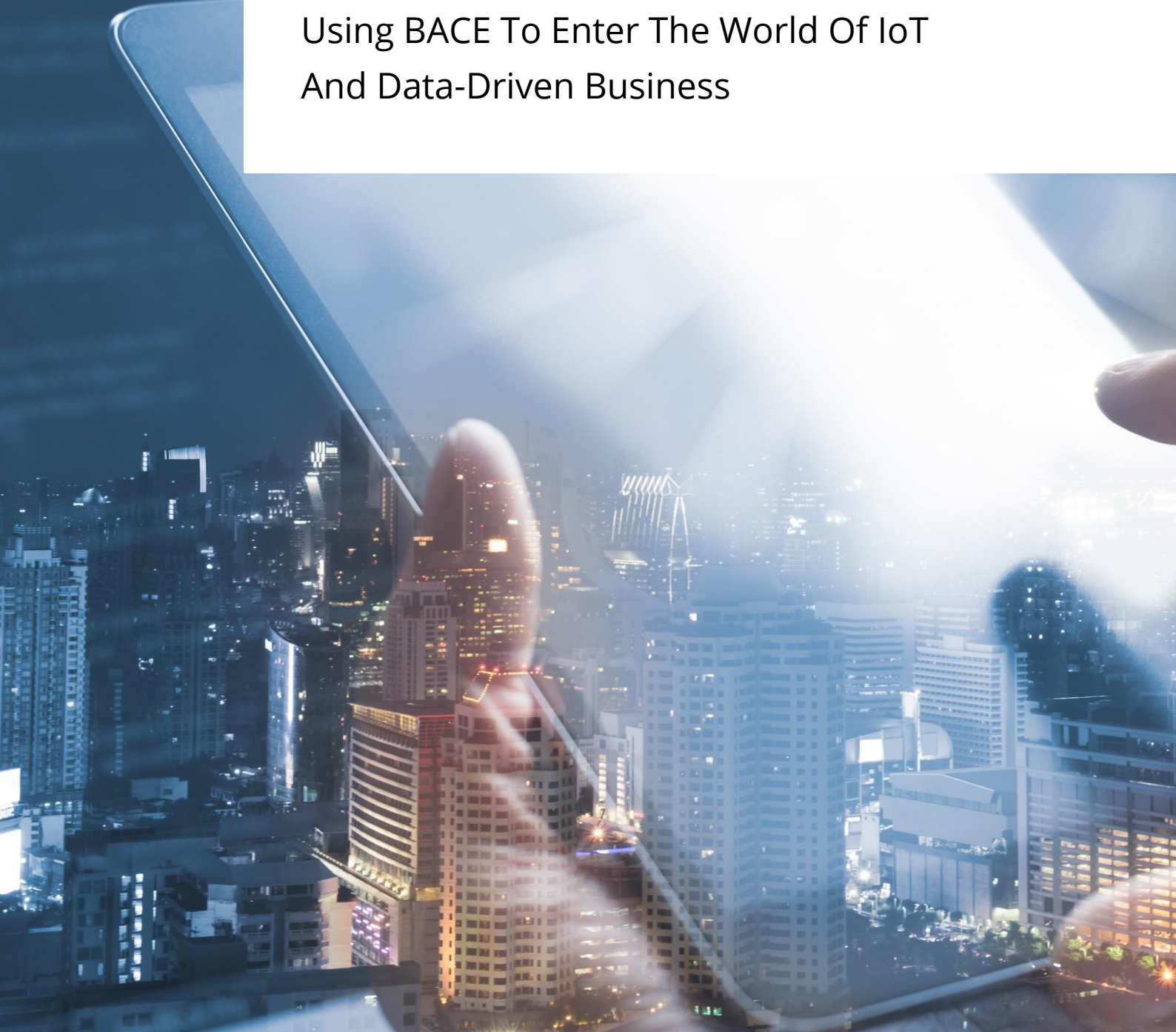
EVALAN

How Modular IoT Solutions Make Going Data-Driven Simpler Than Ever

Using BACE To Enter The World Of IoT And Data-Driven Business



Summary

The Internet of Things (IoT), data, and sensors are rapidly becoming an integral part of our world. No matter the industry, more and more companies are using sensors and IoT solutions to gather large volumes of relevant data. With data, these organizations can raise efficiency levels, optimize workflows, change how they operate – and become futureproof in the process.

In the recent past, companies tended to adopt IoT solutions to troubleshoot specific issues. Today, IoT is less about local problem-solving and more about holistic advancement, and it is a key component of a data-driven business approach. As IoT becomes indispensable, today's businesses need to integrate sensors and data in their wider ecosystems – quickly, easily, and smoothly.

Now, we are offering a new way to take this progression to the next level: BACE. We developed this solution to make adopting IoT easier and faster than ever before, so even companies with smaller budgets and less time can take advantage of IoT and become data-driven. In this whitepaper, we explore the importance of data and IoT for today's companies, before looking at the solution in more detail, including its functionality, benefits, and potential applications.

Contents

I. Why should your organization become data-driven?

Data collection, a vital part of growth

In today's dynamic world, efficiency and optimization are essential for success. Innovative solutions that can improve margins, raise operational standards, save energy, and create new business models are becoming the key growth drivers.

The Internet of Things (IoT), data collection, and sensors are central components in this development, as they can contribute to automating processes, predicting patterns, and making better decisions. Not surprisingly, according to a McKinsey study, the number of IoT-connected devices is projected to increase to 43 billion by 2023, almost three times higher than it was in 2018.[1]

From troubleshooting to integration

The way we are collecting and using data is changing. Until recently, companies recognizing the value of data looked for made-to-measure troubleshooting solutions

[1] *Growing opportunities in the Internet of Things,* McKinsey

for specific challenges, often applying them to a single machine or process. These bespoke solutions are often costly and labor-intensive while failing to harness the broader potential of data collection and analysis. Now, we are seeing companies stepping past individual problems towards integrating new technology across the board: becoming a *data-driven company* is the new way forward.

- The number of companies that use IoT technologies increased from 13% in 2014 to 25% in 2019, according to a McKinsey survey[2]
- Almost 80% of enterprise executives agree that companies who do not embrace data could face extinction, according to an Accenture study[3]
- High-performing organizations are three times more likely to say that data and analytics have contributed at least 20% to earnings over the last three years[4]

"Every company is a data and analytics company"

Amir Orad, Forbes Technology Council[5]

[2] *Growing opportunities in the Internet of Things,* McKinsey
[3] *10 Charts That Will Change Your Perspective of Big Data's Growth,* Forbes
[4] *Catch them if you can: How leaders in data and analytics have pulled ahead,* McKinsey
[5] *Why Every Company Is A Data Company, Amir Orad*

The transformative power of data

There are countless reasons to go data-driven. By using IoT and sensors, you can monitor and manage the key parameters that impact your business. And with the data, you can change your company. Overall, the benefits of adopting IoT and data fit into three broad categories:

1. **Enhancing your performance across the board**

   The integration of IoT and data into your company adds value almost instantly, like:

- *Reducing inaccuracies*

  Without the errors inherent in human measurement, the data you gather are accurate, precise, and reliable, enabling you to improve your quality and service level

- *Increasing sustainability*

  Through sensing and automated actions, you can reduce energy use and the use of resources per unit output

- *Reducing human labor and improving safety*

  Without the need for human measurement, for example, manually measuring temperature, you can save on time and money, and, in some situations, improve the safety of your operations

2. **Raising levels through data insights**

   With the vast amount of accurate and relevant data you gather, you can start to make changes that can enhance your operations, like:

- *Increasing efficiency and raising profit margins*

  Through the integration of IoT, sensing, and optimization, you can reduce inefficiencies across the board, for example, through the use of predictive maintenance

- *Optimizing your workflow*

  By linking IoT solutions to automated actions, you can streamline and optimize your workflow, pushing performance to the highest level

3. **Transforming your business model**

   Ultimately, including data in your company gives you the opportunity to change the services you provide to your customers, creating new sources of revenue:

- With the data you gather, you can find new ways of providing value to your customers, selling products, and running your company.

Improving your services and transforming your business model through IoT

IoT lets you adapt to changing market expectations and offer your clients new services. For example, if you sell machines to customers with a service and maintenance contract, by adding IoT, you can start tracking key parameters from the machines in real-time. With the data that you collect, you can learn about the actual use of the machines and identify potential problems as they occur. Through this, you can optimize your maintenance services and improve quality. Plus, you can reduce costs, as maintenance is often planned with a predetermined schedule instead of being optimized for each individual machine. And the knowledge you gain about how your clients use your machines and their performance over time can prove valuable input for the development of the next generation of your machines. Finally, this process could lead you to offer your machines in a lease or subscription model enabling you to differentiate yourself from your competitors.

The shift towards data and IoT solutions is inevitable. Pushing towards digitization and optimizing your performance wherever possible is vital for survival – a fact that the COVID-19 pandemic has recently highlighted.[6] In the next chapter, we look at how you can adopt data collection and IoT solutions in your own company, introducing BACE.

IoT lets you adapt to changing market expectations and offer your clients new services.

II. Next-generation IoT

Complex and interwoven data flows

The increasingly complex and interwoven data flows that come with today's more fully data-driven approach play a role in both day-to-day operations and long-term forecasting and development. In this context, assembling each separate system from scratch – as we did before to tackle random, incidental issues – has become too slow and costly: what businesses need is a fast-working, plug-and-play solution for multiple IoT requirements.

The next step: BACE

BACE is our answer to that need: a device-to-cloud solution, containing a standalone communication unit with built-in sensors, ready to start measuring and providing data as soon as you connect it. By integrating BACE, you can roll out and interconnect IoT solutions and sensors in your business faster, easier, and in a much more accessible manner than ever before. This makes BACE a perfect entry point into the world of data-driven business.

[6] *Coronavirus: Industrial IoT in challenging times,* McKinsey

In the past, realizing an IoT solution was a demanding undertaking: with several complex components that had to work seamlessly together, adopting an IoT solution was often a long and expensive journey. But, in recent years, the technology has advanced, and the embedded electronics necessary are now both cheaper and more powerful. And because of this, it is possible to develop a flexible and powerful IoT system like BACE.

Scalable to your business needs

Whether you are working at a large-scale factory or in a smaller company, BACE is scalable to your company: you can purchase multiple units to measure a large number of devices – think of reducing inefficiencies and saving money through predictive maintenance – or, with a single unit, the solution can slot into your office.

What businesses need is a fast-working, plug-and-play solution for multiple IoT requirements.

How it works: the 5 elements of the BACE

BACE combines the building blocks of an IoT solution into one small system: a hardware-plus-software end-to-end solution. It contains five distinct components:

1. **On-Board Sensors, Add-On Sensors, and Connectors for Local Data Collection**

- Four standard sensors for temperature, light intensity, relative humidity, and presence
- Examples of possible add-ons: vibration sensors, accelerometers, induction sensors, pressure sensors, water quality monitoring, CO2 sensors, Radio Frequency Identification (RFID) readers
- Connectors for digital communication with an external device, via **Modbus**, **CAN-bus**, or a serial protocol, depending on the device

2. **Communication**

- Communication between the IoT module and the backend, using **LTE-M**, with fall-back 2G, Bluetooth, and Wi-Fi

3. **Backend / Cloud**

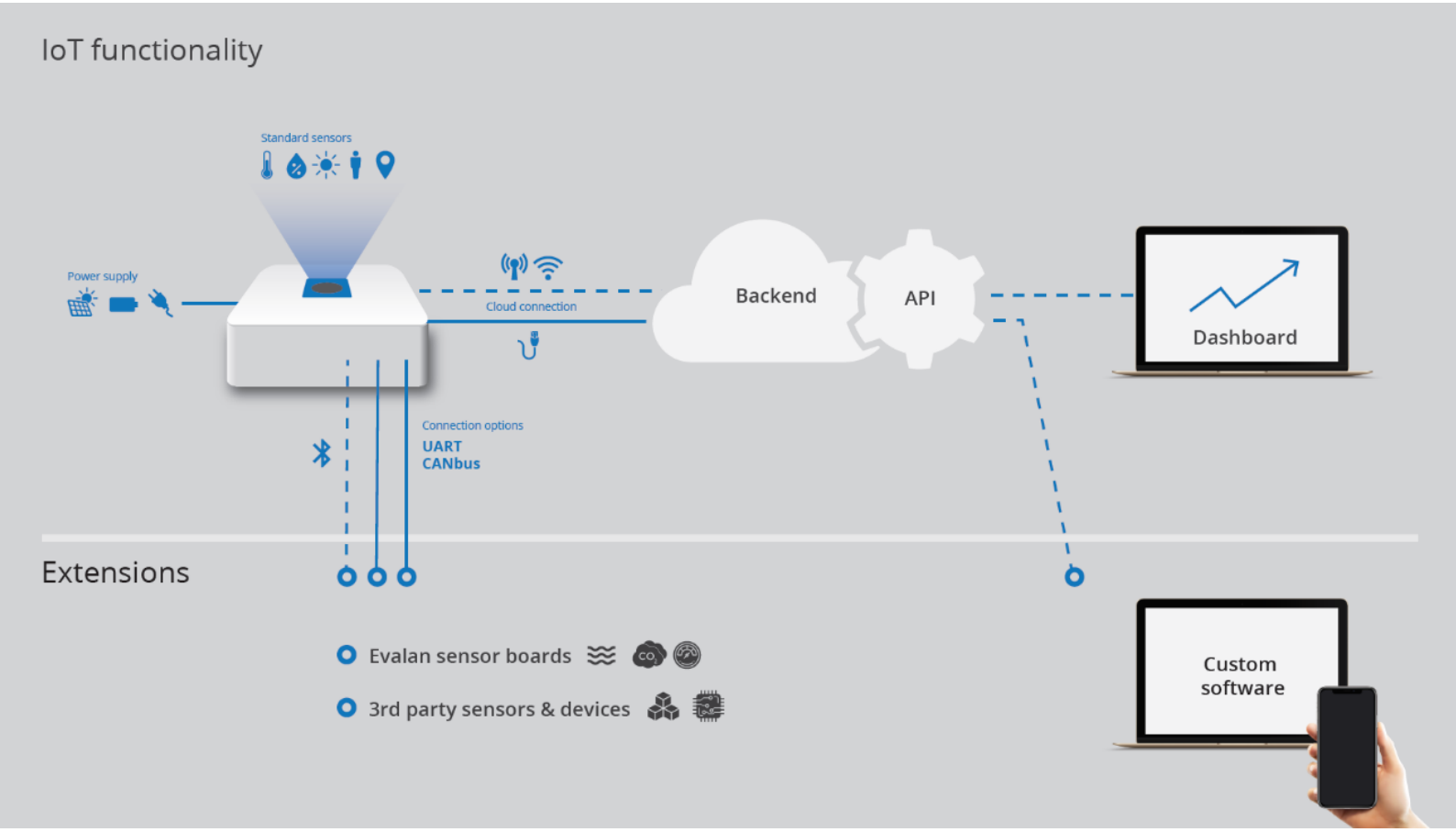
- Centered around the IoT-Hub, a component of the Azure Cloud from Microsoft, with additional functions like security, wireless (“over the air”) software updates, provisioning, and storage

4. **Data processing**

- The data collected by BACE sensors are processed both in the cloud and at dashboard level, depending on your preferences as a user. Advanced data processing options are also available

5. **User interface**

- BACE' modular interface allows you to see your devices, alongside the current status, current data, and historical data.
- You can set actions that can optimize your operations.



Start changing your business

Together, these components combine to make a standalone IoT and sensor solution. When you purchase and connect the device, it will immediately start gathering data and make these instantly available to you in the cloud. With a personal dashboard, you can view these insights, create actions, and start to improve or change your business. You can place the BACE unit itself wherever you want, for example, on a wall, or integrate it into a device.

The benefits of BACE

Our solution offers a wide range of benefits over the customized IoT solutions. As a versatile hardware-plus-software system, BACE brings high value to your company through three significant features:

1. **The value of a standardized hardware unit**

- *Ease-of-use*

  With a simple plug-and-play approach, you can get instant insight as soon as you turn it on

- *Speed of adoption*

  Benefit from a fully tested functional IoT network that is available immediately, as opposed to waiting 6-12 months for the custom development of a bespoke solution, followed by a phase of bug-fixing

- *Scalability*

  Whether you are working in a small office or a giant factory, BACE can scale to fit your needs

- *Integrated security*

  With security built-in to BACE' hardware, you can be confident in the safety and privacy of your data

2. **The benefits of BACE**

- *Versatility*

  Place the unit wherever you want to in your company, and gather the data you want to

- *Economic benefits*

  In addition to helping you optimize costs, BACE itself is an affordable IoT solution

3. **Collaboration with Evalan**

- *Customized add-ons*

Along with the in-built sensors, add-ons can work with your specific needs, like movement sensors, water quality monitoring, induction sensors, CO2 monitoring, or VDC (voltage detection) sensing

- *Support and development*

  There are many ways to expand on this solution, for example, Evalan can assist with device integration

In the next chapter, let's look at how you can use this solution to improve your business.

As a versatile hardware-plus-software system, BACE brings high value to your company.

III. How you can implement and benefit from BACE

Three ways of implementing BACE

So how do you implement BACE in your company? At Evalan, we see three ways:

1. **As an IoT module**

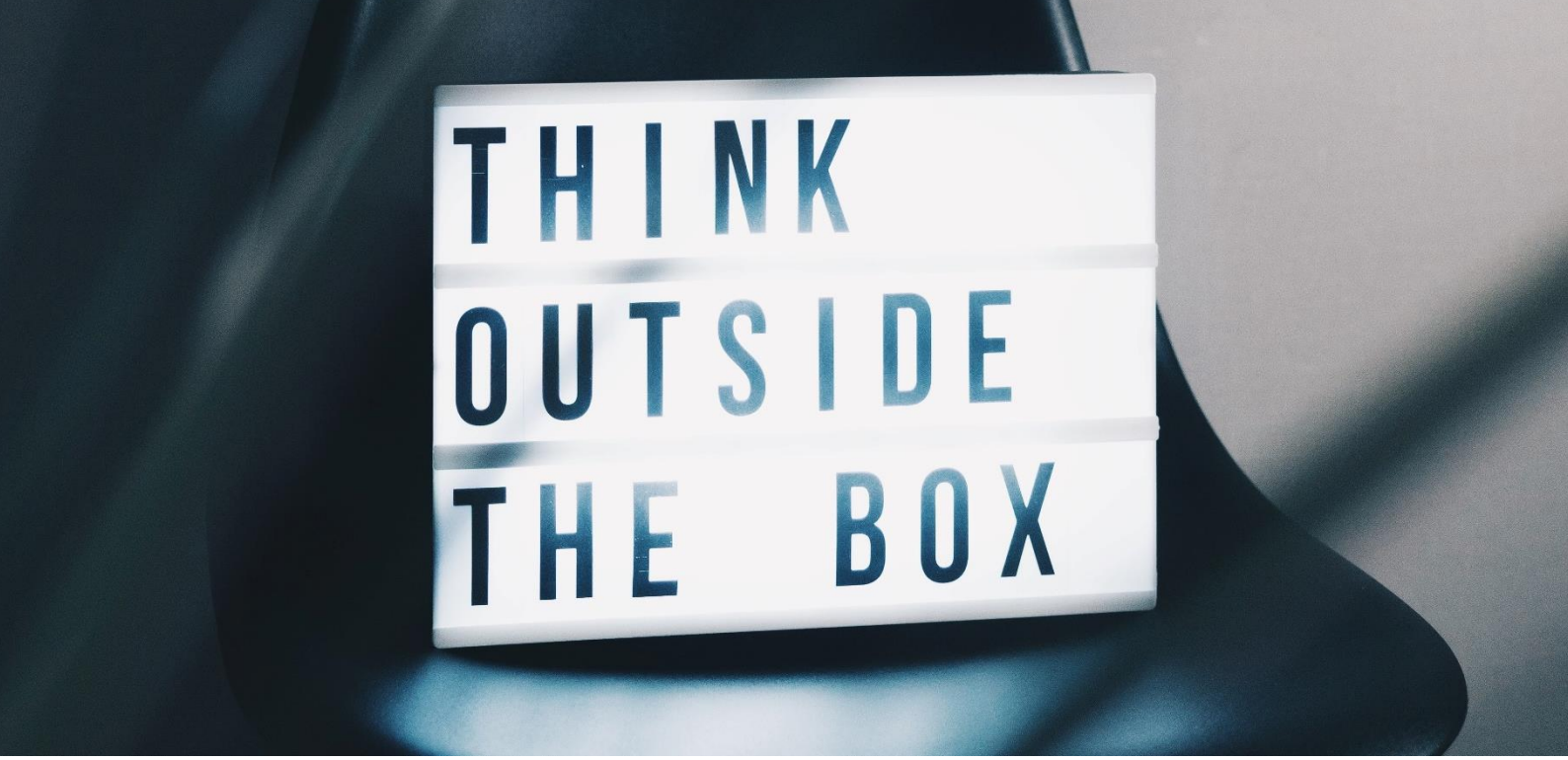
   The BACE unit sends its data directly to your cloud and dashboard. This option is ideal if you already have your own cloud platform and interfaces, and want to get more data onto your platform.

2. **As an IoT connector**

   In this scenario, we include the IoT Hub with associated functions for software updates, security, provisioning, and data transfer from the IoT modules to the cloud. From there, the data is forwarded to your cloud platform, portal, dashboard, or application through an API. This means you don't have to worry about data storage and transmission capacities, and can focus on your own value-adding services.

3. **As an end-to-end IoT solution**

   Here, we offer the complete end-to-end solution that gathers, stores, and processes data, and displays it in a portal. It is easy to implement and eliminates any need for development from the project. For example, if you want to track the temperature of your cold containers or the location of your vehicles, the full end-to-end solution, including the portal, is available for you.



Taking your business to the next level with BACE

How can this work in practice and add value to your company? As we highlighted earlier, IoT and data create benefits in three categories:

1. Enhancing your performance across the board
2. Optimization through data insights
3. Changing your business model

So, if your company manufactures and sells machines and you decide to adopt BACE, how can these benefits be seen?

1. By adopting a monitoring solution like BACE, you can reduce errors, increase efficiency, save energy, and optimize your services.

2. After this, you can use the insights you gather from the data to improve the future designs of your machines, adjusting them after learning how your customers use them. Alongside this, you can move to a predictive maintenance regime, instead of reactive or preventive.

3. Ultimately, you can change your business model, creating future-proof value-adding services and new revenue streams. In this case, instead of selling a single machine as

a one-off purchase, you can lease or offer your customers an ongoing subscription-based maintenance program. By remotely monitoring the condition of the machine and using algorithms that use the data to predict when failures happen, you can optimize when you perform maintenance, keeping equipment at peak performance with minimum risk of breakdown. The result is that you can create long-term business relationships rather than a single sale.

Throughout steps one to three, you can overhaul how your company performs, both in daily operations and in the transformation of your business model.

Business optimization with BACE: two examples

Saving time and money through predictive maintenance

A significant benefit of IoT and data-driven workplaces is the emergence of predictive maintenance: by collecting and monitoring data, you can predict and respond to problems *before* they arise, instead of waiting and reacting *after*. According to the U.S. Department of Energy, predictive maintenance saves almost 15% over preventive maintenance and up to 40% over reactive maintenance.[7]

BACE gives you an easy way of implementing predictive maintenance. For example, if you work in a large factory with many critical machines with moving parts, from conveyor belts to robotic arms, maintenance is a key issue. If you use several BACE units with a vibration sensor add-on, you can measure the mechanical vibrations and environmental factors affecting the machines. With this data, you can predict which machines will need maintenance when, instead of waiting for an issue to crop up.

Equipment management

Beyond the built-in sensors, add-ons increase the options you have with BACE. For example, you can add-on a Radio Frequency Identification (RFID) reader to the IoT module. Information from the RFID tags scanned by the reader can then also be sent

[7] *Predictive and Preventive Maintenance Statistics*, UpKeep Learning Center

to the backend. So if you need to know who accessed the equipment, you can ask your operations personnel to scan their personal badge each time they use the equipment. This could facilitate your record-keeping of the actions performed with the equipment.

With BACE you can change your business model, creating future-proof value-adding services and new revenue streams.

IV. Wrap-up

Transforming your business with BACE

As we've explored in this whitepaper, adopting IoT and data-driven solutions offers your company significant benefits, giving you the insight you need to grow: you can increase your efficiency levels, reduce inaccuracies, save energy, optimize your performance, and even change your business model.

While in the past, having a relevant IoT solution built for your company was complicated and time-consuming, BACE offers an accessible, new entry point into the world of IoT, data, and sensors and data.

- ✓ Accessible to any company
- ✓ Easy to use
- ✓ Plug-and-play
- ✓ Short development time, giving you access to a fully-functional IoT and sensor network almost instantly
- ✓ Versatile
- ✓ Add-on sensor options to suit your business needs
- ✓ Scalable
- ✓ Countless potential applications

Getting started today

Getting started with IoT, data, and sensors has never been simpler. It's time to get connected, data-driven, and futureproof.

If you want to find out more about Evalan's BACE and what IoT can do for your business, get in touch with one of our team members today.

V. About us

Evalan is a fast-growing and innovative development and application partner in the field of the Internet of Things. We work in close collaboration with our customers to achieve the best results possible. Evalan focuses primarily on remote monitoring, biometric measurements, and telemetric solutions for the healthcare, industry, and government sectors. We develop mobile devices, sensors, data management systems, data processing algorithms, and user interfaces for different platforms. We serve around 100 clients, ranging from large multinationals like Heineken and Unilever to government departments like the Ministry of Defense to hospitals and small technology companies. Evalan has frequently been ranked by the Chamber of Commerce to be among the 100 most innovative Dutch small-to-medium-sized enterprises. The company was founded in 2005. From our offices in Amsterdam, we operate in over 50 countries. Find out more at www.evalan.com. Or follow us on Twitter or LinkedIn.

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VII. References

1. *Growing opportunities in the Internet of Thing,* McKinsey Global Institute
2. *10 Charts That Will Change Your Perspective of Big Data's Growth,* Forbes
3. *Catch them if you can: How leaders in data and analytics have pulled ahead*, McKinsey
4. *Why Every Company Is A Data Company,* Amir Orad
5. *Coronavirus: Industrial IoT in challenging times*, McKinsey
6. *Predictive and Preventive Maintenance Statistics*, UpKeep Learning Center

VIII. Appendix

- ***Modbus**: a standard communication protocol used to communicate with and connect to industrial electronic devices*
- ***CAN-bus** (Controller Area Network Bus): an interface used to communicate and link to electronic control units in vehicles*
- ***LTE-M** (Long Term Evolution for Machines): the network which is used for the communication to and from the hardware unit. LTE-M is the optimal choice for mobile devices and has the best international footprint – in those aspects, it is vastly superior to alternatives such as NB-IoT and LoRaWAN*