ELEVATE TECH

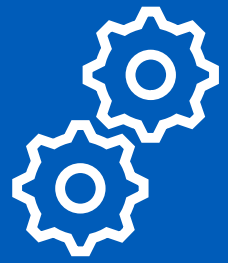
INTRODUCTION

REMOTE MONITORING & PREDICTIVE MAINTENANCE

APRIL 2024

WHAT WE DO

We specialize in innovative predictive maintenance solutions that **utilize IoT sensors, real-time data, and advanced AI / ML models**. Our platform delivers valuable insights that help organizations reduce downtime, improve equipment performance, and optimize maintenance practices.



Actionable insights

We provide customers with insights and tools to prevent breakdowns, reduce costs and increase operational and maintenance efficiency.

Low barrier to entry

We offer customised quotations for your tailored requirements

Tangible benefits

The result is lower operating costs, fewer breakdowns, less disruption to operations and improved operational efficiency.

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TRACK RECORD

20% to 50% breakdown reduction achieved

3,000+ equipment faults and breakdowns detected

Extensive Database

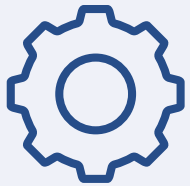
- 2,000Tb of operational data
- 200Tb of fault data

L&E and Industry 4.0 analytics: 5,000+ assets

TYPES OF LIFTS MONITORED BY ELEVATE TECH

Type of Lift	Type of Door
Passenger	Centre opening
High speed (3m/s to 9m/s)	Side opening
Goods	Up sliding
Double deck	Bi-parting
Hydraulic	Through opening
	Double deck

THE INDUSTRY'S CHALLENGES



Frequent breakdowns, low availability

- Lack of skilled technicians
- Technology not being used
- Poor replacement parts inventory management

Outdated maintenance processes

- Unoptimised maintenance management and deployment of manpower
- Lack of fault and performance data analysis

High operating costs

- Costly repairs and parts replacement
- High electricity usage

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WHY ELEVATE TECH?

1. Reduce breakdowns

- Advanced algorithms and machine learning detect faults 24/7
- Take action **before breakdowns occur**

2. Reduce costs

- Fewer breakdowns result in lower maintenance and parts replacement costs
- Replace parts at the optimal time based on their actual condition
- **Reduce energy costs** through optimised settings

3. Fewer operational disruptions

- Less management time spent on lift issues
- **Fewer unscheduled visits** from lift contractors as issues can be rectified during scheduled maintenance
- Avoid congestion and crowding caused by lift breakdowns

4. Improve safety record

- Fewer breakdowns means fewer incidents
- Live alerts reduce response time during man trap situations
- High tenant satisfaction & good safety record

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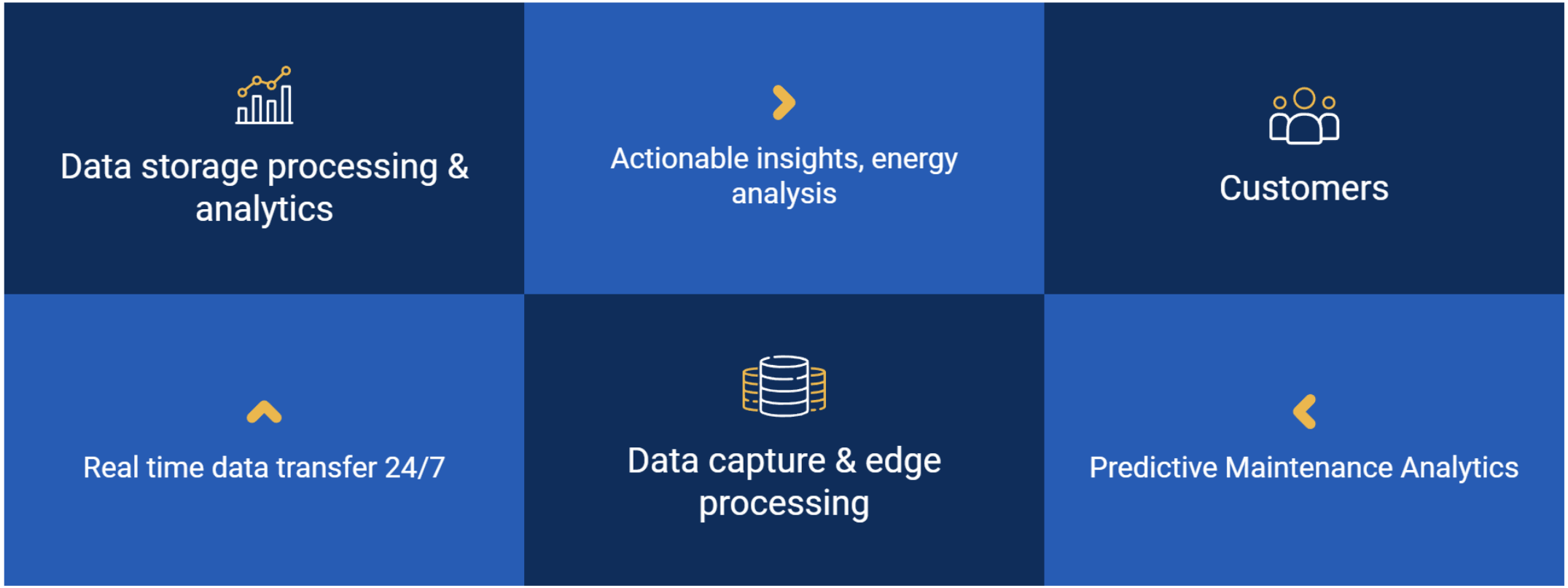
OUR PLATFORM



Entire architecture is hosted on Microsoft's Azure platform and all data transfer is securely transferred over SSH.

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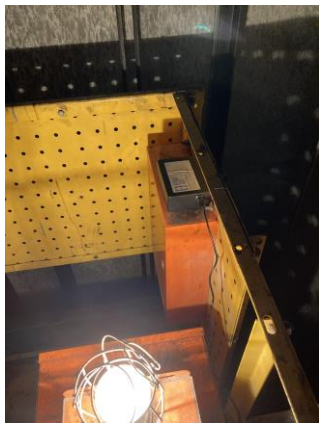
QUICK AND SCALABLE IoT SENSOR SOLUTION

- **Fast and easy installation:** Single car top sensor which only requires power from the car top
- **Non-intrusive**: Does not interfere with the lift controller
- **Minimal hardware:** Allows for rapid deployment
- **Works with any lift**



ADVANCED ALGORITHMS & MACHINE LEARNING

- **Continuous monitoring:** Sensors relay data 24/7 via 3G/4G
- **Data securely stored** on Azure
- **Edge executed algorithms** enable real time processing and alerts
- **Machine learning** on the cloud platform
- **Insights rather than data:** ET provides actionable insights. The customer does not need to interpret lift data
- **Predictive maintenance:** Performance based maintenance based on fault detection and utilisation based maintenance based on utilisation data
- **Energy optimisation:** Calculated from actual utilisation patterns

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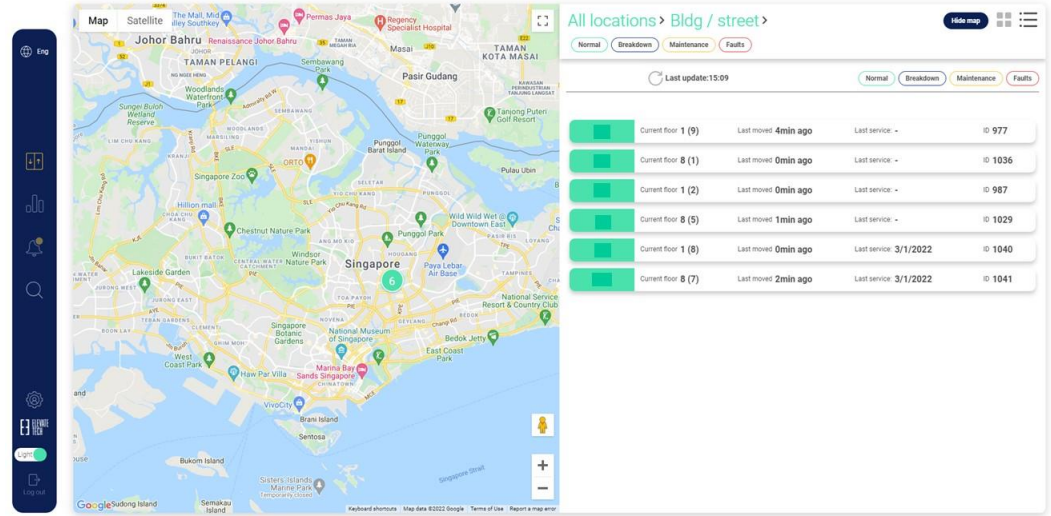
MONITORING AND STATUS ALERTS

IoT sensors installed on lift car tops provide continuous monitoring of lift status and faults

- **Fast and easy installation:** Single car top sensor which only requires power from the car top. 1 minute installation
- **Non-intrusive:** Does not interfere with the lift controller
- **Minimal hardware:** Allows for rapid deployment
- **Continuous monitoring:** Sensors relay data 24/7 via 3G/4G
- Works with any traction lift
- Dashboard visualisation of lift status



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FAULT IDENTIFICATION AND PREDICTIVE MAINTENANCE

Actionable insights to reduce breakdowns

- AI, ML models and algorithms detect faults and anomalies so that pro-active measures can be taken to prevent breakdowns
- Utilisation metrics such as number of trips, distance travelled and door usage are continuously recorded
- We provide customers with insights, so that action can be taken to prevent breakdowns
- Optimise maintenance and parts replacement programs with exact data on faults and parts usage
- Optimise parts inventory management to ensure spare parts are always available but without holding unnecessary stock

Lift system and their sub-system	Elevate Tech
1. Traction Machine	✓
2. Brakes	✓
3. Suspension Means	✓
4. Guide system (i.e. guide rail and guide shoes or rollers)	✓
5. Car and Landing Doors (including door protective devices)	✓
6. Levelling Devices	✓
7. Fault Diagnosis including the following components: a) Overspeed Governor b) Safety Gear c) Controller and Inverter Drive d) Buffer e) Compensation System	✓

WORKFLOW MANAGEMENT DASHBOARD AND MOBILE APP

Workflow management tools designed specifically for the vertical transportation industry, paired with AI and analytics from Elevate Tech's sensor platform

Workflow Management Dashboard

- Job creation and technician's calendar optimisation
- Maintenance schedule optimisation
- Breakdown job assignment optimisation
- Lift fault history and maintenance records
- Team and technician KPI tracking

Technician Mobile Application

- Job alerts
- Elevate Tech AI points technicians towards faults
- Record maintenance outcomes
- Access lift fault history and maintenance records

LIFT AND MAINTENANCE PERFORMANCE TRACKING

Analysis of lift and maintenance performance trends which allows management to make well informed business and operational decisions

Breakdown Trends

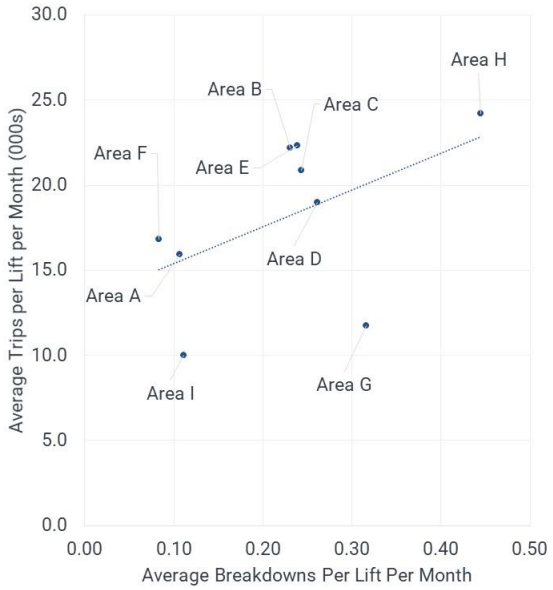
Understand breakdown trends and their corresponding factors, such as weather, type of lift, utilisation, number of landings and other factors.

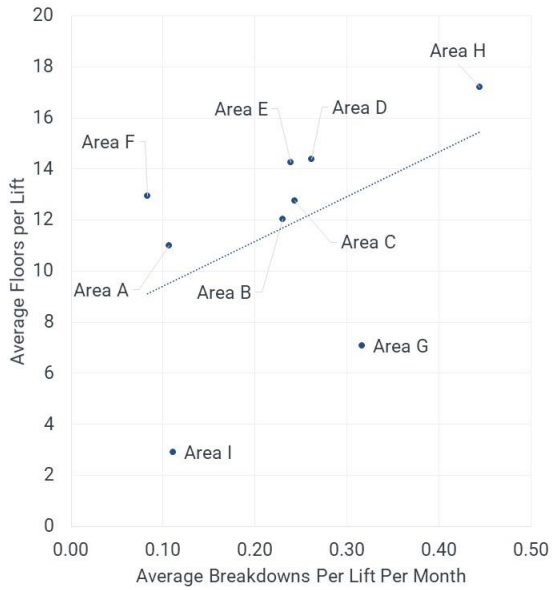
Lift by Lift Trends

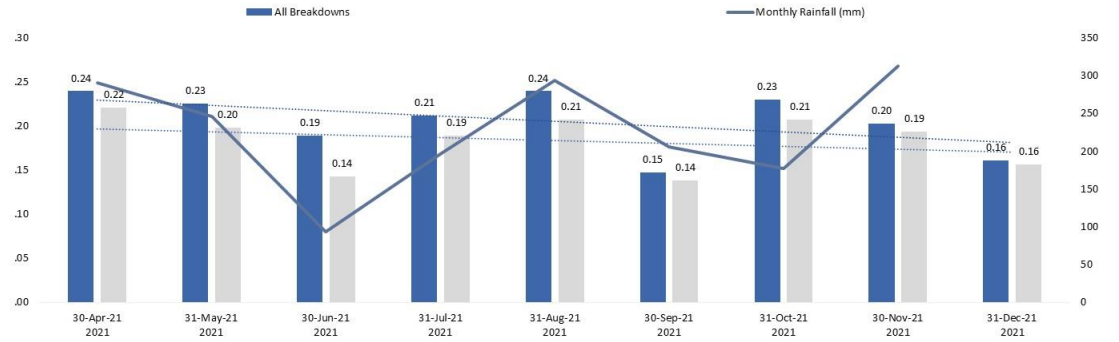
Gain insights into fault trends on troublesome lifts and how to rectify the issues.

Maintenance Performance Tracking and Trends

Understand the frequency, duration and activity of maintenance teams during each monthly maintenance visit and if such activity is correlated to lift performance.





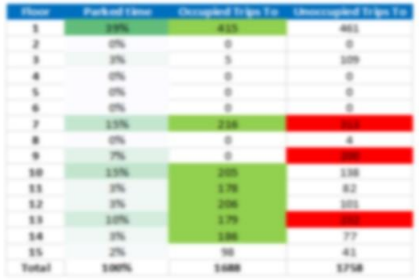


ENERGY USAGE AND WAIT TIME OPTIMISATION

Reduce energy usage and /or reduce wait time

- We analyse lift usage patterns and recommend settings that reduce energy usage and / or wait time
- The analysis will be ongoing to take into account the change in lift usage patterns over time (for example, relaxation of work from home requirements in 2022 would cause a shift in lift usage patterns)
- Up to 10-20% reduction in lift energy usage is typically achievable

CURRENT SETTINGS (PL1-4)



Floor	Parked Time	Occupied Trips To	Unoccupied Trips To
1	19%	415	461
2	0%	0	0
3	3%	5	109
4	0%	0	0
5	0%	0	0
6	0%	0	0
7	13%	236	310
8	0%	0	4
9	7%	0	300
10	15%	255	130
11	3%	178	82
12	3%	206	101
13	10%	179	310
14	3%	186	77
15	2%	90	41
Total	100%	1688	1758

- **Current lift settings:**
  - **12am to 5am:** 4 lifts parked on Floor 1
  - **5am onwards:** 1 lift parked on each of Floor 1, 7, 10 and 13 (most time spent on these floors), but sometimes lifts return to Floor 3, 9, 11, 12, 14 and 15 also.
- **Current lift usage pattern (based on 27&28 Sep 2021):**
  - **Most occupied trips to:** Floor 1, 7, 10, 11, 12, 13 , 14 and 15
  - **Least occupied trips to:** Floor 3 and 9
- **Estimated energy usage per annum (based on Aug 2021):**
  - S$13k and electricity meter readings
  - Current lift usage remains low and could double during non-Covid conditions

PROPOSED SETTINGS AND FORECAST IMPACT (PL1-4)

	Current Setting (based on 27&28 Sep 2021)	No Return Floor	At least 1 lift at F1	At least 2 lifts at F1	1 lift at F1, F7, F10, F13
Occupied Trips	1,688	1,688	1,688	1,688	1,688
Unoccupied Trips	1,758	854	906	999	1,728
Total Trips	**3,446**	**2,542**	**2,594**	**2,687**	**3,416**
Estimated Average Waiting Time (s)	**3.3**	**6.9**	**6.0**	**5.9**	**3.2**
% Difference		+111%	+82%	+79%	-3%
Estimated Energy Cost					
Annual Total (S$)	**12,801**	**9,441**	**9,637**	**10,047**	**11,533**
Difference (S$)		-3,360	-3,163	-2,753	-1,267
% Difference		-26%	-25%	-22%	-10%

Notes:
1. Energy cost savings expected to be larger under normal operating conditions (i.e. Non-Covid)
2. Electricity tariff is assumed to be 0.2338 S$/kWh, exclusive of GST, based on the data from Energy Market Authority.

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CASE STUDIES

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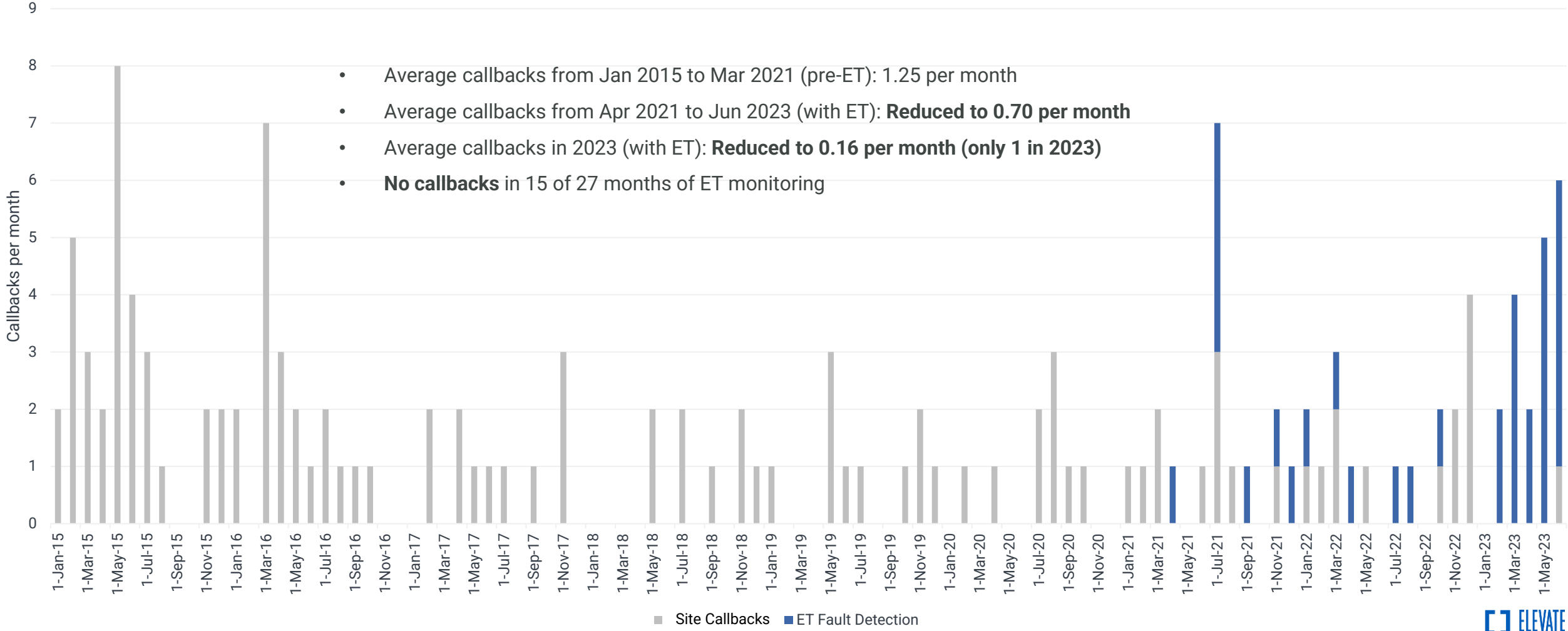
CASE STUDY 1 – SITE A (2015 TO 2023)

Callbacks for ET Monitored Lifts Reduced by 45%



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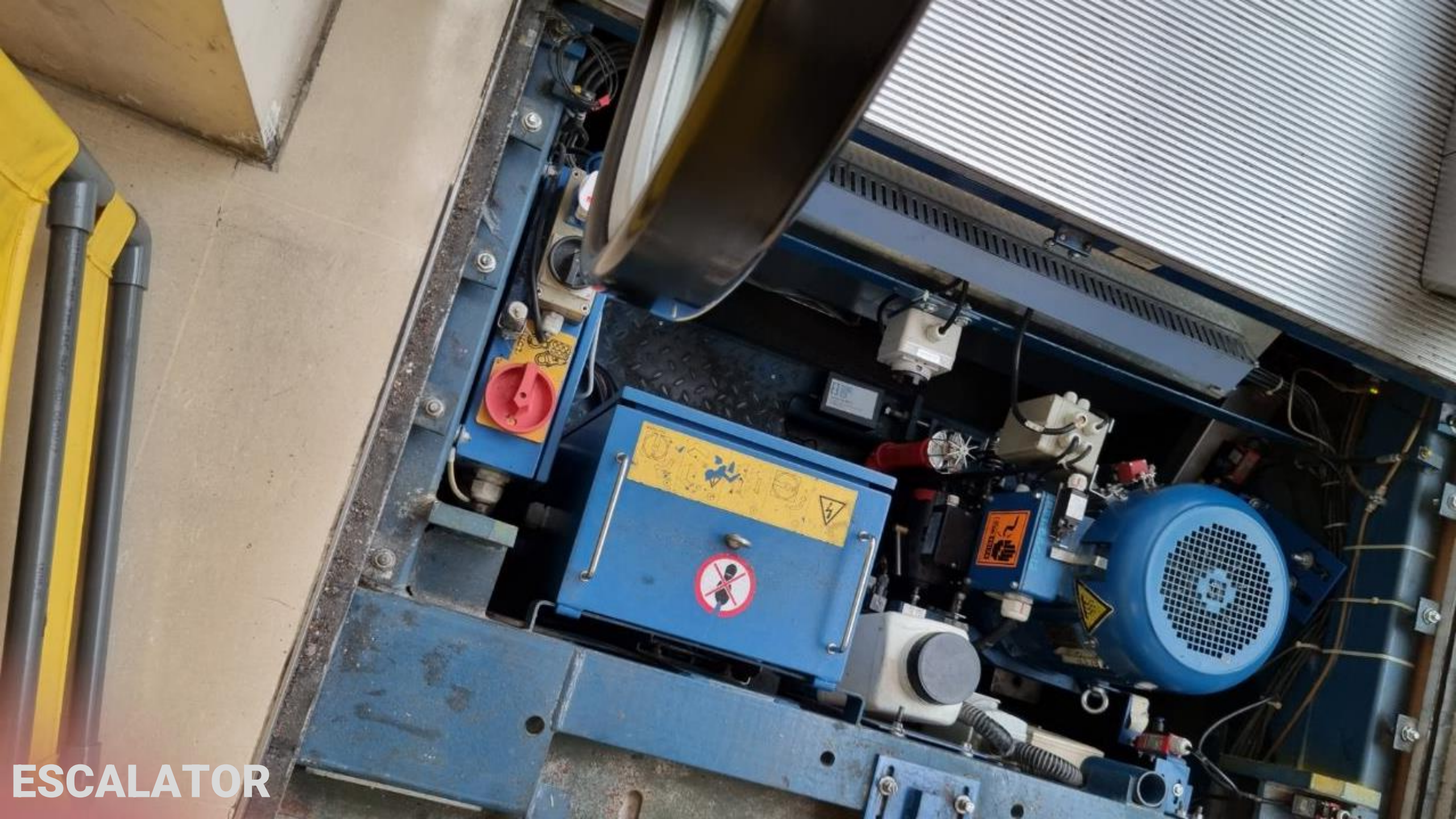
Sensor ID #759
LIFT


ESCALATOR

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