BEST PRACTICES

IoT Project Planning

SIRQUL™

Reimagine the World

Welcome!

Sirqul truly hopes you find this resource helpful as you begin your IoT journey.

As we work with business leaders who are about to plan their first, or augment their existing, IoT project, we run into a recurring theme, and it goes like this...

> "We're ready to leverage IoT, we're excited about the possibilities, but not sure where to begin in making our ideas reality."

Nearly everyone has this concern initially, so we wrote this eBook to offer high-level insights into how to get started. We'll outline a fundamental planning roadmap, along with some key considerations based on numerous successful IoT projects with companies large and small.

> The Internet of Things is open for business – so, let's get started.

Attitudes towards IoT among business executives worldwide

Would like to learn about the relevance and value of the IoT for their organization	Agree that organizations that leverage the IoT will have a significant advantage	Think that IoT is poised for significant growth in the next 3-5 years	Agree that there is a lot of confusion surrounding IoT
71%	65%	62%	59%

Note: *71% of the respondents were from the US. Source: Internet of Things Institute, 2016 IoT Trends Survey, June 22, 2016. www.eMarketer.com

A Little About Sirqul

The year was 1993. Sirqul founder and CEO, Robert Frederick, leveraged his passion for creating a "connected world" to work on device-to-device communications at the MIT Media Lab.

After MIT, Robert brought this passion to his first start-up – a company backed by Intel and Ericsson called Convergence Corporation – where he worked on Bluetooth as it was just in its infancy. By 1999, the company was acquired by Amazon, due to the growing adoption of its product – *DeviceTalk* – which enabled mobile commerce via customizable text messages.

Robert led Amazon's first efforts in mobile and voice recognition with *Amazon Anywhere*. In 2002, he became the technical co-founder and chief architect of Anywhere's evolution into *Amazon Web Services (AWS)*, a new cloud offering that changed application development and disrupted traditional software business models.

That was the beginning of a journey that brings us to today – and Robert's company – Sirqul. The Sirqul IoT Engagement Platform is used by all types of companies to rapidly create engaging IoT experiences and applications for their customers, users and employees.

This was Robert's dream from the start. It's the culmination of over two decades of innovation and patents in cloud, mobile, APIs and services – applied to the Internet of Things.

SIRQUL'S MISSION

"Empower people to easily imagine and deliver engaging experiences via connected devices and ecosystems."

ROBERT FREDERICK
CEO, President and Founder

The Internet of Things... In One Word

If we were to sum up the Internet of Things in one word, that word would be

Engagement with products...devices...data...consumers...employees... each other.

IoT unlocks a vast universe of endless possibilities to engage in ways that just a few short years ago seemed futuristic.

A retailer reinvented its dressing rooms with smart mirrors. RFID tags on clothing items allowed shoppers to launch product screens that showed the item with different looks, search for and receive additional products from a store associate, and then save items for later—without leaving the dressing room.

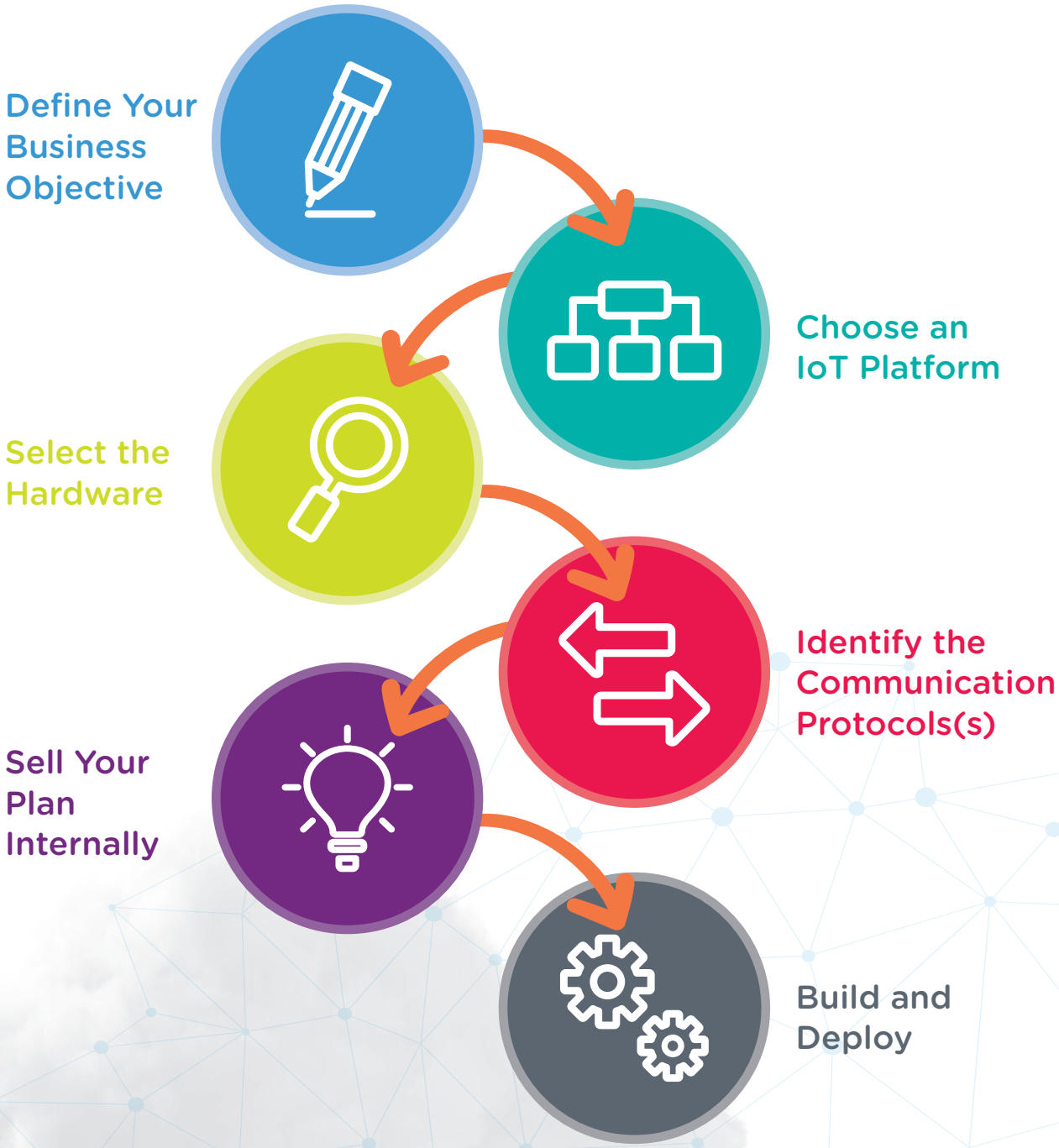
An industrial manufacturer installed sensors inside equipment to monitor if any parts had exceeded their designed thresholds, and automatically sent notifications to owners and manufacturers when exceeded. The data collected from the sensors also predicted equipment malfunctions and automatically scheduled service calls ahead of an actual part failure.

An apparel manufacturer created a “smart shirt”measuring athletic performance including biometrics like heart rate, calories burned, steps taken and energy output. Cutting-edge silver fibers woven directly into the shirt collected real-time stats, and used Bluetooth to stream the data directly to the user’s iPhone, Apple Watch and the cloud.

The future is here and it’s time to set your plan into motion!

Your IoT Action Plan

There's a great deal to consider when defining your IoT plan, especially if you're embarking on your first initiative. To help you get started, we've consolidated the planning process into a practical, six-step roadmap.



Define Your Business Objective

There are countless ways to leverage IoT to add significant value to your business. Many Sirqul clients have found that the best approach is to start by focusing initially on one or two business objectives.

By focusing your initial effort, you can launch a pilot rapidly, cost effectively and quickly demonstrate business impact. After initial success, you can then consider adding additional functionality and addressing additional business needs based on your learnings.

IoT lends itself really well to both:

Internal Applications that improve business operations, to drive operational efficiencies and reduce costs.

Consumer Engagement Applications that deliver a better user experience or open new revenue streams.

Many companies find it effective to focus first on an internal application, such as an inventory management or monitoring application. You can launch a pilot quickly to show how the solution works, and to demonstrate business value, and then move onto consumer-facing areas that you have identified.

To help you prioritize an initial focus, consider working with an outside IoT partner to help you understand what it would take to implement various solutions, the implementation options, and all the variables and requirements.

What's your IoT opportunity?

- New revenue streams
- Sales growth
- Customer experience
- Cost savings
- Workforce efficiency
- Supply chain and logistics
- Asset utilization
- Innovation

Who's Doing What?

Staples Makes Office Supply Orders Easy

Staples is making its famous Easy button more functional by connecting it to back-end services to let business customers place office supply orders.

The tool plugs into a wall outlet and use the customer's Wi-Fi. When the button is pressed, the service prompts the user with a friendly voice to verify the order.
Based on the customer's transaction history, the service narrows down potential product matches.

Choose an IoT SaaS Platform

At the heart of every IoT implementation is the IoT software platform. The IoT platform is the brain behind the solution – the technology that connects everything together and allows you to both develop and manage the end solution across all systems.

The IoT platform you choose will be one of your key strategic decisions, as it is a long-term investment on which you will evolve your initial solution, and create new solutions that can impact multiple areas of your business.

Key Considerations When Evaluating IoT Platforms

There are several criteria to consider when choosing an IoT platform. Here are the key characteristics to seek.

Open Platform for Integration Flexibility

It is crucial that your platform can be integrated easily with other platforms and technologies, with future technologies that come on the market, as well as your legacy systems. Avoid being locked into a proprietary solution, to help you maintain flexibility, and to easily meet your growing solution requirements.

Scalable for Evolving Needs

You will want a platform that is highly scalable to meet your evolving needs, such as adding new applications, features, devices, users, locations and more. Be aware that while pricing models basaed on number of connected devices might be the most cost effective solution for a pilot it may turn into the most cost prohibitive at scale. The platform should also allow you to easily scale up or down your requirements for storage, big data analytics and processing.

Tools for Rapid App Development

A platform that provides a modular approach to app development will enable you to quickly create, test and launch new applications. Pre-built starter kits with modular templates, a robust API library, and a test environment that meet both your current and future needs are key.

Hybrid Capabilities - Edge and Cloud Computing

A hybrid platform will give you the best of both worlds: An onsite service for immediacy of critical data, operational efficiency and localized analytics to provide actionable output in near real-time. And big data analysis and storage in the cloud to help with overall operational and business efficiencies.

CONTINUED

Choose an IoT SaaS Platform

Remote Device and Hardware Management

A key to your IoT solution is a platform that provides remote access capabilities for management, reconfigurations, updates and setting controls, especially when processing between local networks and the cloud.

Device/Protocol Agnostic

An open platform can be integrated with nearly any connected device in the same straightforward way. The more agnostic your platform is, the easier it is to create and evolve your solution without restrictions.

Big Data Analytics and Artificial Intelligence

Your IoT platform must be able to address your big data analytics requirements. IoT devices generate continuous streams of data, and you must be able to handle large data volumes, analyze, and perform actions based on that data. Artificial intelligence, machine learning algorithms and predictive analytics are critical components of your IoT solution, and will provide actionable insights beyond basic diagnostics.

Privacy and Security

Security is a vital part of every IoT solution. You must be able to manage end-to-end data encryption at rest and in motion for both user and device authentication. Make sure that your entire solution includes a robust security architecture with role and access management, end point security, and secure transactions between devices, apps and with the cloud.

Trigger and Action Management

Your IoT platform should drive engagement by employing rules-based, data-driven triggers that enable "smart" actions. Rules engines should be able to handle the logic creation of "if-then" statements with multiple object types and combination of queries.

Who's Doing What?

Sears Makes IoT Mainstream with Connected Appliances

Sears is launching a series of connected products that simplify people's lives while helping them save money. An example is their new Kenmore Smart Room Air Conditioner which features an app that allows users to adjust the AC temperature in their homes remotely. Owners can turn it on or off, lower or raise the temperature, and set a schedule. *"The Internet of Things is core to our connected home strategy,"* said Tom Park, president of Kenmore, Craftsman and DieHard brands at Sears.

Select Hardware and Devices

IoT hardware is a broad category, with several device applications, ranging from user devices, such as wearables, to sensors that monitor nearly anything.

There are a wide range of off-the-shelf devices that can address most IoT applications. If the functionality you require is not readily available, there are original design manufacturers (ODMs) that can build a custom device that addresses your needs. Hardware manufacturers should be willing to work with you to define the requirements that will make your software and communication protocols compatible within the device.

There are new hardware devices from numerous vendors becoming available just about every day across several industries, from healthcare to robotics to the home and more. You will want to work with your IoT partners to help you evaluate the various hardware and device solutions in order to determine the best ones for your implementation.

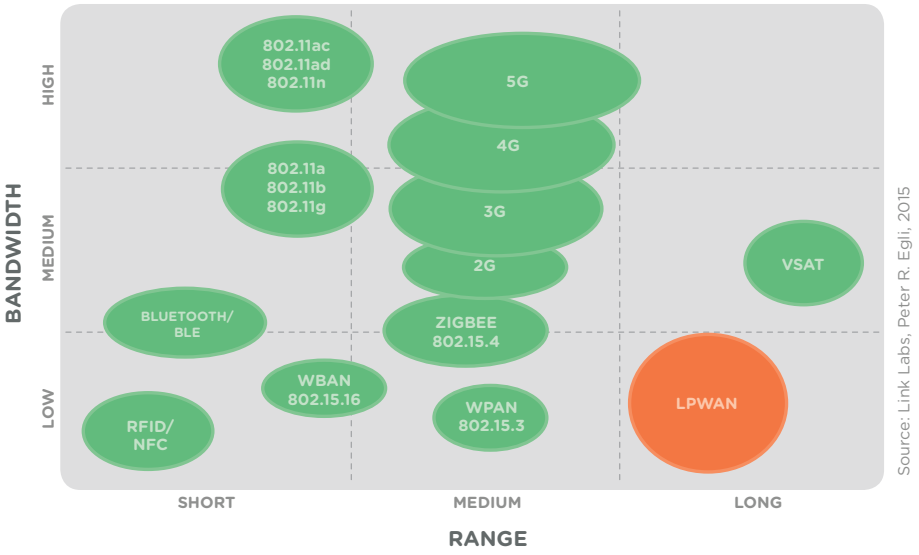
Identify the Communication Protocol(s)

The communications protocol connects your devices to each other, and to your IoT platform. Your solution may require multiple protocols, therefore you will want to ensure that your IoT platform is flexible, to integrate with several of them.

The communication protocols will be based on a range of requirements, which can include:

- **Bandwidth / Data Usage Requirements** – the amount of data throughput per device
- **Geographic Range** – from a small indoor space to a wide range outdoors
- **Security / Access** –public or private access to the network
- **Device Choice** – different devices run over different communications protocols
- **Frequency** – always-on or intermittent availability

Network Options Based on Bandwidth and Geographic Range



Source: Link Labs, Peter R. Egli, 2015

Who's Doing What?

JOHNNIE WALKER

Johnnie Walker uses printed sensor tags to turn every Johnnie Walker Blue Label bottle into a smart bottle that holds digital information consumers can access with any NFC-enabled smart-phone. The connected smart bottle enhances the consumer experience by allowing parent company Diageo to send personalized messages to consumers, who read the sensor tags with their smartphones. Diageo can send targeted and timely marketing messages, such as promotional offers and cocktail recipes, whether the consumer is at the retail location or after purchase.

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Identify the Communication Protocol(s)

The amount of data you need, the frequency you need it, and over what distance will help you determine your communications technology.

For example, if you want to read a meter once per month to create a bill, this is a low amount of data at wide time interval and across a huge geography, which lends itself to LPWANs like Ingenu. LPWANs are leveraged in industries and applications such as agriculture, cities, buildings, utilities and gas.

Typically, if you are connecting several low-powered devices like sensors, meters or lights over a larger geographic range, LPWANs can help connect to the internet at significant cost savings of about one dollar per device vs. ten to twenty-five dollars with a longer battery life.

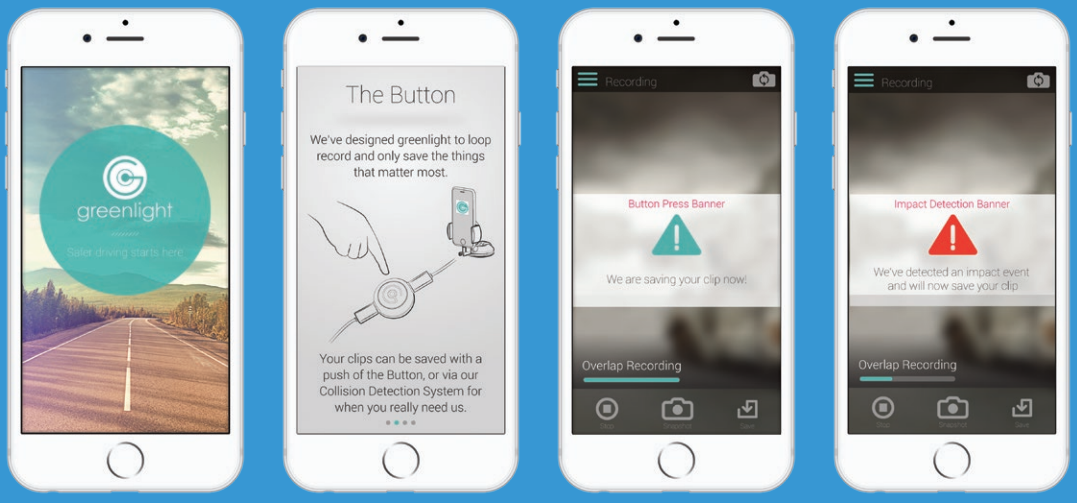
Conversely, if you need to know the traffic flow through your retail store in order to determine product placement and trigger notifications in real-time, cellular networks, Bluetooth or Wi-Fi would work well, like Project Avatar (see page 18).

CASE STUDY

Greenlight powered by SIRQUL

Greenlight Turns Smartphone into a Dash-Cam

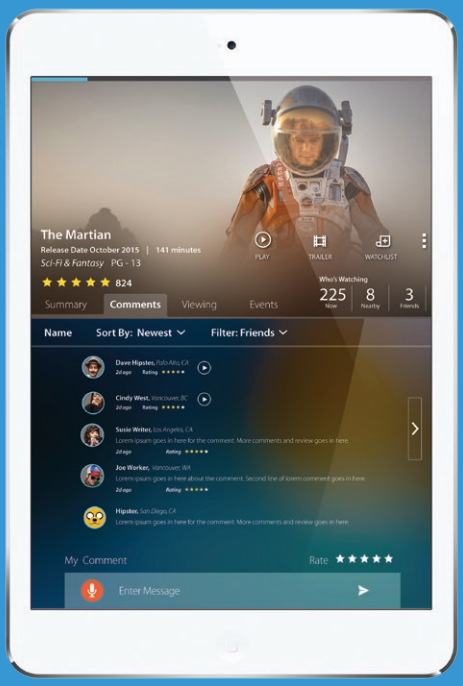
Greenlight powered by Sirqul is making driving safer by turning a smartphone into a dash-cam that drivers use to detect crashes, record and store high-definition video of any incident. Docking an iPhone or Android device in the Greenlight cradle triggers a notification that lets the user easily start the app without needing to search through the phone for the icon.



For more information, please contact us: greenlight@sirqul.com

CASE STUDY

EdgeSpectrum powered by SIRQUL



EdgeSpectrum Personalizes Home Entertainment

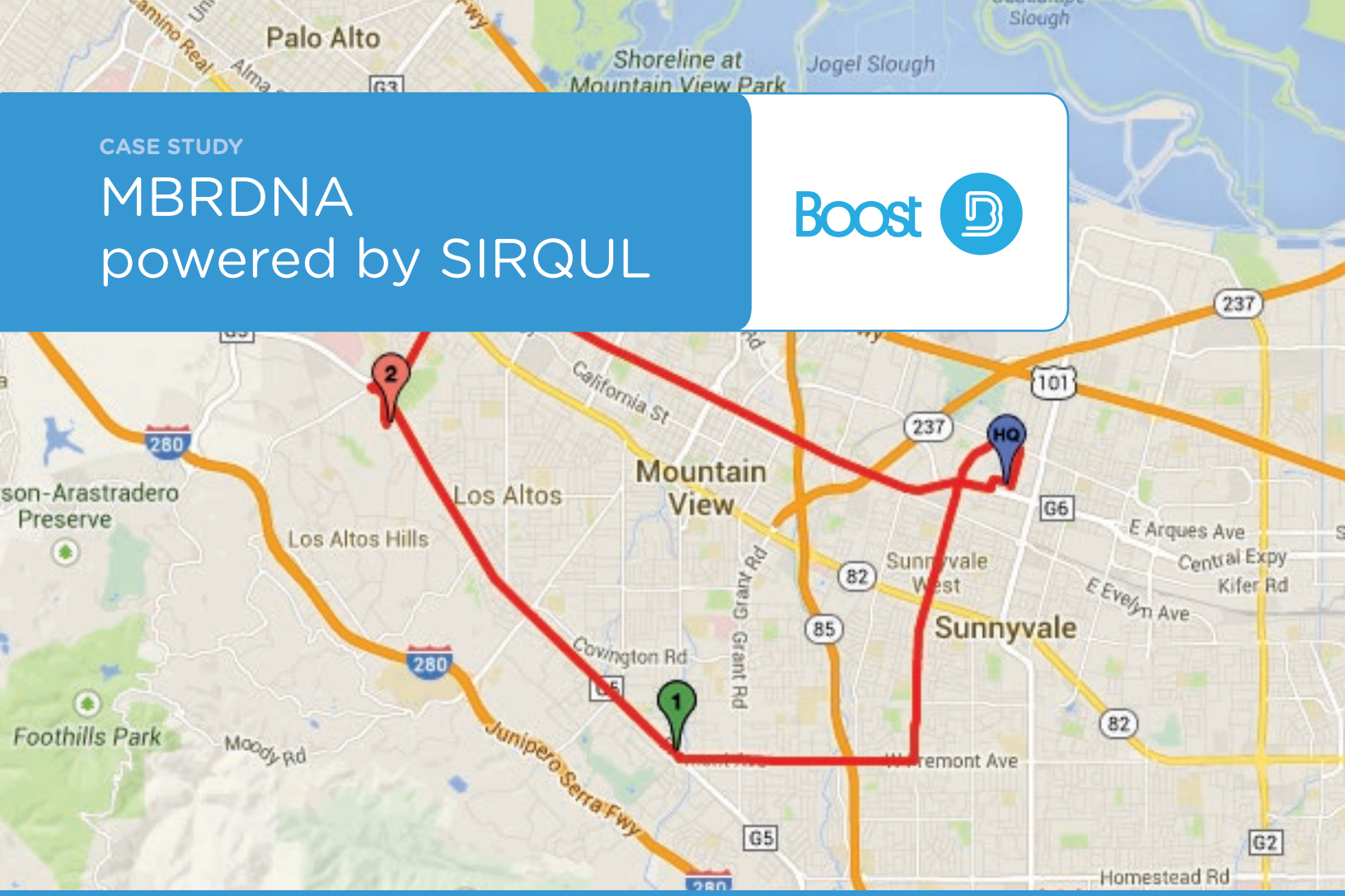
EdgeSpectrum (ESI) is launching set-top boxes and mobile apps that deliver personalized home and hotel entertainment experiences when entering a room. Concentrating on engagement, ESI powered by Sirqul's machine learning algorithms and IoT platform deliver dynamically changing entertainment on physical devices in the smart home, mobile and wearables by controlling the experience based on the social setting. Ingesting trends, user preferences, history and more, both cloud and edge computing algorithms deliver video and data packets to the home's mobile and set-top boxes before a user even requests the content. Predicting content consumption allows for on demand content delivery to be effortless, enjoyable and simply amazing.

For more information, please contact us: edgespectrum@sirqul.com

CASE STUDY

MBRDNA powered by SIRQUL

Boost



BoostbyBenz and RanchRide Shuttle Delivers Modern Mobility

Mercedes-Benz R&D North America (MBRDNA) and their Business Innovation Team launched urban mobility pilots to benefit communities and offer new business models. Powered by Sirqul, BoostbyBenz, a youth transportation service, and RanchRide, a local community car-sharing service, both were successfully launched leveraging several Sirqul APIs including advanced routing, logistics, chat, video, real-time alerts, traffic avoidance and predictive simulation analytics.

Today the same technology MBRDNA's Business Innovation Team used, is now available for licensing. The white label solutions range from passenger transportation to product/food delivery to fleet management to service professional dispatching.

To learn more about licensing options, please contact us: routenroll@sirqul.com

Build and Deploy

There are a range of decisions you will need to make to help you determine the best way to build and deploy your IoT solution. Here are five considerations to think about.

5 Key Considerations

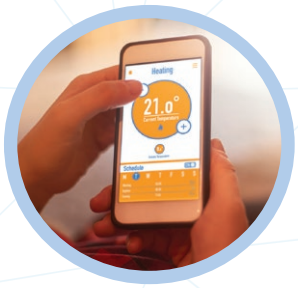
1. Deployment Model

One of your key decisions is how to deploy your IoT platform – on premise, in the cloud, or through a hybrid model. There are advantages to each approach. Much of the decision depends on the type of data you need to store, and your organization's attitude toward cloud computing. Some of the reasons to consider on-premise deployment range from regulations, to security concerns, to connectivity and speed issues.

Many companies prefer a cloud solution, such as Amazon Web Services, because they can deploy more quickly and at a lower development and maintenance costs, and have an agile, scalable platform that allows them to start small and add or subtract new devices and data streams as needed. Some companies prefer a hybrid model, due to the limitations of operating in either a solely dedicated or public cloud environment. The hybrid approach offers benefits, such as enhanced security, while leveraging the cost and scalability benefits of the cloud.

2. Development Resources

Will you be using In-house development resources, or will you outsource development of your solution? Some outside development partners will work with your internal team, enabling you to take a hybrid development approach.



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Build and Deploy

3. Hardware

There are a range of considerations to take into account when choosing hardware, from custom development requirements to environmental conditions. Off-the-shelf hardware is available for most IoT applications. If the functionality you need isn't readily available, you may choose to work with an ODM to build a custom device.

4. Launch Strategy

Should you launch with a limited pilot, or roll out your solution company-wide? As we noted earlier, an effective approach to consider is to start with a pilot that addresses one or two business objectives, and build from there. This gives you the opportunity to launch rapidly, and quickly demonstrate success. Then you can consider adding additional functionality, or launching company-wide.

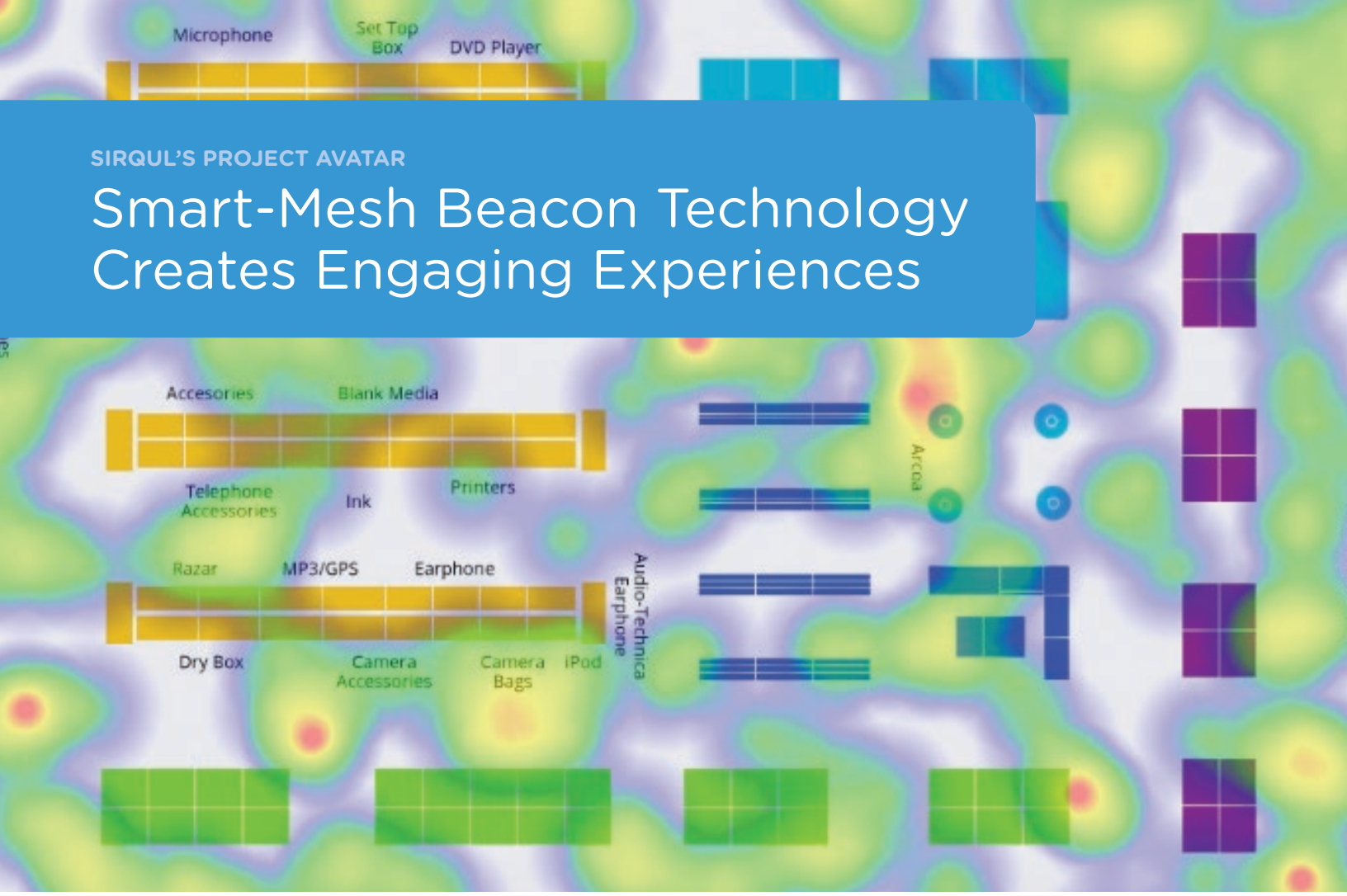
5. Location Logistics

During your planning phase, it's important to pay close attention to location logistics associated with equipment installation. Are there environmental issues that need to be considered? Existing materials or equipment that should be addressed? Are there employee or customer factors to take into account?

Who's Doing What?

Florida Hospital Celebration Health

At Florida Hospital Celebration Health, surgery patients are tagged with real-time location system (RTLS) badges that track their progress from the pre-op room to the surgical suite to the recovery unit. Family members follow the process on a TV in the waiting room. *"Patients have embraced it fully,"* said Ashley Simmons, director of innovation development at Florida Hospital. *"It really has become part of the culture."*



SIRQUL'S PROJECT AVATAR

Smart-Mesh Beacon Technology Creates Engaging Experiences

Sirqul's Project Avatar is a great example of a piece of hardware with embedded software, leveraging several network protocols. This device transforms how business operations, the workforce, and consumers at any venue - from retail stores to stadiums to conferences - interact and engage with one another.

Powered by Sirqul's IoT Platform, the solution includes a two-way smart-mesh technology which surpasses the limitations of competing beacon technologies. Operating indoors where cellular connections are often unreliable or unavailable, and in congested events with thousands of people all at an affordable cost.

Heat maps help to visualize traffic flow, identify dwell times and hot spots for product placement or serving personalized experiences based on context, location and preferences. While a suite of tools empowers turn-by-turn navigation, special offers, push notifications/ alerts, and more. The system is extensible and helps many identify new revenue streams and opportunities to monetize through contextually serving content based on location triggers and interactions.

To request a demo, please contact us: projectavatar@sirqul.com

CASE STUDY

NEXUS Condominiums powered by SIRQUL

NEXUS
CITY LIFE. EVOLVED.

NEXUS Engages Residents and Transforms Urban Living

A sky-high condominium tower is breaking ground in Seattle with a new product category – the smart connected building - enabling an enhanced lifestyle while promoting connectedness and sustainability. NEXUS, isn't just turning heads with its cutting edge design – it's changing consumer mindsets about what urban living truly means now and in the future.

Engineering the connected environment, Sirqul leads the NEXUS *"Living Lab"* as part of the engineering process where prospective homebuyers, real estate brokers and service providers are encouraged to be part of the review and testing. The Living Lab will serve to continually advance the user experience and integrate the latest evolutions in home automation and smart systems involving lighting, climate control, security, entertainment, plugs and appliances, just to name a few. Other innovative explorations include voice and gesture activation, proximity detection systems, and proprietary parking and facility management systems.

Engineering and envisioning what living in the building of the future leverages the Sirqul IoT Platform to future-proof and evolve as rapidly as our surroundings, helping to turn a condo into a home of the future.

For more information, please contact us: nexus@sirqul.com

Selling Your Plan Internally

Your plan is in place, and it's time to sell it to internal stakeholders. When gaining buy-in, try to think beyond ROI, and show how your IoT solution is strategic to your business. Here are some tips.

Demonstrate Alignment with Strategic Goals

Show how your IoT investment meets strategic goals, keeping in mind that goals are very likely to evolve over time. By focusing on the strategic business requirements that your IoT solution is meant to solve, you'll be more successful communicating its value.

Communicate Business Results

Make it a priority to communicate the business results your IoT solution aims to achieve. Can your IoT solution grow sales, save money, improve efficiencies, impact your customer relationships?

Communicate Success Factors

How will you measure success? Is it cost or time savings? Acquisition of new customers? Often companies will do a limited pilot and after hitting their goals, will roll out the solution throughout the organization.

Demonstrate Company-Wide Value

Your IoT solution can impact your entire business — not just one or two departments. Demonstrate how your IoT solution adds value throughout your organization.

Show Business Transformation

Communicate how your IoT solution has the potential to facilitate business transformation. What new businesses will your IoT solution open? How will it modernize operations or redefine product offerings?

Communicate Future Opportunities

Help stakeholders understand that the initial solution is just the beginning. Sell the vision; get people excited about how the platform can evolve over time and impact their business areas. Provide future examples and areas that will create new revenue streams.

Where To Go From Here

We just reviewed a high-level IoT solution planning roadmap comprising the six key steps. There is a great deal of detail under each step, and that's where we invite you to contact the experts at Sirqul.

We work with business leaders and engineers from every industry – expert to novice – to assist in IoT solution planning, development and execution.

We are the creator of the Sirqul IoT Engagement-as-a-Service platform, which is the natural continuation of the breakthrough work that Robert Frederick and his team achieved for Amazon Web Services. The Sirqul platform is designed to empower people to easily imagine and deliver on any IoT vision.

Three reasons companies choose Sirqul

1. Modular architecture, with pre-made building blocks for lightning fast development
2. Ready-made, customizable mobile and web application templates for multiple vertical markets
3. A scalable architecture system that expands, rather than limits, your possibilities without disruption

The Sirqul Platform
IoT Engagement-as-a-Service

The foundation of the Sirqul platform is proven APIs and starter kit templates for rapidly creating IoT solutions. Using a flexible and scalable building block approach, Sirqul provides the most popular IoT features that developers simply plug right in and customize.

- Over 67 APIs empowering companies to deploy IoT solutions in the cloud or on the edge.
- 30 customizable starter kit templates to rapidly build any type of enterprise IoT application.

Sirqul is used by some of the world's largest companies to deliver innovative IoT solutions that drive workforce efficiency, consumer engagement and create new revenue streams. From the smallest development teams to the Fortune 100, innovative organizations use Sirqul to reduce the time from IoT inspiration – to reality.

Innovative IoT Solutions have been deployed around the globe with Sirqul

Spaces & Places - Smart buildings that offset energy costs, improve mobility, and provide more efficient protection, emergency and utility services.

Auto & Logistics – Powerful, multifunctional vehicles with smart connected devices.

Autonomous Robotics - that empower automated agent and machine ecosystems to reduce human interaction, increase safety, and reduce production costs.

Healthcare - Our IoT solutions enable healthcare institutions to improve access and quality of care while reducing costs.

Commerce - Enables retailers to provide immersive, personalized experiences fully integrating physical and digital shopping, while optimizing supply chain and operations.

SIRQUL™

How To Engage

Sirqul is here to help, and we invite you to engage with us in the way that works best for you.

IoT Planning Workshop

Set up a complementary planning session with a Sirqul IoT expert to discuss your project, implementation options, and explore your unique opportunity to create something amazing.

Contact us

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http://corp.sirqul.com/contact_us

Visit our partner, Amazon Web Services, to learn how to purchase a license to the Sirqul platform.
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