

EBOOK

The Build vs. Buy Decision: Calculating the Real ROI of Enterprise Battery Intelligence™

VOLTAIQ



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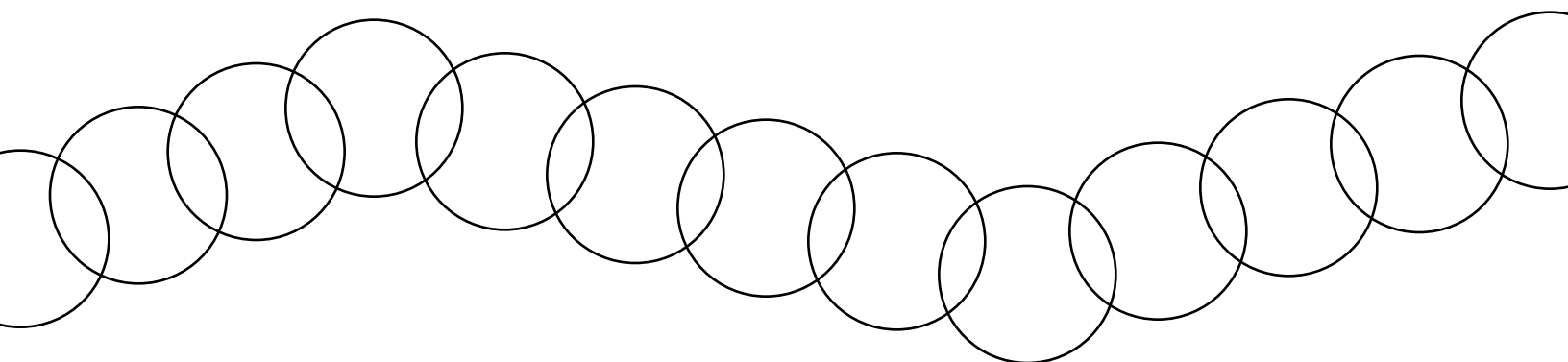
Introduction

When it comes to enterprise software, the build vs. buy dilemma is a common issue for many businesses. You might be tempted to build your own solution – after all, you think **“how hard can this be for us? We have an IT team and know exactly which analyses are required.”** On the other hand, faced with current talent shortages and supply chain constraints, you might think it's more advantageous to rely on a market-proven, third-party solution to ensure timelines and goals are met. And to further confuse matters, when your business revolves around battery-powered products, the overall risks are even higher. After all, batteries are complicated, and no one wants costly recalls that threaten reputation and profitability.

While neither approach in the build vs. buy analysis is wrong, it's important to consider all variables before embarking to ensure you make the right decision from the start. The following guide is meant to help ask the right questions as you begin this important journey.

Top 6 Considerations for Build vs Buy

- ✓ **Business goals:** Do you need a scalable and robust solution that will serve you for a long period of time, or are you looking for a quick fix to a smaller, more immediate problem that doesn't need to stand the test of time?
- ✓ **Operational costs:** Have you budgeted for all areas of deployment, i.e., regular enhancements, as well as hardware, software maintenance? Have you budgeted for additional certifications, e.g., GDPR and SOC Type 2 compliance? Can you afford to wait if you need to launch a new product? Have you allotted time for QA to deal with any quality issues post-launch?
- ✓ **Opportunity costs:** What could your skilled engineers be doing to further your core mission? What new features could they be building? What critical upgrades could they be making during this time?
- ✓ **Qualitative ROI:** What are qualitative benefits to consider beyond the dollars and cents?
- ✓ **Advantages to each approach:** Where's the tipping point for building vs. buying?
- ✓ **The big picture:** How do these options stack up?



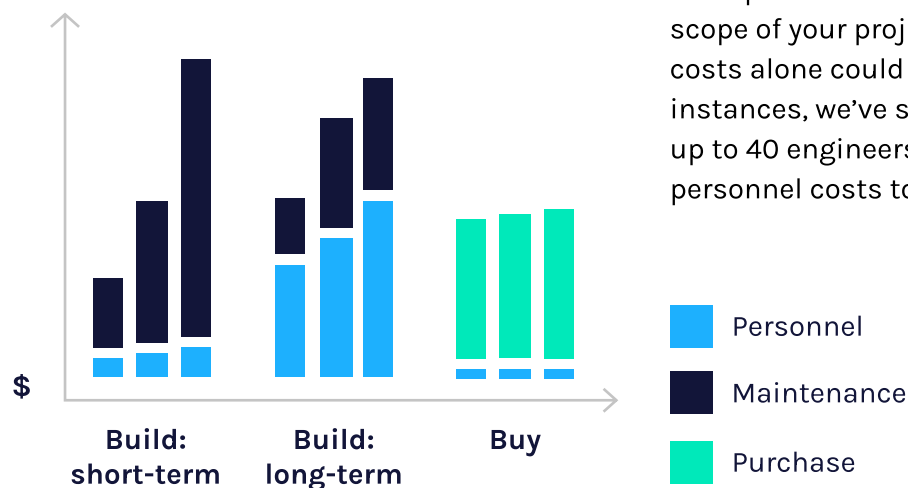


Defining Business Goals

We all know how important goals are to setting priorities in the pursuit of successful outcomes. With the build vs. buy decision, defining your project at the outset is incredibly important. You should determine if you're pursuing:

- a **robust, scalable solution** to future-proof your business, i.e., a system that includes multiple interactive modules, software integrations, API access, migration of data or remediation of legacy systems, or
- if you're developing a **short-term fix** to address an immediate organizational need.

What is the minimum feature set and how will you handle modifications and updates which may add to the maintenance burden? Since your system will be compared – by senior management and users alike – to the commercially available, purpose-built systems on the market, defining breadth and depth will help set expectations.



Operational Costs

To fully understand the true operational outlays of building out a solution, we must first consider the tangible costs of personnel acquisition. In addition, when building a system, the operational costs extend beyond startup personnel to include long-term availability of resources for hosting, enhancements, maintenance, training and support.

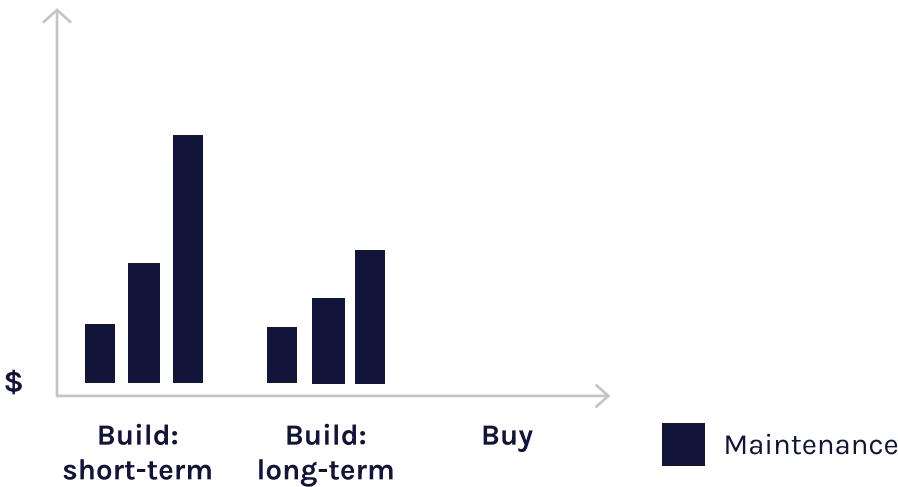
Let's discuss an example below:

Typically, the development and maintenance of an enterprise-grade software solution can take 2-5 years and involve at least 1-2 data scientists, 1-2 data engineers, 1-3 software engineers, 1-2 infrastructure engineers, and at least one product manager, with battery expertise. Enterprise-grade deployments require even larger teams and can reach 30-40 engineers.

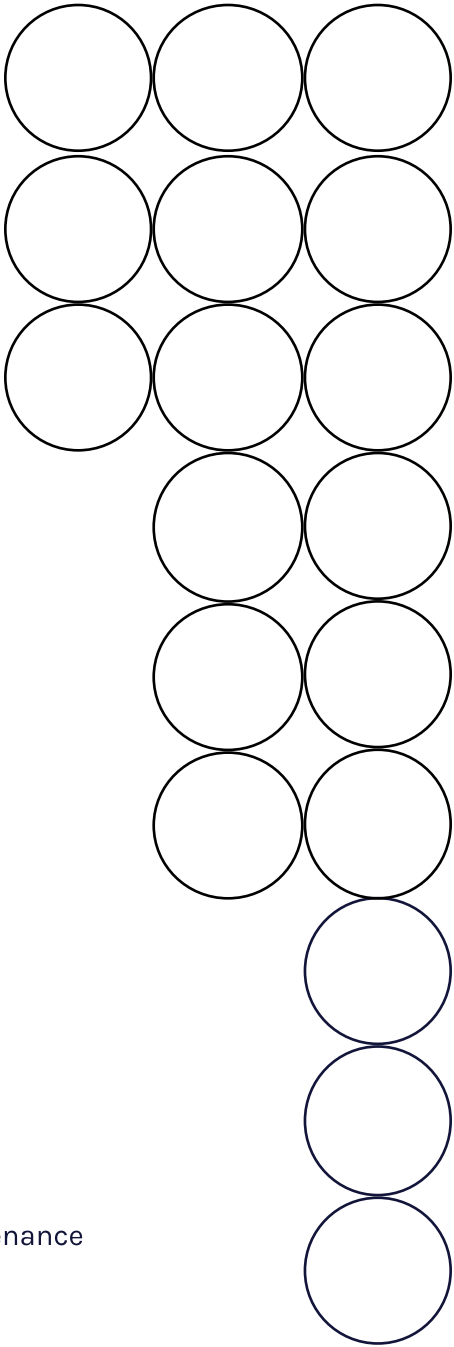
Assuming a fully loaded cost basis of \$300k for each full-time engineer, first year expenditures alone could require \$1.5M to \$3M in hard costs. Multiply this by the 2-5 years it takes to build out a fully developed and optimized solution, depending on the scope of your project, and your personnel costs alone could easily reach \$15M. In some instances, we've seen organizations leverage up to 40 engineers, which balloons annual personnel costs to the \$12M range.

As requirements evolve, large-scale software development projects also may include additional engineering time for new feature development, revisions and updates, as well as maintenance, training, and support to keep users productive and ensure your solution remains relevant. A conservative estimate for supporting this work requires at least 3-4 full-time engineers, sometimes reaching levels of 20-30 engineers for ongoing maintenance. Again, using \$300k annual cost per full-time engineer, this could reach between \$900k and \$1.2M per year, and as much as \$9M on the enterprise side. This doesn't include management time or any deviations from the support plan that could require additional work.

Lastly, battery engineering requires specialized subject matter expertise. This expertise must be retained within the company for the lifetime of an inhouse solution, particularly as the workloads scale internally and management is tempted to redeploy resources. In the current market, personnel with these specialized skills are particularly difficult to recruit and retain.



Building a custom battery analytics software solution can easily cost \$15M over 2-5 years in personnel costs alone





Opportunity Costs

In addition to the complexity and cost of enterprise software development, the design, build, and maintenance cycles can take several years to complete and could lead to missed opportunities. Can you afford to have a delayed product launch due to your solution not being ready? There is also the possibility of overlooking an issue during a long qualification process, resulting in post-production quality and safety concerns in the field.

During this multiple-year period that an in-house solution is being built, the battery teams will be operating without the benefit of advanced battery analytics capability, while competing against organizations that have already seamlessly implemented Enterprise Battery Intelligence. In addition, the costs devoted to the engineering resources working to build an inhouse solution could be devoted to funding engineering projects to help the company compete in its own core business.

Companies that are large enough to attempt building an in-house solution will have to factor in the potential impacts of their own success as their workloads and data management requirements increase and change continually. In these situations, a company can reach a crossroads where their daily, growing battery analytics requirements outstrip the capabilities of the system they implemented when workloads were lighter. The functional requirements of an analytics system will change over time as well, as protocols, chemistries, suppliers, and applications evolve. For these reasons, homegrown systems tend to become outdated within a year or so after deployment unless properly maintained.

Building an in-house solution has several important implications:

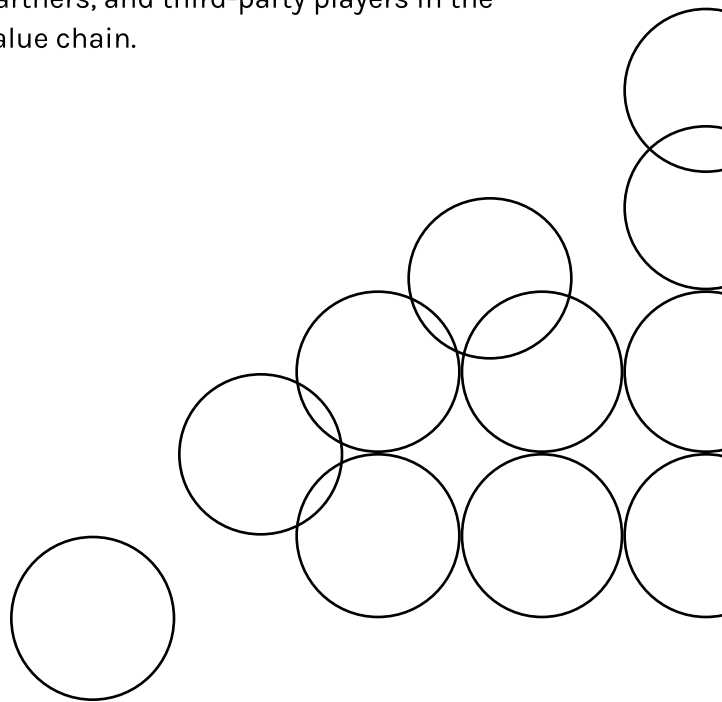
- **Distraction:** Launching an internal effort to build an inhouse system may distract from the core mission of the business.
- **Talent shortage:** In addition to the difficult hiring market mentioned earlier, by having a framework in place, your organization will unlock massive productivity gains from existing battery engineers, and simplify training and onboarding new engineers.
- **Slower development:** Developing a system in house will take a long time, rarely coming in on time and under budget, & no benefit to the organization until the solution is rolled out.
- **Inconsistency:** In the absence of a unified solution, tools will be developed by each team in an organization & inconsistencies in analytics & engineering will result. Industries will innovate & evolve, and any viable system will need to keep up with the market.

Building a solution will result in **lost competitive advantages against organizations who have already implemented their own software**



Qualitative ROI Benefits of Buying

- **Speed-to-market:** During the new product introduction stage, being early to market, and ensuring quality in execution are crucial. Doing it right the first time yields better long-term results and reduces delays, especially when dealing with complex battery systems.
- **Agile, iterative workflows:** Real-time data analytics enable faster learning cycles, data driven decisions, and building up institutional knowledge in a centralized system.
- **Accelerated vendor selection:** As organizations need to qualify & benchmark multiple vendors simultaneously, real-time data analysis provides an early indicator if a vendor or design will pass qualification.
- **Cell-to-pack analysis:** From early R&D and cell selection, through design and validation of large-scale battery packs and energy storage systems, analytics are able to span the entire battery life-cycle. Tools are used to spot everything from cell-level materials contamination, to pack-level “hot spots” arising from system design or poor cell matching.
- **Lower warranty costs:** Traceability capabilities allow for root causes to be more readily identified – early, and before they cause problems—resulting in lower warranty costs in design, production, QA and in-the-field.
- **Maximized Battery Performance:** Having the ability to run statistical or machine learning-based analysis on large volumes of data will let you make data-driven performance optimization decisions to improve performance - e.g. maximize range, accelerate charge, decrease weight, and maximize lifetime.
- **Increased efficiency and productivity:** As organizations face relentless pressure to continually launch an increasing number of new products, their teams are getting stretched. An “off-the-shelf” solution allows organizations to extend their resources and focus as they design the next generation of products, leveraging best practices through existing customers and use cases.
- **Global collaboration with access anywhere, anytime:** Unlimited seats, remote access, and customizable permissions allow for real-time global collaboration between internal teams, partners, and third-party players in the value chain.





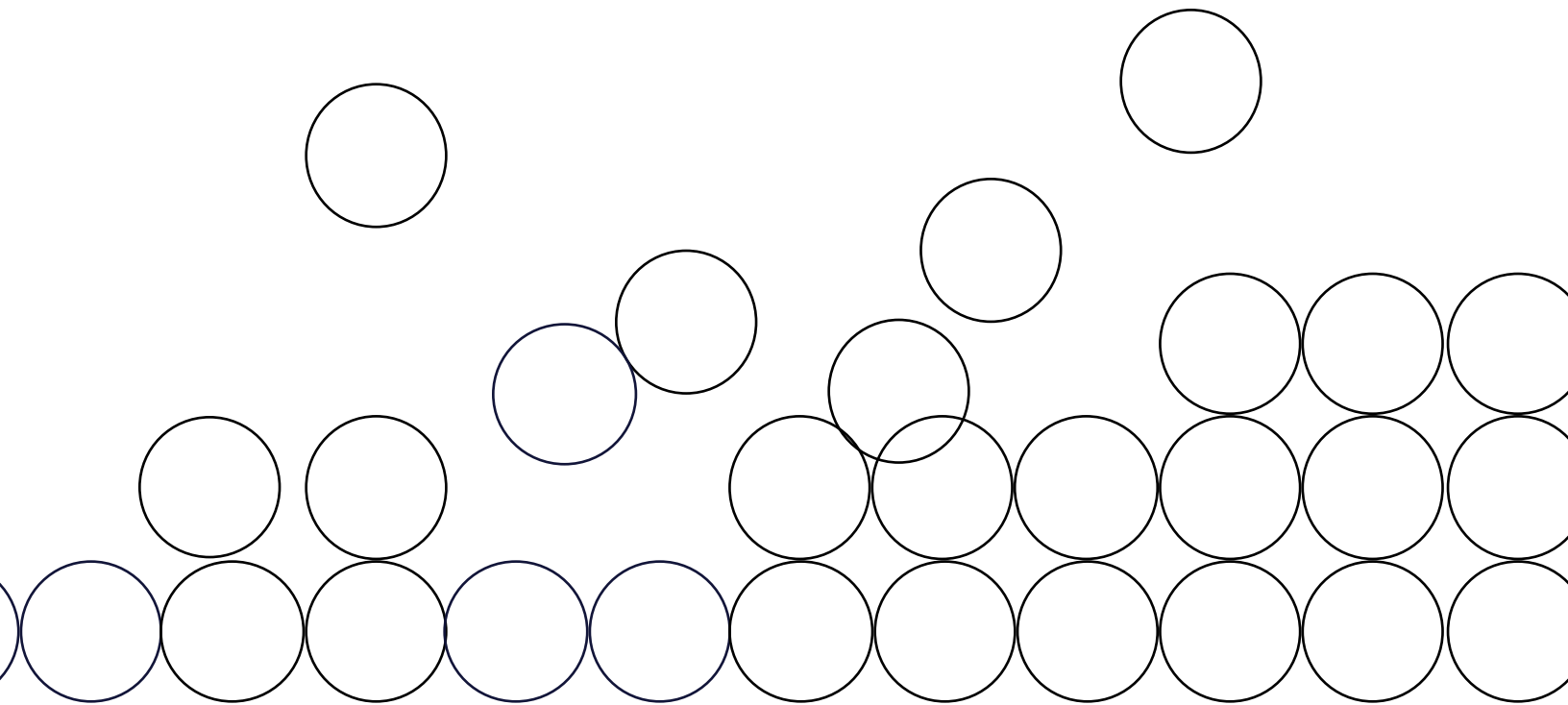
When to Consider Building vs. Buying

Although the benefits of buying a solution typically far outweigh the benefits of building a solution, there are cases in which it makes more sense for a company to build its own in-house system.

For instance, when the problem the software needs to solve is so specialized that commercially available solutions meet less than 50% of the requirements, developing your own solution can be more advantageous. It also may make sense to build when any available software solution will require greater than 70% customization.

However, due to the long-term opportunity costs and difficulty of large-scale software development, enterprises and SMBs alike should view building a custom software solution as an interim approach. As successful organizations scale and grow, they need to empower their valuable engineering resources to focus where they can add the most value to the business.

Enterprise & SMBs should view building custom software as an **interim solution**





Understanding the Big Picture

There are many difficult-to-measure variables involved in understanding the benefits of buying vs. building a battery analytics software solution — and every organization is different.

Below is a comparison of build vs. buy based on actual discussions with companies exploring both paths:

| | Building a Solution | Buying the Right Solution |
|----------------------------|---|--|
| Total First-year Cost | \$6M - \$12M | \$50k - \$1.5M (depending on deployment) |
| Timeline to Launch | 2 to 5 Years | < 1 Month |
| Personnel Needed | 5 to 40 Engineers | 0 to 0.5 Engineers |
| Risk of Failure | High | Low |
| Data & Analytical Insights | Limited | Abundant |
| Data Access | Siloed | Shared across the organization and available to/from external partners |
| Scalability | Difficult with enterprise data volumes | Validated in market; can scale from the start |
| Security | Must be designed & built for the use case | Validated in market; best practices built into launched solution |
| Automation & Acceleration | Depends on build | 90%+ automation, 20-20,000x workflow acceleration |

There are many options to consider when embarking on the build vs. buy decision for an Enterprise Battery Intelligence software solution. While a commercial solution can more quickly and cost-effectively get your business ramped up and focused on solving problems and driving productivity, an in-house approach might better meet your immediate needs. Regardless of the path you take, it's important to assess the big picture to make sure you're choosing the right approach for your business.

About Voltaiq's Enterprise Battery Intelligence Software

Voltaiq has built the industry's first Enterprise Battery Intelligence™ (EBI) software platform, helping its customers optimize battery performance, reliability and financing, while avoiding costly recalls and catastrophic battery fires. Voltaiq's EBI platform is the only purpose-built, fully automated software solution that marshals vast quantities of battery data from across the full product lifecycle, providing a window into real-time battery function and a detailed view into future performance and behavior. Founded in 2012 by energy storage and software veterans, Voltaiq's global customer base includes industry leaders in transportation, consumer electronics, energy storage, and the full battery supply chain.

For more information, please visit www.voltaiq.com.

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