering lower user satisfaction by virtue of their limited functionalities.

In order to address the above-mentioned challenges, Israel-based MUV Interactive has developed an innovative solution. The company has launched “BIRD™,” an efficient, high-accuracy high-performance wearable interface solution that offers users a wide spectrum of interactive capabilities.

New Product Attributes and Customer Impact

Positioning

BIRD™ was developed to enable optimum interactivity for user interfaces using the entire spectrum of known interactive methods. Unlike competing solutions that offer limited gesture-based interactive capabilities, BIRD™ offers a range of interactive features for human-machine interaction. Most competing solutions are dedicated to specific interactive environments; hence, they have limited usage. BIRD™, on the other hand, offers simultaneous touch, write, hover, remote touch, gesture recognition and other interaction methods to support advanced yet very intuitive user interface. Additionally, the small wearable device features an integrated microphone to support interaction through voice
commands. The solution can also mimic a mouse control, with additional interactive features that outperform competing solutions. BIRD™ is an all-in-one device that fits onto the user’s index finger, offering an entire spectrum of interactivities. This allows users the freedom to use different input options for different environments and use cases.

Another key feature that makes BIRD™ superior is its capability to enable social interactions. The solution offers simultaneous multi-user interactivity: with BIRD™, multiple users can interact with the same content, in the same room, at the same time. The solution can accommodate up to 10 devices simultaneously. A base unit, known as the NEST, seamlessly communicates with up to 10 BIRDS™ via Bluetooth. The host computer, tablet or smartphone, is the source of content to be displayed on any surface. Aggregation of BIRDS by the NEST, to communicate with the content source, provides the social interaction with any surface – either a wall, to pull down screen, table or flat panel display (e.g. TV screen).

In terms of operating range, BIRD™ provides freedom of moving up to 100-feet away from the screen. A 360-degree coverage zone allows users to interact from any position or any angle, whether they stand in front of the screen or even if the content is displayed behind them. This unique feature, unlike competing solutions, makes BIRD™ a leading facilitator of social and collaborative interactions.

BIRD™ offers further two unique layers of interactivity for its users: remote touch and hover interaction. The solution leverages absolute positioning and absolute pointing direction capabilities which offer meaningful and positive user experience by enabling the same feeling as physical touch, even from a considerable distance. The user experience is further augmented by enabling the user to interact with content on surfaces which the user can’t or does not wish to touch, such as a pulldown screen or a TV flat panel display. These unique features have given Bird an enormous advantage over competing solutions that do not offer such extensive capabilities.

**Design**

Some of the competing solutions rely primarily on inertial sensing. They result in limited functionalities as these solutions are confined to use relative input data. Others are based on pure optic sensing, merely allowing a limited repertoire of gesture recognition. BIRD™ has been sophisticatedly designed to employ multiple sensing mechanisms. The innovation simultaneously uses input fusion from inertial sensors, optic sensors and wearable sensors. It is based on 9-axis inertial sensing that enables optimum movement interactivity. In addition, the use of structured optic sensors adds extra positioning precision for accurate pointing capabilities. Wearable sensing capabilities, such as capacitive, force and proximity sensing, add an extra layer of touch-based interfaces, unparalleled in the industry.

Furthermore, the company has developed multiple proprietary algorithms that seamlessly deliver optimum interactivity and positive user experience. These algorithms retrieve input data from the sensors in real-time. The input, in the form of relative data, is efficiently
transformed into absolute data for greater control and accuracy. The unique approach of utilizing multiple sensing methods is the key to facilitating a wide array of interaction possibilities. These mechanisms, each having more than one implementation, combine and open up an ocean of interactive application opportunities.

Another key element is BIRD's™ more effective design. Competing solutions focus on interactivity by offering sensing which is focused on external devices or surfaces, thereby limiting the area of interactivity. BIRD™, in contrast, has been specifically designed to focus all sensing efforts on the users’ fingers. This extends the operative horizon exponentially, allowing seamless and very natural interactivity, even from a distance.

Additionally, BIRD is designed with social interaction as a goal. This provides for multiple users to simultaneously interact on the same digital media, thus propelling collaboration and engagements to unprecedented levels of functionality.

**Quality**

The prime differentiating factor for MUV Interactive’s BIRD™ is the high quality of interactivity it offers. Competing solutions, which rely primarily on gesture-based interactions, often have a considerable amount of false positives and true negatives. These occur due to the use of single reference models. In contrast, BIRD™ leverages multiple input streams and analyzes absolute data to deliver its interactive capabilities. The accurate convergence of multiple sensing references and computational absolute data help the solution to deliver highly accurate interactivity, with low false positives and true negatives. These in turn significantly improve user experience.

Another key aspect that makes BIRD™ superior is its use of photosensitivity and radio frequency sensitivity. Competing solutions primarily rely solely on photosensitivity, which often confuses the system which is incapable of identifying the light sources with which it interacts. This phenomenon is common in complex outdoor environments where the presence of multiple unwanted light sources is inevitable. BIRD™, by virtue of its dual technology, does not get confused in environments with unwanted optical sources. The additional radio frequency sensitivity allows the solution to identify unwanted sources, and prevent the system from recognizing and responding to them. This unique solution delivers unprecedented responsiveness to environmental stimuli, which is essential for enabling seamless and accurate interactivity.

**Reliability**

In addition to consistency and accuracy in performance, a few other factors make an input solution reliable. The simple design of BIRD™ makes it effortless to operate. Because extreme usage conditions and the rough handling of input devices often result in malfunctioning, Bird has been specifically designed to protect the fragile and complex electronic components from the rough surrounding environment. Components have been made up of flexible elements, wired together internally, and ruggedness tests were
conducted to make BIRD™ strong enough to withstand rough handling and make it mechanically reliable.

In addition, the company has done a series of acceptance tests to ensure BIRD's™ reliability. The reliability of a solution largely depends on how easily it can be used without any complications. In this regard, BIRD™ was tested, among others, with a group of school-going kids. The results were very promising. Within a few minutes, the children were able to use BIRD™ to interact with the interface and were able to express themselves, proving the solution's reliability.

**Price/Performance Value**

In contrast to competing solutions that offer limited interactivity at a high price of ownership, BIRD™ is affordable; the company aims to make the innovative solution available to a larger market. The simple design, easy handling and easy maintenance make it a strong value-for-money device.

The primary value-added feature is its wide range of functionalities. BIRD™ is able to transform any surface into an interactive space. The social interactivity allows multiple users to collaborate and interact in a single environment which substantially enhances productivity levels. The high scalability of the solution, which accommodates several simultaneous users, is a game-changer for the company and for the industry. In contrast to expensive, traditional solutions for large platforms, BIRD™ comes with added functionalities at a fraction of the price. The company’s move from a surface-mounted, sensor-based approach to a controller-embedded sensor-based approach has opened up opportunities to offer a wide spectrum of interactivities at an affordable price.

**Match to Needs**

While competing solutions have complex operations and limited integration potential, BIRD™ has been developed to enable efficient, effortless use. The MUV Interactive team works closely with its design partners, who help in the development phases. The company also runs focus groups of users from different target markets, such as corporates, schools, universities and consumers in order to obtain valuable user feedback that will help in fine-tuning the solution.

In addition, the company has also enabled users to preorder BIRD™ in order to develop a user-community consisting of end users, developers, testers and researchers. The MUV team expects to receive feedback about the performance of its solution and offer optimal customer and technical support. User experience information is an essential component for the MUV team to enhance its solution through incremental innovation.
Additionally, the company actively partners with third-party developers and provides them with a SDK (Software Development Kit) to create innovative applications using BIRD™ to take human-machine interaction into the future. The company also focuses on targeted campaigns to educate users about the various functionalities of BIRD™ so they can enjoy the best-in-class user experience.

**Conclusion**

MUV Interactive has emerged as an innovator in the human-machine interaction space. BIRD™ is a groundbreaking innovation opening up revolutionary interactivity using wearable input devices. By virtue of its capability to facilitate real-time collaborative, and touchless interaction in a single communicative environment, BIRD™ has obtained a huge advantage over its competitors. The solution’s ability to allow features such as touch, remote touch and hovering is a significant added advantage. With its strong overall performance, MUV Interactive has earned Frost & Sullivan’s 2015 Europe New Product Innovation Award in the Wearable Interfaces solutions industry.
Significance of New Product Innovation

Ultimately, growth in any organization depends upon 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 two 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 Practice Award Analysis for MUV Interactive
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 nuance in performance evaluation; ratings guidelines are illustrated below.

RATINGS GUIDELINES

The Decision Support Scorecard is organized by New Product Attributes and Customer Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criteria 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 players as Competitor 2 and Competitor 3.

**DECISION SUPPORT SCORECARD FOR NEW PRODUCT INNOVATION AWARD**

<table>
<thead>
<tr>
<th>Measurement of 1–10 (1 = poor; 10 = excellent)</th>
<th>New Product Attributes</th>
<th>Customer Impact</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Product Innovation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MUV Interactive</td>
<td>9.5</td>
<td>9.0</td>
<td>9.25</td>
</tr>
<tr>
<td>Competitor 2</td>
<td>8.0</td>
<td>7.5</td>
<td>7.75</td>
</tr>
<tr>
<td>Competitor 3</td>
<td>8.0</td>
<td>7.0</td>
<td>7.50</td>
</tr>
</tbody>
</table>

**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 functionality

**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 like 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

Decision Support Matrix
Once all companies have been evaluated according to the Decision Support Scorecard, analysts can 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.

DECISION SUPPORT MATRIX FOR NEW PRODUCT INNOVATION AWARD
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 players and for identifying those performing at best-in-class levels.
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan Awards 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.

<table>
<thead>
<tr>
<th>STEP</th>
<th>OBJECTIVE</th>
<th>KEY ACTIVITIES</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monitor, target, and screen</td>
<td>Identify award recipient candidates from around the globe</td>
<td>Pipeline of candidates who potentially meet all best-practice criteria</td>
</tr>
</tbody>
</table>
|      |           | • Conduct in-depth industry research  
• Identify emerging sectors  
• Scan multiple geographies |        |
| 2    | Perform 360-degree research | Perform comprehensive, 360-degree research on all candidates in the pipeline | Matrix positioning all candidates’ performance relative to one another |
|      |           | • Interview thought leaders and industry practitioners  
• Assess candidates’ fit with best-practice criteria  
• Rank all candidates |        |
| 3    | Invite thought leadership in best practices | Perform in-depth examination of all candidates | Detailed profiles of all ranked candidates |
|      |           | • Confirm best-practice criteria  
• Examine eligibility of all candidates  
• Identify any information gaps |        |
| 4    | Initiate research director review | Conduct an unbiased evaluation of all candidate profiles | Final prioritization of all eligible candidates and companion best-practice positioning paper |
|      |           | • Brainstorm ranking options  
• Invite multiple perspectives on candidates’ performance  
• Update candidate profiles |        |
| 5    | Assemble panel of industry experts | Present findings to an expert panel of industry thought leaders | Refined list of prioritized award candidates |
|      |           | • Share findings  
• Strengthen cases for candidate eligibility  
• Prioritize candidates |        |
| 6    | Conduct global industry review | Build consensus on award candidates’ eligibility | Final list of eligible award candidates, representing success stories worldwide |
|      |           | • Hold global team meeting to review all candidates  
• Pressure-test fit with criteria  
• Confirm inclusion of all eligible candidates |        |
| 7    | Perform quality check | Develop official award consideration materials | High-quality, accurate, and creative presentation of nominees’ successes |
|      |           | • Perform final performance benchmarking activities  
• Write nominations  
• Perform quality review |        |
| 8    | Reconnect with panel of industry experts | Finalize the selection of the best-practice award recipient | Decision on which company performs best against all best-practice criteria |
|      |           | • Review analysis with panel  
• Build consensus  
• Select winner |        |
| 9    | Communicate recognition | Inform award recipient of award recognition | Announcement of award and plan for how recipient can use the award to enhance the brand |
|      |           | • Present award to the CEO  
• Inspire the organization for continued success  
• Celebrate the recipient’s performance |        |
| 10   | Take strategic action | Upon licensing, company may share award news with stakeholders and customers | Widespread awareness of recipient’s award status among investors, media personnel, and employees |
|      |           | • Coordinate media outreach  
• Design a marketing plan  
• Assess award’s role in future strategic planning |        |
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 almost 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from 31 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.