F3 Wireless

White Paper

Using IoT to Transform Your Business: 10 Cases for Automation

Introduction

The personal computer is a powerful tool to create efficiency in a business. When computers were first developed, however, they weren't widely used. This wasn't just because of size and cost; a major issue was that many business leaders simply didn't understand how a computer could be used in their business. Once they became more compact and cost-effective, they evolved into a standard part of running any modern business.

The same is true for other types of automation, including the Internet of Things (IoT). We are at the inflection point where IoT is being leveraged to accelerate the average small business.

Asking who can benefit from IoT is the same as asking what businesses can get value out of desktop computers, office software or the Internet. And it's the same answer, basically all of them.

At F3 Wireless, we've identified a series of 10 concepts or paradigms where IoT fundamentally changes basic business cases. We've encountered these examples through our direct experience with IoT projects and custom device development for the past decade. Learn more by checking out our white paper: Using IoT to Transform Your Business: 10 Cases for Automation.

What is IoT?

IoT is simply a new generation of automation for tasks and functions outside a factory or office that would have previously proven impractical, too complicated or too expensive.

What businesses can get value out of IoT?

Asking who can benefit from IoT is the same as asking what businesses can get value out of desktop computers, office software or the Internet. And it's the same answer, basically all of them.

FOUR KEY ASPECTS

In this discussion of IoT, we'll refer to four key aspects of IoT as business automation:

1. **Making Money**

   "Making Money" here is about creating or capitalizing on new markets. This is one of the hardest aspects of business in general, so it's not surprising it's uncommon in IoT as well. Examples include logging usage and details of durable medical equipment and tracking consumption of products for restocking. This results in expanding the market for the product and allowing for alternate business models like rental, lease or equipment as a service. Other examples include automated toll or tax collection.

2. **Saving Money**

   Lowering costs is obviously important for most businesses. There are actually a fair number of IoT examples in this category. Need Based Servicing is simply the idea of only servicing something when that specific unit needs it vs. periodically checking whether it needs servicing or not. Garbage cans, trash compactors, recycling bins, etc. are good examples. The more labor and equipment needed, the greater the cost savings.

3. **Legal Compliance**

   Another significant value of IoT is in enforcing, documenting, and verifying compliance to laws and regulations. This is no easy task, as regulations are continuously amended across all industries, and IoT can help your business evolve to match it. Doing so helps to avoid infractions and penalties as well as lower implementation costs. Examples include sensors for structure monitoring, like dams or bridges, or security sensors for ensuring doors and windows are secured in commercial buildings.

4. **Reputation Protection**

   You've spent considerable time and money building your brand and business. Reputation can make or break your company and greatly affect your bottom line and how people view your brand. Legal compliance is just as much about preventing negative impacts to your brand as it is about avoiding penalties. Creative IoT solutions can be used to protect and enhance your brand. Examples such as proactive measurement of

CO_2 emissions and energy consumption, along with the documented measurement of reductions based on improvements, can lead to high-value messaging that differentiates you from the competition.

We will use these key aspects, or business drivers, to discuss a series of 10 concepts or paradigms where IoT fundamentally changes basic business cases. We've come across these examples at F3 Wireless through our direct experience with IoT projects and custom device development for the past decade.

10 IoT Business Cases

1. Track & Report
2. Fleet Management
3. Need Based Servicing
4. Preventative Maintenance
5. Control/Management as a Service
6. Contract Enforcement
7. Vendor Managed Inventory
8. US Medical Insurance Logging
9. Environmental Monitoring
10. Market Research

In this white paper, we'll discuss 10 IoT business paradigms, give concrete examples, and supply inspiration for additional implementations.

Because things are still new, there aren't widely recognized terms yet for common uses of IoT. Based on our decade of IoT experience, we've done our best to name and define them for the purposes of this white paper.

The basis of Track & Report is allowing a central information system to know the current, or most recently recorded, location and status of one or more targets.

1: Track & Report

The fundamental basis of Track & Report is allowing a central information system to know the current, or most recently recorded, location and status of one or more targets. A target can be anything you want information from or about: a truck, a pet, a person, a shipping container, etc. Also, “track” can mean knowing where the target is right now (live tracking) or knowing where the target was at specific times during its trip after the fact (track recording aka breadcrumbs). Often you are also measuring data such as temperature, shock and vibration, moisture, health status, condition or other details of interest.

Tracking can be done using a number of technologies which break down into three main groups:

1. **No device on the target:** Facial, gait or image recognition using cameras, fingerprint scanners, voice detection, voice or keypad entered pass codes. Detecting the target by external means.
2. **Minimal device on target:** NFC, RFID, magnetic keycards, QR codes, OneWire tags. The target has some small/cheap provision for identification or tracking.
3. **Active device on target:** GPS, BlueTooth beacon, radar with transponder, other active indoor or outdoor location solutions.

TIE TO BUSINESS DRIVERS

What resources or assets does your company use? What are your major risks and liabilities? What is the most profitable thing you do? What is the highest cost thing you do? Could you do more business with fewer resources because you can measure their usage? Because each business is different, the opportunities vary widely. In general, anything that uses a lot of worker hours is a good thing to look at first.

Track & Report offers new ways to measure your business, allowing you to make sizable improvements. It can create competitive differentiation by letting you provide customers with more information. It can also help manage customer or vendor expectations to improve your reputation, and document compliance with regulations.

BUSINESS CASE EXAMPLE

Track & Report is often part of a vehicle telematics solution, such as Trimble/peoplenet, and car-sharing solutions like ZipCar or HourCar. Other common applications are pet trackers, offender tracking/house arrest, patients in nursing homes, home care or hospitals, package tracking, and cold chain monitoring.

The fundamental idea is you have some means of tracking your “fleet”, and you can then use that information to be more efficient.

2: Fleet Management

Fleet Management is actually one of the most mature use-cases in IoT. There are a wide variety of off-the-shelf services and devices related to Fleet Management. The fundamental idea is you have some means of tracking your “fleet”, and you can then use that information to be more efficient.

A fleet in this sense could be the 20 vans of a plumbing company, the 50 trucks of a gasoline delivery company or the 500 trailers of an agricultural co-op. All that’s required is that the group of things you are managing are mobile and owned by the same company.

“Be more efficient” can mean better use of:

- **Time:** Let sophisticated route planning software and real-time traffic information manage which units are dispatched to which locations, in what order and when. This means using your resources more efficiently while spending less hours doing it.
- **Predictive Maintenance:** Service the units in your fleet that need it based on actual use.
- **Fuel:** Less transit time based on more efficient dispatching translates directly into fuel and maintenance savings.
- **Capital:** Better use of assets results in getting more billable work done with less total investment in expensive capital assets.

TIE TO BUSINESS DRIVERS

Fleet Management offers new ways to measure your business, allowing you to make sizable improvements. It can create competitive differentiation by letting you provide customers with more information. It can also help manage customer or vendor expectations to improve your reputation, and document compliance with regulations.

BUSINESS CASE EXAMPLE

Let’s use the example of owning a pizza company where drivers deliver pizzas with their own cars. You offer a small incentive for the drivers to use a device in their car that reports miles driven, mileage, engine efficiency, and even pollution generated. Once these things are measured, you can create ways to change them. For example, you can enhance your reputation with a carbon footprint reduction program. You can make new money by documenting and selling carbon offsets. By documenting your driver’s compliance with speed limits to limit liability, you can work with insurance companies to turn that compliance into lower rates. Any part of your business that you can measure and manage better you can generally monetize.

Need Based Servicing is one of the most intuitive uses of IoT. It's simply the idea of only servicing or attending to those remote devices that need it.

3: Need Based Servicing

This is one of the most intuitive uses of IoT. It's simply the idea of only servicing or attending to those remote devices that need it. For example, think about municipal garbage cans in parks and on street corners. Some of those garbage cans will reach capacity faster than others. The conventional way of dealing with the garbage can is to have a truck go out periodically, maybe 3 times a week, to empty all of them. The truck has an assigned route, and every can is emptied regardless of how full it is.

When you apply Need Based Servicing, you add a sensor on each can that reports how full it is. This allows intelligent planning of routes, resulting in the minimum number of trucks and miles to service only the cans that need to be serviced. This means only doing the work that's needed to be done is done at any given time, so it's inherently more efficient. You can see how fast various cans are filling up, and know when you'll need to empty them well in advance.

Need Based Servicing can be applied to any situation with a "drive a route" or "check on something" and "deal with it" based on that information. All this business model requires is adding sensing capabilities to the device in the field and the ability to report the status of that sensor. In some cases, that's really easy because some devices already have electrical power. In other cases, recent advancements in batteries, energy harvesting, and power management are what enable solutions that were never practical before.

TIE TO BUSINESS DRIVERS

Saving money is pretty intuitive with Need Based Servicing; the garbage collection example demonstrates that value. Being able to document that you did what was required and what was best in the situation achieves compliance and reputation. But what about creating new markets and making more money? What can we do with high quality, sufficiently frequent sensor data that we couldn't before? Well, there's the question only those closest to the business can answer. Often only the people who live and breathe a business are going to be able to see the potential to create new markets.

BUSINESS CASE EXAMPLE

This case applies to any business that has humans driving a route to service items in the field. Examples could include waste and recycling pickup, fryer oil, parts cleaner fluid, secure shredding, and water, air or other fluid filters. If you visit it periodically to maintain it or provide a service now, you could dramatically increase your customers with the same resources with need based servicing.

Preventative Maintenance allows for a clear assessment of changes to save money.

4: Preventative Maintenance

Preventative and predictive maintenance for static equipment, such as printing presses, fluid pumps or power generation systems, has been around for a long time. At first, this was as simple as “oil the thing every week” or something similar. In the last 30 years, it’s evolved into a careful analysis of vibration, sound, temperature, and other variables measured directly from the equipment. This data, combined with a deep understanding of failure modes of the machine being observed, allows for very accurate, frequently updated predictions of when that machine will fail, and why.

These same concepts apply to vehicles, remote equipment, and, to an extent, even people and animals. You can monitor the vibrations of a railroad car and know when you will need to change the breaks or the wheel bearings. You can monitor vital signs on a person or animal to know how to adjust medical treatment, diet, and other factors. The only difference is if the thing your measuring moves around, a wired connection to harvest all that useful data isn’t going to work very well.

TIE TO BUSINESS DRIVERS

Preventative Maintenance allows for a clear assessment of changes to save money. Maybe you only need to oil the machine once a month vs. once a week. It also allows for major maintenance to be scheduled and planned out well in advance, often saving huge amounts of money vs. running the machine till it fails. Another factor is that because you have individual data for each thing you’re monitoring, you can treat those things as individuals and only service the units that need servicing, when they need it based on usage or other conditions.

What assets does your company use? How much time does your organization spend on maintenance? Would you be more profitable if you were able to predict when work was needed? Could identifying potential problems before they occur benefit your reputation and maintain organizational compliance?

BUSINESS CASE EXAMPLES

Examples of preventative maintenance vary greatly by industry. Some implementations include:

- **Manufacturing:** Temperature and vibration sensors can help determine when essential equipment, such as a printing press or milling machine, may need maintenance or break down.
- **Power plants:** IoT-based maintenance can help ensure uninterrupted power generation for gas, wind or steam turbines, or detect maintenance needs for solar panels and other components.
- **Transportation:** Sensors can keep fleets of trucks, railways, and other methods of transportation in working condition by predicting when maintenance is needed.
- **Healthcare:** IoT devices can alert medical professionals if a patient needs an adjustment in care or if there is a change in condition.

Control/Management as a Service can lead to less waste, cost savings, and environmental advantages.

5: Control/Management as a Service

Using fewer resources is a good thing. Equally important is using resources efficiently. Control/Management as a Service can lead to less waste, cost savings, and environmental advantages. You can apply this type of intelligence to almost any kind of consumable resource, from food and fuel to fresh water and wastewater management.

Before the technological advances provided by IoT, these types of initiatives would have to be hardwired to run properly – usually with a dedicated computer needed on premises. A good old-school example is how power plants are monitored to enhance and ensure efficiency. There are extensive measurement, analysis, and control systems in a power plant to wring out every last fraction of a percentage of efficiency. For mobile or distributed applications, IoT provides low-cost connectivity, allowing controller devices to be deployed en masse to actively manage the consumption of resources in many places.

Data collected during normal system behavior can show how much, when, and by what means the resource is being consumed. Then using sophisticated analysis such as data mining and machine learning, the management as a service system can learn how to use the resource most efficiently.

TIE TO BUSINESS DRIVERS

Management as a service provides a way for mundane but important resource utilization to get the value of data analytics and efficiency enhancements. If done correctly, you can potentially see reduction of resource consumption, not to mention save money and emit less CO_2 and pollutants into the atmosphere.

BUSINESS CASE EXAMPLE

One good example of IoT enabled management as a service is refrigeration control for a chain of grocery stores. Refrigeration units and cold cases in grocery stores are controlled by simple thermostats with compressor units typically located on the roof. By placing an IoT device with cellular connectivity on each compressor and interfaced to the control loop, the temperature can be monitored and controlled independently from the primary thermostat.

Data collected during normal system behavior can show how much, when, and by what means energy is being consumed. Then using sophisticated analysis such as data mining and machine learning, the management as a service system can learn how to save on energy consumption, such as keeping certain cold cases at a higher temperature depending on the product or over-chilling or freezing product overnight when the equipment is most efficient or electricity is cheaper.

When you have a contract to replenish consumables or usage of something, accurate reporting can make a big difference.

6: Contract Enforcement

As subscription or “as-a-service” business models become more popular, the ability to implement that in a cost effective way becomes critical. When you have a contract to replenish consumables or usage of something, accurate reporting can make a big difference. Not only does it ensure your customer has the supplies they need, but it also ensures that you get paid sooner and prevents your customer from avoiding the consumable contract.

Before the technological advances of IoT, someone would have to physically check the supply or usage of something. Or you would need to rely on self-reporting or reorders from the customer. Now an IoT device can measure and report the usage of something in accordance with a contract.

TIE TO BUSINESS DRIVERS

Is your company losing money due to an inability to efficiently check customer usage? Are you wasting valuable worker hours due to unnecessary site visits? Do you want to reduce risk and further safeguard the reputation of your products?

BUSINESS CASE EXAMPLES

Using an IoT device for contract enforcement is applicable in many situations. Below are a few examples:

- **Heavy construction equipment:** Once a leasing company delivers equipment to a construction site, they normally wouldn’t know how much it is being used unless someone goes to look at the meter on the machine. Since most of the revenue is made through hourly usage fees, this delays payments from the customer. The leasing company can put a device on the equipment with GPS and usage tracking. It also could report on where the equipment is being used, environmental factors, and the equipment’s condition. This can ensure it is being used in compliance with the contract, enable billing for usage as it happens (vs. all at the end), and allow for preventative maintenance.
- **Beverage distribution:** A beverage distributor provides equipment to a customer with a contract to sell them the consumable/beverage when supplies are low. Often the contract is such that the equipment is free, but you must buy the consumables from that vendor. Normally supplies would be replenished when the customer makes an order, or by automatic deliveries. By adding a wireless device, the distributor can automatically track usage of the consumable and send only the needed supplies, only when they are needed. They can also ensure customers are using the intended products and check proactively on equipment health, cleaning, and quality analysis. This is already used for things like coffee and beer.

With Vendor Managed Inventory, the supplier can increase brand loyalty, customer experience, and revenue.

- **Vehicle loans:** When car dealerships let customers pay for a vehicle in installments, they put a significant amount of capital on the line. A GPS receiver and cellular radio can be installed to track usage and vehicle health, which can be especially useful for leased vehicles. It also can help with payments, as a remote shut off can be triggered for default on loans. This also allows dealerships to charge less interest and allow for higher value vehicles to be purchased.

7: Vendor Managed Inventory

With Vendor Managed Inventory, suppliers own and maintain their products until customers use them, even though the inventory is stored at the customer's point of consumption. When the customer uses the product, the vendor charges the customer for the product.

There are many ways to handle vendor managed inventory. You can use barcodes, RFID tags or product specific solutions like measuring the flow of liquid product, weight of a bulk product or even measuring the height of a pile for things like salt, grain, and coal.

TIE TO BUSINESS DRIVERS

When done effectively, Vendor Managed Inventory can be a beneficial arrangement for suppliers and their customers while creating an optimal experience for end users as well. The supplier can increase brand loyalty, customer experience, and revenue by having their products on-site when the customer needs them, and the customer saves by only paying for what they need when they need it. It also provides an effective way to control the inventory — as well as bill or restock only when necessary.

BUSINESS CASE EXAMPLES

Here are some examples of Vendor Managed Inventory in action:

- Stents or other implantable devices owned and stocked at a hospital by the medical device supplier until they are scanned out and used by the hospital.
- Beverage distributors own the liquor, beer or soda until the restaurant/bar pours it.
- Palettes of paint can be stored at hardware stores so they have all the colors they need, but the inventory is owned by the supplier until it is removed from the pallet.
- Roofing shingles are owned by the manufacturer until the contractor brings them to the work site, so they only buy what they need.

Your customers can more accurately measure usage data and send it along to the insurance companies.

SAVI™ BY ENEURA

8: US Medical Insurance Logging

Medicare requires that prescribed durable medical devices, such as CPAP machines and other durable medical equipment (DME), be shown to be used as prescribed at least 70% of the time to be covered for financial reimbursement. US insurance companies have similar requirements.

Historically, without IoT, this would be done by the patient logging usage manually, which often resulted in errors and non-compliance. By adding the ability for the DME to automatically log utilization, you can more accurately measure usage data and send it along to the insurance companies.

TIE TO BUSINESS DRIVERS

Automatic logging can dramatically increase compliance, which leads to higher reimbursement rates by the insurance companies. It also provides better feedback data to health care providers, allowing them to adjust therapies as needed and improve patient outcomes.

Companies that design and build DMEs can add logging capabilities as an extra selling point. Additionally, companies that sell and service DMEs can add automatic logging as an after-market feature. In either case, it would be an attractive option to potential customers who are concerned with equipment reimbursement – which usually occurs through compliance with Medicare and other insurance companies.

BUSINESS CASE EXAMPLE

The SAVI™ by eNeura provides clinically proven migraine treatment using non-invasive single-pulse Transcranial Magnetic Stimulation (sTMS). This device is portable, convenient and easy-to-use. As any migraine patient knows, once headache pain strikes, making a specialist appointment and getting to the doctor's office can be impossible. The portability of the SAVI is a major advance in migraine treatment.

F3 Wireless worked with eNeura to integrate a wireless Digital Therapeutic platform into the SAVI product. This allows the patient, doctor, and the insurance company to receive accurate, real-world data on both therapeutic benefit and treatment compliance. In today's healthcare environment, these are important tools for cost effective improvement in both patient wellness and satisfaction.

A reduction of carbon generation opens up money making opportunities, as you can take advantage of new markets for selling carbon offsets.

9: Environmental Monitoring

Organizations of all sizes are looking for ways to lower their carbon footprint. To do this, they often need to start by measuring current greenhouse gas emissions or other pollution factors. This can be as straightforward as examining your power usage, but depending on the nature of your business it can get pretty complicated.

The key factor is to be able to transparently and accurately measure your carbon and pollution footprint. This could be sample based where you apply measurement solutions to a representative sample of your fleet or a comprehensive solution where you're getting data from every vehicle. You could take data over a short period of time, or you could get data continuously. From this data, you can then determine the causes of environmental impacts, apply mitigation, and measure again to see if the situation has improved.

TIE TO BUSINESS DRIVERS

If we tie Environmental Monitoring back to the business drivers, you can see clear ties to regulatory/legal compliance. Many of the improvements that can be made may also save your company money and improve your reputation. Additionally, a reduction of carbon generation opens up money making opportunities, as you can take advantage of new markets for selling carbon offsets.

BUSINESS CASE EXAMPLE

Vehicles of all types tend to have a significant environmental impact due to direct pollution emissions, emissions from construction and maintenance, and other factors. Businesses can create positive change by ensuring they use the most environmentally friendly vehicles, use the best route planning tools to minimize energy consumption and travel time, and use IoT solutions to ensure you only travel when you actually need to.

Small changes can be made that have significant impact. In the situation with delivery drivers, it could be certain models of cars that are particularly harmful, in which case some sort of incentive for drivers to purchase newer vehicles could help. Or drivers could be idling their cars in the parking lot until orders are ready for delivery, in which case some sort of lounge would be an easy solution.

Effective market research can make the difference between the success and failure of new products.

10: Market Research

In any business, it is vital to understand what your customer wants and needs. Many organizations use market research to attempt to achieve this. Effective market research can make the difference between the success and failure of new products. Which makes refining the process imperative.

The traditional way of conducting market research consists of hosting a number of carefully selected focus groups. This method is often costly and done by external marketing companies – which means you would need to relinquish some control over the process.

Luckily, with IoT devices, there is another way. In fact, you can conduct high value market research that reduces the risk of introducing the wrong new products to market.

TIE TO BUSINESS DRIVERS

Market Research closely ties in with two business drivers: saving money and making money. By obtaining better marketing information, you eliminate wasted time and errors and produce the products that customers want. You make more money by better understanding consumer demand and selling products that you didn't know were popular before using marketing research tools.

BUSINESS CASE EXAMPLES

Below are a few examples of this business case in action:

- **Self-serve soda machines:** Similar to an inkjet printer, soda machines are loaded with base sodas and flavorings. This gives consumers the ability to create whatever flavor combination they want. The IoT device records a range of data, such as venue, time of day, location, and of course the flavors created by consumers. This data can be used by the company to determine potential new soda flavors to test in certain markets.
- **Ratings systems for television and radio:** Historically, ratings devices could determine when someone was watching TV or listening to the radio, and what station they had on. With an IoT device, you can "listen" to what is being broadcast and compare it to a broad list of available programming.
- **Product tracking at retail stores:** A retail store can act as a giant smart shelf for companies. Retailers can track what is selling, when, what location, and what quantity. That information can be reported in real time to the supplier or producer of the product and eliminate some guesswork regarding how much to make and where to distribute.

Conclusion

As these business cases have demonstrated, IoT is applicable to almost any business in any industry. Like any technology, the basic business case should drive a solution. IoT is a tool in the business automation toolbox. The difference is that IoT is like having power tools when everybody else only has manual hand tools. Look on your balance sheet and see where your biggest costs are. Chances are we can lower that number dramatically. And that's just one of the four business drivers. If you can define the need, we can help you define your options.

Have an IoT need for your business?

At F3 Wireless, we specialize in making the "thing" in the Internet of Things. Our professionals can help you explore your business case needs and help you understand the trade-offs so you can choose what works best for you and bring those solutions to life.

F3 Wireless

About F3 Wireless
F3 Wireless is a custom wireless electronics device organization based in Minneapolis that offers consulting, engineering, design, certification, and manufacturing for the "things" in the IoT. F3's core competency is wireless in all of its variations, and providing best in class device cost and time to volume.

For more information, visit www.f3wireless.com.