The Internet of Things
Market Overview and Proprietary Financial Intelligence
SVB Analytics provides business analytics solutions to every stakeholder in the venture capital ecosystem.

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6,000 Valuations completed since 2006

1,200 Active clients in 2012

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Executive Summary

Advancements in technology have created a renaissance for the Internet of Things. Specific sub-sectors show promise, but significant technological hurdles still remain to realize the holistic vision.

Dissonance exists between products and services that large tech companies are pushing and where strong growth is observed.

Innovation capital providers continue to be skeptical until quantifiable benefits exist beyond a promise of widespread benefits to society.
# Overview of the Internet of Things

## The Internet of Things in 2013

## What has changed | Case Study in Apparel

## Advancements Powering IoT v2

## Challenges Facing IoT v2

### Market Forces at Work

## Push vs. Pull – A Clear Business Case

## Relative Overall Performance of IoT Companies

## Sales Trends of IoT Companies by Size

### Financing the Internet of Things

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## IoT investments – Who and How Much

## Revenue Growth and Value Progression

### Niche Performance Mapping

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What is the Internet of Things in 2013?

The “Internet of Things” is not an industry.

It is an umbrella term encapsulating a collection of interrelated industries. Each sub-industry has its own stakeholders, value chains, and economics, and therefore each must be evaluated individually.

The Internet of Things is also the buzz word of 2013 in the tech media, Kickstarter world (the “Quantified Self”), and of large technology companies worldwide.

Qualcomm CEO Paul Jacobs at CES 2013, courtesy of TheVerge
MIT coins the term RFID to bring about a ubiquitously connected world by 2005

What happened to IoT v.1?

“It is important to take into account that the 'Internet of Things' is a concept invented by academics, and not a response to any expressed market need.”

– Bob Williams, Synthesis Journal, 2008
What Has Changed in IoT?

**Successful IoT v1**

- M2M Communications
  - Numerex
- Wireless Patient Monitoring
  - Cardionet
- Fleet Management and Asset Tracking
  - Intermec

**Emerging IoT v2**

- Consumer and Quantified Self
  - Fitbit
- Energy Management
  - Redwood Systems
- Mass Enablement Technologies
  - Electric Imp

An “Internet of Some Things”
Primarily enterprise-class, dedicated hosting, high investment, ROI-driven solutions.

An “Internet of More Things”
A new class of tools and solutions driven by decreasing hardware prices and cloud infrastructure.
Case Study | Apparel Industry – IoT V1

- Linear, one-dimensional information flow
- Static data points
- Focus on improving logistics
- Limited or no feedback to marketing/sales, design teams
Case Study | Apparel Industry – IoT V2

- Dynamic, rich data points collected at many points in the distribution channel
- Real time data collection and analytics allowing agile product design and product improvements
- Greatly enhanced product mix, market segment targeting and better customer experience
Advancements Powering IoT v2 | Key Convergences

A confluence of technologies have been key drivers advancing the Internet of Things.

**Moore’s Law**
- Decreasing prices of wireless sensors, hardware
- Storage and compute resources
- Smaller, more diverse, and powerful chips

**Metcalfe’s Law**
- Penetration of smartphones and tablets
- Public, private, and hybrid cloud-based architectures and resources
- Wireless connectivity technologies (3G/4G/LTE, WiFi, ZigBee, Bluetooth)
- Ultra-low power Micro-controller Units (MCUs)

**Big Data Analytics**
- Exploding volume of data
- Cloud storage systems are dated
- Converting data into actionable intelligence
- Controlling decisions, optimizing resources, lowering uncertainty in real time
Challenges Facing IoT v2

- Phasing out of 2G spectrum
- Fragmentation of Wireless Communication Standards
- Battery technologies and alternative power sources (solar, motion, vibration, temperature)
- Software architectures and APIs
- Costs to retro-fit current generation “things”
- Master ontology to facilitate inter-device communication

“A new Wireless Intelligence report estimates more than 200 LTE networks will have launched around the world by 2015. That’s great news, but they’ll use 38 different frequencies.”

— Kevin C. Tofel, GigaOm (December 2011)
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Large, and frequently slow-growth, enterprises have been the main drivers of IoT *use cases*. Particularly around the connected home, investments in “marketing the future” have failed to drive widespread consumer demand for those services. Conversely, innovation in Healthcare IT and Energy Management has come directly from the VC-backed market, and in response to buyer-driven *business cases*. 
IoT Companies Struggle at the Early Stages Relative to a Broad Index of Same-Size Peers

IoT companies with less than $10M in revenue underperform relative to a broad peer group. However, companies with more than $10M in revenue outperform their peers.

This can be seen in the progression of comparable sales growth from the sub-$1.5M sales growth segment to the large, over-$10M segment.
Small IoT companies are able to grow revenues faster than their sales and marketing spending. This ability to grow revenues faster than their operating expenses is an indication of viral growth.

However, given their small sales volume, these companies lack economies of scale and struggle to keep their production costs (COGS) in check. As such, we observe high fixed costs relative to net revenue.

Source: SVB Analytics
As they grow, revenues at IoT companies continue to outpace sales and marketing spending (as tracked by their operating expenses), exhibiting slower yet still present organic growth. However, the widening gap between Revenue growth and COGS growth indicates trouble scaling from early-adopters to a wider customer base.
As IoT companies achieve size and scale, revenue growth not only outstrips sales and marketing costs, but also production costs (i.e. COGS growth). In contrast to smaller companies, large companies’ operating expenses begin to be affected by the scale of revenues.

As can be observed in all three revenue buckets, IoT companies exhibit the ability to grow revenues without excessive investments in sales and marketing expenses.
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VC Market Dynamics Affecting IoT

The “Series A Crunch”

Let’s All Shed Tears For The Crappy Startups That Can’t Raise Any More Money

Dan Lyons - December 3rd, 2012

The Series A Crunch is a supply-demand imbalance that will result in over 1000 seeded startups being orphaned and more than $1 billion of investment evaporating. It is all part of a healthy natural selection process.

Dan Lyons, CB Insights, December 3, 2012

Declining Venture Capital Investment

Venture Dollars Raised Fall 27% Below 15-Year Trailing Median

Tomasz Tunguz, Tech Crunch, July 22, 2012

There are more angel/seed-funded companies than institutional dollars available to continue to fund them.
Does a “Series A Crunch” Affect IoT Disproportionately?

Estimates of Silicon Valley Bank’s market share in the VC-backed market exceed 50% in the U.S.. A review of identified IoT companies shows an even distribution by stage of development between Series A, B, and C.

However, IoT companies as a % of SVB’s total client base is small (~3%), indicating an overall lack of VC enthusiasm for the space thus far.

An important thing to note, SVB’s portfolio does not cover a majority of the angel-backed market (or seed-stage companies). Activity in IoT at the seed-stage is high, but most products being developed are not “venture fundable.”

Source: SVB Analytics
Who is Investing in IoT?

The ratio of Strategic-to-VC (excluding angels) is higher in IoT than other sectors.

This further illustrates the strategic imperative for large enterprises to create a market for IoT-related products and services.

The even distribution between Series A, Series B, and Series C supports the view of two iterations of IoT and that certain sub-industries have progressed from product development to product-market fit.

Notable VCs include **KPCB, DAG, Khosla, Lighthouse, and NEA**.

Notable Strategic Investors include **Intel, BestBuy, Cisco, and Comcast**.
How Much are VCs Investing?

Important Note: “Series A” in SVB databases refers to institutional VC rounds. Angel rounds are considered to be “Seed” rounds.

To get a product to market and successfully expand (Series C and beyond), it takes, on average, $30M+ in total invested capital. Given some of the quick hits in recent years (e.g. Instagram), IoT factors such as hardware development, inventory management, long sales cycles and/or slower than expected up-take may explain the lack of investment activity.

Source: SVB Analytics
Revenue progression from Series B to Series C indicates that many mid-stage IoT companies experience trouble creating rapid growth.

Successful Series C companies take invested capital and fuel strong growth going into their Series D rounds. There are much fewer Series D companies than Series C, indicating that winners and losers separate at this stage of development.

Unfortunately, the cost to get an IoT company through its Series C financing is high (~ $30M.)
Value Progression

75% of Series D rounds are at higher valuations than the Series C financing again highlights the growth challenges mid-stage companies face.

Those that successfully execute are rewarded with higher valuations in the Series D round.

Source: SVB Analytics
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IoT Segmentation

Distribution of SVB IoT Companies

Source: SVB Analytics
Niche Spotlight | Enablement

Source: ZTE Technologies - Opportunities, Challenges and Practices of the Internet of Things [2010]

The Brains
- Enables underlying M2M interactions, creating a unifying experience across platforms
- Maximizes the limits of the operating environment through intelligent, robust and lean software
- Increases the focus on an information and decision-based world delivered through apps

The Sensory Network
- The majority of connected devices in IoT are located at the “last inch” of the network
- Bridging the gap between access networks such as the Internet or utility networks to a localized home area network or sensor nodes
## Spotlight | Enabling the Internet of Things

### Hardware

*Enabling late-stage consumer-facing product development*

1. **Interoperability through Standardized Protocols**
   - Uniformity across frequencies, communications protocols
   - Minimize device, node and band fragmentation
   - TCP/IP support along the communications channel

2. **Superior Power Efficiency**
   - Ability to operate for months/years on low power sources
   - Ability to harvest energy from environment

3. **Ease of Installation/Deployment**
   - Consumer-facing devices with negligible capacity for user error, ease of installation in a host of environments
   - Developer-facing devices with ease of developing and deploying firmware updates, design, debug and optimize

### Software

*Empowering IoT end-to-end and unifying user experience*

1. **Single Control Interface**
   - Creating rich, cross-platform native experiences across connected devices

2. **App-Platform Consolidation**
   - Build out application-development environments spanning multiple devices
   - Enable development of consumer electronics devices – tablets, smartphones, set-top boxes, social TV, in-car entertainment

3. **Optimize Cloud-Based Service Deployments**
   - Developing smart software for tracking, situational awareness, decision analytics, resource and process optimization – all deployed and controlled through the cloud
   - Enhanced network optimization for content delivery
IoT enablement technologies are the base upon which all other IoT products are built, and this dependence is reflected in the robust sales growth.

However, strong organic growth is matched with increasing COGS and operating expenses.
Much of the current excitement in the IoT enablement space is driven by advancements in Big Data.

The Cloud links sensors, networks, people and applications, allowing for the analysis of Big Data. Software revenue models allow for fast scaling after high initial investments in R&D.

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*Source: SVB Analytics*
The prices of mobile enablement devices have continued to fall, resulting in decreased revenue levels.

Production costs for these companies have risen modestly but have been offset by proactive management of operating expenses.

Source: SVB Analytics
Hardware

Overview
- Founded in 2011, Electric Imp is developing Imp, a platform that leverages WiFi and cloud technologies to connect everyday electrical devices to the Internet.
- Imp-enabled devices can be accessed through the web or mobile devices using Electric Imp’s application or other third-party applications.
- The Imp chip will be available as a user-installable card integrated with a processor and WiFi capability. The chip can automatically recognize the device in which it is inserted to retrieve software required to operate the device.

Value Proposition
To Developers:
- Open Imp API, which connects to most Web services, servers and applications.
- Web-based IDE maintains software and pushes new features instantly.
To Manufacturers:
- Pre-built scalable, reliable and secure connectivity solution.
- Design, test and deploy network integration into unconventional devices.

Software

Overview
- Founded in 2000, UIEvolution provides the UIEngine platform, tool suite, and specialized services to support real-time data application services, rich storefront clients, multimedia applications, casual games, and device/service User Interfaces (UIs) to a large number of devices and wireless/broadband users. UIEvolution employs both a traditional packaged software delivery model and an SaaS-based delivery model for its products.

Value Proposition
To Developers:
- Write-once application logic that adapts to many native platforms and adapts itself to different screen types.
To Manufacturers/ Businesses:
- The connected car vertical is very promising – from audio today to enhanced driving and increased safety in the future.
- Creates seamless rich, cross-platform native user experience on multiple platforms across multiple devices.
- Integrate back end services: takes your existing Enterprise web services and optimizes them to work better with your mobile applications.
- Diverse app management: easily modify the content of applications across diverse platforms and screens.
A Clear Business Case:

- Demographic changes leading to an increasing target market
- Rapid decrease in size and cost of devices
- Federally mandated re-admission penalties leading to increased provider demand for telehealth and remote patient monitoring solutions
- Gradual shift in payer framework to accountable care organizations resulting in greater reimbursement for connected healthcare solutions
- U.S. Department of Health and Human Services launching the Health Data Initiative, which provides greater amounts of health data in more usable formats

Risks and Challenges:

- Long sales cycles associated with selling into healthcare markets lead to delays in successful product commercialization
- Complex regulatory requirements associated with healthcare devices that many technology entrepreneurs are unfamiliar with leading to product delays
- Security and privacy concerns related to the data generated by wireless devices lead to delayed customer acceptance
- Lack of standards leads to fragmented solutions, inability to scale efficiently

“While the focus of funding has been in the Health Information Management [HIM] category, which covers technologies on the Healthcare Practice side, there is significant investment and funding going into companies that engage the consumers—like mobile health, telehealth, personal health, and social health.”

– Mercom Capital Group “HIT 2012 Annual Funding and M&A Report”
IoT companies developing patient-monitoring products are seeing solid fundamental consumer demand for their products. However, companies in this niche tend to be relatively small (less than $10M in sales,) resulting in higher COGS growth due to a lack of scale.
Company Spotlight | Healthsense

Overview:

- Founded in 2003, Healthsense is a Minnesota based company providing technology-enabled care solutions for the entire senior care continuum.
- Healthsense has its platform in over 100 senior living communities serving approximately 10,000 seniors.
- Full suite of WiFi-enabled products for remote monitoring, nurse calling, emergency response and wellness management.
- Healthsense plans to offer their products and services to all at-home care customers.

Value Proposition:

- Aging demographic yields large and growing market for senior care.
- PPACA (Obamacare) expected to increase incentives and financing options for assisted living programs. Medicare and Medicaid incentives driving more long-term preventative care spending.
- Potential to be a key provider of highly valuable data and services.
- Partnerships with strong partners such as Verizon, Sodexo, as well as NIH.
- ROI benefits of a single standards-based platform solution.
Niche Spotlight | Energy Efficiency in the Home

Current State of the Smart Energy Home:

- Smart Energy technologies employ two primary approaches to reducing peak demand:
  - Energy Efficiency: Cutting unnecessary energy consumption, such as plug-load waste and vacant home temperature control.
  - Load Management: Shifting energy consumption away from peak demand times, optimizing utility generating capacity.

- Energy efficiency models are already prevalent in the Smart Energy Home—they enable real-time energy use monitoring, remote control of devices and appliances, and aggregate consumption data and trends for better informed decision making.

- Load management is critical to reducing peak energy demand but requires residential customers to know the current price of electricity, and be charged dynamically as opposed to a flat rate. Installing “smart meters”, digital meters which enable two-way communication, is the first step a utility can make toward enabling the Smart Energy Home.

Risks and Challenges:

- Metering: Legacy meters must be overhauled to enable two-way communication of real-time electricity pricing based on peak demand.

- End Use: Residential energy consumption is fragmented over several dozen end uses, each contributing differently to a user's energy bill.

- Affordability: Broad consumer adoption requires technologies to be priced to provide users with a reasonable rate of return on their energy expenses.

- Security & Privacy: Devices and technologies must be transparent about what information is collected and communicated and for what purpose.
IoT companies focused on developing products for improving energy efficiency are performing exceedingly well. Revenue growth well exceeds increases in both COGS and operating expenses.

Benefits from improving energy is easily quantifiable, making the case for the adoption of products easy to justify. For example, smart meters for various utilities, such as electric, natural gas and water, have proven their value in reducing waste and improving bottom lines.

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Source: SVB Analytics
Overview:

- Founded in 2008, ThinkEco is a New York City-based company developing easy-to-use energy efficiency solutions for homes and businesses.
- Its flagship product, the Modlet—short for “modern outlet”—is a hardware-software solution for saving money and energy on plug loads, both at home and in the office.
- The Modlet plugs directly into any standard outlet and communicates wirelessly to a user’s Internet-connected computer, allowing users to:
  - Monitor real-time energy consumption;
  - Remotely control plugged-in devices via the web or smartphone; and
  - Set schedules for controlling plugged-in devices.

Internet of Things:

- The Modlet enables remote control and connectivity to virtually any appliance that plugs into a standard outlet. Through the use of proprietary algorithms, the Modlet software helps detect when electronic devices are unused and turns them off at the source.

Clear Value Proposition:

- Prevention of plug-load waste, the fastest growing segment of commercial energy use.
- 6-8 month payback period, reducing home energy use by 6-10%.
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Summary and Key Takeaways

- Despite the attention being paid to the Internet of Things by large tech companies and media, there remain significant financial and technical hurdles to overcome.

- Compelling use cases have not, so far, translated directly into viable business cases, with the exceptions of healthcare IT, energy efficiency, and enablement technologies.

- Venture Capital, and in turn, venture-backed companies, fuel innovation and disruption. However, the future of the VC industry, and the thousands of seed-stage companies needing funding, is uncertain.

- IoT companies appear to be starting strong out of the gates financially but fight strong headwinds as they attempt to scale their businesses.

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The Internet of Things offers the promise of enormous socio-economic benefits, but the providers of innovation capital will continue to proceed cautiously until use cases evolve into compelling business cases.
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<td>Application Programming Interface</td>
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<td>CES</td>
<td>Consumer Electronics Show</td>
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<td>COGS</td>
<td>Cost of Goods Sold</td>
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<td>IoT</td>
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<td>MDM</td>
<td>Mobile Device Management</td>
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<td>Metcalfe’s Law</td>
<td>The value of a network is equal to the square of the number of devices connected to it</td>
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<td>Moore’s Law</td>
<td>The number of transistors on integrated circuits doubles approximately every two years</td>
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<td>Organic Sales</td>
<td>Growth that comes from existing customers, word of mouth, and viral sources, versus from increased sales and marketing efforts</td>
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<td>Radio-frequency identification</td>
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<td>ROI</td>
<td>Return on Investment</td>
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<td>SaaS</td>
<td>Software-as-a-Service</td>
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<td>Step-up</td>
<td>Refers to the percentage increase in the original issuance price of the preferred securities between two rounds of financing</td>
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Steve Allan is a managing director with SVB Analytics, responsible for leading SVB Analytics in executing client engagements, issuing valuation opinions for private companies, and conducting research in the technology and life science private financing arena. Allan brings a strong financial background and passion for entrepreneurship to his leadership role at SVB Analytics.

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