

Improving the explanatory content of problem profiles using hypothesis testing

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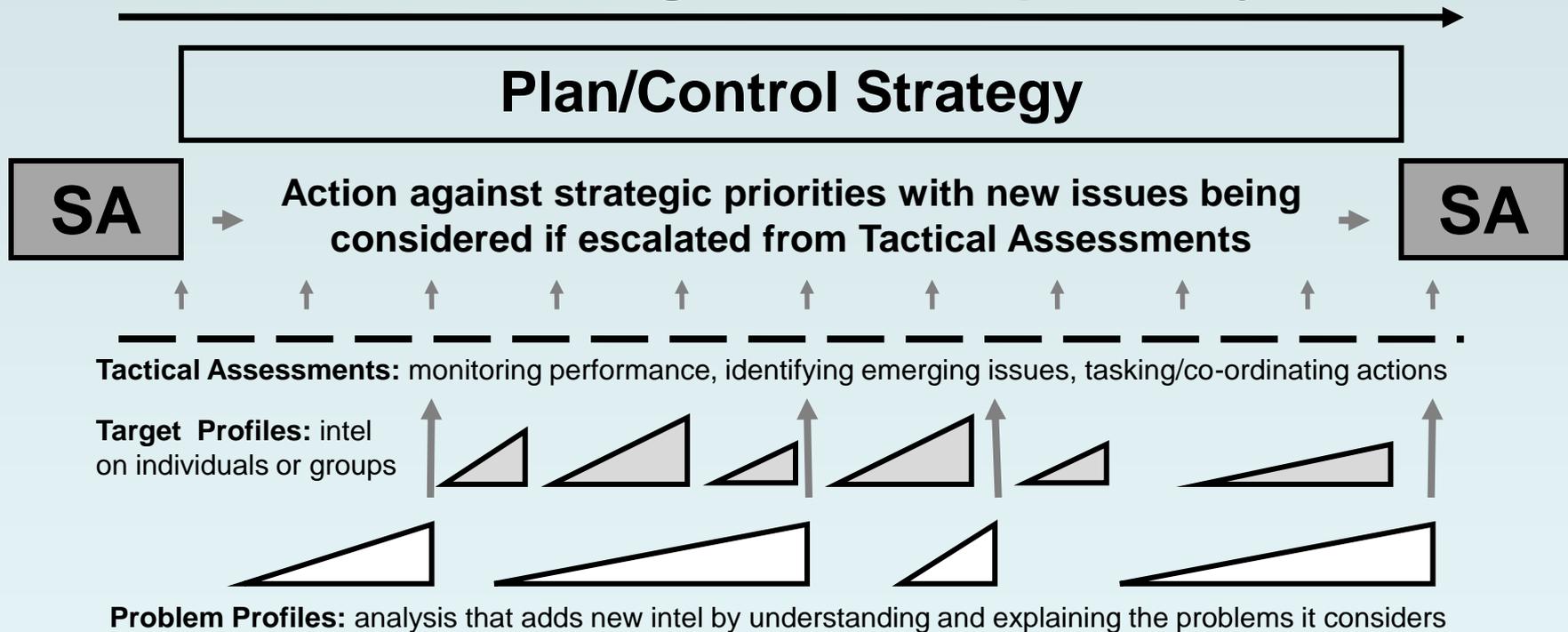
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of Crime Science

Overview

- Intelligence development process and SARA
- The role of analysis
- Using hypothesis testing to move from the descriptive to the explanatory
 - Problem profile structure
 - Example:
 - Residential burglary in Oldham
- Practical considerations
- Resources

The UK's intelligence development process

12 month intelligence development cycle



The problem-solving SARA process and the problem analysis triangle

SARA: recursive, knowledge building process

- **Scanning:** identifying, defining, and exploring nature of the problem
- **Analysis:** interprets the problem; generates intelligence that helps understand and explain the problem
- **Responses:** (and who is best placed to deliver them) confidently determining what is likely to work, and why
- **Assessment:** identifies what worked



Problem Analysis Triangle



Intelligence-led decision-making (Ratcliffe's 3i Model)

Intelligence process: continuous cycle of commissioning, data collection, collation, analysis, dissemination, feedback and review

Intelligence:

- Analysis of info gathered via
- crime records
 - calls for service
 - patrols (incl. stop and search)
 - covert surveillance
 - offender interviews
 - informants
 - public engagement
 - socio-demo data

interpret

Criminal Environment

impact

Response opportunities:

- Investigation/detection
- Deterrence
- Disruption
- Rehabilitation
- Victimization/risk/harm reduction
- Reassurance
- Public confidence
- Community engagement

intelligence / WWWWWH

Analysis Unit

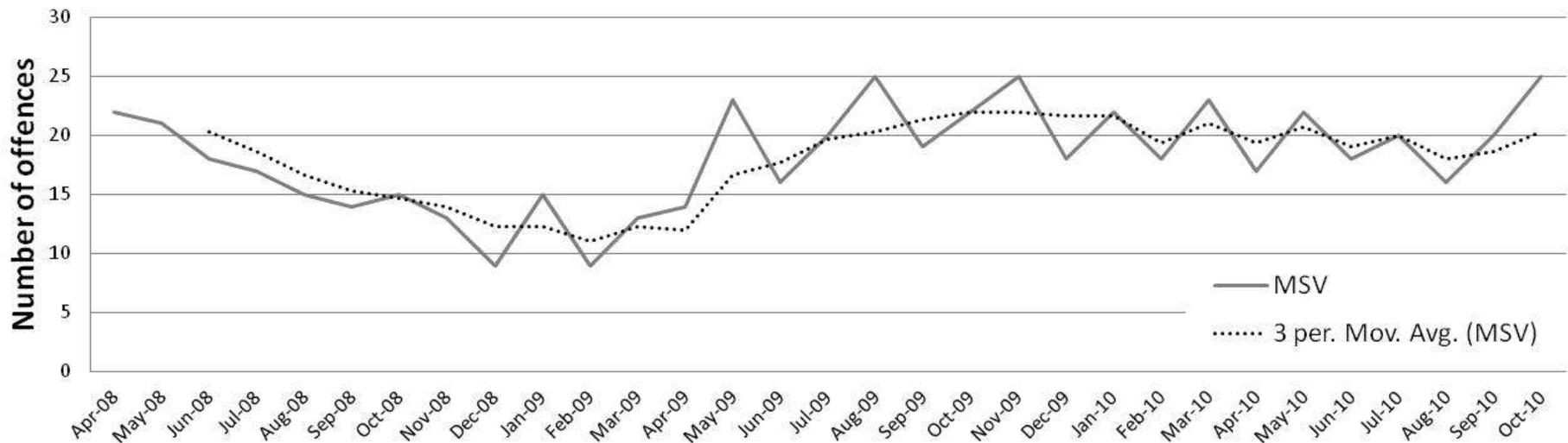
influence

Decision-Maker

Intelligence product: fundamental component to intel-led policing, facilitating decision-making framework

Failing to understand an increase in violence

Serious violence in ***** (Apr 2008 - Jan 2011)



MSV = Most Serious Violence

- Routine production of intelligence products that would only *describe* rather than *explain* the problem
- Routinised process can have tendency to direct you to using intelligence on what you know (is conveniently recorded), rather than what you should know

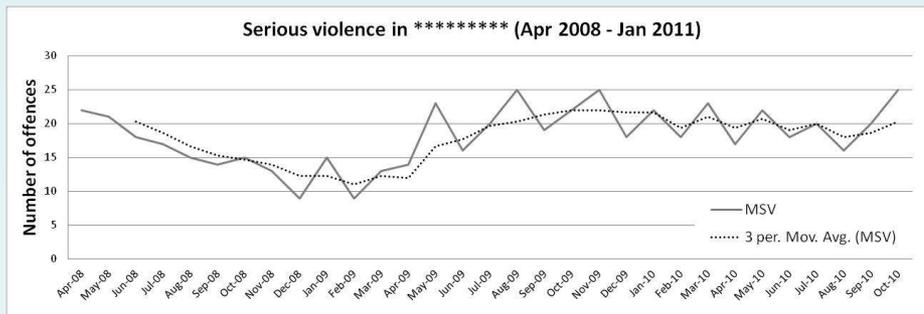
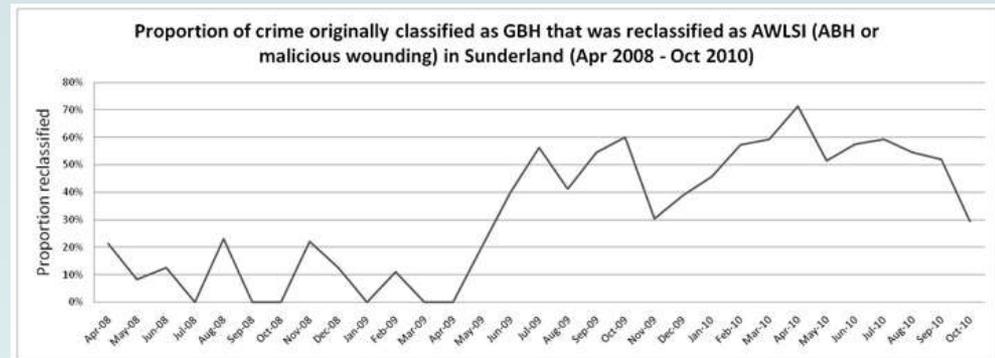
Improving the explanatory content of intelligence analysis using hypothesis testing

- Hypothesis: a true (or false) statement that provides a plausible reason to explain the problem
 - Testing it results in coming to some conclusions



Improving the explanatory content of intelligence analysis using hypothesis testing

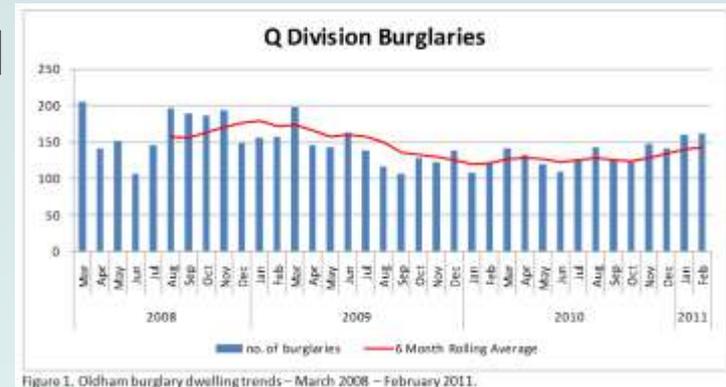
- Hypothesis 1: the increase in serious violence is due to a change in recording practice. It is likely that this is to do with a change in the recording of Grievous Bodily Harm rather than Wounding
- Hypothesis 2: the increase in serious violence is due to an improvement in reporting



Explaining the burglary increase in Oldham

Overview: burglary dwelling in Oldham

- Jul-Oct 2010 - Nov2010-Feb2011
 - 18% increase (91 more burglaries)
- Increase concentrated
 - Q2 Oldham East: 65%



	Nov09- Feb10	Jul- Oct10	Nov10- Feb11	Change: Nov09 to Feb10 – same period prev year	Change: Nov09 to Feb10 - prev 4 mnts
Q1	125	142	147	↑18% 22	4% 5
Q2	71	81	134	↑89% 63	↑65% 53
Q3	71	76	90	↑27% 19	↑18% 14
Q4	81	70	89	↑10% 8	↑27% 19
Q5	86	103	80	↓7% -5	↓22% -23
Q6	58	43	66	↑14% 8	↑53% 23

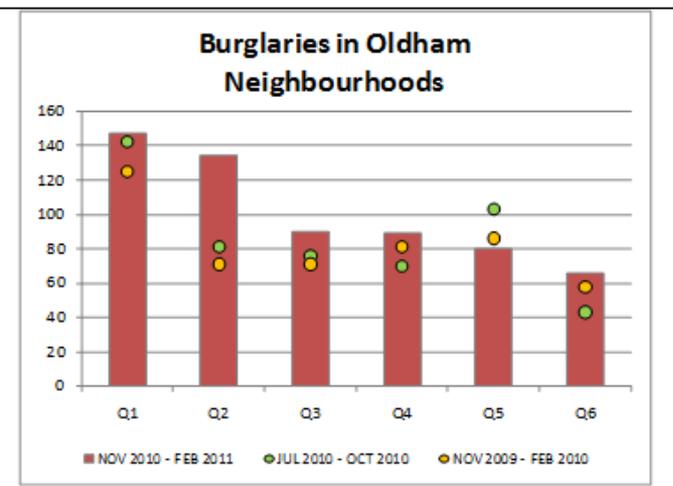
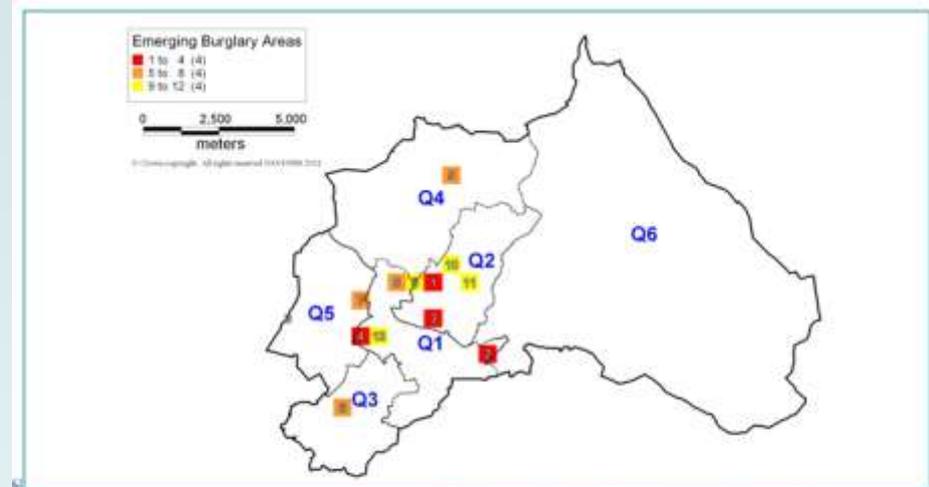


Figure 2. Burglary dwellings in Oldham for Nov 10 to Feb 11 compared to previous periods.

Explaining the burglary increase in Oldham

Overview: burglary dwelling in Oldham

- Emerging problem areas
(Using Ratcliffe's Dispersion Calculator)
 - 12 out of 462 areas (grid cells) were mainly responsible for the increase
i.e. 18% increase in just these 12 areas



- Why do you think there has been this increase in burglary dwelling?*

Locality of grid cell	Burglary dwelling Jul – Oct 2010	Burglary dwelling Nov 10 – Feb 11	Increase
1. West of Shaw Road, Q2	1	14	13
2. Holts Estate, Q1	4	15	11
3. Greengate Street, Q2	0	9	9
4. West of Block Lane, Q1	4	12	8
5. Small Brook Estate, Q5	3	10	7
6. Higher Memorial Park, Q3	9	15	6
7. Middleton Road, Q1	1	7	6
8. Mitchell Street, Q1	5	11	6
9. Oldham Edge, Q1 / Q2	9	15	6
10. Around Stoneleigh Park, Q2	2	8	6
11. Littlemoor Lane, Q2	9	15	6
12. Newport Street, Q1	2	7	5
Total	49	138	89

Figure 4. Areas in Oldham that have contributed most to the recent burglary dwelling increase, listed in rank order of their contribution.

Explaining the burglary increase in Oldham

Jul-Oct 2010 - Nov 2010- Feb2011: 18% increase (91 more burglaries)

- **Hypothesis 1 (More Offenders):** The increase in burglary is attributable to an increase in burglary offenders living in these areas as a direct result of an increase in prison releases
- **Hypothesis 2 (Less Effective Cocooning):** The increase in burglary is attributable to a decrease in the effectiveness of “cocooning” in these areas, leading to a higher level of repeat and near-repeat victimisation
- **Hypothesis 3 (Targeting Jewellery):** The increase in burglary has been driven by an increase in gold jewellery thefts, particularly in Asian neighbourhoods
- **Hypothesis 4 (Darker Evenings):** The increase in burglary is attributable to an increased opportunity for burglars to offend in the early evening due to the extended hours of darkness over the winter

Explaining the burglary increase in Oldham

Jul-Oct 2010 - Nov 2010- Feb2011: 18% increase (91 more burglaries)

Hypothesis 1 (More Offenders): The increase in burglary is attributable to an increase in burglary offenders living in these areas as a direct result of an increase in prison releases

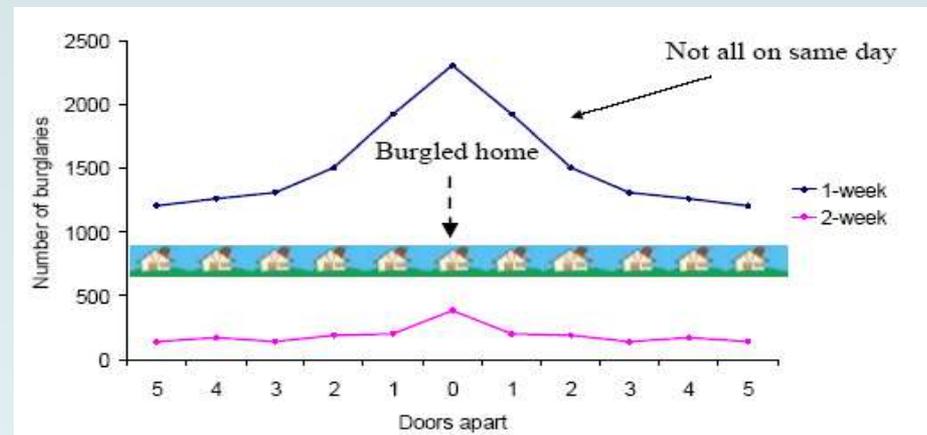
- Prison releases
 - Increased by 52%. However:
 - Intensive supervision of ex-offenders via Offender Management
 - Intel: only one of these prisoner releases was linked to a burglary that was committed between Nov10-Feb11
 - Intel: only 5 offences were linked to 4 offenders who had been released from prison between Jul-Oct 2010
- If recent prison releases were considered to be responsible for the recent increase in burglaries
 - Expected there to be many more linked to burglaries that were committed during Nov 2010 – Feb 2011

Explaining the burglary increase in Oldham

Jul-Oct 2010 - Nov 2010- Feb2011: 18% increase (91 more burglaries)

Hypothesis 2 (Less effective cocooning): The increase in burglary is attributable to a decrease in the effectiveness of “cocooning” in these areas, leading to a higher level of repeat and near-repeat victimisation

- Repeat victimisation:
 - Jul-Oct 2010: 3.1%
 - Nov10-Feb11: **1.2%**
- Near repeat victimisation:
 - Jul-Oct 2010: 7.2%
 - Nov 2010-Feb 2011: **9%**
 - Evidence of near RV within 2 days, and within 200 metres around an initial event
- If NRV was reduced to levels in Jul-Oct10, this alone could contribute towards 4% reduction in burglary (1 in 5 additional burglaries were NRVs)



Explaining the burglary increase in Oldham

Jul-Oct 2010 - Nov 2010- Feb2011: 18% increase (91 more burglaries)

Hypothesis 3 (Targeting jewellery): The increase in burglary has been driven by an increase in gold jewellery thefts, particularly in Asian neighbourhoods.

- Jul-Oct 2010: 58 burglaries where jewellery was stolen (11% of all burglaries)
- Nov 2010-Feb 2011: 66 burglaries where jewellery was stolen (11%)
- Jewellery remains popular item to steal; difficult to distinguish 'gold'
- Targeting of Asians: no evidence to support this

Summary and interpretation:

- Jewellery continues to be common target, can't determine gold from other jewellery
- No evidence to suggest any particular ethnic group or geographic area
 - Areas where there has been increase in jewellery burglaries are areas which have experienced an increase in burglary generally

Explaining the burglary increase in Oldham

Jul-Oct 2010 - Nov 2010- Feb 2011: 18% increase (91 more burglaries)

Hypothesis 4 (Darker evenings): The increase in burglary is attributable to an increased opportunity for burglars to offend in the early evening due to the extended hours of darkness over the winter

Time of day 15:00 – 20:59:

- Burglary increased by 98% Nov 2010–Feb 2011 compared to the same period in Jul – Oct 2010
 - Increase is equivalent to approx 100 more burglaries
 - Equates to 18% increase in burglary in Oldham
- Other hours of day: remained comparable to the summer period
- Pattern has been evident in each of the previous 3 years

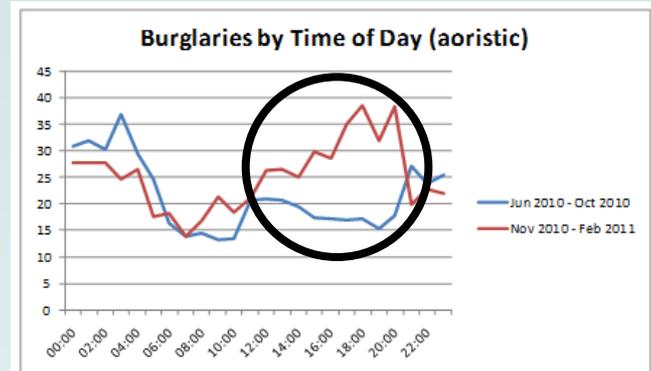
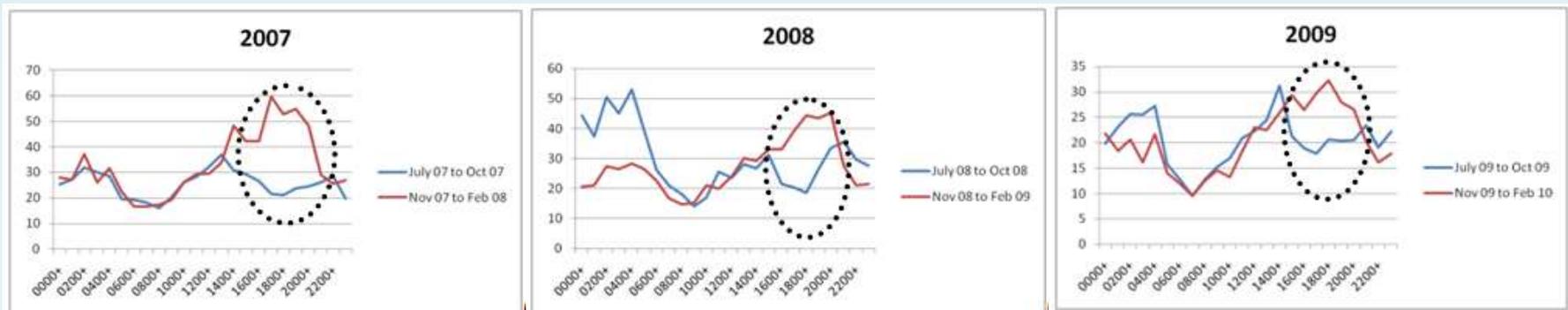


Figure 11. Time of day when burglaries were committed in Oldham, comparing Nov 2010- Feb 2011 to Jul – Oct 2010



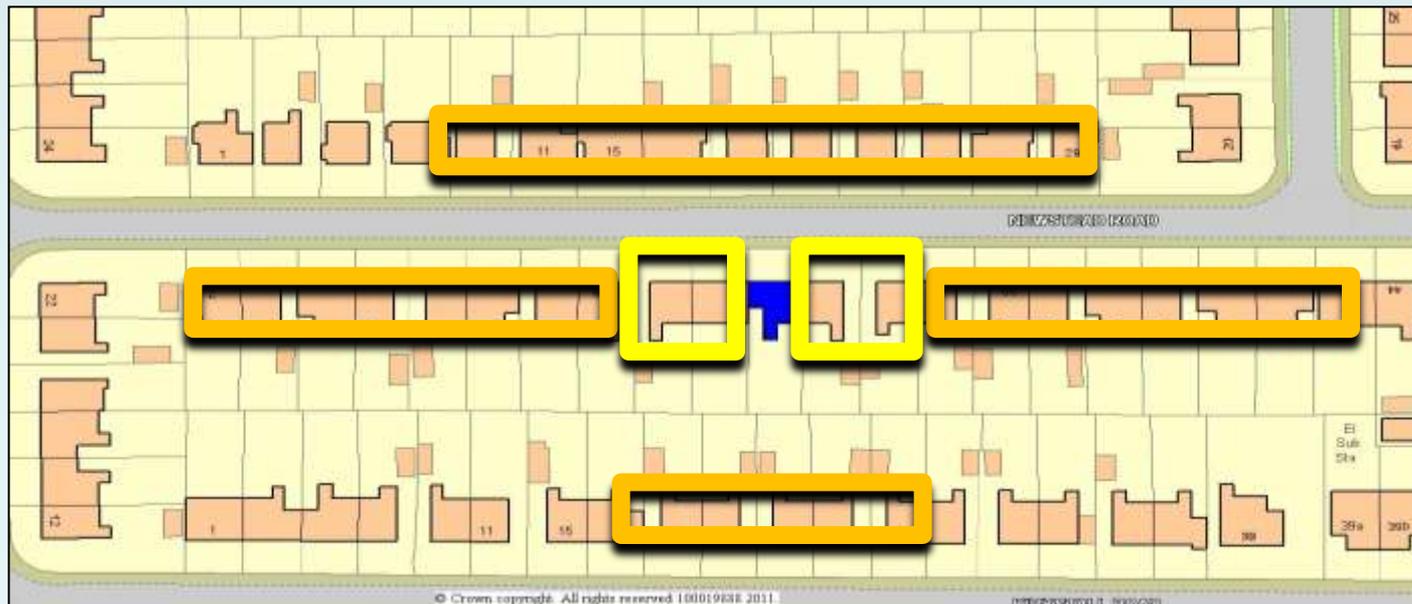
Did the analysis make a difference?

Response opportunities

Crime prevention (1)

Minimise heightened risk of RV

- Crime prevention officer – improve security: visit burgled properties within 24 hours
- Immediate action to address vulnerabilities



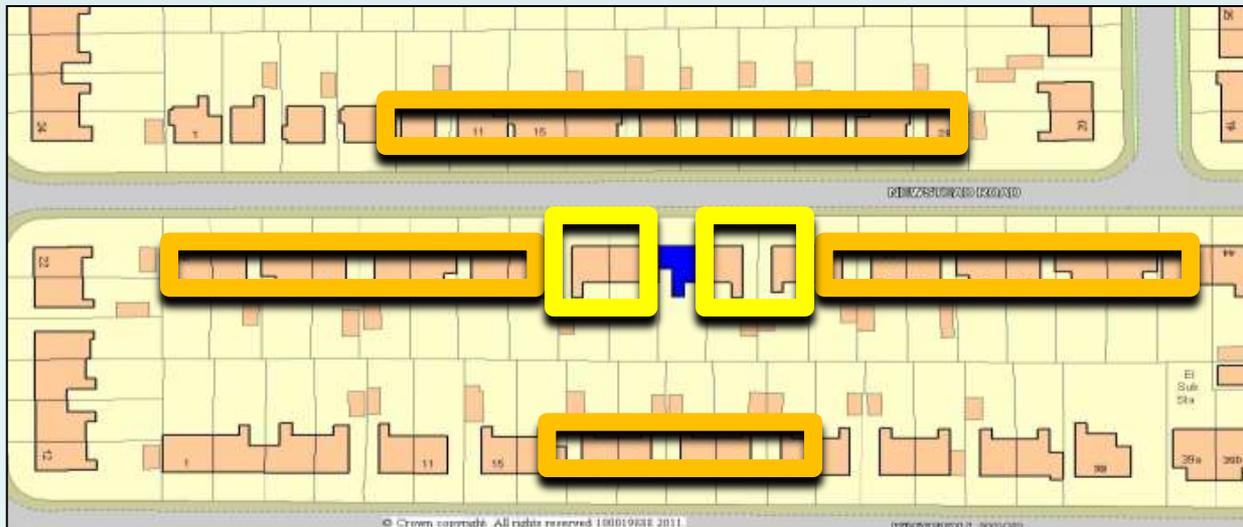
Did the analysis make a difference?

Response opportunities

Crime prevention (2)

Minimise heightened risk of NRV

- Visit neighbouring properties; as much face-to-face contact with residents as possible:
 - Inform – Reassure – Advise
(start with those within 100m)



I'm not sure whether you are aware, but there was a burglary a few doors up yesterday.

The chances of you being burgled are very low.

There are a couple of things you can do to help us out

- Report suspicious behaviour
- Offer seasonally-sensitive, tailored crime prevention advice

Did the analysis make a difference?

Response opportunities

Detection opportunities (3)

- Likely to be offender who committed first burglary who will return to commit repeat or near repeat
- Police to be vigilant of suspicious persons and known offenders
 - PPOs?
 - Stop and search
- PPO supervision
- Forensic opportunities from RVs and NRVs



Did the analysis make a difference?

Response opportunities

Deterrent opportunities (4)

- Visits to residents and neighbourhoods to coincide with times when there have been burglaries

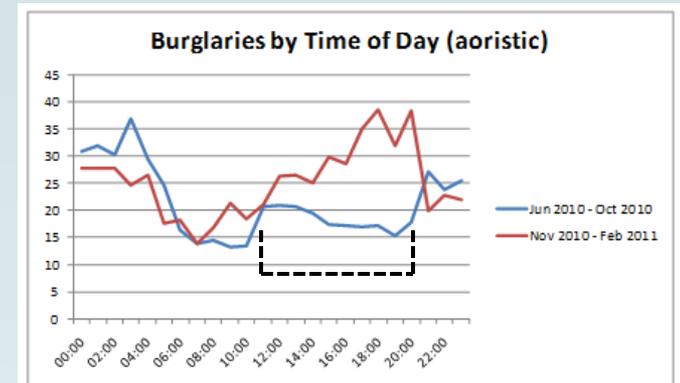


Figure 11. Time of day when burglaries were committed in Oldham, comparing Nov 2010- Feb 2011 to Jul - Oct 2010



Did the analysis make a difference?

- If the problem has a pattern, the problem is predictable; if its predictable, its preventable (Chainey, 2012)

Nov 2010 – Feb 2011: 606

Nov 2011 – Feb 2012: 457

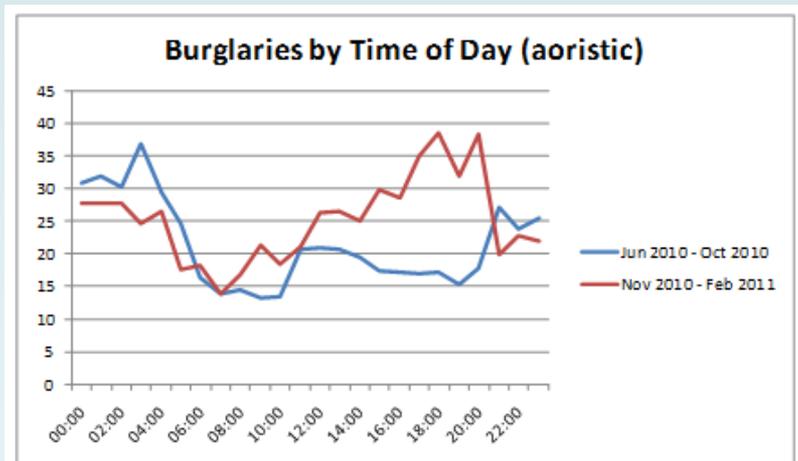
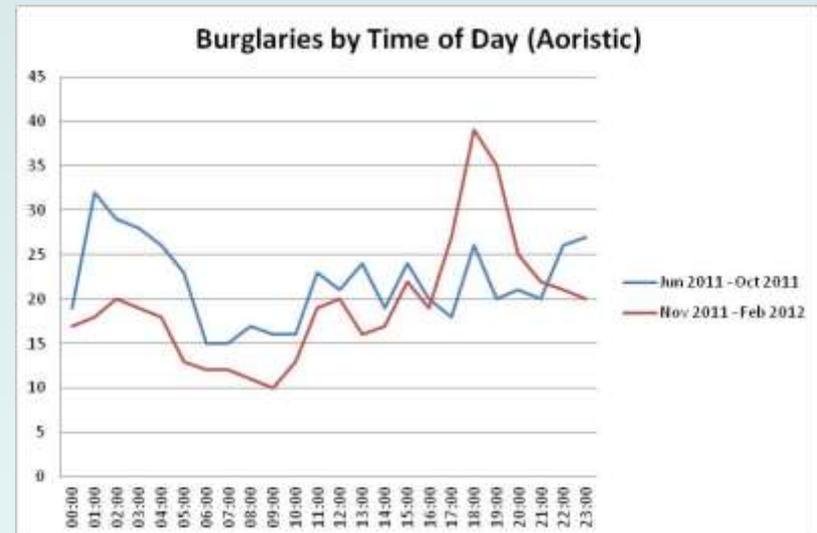


Figure 11. Time of day when burglaries were committed in Oldham, comparing Nov 2010- Feb 2011 to Jul – Oct 2010



25% reduction in crime

Practical considerations

- Approach does not provide all the answers!
 - Explains several of the main causes
- ‘Overview’ alongside local knowledge usually provides enough for stakeholders to offer reasons
 - But useful to hold meeting to discuss Overview
- Need to articulate reasons into testable, specific hypotheses
- Encouraging key stakeholders/decision-makers to suggest hypotheses improves commissioning
 - Actually results in some dialog!
 - And better involves them in interpretation of analysis results
- Involving number of different agencies leads to richer range of hypotheses
- Problem profile more fit for purpose
 - Easier to identify how to respond, and who is best placed to respond

What the police/CSPs say ...

“It identified why burglary had increased, and in turn helped us think what response was most likely to work.”

Hadyn Roberts, Head of Community Safety – Greater Manchester Police

“For 18 months we struggled to get to grips with a violent crime problem. Previous problem profiles failed to explain why there had been this increase. Hypothesis testing analysis helped to exactly identify what the main causes were.”

Chief Supt Alan Veitch, Commander for Sunderland – Northumbria Police

West Midlands, Durham, North Wales

- West Midlands - hypothesis testing approach has now been trialled in all 10 WMP Local Policing Units on a range of crime and ASB problems:
 - mobile phone theft, street prostitution, drug dealing, ASB on housing estate, street drinking, residential burglary, criminal damage, metal theft, youth-related ASB, shoplifting ...
- Durham: introduced by four Neighbourhood Police Teams
 - ASB at Stanley bus station, ASB at Tesco car park (Aycliffe), residential criminal damage and ASB in North Darlington, criminal damage in Consett
- North Wales: Street drinking in Rhyl, Youth ASB at Wrexham bus station

Summary

- Need to move on from producing descriptive, general material, that says very little, and usually what is already known!
- **Hypothesis testing:**
 - Injecting a bit of scientific method into the **SARA** problem solving process
 - Provides a richer explanation of the problem
 - And specifically how it can be countered/tackled

Paper in Policing: Journal of Policy and Practice

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