IoT in Agriculture:
Fertile Ground with Opportunity
Ripe for the Harvest

July 25, 2017
James Brehm & Associates: About Us

Who We Are
We are a leading consulting and market intelligence firm providing project based & retained strategic advisory services to technology companies worldwide.

Launched in 2013, we are 100% focused on the Internet of Things.

What We Do
We empower companies to unlock unforeseen potential in a hyper-connected world.

We provide actionable intelligence & strategic insight to enable our clients to succeed in IoT.

Who We Serve
We provide actionable insight to a wide range of organizations

- Communication Service Providers
- Software Vendors & Application Developers
- Hardware, OEMs, & ODMs
- Cloud Providers
- Analytics Companies
- Investment Bankers & Private Equity
- Platform Providers
- Enterprises
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Why We Are Different

**Pragmatic**
You can count on us to tell it like it is. We do not inflate numbers, buy into hype or allow our imaginations to get the better of us.

Instead, we apply tried-and-true processes to validate numbers to deliver proven, practical solutions you can trust.

**Unparalleled Network**
We know the ecosystem better because we listen to more people – conducting original research across all parts of the IoT value chain from silicon & software to end-user adopters.

We leverage our network to develop the right partnerships for clients – relationships that accelerate the path to value creation.

**Unmatched Capabilities**
Our team has worked in IoT across multiple disciplines equipping us with unmatched knowledge and capabilities.

We have more than 70 years of combined experience in machine-to-machine and Internet of Things technology, research and marketing.
How We Support Marketing & Messaging
Product/Solution Positioning, Narrative Development, Thought Leadership

- White Papers & Case Studies
- Webinars
- Blogs & Social Media
- Panels & Keynotes At Industry Events
- Press Releases & Publication Placement
- Messaging Refinement
### How We Segment The Market

<table>
<thead>
<tr>
<th>Segment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEM Telematics</td>
<td>Aftermarket Telematics</td>
</tr>
<tr>
<td>Commercial Fleets</td>
<td>Buy Here / Pay Here</td>
</tr>
<tr>
<td>Usage Based Insurance</td>
<td></td>
</tr>
<tr>
<td>Trailers, Pallets, &amp; Containers</td>
<td>Agriculture &amp; Natural Resources</td>
</tr>
<tr>
<td></td>
<td>Energy Production &amp; Distribution</td>
</tr>
<tr>
<td></td>
<td>Intelligent Buildings</td>
</tr>
<tr>
<td></td>
<td>Lighting</td>
</tr>
<tr>
<td>High Value Assets</td>
<td>Offenders &amp; Parolees</td>
</tr>
<tr>
<td></td>
<td>Retail &amp; Point Of Sale Systems</td>
</tr>
<tr>
<td></td>
<td>Vending &amp; Kiosks</td>
</tr>
<tr>
<td></td>
<td>Branch Office Failover &amp; Wi-Fi</td>
</tr>
<tr>
<td>Alarm Monitoring</td>
<td>Connected Home</td>
</tr>
<tr>
<td></td>
<td>Enterprise Security &amp; Surveillance</td>
</tr>
<tr>
<td></td>
<td>Consumer Electronics</td>
</tr>
<tr>
<td></td>
<td>Clinical Remote Monitoring</td>
</tr>
<tr>
<td>Tele-Medicine</td>
<td>Health &amp; Wellness</td>
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<td></td>
<td>Smart Meters</td>
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<tr>
<td></td>
<td>Digital Signage</td>
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<td></td>
<td>Traffic Management</td>
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<tr>
<td>Smart Cities</td>
<td>Track &amp; Trace</td>
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<td></td>
<td>Public Safety</td>
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<tr>
<td></td>
<td>Industrial Equipment</td>
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<td></td>
<td>Infrastructure</td>
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</tbody>
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High Value Assets

- Trailers, Pallets, & Containers
- Agriculture & Natural Resources
- Energy Production & Distribution
- Intelligent Buildings
- Lighting

Offenders & Parolees

- Retail & Point Of Sale Systems
- Vending & Kiosks
- Branch Office Failover & Wi-Fi

Connected Home

- Enterprise Security & Surveillance
- Consumer Electronics
- Clinical Remote Monitoring

Health & Wellness

- Smart Meters
- Digital Signage
- Traffic Management

Track & Trace

- Public Safety
- Industrial Equipment
- Infrastructure
How We View Use Cases Within IoT

- Automotive Solutions
- Fleet Management
- Asset Monitoring & Tracking
- Retail & Banking
- Smart Cities & Public Transport
- Security & Surveillance
- Health & Wellness
- Consumer Electronics & Wearables

- OEM Telematics
- OTR / Long Haul
- Trailers, Pallets, & Containers
- Point Of Sale
- Smart Energy Meters
- Alarm Panels
- Remote Patient Monitoring
- eReaders

- Consumer OBDII Aftermarket
- Local Service
- Ag & Natural Resources
- Vending & Kiosks
- Fire & Safety Solutions
- Medical Wearables
- Consumer Wearables

- Fleet
- Rental & Livery
- Heavy Equipment
- Banking
- Parking
- Video Surveillance
- Wellness

- Usage Based Insurance
- Local Delivery
- Intelligent Buildings
- Hospitality & Casual Dining
- Water Monitoring
- Traffic Management
- Access Control

- Vehicle Finance & Lot Mgmt
- Government
- Energy Production
- Wireless WAN
- EV Charging
- Home Automation
- Offender Monitoring
- Property Trackers
How We View The IoT Stack
How We Size & Forecast The Market

• James Brehm & Associates combine primary & secondary research to derive the total industry view.
• Primary Research
  – Structured & unstructured discussions with over 500 key industry stakeholders and ecosystem participants including multiple people from the same company quarterly.
• Secondary sources include:
  – Available Published Financial Reports, Trade journals & Industry Publications, Trade Shows & Industry Events, etc
Whiteboarding & Context

Working Session Provides Clarity & Context On What Can & Should Be Brought To Market

Capabilities ↔ Culture

Customers
- Current
- Ideal

Competitors
- Partners
- Suppliers

WHAT DO THEY DO BETTER THAN US?
WHAT DO WE DO BETTER THAN THEM?

WHY US?

Next Steps!

SOLUTIONS
- Strengths
- Weaknesses

Data
- Capture
- Retrieve
- Analyze
- Execute
How We Support Our Clients

Tier 1 Mobile Operator
• Market Analysis Across Multiple OBDII Use Cases / Offerings
• Competitive Analysis / Benchmarking / Secret Shop
• Recommendations Regarding Offers, Partners, Distribution, and Product Enhancements

Private Equity Partners
• Advisory Services & IoT Market Intelligence Related To Private Equity M&A And Corporate Financing
• Support Both Buy & Sell Opportunities
• Business Cases, Validation or Denial, Due Diligence, etc.

European Company Entering U.S. Market
• Press Releases & Market Collateral To Raise Profile In The United States
• White Paper Development & Publication

Tier 1 Insurance / Financial Services Provider
• Evaluate Existing Product & Services Portfolio
• Identify New Solutions & Opportunities
• Assist With Product And Partner Development & Deployment
• Secure Industry Event Keynote to Position as Thought Leader

Mobile Resource Management Market Leader
• Recommend Partnerships, Acquisitions, and Investments
• Opportunity Assessment Across Product & Service Portfolio
• Custom Qualitative and Quantitative Analysis of Key Markets Including Commercial Telematics, Heavy Equipment, Insurance, and Platforms

Italy-Based IoT Solution Provider
• Partnership Development
• Facilitate U.S. Market Entry & Expansion
• Led To Acquisition By One Of The World’s Largest Multinational Technology Companies
Our Team Members

James Brehm
**Founder & Chief Technology Evangelist**
James Brehm is one of the leading voices on the state of the IoT and M2M market. Leveraging experience gained in a decade long career as an industry analyst along with multiple marketing and customer facing roles with leading technology companies, Brehm launched James Brehm & Associates in early 2014 to serve the very specific needs companies participating in IoT.

A regular speaker at industry events and frequent contributor to CNBC and other news agencies, Brehm spent nine years in multiple roles at Frost & Sullivan and three years at a boutique technology and telecommunications consulting firm. Previously, Brehm worked in marketing, sales management, and business development at Rackspace Managed Hosting and Interland (now Web.com), two of the largest pure play web hosting companies in the U.S.

Keith Tamboer
**Vice President of Business Intelligence & Analytics**
Keith Tamboer is a market research and business operations professional with extensive telecommunications experience. Keith has a unique ability to transform data into valuable information to drive business strategy. He has more than 20 years of experience across marketing, sales operations, business analytics, and competitive intelligence. In his most recent role at AT&T, Keith was responsible for market forecasting and market share for business mobile services and IoT. Keith was also the marketing lead for Dun & Bradstreet’s telecommunications and cable vertical supporting the largest U.S. communications service providers. Tamboer also leads the design and deployment of JBA’s Survey practice.

Randy Field
**Director of Consulting & Chief IoT Architect**
Randy Field focuses on key client development, project management, and industry speaking engagements. He works closely with industry leaders throughout the IoT stack and formulates strategies to bring new solutions to market. Randy is an International Business veteran trained in product and business development, sales, marketing, and finance. He has spent the last 20 years focusing on business process automation with roles at Teletrac, Hertz, and Panasonic. Randy has also advised IHS, Sprint, Rogers, and IBM to help build ecosystems to deliver end-to-end solutions.

In 1991, Randy participated in the Collier Trophy (aviation’s highest honor) as part of Northrop Corporation’s Industry Team for his assistance in making the B2 stealth bomber mission-ready. He is a published author and recipient of multiple product awards.
Our Team Members

Mike Krell
Head of IoT Strategy
Mike’s passion for all things electronic spans more than 30 years of working with hardware, software, PCs, laptops, handhelds, and home electronics. For James Brehm & Associates, Mike provides research, analysis, and go-to-market strategies for companies looking to deliver successful industrial and consumer IoT solutions. Prior to JBA, Mike was the Lead IoT Analyst for Moor Insights & Strategy and helped clients such as Cisco, Dell, HP Enterprise and Qualcomm to develop IoT strategies and communications. Mike has also worked within a variety of hardware and software firms, developing marketing and communications strategies for the likes of MIPI Alliance, Alereon, Legerity, and AMD.

Bill Brehm
Managing Director and Chief Operations Overlord
Bill Brehm brings more than 20 years of operations expertise to JBA. Previously, Bill led entry into the South Texas market for Palfleet, a division of Palfinger Corporation. Prior to that, he served as Customer Service Center and Operations Manager for Terex Corporation, engineering a successful turnaround of the Utilities service business unit increasing revenues by over 300%. Bill’s demonstrated track record in new business innovations, services, product management, and long-term strategic planning helps clients with big picture solutions. A seasoned professional, Bill utilizes his understanding and skills in accounting, operations, and administration to direct JBA’s daily operations.
Our Team Members

Matt Champion
Director of Research
As Director of Research, Matt dedicates himself to finding the most impactful and relevant information for our clients and projects, and guides the team in all data acquisition strategies. Prior to working for James Brehm & Associates, he spent more than a decade doing intensive research and investigative work for Champion & Champion, an genealogy and estate research company. Additionally, Matt’s precision, derived from his passion for technology and his obsessive need for accuracy, provides our clients and partners with laser-cut results, every time.

Consuelo Azuaje
Content Developer
As Content Developer at JBA, Consuelo combines her education with her military experience as a Korean linguist to produce accurate and digestible content regarding a range of topics related to IoT. A lifelong interest in languages and nature led to her developing a passion for clear communication, multiculturalism, and scientific inquiry. Consuelo recently graduated from UIW with a major in biology and a minor in English. Additionally, she interned and participated in research at the University of Texas Health Science Center at San Antonio, where she performed protein analyses and other various molecular and biochemical techniques. And, while studying for her undergraduate degree, she also spent a year contributing to graduate-level research and maintaining cell cultures.

Yasmine Alexa Rojas
Research Specialist
As Research Specialist, Yasmine uses her background in statistics to provide and gather insightful data in order to analyze industry trends. Her work at JBA enables her to work closely with clients in order to generate deliverable projects and information. Yasmine currently attends the University of Texas at San Antonio and is majoring in Statistics with a certification in Business Analytics. Prior to her work at JBA, Yasmine has gained experience from working at the Statistical Consulting Center at UTSA, and in logistics as a bookkeeper.
Why IoT in Agriculture

• The future of farming is in collecting and analyzing big data in agriculture in order to maximize efficiency.

• Efficiency is what will transform agriculture.

• For instance, if we can precisely monitor the soil moisture level in the field and dial it in to exactly what the crop needs, we will be much more efficient than just watering for time and gallons.

• If we can precisely monitor livestock – genetic makeup, growth rates and feed rations, quality of end product and the amount of consumable meat will be much higher than today.
Why Ag Needs IoT

• One **U.S. farm feeds 168 people** annually in the U.S. and abroad.

• In 2015, **$133.1 billion** worth of American agricultural products were exported around the world.

• The world will need to produce 70% more food in 2050 than it did in 2006 in order to feed the growing population of the Earth, according to the UN Food and Agriculture Organization.

• In 1980, farmers and ranchers received **31 cents out of every dollar** spent on food at home and away from home. The rest goes for costs beyond the farm gate: wages and materials for production, processing, marketing, transportation and distribution. Today, farmers and ranchers receive only **16 cents out of every dollar** spent.

• OnFarm (an ag platform) conducted studies and discovered that for the average farm harnessing IoT, yield rose by 1.75%, energy costs dropped $7 to $13 per acre, and water use for irrigation fell by 8%.
Opportunities In Agriculture

**Animal Husbandry**  
Feed, Water, Temperature & Airflow, Air Treatment

**Crop Production**  
Grain Handling & Drying, Soil / Plant Monitoring, Weather Monitoring

**Water / Wastewater Mgt.**  
Irrigation, Water Tanks & Ponds, Wastewater, Pumps, Wells & Monitoring

**Monitoring / Farm Security**  
Equipment Monitoring, Farm Security, Livestock Monitoring

**System Integrators**
Top Uses for IoT in Ag. Today

• Remote Monitoring
  – Tanks
  – Fences
  – Livestock
  – Resources

• Irrigation
• Connected Machinery
• Precision Agriculture
• Security and Surveillance

• Building Automation
  – Temperature
  – Humidity
  – Light
  – Dust

• Cold Chain
  – Food Safety Modernization Act

• Efficiency
• Theft Deterrence
Farms and Ranches

2 million farms in the U.S covering just over a billion acres.

40.8% of the U.S. or 915 million acres is Farmland.

An additional 181 million acres of the U.S. is pasture land.

This billion acres of farm and ranchland is the approximate equivalent of the amount of total acreage of the current European Union.

The average size of U.S. farms of 434 acres.
Top Stolen Items from Farms and Ranches

- Power tools
- ATVs/Quad bikes
- Trailers
- Machinery and tractors
- Livestock
- Garden equipment
- Oil/Diesel
- Anhydrous Ammonia (used to make Meth)
- Equestrian equipment
- Bicycles
- Solar panels

Over $2.5 billion in Theft in Ag.
Animal Husbandry

- Feed
- Water
- Temperature & Airflow
- Air Treatment

Brands: Jamesway, Harvestore, Ritchie, Agromatic, Munters, Smidley, Trojan, J&D Manufacturing, Roll-O-Matic, Bohlmann, Bigass
Livestock

- 72 million hogs and pigs on farms at the end of 2016
- 98 million cattle, including 9.3 million dairy cows and 30.5 million beef cows.
- 1.5 billion chickens and 100M turkeys in the US.
How do you keep a livestock waterer from freezing? An incandescent light bulb. How do you tell when it goes out?
Crop Production

Grain Handling & Drying

Soil & Plant Monitoring

Weather Monitoring

[Logos of various companies]
What’s one of the Most Expensive Part of Corn Harvest?
Drying of Grain for Optimal Yield
Making Harvest Pay Off
Random Facts about Crop Production

• Producers surveyed across the United States intend to plant an estimated 89.5 million acres of soybeans in 2017, up 7 percent from last year and a record high.

• Corn growers intend to plant 90 million acres in 2017, down 4 percent from last year, but 2 percent higher than in 2015.

• Use of irrigation and IoT sensors improves crop production by between 2 and 8% according to Iowa State University.
# Water & Wastewater Management

<table>
<thead>
<tr>
<th>Irrigation</th>
<th>Tank &amp; Well Monitoring</th>
<th>Wastewater Management</th>
<th>Pumps</th>
<th>Well Monitoring</th>
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<tr>
<td><img src="image1.png" alt="Irrigation Image" /></td>
<td><img src="image2.png" alt="Tank &amp; Well Monitoring Image" /></td>
<td><img src="image3.png" alt="Wastewater Management Image" /></td>
<td><img src="image4.png" alt="Pumps Image" /></td>
<td><img src="image5.png" alt="Well Monitoring Image" /></td>
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- **Valley Systems**
- **Ranch Systems, LLC**
- **Börgers**
- **Stewart & Stevenson**
- **Advantech**
- **B&B SmartWorx**
- **Lindsay Corporation**
- **Rain Bird**
- **Alarm Systems**
- **BioFerm Energy Systems**
- **Viehmann Group**

*Images depict various systems and equipment used in water and wastewater management.*
Irrigation

**Market Dynamics**

- Water is the “new gold”.

- According to USDA, there were **55.8 million irrigated acres** in the United States in 2012, representing 6.1% of all land in farms.

- Remote monitoring in irrigation could save as much as 800 billion gallons of water annually.
Automated Irrigation Through Analytics
Eliminating Waste Run-off

Reduce or eliminate EPA and USDA fines for run-off and wastewater.
Irrigation Technology

• It is estimated that the US currently has 55,000,000 acres under irrigation.

• This is across 235,000 farms and ranches.

• Approximately 600,000 pumps are being used for agricultural use.

• Farmers and ranchers spend approximately $2.6 billion on irrigation equipment, facilities, land improvements and computer technology.
Irrigation (continued)
Soil and Moisture
Monitoring & Farm Security

- **Equipment Monitoring**
- **Farm Security**
- **Livestock Monitoring**
High Value Assets
An average midwestern corn and bean seed salesman will have between $3.5M - $4.5M in inventory at any given time.

A pallet of seed corn is worth roughly $50,000 and can be stolen in less than 10 minutes.

Asset tracking, security, surveillance, temperature, and humidity sensors can all be used in seed sales warehousing.
Track and Trace
Electric Fence – Grab Hold or SMS?
System Integrators
Confusing Ecosystem
Top 10 Agricultural Equipment Manufacturers

- John Deere
- CNH Industrial
- AGCO
- CLAAS
- Deutz-Fahr
- Kubota
- Bobcat
- Mahindra
- JCB
- Belarus
Augmented Reality

- Directional Virtual Fencing is basically augmented reality for livestock: the creation of a new layer of perceptual information that can redirect the movement of livestock across remote landscapes in real-time response.
Drones

Insects
Moisture
Etc.

Crop Quality

Security
What’s Next?

SIX SIGMA CONSULTANT

THE FIRST STEP IS TO IDENTIFY YOUR PROBLEMS.

WE DON’T HAVE ANY PROBLEMS. WHAT’S THE SECOND STEP?

www.dilbert.com scottadams@aol.com