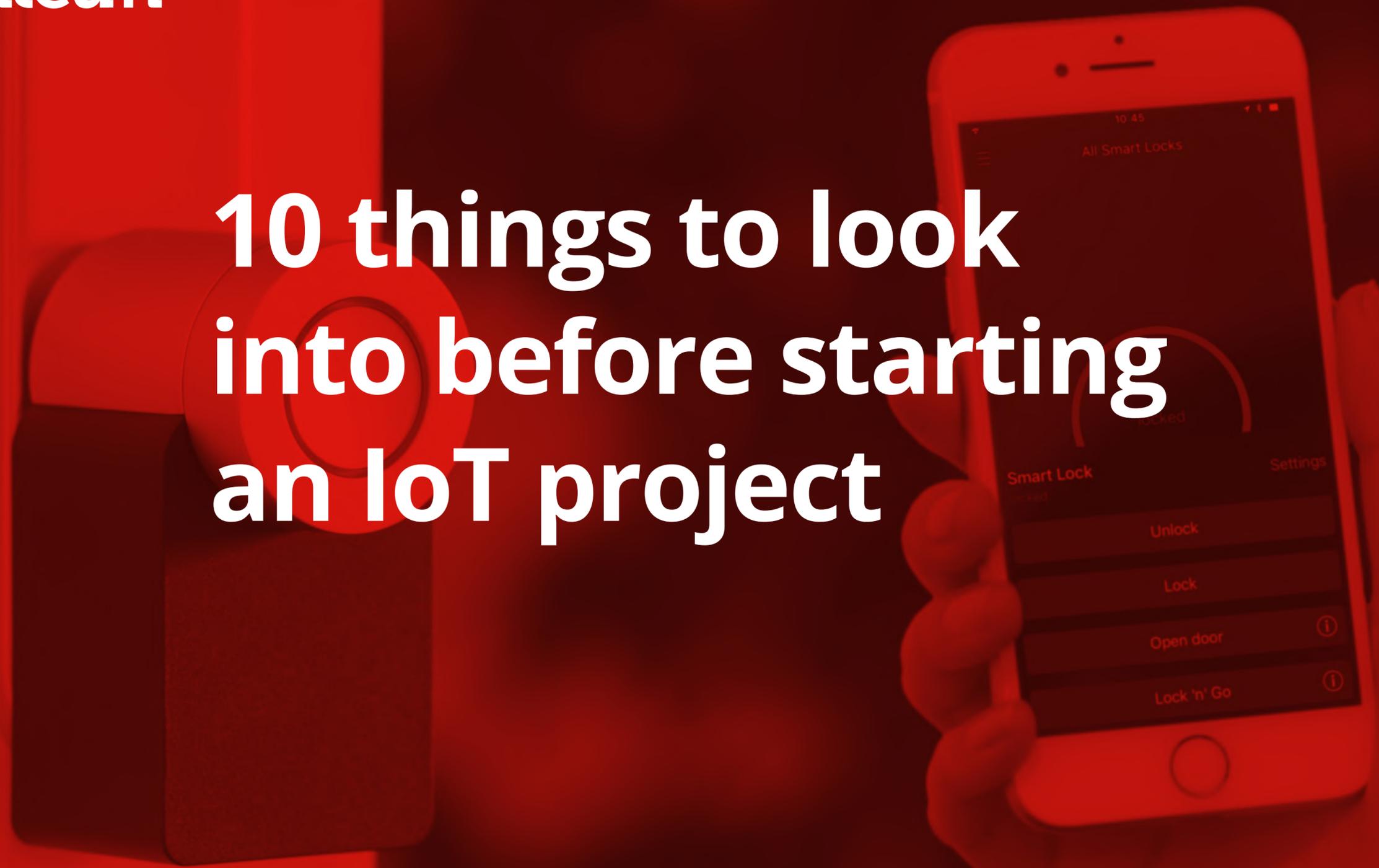Open the door to IoT world with

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10 things to look into before starting an IoT project

IoT Implementation Checklist

Internet of Things creates incredible opportunities for business. But building a viable IoT system and integrating it into an established business process can be challenging. Fundamentally, IoT is a multicomponent technology. Therefore, it takes a thorough analysis, holistic approach and a bit of vision for the future to implement an IoT system that would have a desired impact on business and justify the cost. Here are 10 things to think of at the very beginning of IoT implementation:

1 **The choice of hardware**

2 **IoT platform**

3 **Connectivity**

4 **Security and privacy**

5 **Data strategy**

6 **Environment**

7 **Infrastructure**

8 **Data visualization and analytics**

9 **Machine learning**

10 **Scalability**

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The Choice of Hardware

The market is loaded with IoT hardware for various purposes, including small computers, chips, microcontrollers, use case or industry-specific kits and accessories. To choose the right one, you will need to consider many factors: cost, functionality, processing power, flexibility, compatibility, scalability, power requirements, connectivity options, even size and robustness. Here're some things to remember while comparing different options:

- You should see a big picture from the very beginning. Simple hardware design and affordable boards are great for an IoT prototype, but maybe not enough for a fully-fledged IoT system. Make sure you will be able to scale up (if needed).

- Among other factors, consider the conditions your IoT system will sit in (temperature, humidity, noise, etc.). Some hardware is more robust and can endure harsh conditions better than the other one.

- Pay close attention to connectivity capabilities and review your hardware choice against the data model your system will rely on.

35%

Hardware accounts for 35% of the global IoT market value.

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IoT Platform

IoT platforms provide comprehensive services to manage the data collected by connected devices and sensors. Their number and variety are growing fast, however, the top providers keep their seats for years. Microsoft Azure IoT Suite, Amazon AWS IoT, Cisco IoT Services, IBM Watson IoT and Google Cloud IoT are the most popular platforms, and there are hundreds of smaller ones. Here's what you need to know when choosing the one for your IoT project:

- First of all, review the tools and cloud services offered by IoT platforms against your project requirements. Do they offer edge intelligence? What about machine learning for data analytics? Are there existing use cases? These and other questions will help you narrow down the choice.

- Consider the number of endpoints your IoT system will have. IoT platforms offer different datapoint management capacity from several hundred to billions as well as different performance.

- Check if IoT platforms offer integration services compatible with your existing infrastructure and user applications.

29%

29% of IoT projects use Microsoft Azure IoT Suite to run connected devices, according to Statista.

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Connectivity

Connectivity is the core of Internet of Things technology. Cellular, satellite, WiFi, Bluetooth, Ethernet, LPWAN, mesh networks and other connectivity options differ in bandwidth, area of service, speed, power equirements and cost. Choosing the right communication protocol and connectivity technology can be a real challenge. To make the right choice, consider that:

- Connectivity is always a compromise. Essentially, the bigger bandwidth requires more power and implies a higher cost if we talk long-distance or even global coverage (cellular, satellite). For smallarea connectivity, cheaper solutions like WiFi, Bluetooth and mesh networks work fine and still handle high bandwidth. Dealing with a wider area, low power requirements and small data packages (e.g. humidity sensor reading), consider LPWAN solutions like LoRa or SigFox.

- You can combine connectivity technologies to excel their performance and optimize cost.

- The era of 5G is around the corner, and it's believed to address most IoT connectivity needs.

1.5b

Ericsson believes the number of 5G subscriptions will reach 1.5 billion in 2024. 5G IoT market will grow to $6.3 billion by then. according to Statista.

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Security and Privacy

Even though data is the major component of an IoT system, data security is often underestimated and even cut from the design of an IoT prototype. This is a huge mistake, as IoT devices become a soft spot and open for breaches, unauthorized control takeover and data theft. Not to mention the fact that many IoT systems work with personal information, location and other private data. To maintain IoT data security and address privacy regulations:

- Use the combination of hardware and software encryption measures and reliable data model from the very beginning of an IoT project.

- Ensure IoT data safety from the moment it's generated to every step of its processing and storage. You may want to teach devices how to "forget" data once it's used to limit soft spots in your system.

- Consider the segregation of roles and up-to-date authentication means like biometrics or voice for different end-users.

61%

61% of organizations experienced IoT security accidents.

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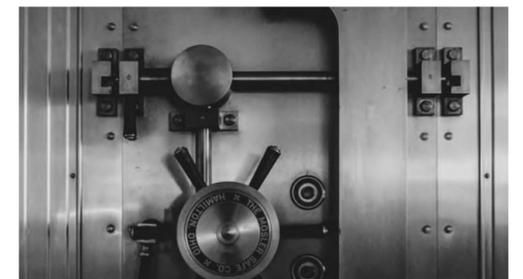
Data Strategy

Data is a fundamental part of IoT functionality. Uninterrupted, consistent data flow is essential for its successful work. At the same time, IoT systems are typically multi-component and include a number of data points and modules for data processing, sorting, storing, etc. In this context, it's important to make sure data is not only secured from outside attacks but is safe within the system and is reliably transferred between system blocks. For that:

- Review options for big data ecosystem management (e.g. Hadoop) and data backup tools.

- When designing a big data ecosystem, consider isolating its components. Thus, the problem in one component won't affect the other ones.

- Explore the possibilities of edge (fog) computing to move initial data processing "closer" to sensors, smart devices and actuators.

5.8b

5.8 billion IoT devices owned by enterprises and governments will use fog computing in 2020, according to Business Insider Intelligence.

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Environment

The physical environment can be a determining factor in choosing hardware, power solution, connectivity technology and, in general, building an IoT architecture. Many IoT systems work in remote locations (e.g. off-shore oil rigs), noisy environments (e.g. manufacturing), out of range places (e.g. underground drilling). Even habitual places like hospitals can have a level of electromagnetic interference which can influence the work of certain IoT technologies. Before designing an IoT system, take into consideration:

- The physical conditions your system components will work in. It includes temperature, humidity, noise and other interference which can influence the performance or data transmission.

- The difference between the environment where you test your IoT prototype and where your finished IoT system is supposed to operate.

- The complexity of your system in terms of access, maintenance, battery change, etc.

60%

60% of companies substantially underestimate the complexities of building an IoT service, according to Cisco IoT survey

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Infrastructure

Connected technology impacts literally every sphere of our lives and the ways things work. One business can have the whole infrastructure of IoT systems in place: an energy consumption management system, smart lighting and other smart office systems, intelligent surveillance, automated inventory and smart retail stores. Interoperability between the systems in an IoT network is the key to efficiency. This is why it's important to mind the infrastructure the new IoT system will integrate into.

- Analyze the existing infrastructure your IoT system will integrate into in terms of interoperability, connectivity, data sharing opportunities.

- Review legacy technologies you work with (if any).

- Consider interoperability with third-party products or using a hub as a control center for several IoT systems.

11t$^+$

The total economic potential of IoT can reach up to $11.1 trillion by 2025, according to McKinsey report.

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Data Visualization and Analytics

Visualization and analytics play a pivotal role in leveraging IoT data. You see, as is IoT data can have little to no benefit for business. Often, it is represented by an enormous amount of unsorted and updating data in an unreadable form. Analytics is focused on turning such data into a practical source of high-value insights and visualization helps grasp the meaning of these insights, identify trends and even notice inconsistencies and errors. Here's what you need to know for creating a powerful data visualization and analytics strategy:

- You should figure out what value you want to derive from your IoT data and how you plan to act on it. Will it be the core of automating processes, real-time monitoring or planning ahead?

- Data visualization helps you understand data. There are plenty data visualization tools from versatile Tableau to powerful Kibana and Grafana often used in IoT projects. Review these tools against your data strategy and business goals.

- If your IoT project requires profound analytics of data coming from different sources, you may need to consider addressing to data scientists and/or using advanced algorithms.

95%

95% of U.S. organizations say that they use data to power business opportunities, according to Experian report.

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Machine Learning

As mentioned in the previous part, dealing with massive IoT data provided by various sources and multiple endpoints requires special forces. Advanced algorithms and Machine Learning help determine relationships between data sets, reveal patterns, build predictions and make data-driven decisions and planning. Many IoT platforms already offer AI services to help businesses unlock the power of intelligent machine analytics. You may be interested in machine learning and other AI technologies, if:

- Your IoT system will deal with a lot of data coming from various sources and will need to make autonomous decisions based on this data.

- You plan on using advanced authentication and control in end-user applications like face or voice recognition, biometrics, etc.

- You have legacy data and want to derive meaning from it. For example, you may use year-long performance data to find patterns and plan your future strategy based on these insights.

80%

80% of all enterprise IoT projects will include an AI component by 2020, according to Gartner report.

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Scalability

Scalability is a long-standing issue in IoT. More than a half of IoT projects don't outgrow the PoC phase for different reasons: budgeting constrains, poor design choices, lack of competitive viability or simply missing the right moment to enter the market. In fact, scalability should be taken into consideration at every step of decision making: when choosing connectivity, data management tools, hardware design, even building end-user applications. Here's what you should remember:

- When designing a prototype connected device consider the specifics of mass manufacturing (if this is the goal).

- Take into consideration geo factor. For example, a prototype based on certain connectivity technology may work perfectly in one country, but have problems adapting to other standards once shipped to other locations.

- Remember about scalability when choosing data management tools. Your system may process a couple of thousands of messages per month at first, but this number may grow in times once your system scales up. Your IoT platform and big data ecosystem will need to adjust.

50%⁺

More than half of all IoT projects don't make it past the proof of concept phase.

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One More Thing: IoT Partnership

Seems like a lot, isn't it? Indeed, building a decent IoT system able to grow from a prototype to a fully-functional IoT solution requires versatile skills, profound experience and visionary outlook. Depending on the individual use case and available skills in your company, you may need to address to a technology partner who could either augment your capabilities and expertise or take on your project and provide endto-end IoT development services to build it from scratch. A reliable IoT partner will help you:

- Analyze all the factors mentioned above and build an efficient development strategy for your IoT project.

- Rationally divide your project into phases to be able to quickly develop a prototype, test it often to get real feedback and data on its performance and, using this data, make adjustments accordingly.

- Select optimal tech stack based on the project requirements and budget, your short and long-term business goals, changing market situation and shaping trends.

76%

76% of companies adopters of IoT feel like they need higher level IoT specialists.

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About Digiteum

Digiteum is a cross-functional team focused on designing, developing and delivering IoT systems and data solutions to businesses across industries and verticals. We understand that IoT is a solid ecosystem where every component has its purpose and all of them are seamlessly integrated with each other. Therefore, we make sure the products we build organically fit into our client's infrastructure. At Digiteum, we equally value the opportunities that connected systems and data can bring to our clients. This is why, we focus on extracting as much value from data as possible and guarantee these insights make real impact. To learn more, check our IoT development services or contact our team.
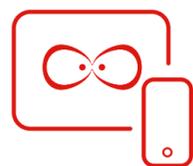
5
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10+
YEARS
of experience in digital

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