

How to build a Scalable IOT Business

IoT is ready to move from 'What' to 'How'

IoT is complicated and has many moving parts. From sensors, devices, connectivity and platforms to the business logic, the applications, and the users (including training and changing their workflows), the arrangement of these parts takes precision and proficiency.

In this IoT System Integrator Guide, let's look at what it takes to build a scalable and repeatable IoT business, and how to transition quickly.

Not a single IoT vendor can offer an end-to-end solution that covers all of these, and you wouldn't want them to. If a platform is built around devices, your IoT application will be limited to what those exact devices can do. Your platform will be somewhat limited. The true value of IoT lies in its many possibilities. You should always be able to select your "parts" to get the benefits needed for your IOT solution.

Part I: Systems Integrators are Key in Building IoT Projects

Those best qualified to pull together a complex IoT project, have been system integrators. With experience putting together networking, IT or security projects, using equipment from various vendors and connecting them all together. All this, while training the users, supporting, monitoring and maintaining the application and devices.

In a valuable Machina Research report titled, 'System Integrators are most trusted to deliver the IoT', they report the following:

70% of companies already work with system integrators and consider them an integral part of their workforce.

44% of all IoT projects are executed using system integrators.

System integrators and service operators as an integral cog in building an IoT project. It is rare to see cases where the customer can pull together a project on his/her own, without the help of a system integrator.

Most enterprises are hesitant to entrust a new set of vendors with an unused technology for achieving their critical goals. Therefore, integrators are useful because they already have a relationship with enterprises because they already have an established and trusted relationship with them.

As the scope and demand for the IoT increases, the role of integrators between the solution providers and their targeted marketing segments will be increasingly important. In the age of collaborative manufacturing, the hardware and software vendors with the most robust integrator will be the one to lead the IoT game.

System integrators serve all business units & systems

IoT will have the most positive impact on the enterprise when it crosses business unit borders. The grand vision of a smart manufacturing plant isn't limited to the connected production line, but also to warehouse monitoring and beyond. Each of these are owned by a separate department, yet the IoT application can, and

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should connect them all, enabling rules and actions between them to reach correlated insights. It should be populated across the existing systems in order to unlock maximum value from it.

In addition to their project management skills, system integrators are well placed to obtain smooth access to multiple business units. System integrators have historically provided integration with systems like the existing CRM, ERP, BMS, WMS and others.

System integrator's expertise - Priceless!

Many customers do not even realize their problem can be solved with IoT. For example, a company that is losing refrigerated goods might first think they need a better thermometer, or a connected thermometer. They aren't aware that their connected thermometer can be easily expanded to humidity and door sensors - controlling everything remotely, monitoring usage and optimizing use of refrigeration space, with an IoT platform.

IoT technology brings so many possibilities that it becomes difficult to select the specific ones which will have a positive impact on the business and define the various project phases. This is where the expertise of IoT system integrators and service operators is invaluable. Because of their exposure to multiple projects and industries, they understand how to build a business case, how to phase a project so a customer can handle the burning issues immediately and build up to additional benefits. In many cases they have vertical expertise, as well as the deep understanding of business drivers that can improve the IoT application design.

Start small and scale.

The complexity of an IoT project, and the number of players and vendors involved is the reason to start small and scale. IoT is new, yet still unproven. In combination with its unlimited possibilities, end customers are going to have a hard time committing to anything large. Resources and the potential business impact are other barriers for commitment. The most common deployment will start with a PoC - a first step. Vendors have a hard time starting small and scaling, while system integrators are structured to provide scale to their customers' businesses.

Part II: How to get to a live IoT project in just 4 days

There are 3 important ideas encapsulated in this section title:

1. First, the idea that there is a live IoT project that can be achieved in a very short time frame.
2. Second, it's possible to get to an operational project in a short time frame and with minimal resources.
3. Thirdly, it's important for system integrators to get off to a running start.

Let's first look at a group of growers, interested in monitoring their greenhouse. The agronomists wanted to monitor temperature, humidity, pH, wind, water level, calcium, and more. In addition, they wanted to control the motor, valve, pumps, and other physical equipment. The business logic is complex with many variables and dashboards.

Everything they asked for is possible with a full stack IoT platform, and the actual configuration timeline isn't too long. However, what is time consuming for the system integrator is locating all the sensors, testing

them and working with the agronomists on all the business logic and alerts - before platform configuration even begins. This scenario includes a long timeline, multiple users and workflow considerations, as well as a large budget.

A better way to approach this project would be to identify the 1-2 sensors that would have the maximum impact. If they are easy to find, such as temperature and humidity, take those sensors and create a minimal 'IoT' type project, get it up and running and begin providing value within days.

This is much easier than constantly building on a running app.

Most companies have a grand IoT vision, and that's terrific! But in order to be successful, you must start fast and small. First, get your small application functional and continue to grow from there. This is what agile IoT is all about.

Part III: Agile IoT - Start small, scale fast, win big

Most system integrators are concerned about turning IoT into a scalable and repeatable business. When adding an offering, there should be a certainty that it can repeat it over and over again. In the beginning, there is a learning curve and uncertainty regarding time & resources; but once past that initial stage, the offer becomes much more profitable.

Statistics show that IoT is the future, and with today's advanced technology and connectivity, 30 billion connected devices are predicted by 2020. This number itself, is a sizable market for all system integrators, and large enough incentive to jump right in. But first, consider the significance of scalable and repeatable IoT projects, and how they are key in starting small and scaling.

There are 3 types of scaling that system integrators need to master in order to build a scalable and repeatable IoT business.

1. Vertical scaling

Vertical scaling starts with 2 sensors and then adding 5 more. For example, first install an asset management application for a hotel, and then add energy savings in the next phase. Or roll out a service in stages. For instance, open directions to available parking spots at an event, first to VIP customers, and then scale to all customers. This type of scaling is part of every single enterprise IoT implementation. Address one need and build on that.

2. Industry scaling

Industry scaling is, scaling within a certain industry multiple times. If multiple offerings for a fast food chain have already been created, and a repeat offering for another restaurant is requested, simply use industry scaling to complete the project. It's duplicating an offer for a new business.

3. Solution scaling

Solution scaling is scaling a solution in all directions. For example, If there's already a solution for an asset management problem for a hotel in place, repeat that solution for a ski resort. The same goes for any type of solution already in place - go ahead and clone the solution for the new industry.

A system integrator should be able to scale in all directions. Profitability will be maximized, only when sensors, business logic, connectivity, dashboards, integration and other project parameters are copied successfully within and between customers.

Part IV: Implementation

The 5 keys to scaling your way to IoT success

We have a huge market, vertical, solution and industry scaling, but the truth is that every single customer is going to be slightly different. Maybe they'll want a cheaper or more reliable sensor, or maybe their business logic will deviate slightly to support their business processes. We work in the land of custom snowflakes and all those specific customizations for customers can ruin the bottom line if an IoT practice is not set up correctly.

5 things Ryarc provides in order to scale & customize successfully:

- 1. An IoT platform.**
Every individual project simply cannot be sustained by developing its own backend, due to time restraints and budget issues. Focusing on one IoT platform and moving ahead with providing customer solutions should be the priority.
- 2. A platform which supports any device, system, protocol and data structures.**
When there are no limits to the type of devices you can add, it is much easier to scale to any customer requirement without overhauling the customer's infrastructure. There is no need to plan a full-blown IoT project in advance, if you have the capability to meet any requirement on the fly. When there's a change in device requirements, your platform should be able to handle it.
- 3. Easily change business logic, dashboards and user hierarchies without expensive professional services hours.**
The scaling and customization will rely on modifications, and you need to be able to handle those on your own - without relying on expensive and time-consuming professional services at every step.
- 4. Speed.**
When delivering many IoT projects, enough to favorably impact your bottom line, you need to move fast. How long should it take to configure a few sensors, some rules, dashboards and alerts with access rights by user and localization? The answer is days, not months, and you can then continue the process as many times as needed.
- 5. Cross-application capabilities, also known as IoT orchestration.**
For scaling, you need to be able to continue building on your apps. If you've set up a smart warehouse and are expanding to smart logistics, you want the two apps to interact and have joint rules, metrics and alerts on shared data. This cross-application capability can also be very useful for managing your business. For example, you can view device performance across various customers and choose the most reliable one for the next project in your queue.

This is where IoT bundles come in

IoT bundles are pre-defined IoT applications, providing quick answers to questions such as:

- What is the value of a specific IoT application?
- Which applications are most likely to hit customer pain points?

- Which sensors should be used?
- Do we need 3rd party integrations?
- What are the connectivity requirements?

They can be used:

- As a basis for IoT project proposals.
- To train your salesforce on what to pitch customers.
- IoT bundles will help you quickly ramp up your IoT services and gain more revenue per customer.

Sensor Board for Demo is available with following features:

- **Wi-Fi / Bluetooth Module with Microcontroller**
 - Highly integrated solution for Wi-Fi-and-Bluetooth IoT applications, with around 20 external components. Integrates an antenna switch, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. As such, the entire solution occupies minimal Printed Circuit Board (PCB) area.
- **Embedded Cloud Connectivity, MQTT Protocol**
 - **MQTT** is a simple **protocol** that lets an **embedded** device publish/receive messages in the **cloud**. It has minimal packet overhead compared to **protocols** like HTTP and is therefore very efficient, lending itself to low-power environments. The **MQTT** publish/subscribe system consists of many clients, which are connected to a server acting as a broker.
- Works with Ryarc Gateway or Online Server
- Wi-Fi Provisioning Phone App for Easy Setup
- Over-the-Air (OTA) Programming of the Firmware and Logic Control
 - The OTA programming allows updating/uploading a new program to ESP32 using Wi-Fi instead of requiring the user to connect the ESP32 to a computer via USB to perform the update.
 - OTA functionality is extremely useful **in case of no physical access** to the ESP module. It helps reduce the amount of time spent for updating each ESP module at the time of maintenance.
 - One important feature of OTA is that one central location can send an update to **multiple ESPs** sharing same network.
- **GPS/GLONASS Module with Antenna for Location Tracking**
 - Global Positioning System (GPS) is a worldwide radio-navigation system formed from the constellation of 24 satellites and their ground stations. The Global Positioning System is mainly funded and controlled by the U.S Department of Defense (DOD). The system was initially designed for the operation of U. S. military. But today, there are also many civil users of GPS across the whole world. The civil users are allowed to use the Standard Positioning Service without any kind of charge or restrictions.

- **Accelerometer/Magnetometer/Gyroscope**
 - An accelerometer is an electromechanical device used to **measure acceleration forces**. Such forces may be static, like the continuous force of gravity or, as is the case with many mobile devices, dynamic to sense movement or vibrations. Acceleration is the measurement of the change in velocity, or speed divided by time.
 - **A gyroscope and accelerometer are used together** to create a more accurate measurement of overall movement and location through space by providing constant, cross-referenced measurements of spatial placement and acceleration.
- **Human Presence Sensing**
 - Human sensing (also called human detection or human presence detection) encompasses a range of technologies for **detecting the presence of a human body in an area of space**, typically without the intentional participation of the detected person.
- **Ambient Light Sensor**
 - The detection of human presence is becoming an important and even compelling requirement in a growing number of applications. From computer peripherals, personal electronics, and domestic appliances to building access management, healthcare, and security systems, today's applications must be able to ensure a seamless interaction of users with the systems and the services associated.
- **Audio Microphone, Sound Detection**
 - The Sound Detector combines a microphone and some processing circuitry. It provides not only an audio output, but also a binary indication of the presence of sound, and an analog representation of it's amplitude.
- **Environmental Sensor – Air Quality, Moisture, Pressure**
 - Environmental conditions have a major impact on our well-being, comfort, and productivity. This sensor solution provides detailed and reliable data on key environmental parameters such as humidity, temperature
- **Temperature and Humidity**
 - Temperature sensor **measure air temperature, while humidity sensors measure air humidity**. Both sensors are often applied in combination to reduce cost. The calculation of the air humidity does not directly influence a wind site assessment, but knowing this parameter helps assessing the potential danger of ice build-up at the measuring location.
- **12-Bit Dual Digital-to-Analog Converter (DAC) with Two Wire Connectors**
 - A system that converts a digital signal into an analog signal
- **External UART for off-board Connectivity**

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- An embedded system often requires a means for communicating with the external world for a number of possible reasons. It could be to transferring data to another device, sending and receiving commands, or simply for debugging purposes. One of the most common interfaces used in embedded systems is the universal asynchronous receiver/transmitter (UART).
- Micro USB Serial Interface
 - Micro USB is a miniaturized version of the Universal Serial Bus (**USB**) interface developed for connecting compact and mobile devices such as smartphones,
- Rechargeable Lithium Polymer (LiPo) Battery or USB Powered
- RGB LED Status Indicator
- Digital Expansion Port for GPIO, External Sensors
 - A general-purpose **input/output (GPIO)** is an uncommitted **digital** signal pin on an integrated circuit or electronic circuit board whose behavior—including whether it acts as input or output—is controllable by the user at run time. GPIOs have no predefined purpose.
- Off-Board Capacitance Touch Capability
 - Capacitive touch sensors are based on the electrical capacitance of the human body. When, for example, a finger comes close to the sensor, it creates a capacitance to Earth with a value.
- Board size 50mm x 90mm (2.0" x 3.5")

About Ryarc

Founded in 2003, Ryarc is a privately held software and technology company focused on the development of applications that use Digital Sensors and Devices to drive operational efficiency, compliance, and customer experience. Based on this multi-application platform that provides custom configuration rather than long term development launches IoT projects faster with a higher ROI. Ryarc's products are used worldwide by technology integrators to turn data into actionable intelligence to provide speed and scale with managing IoT applications.