# INTELLIGENT ASSET MAPPING WHITE PAPER

## Transforming Facilities & Maintenance Workflows Across Process Intensive Industries

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### UNLOCK OPERATIONAL EXCELLENCE

Learn how PlantQuest revolutionises asset management and location, reduces downtime, and enhances efficiency in large process-intensive facilities.

### FINANCIAL IMPACT

Discover real-world cost savings and ROI analysis, showcasing how PlantQuest can transform your facility's maintenance operations and deliver tangible ROI.

# EXECUTIVE SUMMARY

In today's evolving manufacturing landscape, including pharmaceuticals, medical devices, and petrochemicals, the need for improved operational efficiency and safety compliance is critical. Challenges like staff turnover, large & complex facility layouts, resource wastage, on-boarding complexities, and knowledge silos underscore the need for PlantQuest, an intelligent asset mapping platform. PlantQuest offers cost savings, enhances efficiency, optimises resource use, improves data utilisation, and streamlines task planning and execution. With a robust technology stack, seamless integration, and scalability, PlantQuest transforms asset management and location. Real-world case studies show its impact on reducing downtime, enhancing efficiency, and cost savings. In a scenario focusing on routine maintenance tasks, the platform pays back the investment in under 2 years, with even shorter payback periods when considering broader task planning and execution efficiency gains.

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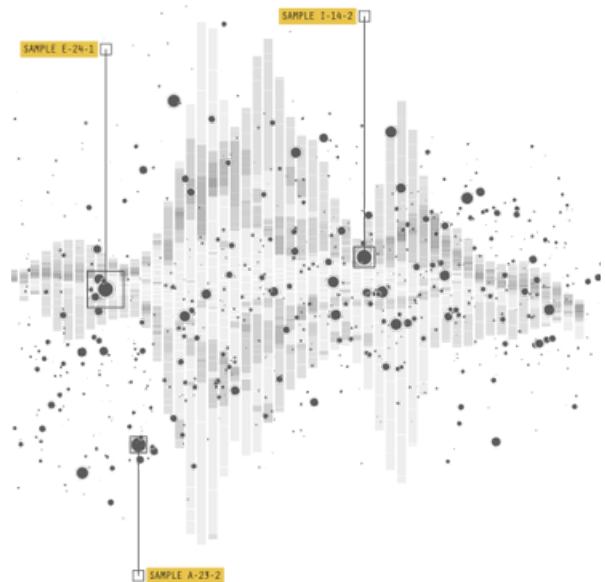
# 1. INTRODUCTION

In the current landscape of manufacturing, in industries such as pharma, medical devices, and petrochemicals, the paradigms are shifting faster than ever before. As the demands for enhanced operational efficiency continue to rise, and stringent safety protocols are ever present, maintenance and facility leaders find themselves at a crossroads. In environments where every minute equates to either a profit gain or a potential compliance risk, lagging operational efficiency isn't just a hurdle—it's a critical business problem.

Today, process-intensive facilities have expanded into colossal landscapes of innovation, housing intricate processes and an increasing number of assets, often reaching into the tens of thousands. In the face of these evolving complexities, traditional asset management approaches are rapidly becoming obsolete. The industry is in need of an intelligent, dynamic solution for asset mapping and location. This need is not just about maintaining the status quo; it's about propelling facilities into a new era of operational excellence, safety, and continuous improvement.

# 2. THE PROBLEM SPACE

## Challenges Faced by Facilities & Maintenance Teams



- **High Turnover of Staff:** The growth of pharma and similar industries had led to increased competition for staff, leading to a revolving door of operations, engineering and maintenance staff as workers move from facility to facility This turnover significantly impairs the organisation's collective memory and understanding of asset locations and tacit knowledge.

- **Time and Resource Drain:** Thousands of work hours are squandered annually as teams scramble to both locate and navigate to fixed and mobile assets. This inefficiency echoes through the operational chain, resulting in costly delays and production downtime.

- **On-boarding Efforts:** Newly hired engineers, technicians and contracted workers face a steep learning curve from the first day on-site when it comes to learning a site's layout and asset geography. A lack of efficient asset mapping can extend this acclimatisation period from days to often months, further exacerbating inefficiencies.

- **Knowledge Silos:** Experienced workers might possess extensive, yet incomplete, asset knowledge, be it in "excel mania" or custom drawings. These silos of expertise lead to inconsistent experiences and work outcomes, especially when tackling the elusive last 10% of assets that are often more challenging to locate.

- **Disparate Systems:** Maintenance, BIM, IoT, calibration, building management, and other operational systems often function in isolation. This lack of integration creates data gaps that prevent teams from making informed, real-time decisions.

- **Mean Time to Repair:** In corrective maintenance scenarios, the overarching goal is to minimise time to recovery. However, this aim is often compromised due to challenges faced of prompt asset and alarm location in the field.

- **Loss of Tacit Knowledge:** Currently, there's no standardised platform to capture and share essential asset locations, videos, photos, or notes. When a seasoned worker leaves, or is simply tied up with additional work, their information is unavailable to other team members—representing an irreplaceable loss to the facility.

- **Navigational Inefficiencies**: Even when workers know the location of an asset, the absence of route optimisation tools results in wasted time and effort. Plus, workers are often uninformed about specific requirements for accessing particular assets or rooms, like Permits to Work (PTW) and access requirements, or specialised safety protocols.

- **Over-reliance on Outdated Tools:** Excel sheets, complicated CAD drawings, and legacy systems, often personalised to an individual's understanding, are still the go-to solutions for asset location. These methods are not only outdated but also not scalable or easily understandable between workers and departments.

- **Lack of Optimisation for Routine Checks:** Workers often perform routine asset-related tasks without a standardised, optimised procedure. With these tasks often being carried out weekly or monthly by different individuals, this lack of uniformity results in significant time and resource wastage due to workers not knowing the optimal way to execute the routine.

## Common Questions Plaguing Technicians

- What's the best way to complete this walk-down?
- Where is XV-B121790?
- How do I get to this room?
- What does that asset look like?
- What do I need to get to this asset?
- Where is this alarm?
- What does this room look like?
- How do I view the locations of all these assets?
- Where are all the facilities plant rooms, noise areas and ATEX areas?

# Cost Implications: The Financial Toll of Operational Inefficiencies

Navigating the maze of asset management in large process-intensive facilities presents several challenges. Yet, these challenges don't just disrupt operations - they come with a hefty price tag. The following conservative figures are based on reviews with our customers, and our experience having over 50 years of experience in maintenance and operational roles in large process-intensive facilities globally.

## Time Lost in Asset Location and On-Boarding

| | |
|---|---|
| **Asset Location** | • With **40 operations** and maintenance technicians<br>• Average of **1.5 hours per week** wasted locating assets and escorting workers<br>• **60 hours** wasted per week—or **3,120 hours per year**<br>• Average cost of employment of €70,000 per worker<br>• Total lost time comes to **€105,000 per year.** |
| **Onboarding** | • **4 new staff** a year due (10% attrition rate)<br>• **8 hours per week** are wasted for the **first 3 months** due to the new worker learning the sites layout and asset geography<br>• **96 hours** per new employee lost per year = **€2,016**<br>• **384 hours** lost across 4 employees per year = **€8,064** |

## Total of €113,064 wasted per year in locating assets

*Imagine about how much time you would spend planning and executing a route in your personal life without Google maps!*



### Average Time Lost per Worker per Week
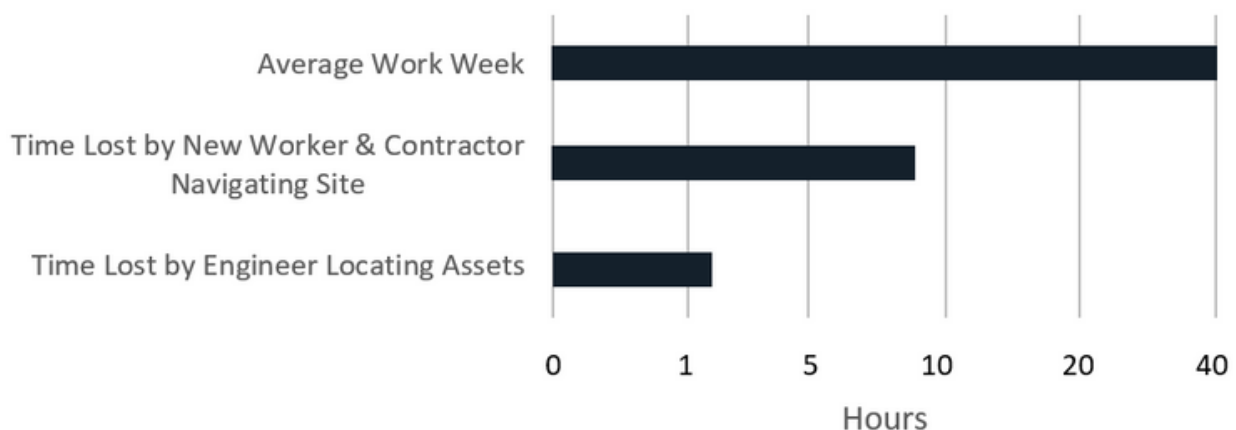
## Operational Delays and Downtime

Downtime in the pharmaceutical industry can cost on average between $100,000 and $500,000 per hour, with some incidents costing $20,000 a minute, equating to $1.2M per hour (Kruglyak, 2021). Even if we take a conservative estimate, a single hour of downtime can be detrimental. Delays in locating assets or alarms, can often contribute to such downtime scenarios.

## Unoptimised Navigation

| | |
|---|---|
| **Routine Tasks & Walkdowns** | • Average of **12 hours** wasted per week **lost on routine tasks** by maintenance department due to unoptimised walk down routes<br>• Total cost of employment 33.60/hour per worker<br>• **€403 wasted** per week<br>• **€20,966 wasted** per year |
| **Individual Tasks & General Navigation** | • If **only 5 minutes** was wasted per task locating and navigating to assets (fixed or mobile) across facility<br>• **1000** tasks per month (maintenance, production, & engineering)<br>• 83 hours wasted per month = **€2,800 per year**<br>• **€33,600** wasted per year |

### Total of **€54,566** wasted per year due to inefficient navigation

## The Total Cost of Inefficiencies

| | |
|---|---|
| Asset Location and On-Boarding | €113,064 |
| Operational Delays | Incalculable |
| Unoptimised Navigation | €54,566 |
| **Total Minimum Cost Savings by PlantQuest** | **€167,630** |

The total cost of the inefficiencies doesn't account for other unqualified but significant costs, such as extended production downtime due to delayed asset and alarm location, lost institutional knowledge, and system inefficiencies. In a competitive industry where efficiency is key, these costs aren't just numbers—they're leading indicators of an operational model that requires transformation. PlantQuest's intelligent asset mapping solution addresses these challenges, offering a robust, scalable, and cost-effective solution that's tailored for the complexities and demands of modern process intensive facilities.

By investing in intelligent asset mapping, facilities stand to recoup these losses, enhancing operational efficiency and turning hidden costs into visible profits. To view a ROI calculation on the above inefficiencies, see Page 10: ROI Analysis.

# 3. PlantQuest

PlantQuest digitises large process-intensive facilities, allowing customers to transform their site operations with intelligent asset mapping. PlantQuest's ability to combine and layer multiple data sources allows workers to make data-driven decisions, locate and navigate to all assets (fixed & mobile), reduce alarm response times and lock in critical site knowledge. With the ability to integrate with existing facility systems, the PlantQuest platform has been designed to be deployed within all sites. From the oldest legacy and brownfield facilities to the most cutting-edge greenfield sites.

## Intelligent Asset Mapping Platform

### 2D Digital Twin
- Delivered through desktop, tablet, or available as an SDK (Software Development Kit), the platform is optimised for both greenfield and brownfield facilities.
- Features a modern, cloud-based architecture for quick, secure and seamless deployment.

### User Interface & Experience
- Think Google Maps for your facility.
- A platform and user interface that resonates with workers.
- Access and view complex data in a format that all can comprehend.
- Interactive, searchable maps with easy transitions between 2D map and BIM, or 360° imagery.

### Operational Efficiency & Safety
- Seamless asset and alarm location.
- Accelerate, and transform task planning and execution whilst optimising resources.

### Data Layering & Integration
- Layer data, rules, and asset information over your facility map proviing the context required for informed decision-making.
- Integrate with existing CMMS, BMS or Calibration systems for joined-up thinking and insights.
- Capture a wide range of data and asset locations through PlantQuests IoT and mobile tracking devices, or integrate your existing devices.
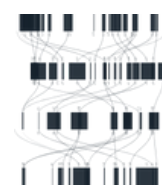
**FACILITY INFORMATION** + **LOCATION INTELLIGENCE** = **ACTIONABLE DATA**

## Knowledge Retention

- Create a centralised repository of asset information, photos and locations accessible to all site workers.
- Build team resilience and optimise procurement decisions.
- Empower workers to share knowledge through the PlantQuest desktop application or field survey tools.

## Navigation & Wayfinding

- Customisable, industry-focused navigation engine.
- Efficient and optimised route planning.
- Turn-by-turn navigation allowing for seamless alarm response and site navigation.

The benefits of incorporating PlantQuest into your operations are numerous and impactful. The platform brings significant time and resource savings, empowering your maintenance and facility teams with efficient tools for work execution. It optimises resource utilisation, helping to save countless hours and thereby increasing your team's output. PlantQuest revolutionises asset and data location, allowing you to locate any asset and its associated data instantly, which contributes to a reduction in maintenance backlog. The system enhances data utilisation by integrating location intelligence into your existing data and systems. Routine tasks like P&ID walk-downs and GEMBA walks can be completed in a fraction of the conventional time, boosting overall efficiency. Additionally, the platform serves as a powerful tool for strategic planning, facilitating the effective planning and scheduling of maintenance, shutdowns, and production operations.

# 4. Integration and Scalability

PlantQuest is designed from an integration-first perspective. This enables our ability to seamlessly integrate with a myriad of systems used within your facility. Designed to be as versatile as it is robust, PlantQuest makes sure that adopting our system doesn't mean sidelining your existing investments, but rather leveraging its data and providing additional insights otherwise not attainable.

## Integration Capabilities

By bringing all this data under one roof, PlantQuest creates a centralised platform that allows for true alignment of information, thereby empowering your workforce to make smarter and more responsive decisions.

**Visual Context:** PlantQuest goes a step further by adding visual context to your existing facility systems. It's one thing to have data; it's another to understand what that data means in the real world. The system reveals crucial insights about asset locations, condition, status, and other important metrics, turning raw data into actionable information.

**Non-Disruptive:** The integration of PlantQuest is designed to have no impact on current qualified systems. This ensures a smooth integration and immediate deployment, without any operational hiccups or procedural overhauls.

**Seamless Metadata Updates:** Any update made to asset metadata in your existing systems can be automatically integrated into PlantQuest, ensuring that your asset management is always up to date.

**Centralised Asset Management:** With PlantQuest, you gain centralised view over all asset, ensuring you can view the latest information for an asset, in one platform, with live links from PlantQuest back to the original source of the data.
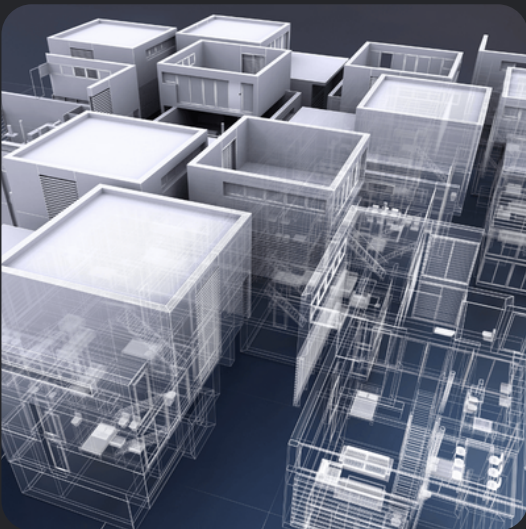


## Scalability

PlantQuest is not just a one-sise-fits-all solution. The platform is designed to grow with your facility and organisation. As you add new systems or evolve existing ones, PlantQuest can easily be scaled to meet those needs, ensuring that it remains a long-term solution for your asset management requirements. Integrating PlantQuest into your existing operational ecosystem not only enhances efficiency but also opens doors to new levels of insights and control. The power of PlantQuest lies not just in what it can do on its own, but also in how it can amplify the capabilities of your existing systems.

# 5. Customer Success

PlantQuest is pioneering revolutionary changes across process-intensive facilities. Leveraging cutting-edge technologies, PlantQuest delivers unparalleled operational improvements and cost savings.

> "The PlantQuest system has become integral to my role"
>
> FACILITIES & PROJECT ENGINEER

# Success 1: Achieving Operational Excellence

## Client Overview

Pharmaceutical giant transforms facility operations with goals of reducing downtime, enhancing efficiency, and optimising task execution.

## The Challenge

Spanning 12 buildings and 4 levels, workers faced difficulties in locating assets resulting in unnecessary downtime and inefficiencies. Furthermore, with countless tasks requiring walkdowns each week, these tasks where not optimised.

## The Solution

PlantQuest's platform was seamlessly deployed with zero impact on the site operations. This allows workers to instantly locate and navigate to assets and shared tacit knowledge from colleagues throughout their facility on both desktop and table.

## Impact

- Reduced journey times by 50%.
- Reduced alarm response by up to 75%.
- Removed the need to escort contractors throughout the site.
- Routine task execution has been transformed, with the average task executed 50% to 70% quicker when using PlantQuest.



# Success 2: PlantQuest & The Global Pharma Leader

## Client Overview

A front runner in global pharmaceuticals, the client runs state-of-the-art manufacturing facilities across the U.S. and Europe.

## The Challenge

Workers across multiple disciplines including maintenance, calibrations, and production faced difficulties in locating mobile assets and equipment. This resulted in costly production delays, time lost in the field when locating assets for maintenance, extended waiting times of production vessels, and under-optimisation of maintenance and calibration equipment.

## The Solution

PlantQuest's Industry 4.0 Mapping Technology was deployed in line with the customer's unique requirements, allowing for the seamless location of all mobile assets whilst providing dynamic alerts and real-time updates.

## Impact

- Removed all wasted time in locating assets and equipment.
- The geo-optimisation of tasks and equipment across the facility allowing for an increase in maintenance output.
- 50% reduction in production vessel wait times after cleaning.
- Increased production of additional batches, equivalent to €860,000/year.



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# 6. ROI Analysis

The following is an analysis of real-world scenarios, and how PlantQuest can demonstrate strong ROI. The analysis aims to highlight how PlantQuest can improve efficiency, and reduce the costs associated with facility maintenance.

## Investment Costs

PlantQuest is offered on an annually recurring license alongside a once-off implementation cost. The recurring license is dependent on the number of users, modules and integrations required, whilst the implementation cost is dependent on facility sise and the assets mapping process. Learn more about this here. The adjacent costs are the average investment costs our customer experience.

**Average Annual Recurring License**

**€25,000**

**Average Implementation**

**€75,000**

## Use Case Example

**Activity:** Weekly Valve Checks

**Carried out By:** Site Maintenance Technician

**Time working on Site:** 2 Years

**Typical Day-Day Activity of Task Executor:** Carries out tasks on assets throughout the facility. Every week they are tasked with executing different tasks, in different parts of the facility.

### Before Using PlantQuest

- Technician receives a list of 40 valves that they must check.
- They haven't done the task in 7 weeks.
- They don't know where each asset is, as the valve ID has no relation to its location. The location field in their CMMS is free text and only partially complete.
- Technician goes into the field inefficiently looking for valves.
- They work their way through their list from top to bottom.
- They continuously double back on themselves wasting hours trying to find some valves.
- Activity takes 12 hours on average.



### Using PlantQuest

- They receive a list of 40 valves
- Load PlantQuest and select the pre-saved workpack.
- They enter their current location.
- Provided with the shortest and optimal route in order to complete the task.
- Made aware of any restricted areas/constraints he will face in accessing assets within the workpack.
- They go from asset to asset following way-finding directions and navigation routes.
- Complete the task in the most efficient manner.
- Activity takes 3 hours on average. **75% quicker!**

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**Financial Impact**

- Time saved per task - 12 hours - 3 hours = **9 hours**
- Total cost of employment per worker of **€70,000/year**
- **Savings per weekly task**: 9 hours * €34/hour = **€304**
- Number of tasks per month: 4 (pressure valve checks) + 10 (similar tasks) = **14 monthly tasks**

| Monthly Savings of **€4,253** | Annual Savings of **€51,046** |
|---|---|

**Initial ROI**
€100,000 / €51,046 =

## 1.96 Years

**Year 3 + ROI**
€25,000 / €51,046 =

## 0.5 Years

When taking into account the cost implications faced due to lost time locating and navigating to alarms and assets as previously outlined on pages 4 & 5: The Financial Toll of Operational Inefficiencies, we can see an even stronger ROI. To recap:

- Asset Location and On-Boarding Costs = €113,064
- Unoptimised Navigation Costs = €54,566
- Total Costs = **€167,630**

**Initial ROI**
€100,000 / €167,630 =

## 0.59 Years

**Year 3 + ROI**
€25,000 / €167,630 =

## 0.15 Years

# 7. Technical Specs and Security

## Certifications and Approvals

Tested and certified by world leading pharma organisations for global deployments, PlantQuest meets the highest standards in data protection. PlantQuest are in the process of working towards ISO 27001 and SOC2 accreditations. Our aim is to provide a secure platform that you can trust for managing all your data needs.

## Our Security Statement

*"At PlantQuest, we recognise the critical nature of security in the digital age. Partnering with some of the world's most security-conscious enterprises, we ensure our software safeguards sensitive data and complies with all legal, industry, and regulatory standards. Our team is devoted to maintaining transparency around our robust security measures."* – PlantQuest CTO

## Technology Stack

PlantQuest operates on a Cloud-based system and leverages a mix of online and offline-capable tablet applications for field use. This ensures access to asset locations and information no matter the environment when being used in the field. These applications are built to enterprise production grade, enabling highly performance execution of our physical world model algorithms.

### Cloud-Based System

The Cloud system is hosted on Amazon Web Services (AWS), incorporating best practices around architecture and security. It serves a dual purpose:

- A data API for the tablet applications and integrations with existing facility systems
- A Web-based User Interface for asset location and data & device management

Supported by an industry-standard cloud security framework, ongoing testing and monitoring of all controls and countermeasures are performed. Each PlantQuest deployment is provided on a single-tenant basis per client, ensuring that data remains isolated and secure, preventing cross-pollination between clients. You can learn more about this here.

# 8. Implementation Plan

PlantQuest is optimised for both green and brownfield deployments, with a typical brownfield deployment lasting 10 weeks. Typically comprised of 5 steps, PlantQuest manages the entire deployment process, requiring very little input from the client.

## Step 1 - Project Scope

- Identify target workflows for optimisation:
  - Maintenance Scheduling & Execution
  - Facility & Asset Management
  - Mobile Asset Tracking
  - Worker On-boarding & Training
  - EHS/ERT
  - IoT, Energy,
  - PTW Visualisation

- Product Customisation

- Facility layout details such as
  - Overall site layout
  - Fire safety drawings
  - BIM (if available)
  - Existing maps
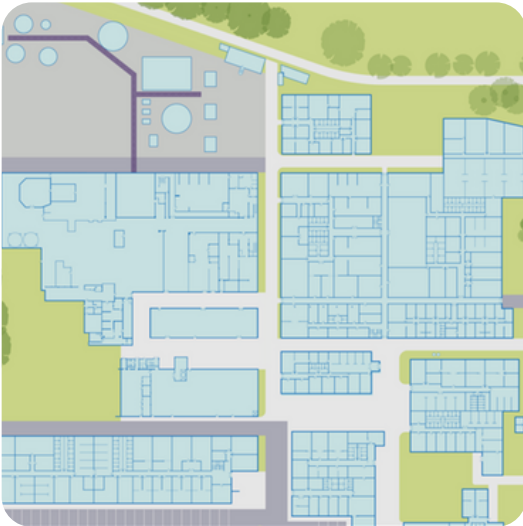
# Step 2 - Map Development

- PlantQuest generates user-friendly, interactive facility maps.
    - Each room/area is clickable and labeled.
- Classifications are assigned to rooms/areas, such as:
    - PTW Required, ATEX Area, Clean Room, Confined Space, Noisy Areas, etc.
- Indoor navigation is enabled with optimised routing options. Facility can define:
    - Priority, one-way, emergency routes etc.

# Step 3 - System Integrations

- PlantQuest adds visual context to existing facility systems, revealing crucial data and insights.
- No impact on current qualified systems ensured.
- Asset metadata updates in the existing system seamlessly integrate with PlantQuest.
- Centralised management of all asset locations using PlantQuest.
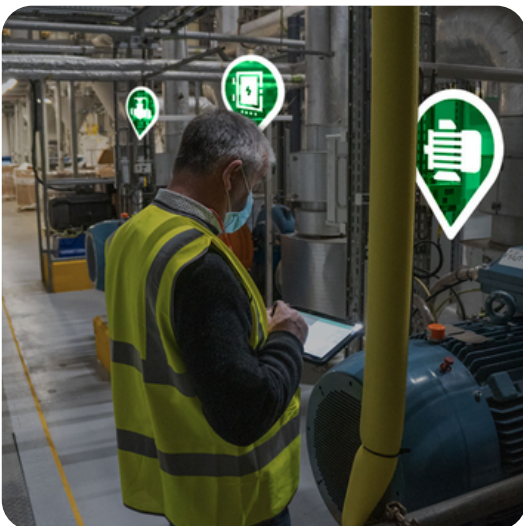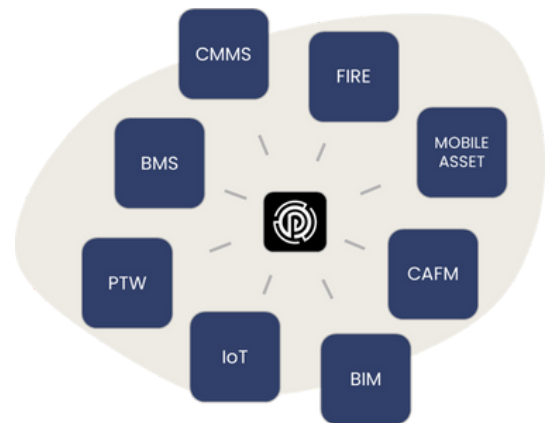


# Step 4 - Locations Logging

- Use existing Fire & Site Layout Drawings
    - PlantQuest map assets prior to deployment, using a suite of internal tools
- Employ PlantQuest Field Survey Tool
    - Log the location of assets in the field. This can be executed by PlantQuest or by the client
- Bulk Data Import
    - Leverage existing your tabular data or BIM model.
- Utilise the PlantQuest Management Portal for post-deployment adjustments.
    - Take control of the system post-deployment allowing you to manage and maintain asset locations.

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## Step 5 - Deployment

- PlantQuest spend 2 days on-site commissioning the system and providing end-user training.
- Comprehensive system turnover packs and dossiers are provided.
- Clients assume control post-deployment, with PlantQuest providing on-site and remote support.
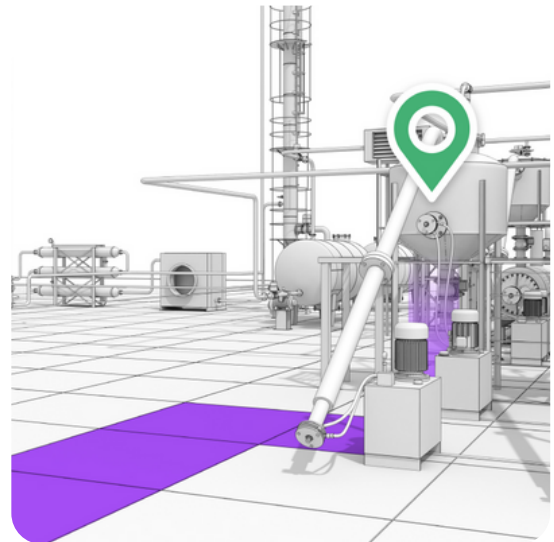
# 9. Conclusion

The evolving landscape of large-scale, process-intensive facilities, such as pharmaceutical, medical device and petrochemical plants, presents a complex set of challenges to operations and maintenance teams. From high staff turnover and time-consuming asset location tasks, to navigational inefficiencies and disparate systems, these challenges significantly impact both operational efficiency and the bottom line. This white paper has clearly illustrated the financial impact of these operational inefficiencies, to the tune of €167,630 per year in time loss alone when locating assets.

PlantQuest's intelligent asset mapping platform emerges as a transformative solution to these challenges outlined above. By digitising facility operations and offering a unified, data-driven platform, PlantQuest not only reduces wasted hours and operational costs but also enhances the quality of decision-making, route optimisation, and overall operational efficiency. These case studies highlights impressive gains—ranging from 50% to 75% reductions in various metrics—that speak volumes about the ROI achievable through our platform. Even on a conservative scale, the payback period for investing in PlantQuest is remarkably short when considering the broad utility of the platform beyond mere routine tasks.

Furthermore, PlantQuest is designed for seamless integration, ensuring that your current systems can be leveraged more efficiently without any disruptive overhaul. Its cloud-based infrastructure, hosted on Amazon Web Services (AWS), ensures a secure and reliable data management environment.

In a world where operational excellence is not just a goal but a defining criterion for competitive survival, PlantQuest offers a vital, scalable, and robust solution. By investing in intelligent asset mapping technology, facilities can turn operational challenges into opportunities for improvement, transforming hidden costs into visible profits and laying the foundation for a smarter, more efficient future.

To learn more about PlantQuest, visit www.plantquest.com, or contact the team at info@plantquest.com

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