

A circular, dark grey robot with a red border is positioned in a brightly lit hospital hallway. The hallway has a polished floor, potted plants, and medical equipment in the background.

Robots in Healthcare

White Paper

How do you keep 10 million sqft of healthcare facilities clean?

This whitepaper revolves around one of FieldBots' biggest customers in the American healthcare sector. This organization is one of the largest operations in the country, generating multiple billions of dollars a year in revenue. For this particular whitepaper we focused on only one of their dozens of hospitals.

The dimensions of this facility in particular are absolutely mind-boggling. Over **10 million square feet**, split into a clinical side operating on a 9-5 schedule and the patient facing side, open 24/7. What are the personnel requirements to keep such a space clean? No less than **1,000 employees** in the EVS department. The majority of companies don't have this many people in their entire workforce, and this healthcare organization has this many just for keeping things clean!

So why does a hospital with such a huge workforce decide to explore the use of robots? Two key reasons, rising costs, and the labor shortage.



Objectives

Inflation, a pandemic and market trends have created a tough labor market for employers. Hospitals are looking outside of the box to find ways to maintain clean facilities without increasing their costs.



Solutions

As you'll see in this whitepaper, this hospital looked into robotics from the very start. They're not looking at it as a way to replace their employees, but as a way to empower them and make them more productive.



Introduction

Healthcare is one of the biggest and most important sectors in the world. The complexity behind even some of the smallest hospitals is jaw-dropping. Many individual pieces come together and work in harmony to allow daily operations to take place. If you take any of those pieces out, no matter its size, it's likely that the whole thing will end up coming to a stop.

Cleanliness is in fewer places more important than in a hospital. The cleaning team, also known as EVS personee (Environmental Services), play a pivotal role. Their job is one of the toughest and that most often goes unseen. Nobody notices their hard work until they stop doing it. They also need to work around the clock trying to disturb medical personnel and patients as little as possible. This is easier in some areas of the hospital than in others, but we will go into further detail later on in the whitepaper.

What's causing the labor shortage and rising costs? The Macro Factors

As we all know, the world was hit hard just a few years ago with the pandemic. This sent ripple effects throughout the whole system that caused a massive inflation that hasn't gone back to it's pre-covid level even 4 years after the fact. Salaries went up, costs of goods went up, and people took that time to pivot into different careers.

Front line workers were hit particularly hard, and were put in a tough spot. This feeling settled in to people joining the workforce, which slowly led people away from pursuing a profession in cleaning and housekeeping. Low salaries and long working hours didn't contribute to bringing in people to fulfill these openings, and the whole country has seen a sharp increase in open postings for all types of these frontline workers.

Conditions have improved considerably since then yet there's still a huge demand for these professional profiles and not enough people to fill them. This has caused salaries to increase to capture and retain talent. This tendency has led to an overall reduction in teamsizes taking on this function, but they're left with a tough situation. They now have to be able to perform the same task with fewer people, so what can hospitals and other companies do to solve this?

Let's dig in.

$$\begin{array}{ccccccc} \text{Employment} & + & \text{Cost of living} & + & \text{Work hours} & = & \text{Hard to find} \\ \text{Growing} & & \text{Increasing} & & \text{Long} & & \text{Employees} \end{array}$$

Situation in the Hospital Pre-pilot



As we've briefly mentioned before, the hospital employs over 1,000 people to keep the entire 10 million square feet clean. Hospitals have incredibly high standards when it comes to cleanliness and there's no room for mistakes, as in some extreme cases, some people's lives depend on it. Even though it wasn't easy to find people to fulfill all of these positions, they were fortunate enough to cover the key positions. So the main challenge was, how do we deal with this growing trend, and help our staff become more productive with their time?

The answer seemed pretty clear. The head of operations of the hospital had the idea of going to one of the largest trade shows in the world covering cleaning, the ISSA in Las Vegas. There he saw all of the up and coming trends in the space, and saw the huge improvements in autonomous cleaning robots. The answer became as clear as day.



Revenue:
\$10 bn per year



Area:
10,000,000 sq ft



Location:
Northwest, USA



Employees:
1,000 EVS



Robotics as a potential Solution?

The hospital initially experimented with several consumer-grade retail robots across multiple brands, hoping to enhance efficiency without compromising operational reliability. However, the robots consistently underperformed; they were unreliable, frequently broke down, and demanded excessive human intervention. Each robot brand required its own app setup, forcing the facility to manage separate environments that didn't integrate. This fragmentation of data led to significant issues, as they couldn't access or analyze fleet performance metrics comprehensively, which hindered their ability to maintain consistent standards.

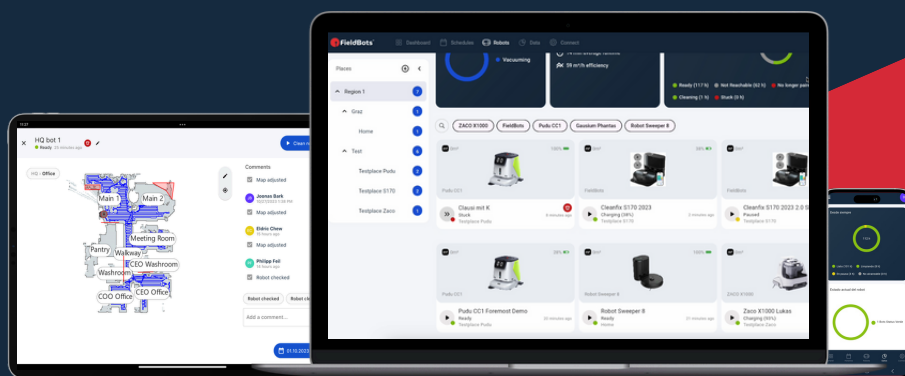
Quote from Head of Operations:

"Consumer-grade robots worked half of the time, and they're not built as sturdy and reliable as some of the commercial robots. Having to use different apps to manage the fleet just complicated operations and made it almost impossible to scale."

While these robots didn't quite work in the beginning, the results when they did work correctly were promising. They took the time to reach out to us at FieldBots and have open discussion with us about their current situation and what they wanted to achieve.

There were 2 different problems that needed to be tackled, being the hardware and the software. The software side was the first to be dealt with, as it was the easiest one to be solved.

FieldBots provided the solution to this first challenge with FieldBots OS, the platform that allows them to manage all their robots from a single dashboard, regardless of brand, which eliminated redundancy and centralizing all data in one place. With all their operational and maintenance data stored securely in the European part of the **Microsoft Azure cloud** they could finally leverage a unified, secure, and reliable system. This integration eliminated the need to reconfigure settings each time a new robot was added to the fleet, saving considerable time and reducing operational friction. Later this year FieldBots will provide a dedicated US version to ensure the data location for its North American customers is in the US.



Tailoring the Pilot

Quote from Head of Operations:

"We have over 10 million square feet of installations in this city alone! That's a lot of manpower that we need to keep it clean.

Robots were the obvious next step to empower our team. Not using them would be like refusing to use electricity or running across the country rather than taking a flight."

The pilot involved deploying **12 Cleanfix Navi S170s** and later on adding a **Zaco X1000**, tailored for specific areas within the hospital's vast facility of combined patient-facing and clinical sections. Each section required flexible scheduling to avoid disrupting staff and patient activities, as the patient-facing areas operated 24/7, while clinical sections adhered to a standard 9-to-5 schedule. FieldBot OS' scheduling features allowed them to precisely time robot deployment, ensuring minimal disturbance.

Now let's talk about **Hardware**



We sat down with them and carefully reviewed all the hardware requirements for this particular case. They didn't need nor want big heavy machines, and as they wanted to test out the concept to see if it was right for them, they didn't want a huge initial setup cost. Our team at FieldBots proposed the Cleanfix S170 Navi because of its reduced size and price, and its powerful capabilities. This would make it perfect to navigate around obstacles and under most furniture.

Hallways were another concern for the hospital, as there are so many of them and amount to massive square footage. Some of the floors were also carpeted, which meant we needed to pick something else with some extra suction power. For this reason we decided on the Zaco X1000. The Zaco delivers over 6-times as much suction power as most conventional vacuum robots, and is capable of covering up to 10,000 sq ft (930 m²) per run! It also has a very reasonable price (prices vary on the region and number of units).



Cleanfix Navi S170:

This robot, equipped with advanced navigation and high-efficiency sweeper capabilities, enabled thorough cleaning of carpeted areas and intricate spaces, including around and beneath furniture. The Navi is categorized as a microbot for two reasons, the size and the price. The S170 is a fantastic entry point for any organization looking to automate part of their work. The S170 boasts a 3,000 Pa. suction power, and is capable of covering up to 3000 sq ft (270 m²) per run.

Zaco X1000:

With superior vacuum power and obstacle detection, the Zaco X1000 was specifically tested for its ability to handle large, open corridors and withstand high foot traffic without compromising performance. The Zaco is one of the best performers in its price bracket, and offering more advanced features, like a 6 hour battery and 20,000 Pa suction power, making it ideal for any carpeted surfaces. It also has AI baked in, allowing it to navigate seamlessly around potential obstacles without a hiccup.



What about the ROI?

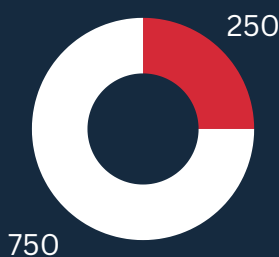
As we previously mentioned, cost was one of the key concerns for our client. They wanted to make sure that their new setup was going to have a positive ROI for them. The hospital was interested in finding a solution that they could scale up to all of their facilities, but if the numbers didn't make sense for a single hospital, how could you even consider scaling it to the rest? So, how does one calculate ROI for a case as complex as this? Here's the simplified version of what we did to help them figure it out.

The main source of costs are, understandably, hourly wages. To determine this ROI we need to understand how much time an employee spends vacuuming, as that could completely be automated. That's not to say that there are better and worse places to place robots, as smaller rooms with a lot of obstacles won't be cleaned nearly as fast by a robot as by a person with a handheld vacuum, which can lead to a lower return.

We took the **ISSA standard for vacuuming, at 0.012 minutes per square foot, which roughly translates to 5,000 square feet per hour.** Now we need to keep in mind that this facility in particular had over 10,000,000 square feet that needed to be vacuumed almost daily. Vacuuming the entire space would cost an eye-watering **\$20,000 each time!** That's roughly 2,000 hours of manpower at a minimum wage of \$10/hr.

If vacuuming is so time intensive for employees, and can be easily automated and done by robots, why not do just that? Automation is a force multiplier, and it allows your team to do the higher touch activities, while the monotonous and strenuous task of vacuuming is delegated to robots.

- Number of employees vacuuming full-time
- Number of employees performing other types of cleaning



What a person can vacuum in an hour

0.012 min / sq ft roughly = 5,000 sq ft / hour

How long it would take to vacuum the whole space

$$\frac{10,000,000 \text{ sq ft (entire facility)}}{5,000 \text{ sq ft / hour}} = 2,000 \text{ hours}$$

What it costs to vacuum this space (at minimum wage)

2,000 hours * \$10/hr = **\$20,000 - Each time!!**

Switching to a combined fleet of Cleanfix S170s and Zaco X1000s under FieldBots OS' centralized management has brought down operational redundancies, further reducing time and costs associated with maintenance and setup across various apps. This streamlining has proven pivotal in maintaining operational consistency across the hospital's expansive, round-the-clock facility.

How do we use the data?



Before, when they were using multiple robots from different brands without a unified management system, they would rely on things "just working". Unfortunately, more often than not, robots would get stuck, or have some sort of problem that wouldn't allow them to finish their planned sections. With FieldBots OS it's easy to see exactly where a robot has been and where it might have had trouble. If it's a region that tends to get the robot stuck, you can simply create a no-go zone over it to avoid the robot having the same problem in future runs. Once you determine what has happened, you can have the robot pick up where it left off.

This might sound easy enough, but if you have multiple robots, and need to check different apps for this data, it becomes quite the headache, in some cases even impossible because the apps don't allow it.

Another one of the standout benefits of FieldBots OS platform is its ability to harness real-time data across all robot models for predictive maintenance and operational insights. With all robot data consolidated, the facility could access information on operational uptime, usage patterns, and maintenance needs for the Cleanfix Navi S170 and Zaco X1000 models. This allowed the cleaning management team to perform maintenance before issues even happened, minimizing downtime and optimizing fleet performance.

Now, with FieldBots, data-driven alerts on everything from battery health to dustbin levels, have helped maintain consistent performance and extended the robots' lifespan.

But can we scale it?



By eliminating vendor lock-in, FieldBots provides unmatched flexibility for the hospital's future growth. In previous setups, each new robot brand demanded its own software, creating silos of data and operational inefficiencies. FieldBots' unified platform enabled the hospital to use any brand or model they chose—whether the 12 Cleanfix Navi S170s, the later addition of the Zaco X1000, or any future upgrades—without having to overhaul their operational environment or reconfigure multiple systems.

This flexibility has paved the way for the hospital's planned expansion, which involves rolling out nearly 200 more robots across its facilities. FieldBots ensures that as the fleet grows, the setup and integration process remains seamless, with all data and performance analytics housed in a single, accessible location.

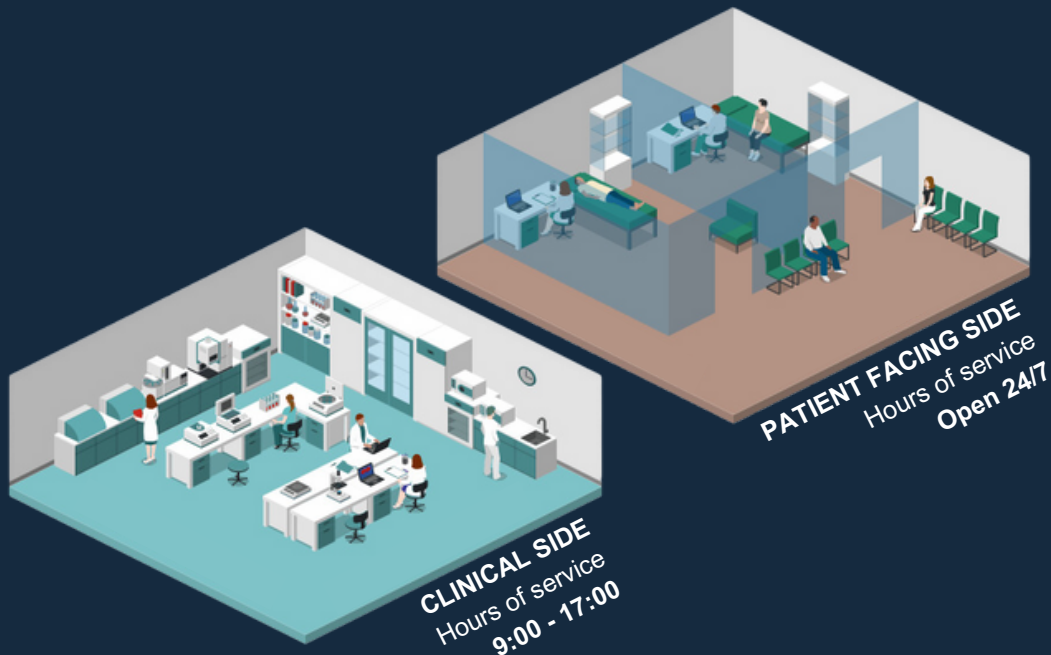
Quote from Head of Operations:

"It was a slow process from our side. There's a lot of stakeholders when taking on such a project, but with the support from the FieldBots team we were able to navigate all the obstacles, and we're now on track to automating a large part of our cleaning efforts."

Adapting to the environment



FieldBots' platform allowed the hospital to effectively schedule robots for cleaning without disrupting patients or staff. The scheduling was critical, as the hospital was divided into two sections: a patient-facing side, operating 24/7, and a clinical side with standard 9-to-5 hours. FieldBots' flexible scheduling feature accommodated this division, ensuring that robots cleaned during off-peak hours, minimizing interference.



Using FieldBots, the facility could schedule cleaning with pinpoint precision, further aided by the platform's ability to adjust in real-time as needs evolved. This level of control and flexibility improved the cleaning team's ability to maintain a spotless environment while prioritizing the comfort of patients and healthcare staff.



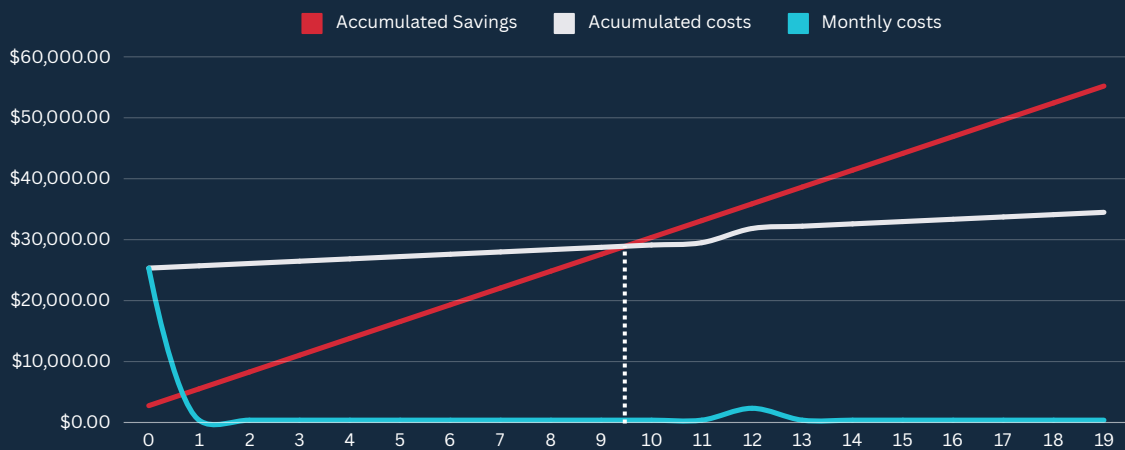
Best-in-class cybersecurity

In the healthcare environment, data security is critical. **FieldBots' EU- and U.S.-based servers** ensure that sensitive operational data, including maps, robot performance metrics and operational schedules, are securely stored and compliant with data protection standards. This secure infrastructure allows customers like the hospital to track robot performance, generate insightful analytics, and confidently scale the fleet without data vulnerability risks.

With previous systems, data was dispersed across multiple apps without centralized monitoring. The FieldBots platform unified all data, creating one reliable source for analytics and enhancing the hospital's ability to monitor its operational environment comprehensively.

Results and executive summary

After the month-long pilot the results were conclusive. The combination of the 12 Cleanfix S170s, the Zaco X1000 and FieldBots OS to manage them worked like a charm. When we take into account each of the robots' prices, the cost of the yearly license of FieldBots OS we recover our investment in 8.92 months, roughly 271 days. We also need to keep in mind that this return takes a bit longer because you need to factor in the initial cost of purchasing the robot. After that, it's easy to see just how profitable this investment will be, with only the licenses and the replacement parts as a cost.



In the previous chart you can see that in 10 months you've recovered your investment. We've also added an approximate amount of \$350 a year in replacements per robot, and we've included the yearly licenses of these robots in month 13 (the start of the next year). The most important line to pay attention to is the light blue one. It represents the monthly costs for the hospital, and as you can see, it falls to a bare minimum level after the first initial investment.

In conclusion, the pilot program was so successful that they've put in an order for an additional 200 units to be deployed across the whole facility. Managing these large numbers of robots wouldn't be possible without the help of FieldBots OS' central dashboard and easy-to-use interface.

Quote from Head of Operations:

"It's only a matter of time until we deploy FieldBots nationwide."

Wonder what it may look like for your company?

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