



**Integrated Skills**



Presentation to ESRI Annual Conference

GIS-based Route Optimisation: From Desktop to Mobile and the Cloud

**Stuart Henshaw** Business Development Director Integrated Skills

**Mark Mohun** Business Analyst Newcastle City Council

# Introduction

- ⚙️ Stuart Henshaw - Background and overview
- ⚙️ Mark Mohun – Application of the technology at Newcastle City Council



# Integrated Skills

Specialists in Waste Management and  
Route Optimisation

**Business Partnerships:-**



Offices in Northern Ireland, Southampton, Leeds, Leicester, Guernsey



# RouteSmart World's Best-selling High Density Routing Software

Over 1,500 Clients worldwide



# Over 75 local authority clients ...

Providing  
Routing solutions  
around the UK



# Over 75 local authority clients ...

Providing  
Routing solutions  
around the UK



# Over 75 local authority clients ...



Providing the  
**largest**  
Route  
Optimisation  
project in  
Europe.



# Over 75 local authority clients ...



Providing the  
**largest**  
Route  
Optimisation  
project in  
Europe.





# Over 75 local authority clients ...

 The Chartered Institution  
of Wastes Management  
North East Centre Council

Local  
Partnerships 

Delivering Waste Efficiencies  
in the North East

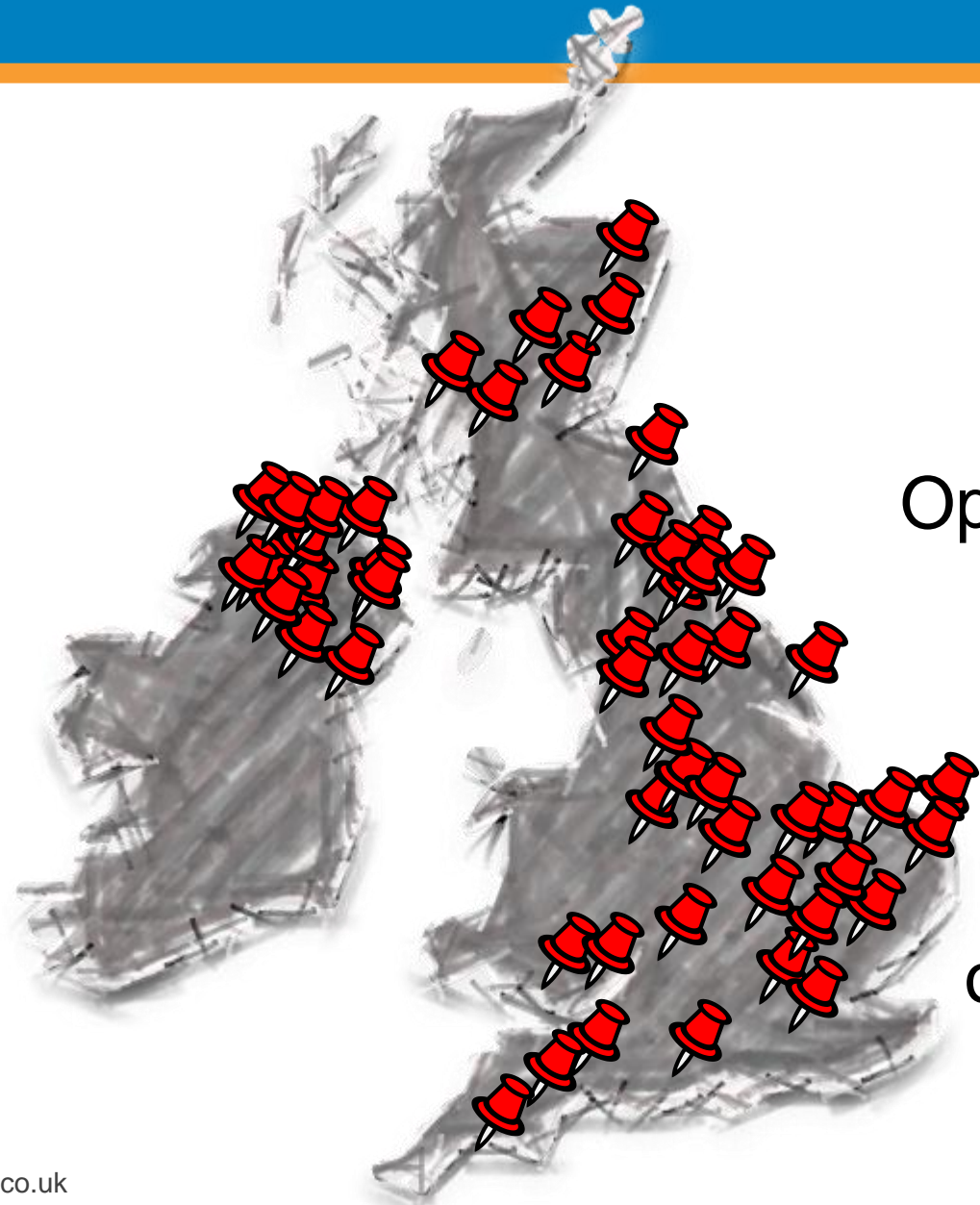


Project  
“realising  
**£10M**  
savings  
per year”

Local Partnerships



Over 75 local authority clients ...



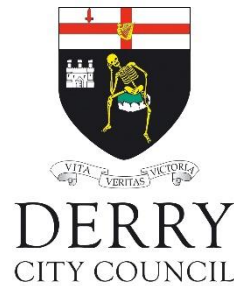
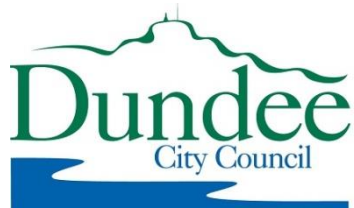
Providing  
Route  
Optimisation to

**15%**  
**12%**

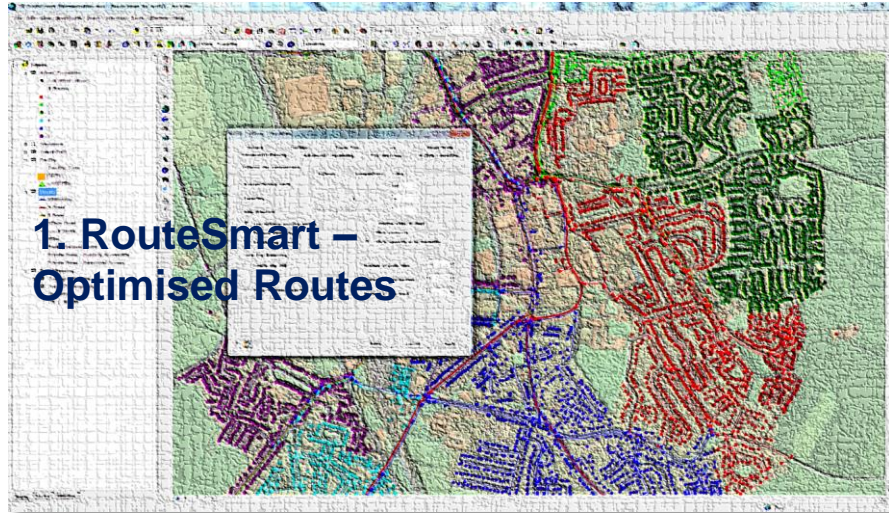
of UK streets



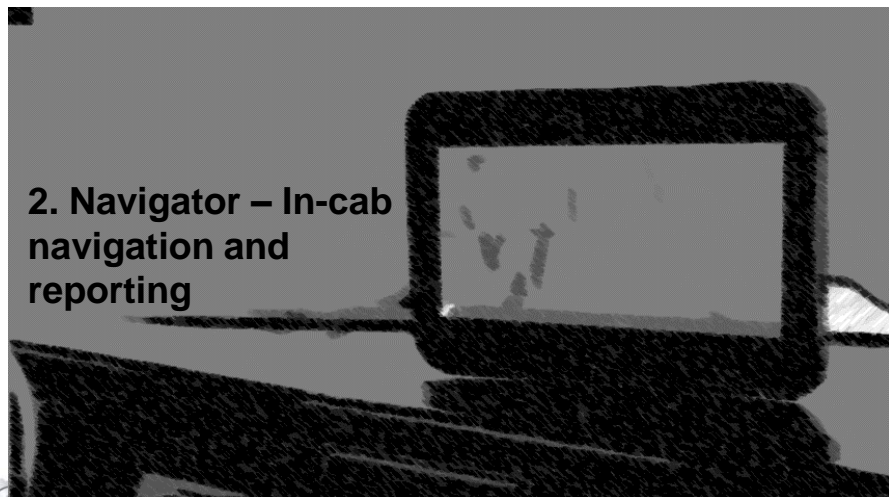
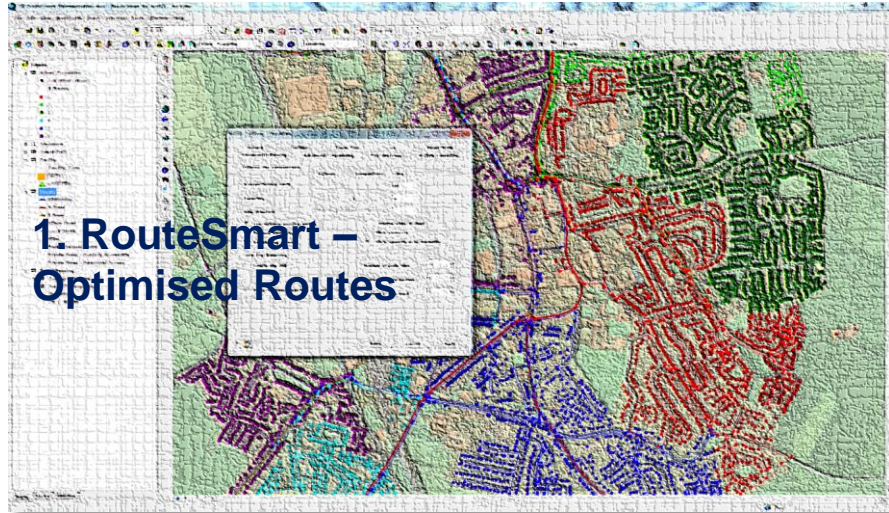
# Including major UK cities...



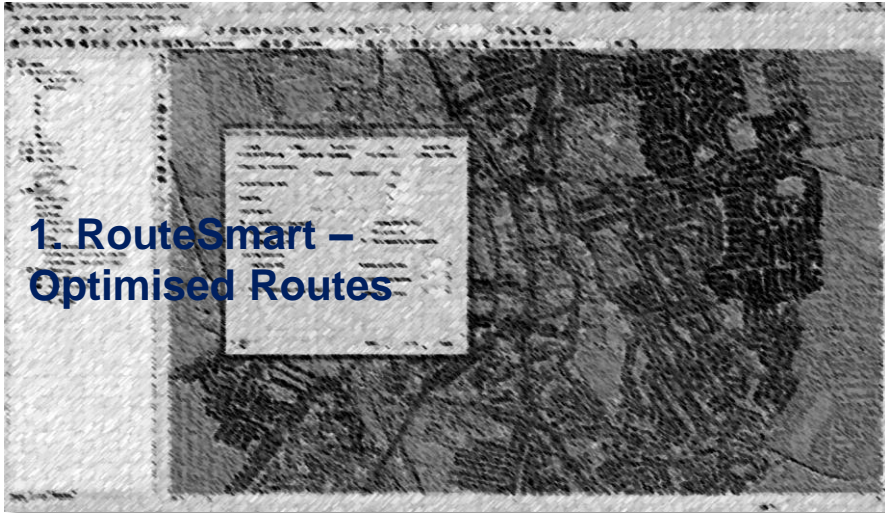
# The Integrated RouteSmart Solution



# The Integrated RouteSmart Solution

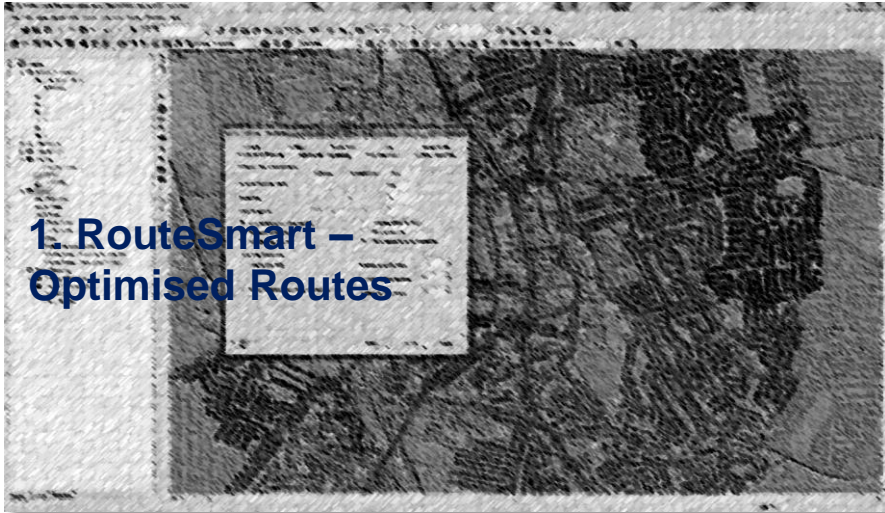


# The Integrated RouteSmart Solution



# The Integrated RouteSmart Solution

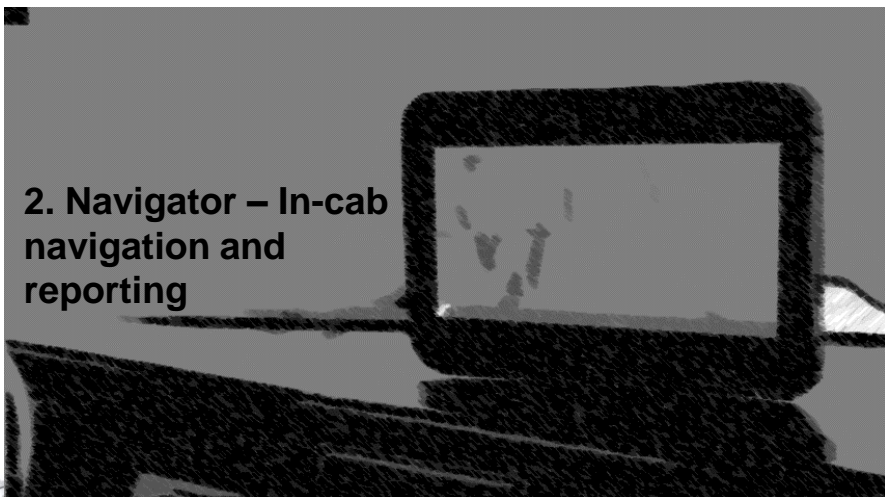
## 1. RouteSmart – Optimised Routes



## 3. Fusion – In-Depot web-viewer



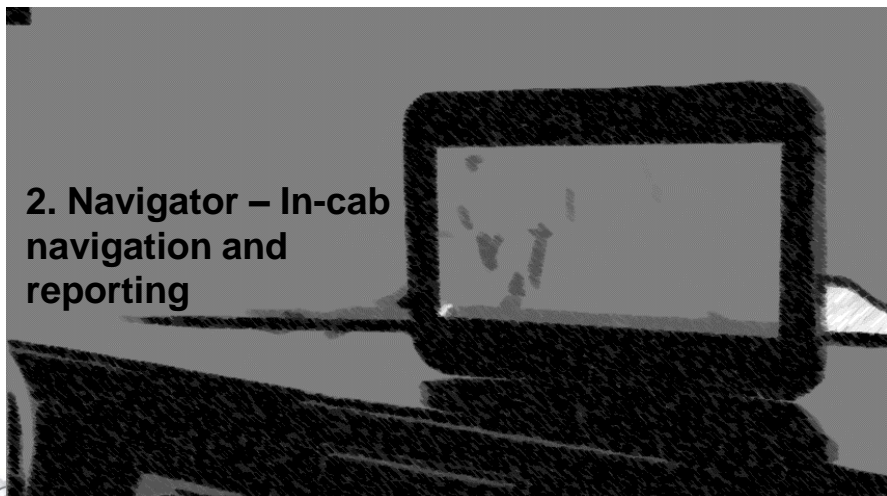
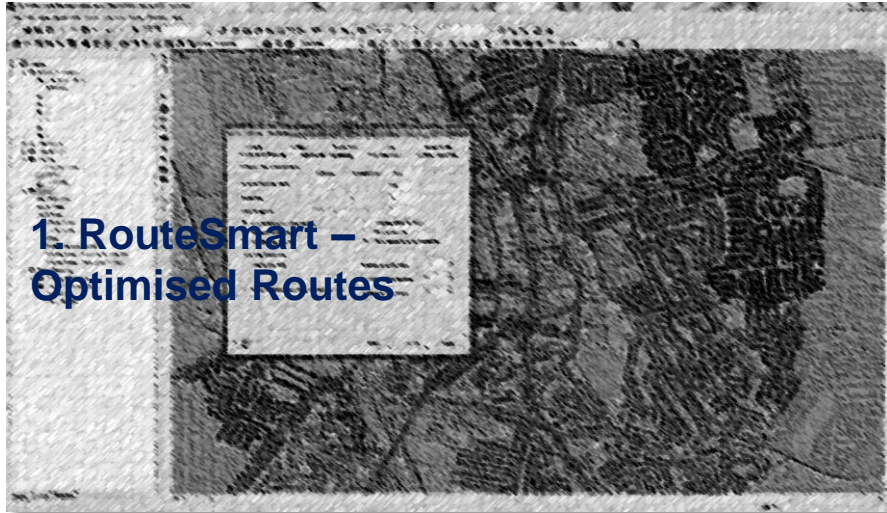
## 2. Navigator – In-cab navigation and reporting



## 4. Communicating with the Public



# The Integrated RouteSmart Solution





# RouteSmart Route Optimisation software

The screenshot displays the RouteSmart software interface within ArcGIS. The main map shows a residential area with several routes highlighted in different colors: red, green, blue, and purple. A 'Solver Options - Generate' dialog box is open in the center, allowing users to adjust various parameters for route optimization.

**Layers Panel:**

- Urban\_Properties
  - all other values
  - 6 Routes
    - 1 (Red)
    - 2 (Green)
    - 3 (Blue)
    - 4 (Cyan)
    - 5 (Purple)
    - 6 (Dark Purple)
- Sequence
- Travel Path
- Facility
  - Facility\_Type
    - DEPOT (Yellow)
    - LANDFILL (Green)
- Streets
  - Motorway
  - A Road
  - B Road
  - Minor Road
  - Local Street
  - Alley
  - Pedestrianised Street
  - Private Road - Publicly Accessible
  - Private Road - Restricted Access
- Base Mapping
  - TopographicArea
  - Aerial Photography
  - StreetView
  - OS\_1\_50\_000

**Solver Options - Generate Dialog Box:**

- General | Facilities | Route Sets | Cost | Mixed Mode
- Advanced Balancing | Advanced Sequencing | Park and Loop | Multiple Capacities
- Balance and compactness:
  - Non-productive travel: Balance (slider), Compactness (slider), Value: 87
  - Reaching: Value: 4
  - Area reduction: Value: 1
- Use balance crossing penalty
- Reduce interlacing
- Enable stop locking
- Combine sides of street
- Allow crossover
- Allow capacity to be exceeded
- Cycle Day Balancing:
  - Enable day shift
  - Number of cycle days: 20
  - Number of days forward: 5
  - Number of days back: 5
- Move between beginning and end of cycle

Solve Cancel Apply

# RouteSmart



# RouteSmart

 **REDUCE** time and mileage



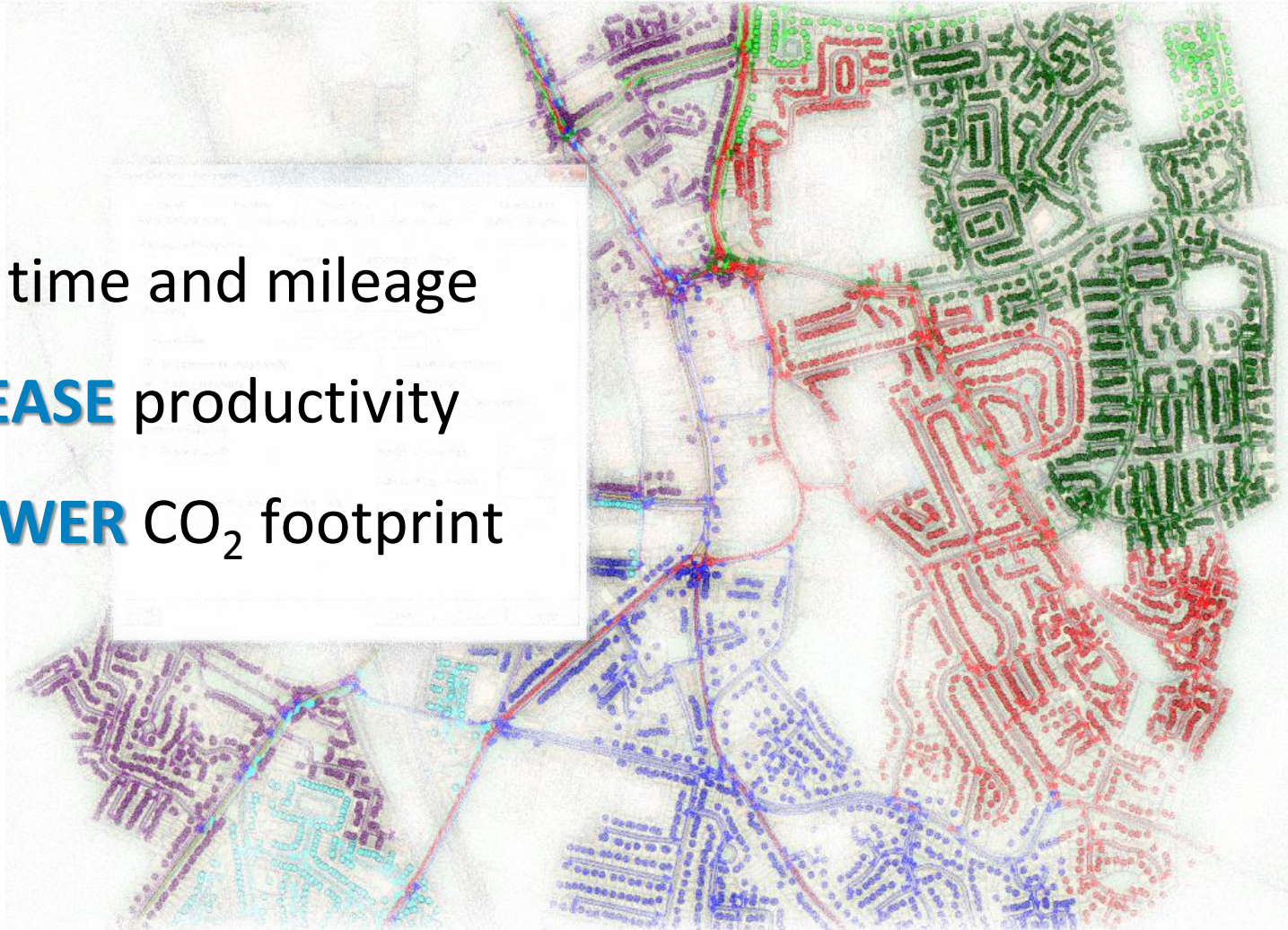
# RouteSmart



- ☀ **REDUCE** time and mileage
- ☀ **INCREASE** productivity

# RouteSmart

- ☀ **REDUCE** time and mileage
- ☀ **INCREASE** productivity
- ☀ **LOWER** CO<sub>2</sub> footprint



# RouteSmart

 **BALANCE** workloads



# RouteSmart

- ☀ **BALANCE** workloads
- ☀ **MODEL** new scenarios



# RouteSmart

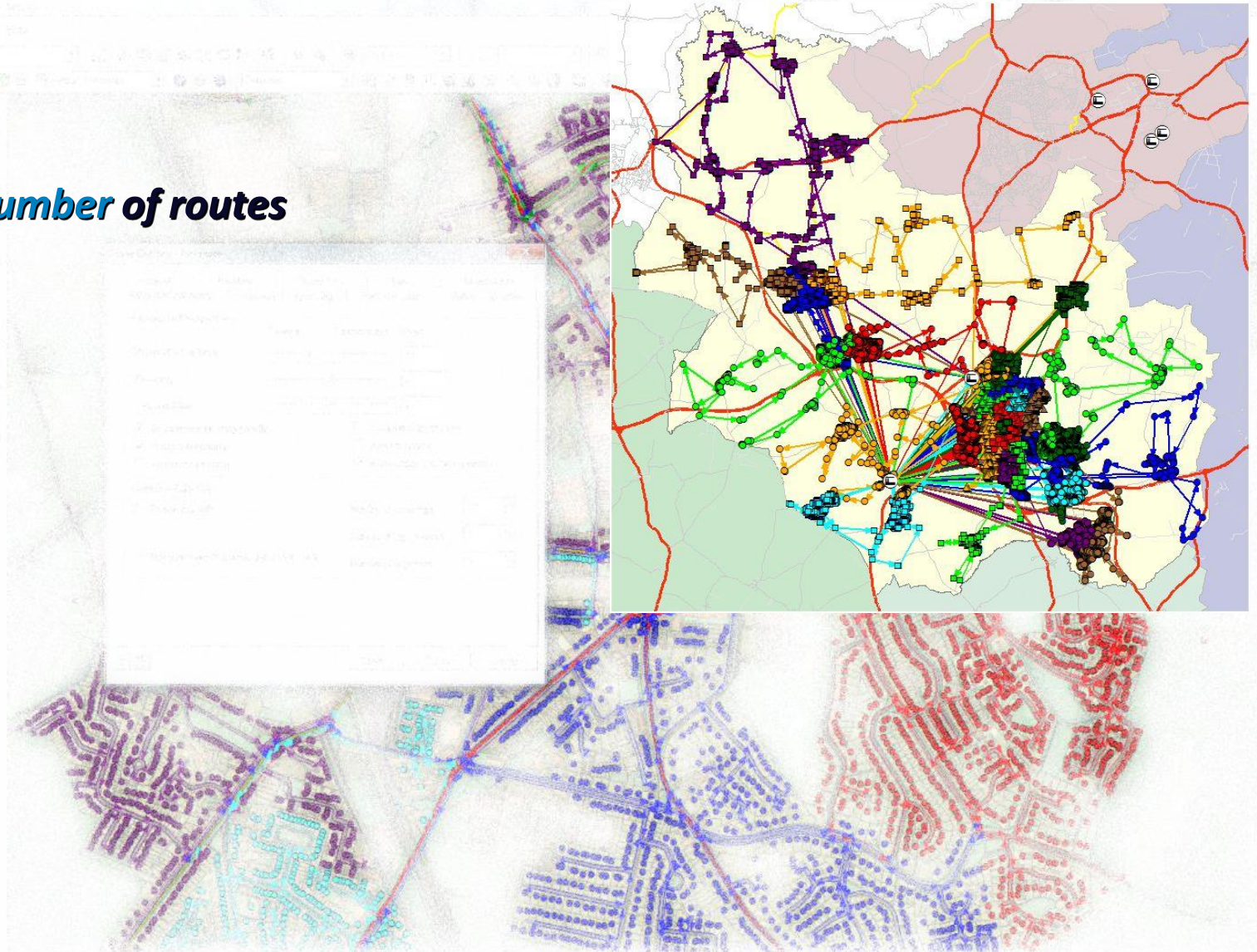
- ⚙️ **BALANCE** workloads
- ⚙️ **MODEL** new scenarios
- ⚙️ **OPTIMISE** resources





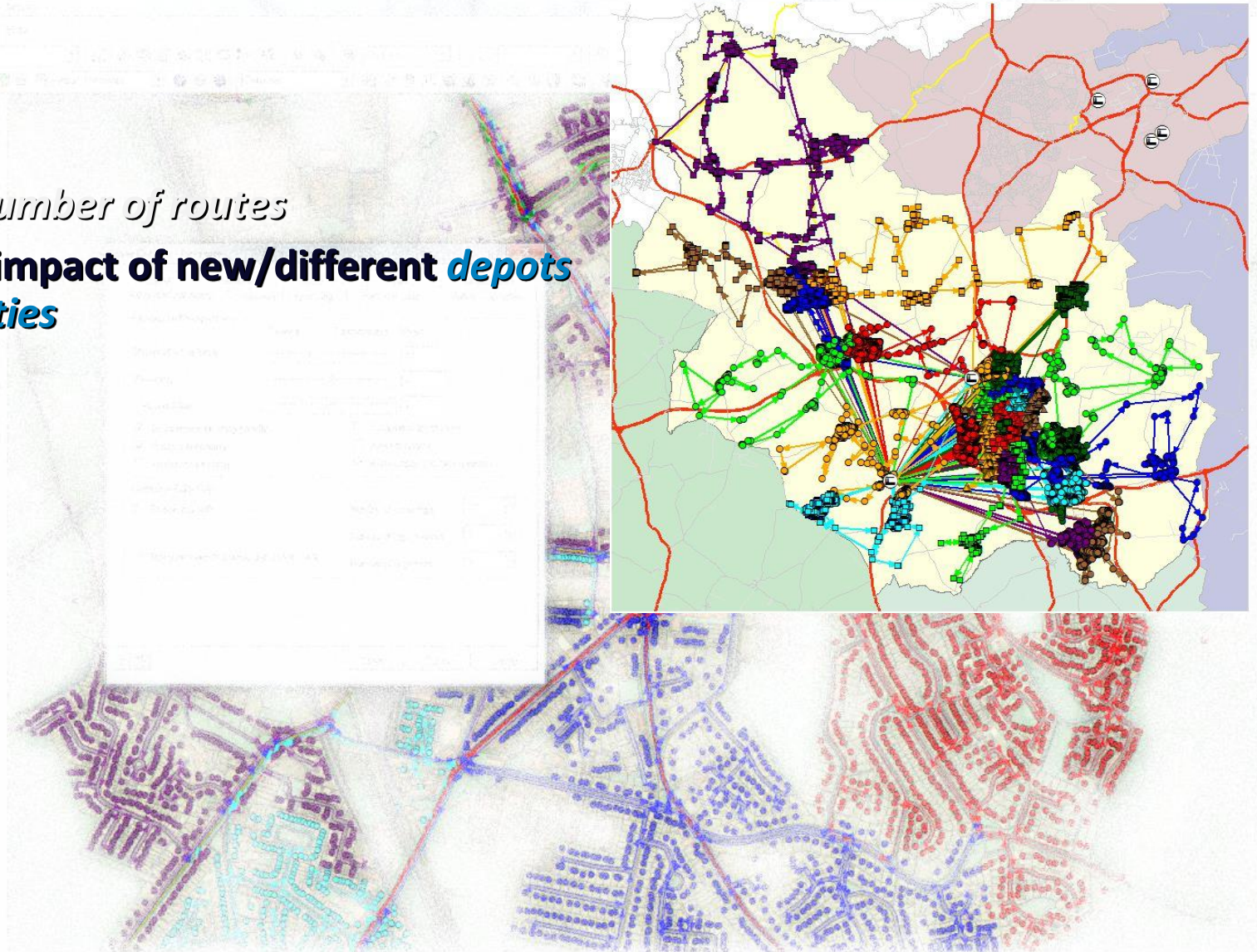
# RouteSmart

➤ Reduce *number of routes*



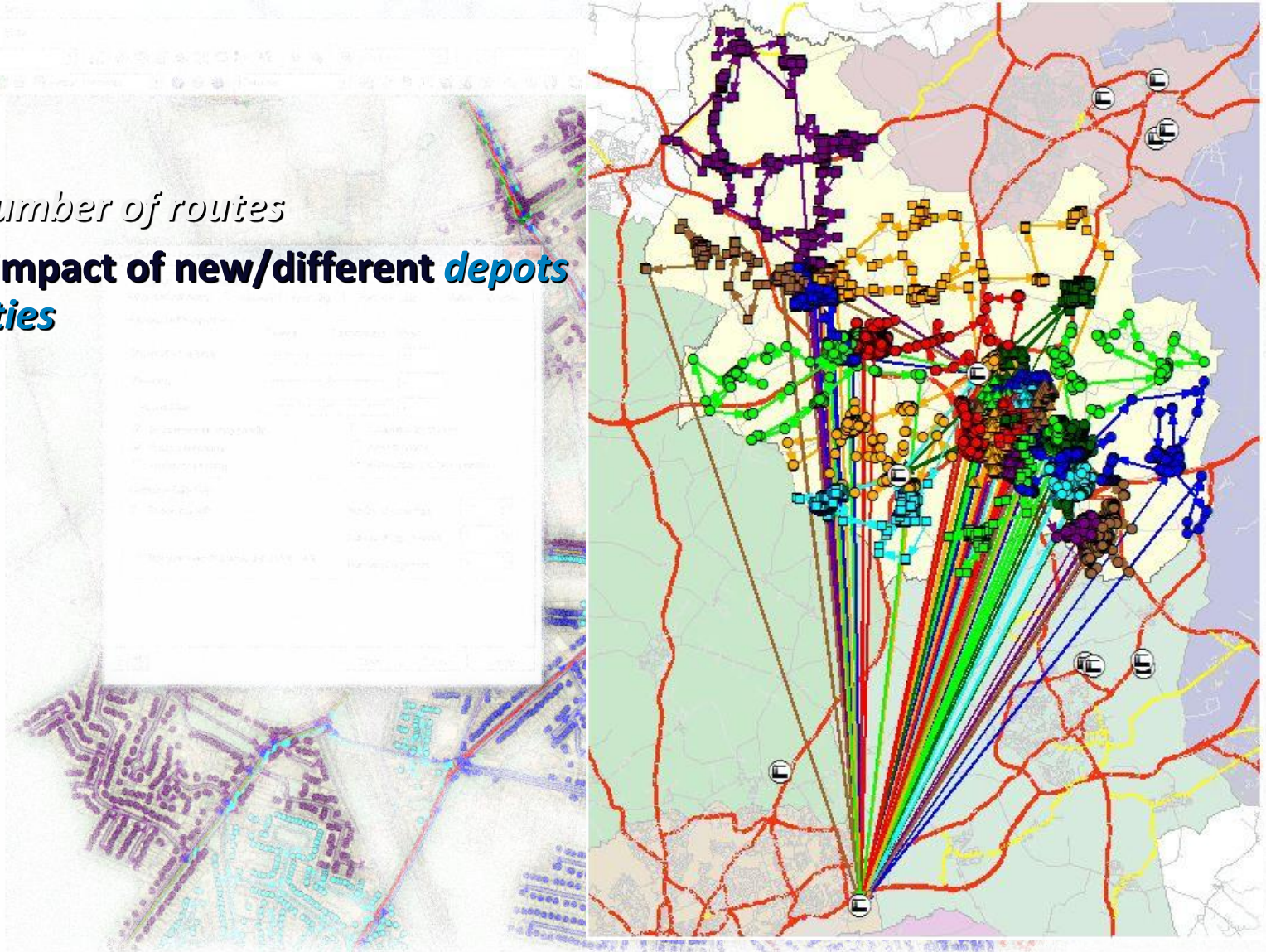
# RouteSmart

- Reduce *number of routes*
- Evaluate impact of new/different **depots** and facilities



# RouteSmart

- Reduce *number of routes*
- Evaluate impact of new/different **depots** and facilities



# RouteSmart

- Reduce *number of routes*
- Evaluate impact of new/different *depots and facilities*
- **Model *property growth***



# Fast & Accurate Modelling of Options



## Route Summary

Solution Name: Demo Solution  
Solution Label:

Report Date: 04/06/2014  
Report Time: 10:49 AM

Route ID	Time Span		Travel Time	Service Time	Facility Time	Break Time	Total Time	Distance (miles)	Location Count
	Start	End							
1	7:00	16:03	0:49	5:55	1:39	0:40	9:03	30.5	1,314
2	7:00	16:31	1:06	6:06	1:39	0:40	9:31	36.4	1,366
3	7:00	16:29	1:20	5:50	1:39	0:40	9:29	43.8	1,263
4	7:00	16:41	1:14	6:07	1:39	0:40	9:41	43.2	1,503
5	7:00	16:11	1:08	5:44	1:39	0:40	9:11	39.7	1,515
6	7:00	16:03	0:57	5:46	1:39	0:40	9:03	34.6	1,478
7	7:00	16:52	1:29	5:40	2:02	0:40	9:52	45.6	1,302
8	7:00	15:56	1:06	5:31	1:39	0:40	8:56	39.2	1,400
9	7:00	16:29	1:23	5:46	1:39	0:40	9:29	47.8	1,455
10	7:00	16:25	1:08	5:57	1:39	0:40	9:25	38.2	1,488
11	7:00	16:40	1:16	6:04	1:39	0:40	9:40	42.9	1,475
12	7:00	16:48	1:22	6:06	1:39	0:40	9:48	43.2	1,594
13	7:00	16:29	1:07	6:02	1:39	0:40	9:29	39.2	1,430
14	7:00	16:27	1:15	5:53	1:39	0:40	9:27	42.2	1,304
<b>14</b>			<b>16:41</b>	<b>82:26</b>	<b>23:29</b>	<b>9:20</b>	<b>132:04</b>	<b>566.6</b>	<b>19,887</b>

All service locations have been sequenced.



# RouteSmart

- Reduce *number of routes*
- Evaluate impact of new/*different depots and facilities*
- Model *property growth*
- Compare different **operational methodologies**



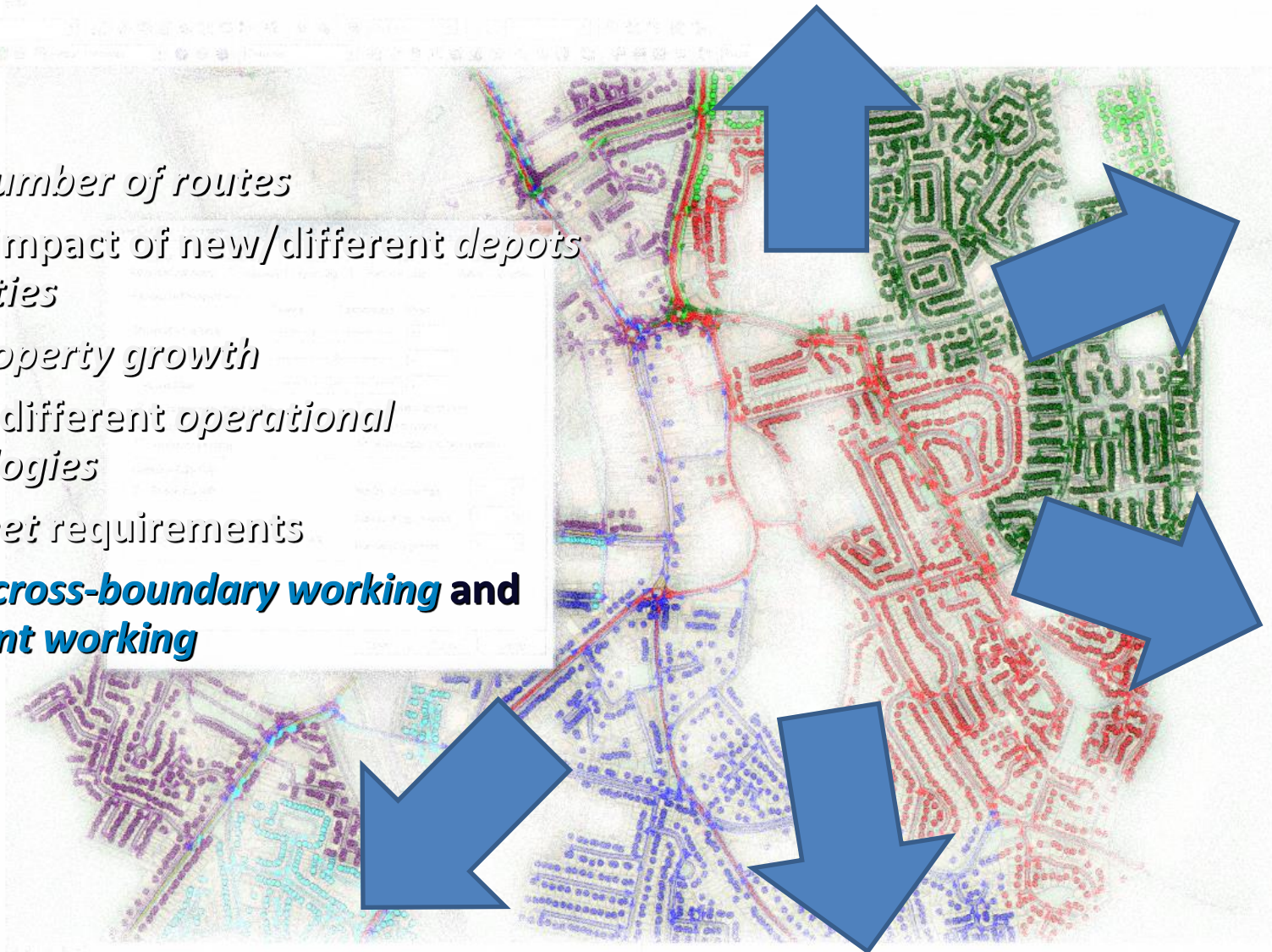
# RouteSmart

- Reduce *number of routes*
- Evaluate impact of new/*different depots and facilities*
- Model *property growth*
- Compare different *operational methodologies*
- Define **fleet** requirements



# RouteSmart

- Reduce *number of routes*
- Evaluate impact of new/different *depots and facilities*
- Model *property growth*
- Compare different *operational methodologies*
- Define *fleet requirements*
- Evaluate ***cross-boundary working*** and model ***joint working***





# RouteSmart

- Reduce *number of routes*
- Evaluate impact of new/different *depots and facilities*
- Model *property growth*
- Compare different *operational methodologies*
- Define *fleet requirements*
- Evaluate *cross-boundary working* and model *joint working*
- **Take account of *H&S issues***



# In-Cab Navigation and Reporting



# In-Cab Navigation and Reporting



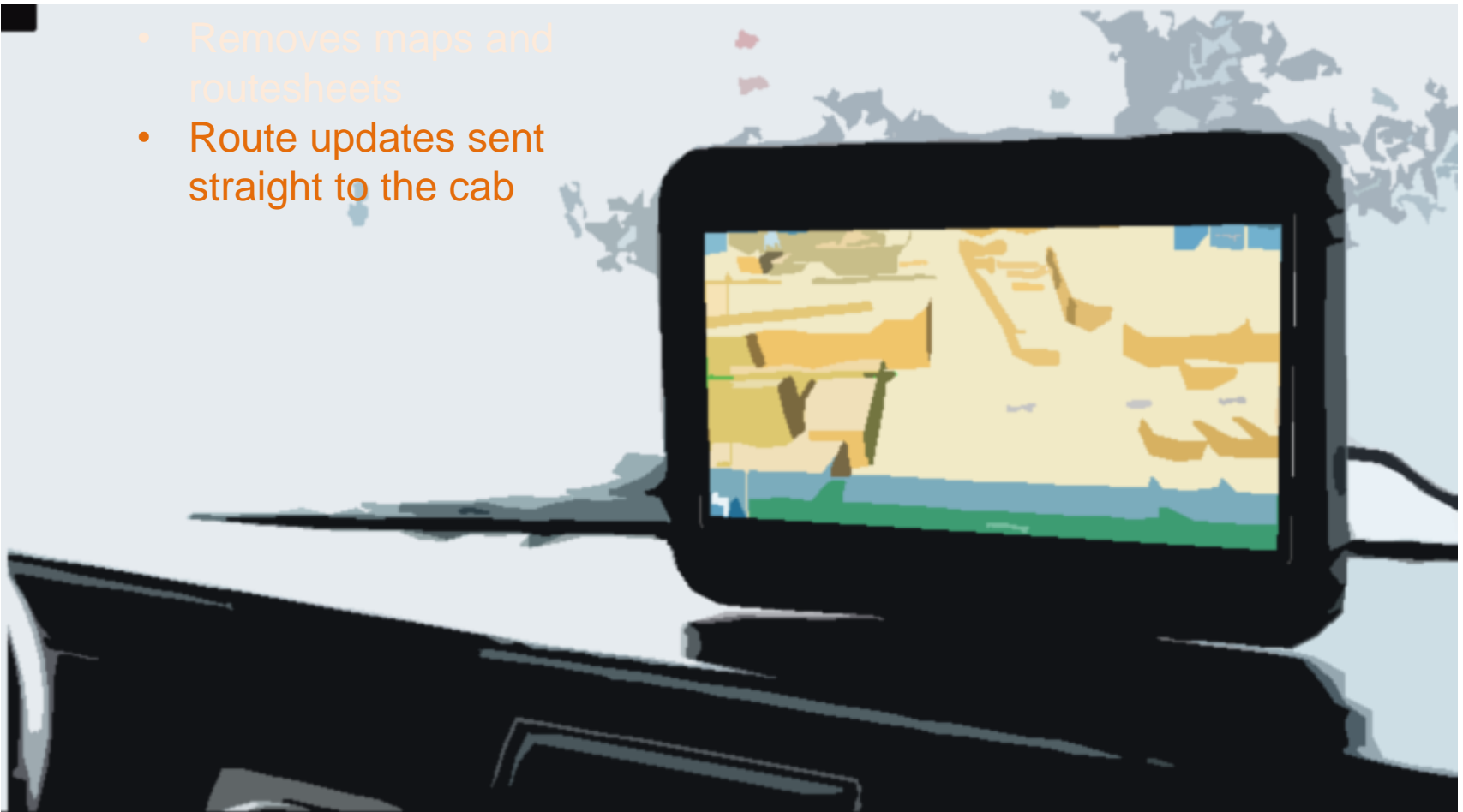
# In-Cab Navigation and Reporting

- Removes maps and routesheets



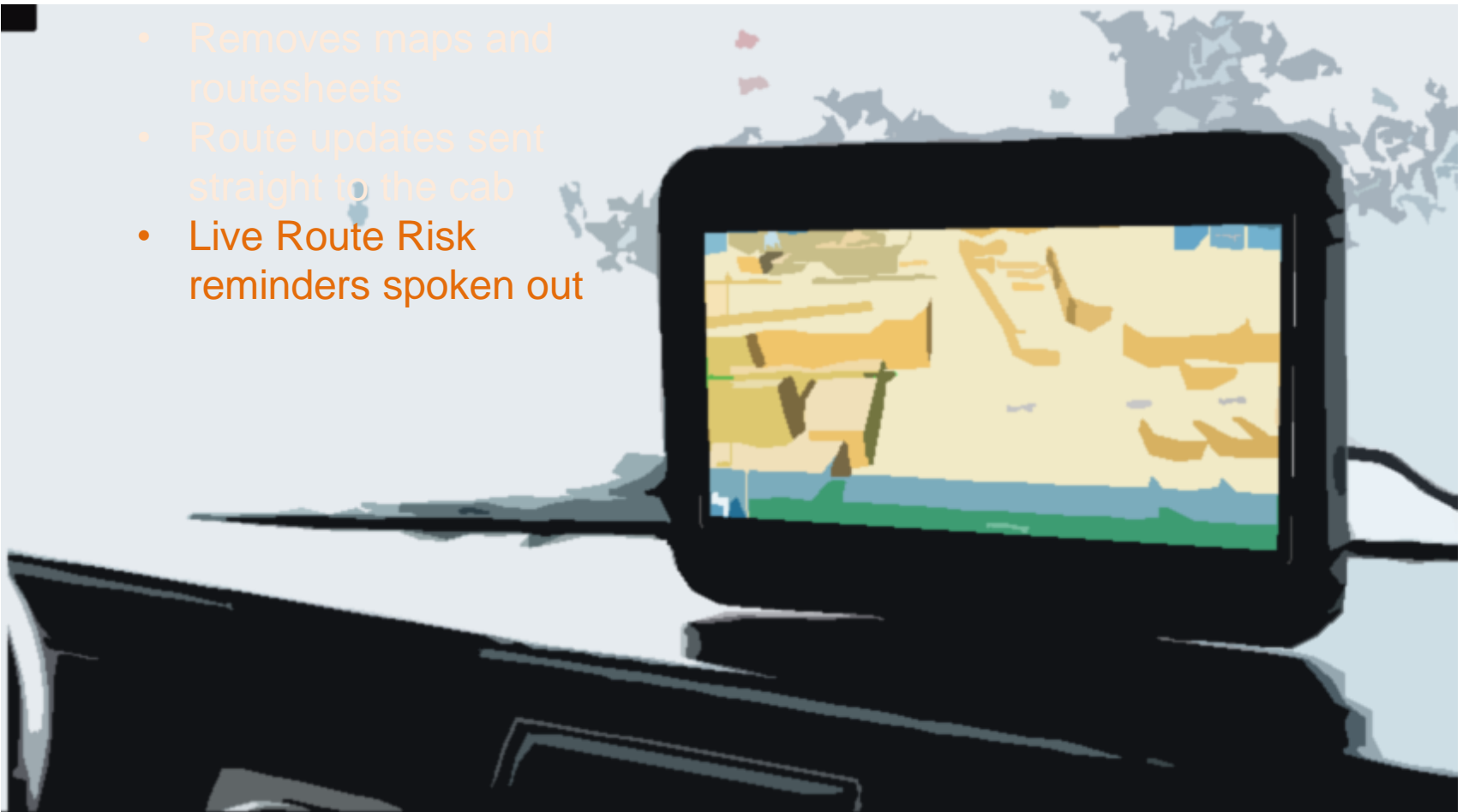
# In-Cab Navigation and Reporting

- Removes maps and routesheets
- Route updates sent straight to the cab



# In-Cab Navigation and Reporting

- Removes maps and routesheets
- Route updates sent straight to the cab
- Live Route Risk reminders spoken out



# In-Cab Navigation and Reporting

- Removes maps and routesheets
- Route updates sent straight to the cab
- Live Route Risk reminders spoken out
- Leads drivers through the route end to end



# In-Cab Navigation and Reporting

- Removes maps and routesheets
- Route updates sent straight to the cab
- Live Route Risk reminders spoken out
- Leads drivers through the route end to end
- **Locate Mode allows drivers to lead**





# In-Cab Navigation and Reporting

- Removes maps and routesheets
- Route updates sent straight to the cab
- Live Route Risk reminders spoken out
- Leads drivers through the route end to end
- Locate Mode allows drivers to lead
- Log service problems



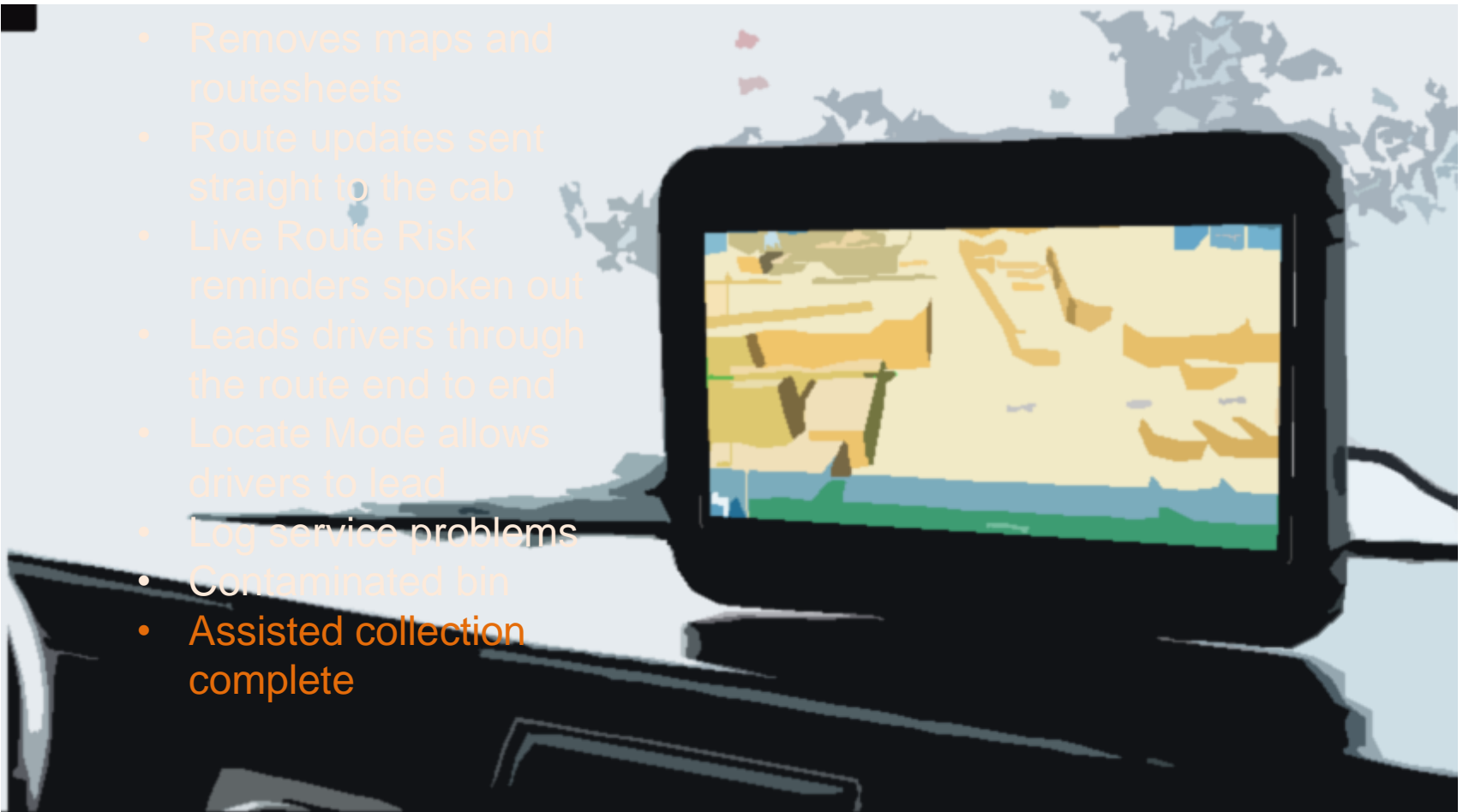
# In-Cab Navigation and Reporting

- Removes maps and routesheets
- Route updates sent straight to the cab
- Live Route Risk reminders spoken out
- Leads drivers through the route end to end
- Locate Mode allows drivers to lead
- Log service problems
- **Contaminated bin**



# In-Cab Navigation and Reporting

- Removes maps and routesheets
- Route updates sent straight to the cab
- Live Route Risk reminders spoken out
- Leads drivers through the route end to end
- Locate Mode allows drivers to lead
- Log service problems
- Contaminated bin
- **Assisted collection complete**



# In-Cab Navigation and Reporting

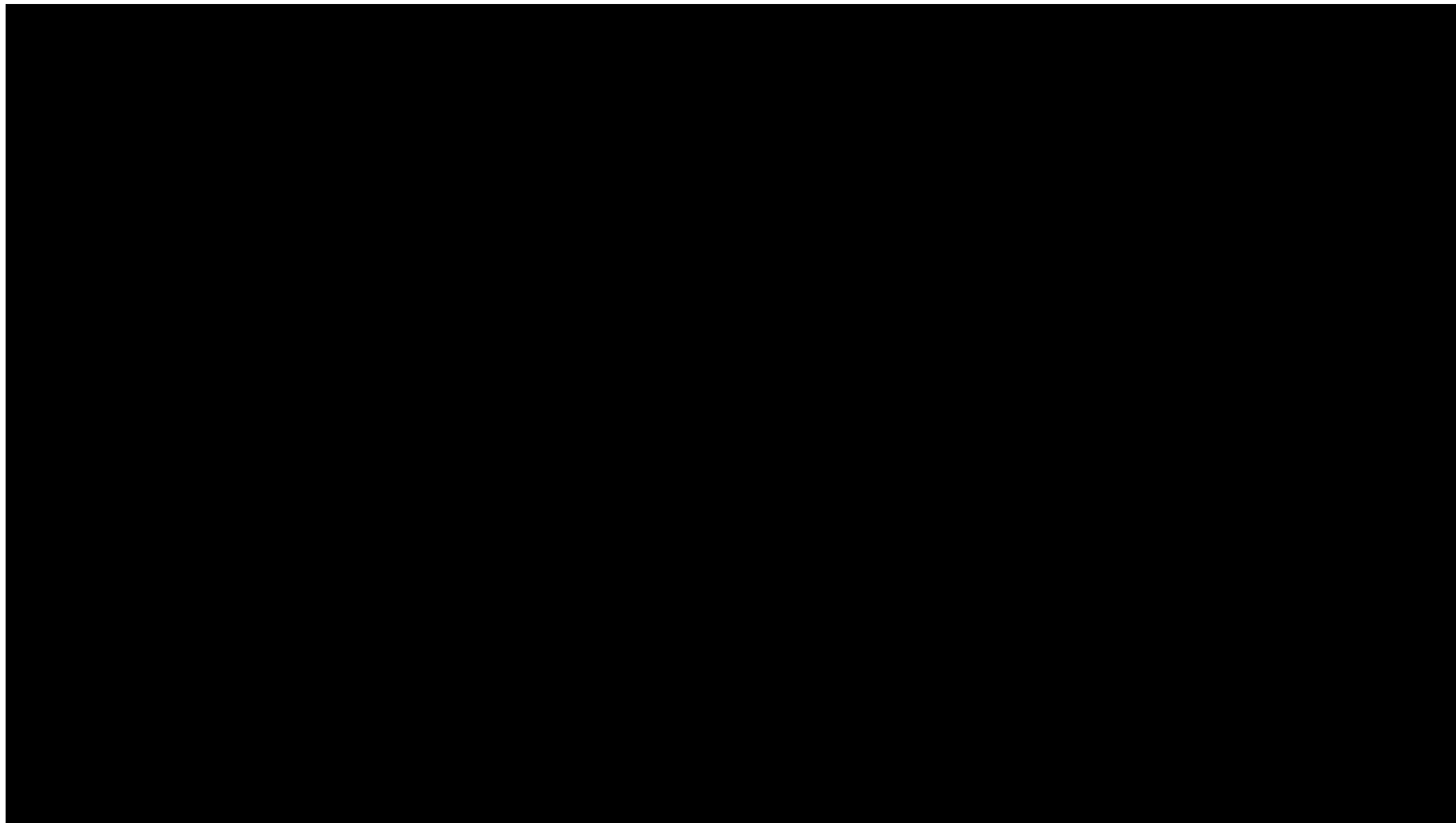
- Removes maps and routesheets
- Route updates sent straight to the cab
- Live Route Risk reminders spoken out
- Leads drivers through the route end to end
- Locate Mode allows drivers to lead
- Log service problems
- Contaminated bin
- Assisted collection complete
- Route can be shared with other drivers



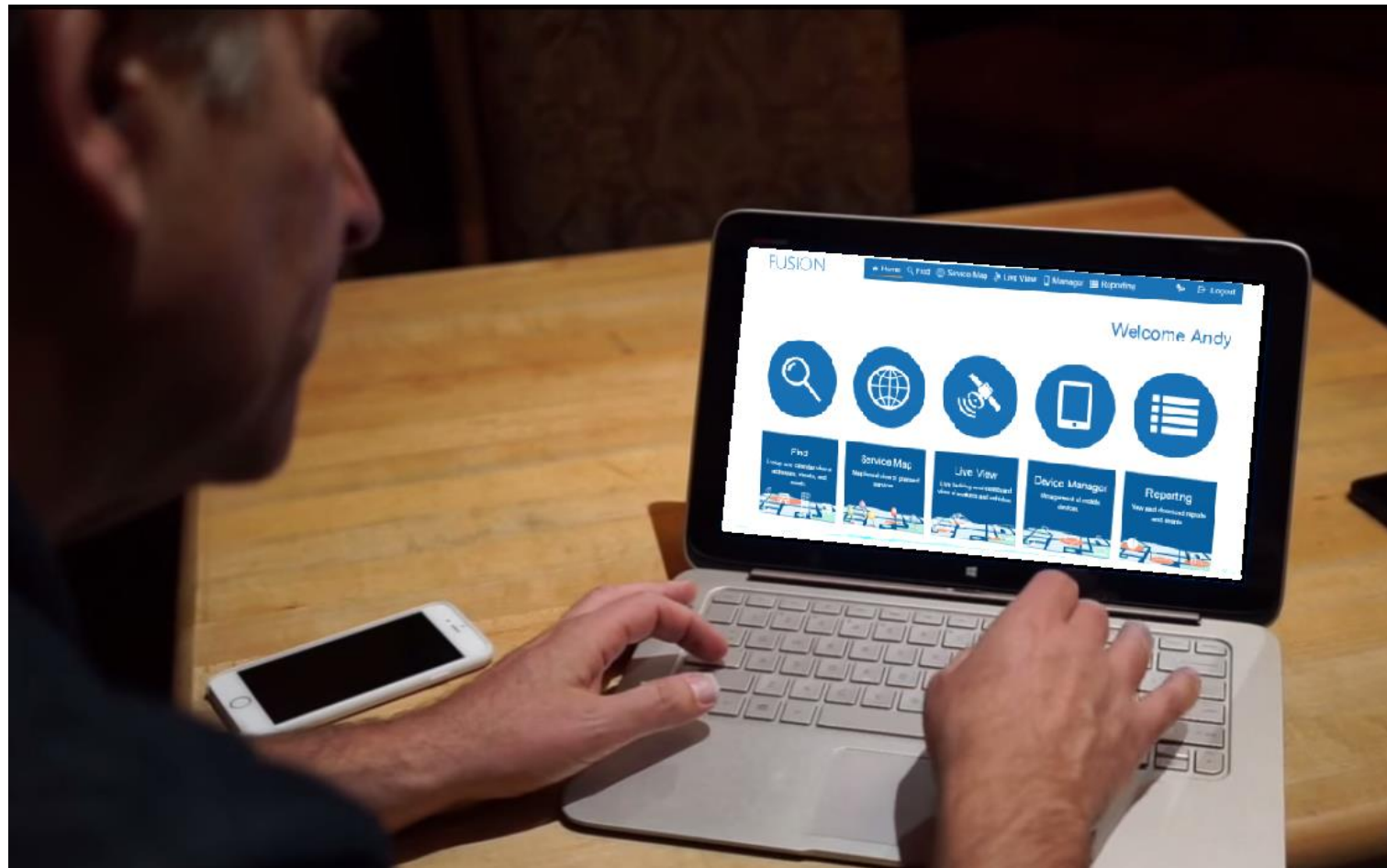
# In-Cab Navigation and Reporting Demo



# Navigator Demo



# In-Depot Route Management



# In-Depot Route Management





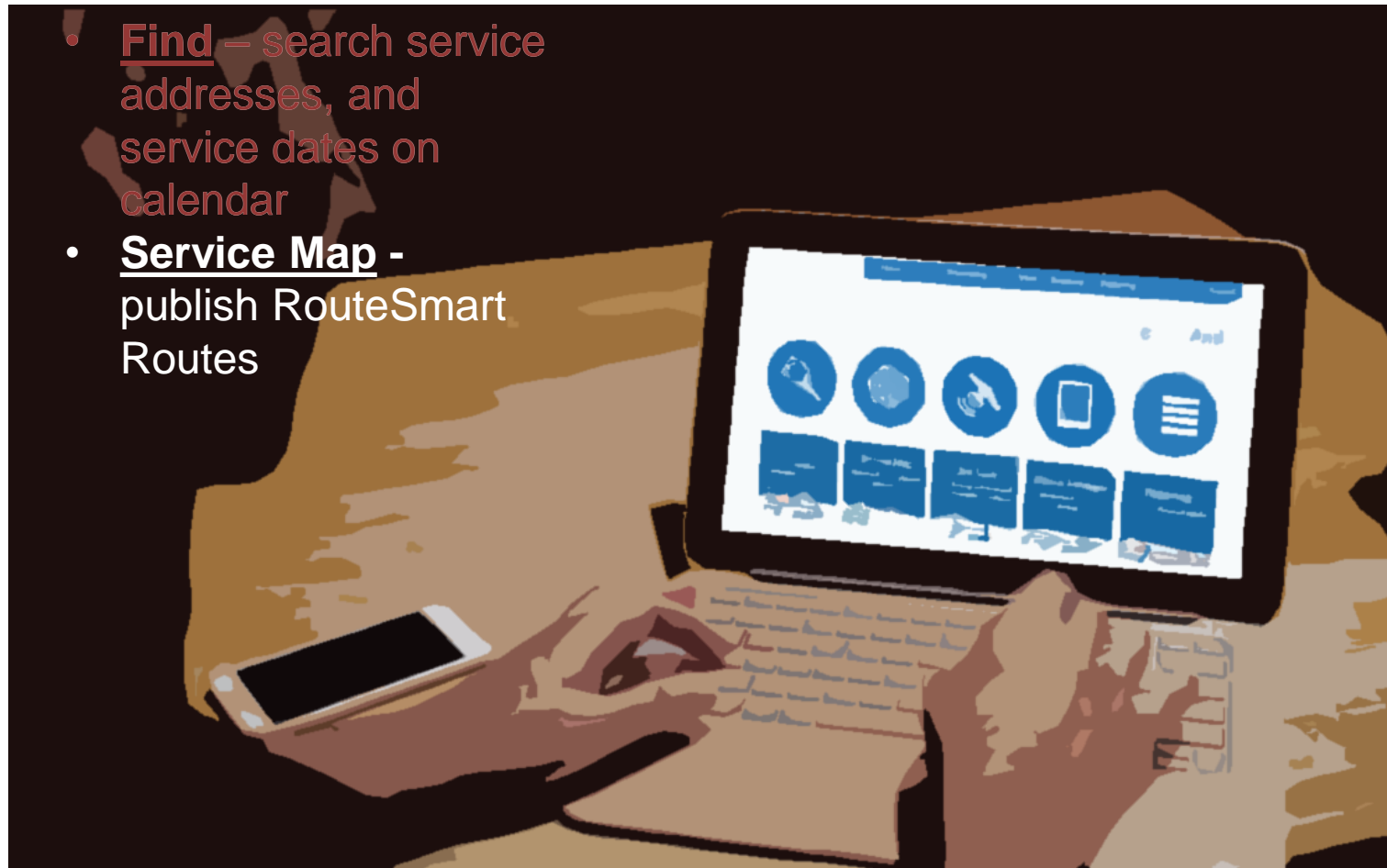
# In-Depot Route Management

- **Find** – search service addresses, and service dates on calendar



# In-Depot Route Management

- **Find** – search service addresses, and service dates on calendar
- **Service Map** - publish RouteSmart Routes



# In-Depot Route Management

- **Find** – search service addresses, and service dates on calendar
- **Service Map** - publish RouteSmart Routes
- **Live View** – track vehicles & driver reporting



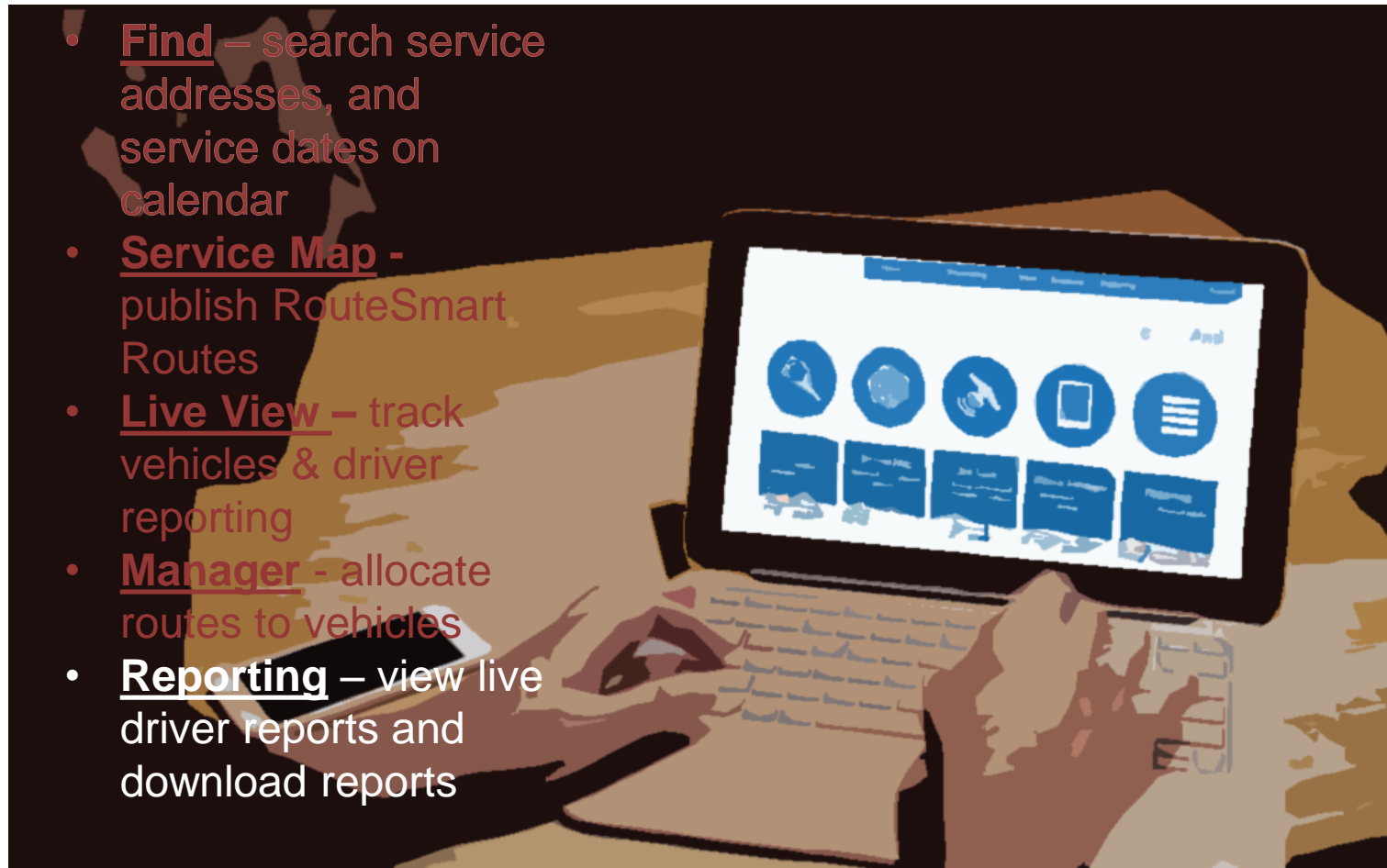
# In-Depot Route Management

- **Find** – search service addresses, and service dates on calendar
- **Service Map** - publish RouteSmart Routes
- **Live View** – track vehicles & driver reporting
- **Manager** - allocate routes to vehicles



# In-Depot Route Management

- **Find** – search service addresses, and service dates on calendar
- **Service Map** - publish RouteSmart Routes
- **Live View** – track vehicles & driver reporting
- **Manager** - allocate routes to vehicles
- **Reporting** – view live driver reports and download reports



# FUSION Solution browser

FUSION

[Home](#) [Find](#) [Service Map](#) [Live View](#) [Manager](#) [Reporting](#) [Logout](#)

Welcome Andy



## Find

Lookup and calendar view of addresses, streets, and assets.



## Service Map

Map-based view of planned services.



## Live View

Live tracking and dashboard view of workers and vehicles.



## Device Manager

Management of mobile devices.

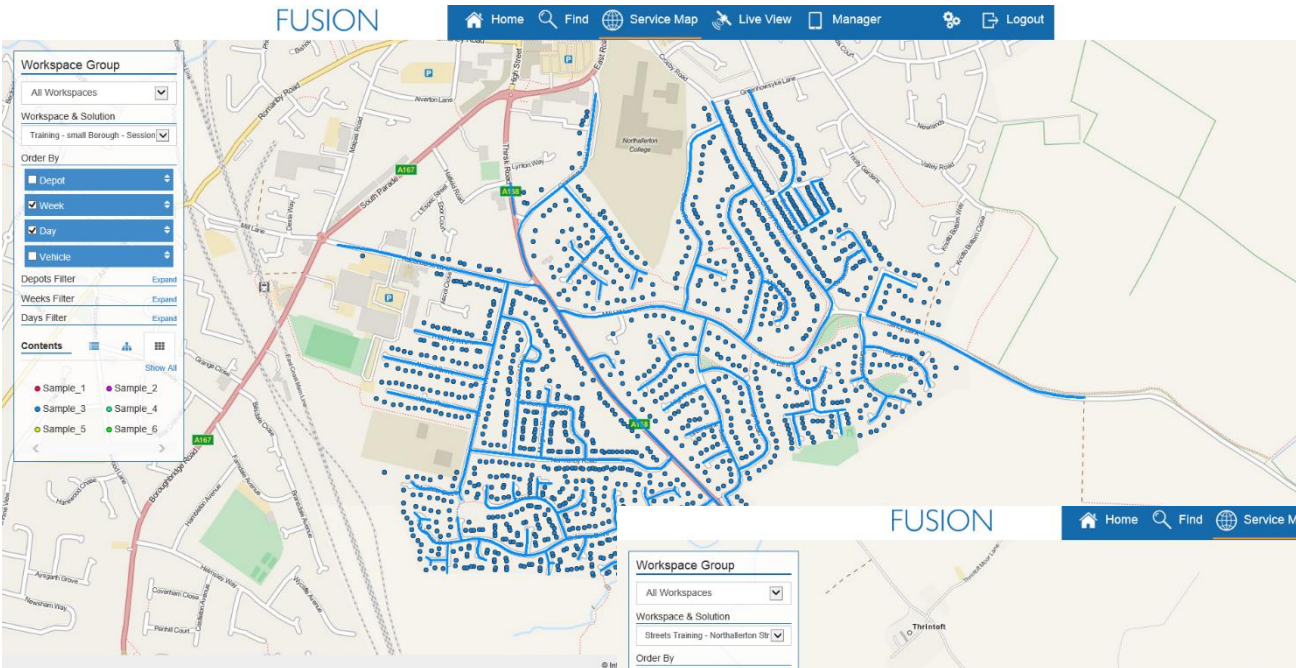


## Reporting

View and download reports and events

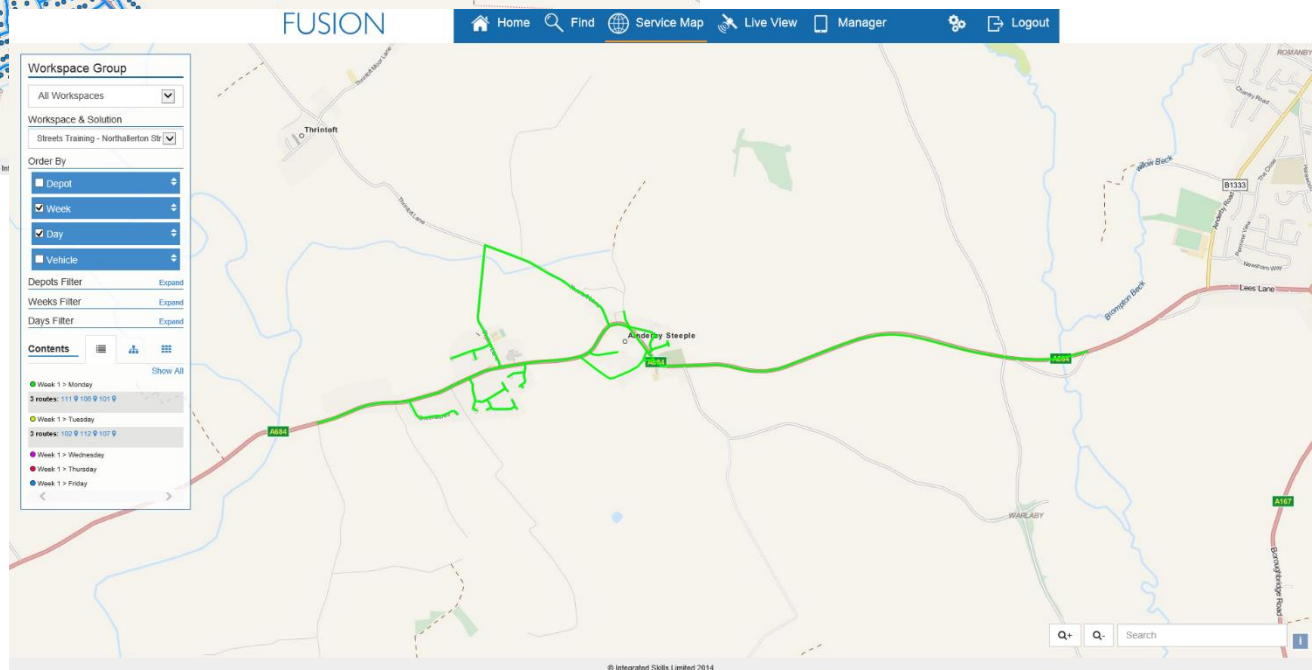


# FUSION Solution browser



Fusion Service Map:  
Waste Collection

Fusion Service Map:  
Street Cleansing

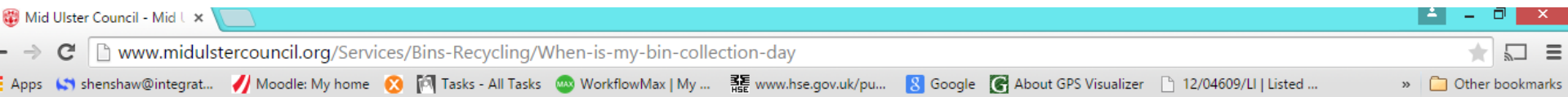


# Communicating Service Information





# Public –facing calendar



Comhairle Ceantair  
**Lár Uladh**  
**Mid Ulster**  
District Council

Text Size: A A A Text Colour: C C C

New phone number  
**03000 132 132**

[Contact us »](#)

[Your Council](#)

[Services](#)

[Things To Do](#)

[Business](#)

[Community](#)

[Online Services](#)

Search



[A-Z](#)

[Home](#) » [Services](#) » [Bins & Recycling](#) » [When is my bin collection day?](#)

## When is my bin collection day?

You can check your bin collection day below.

At the moment, this facility is only available to residents of the former Cookstown District Council. We are working to make it available to all residents of Mid Ulster.

**Enter your address to find when your bins are collected**

Address Search



# Public-facing calendar

**22 ANNAGHMORE ROAD ,  
COOKSTOWN, BT80 0JQ**



Refuse - Thu 14/05



Garden - Thu 14/05



Recycling - Thu 21/05

Sun	Mon	Tue	Wed	Thu	Fri	Sat
10 May	11 May	12 May	13 May	14 May   Refuse Garden	15 May	16 May
17 May	18 May	19 May	20 May	21 May  Recycling	22 May	23 May



# Communicating Service Information

Through...  
Smart Phones and  
Tablets through the  
use of Apps

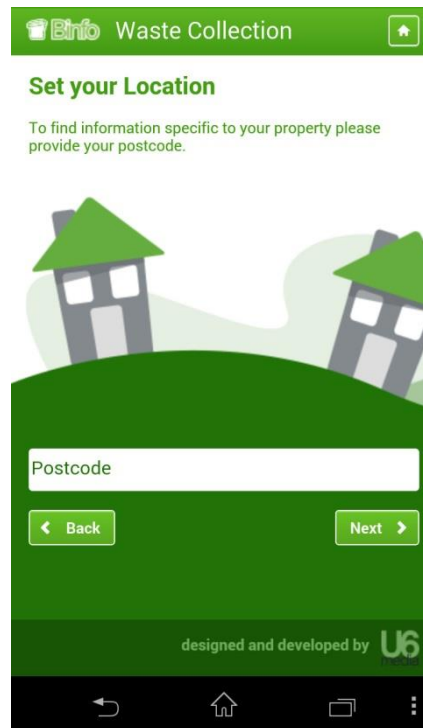


# Reporting issues to the Council



# Waste Collection App

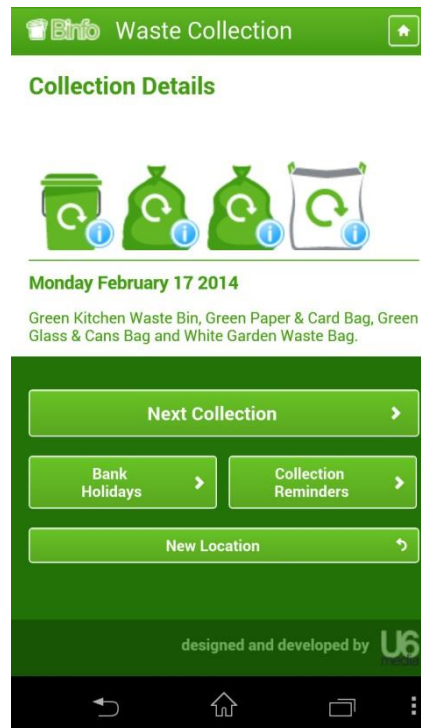
Select your  
location



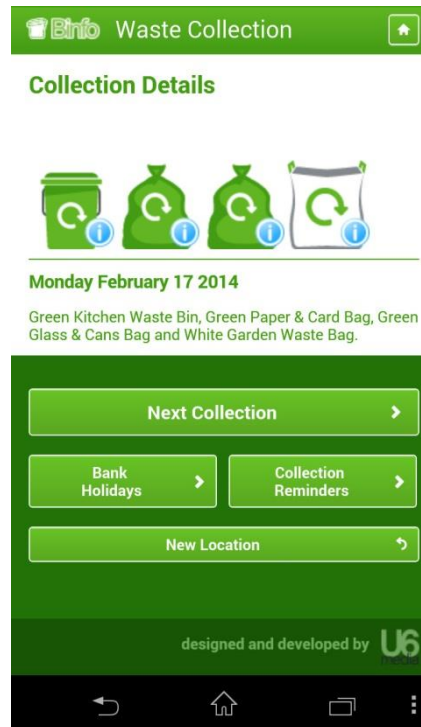
# Fetching....



# Your bin collection details



What goes in  
my kitchen  
bin? Click on  
the icon...





OK... thanks  
... no excuses!



Want a  
reminder when  
your bin goes  
out?

The screenshot shows a mobile application interface for 'Waste Collection'. At the top, there is a green header bar with a trash can icon, the text 'Waste Collection', and a star icon. Below the header, the title 'Collection Reminders' is displayed in bold. The main content area contains two paragraphs of text: 'Would you like to be reminded to put your bins out the day before each collection? (A bell will sound and a message will appear in your notification bar).' and 'These are dynamic reminders. They require a minimal infrequent Internet connection at least (once or twice a week) to work. The alarms can adapt and change to reflect last minute unscheduled changes to your bin collection day!'. Below the text, there is a 'Notification:' section with a toggle switch set to 'On'. The 'Time:' section has two input fields for '18' and '00', followed by the text '24 hour clock'. At the bottom of the form, there are 'Back' and 'Save' buttons. The footer of the app displays 'designed and developed by U6' and a standard Android navigation bar with back, home, and recent apps icons.

**Waste Collection**

### Collection Reminders

Would you like to be reminded to put your bins out the day before each collection? (A bell will sound and a message will appear in your notification bar).

These are dynamic reminders. They require a minimal infrequent Internet connection at least (once or twice a week) to work. The alarms can adapt and change to reflect last minute unscheduled changes to your bin collection day!

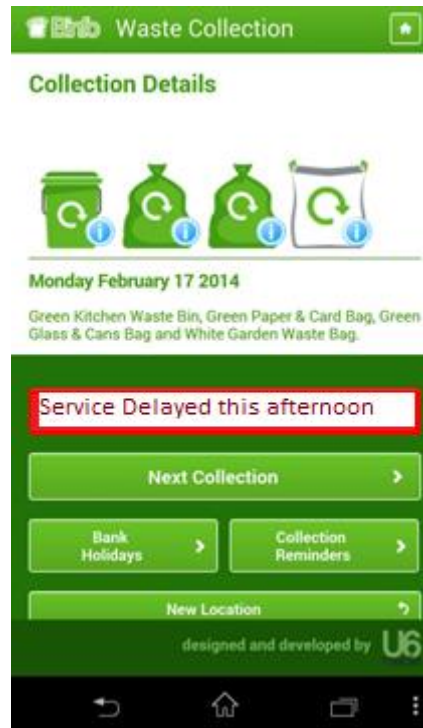
Notification:  
 On

Time:  
18 : 00 24 hour clock

designed and developed by **U6**



Or need to know if there is a service delay?



- ⚙️ RouteSmart users since 2007
- ⚙️ Drive change and efficiency in front line service delivery through intelligent design
  - ⚙️ Waste – Over 7.5 million collections per annum
  - ⚙️ Winter – Service 500 mile network with a pool of over 50 drivers over 3 shift patterns
  - ⚙️ Smaller projects such as SEN transport, security, grounds maintenance, meals delivery...
- ⚙️ Small team of 2 users



# Our drivers for change...

- Local government budgets reduced for front line services and back office support
- Digital by default for staff and customers
- Traditional maps and paper reports are being replaced. Why?
  - Cost, Dynamics, Limitations, Technology
- Customer, management and staff expectations now and in the future



- ⚙️ Distinction between service use and strategy
  - ⚙️ One off jobs to front line from call centre
  - ⚙️ Planned complex service delivery to front line
- ⚙️ Apply to the front line where applicable
  - ⚙️ Waste Management including service redesign
  - ⚙️ Street Servicing including service redesign
  - ⚙️ Gullies and Litter Bins including service redesign
- ⚙️ Link back office, call centre and front line with Navigator and Fusion



# What's the current situation

## Live with garden waste service

The screenshot displays the Fusion Live Map interface. The main map shows a residential area with numerous purple circular markers representing vehicles or service points. The interface includes a navigation bar at the top with options like 'Find', 'Service Map', 'Live View', 'Manager', and 'Reporting'. On the left, there is a 'Group' sidebar with 'Workspaces' listed, including 'WAC Garden' with sub-items 'Garden Waste 7731' (31% complete) and 'Garden Waste 7704' (27% complete). On the right, a 'Stats' panel shows '1 selected vehicle', 'Est. Completion: 13:20', 'Complete: 31%', and 'Total Distance: 20.3 miles'. Below the stats is a 'Reports' section with three colored indicators (red, orange, green) and a list of reports including 'Bin Not Out' (0 hrs 41 min) and 'Confirmed Assisted Collection' (0 hrs 31 min). The bottom of the screen shows a Windows taskbar with various application icons and a system tray with the time 08:16 and date 19/05/2015.



# What's the current situation



## Live with winter service

Fusion :: Service Map

fusion.integrated-skills.com/servicemap.php

FUSION

Find Service Map Live View Manager Reporting Logout

Routes Show All Routes

ROTHBURY TERRACE DEPOT

- Central\_1
- Central\_2
- Central\_3
- Central\_4
- Central\_5
- Central\_6
- CityCentre
- East\_1
- East\_2
- East\_3
- East\_4
- North\_1
- North\_2
- SnowRouteA
- SnowRouteB
- SnowRouteC
- SnowRouteD
- SnowRouteE
- West\_1
- West\_2

08:19  
19/05/2015

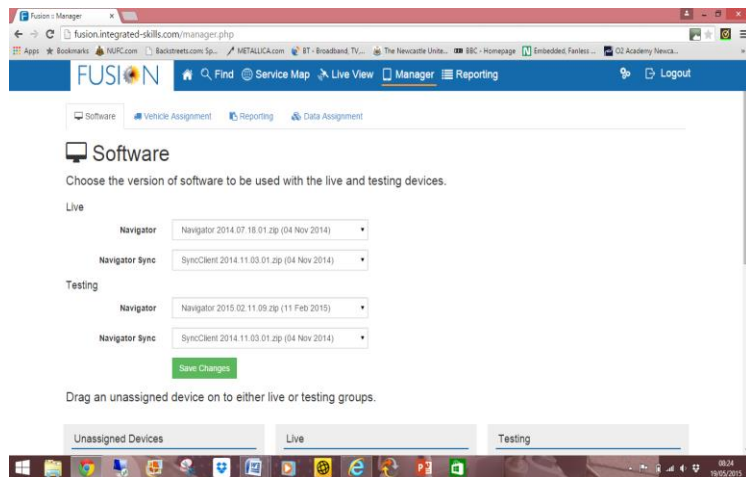





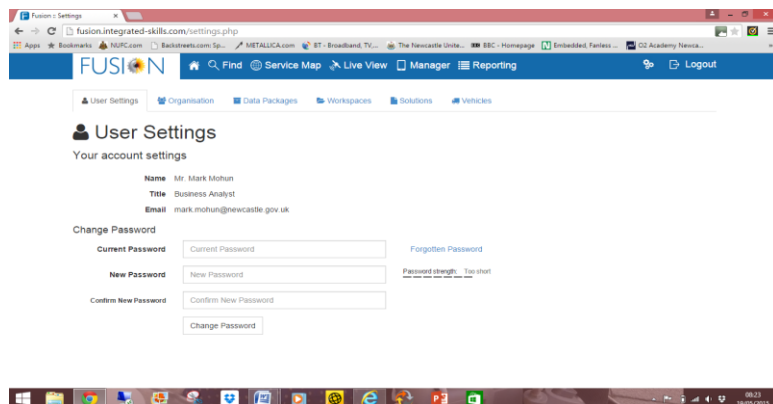
# What's the current situation



 Data transfer tools fully tested and working



 Software and data packages synced for all users



 Full control over user settings and privacy



- Information for anyone who needs to know
- Clear, accurate useful information in real time with minimum effort – In the Cloud
  - Issues / Completion rates / Status
- Clear detailed plans of work, resource, cost and risk for any applicable service
- Geographically tailored service delivery
- React to change in policy – Dynamic and digital by default





# Integrated Skills



**Thank You**  
**Any Questions**