Crime, situational prevention & technology: The nature of opportunity and how it evolves

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Introduction

- Situational crime prevention (SCP) has often drawn on technology for practical purposes, and this will accelerate
- But little attempt to explicitly and systematically theorise about the role of technology in SCP
  - There's a bit in Routine Activities, none in Rational Choice and a little by implication in Crime Pattern approach
- Aim is to correct this and develop a more self-aware and detached view of what technology is, and how it fits with SCP and crime science
- Covering material and cyber crime/technology in parallel

What's coming up

- What is technology?
- How does technology relate to crime and crime science – opportunity, problems and solutions?
- What are short-term tactical dynamics of technology – scripts and script clashes
- What is the relationship between crime, technology and change over longer timescales?
  - Evolution and co-evolution between crime and security
- How to adapt to these changes, and how do we anticipate future threats/opportunities for security?
- What are the weaknesses of purely technological approaches?

What exactly is technology?

- Mitcham:
  - **Artefact** (tools, manufactured products etc.)
  - **Knowledge** (scientific, engineering, technological know-how, plus insight from social and physical sciences)
  - **Process** (problem-solving, research and development, invention, innovation)
  - **Volition** (ethics, technology as social construction)
- Arthur:
  - **Phenomena** – natural effects (e.g. gravitation or electricity) that exist independently in nature
  - Central **principles** – application of phenomena for some *purpose*
  - Principles expressed in the form of **physical or informational components** which are combined to meet that purpose
  - Technological **domains** – toolboxes of potential, clustered around some common set of phenomena or applied principles e.g. movement of mechanical parts, or of electrons

Crime Science, opportunity and problems

Crime science

- Centres on proximal causes of criminal events, especially **opportunity**
- Views opportunity via these loosely-related perspectives:
  - **Rational Choice** – offender perceives risk and effort as low and reward high
  - **Routine Activities** – ecological perspective of likely offender encountering a suitable target in the absence of capable guardians
  - **Opportunity structure** – entire pattern of available opportunities for crime
- Applies a **problem-oriented** approach to crime reduction – usually via diminishing the opportunities
- Opportunities and problems are key to relating technology, crime and security, but the current conceptualisation isn't up to the job – only a few loose ends:
  - **25 Techniques of SCP** – 'control tools/weapons' appears under 'Increase the effort', but very ad hoc formulation
  - '**Likely offender**' includes capability which implies technology… as does '**capable guardian**'

Opportunity

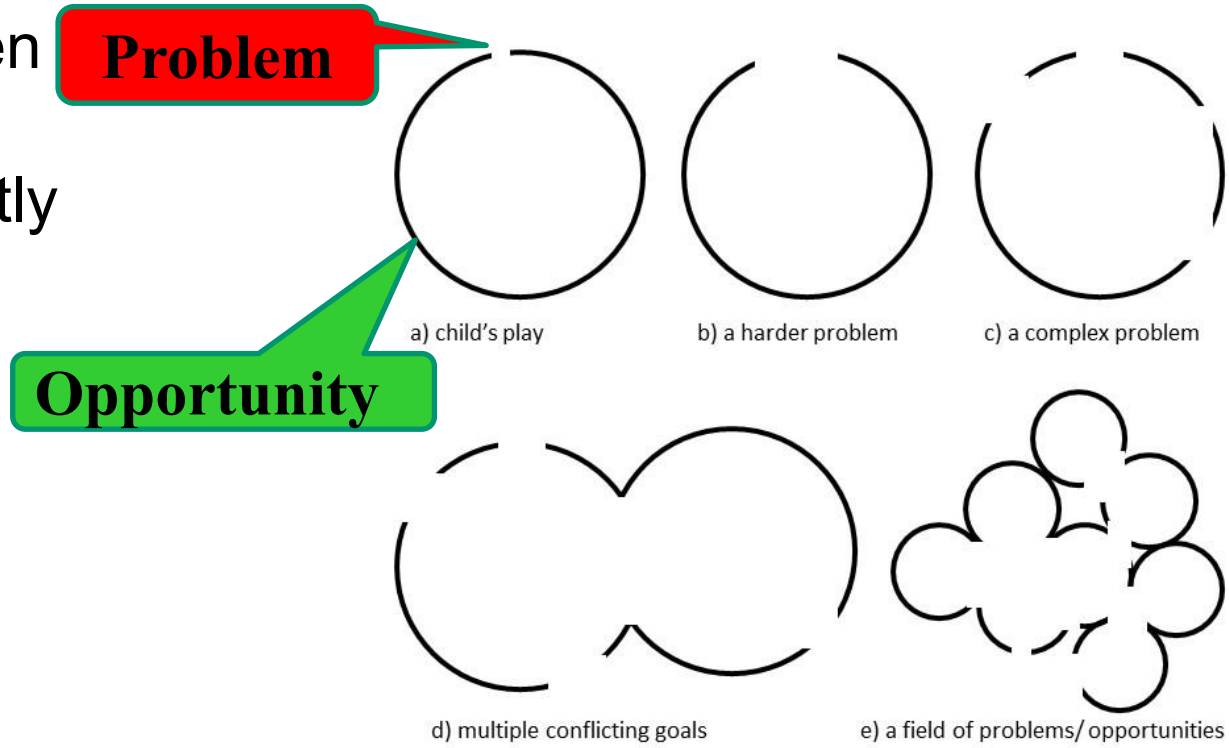
- It is common for opportunity to be equated with **environment, situation**
- But a full definition/characterisation needs more:
  - **Resources/capability** to exploit possibilities, cope with threats/hazards
  - **Goal/s** – opportunity to achieve **what**?
    - Note that ‘risk, effort, reward’ all relate to **goal states**
  - **Presence or access**
  - **Dynamics** (later)

Problem

- Crime science implicitly sees problems as something for the Security side to solve or deal with
- But in wider engineering approaches, 'problem' is conceived more broadly
  - A problem is 'the **difference between a goal state and a current state**' (Jonassen 2000)
  - Problem solving is the '**generation and selection of discretionary actions to bring about a goal state**' (Scandura 1977)
- So – a problem is
  - Some set of environmental circumstances that hinders an agent, equipped with certain resources, from immediately achieving a particular goal/goals
  - In effect, it's what stops the realisation of an opportunity from being child's play (Ekblom 2016)
  - Hence, purpose that is frustrated – maybe just temporarily
  - Note **positive** goals (steal car) and **hygiene** goals (without getting caught or injured)

Opportunity and Problem

- Relationship between opportunities and problems insufficiently noted



- This flip of perspectives can be useful regarding
  - **Conflicts**, where problems and opportunities are intimately entangled: one party's opportunity will invariably be another's, or the state's, problem
  - **Arms races**, where each move sets a problem for the opposing party to come up with a countermove

Technology, opportunity & problem

- Opportunity sometimes realised/ problems solved through behaviour alone
- But often bridging the opportunity gap in the circle requires technology – principles derived from natural phenomena and realised in more or less complex combinations, to meet some criminal or security goal
  - How to stop car alarms going off *as intended* (problem for offenders), or *inappropriately* (problem for car owners, their neighbours and police)
- Technology can be part of the opportunity and/or part of the problem…can even start an entirely fresh circle, opening the doors to new rounds of problem and opportunity
  - E.g. CCTV – monitoring misbehaviour, or spying on changing rooms
- Technology can help either party adapt to contextual conditions necessary for offending or preventive mechanisms to be triggered
  - E.g. street lighting could help either side (or hinder them)
- Technology can halt a criminal attack that has been launched
  - E.g. personal attack alarms
- And *mitigate* the adverse consequences of crime
  - E.g. backing up the data on a stolen phone

The challenge for technology (1): Handling civil-world tradeoffs & conflicts

- **What's stopping** technologies from favouring security?
- Various broader **design contradictions** can hold back exploitation of current/future technologies by the security side (offenders are less constrained):

Security and…

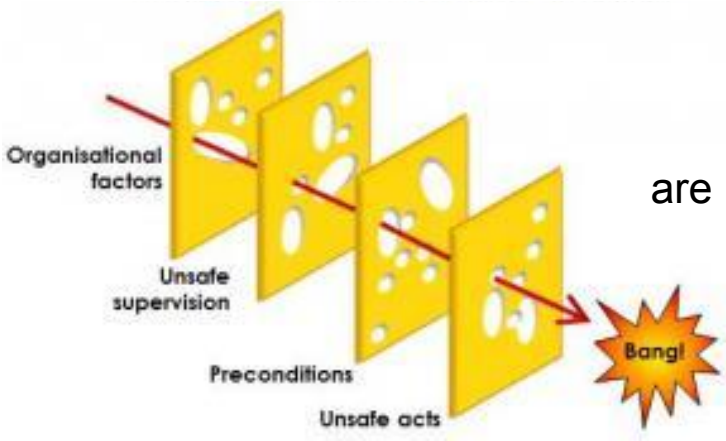
Sustainability	Convenience	Market freedom
Health & safety	Privacy	Trust & collective efficacy
Freedom of movement	Aesthetics	Social inclusivity

- Will innovations relax, bypass, or tighten these contradictions?
- Can we steer them in beneficial directions, or at least be ready with mitigations?

Dynamics – tactical

Dynamics of crime and technology viewable at 2 levels – **tactical** and **evolutionary**

- Tactics in the here-and-now
  - Encountering, maximising, grasping, creating opportunity (opportunity takers and makers), and solving problems, through existing repertoire and exploratory adaptations often involving technology
  - **Crime scripts** (Cornish, Ekblom & Gill)
    - Technology has scripts too (Latour, Lockton) – e.g. cash machine – which criminals may violate or manipulate
    - Scripts complicate concepts like CRAVED of Hot Products (Clarke) – *Concealable* at the *search* stage hinders offenders, but helps them at *escape*
  - Corresponding **opportunity paths** enabling the scripts
    - Relate to Reason's 'Swiss Cheese model' of accident causation, but here the causes mainly purposive
    - Think of the opportunity path enabling 9/11
  - Users, preventers and perpetrators each have scripts



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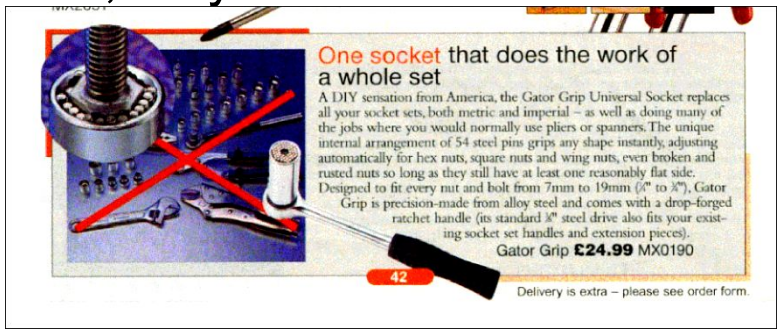
The challenge for technology (2): Addressing tactical 'Script Clashes' between offenders and preventers

Wield force v resist (Damage v protect, Injure v keep intact)	Take v keep	Snoop v maintain privacy
Act at will v control misbehaviour	Confront v avoid	Pursue v escape
Conceal traces and tracks v detect	Surprise/ ambush v be alert	Trap v elude
	Challenge suspect v give plausible response	Conceal criminal intent v detect
	Surveill v conceal	

- These clashes
  - Influence **criminal plans and outcomes**
  - are **generic and perennial** – will always need to be faced
- Tech and other innovations can **disrupt the balance** of these clashes, and favour one side over other – which side will gain from a sudden breakthrough?
- We must design things to **advantage the good side**
- Approaches to **inventiveness** like TRIZ highlight these contradictions, and also identify **evolutionary trends in invention**

Dynamics – evolutionary

- Technology changes over different domain scales and time scales – here at the larger ends:
  - Godfrey-Smith – 'cultural-phylogenetic changes' – e.g. Neolithic Revolution from hunting/gathering to farming, or fire
  - Felson & Eckert, Brantinghams – impact of mass transportation on routine activities generating crime opportunities
  - Currently ICT is driving major phase change in society including of crime
- Tech and wider changes, plus adaptive criminals, mean that script clashes flip over to favour bad guys, and what works now, may not work in future
- **Co-evolutionary arms races** accelerate and focus change
  - E.g. banknote security, tax evasion, car theft (Rick Brown), malware; script kiddies



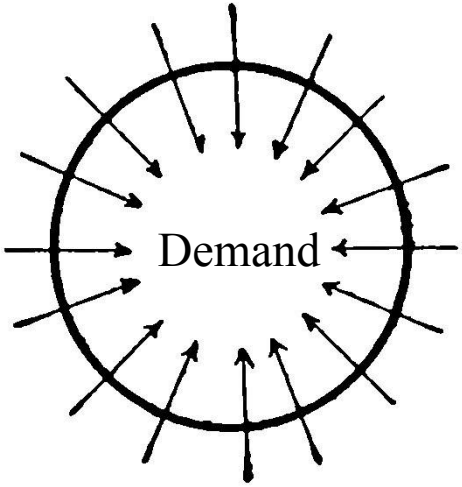
- Managing (co-)evolution is vital – motivating, developing, disseminating **capacity to out-innovate offenders** through variety, upgradeability, of solutions
- It also requires both early **detection and reaction**, and **anticipation** of changes rather than waiting for crime harvests before acting (Pease)

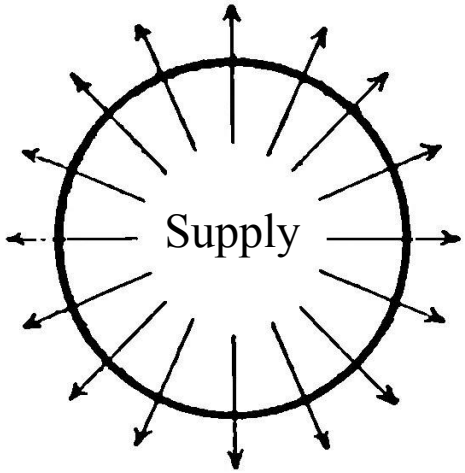
Tweaking the tradeoffs and biasing the clashes – desirable techno trends

- **Tunability** of materials, applications, for optimisation to diverse contexts
  - 'What works' in crime prevention is very context-dependent
- **Smart discriminator** functions
  - What's good for legitimate users (e.g. **Smaller, lighter, more portable, more durable, cheaper, easier to operate**) is good for thieves
  - How to serve one while thwarting the other?
- **Adaptable, reconfigurable** form
  - Modelled on swing down fire escapes – both configurable and discriminating
- **Creative leap** rather than compromise
  - Internal combustion engine enabled armour **and** mobility

How to anticipate? Rising to the challenge

- Anticipation is hard
- Can take different perspectives on future crime/ security implications of techno innovations
- Causal v functional
  - **Causal** – e.g. how might this innovation generate stress or conflict?
  - **Functional** – how might this innovation serve criminal or security purposes?
- Within functional
  - **Demand-side** focus – what do criminals or security *need* to be invented, to solve their problems/ complete an opportunity? Is any specific requirement holding them back?
  - **Supply-side** focus – what can *this* new piece of science or technology do for criminals or security?



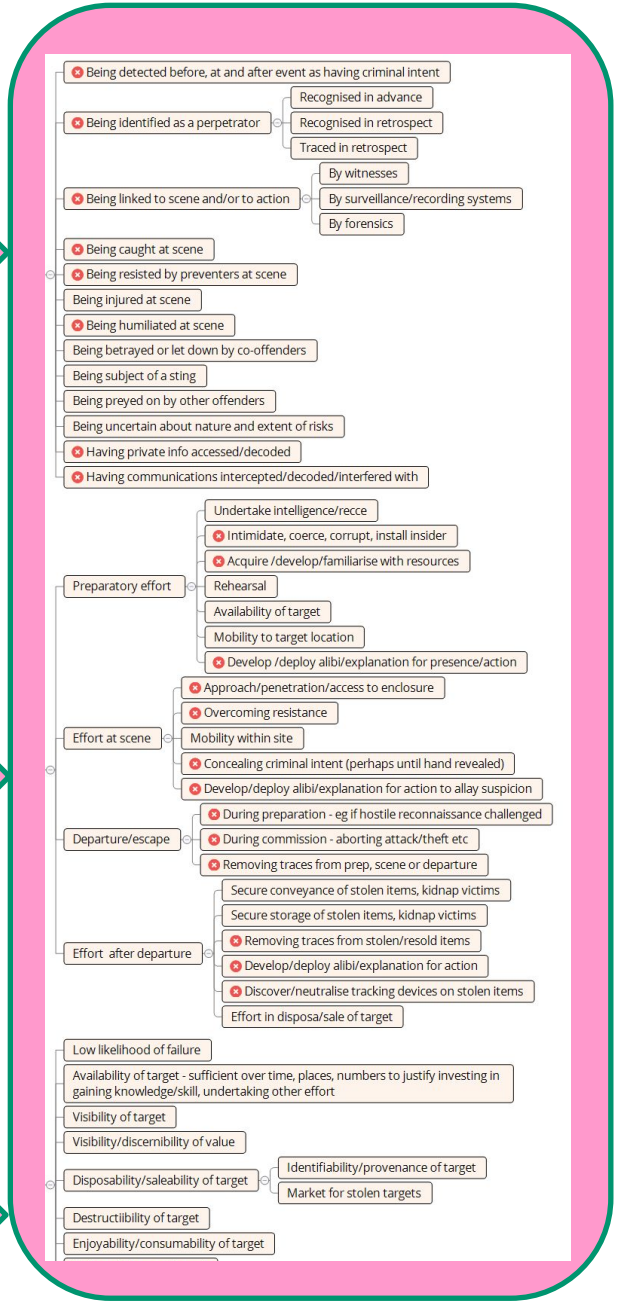


Function – demand-side – offenders' needs

What do offenders need?

Innovations which help crimes to be

- Low risk
- Low effort
- High reward



Example – supply – what can Drones do to/ for Crime/ Security?

Causal attributes

- Noisy
- Visually intrusive
- Stimulating/fun
- Danger of fall

Functional essence of drone?

Active, mobile, effective ***telepresence of human agency***

Specific **functional** attributes

- Remote operation - can go to and do in different places from humans in general, individual agents in particular... remoteness can range from metres to many km... Allows distancing of agent from hazards, tracing by traditional means eg facial recognition
- Mobility and agility in different modes - air, land surface, walls, water
- Different size/shape/body configurability from agent - entry/exit, detectability eg through size/shape/disguise
- Communication with agent - coded/encrypted
- Sensors - human + more - inc Radar
- Image capture, transmission, recording
- Image interpretation
- Autonomy at various levels from tactical to more operational... navigation, risk and objective identification, decision, response
- Ease of operation/ limited training by user
- Conveyance of goods to/from destination
- Actuation
- Self-defence v threats/protection v natura/ accidental human hazards
- Generic regulatory requirements - eg licensing, identification, constraints on flight eg line-of-sight operation, no-fly zones
- Cheap

Function – supply-side – Drone can be:

Tool for criminals

- **Misused** – hostile recce, IED delivery, drug delivery
- **Misbehaved with** – noise, intimidation, voyeurism
- **Misled with** – causing panic, riot

Target of crime

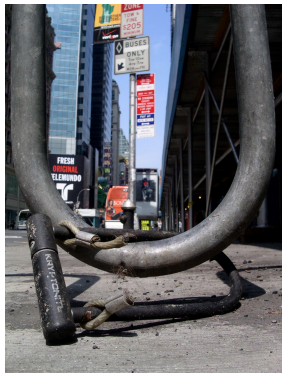
- **Misappropriated** – stolen, or stolen from (Amazon)
- **Mistreated** – shot down by angry neighbour
- **Mishandled** – false licence, smuggled in
- **Misbegotten** – counterfeit model, spares

Aligned with security

- **Secured against above risks** – e.g. identification, limiters
- **Exploited to control crime** – surveillance, detection, pursuit
- **Proofed against Mistakes & Mishaps** – e.g. log/ check

Limitations of technological approaches to security

- Tactically, beware of superficial ‘bolt-on, drop off’ solutions offering single fixed line of defence
- Solution- or supply-driven approaches to problems can canalise responses, constraining both current interventions and future adaptability – e.g. the rush into public-space CCTV surveillance, with white-elephant and running cost legacy
- Beware of simplistic techno-determinism – these are processes involving complex adaptive systems; and solutions need subtlety and understanding of stakeholders, and should cater for wide range of interests



- Technology can be **self-defeating**: clunky security systems overload memory and exceed employees’ ‘compliance budget’
- Technology can make things **worse** – e.g. false burglar alarms wasting police time and annoying neighbours

But…

- None of these are inherent limitations of technology – only technology that is:
  - Over-relied on in isolation from human and system considerations
  - Poorly designed (e.g. to be abuser-unfriendly without being simultaneously user-friendly)
  - Attempting to incorporate security too late in design process
  - Rigid and constraining in the face of the messy complexity of real life
  - Incapable of being adapted to changing patterns of risk during its lifetime of use, through material or software upgrades
- Opportunity still a useful concept but far subtler and more dynamic than traditional SCP acknowledges