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Future crime problems & solutions – How to anticipate them

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- The Problem-Oriented approach to policing and wider crime prevention was a major advance in the practice of security

- It focuses inductively on problems that have already happened, sufficiently often to establish a pattern of incidents

- But new problems are continually emerging, thanks to social and technological change and the adaptability of offenders

- How can we develop an approach to anticipating the crime problems, and solutions of the *future*, in a way that does so in a structured and systematic way whilst acknowledging the many uncertainties and non-linearities that horizon-scanning inevitably entails?

- And how can we develop the capacity to out-innovate those adaptive offenders in the preventive interventions we devise and deploy?

- Today I'll focus on horizon-scanning and describe a project on future technology and crime, undertaken at UCL

- The Dawes Centre for Future Crime at UCL was set up following a £3.7M grant from the Dawes Trust (5yrs). It aims to:

  - Develop a global presence, fund and generate cutting-edge, application-focused research designed to meet the challenges of the changing nature of crime

  - Bring together experts across scientific domains *and* stakeholders to identify, understand and propose solutions to problems

State of the Art research

Impact

Stakeholders (e.g. police, manufacturers)
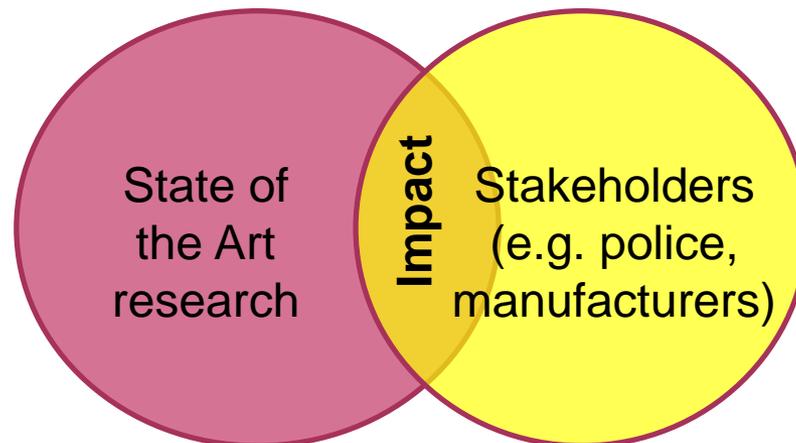
Phase 1: Scoping

10 projects (~2 per year)

Phase 2: Original research

10 Dawes Research Fellows
(6 months)

Dawes International
Exchange

5 Dawes Impact Research Fellows
(12 months)

10 Dawes PhD studentships

- Identifying candidate scientific/ technological/ social trends with implications for understanding crime and enhancing security

  - Prevention, response, detection

- Whilst breaching interdisciplinary silos

- By these methods

  - **Scanning** science & engineering disciplines

    - Newsfeeds e.g. *sciencedaily.com*

    - Review publications e.g. *New Scientist*

    - UK Research Council and Government Websites

  - **Pursuing** UCL departmental contacts and holding a Town Meeting to flag opportunities and encourage contributions

- Then…

  – Shortlisting of domains and trends to develop up to 10 in-depth projects e.g. for PhD students

  – Holding focus group/ stakeholder discussions to ensure impact

  – Reporting and publication

  – Seeking further funds to shape the future by developing practical measures to counter risks and boost security

- Assumptions:

  - Criminals have some broad **panhuman motives to offend** – subsistence, greed, vengeance, hatred, sexual conquest, defence, domination

  - This will remain broadly constant in nature and level into the future, though details may vary

  - But specifics of what criminals want to achieve – strategic **purposes** and tactical **goals** – *will* vary as will the conflicts that underlie them

- Security side wish to

  - **Reduce risk** of crime (eliminate possibility, reduce probability or harm)

  - **Reduce rate of growth** of crime

  - **Out-innovate** adaptive offenders against a background of tech and social change that may favour first one side, then the other

- Can do this either by addressing **drivers of criminal purposes**, or reducing **criminal opportunities**

- We focus mainly on **opportunity**, where security aims to
  - **Spot** emerging crimes and address opportunities that underlie them
  - **Anticipate** criminal opportunities directly over a range of timescales and **block** or counter them by changes in everyday world including designs of products, places and systems
  - **Crime-proof** products, places and processes at engineering/design stage to avoid **crime harvests** from naïve items

  Also to
  - **Spot** emerging technologies for crime prevention and apply them
  - **Anticipate** broader preventive opportunities and help make them happen

- Focus on **criminal opportunity – but it's much more than 'something out there in the environment':**

  - **Intention** – opportunity to do *what*, whilst avoiding *what* (positive and negative goals)

  - **Presence** or telepresence in situation

  - **Capability** – resources for offending – tools, weapons, knowledge, networking

  - **Situation** – immediate environment conducive for crime (access, absence of crime preventers, surveillance difficult etc)

- Dynamics of opportunity – Encountering (Routine Activities), Maximising, Grasping, Creating opportunity (takers and makers)
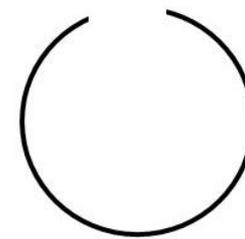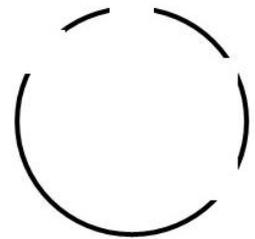
Opportunity **Problem**

- Criminals' **opportunity** = Security's **problem** and vice-versa

- A **problem** is 'the difference between a goal state and a current state'

- Opportunities in the here-and-now vary:
  – Narrow and specific
  – Broad and vague

- Same applies to opportunities of the future, but even more so

- Think how many things had to come together to make theft of mobile phones a feasible crime… or 9/11

- Plenty of nonlinearities – why did handsets disappear from phone boxes in Bali – only on the coast?
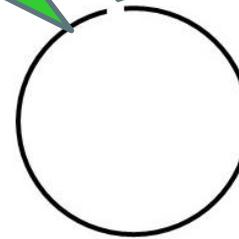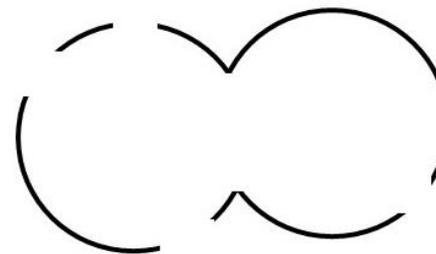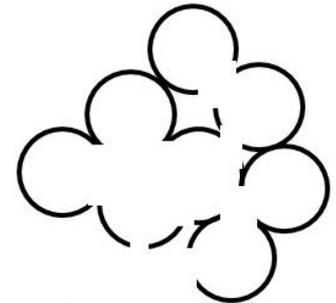
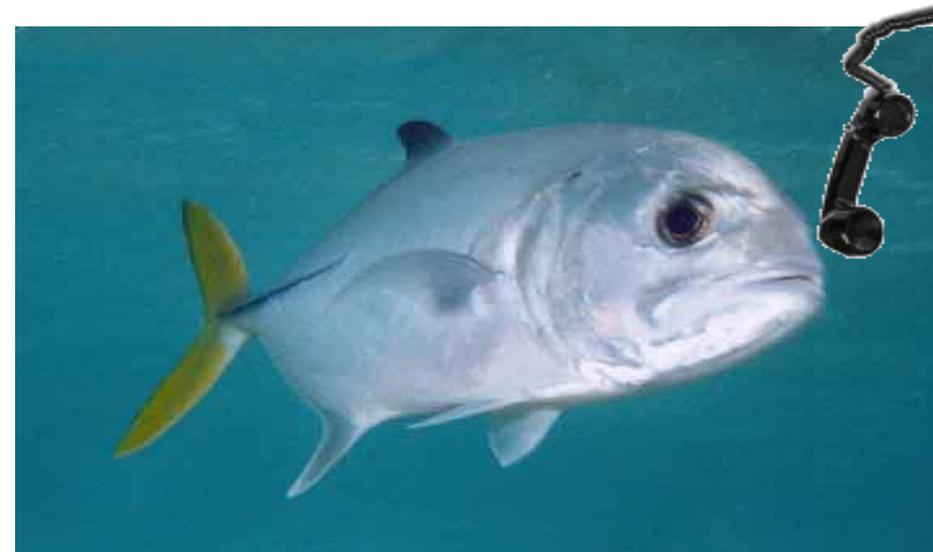a) child's play   b) a harder problem   c) a complex problem

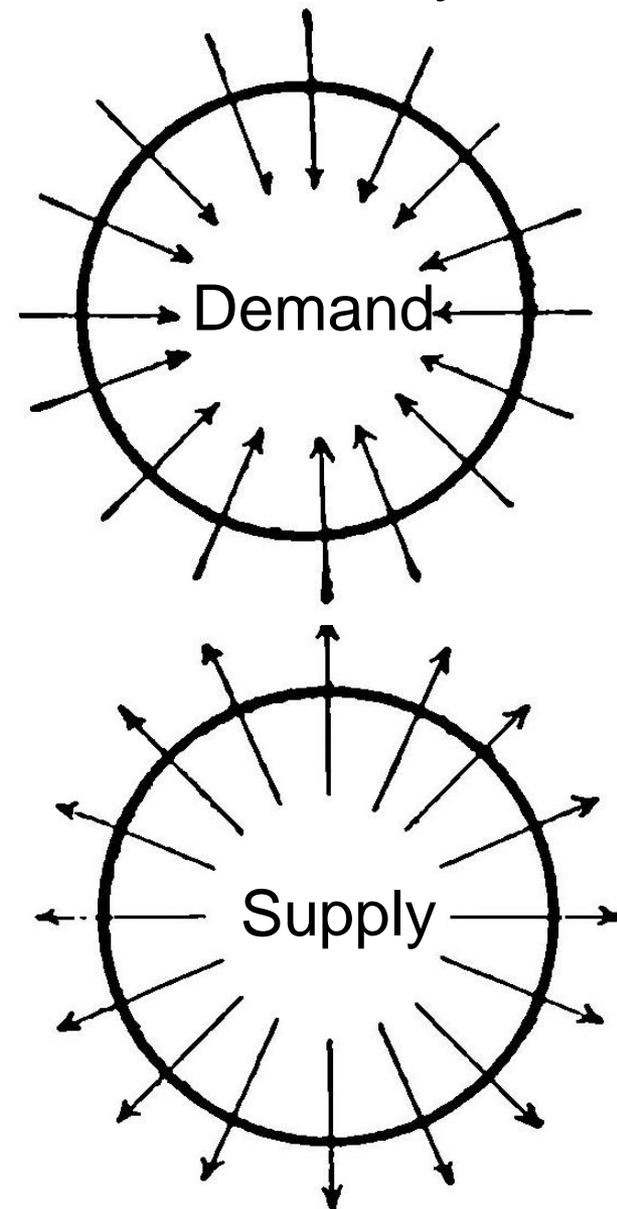d) multiple conflicting goals   e) a field of problems/ opportunities

- Anticipation is tricky and potentially overwhelming
  - Many **crime types**, each using diverse **perpetrator techniques**
  - Many crime **targets** and crime **environments**
  - Huge range of possible **resources** for crime
  - Huge range of **preventive methods** which could exploit new technology – or be defeated by it
  - Huge range of **scientific/tech innovations** coming, individually & in combinations
  - Many complex **contextual changes** in other PESTLE domains
  - **Nonlinearities**
  - **Uncertainties**
  - Co-evolution – **arms races**
- But it's a great challenge for science and technology that will run and run!

Can take different perspectives on future crime/ security

- 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?
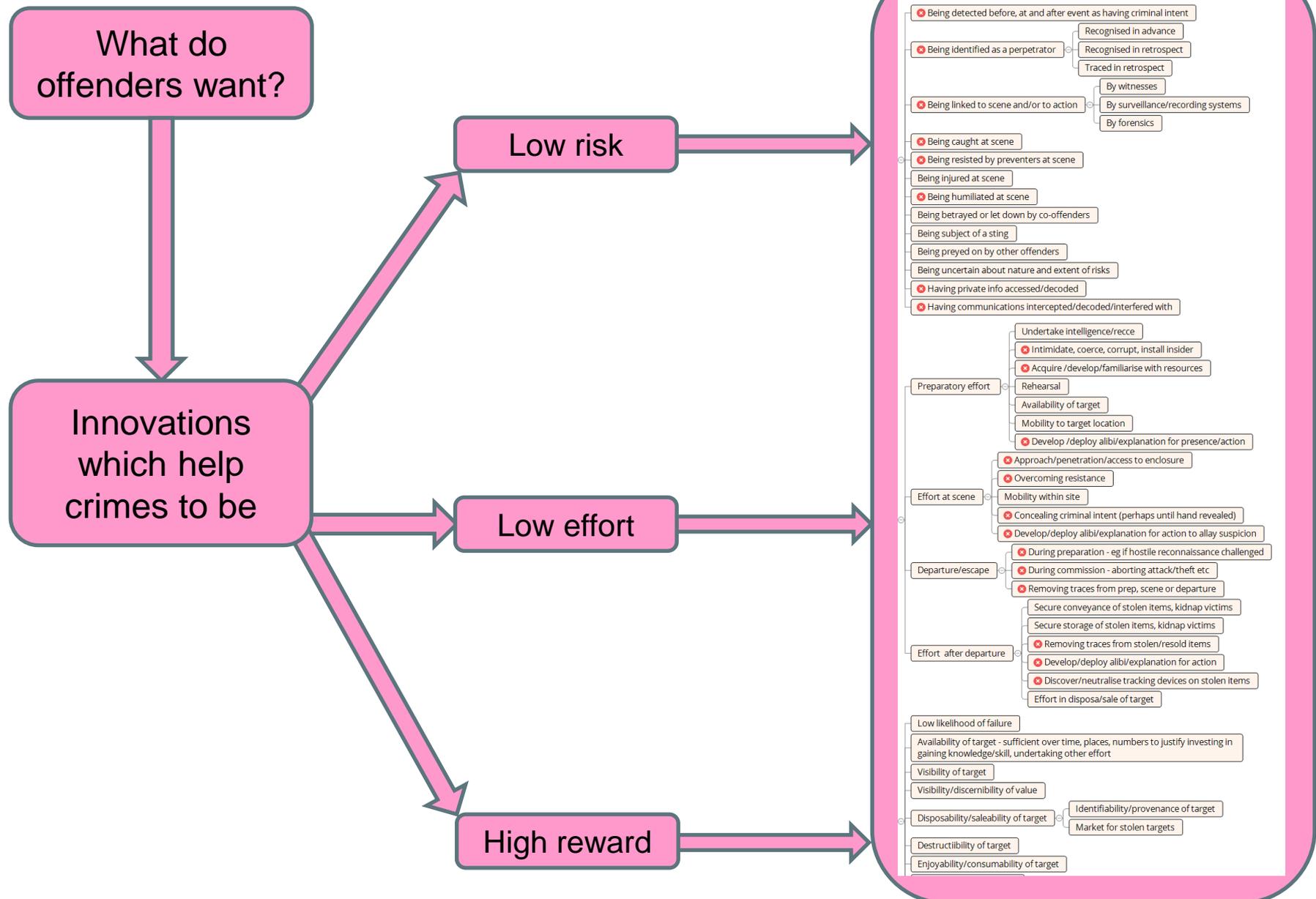
Demand

Supply

Function – demand-side – offenders' needs

Function – demand-side – offenders

What do offenders want?

- Low likelihood/ amount of harm
  - ❌ Being detected before, at and after event as having criminal intent
  - ❌ Being identified as a perpetrator
    - Recognised in advance
    - Recognised in retrospect
    - Traced in retrospect
  - ❌ Being linked to scene and/or to action
    - By witnesses
    - By surveillance/recording systems
    - By forensics
  - ❌ Being caught at scene
  - ❌ Being resisted by preventers at scene
  - Being injured at scene
  - ❌ Being humiliated at scene
  - Being betrayed or let down by co-offenders
  - Being subject of a sting
  - Being preyed on by other offenders
  - Being uncertain about nature and extent of risks
  - ❌ Having private info accessed/decoded
  - ❌ Having communications intercepted/decoded/interfered with
- Low likelihood/ amount of effort
- High likelihood/ amount of reward

UCL

What do offenders want?

- Low likelihood/ amount of harm
- Low likelihood/ amount of effort
  - Preparatory effort
    - Undertake intelligence/recce
    - ❌ Intimidate, coerce, corrupt, install insider
    - ❌ Acquire /develop/familiarise with resources
    - Rehearsal
    - Availability of target
    - Mobility to target location
    - ❌ Develop /deploy alibi/explanation for presence/action
  - Effort at scene
    - ❌ Approach/penetration/access to enclosure
    - ❌ Overcoming resistance
    - Mobility within site
    - ❌ Concealing criminal intent (perhaps until hand revealed)
    - ❌ Develop/deploy alibi/explanation for action to allay suspicion
  - Departure/escape
    - ❌ During preparation - eg if hostile reconnaissance challenged
    - ❌ During commission - aborting attack/theft etc
    - ❌ Removing traces from prep, scene or departure
  - Effort after departure
    - Secure conveyance of stolen items, kidnap victims
    - Secure storage of stolen items, kidnap victims
    - ❌ Removing traces from stolen/resold items
    - ❌ Develop/deploy alibi/explanation for action
    - ❌ Discover/neutralise tracking devices on stolen items
    - Effort in disposa/sale of target
- High likelihood/ amount of reward

What do offenders want?

- Low likelihood/amount of harm
- Low likelihood/amount of effort
- High likelihood/amount of reward
  - Low likelihood of failure
  - Availability of target - sufficient over time, places, numbers to justify investing in gaining knowledge/skill, undertaking other effort
  - Visibility of target
  - Visibility/discernibility of value
  - Disposability/saleability of target
    - Identifiability/provenance of target
    - Market for stolen targets
  - Destructiibility of target
  - Enjoyability/consumability of target
  - Hateworthiness of target
  - Satisfaction of event experience
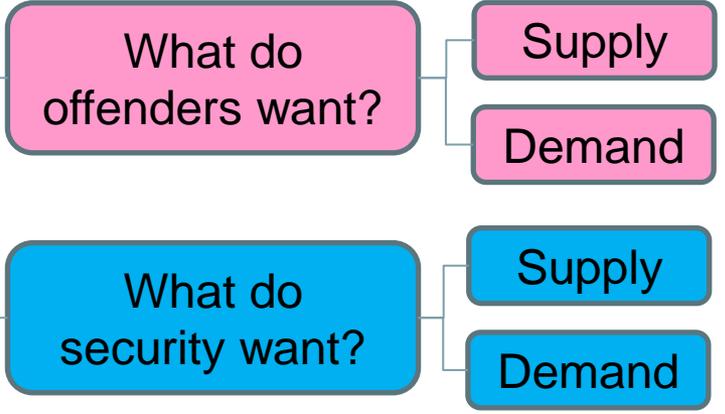 - Utility of target whose acquisition is an intermediate goal - eg as tool/weapon

Causal properties relevant to Crime/ Security

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

Trend: Autonomous drones become pervasive

Functional properties relevant to Crime/ Security

What do offenders want?
- Supply
- Demand

What do security want?
- Supply
- Demand

Functional **essence of drone?**

Active, mobile, effective telepresence of human agency

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

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

- We can identify **tactical clashes** between offenders and security

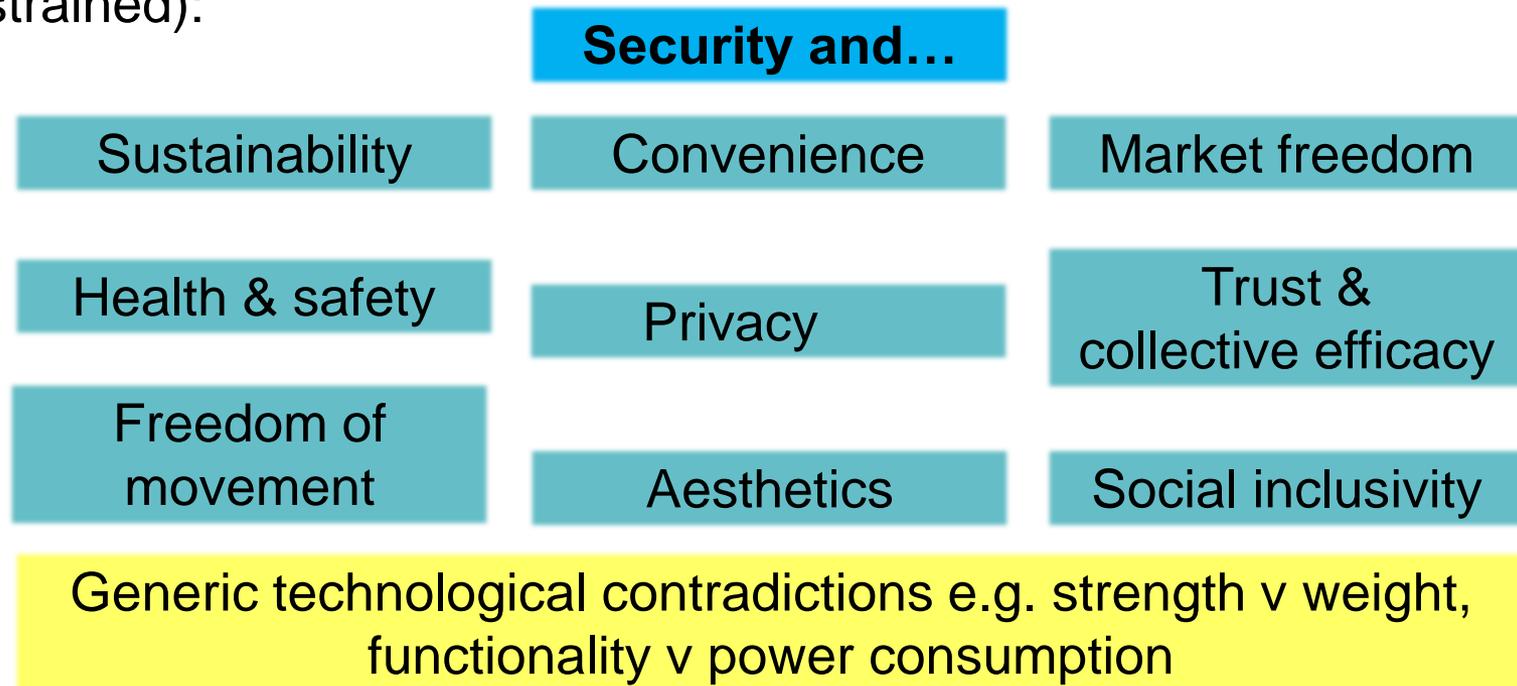|		
Wield force v resist (Damage v protect, Injure v keep intact)	Take v keep	Snoop v maintain privacy
Act at will v control misbehaviour	Confront v avoid	Pursue v escape
	Surprise/ ambush v be alert	Trap v elude
Conceal traces and tracks v detect	Challenge suspect v give plausible response	Conceal criminal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

- These clashes
  - Influence **criminal plans and outcomes**
  - are **generic and perennial** – will always need to be faced
- 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**

- **What's stopping us** from making the future favour 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

Generic technological contradictions e.g. strength v weight, functionality v power consumption

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

- **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

Example trends of interest to crime/security

Applications

- Drones
- Autonomous vehicles
- Smart rail signalling systems
- Non-GPS navigation
- Blockchain
- Brainwave reading/ control
- Smart lighting
- Performance-enhancing prosthetics
- Instructional technology
- Script kiddies

Generic technologies

- Hyperconnectivity
- AI
- Robotics/ Nanobots
- Quantum computing
- SCADA
- 3D printing
- Mass customisation
- Portable, renewable power
- Wearable ICT
- Smart materials
- Stealth technologies
- Sensors, sensor fusion
- IoT
- Pharma
- Chemical synthesis
- GM/ CRISPR
- Advanced optics
- Hacking (both senses)

Background changes

- Climate change
  - Temperature
  - Sea level/ acidification
  - Water, food shortage
- Mass migration
- Antimicrobial resistance
- Commodity scarcities
- Commodity substitution e.g. Mo for Pt catalysts
- Circular economy
- Universal wage
- New finance/ banking models
- New working patterns
- New transport/ movement patterns
- Any concentration or dispersal of value, anywhere in the value chain

'Tomorrow, and tomorrow, and tomorrow,
Creeps in this petty pace from day to day,
To the last syllable of recorded crime'

Thank you!

- <u>Scope of candidate cause/trend</u>
  - **Timescale** – immediate future…to 2050? Cycles of research, innovation, policy?
  - **Perspective** – Supply-side, demand side, both?
- <u>Attributes of cause/trend</u>
  - **Certainty/clarity** – is trend reliable? What's the evidence? Is there controversy?
  - **Interactions** – multiple trends raise complexity but may be more realistic?
  - **Influence on crime/security** – given the trend, how strongly/ plausibly/ and reliably will it affect crime or security? E.g. feasible for offenders to get/ apply?
- <u>Crime problems and solutions</u>
  - **Importance** – severity of harm, volume of harm from crime? Rate of growth?
  - **Discernibility** – broad possibilities or specific crimes in specific contexts?
  - **Tractability** – will we ever be able to do something about crime problem?
  - **Urgency** – how soon do we need to take action to intercept the problem?
  - **Countermoves** – is a crime/security arms race likely?
  - **Ethics, proportionality, public confidence** – human rights, non-discrimination?
- <u>Research considerations</u>
  - **Interest** – to home disciplines, connection with theory, research and methods
  - **Researchability** – sharp research questions
  - **High impact** – for REF, appeal to co-funders