Self-Containment of Crime:

- area based analysis of Journey to Crime (J2C) trips & the concept of self-predation.

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GIS &Crime Mapping

Aim

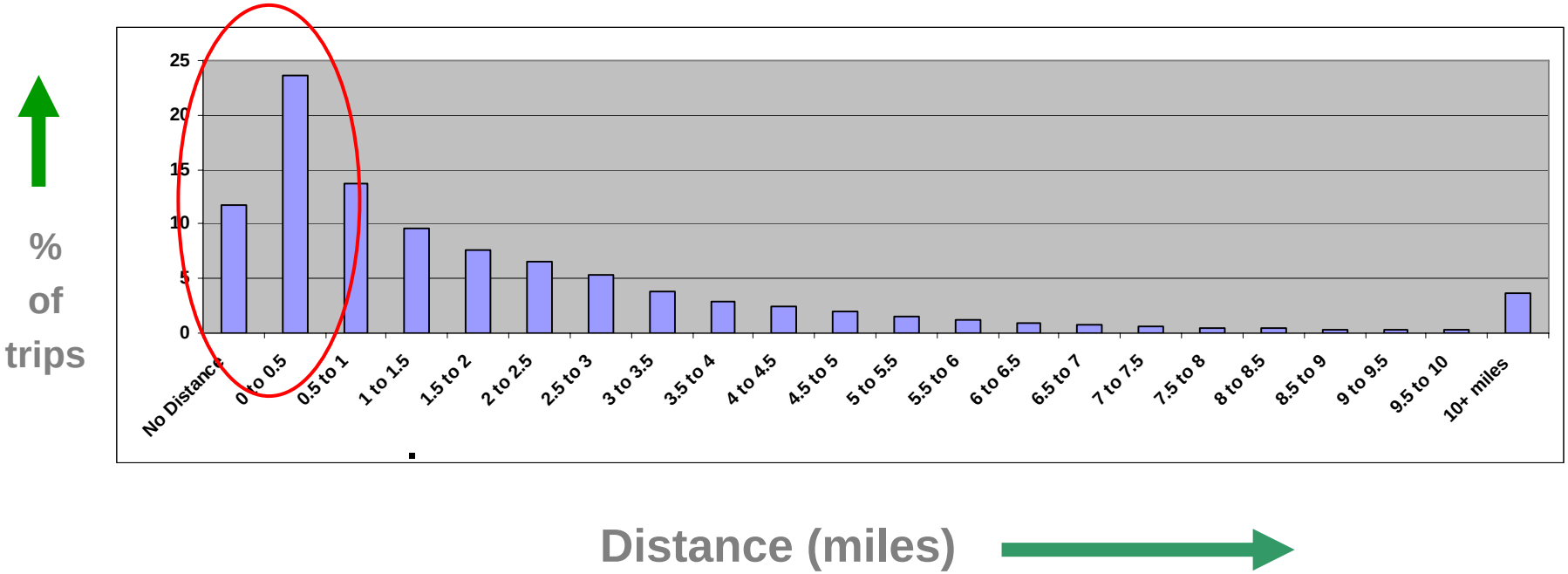
Previous J2C research:

- **individuals (profiling)**
- **criminal groups**
- **crime type, age, gender etc.**

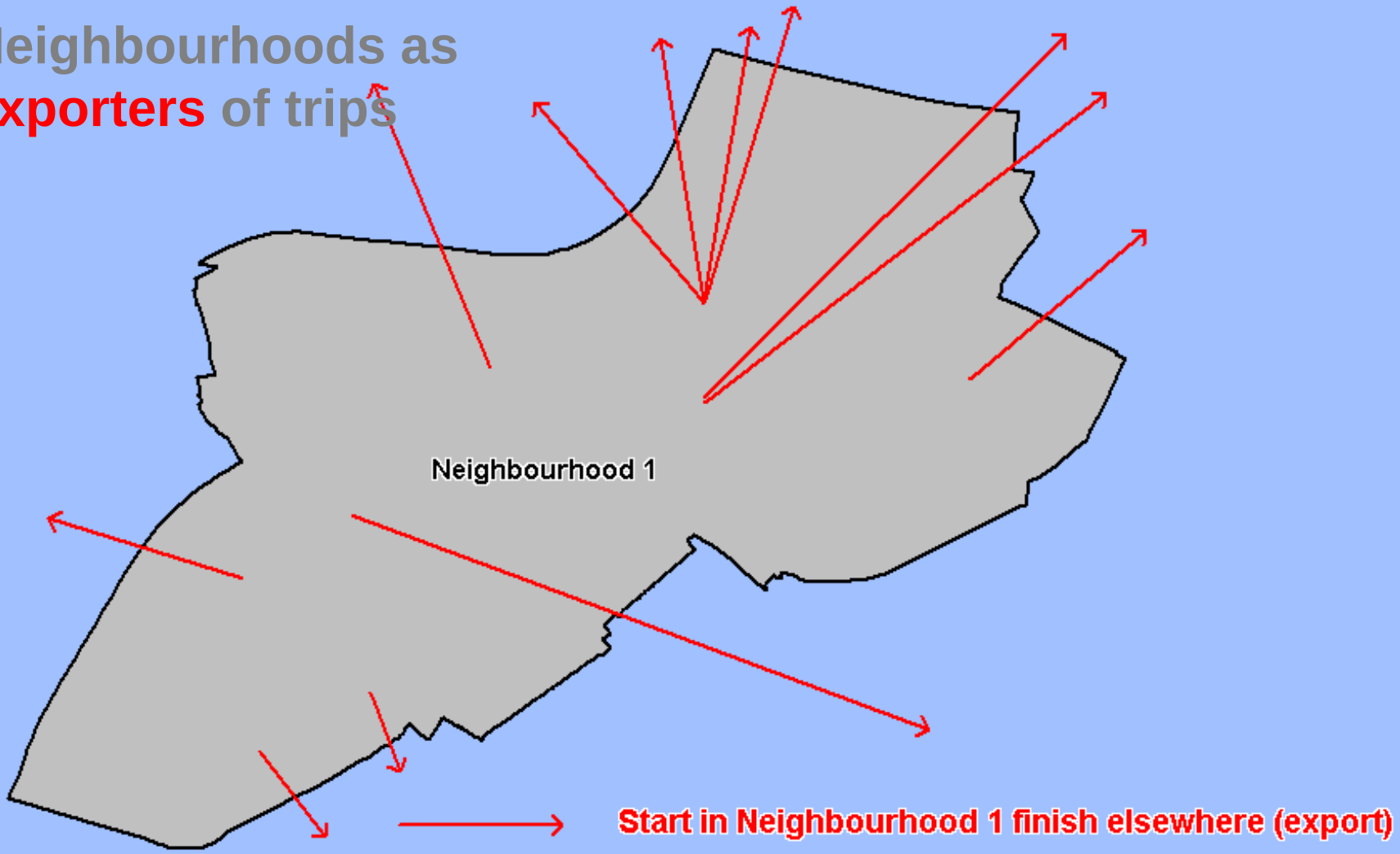
This research looks at J2C trips aggregated to areas:

- **trip origins**
- **destinations**
- **concentrate on those areas suffering from local offending i.e. short J2C – origin and destination fall in same area**
- **Step by step guide to calculating self-containment index (SCI)**

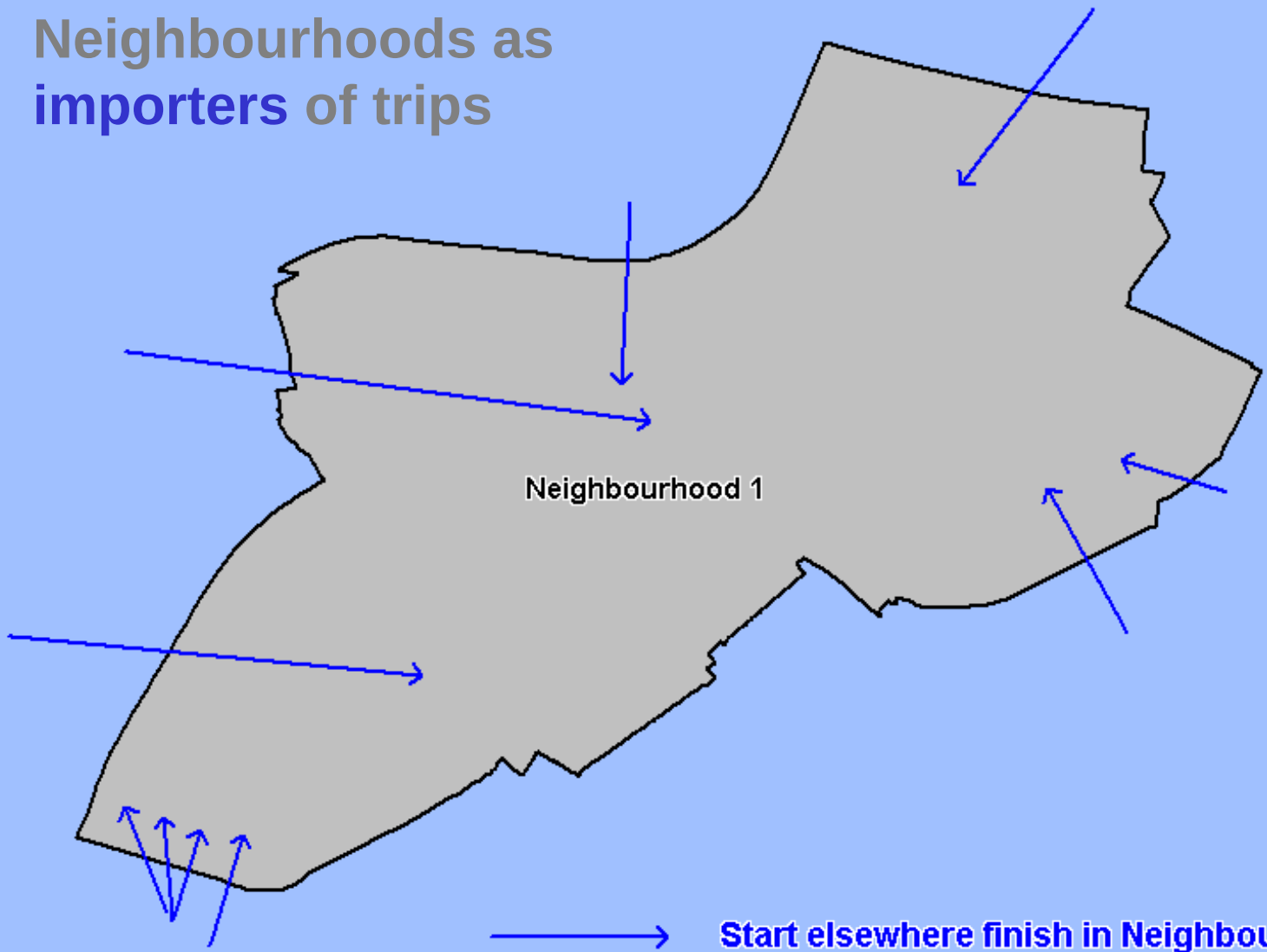
Distance travelled to crime



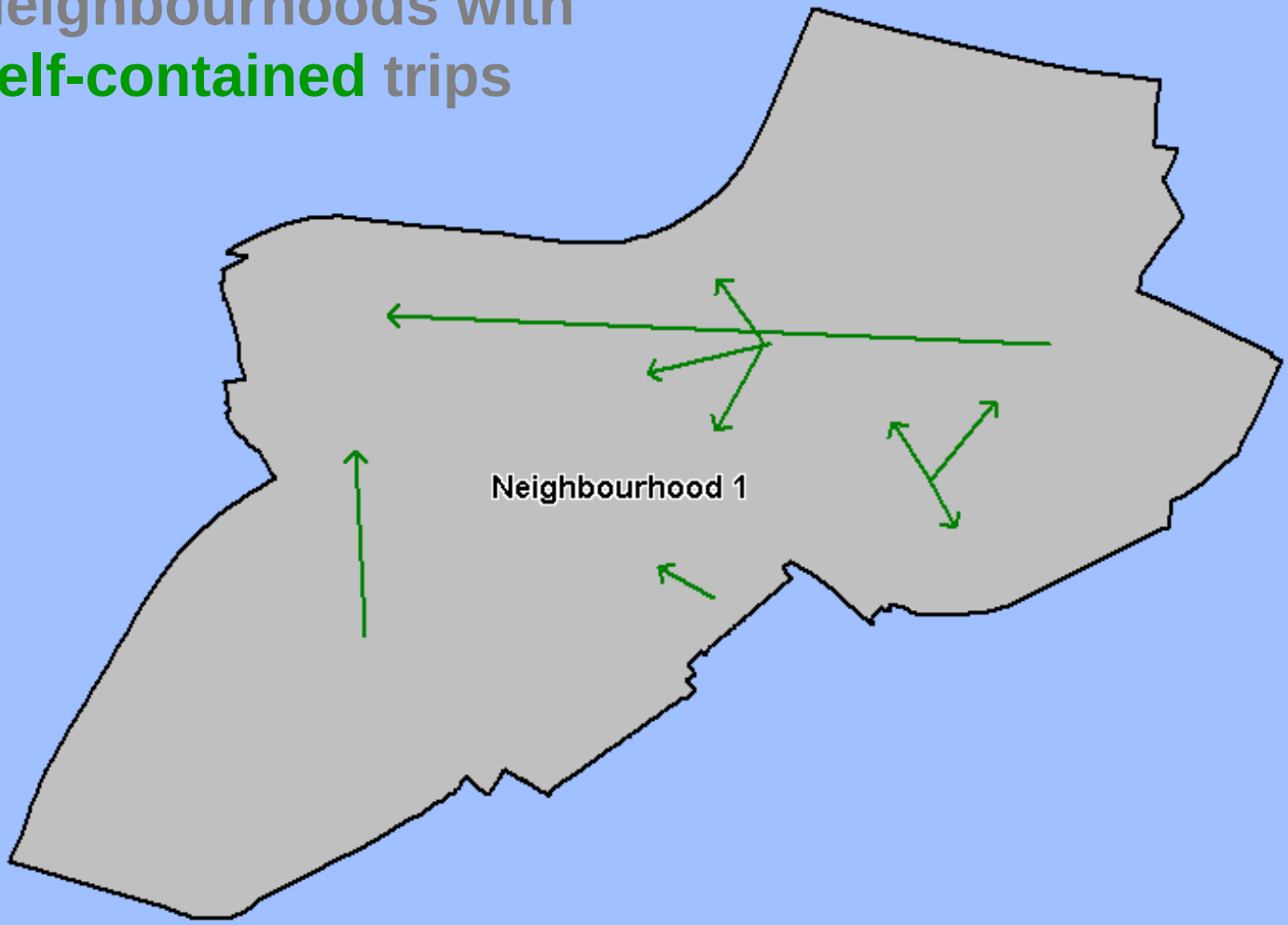
Neighbourhoods as **exporters** of trips



Neighbourhoods as **importers** of trips

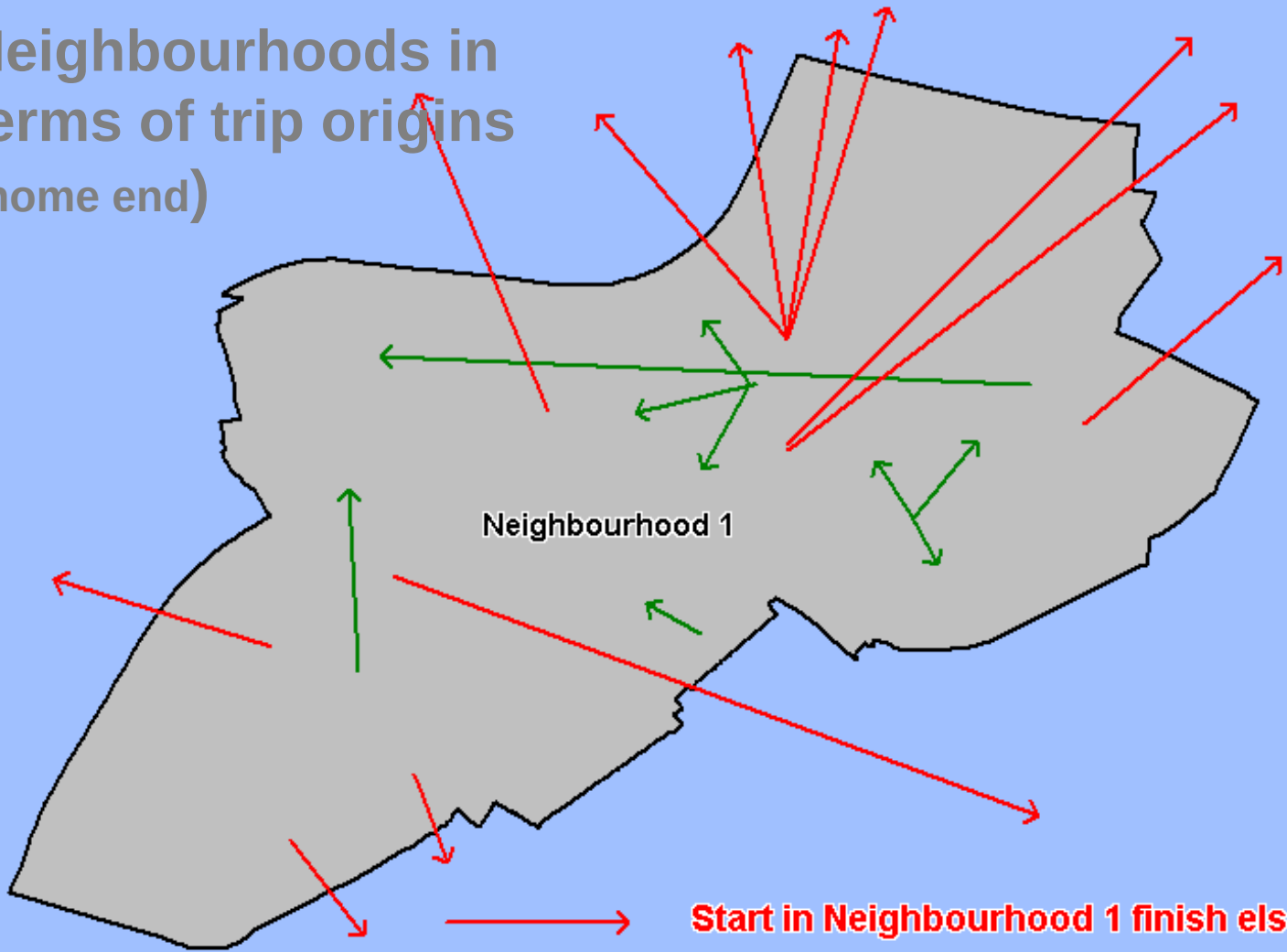


Neighbourhoods with **self-contained** trips

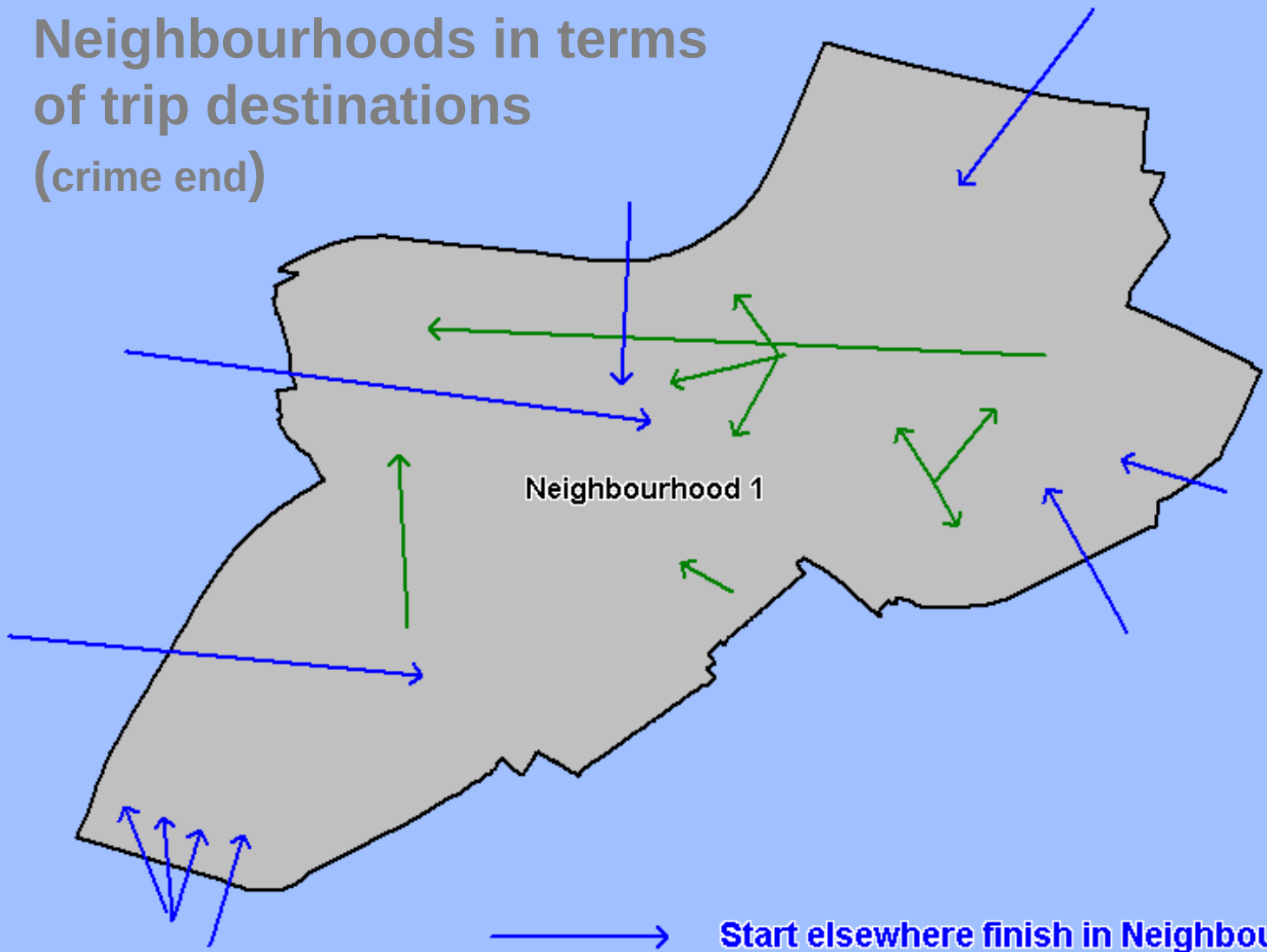


Start and Finish in Neighbourhood 1 (self-contained)

Neighbourhoods in terms of trip origins (home end)

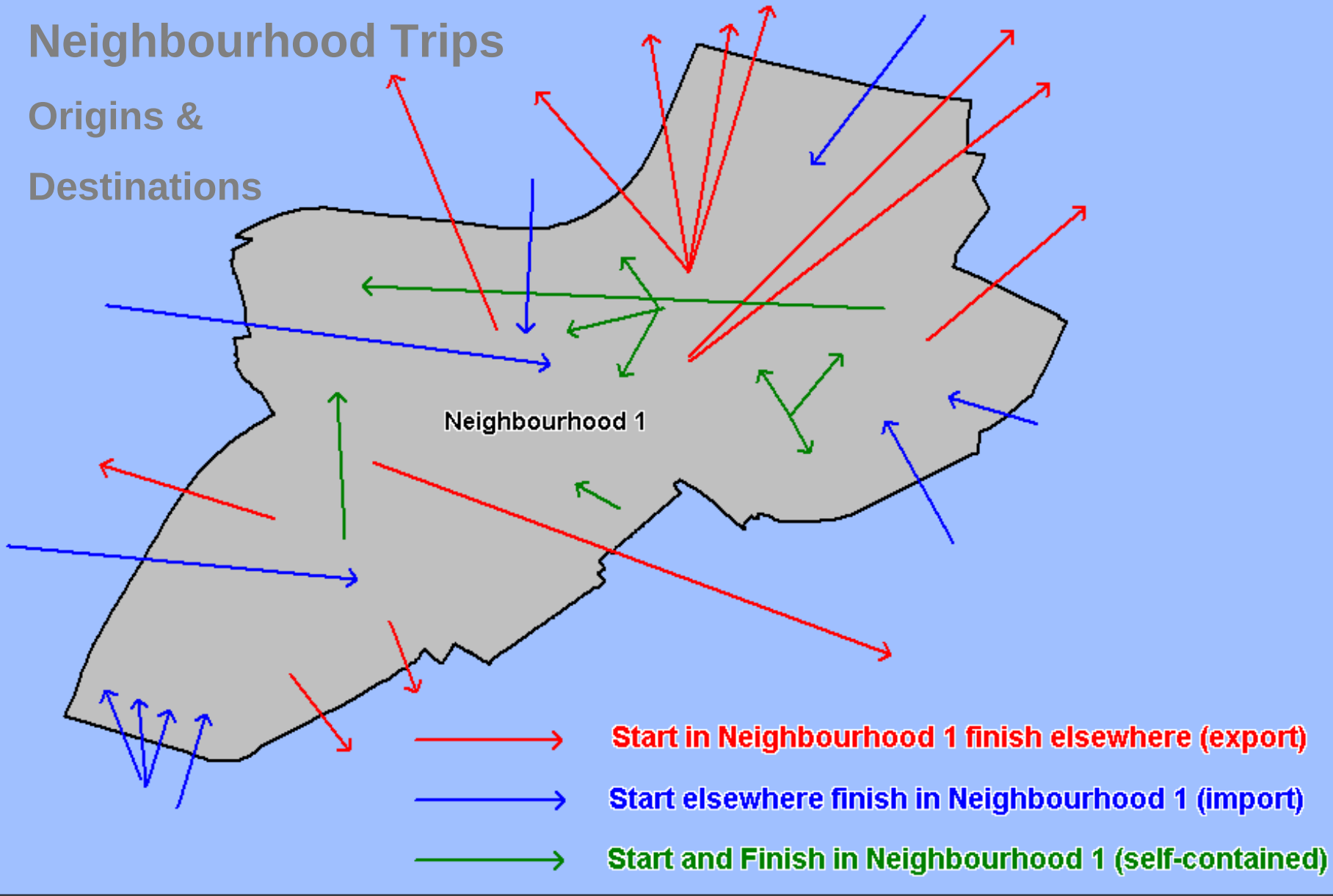


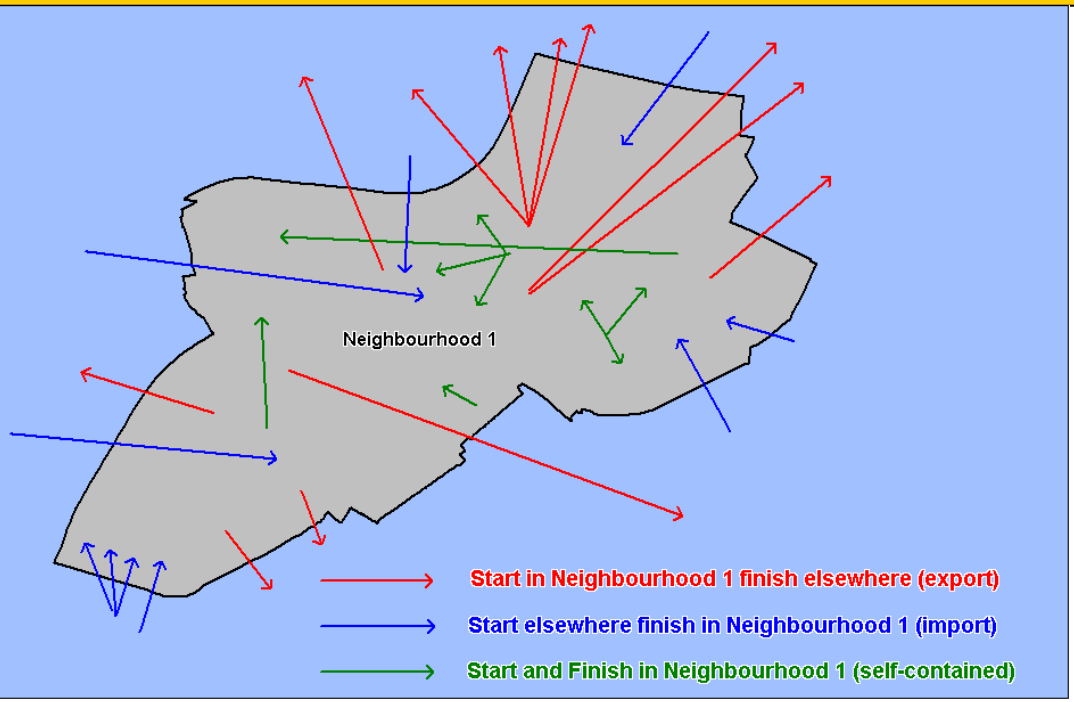
Neighbourhoods in terms of trip destinations (crime end)



Neighbourhood Trips

Origins & Destinations





Self-containment index (SCI):

"proportion of detected crime in an area committed by offenders who live in the same area"

more specifically:

"proportion of J2C trip ends that have an origin in the same area".

Measure of:

"local offending" or

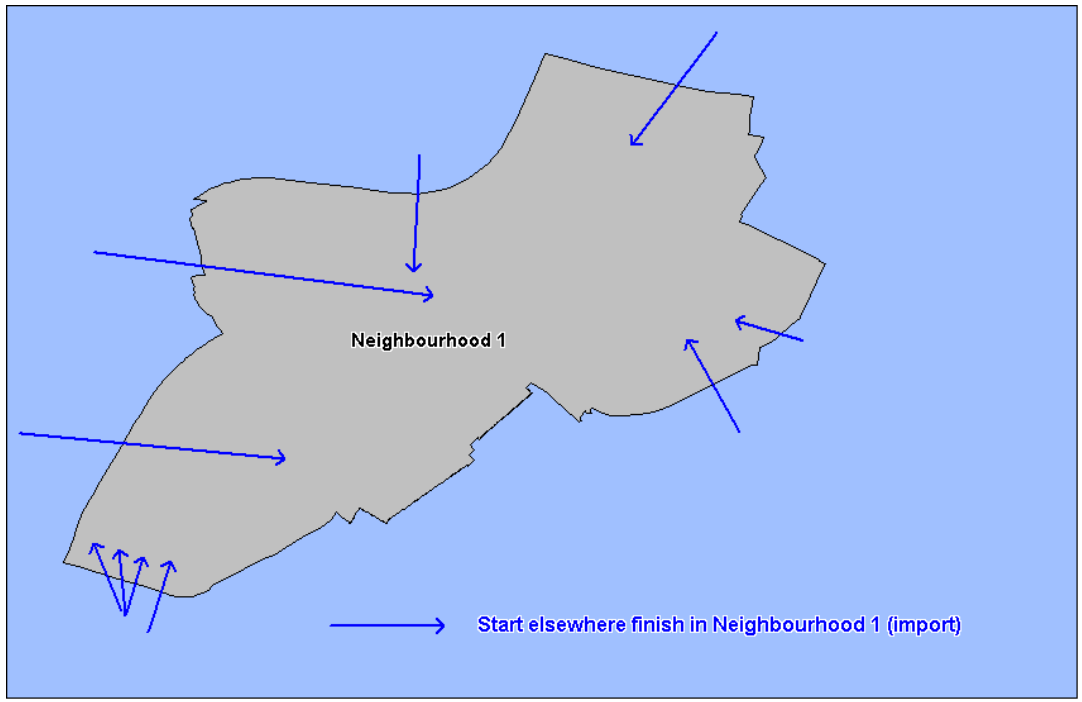
"self-predation"

SCI = 0	NO trip ends originate from inside the neighbourhood (travelling criminals)
SCI = 100	ALL trip ends originate from inside the neighbourhood (local criminals)

Example: Calculating the SCI:

Total J2C trips ending in Neighbourhood 1:

10 (imported) +



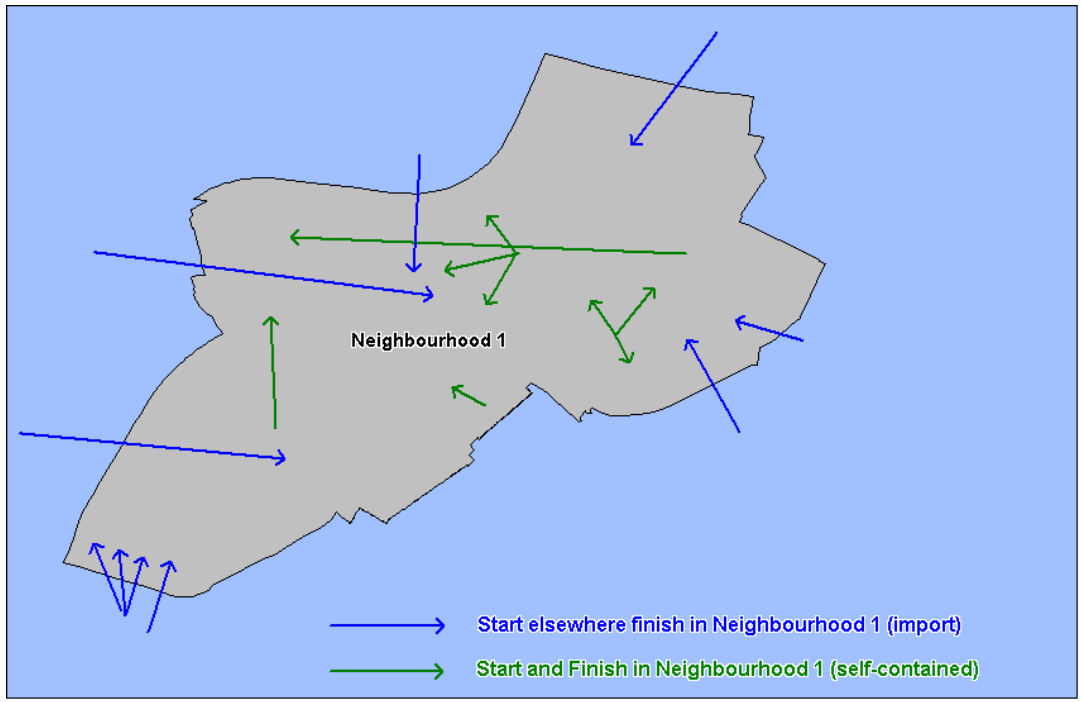
Example: Calculating the SCI:

Total J2C trips ending in Neighbourhood 1:

10 (imported) +

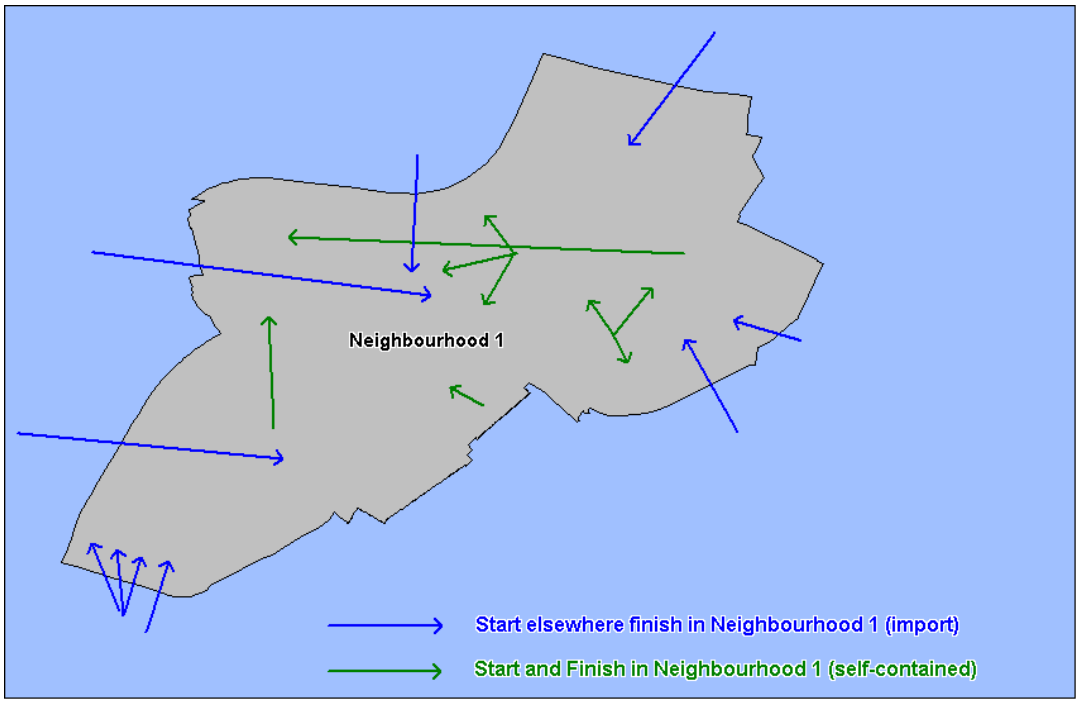
9 (within)

19 in total



Calculating the SCI:

$$SCI = \frac{\text{Start and finish in same neighbourhood}}{\text{total trip ends in the neighbourhood}} = \frac{9}{19} * 100 = 47$$



Methodology:

- 3 years defendant & crime data - crime occurred between April 2003 & March 2006
  - home & offence location
  - crime type,
  - age, gender, prolific flag

- 247,000 trips
- 197,000 crimes

- locations cleaned to best possible extent
- 27,600 (11%) excluded due to poor geo-coding
- leaving 219,400 trips

- Using MapInfo - point in polygon search of both trip ends (O&D) into “geographies of interest” - Force, CSP, wards, neighbourhoods, census areas.

- export to SPSS and merge defendant data file with crime data file

Methodology…. the database bit

Defendant Data

C Num	Name	H_Ward	H_neigh
C1	Andy	Ward A	N1
C1	Steve	Ward A	N2
C2	Paul	Ward B	N3
C3	John	Ward C	N4

Crime Data

C Num	C_Ward	C_neigh
C1	Ward A	N2
C2	Ward B	N3
C3	Ward D	N6

Many : 1

C Num	Name	H_Ward	H_neigh	C-ward	C_neigh
C1	Andy	Ward A	N1	Ward A	N2
C1	Steve	Ward A	N2	Ward A	N2
C2	Paul	Ward B	N3	Ward B	N3
C3	John	Ward C	N4	Ward D	N6

Methodology…. the database bit

C Num	Name	H_Ward	H_neigh	C-ward	C_neigh	SCI (ward)	SCI (neigh)
C1	Andy	Ward A	N1	Ward A	N2	Y	N
C1	Steve	Ward A	N2	Ward A	N2	Y	Y
C2	Paul	Ward B	N3	Ward B	N3	Y	Y
C3	John	Ward C	N4	Ward D	N6	N	N

Methodology…. the database bit

C Num	Name	H_Ward	H_neigh	C-ward	C_neigh	SCI (ward)	SCI (neigh)
C1	Andy	Ward A	N1	Ward A	N2	Y	N
C1	Steve	Ward A	N2	Ward A	N2	Y	Y
C2	Paul	Ward B	N3	Ward B	N3	Y	Y
C3	John	Ward C	N4	Ward D	N6	N	N

Trip 1: Home ward = Crime ward SCI = “Y”

Methodology…. the database bit

C Num	Name	H_Ward	H_neigh	C-ward	C_neigh	SCI (ward)	SCI (neigh)
C1	Andy	Ward A	N1	Ward A	N2	Y	N
C1	Steve	Ward A	N2	Ward A	N2	Y	Y
C2	Paul	Ward B	N3	Ward B	N3	Y	Y
C3	John	Ward C	N4	Ward D	N6	N	N

Trip 1: Home neigh < > Crime neigh SCI = “N”

Methodology…. the database bit

C Num	Name	H_Ward	H_neigh	C-ward	C_neigh	SCI (ward)	SCI (neigh)
C1	Andy	Ward A	N1	Ward A	N2	Y	N
C1	Steve	Ward A	N2	Ward A	N2	Y	Y
C2	Paul	Ward B	N3	Ward B	N3	Y	Y
C3	John	Ward C	N4	Ward D	N6	N	N

Trip 2: Home ward = Crime ward SCI = “Y”

Methodology…. the database bit

C Num	Name	H_Ward	H_neigh	C-ward	C_neigh	SCI (ward)	SCI (neigh)
C1	Andy	Ward A	N1	Ward A	N2	Y	N
C1	Steve	Ward A	N2	Ward A	N2	Y	Y
C2	Paul	Ward B	N3	Ward B	N3	Y	Y
C3	John	Ward C	N4	Ward D	N6	N	N

Trip 2: Home neigh = Crime neigh SCI = “Y”

Methodology…. the database bit

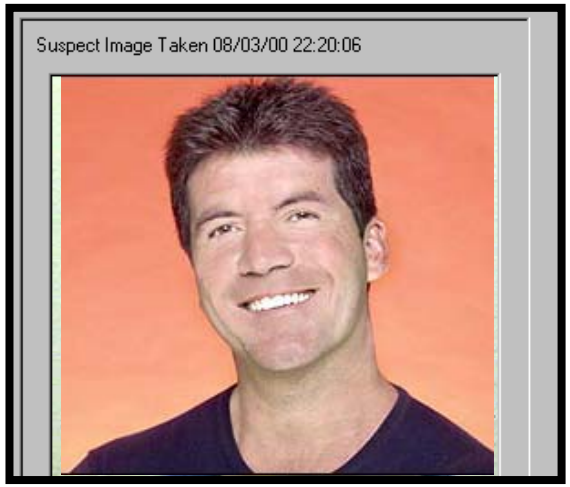
C Num	Name	H_Ward	H_neigh	C-ward	C_neigh	SCI (ward)	SCI (neigh)
C1	Andy	Ward A	N1	Ward A	N2	Y	N
C1	Steve	Ward A	N2	Ward A	N2	Y	Y
C2	Paul	Ward B	N3	Ward B	N3	Y	Y
C3	John	Ward C	N4	Ward D	N6	N	N

Aggregate on the crime location (ward or neighbourhood)

Search for the perfect geography

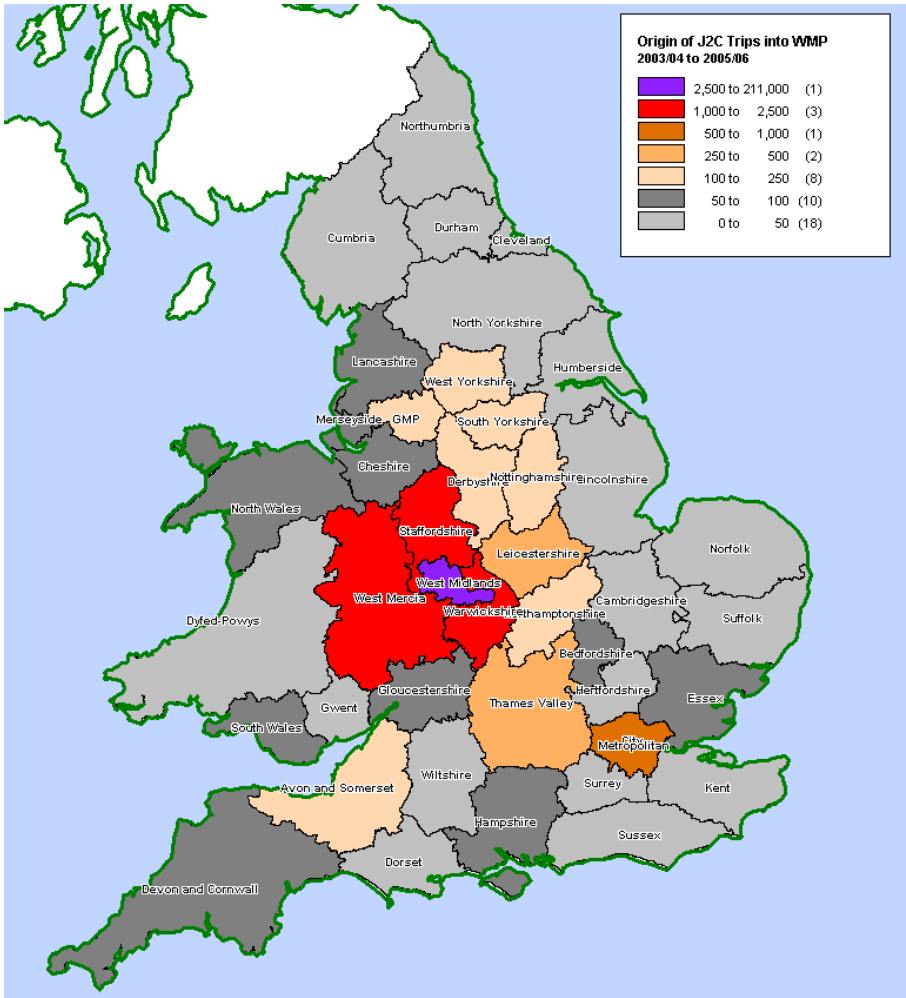
The ultimate outer boundary….?

West Midlands Police – Most Wanted



Have you seen these men ? Call free on 0800….

Force level analysis



218,000 trips

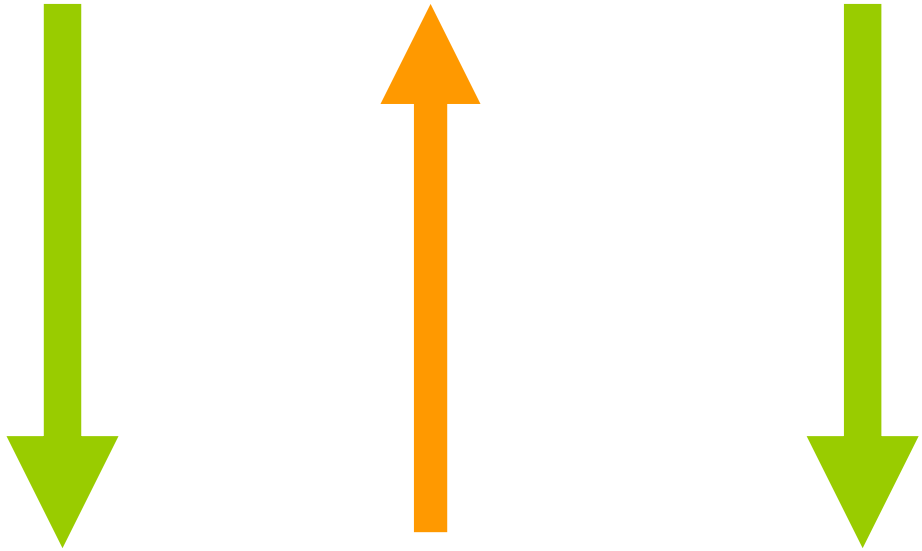
210,000 trips from **within** Force area

8,000 trips from **outside** force area

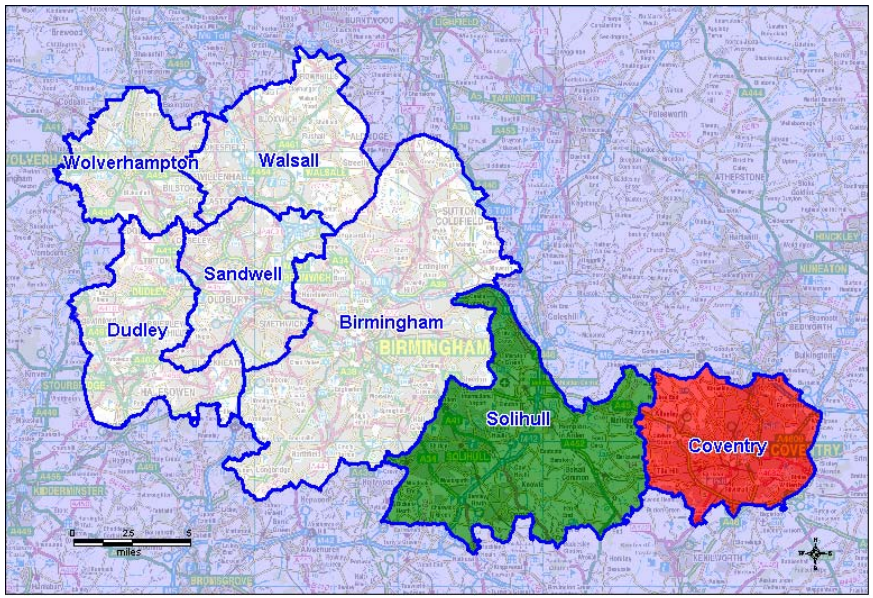
SCI = 96

Effect of looking at smaller areas

Geographical Area	Chance of crossing a boundary	SCI
•Force (1 area)		
•CSP (7 areas)		
•Ward (163 areas)		
•Neighbourhood (382 areas)		
•SOA Census areas (1,687 areas)		

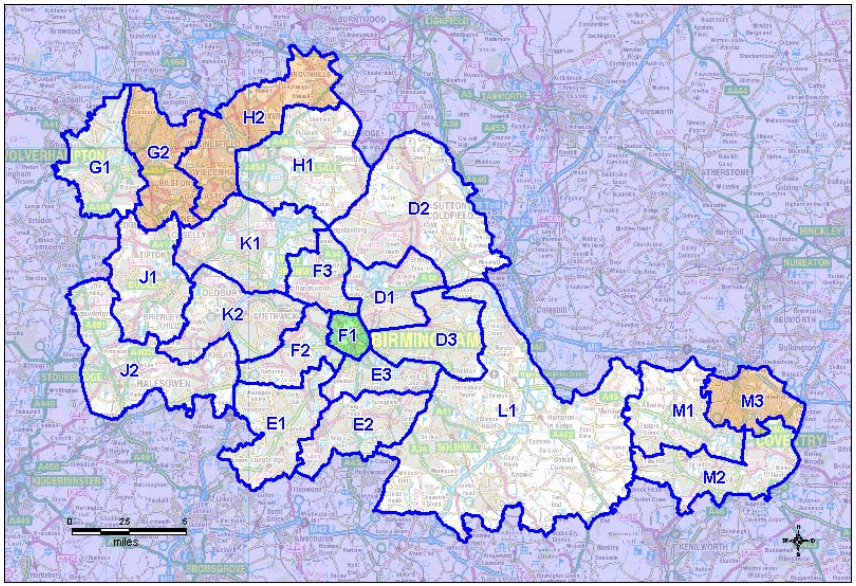


CSP level analysis

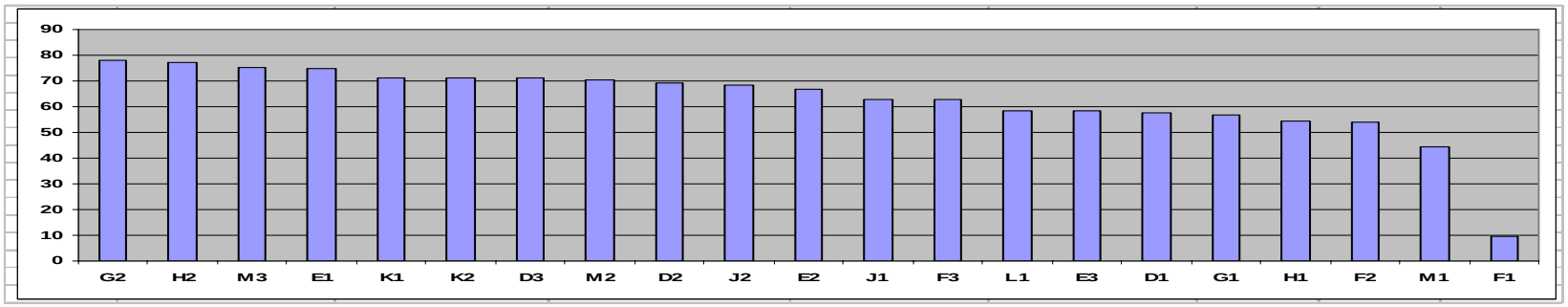


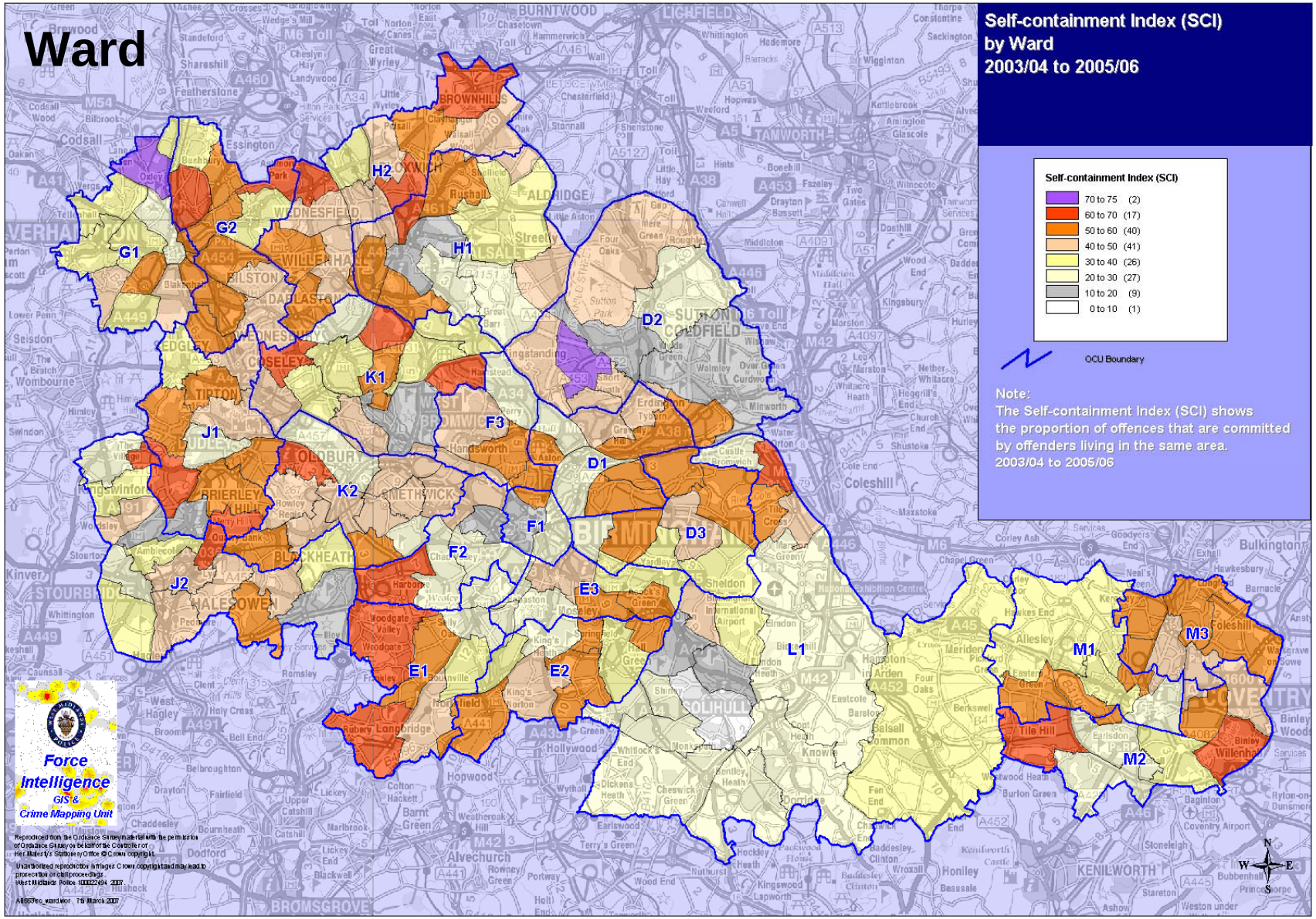
CSP	SCI
•Coventry	91.5
•Birmingham	89.1
•Wolverhampton	86.1
•Walsall	80.7
•Dudley	76.0
•Sandwell	78.0
•Solihull	57.2

Operational Command Unit (OCU) level analysis (21 areas)

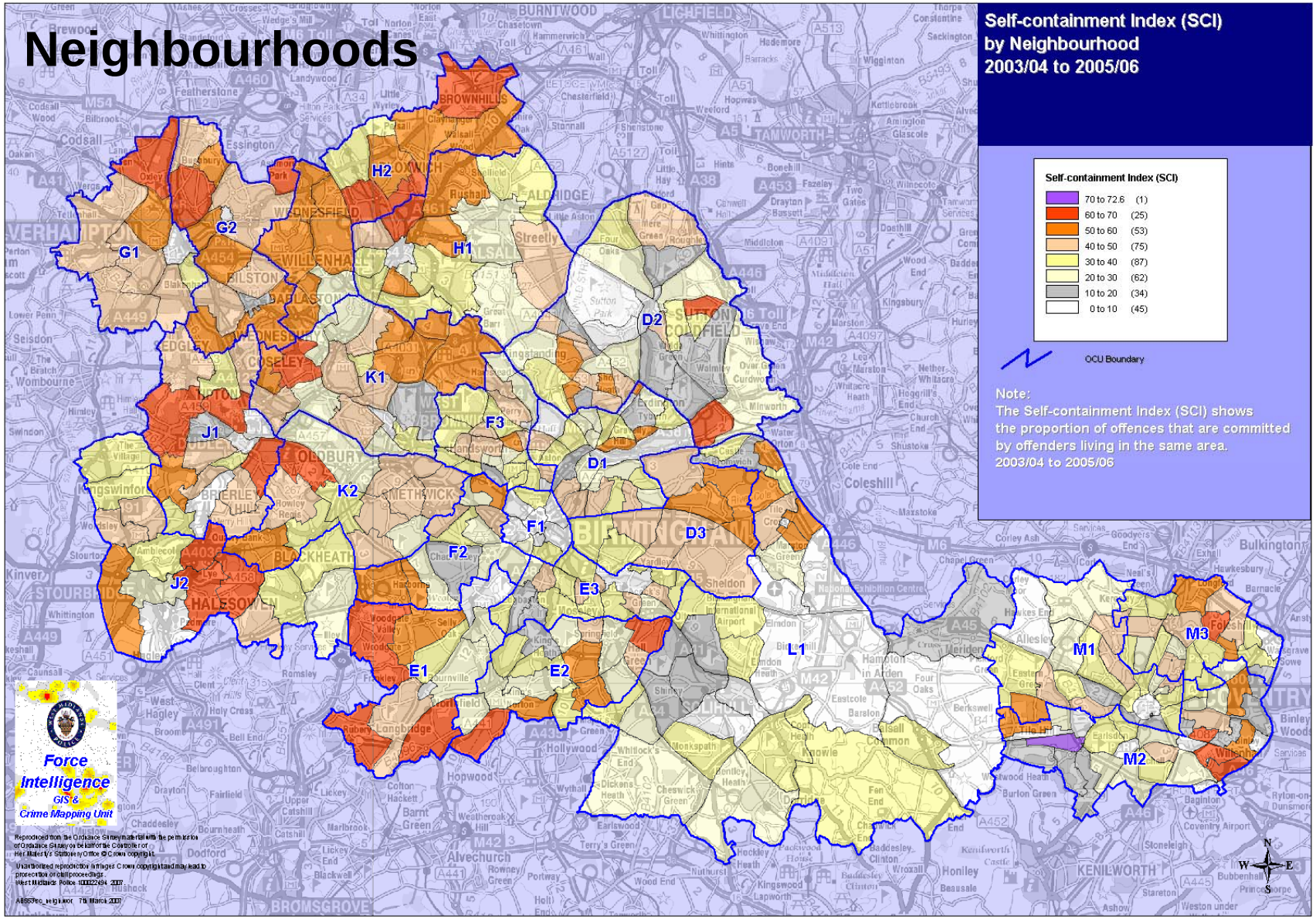


•OCU	SCI
•G2	78.0
•H2	77.0
•F2	54.0
•M1 (includes a City centre)	44.1
•F1 (City centre)	9.5

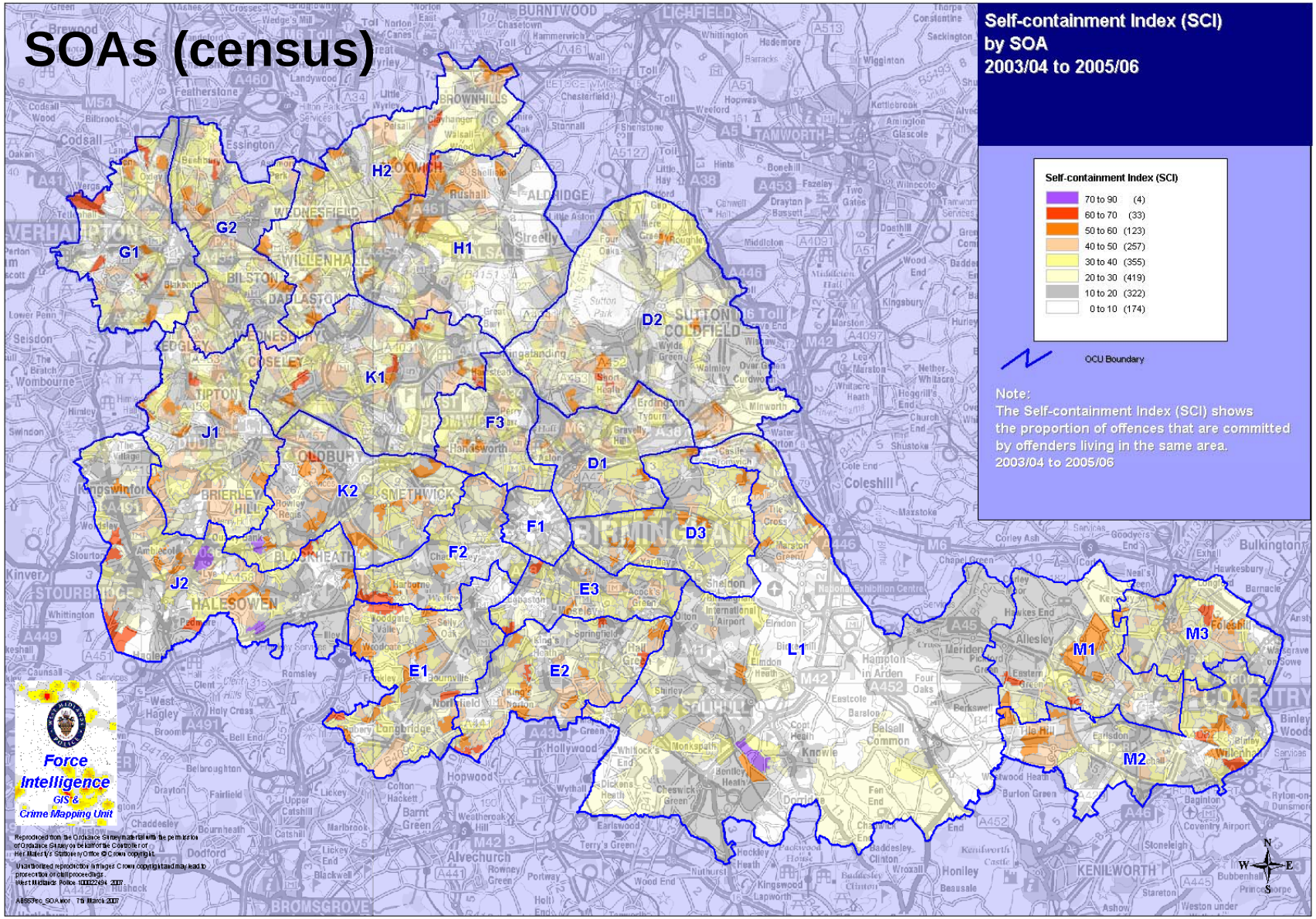



Ward
Self-containment Index (SCI)
by Ward
2003/04 to 2005/06
Self-containment Index (SCI)
70 to 75 (2)
60 to 70 (17)
50 to 60 (40)
40 to 50 (41)
30 to 40 (26)
20 to 30 (27)
10 to 20 (9)
0 to 10 (1)
OCU Boundary
Note:
The Self-containment Index (SCI) shows the proportion of offences that are committed by offenders living in the same area.
2003/04 to 2005/06
G1
G2
H1
H2
J1
J2
K1
K2
D1
D2
D3
F1
F2
F3
E1
E2
E3
L1
M1
M2
M3
Force Intelligence
GIS & Crime Mapping Unit

Neighbourhoods



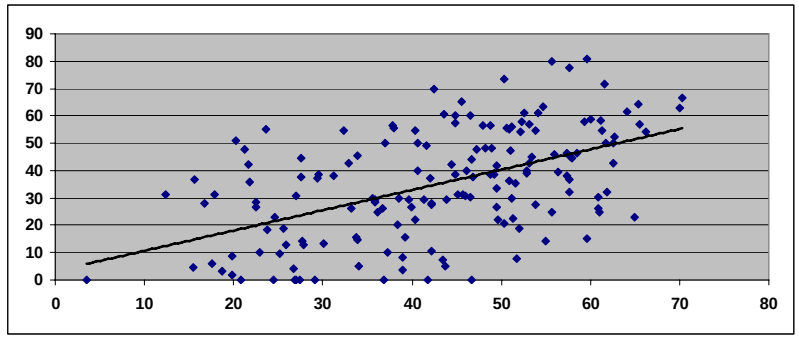
SOAs (census)


Self-containment Index (SCI)
by SOA
2003/04 to 2005/06
Self-containment Index (SCI)
70 to 90 (4)
60 to 70 (33)
50 to 60 (123)
40 to 50 (257)
30 to 40 (355)
20 to 30 (419)
10 to 20 (322)
0 to 10 (174)
OCU Boundary
Note:
The Self-containment Index (SCI) shows the proportion of offences that are committed by offenders living in the same area.
2003/04 to 2005/06
G1
G2
H1
H2
J1
J2
K1
K2
F1
F2
F3
D1
D2
D3
E1
E2
E3
L1
M1
M2
M3
Force Intelligence
GIS & Crime Mapping Unit

Do SCI values vary by crime type?

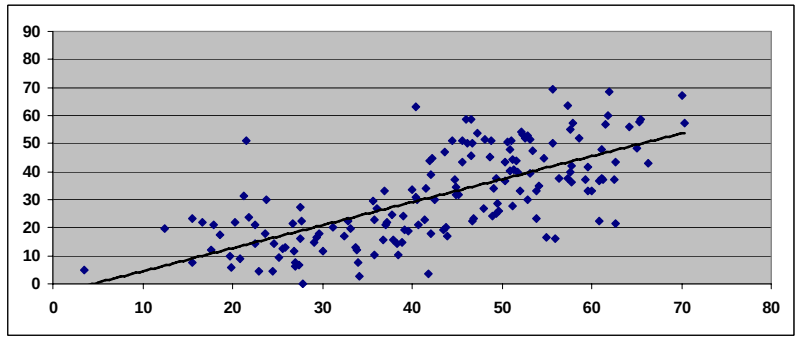
Residential Burglary

All crime:BDH 0.53



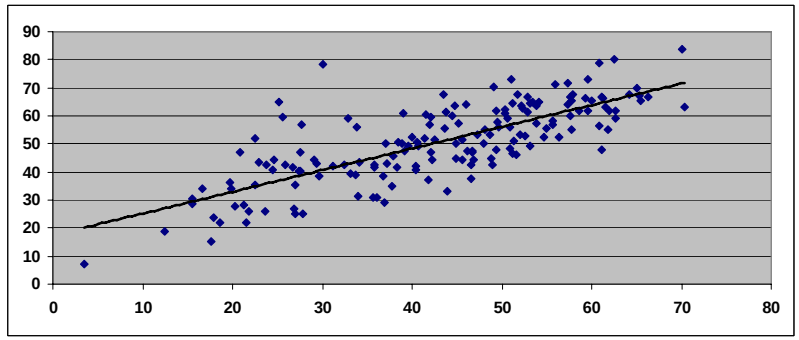
Vehicle crime

All Crime:vehicle crime 0.7



Criminal Damage

All crime:crim damage 0.77

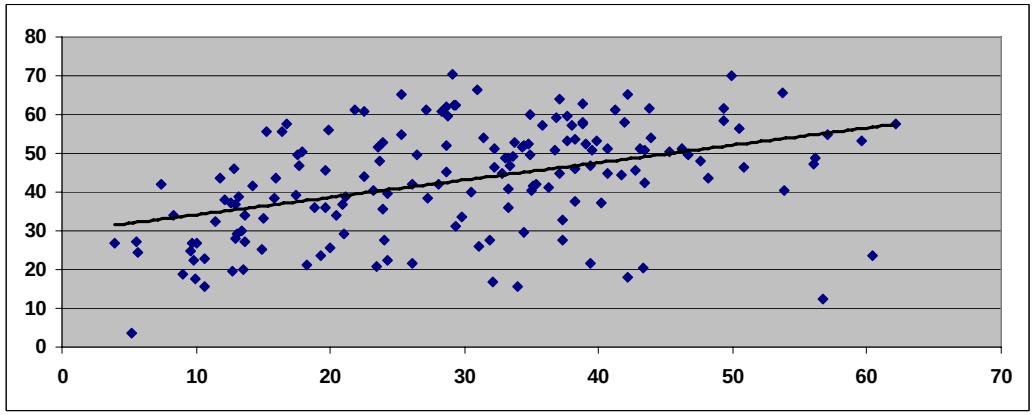


Does SCI correlate with other factors?

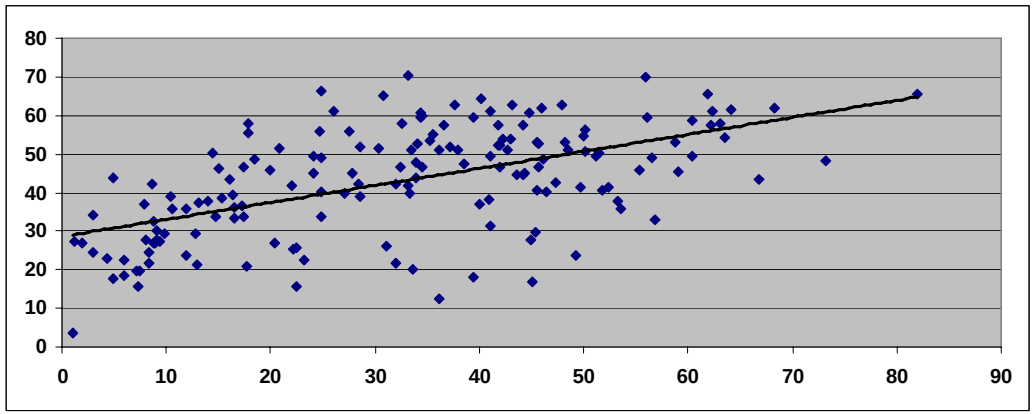
Correlations with deprivation

ward level n = 163

IMD overall 0.43



IMD education 0.56

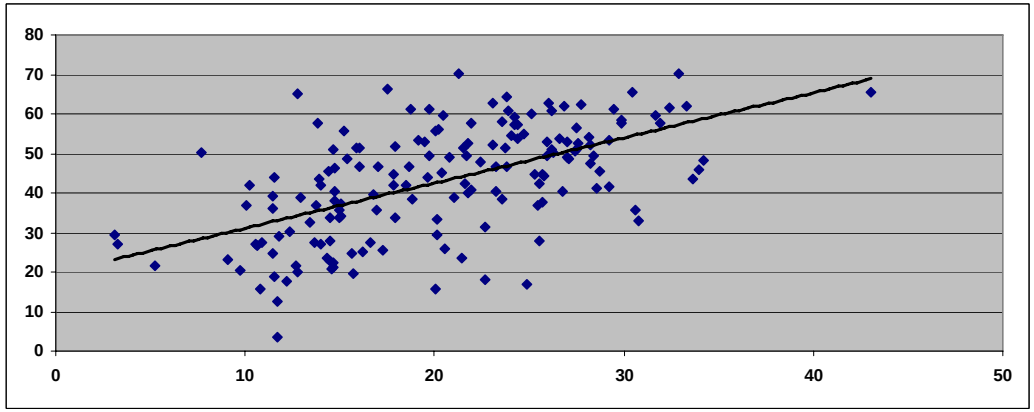


Does SCI correlate with other factors?

Correlations with census ward level n = 163

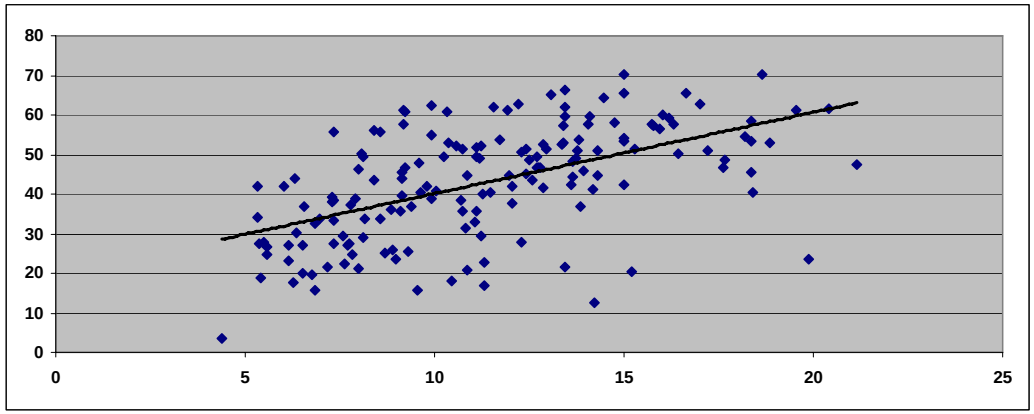
% 16-24 no qualifications

0.57



% lone parent families

0.55



Does SCI correlate with other factors?

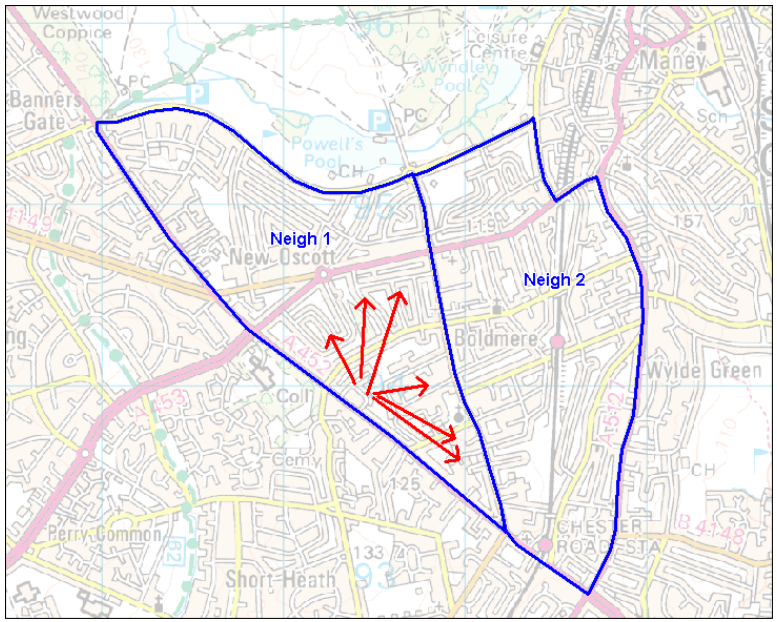
- many reasons why areas have high SCI
- no one overall reason (variable)
- very complex offending patterns
- different reasons for different areas
- Even within same crime types & victims

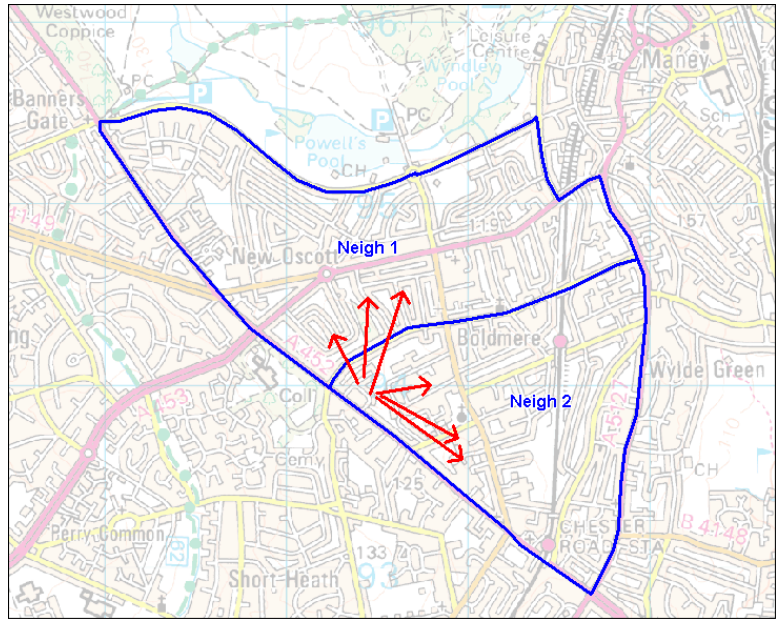
For example by MO

- Elderly victims
  - breaking in
  - local offenders
  - distraction burglars – long J2C

Potential Problems…?

SCI is a very ruthless statistic

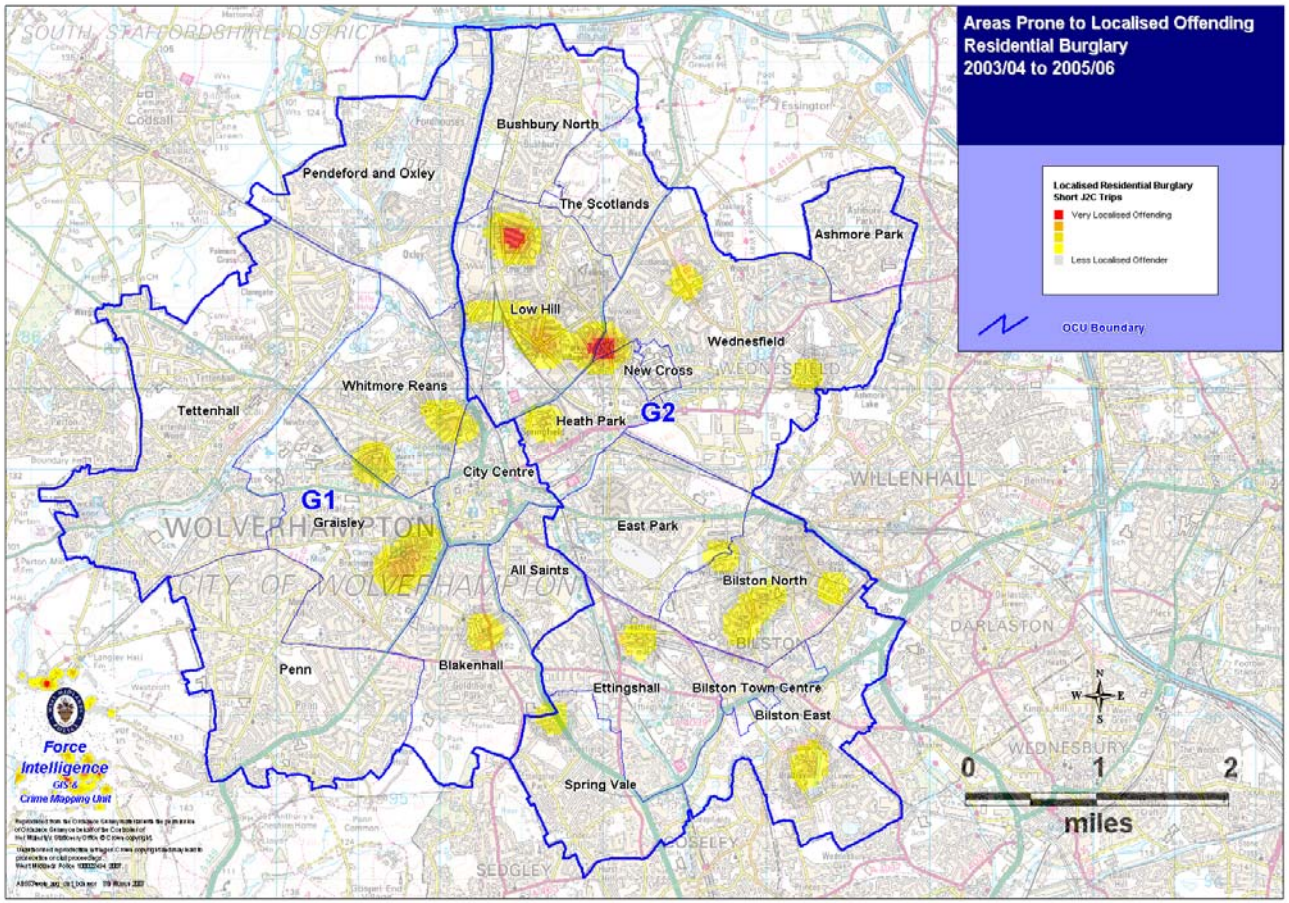




very susceptible to small changes in the boundary

Localised Offending in Wolverhampton

Residential Burglary



So what……

how can this inform policing & drive crime prevention?

National Intelligence Model (NIM) – business framework – policing & partnership activity is evidence based and analysis driven

- SCI is measurable
- SCI easy to calculate
- SCI easy to understand

Intelligence Products:

- Strategic assessments
- Crime pattern analysis
- Tactical Assessments
- Problem Profiles
- Results analysis (e.g. displacement)

So what……?

Neighbourhood Policing

- planning neighbourhood areas
- neighbourhood profiling
- offender profiling

www.neighbourhoodpolicing.co.uk

Community Cohesion & Fear of Crime

Neighbourhood watch scheme

Watch your scheming neighbour

Does local offending have a disproportionate impact on fear of crime?

So what……?

- Strategic & Local Offender Management
- understand size & nature of J2C

Tactical options and allocation of resources

High SCI (local offending)

- PCSOs
  - local intelligence (problems with evidence gathering)
  - local reassurance
  - reliance on & /need for CHIS (management issues)
  - use of Key Individual Network (KINs) – community contacts
- Juvenile risk factors – exposure to local offenders
- Need for community based organisations (youth)
- Location for local stations
- Physical prevention measures may be less effective (know their way around)
- Different situational crime prevention measures e.g ally-gating won't work
- covert activity

Tactical options and allocation of resources

Low SCI (travelling offenders)

- ANPR
- Police Patrol activity – interdiction of major travel routes
- "Lock downs"
- Safer Travel operations (public transport)
- overt activity

Other issues:

- Higher costs of investigating (officer movements)
- Intelligence gathering and organisational memory
- Cross OCU communication & intelligence sharing

What next……?

- Accessibility studies
- Mode of travel of offenders
- Geo-demographic analysis
- Link in with Feeling the Difference Survey (customer/public attitude surveys)

Thank you for listening.....

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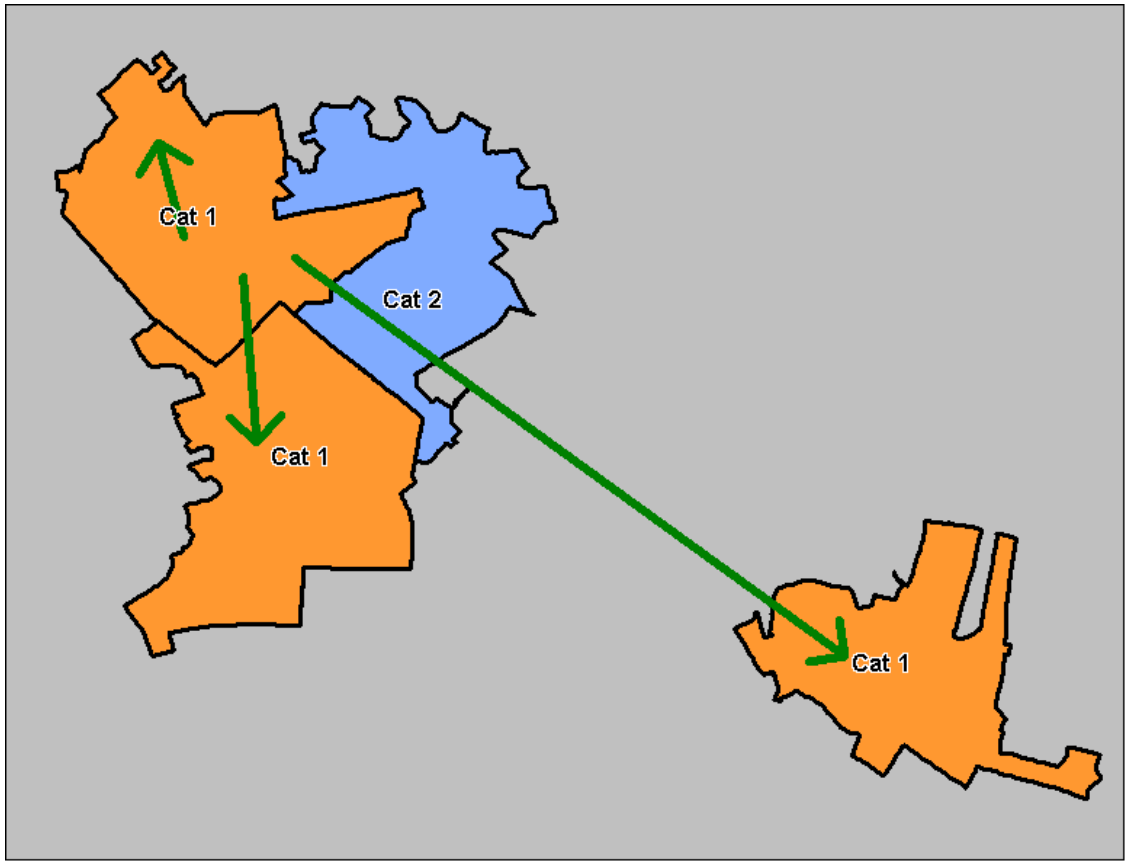
GIS &Crime Mapping

ACORN© - Geo-demographic analysis

5 Categories	- Wealthy Achievers	>>>	Hard Pressed
17 Groups	- Wealthy Executives	>>>	Inner City Adversity
56 Types	- wealthy working families with mortgages …… singles and single parents, high rise estates		

ACORN© - Geo-demographic analysis

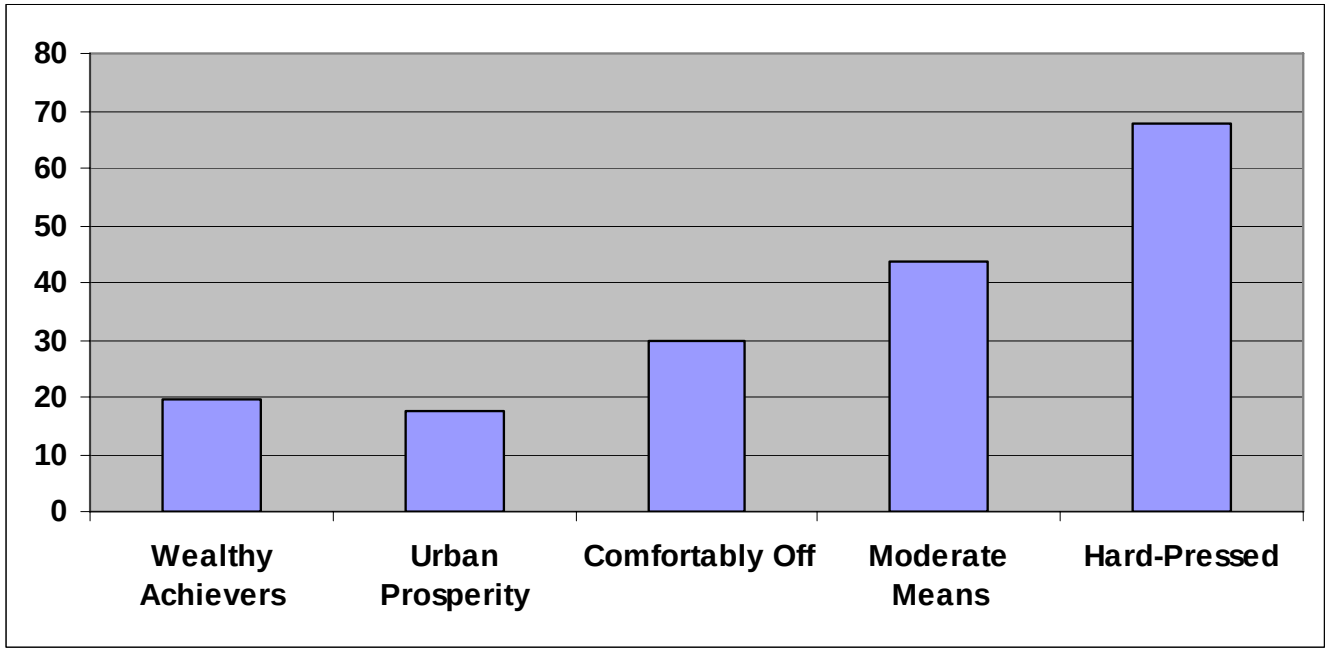


Self-containment within typology

NOT just within a

geographical boundary

ACORN© - Geo-demographic analysis



Analysis by

ACORN CATEGORY

Wealthy achievers	All Crime	SCI = 19.7
Urban Prosperity	All Crime	SCI = 17.8
Hard Pressed	All Crime	SCI = 67.6

Thank you for listening.....

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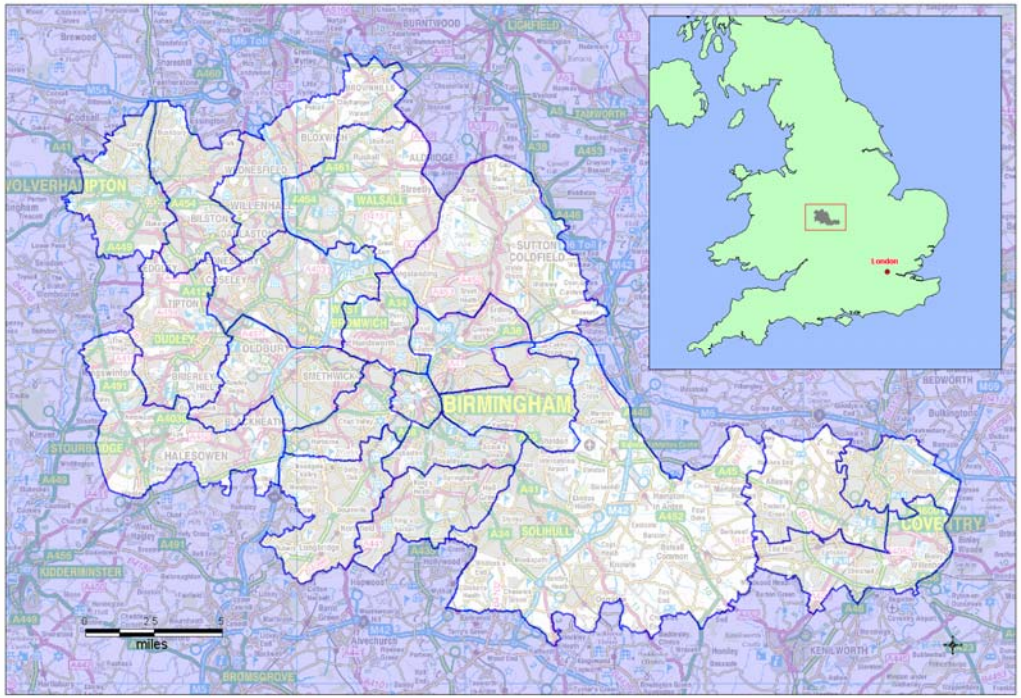

West Midlands Police

Second largest police force in the UK

3 major cities

- Birmingham
- Coventry
- Wolverhampton
- & 4 other urban authorities

Policing:

- 21 Operational Command Units (OCUs) -responsible for policing 24/7
  - 8,200 Police officers
  - 4,000 Police staff
  - 1,000 special constables
  - 500 PCSOs
- 275,000 recorded crimes per year

Demographic:

- 350 square miles (30 by 20 miles)
- resident population 2.5 million
- very diverse population