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Smart Scheduling
Proof of Value Summary

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Prepared by asBuilt Digital Ltd

08 April 2025

Smart Scheduling PoV Overview

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Executive Summary

This study report highlights the development, implementation, and outcomes of the Smart Scheduling Proof of Value (PoV) for Northampton highway maintenance operations.

The initiative focuses on using AI-driven simulation solution to enhance job scheduling, optimize resource allocation, and improve operational efficiency.

Smart Scheduling demonstrates the potential to streamline tasks, increase productivity, and reduce costs by leveraging real-time data and advanced algorithms.

Objectives

Reduce Scheduling Time

Minimise Travel Distance & CO_2 Emissions

Optimise Resource Allocation

Enhance Job Completion Accuracy

Key Features of Smart Scheduling Web App

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Smart Scheduling

The home screen consisting of current job information and insights, the interactive map and data visualisation, and the final schedule parameters before the AI Generates the final schedule.

Digital Gang Calendar

The Gang Calendar is used to set the availability of each gang, allowing the AI to only schedule gangs that have availability.

Gang Profile Settings

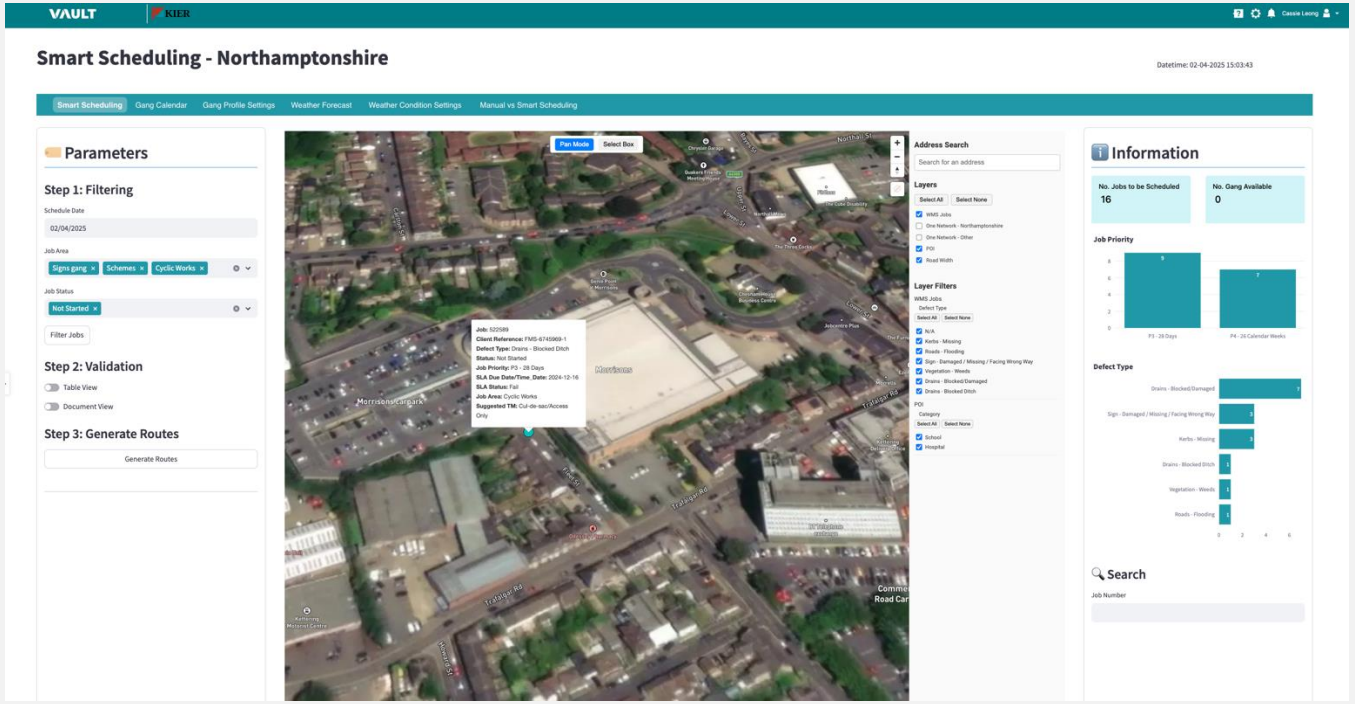
Gang Profile Settings allows the user to set each gangs general information, areas, capabilities, and performance rating.

Visualisation

View all available jobs in Table View, Document View, or Timeline View, letting users choose the format that suits them best.

Insights Overview

Gain insights from available jobs to understand the quantity and severity of each category.



Interactive Map

The home screen consisting of current job information, the map view, and the final schedule parameters before the AI Generate.

Search Tool

The search tool allows the user to compare historic manual schedules to the AI generated smart scheduling route for the same day.

Weather Forecast

7 day lookahead used by the AI to ensure jobs are not scheduled on dates where the weather condition settings do not allow for work to be undertaken.

Weather Condition Settings

The weather condition settings allow the users to dictate environmental thresholds, i.e. Pothole Repairs can not be scheduled when the temperature is less than -5 C.

Manual vs. Smart Scheduling Review Tool

The review tool allows the user to compare historic manual schedules to the AI generated smart scheduling route for the same day.

How Smart Scheduling “Thinks”

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Filtering

- Status
- Gang Availability
- Weather
- Planned Work

Assignment

- Gang’s Profile & Competency
- Completion Time Prediction

Ranking

- SLA Due Dates
- Job Priority {Sequence}

Matching

- Nearby Search
- Assigned Gang
- Work Hour
- Material

Smart Scheduling Journey

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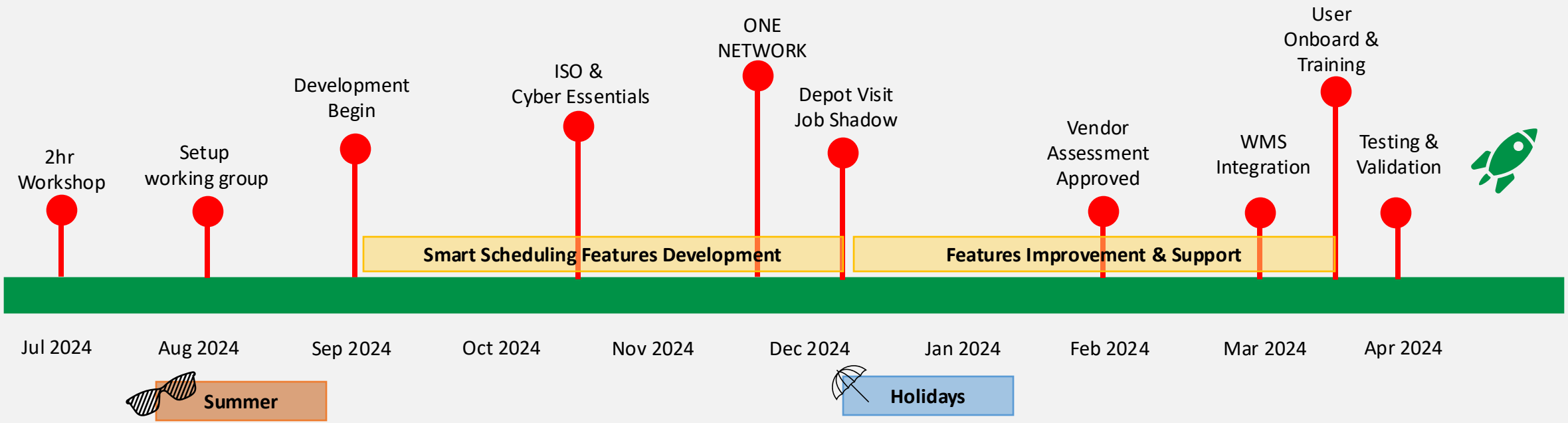
Timeline: Sep 2024 to Dec 2024 with extension



Smart Scheduling Testing Approach

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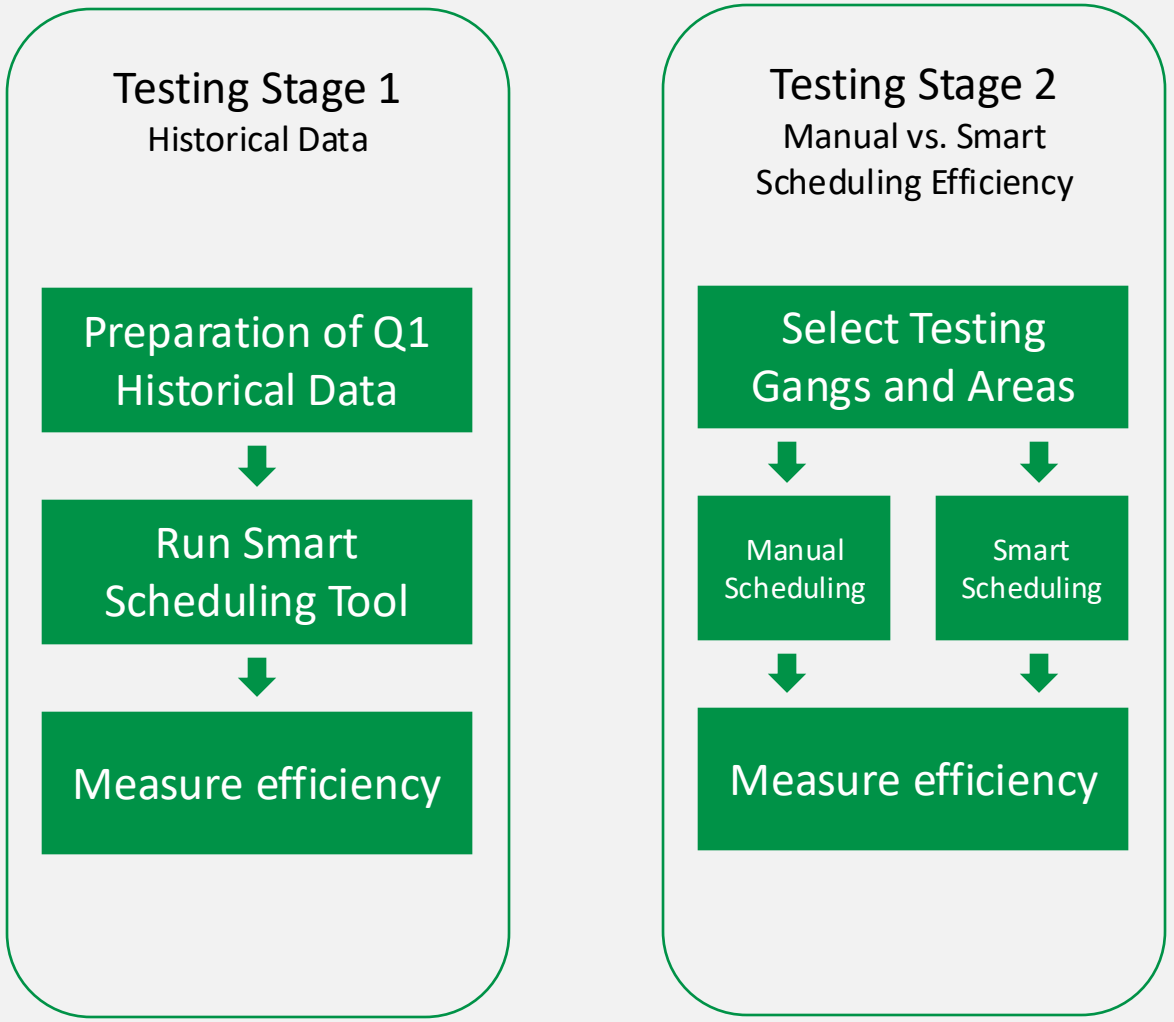

Study Findings

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% of Excess Travel Time	Avg Distance /Day Reduced by	Avg Travel Time Saved Per Area	Fuel Cost Savings	CO2 Emission Reduced by	Labour Cost Saved	In Office Scheduling Productivity
12.93%	**157.23 km**	**10.88 hrs**	**£ 1,465**	**2,844 kg**	**£43,750**	**90%**

Metric	Manual / Current	Smart Scheduling	Difference
Overall Travel Time for > 4 Jobs	2,180 hrs	1930 hrs	250 hrs
Overall Travel Distance	111,991 km	97,840 km	14,151 km
Avg Travel Distance per Job	11.03 km	9.64 km	1.39 km
Overall Fuel Consumption	8,400 L	7,338 L	1062 L
Overall CO2 Emission in Kg	22,508 Kg	19,664 Kg	2,844 Kg
Scheduling Processing Time	20 mins (avg)	2 mins (avg)	10x Faster

*fuel_consumption_per_100km = 7.5 # L/100km | Average Petrol Price = 1.38 # $ per litre | CO2 Factor = 2.68 | Labour Cost = £35 | No. Gang per Day = 5 | No. Crew in a Gang = 2 | Testing Period = 1/1/2025 – 31/3/2025

Smart Scheduling Proven Benefits

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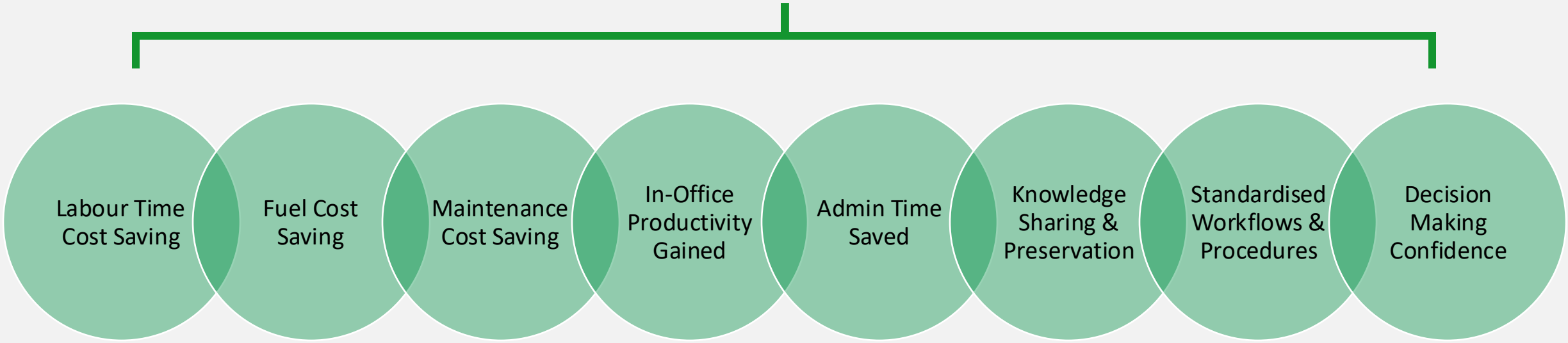

Challenges & Lesson Learned

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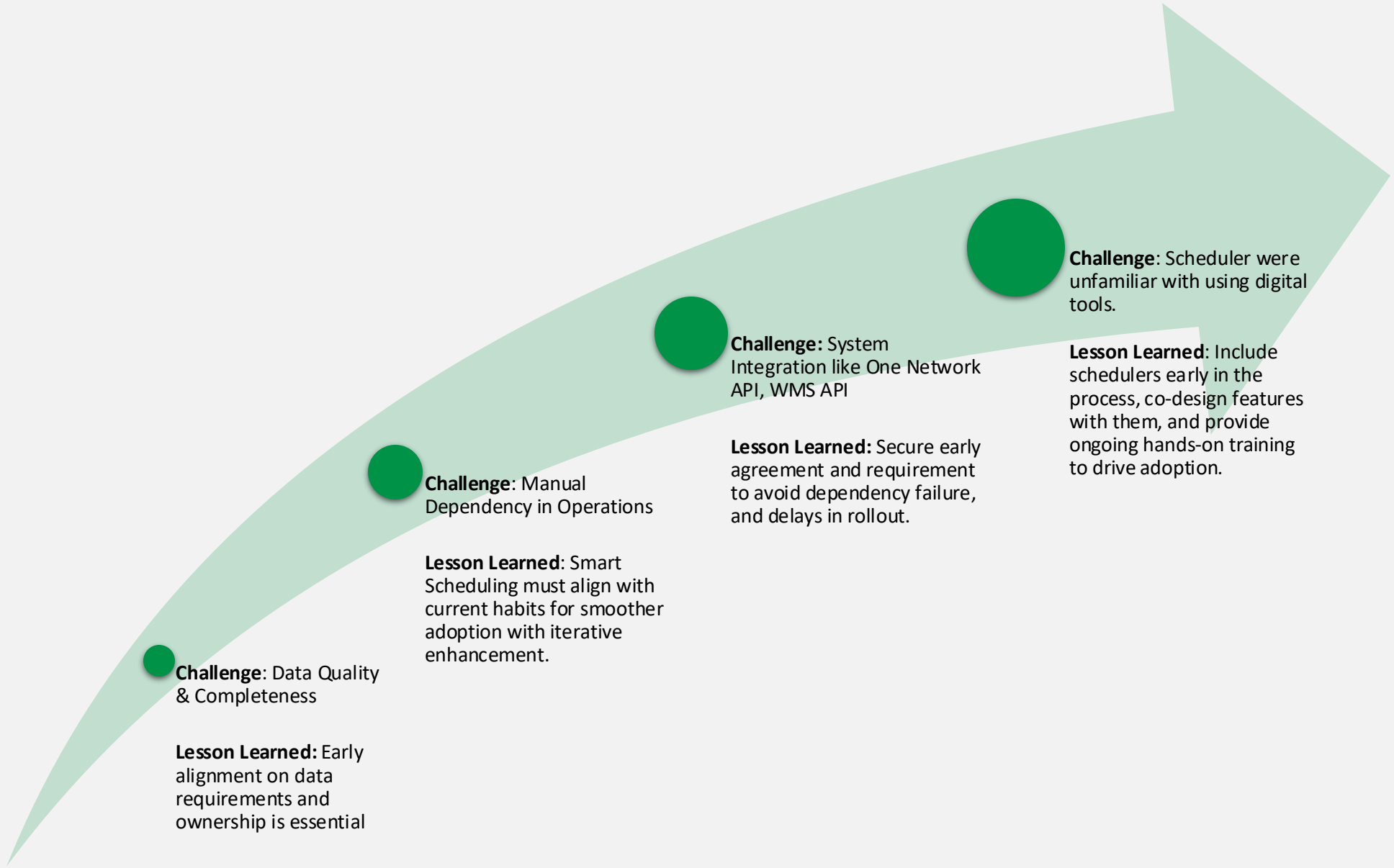


Challenge: Data Quality & Completeness

Lesson Learned: Early alignment on data requirements and ownership is essential

Challenge: Manual Dependency in Operations

Lesson Learned: Smart Scheduling must align with current habits for smoother adoption with iterative enhancement.

Challenge: System Integration like One Network API, WMS API

Lesson Learned: Secure early agreement and requirement to avoid dependency failure, and delays in rollout.

Challenge: Scheduler were unfamiliar with using digital tools.

Lesson Learned: Include schedulers early in the process, co-design features with them, and provide ongoing hands-on training to drive adoption.

Next Steps

Smart Scheduling Part II

WMS Integration

- Automate schedule transfer between WMS and Smart Scheduling.

AI Generated Traffic Management Plans

- Automatically generate Traffic Management Plans.

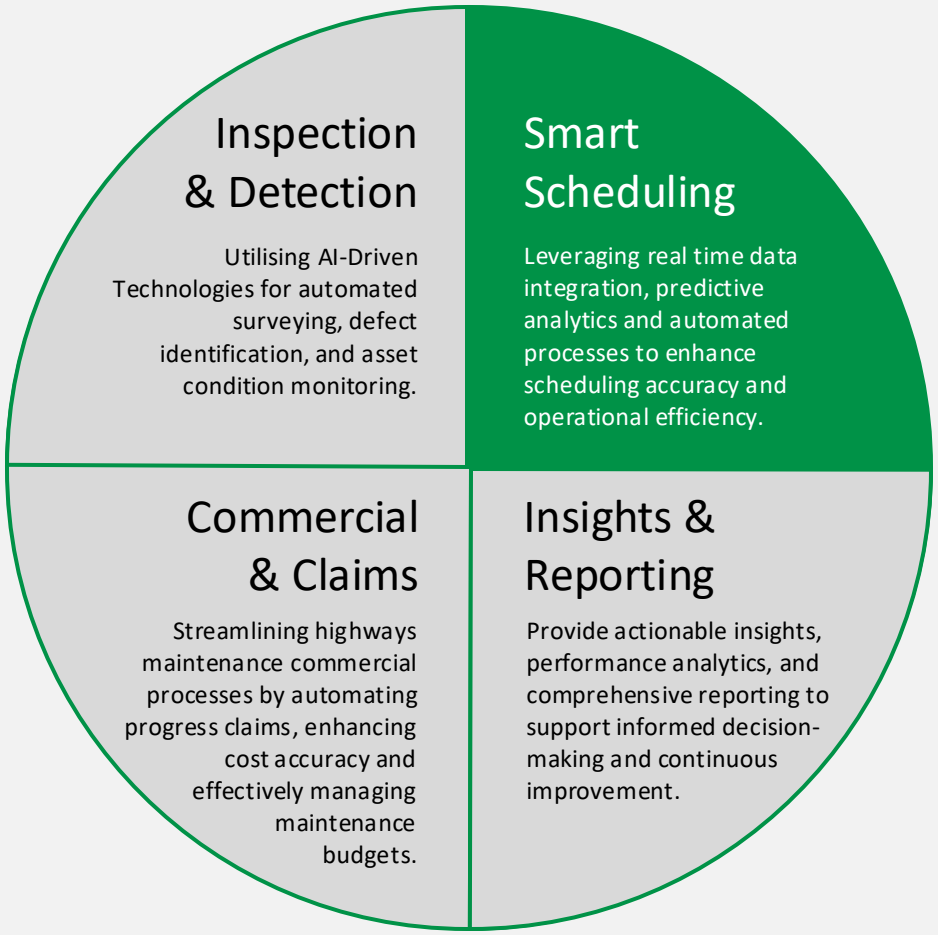
Paperwork Digitization / Automation

- Automatically generate required forms to optimise existing business functions.

Open Roadworks Data API

- Continuous retrieval and visualisation of real time roadworks data from Street Manager.

HIGHWAYS INTELLIGENCE CAPABILITY



Appendix

Smart Scheduling

Test Plan Stage 1 – Historical Data

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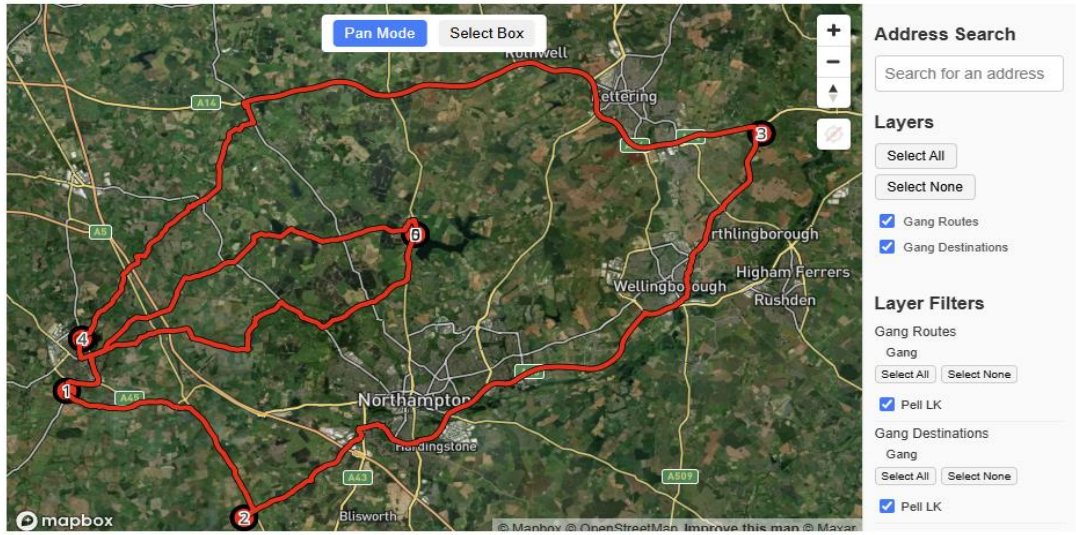
Manual VS. Smart Scheduling

Pell LK

Compute Travel Time	Travel Distance	CO^2 Emission	Petrol Cost
2.66 hrs Total Field Time 0.0 hrs	163.86 km	32.93 kg	£14.75

Job Sequence

1	2	3	4
IRR-532170	IRR-532175	IRR-532186	IRR-532198

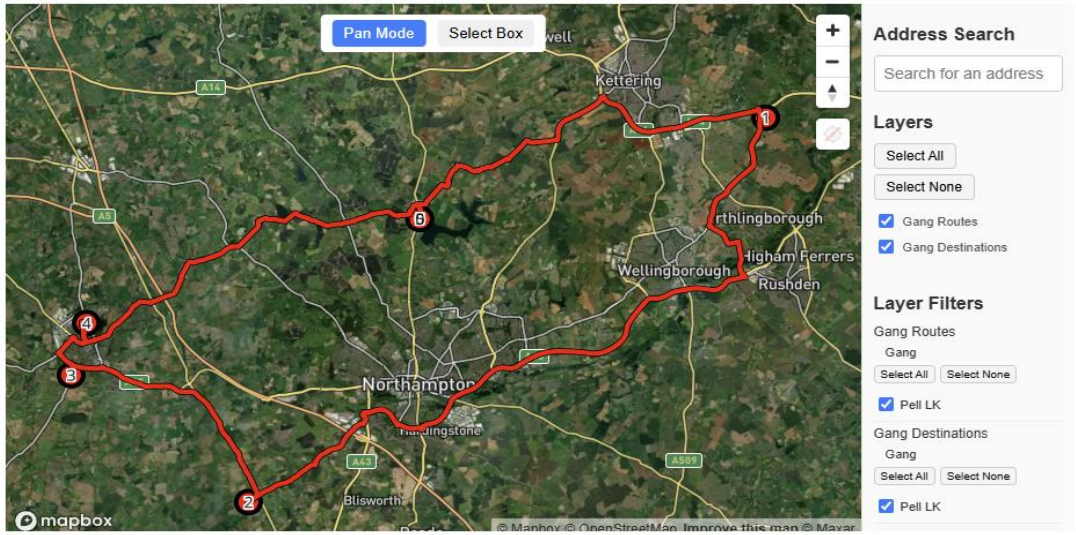


Pell LK

Travel Time	Travel Distance	CO^2 Emission	Petrol Cost
2.0 hrs	117.55 km	23.63 kg	£10.58

Job Sequence

3	2	1	4
IRR-532186	IRR-532175	IRR-532170	IRR-532198



Smart Scheduling

Test Plan Stage 1 – Historical Data

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Manual VS. Smart Scheduling

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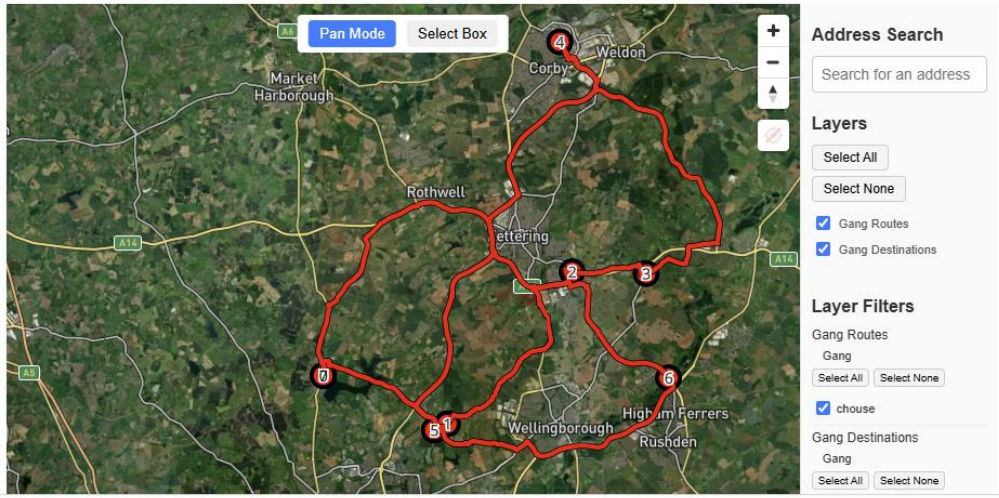
Compute Travel Time	Travel Distance	CO^2 Emission	Petrol Cost
2.04 hrs Total Field Time 5.79 hrs	135.79 km	27.29 kg	£12.22

Job Sequence

1	2	3	4	5
IRR-532174	IRR-532176	IRR-532186	IRR-532189	IRR-532222

6
IRR-532227



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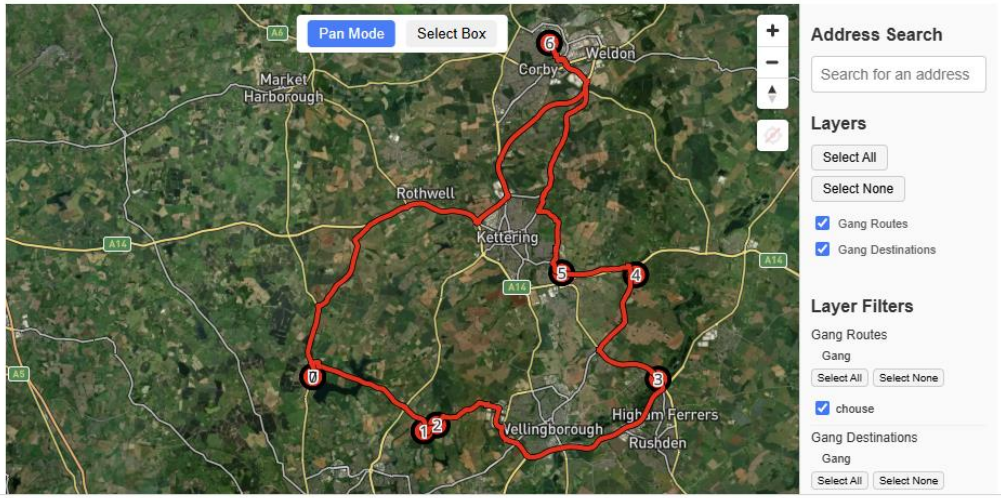
Travel Time	Travel Distance	CO^2 Emission	Petrol Cost
1.54 hrs	94.11 km	18.93 kg	£8.47

Job Sequence

5	1	6	3	2
IRR-532222	IRR-532174	IRR-532227	IRR-532186	IRR-532176

4
IRR-532189



Smart Scheduling

Test Plan Stage 1 – Historical Data

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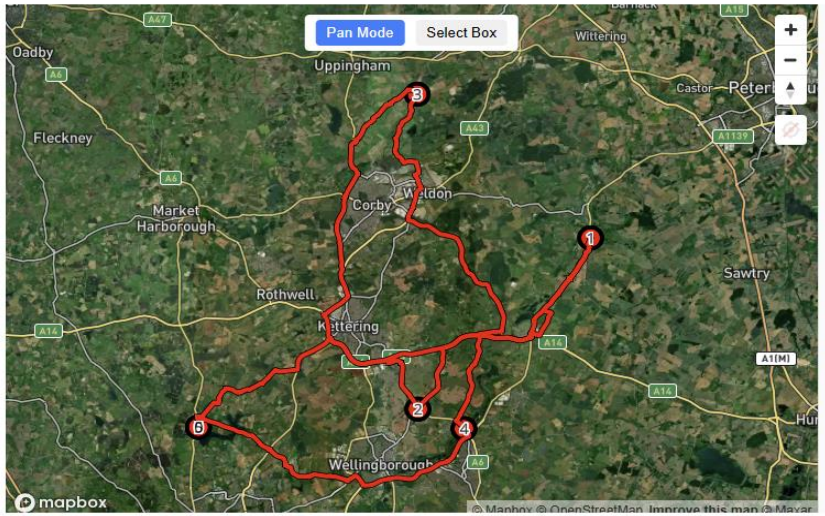
Manual VS. Smart Scheduling

Well Community Steward AB

Compute Travel Time	Travel Distance	CO^2 Emission	Petrol Cost
2.77 hrs Total Field Time 5.41 hrs	163.92 km	32.95 kg	£14.76

Job Sequence

1	2	3	4
IRR-534305	IRR-561467	IRR-561474	IRR-561501



Well Community Steward AB

Travel Time	Travel Distance	CO^2 Emission	Petrol Cost
1.99 hrs	107.92 km	21.69 kg	£9.72

Job Sequence

2	4	1	3
IRR-561467	IRR-561501	IRR-534305	IRR-561474