



\* \*  
University of the  
Arts London \* \*  
Central \*  
Saint Martins \*  
\*

# Liberty versus safety: A design review

Adam Thorpe and Professor Lorraine Gamman  
University of the Arts London

Design for the 21st century



Arts & Humanities  
Research Council



1. Introducing BikeOff
2. Liberty versus safety: bikes versus bike bombs
3. Mediating risk: user accommodation (BikeOff) vs abuser exclusion (CTO)
4. Biciberg: an informed reappraisal
5. Conclusion

# What is BikeOff ?

---

BikeOff is the DAC research strand addressing bicycle theft and secure cycle parking provision.

BikeOff is investigating how designed and ad-hoc cycle parking solutions are complicit with crime i.e. linked to misuse and abuse/ theft of bicycles.



## Why BikeOff?

---

The department for Transport, National Cycle Strategy (1996) aimed to increase cycle usage x4 by 2012.

**17%** of cyclists experience bicycle theft. Of these **24%** stop cycling and **66%** cycle less often.

*Transport Research Laboratory 1997*

# Why BikeOff?

---

Cycle theft seriously impedes cycle usage and the benefits that cycling has to offer the public:

- \* Quick
- \* Healthy
- \* Affordable
- \* Non-polluting



## Why BikeOff?

---

The department for Transport, National Cycle Strategy (1996) aimed to increase cycle usage x4 by 2012.

September 2004, above target was replaced with local achievable targets.

London: Mayor Livingstone has targeted an 80% increase in cycling by 2010 and 200% increase by 2020.

In 2004, 80,000 bicycles were stolen and fewer than 5% were returned to their owners.

# Why BikeOff?

---

**1600 premature deaths per year due to poor air quality.**

Mayor of London, 2006: Cleaning London's Air – The Mayors Air Quality Strategy, London: Greater London Authority

## DAC: user/mis-user/abuser focus

---

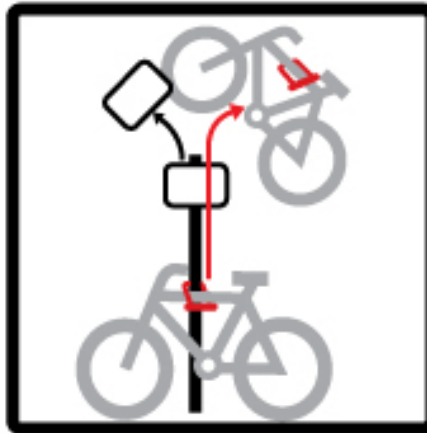
Research focus on perpetrator techniques seeks to establish ‘what is’, ‘what does’ scenarios rather than theoretical ‘what if’, ‘what could’ scenarios to inform appropriate responses that are fit for purpose.



# Bike theft perpetrator techniques: establishing reality

## lifting

Thieves lift the bike and lock over the top of the post to which the bike is secured. If it is a signpost then the thieves may remove the sign to lift the bicycle clear. They may replace the sign afterwards. Sometimes the post itself is not anchored securely and can be lifted clear of the bike and the lock.



Always lock your bicycle to a 'closed structure' that is well secured to the ground. If you must lock to an 'unclosed structure' then make sure it is more than 5 metres high and well secured to the ground (thieves will stand on shoulders to pass your bike clear if the structure is low enough).

## levering

Thieves will use the gap between the stand and the bike left by a loosely fitted lock to insert tools such as jacks or bars to lever the lock apart. Thieves will even use the bike frame itself as a lever by rotating it against the stand or other stationary object it is locked to. Either the bike or the lock will break – the thief doesn't mind which – after all, it's not their bike!



Always fit your lock so that as much of the aperture within the lock is filled by the stand and bike (and maybe helmet). This will make it harder to insert tools between the lock and the stand. **Never lock your bike by the 'top tube' (AKA 'crossbar') alone** as this will allow for the bike frame to be rotated against the lock.

# Bike theft perpetrator techniques: establishing reality

## striking

Given the opportunity thieves may use a hammer and cold chisel to split a securing chain or lock.



Always ensure your lock is fitted so that it cannot rest upon the ground or other immovable surface. This will allow the lock or chain to move if it is struck, diffusing the force of the strike and keeping your lock or chain in one piece.

## cutting

Thieves are known to use tinsnips, bolt cutters, hacksaws and angle grinders to cut their way through locks and chains to steal bicycles.



Don't make it easy for thieves. Some locks, such as coil or cable type, can easily be cut using readily available hand tools. More robust cutting equipment can be difficult to defend against. Expect to spend up to 20% of the value of your bike on your lock. Look at [www.soldsecure.com](http://www.soldsecure.com) and manufacturer guarantees and security ratings to buy the best lock you can. **It is best always to use two locks to enable you to secure both wheels and the frame of your bike to the stand.** If you buy two locks go for different types e.g. a strong D-lock and a sturdy chain lock. This means that if the thief has the tools to defeat one type they may not be equipped to deal with the other.

# Bike theft perpetrator techniques: establishing reality

## unbolting

Thieves know how to undo bolts and quick release mechanisms. If you lock your bike by the wheel alone this is likely to be all that will remain when you return. If you lock only your frame then a thief may remove your wheel(s). If you leave your wheel-less bike to pick it up later then the thief will likely return before you do and remove the rest of the bike if circumstances allow.



Always lock both wheels and the frame of your bike to the stand and remove any quick release accessories such as saddle and wheels. If you only wish to carry one lock then secure skewers are a good idea. These are available from most good cycle shops and do not allow unauthorised removal of wheels, meaning you only need to secure your frame to the stand.

## picking

Thieves can insert tools into the lock mechanism itself and 'pick' it open.



Most good locks are designed to resist this technique. Check that yours is one of them. Also, make it harder for the would-be thief by securing your lock in such a way that the mechanism is hard to get at. Tightly secured to the bike and stand and facing into your bike. Whilst this makes things a little more difficult for you it will make it a lot more difficult for a lock picker.

www.illustrations by Michael Salmon

## BikeOff intervention areas:

---

Project aims to use research to inform solutions in the following areas:

**Information Environment:** methods of communicating security issues and user best practice to cyclists and other users of the space.

**Surveillance and Guardianship:** schemes that will help cyclists look after our own bikes and/or work with existing services to do so.

**Cycle parking furniture:** designing more secure user-friendly cycle parking furniture.

**Lighting and Site Improvement:** the design of more user-friendly, abuser unfriendly sites for cycle parking.

## BikeOff intervention areas:

---

**Information Environment:** methods of communicating security issues and user best practice to cyclists and other users of the space. (signage/messaging/ integrated?)



## BikeOff intervention areas:

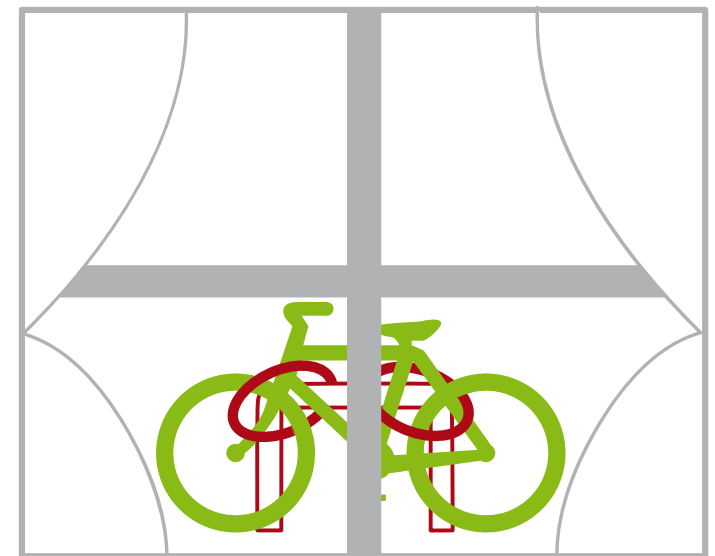
---

**Surveillance and Guardianship:** schemes that will help cyclists look after our own bikes and/or work with existing services to do so.

The BikeOff weblog and site observations have shown that users do not put their trust in cctv.

Little Brother : Bosch

- Self monitoring
- System mgmt – registered users
- Triggers and alerts
- Response – physical/sensory?



## BikeOff intervention areas:

---

**Cycle parking furniture:** designing more secure user-friendly cycle parking furniture.

Short stay (0-2 hrs)

Medium stay (2-6 hrs)

BikeOff research indicates a requirement for stand design to address:

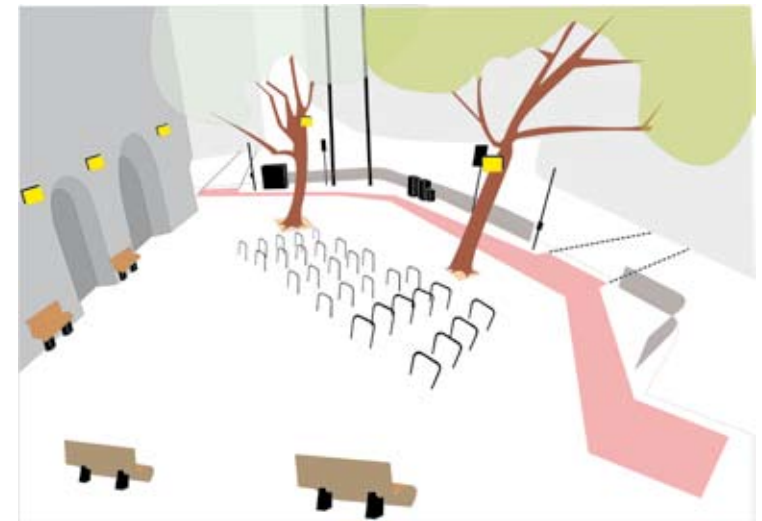
- \* Reducing opportunity for insecure locking practice.
- \* Support bike from falling and front wheel from falling to side
- \* Increase security of '1 lock' users



# BikeOff intervention areas:

**Lighting and Site Improvement :** the design of more user-friendly, abuser unfriendly sites for cycle parking.

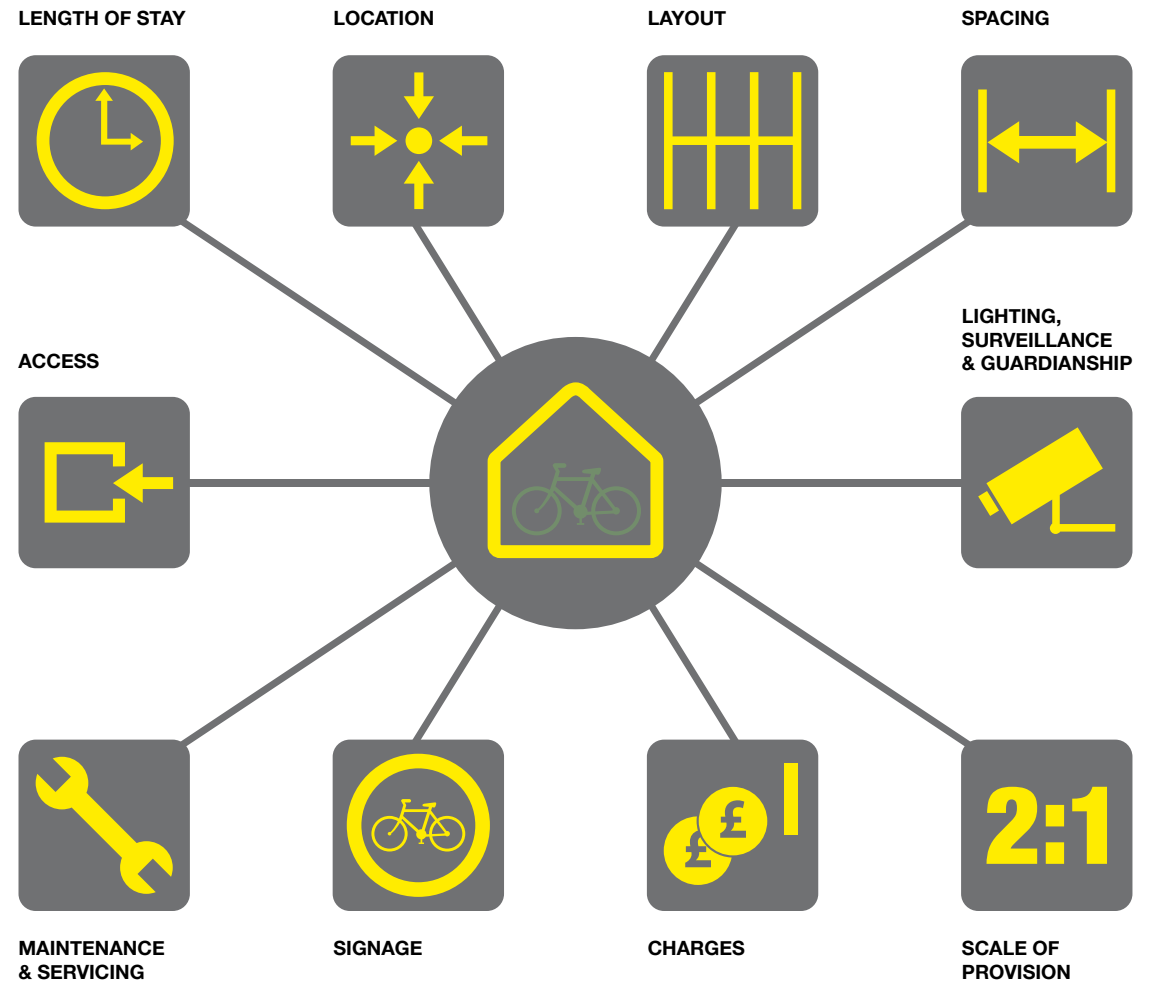
- \* Pedestrian flows (phoneboxes)
- \* Cyclist access – conflicts?
- \* Site lines
- \* Lighting
- \* Service – site management and maintenance – broken bike effect
- \* ‘Place making’ – Holborn Gateway
- \* Other users – college users/ office workers/ tourists/visitors
- \* Way-finding





# Cycle parking environment guidelines

- \* Desk based research
- \* Best of breed guidelines
- \* Bikeoff research
- \* TFL
- \* MAID engagement and feedback



## Liberty vs safety

---

*“Those that would give up essential liberty to purchase a little temporary safety, deserve neither Liberty nor safety”.*

**Benjamin Franklin, 1755**

# Liberty vs safety: bikes vs bike bombs

---

Parliament Square, April 2006



# Liberty vs safety: bikes vs bike bombs

Westminster, London 2006



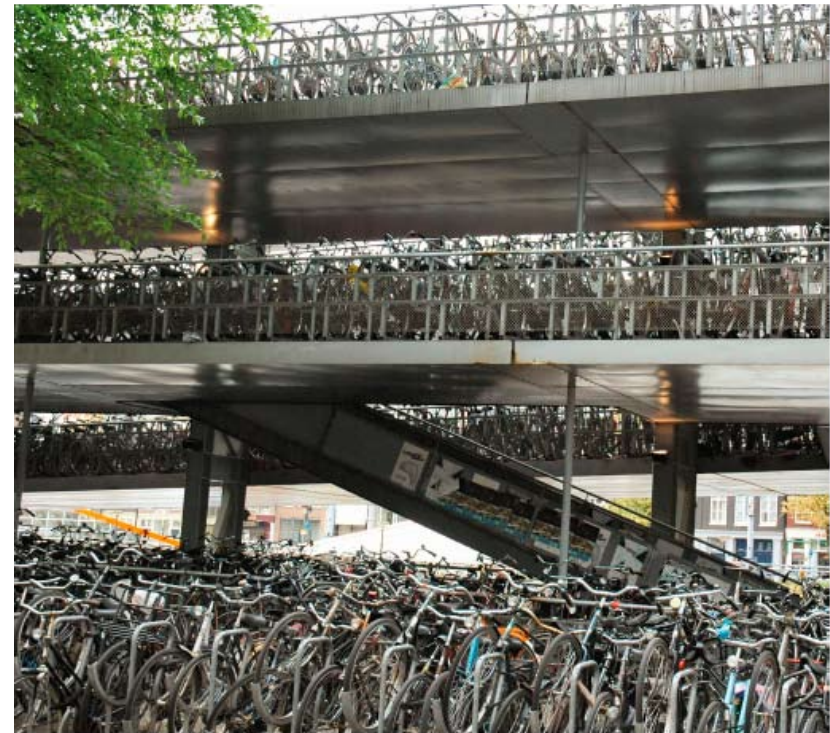
# Today Parliament Square, Westminster – tomorrow?

---

\* Olympics



\* Integrated transport hubs





# Bike bombs: fact or fiction?

---

Brighton & Bognor, UK, 1994,

Kabul, Afganistan, October 2006



# Hostile reconnaissance – the terrorist gaze

---

CHANNEL NEWS ASIA. Terrorist Arrest in Singapore [online]:

<http://www.channelnewsasia.com/cna/arrests/transcript.htm>

“You will notice that some of the boxes placed on the motorcycles, these are the same type of boxes that we intend to use.”

The camera pans across the bicycle stands to motorcycle racks and other parking facilities and the voice continues:

“This is a taxi stand, our bicycle can be parked there also; either bicycle or motorcycle. This is a view of the pickup point from the rear, there is a tree next to the bicycle bay, this is the place where the military personnel will alight from the bus or queue up for the bus.”

# Bike bombs: perpetrator techniques

---

24 detailed accounts

Explosives located in bike frame: 0

Explosives located in bag/box on bike: 24



# Bike bombs: what is? what does?

---

- \* Bombs in bags not bikes.
- \* Ban bags on bikes from situation not bikes themselves.

## Bikes vs bike bombs: the risks

---

- \* Premature deaths due to poor air quality, London, 2005: 1600
- \* Premature deaths due to terrorism, London, 2005: < 1600
- \* Premature deaths due to bike bombs. London, 2005: 0
- \* Without bikes air pollution will continue to be a problem
- \* Bikes may be used as vehicles for terrorist bombs

### (3) Mediating risk

---

Cross-comparison of requirements for user (cyclist) accommodation and abuser (terrorist) exclusion.

- \* Bikeoff bicycle parking design guidelines

- \* Conjunction of Terrorist Opportunity design principles (Roach et al, 2005)

# Bikeoff requirements x CTO principles

---

- \* Identify conflicts and compatibilities.
- \* Amplify compatibilities
- \* Mediate conflicts (through design)

## Conflict e.g. location

	Exclusion	Deterrence	Vectors	Enclosure	Environment	Preventers	Promoters
Location	—	—	—	+	—	+	0
	<25m means	Proximity to target could increase rewards for terrorists	Bikes are symbolic of sustainability and social progress/responsibility. To make bikes a threat is to limit social evolution.	Despite location parking can be physically enclosed to contain blast.	High risk due to proximity to destination – particularly at iconic sites that may attract terrorist attention which may warrant special consideration	Proximity to destination served may allow for acquisition of personnel at destination to serve as preventers.	

## Conflict e.g. location

---

Location is a high conflict consideration. Research shows that for short stay cycle parking to be used it should be located within 25m of the destination served and 50m for long stay parking (Sustrans 2004).

The lethal blast radius of 5lb of Semtex (as hidden within a saddle bag in Brighton in 1994) is 46 meters. Thus, the user requirement for parking to be close to the destination it serves is problematic, especially at iconic sites that may attract terrorist attention.

# Compatibility e.g. surveillance & guardianship

	Exclusion	Deterrence	Vectors	Enclosure	Environment	Preventers	Promoters
Guardianship/ Surveillance/ Lighting	+	+	-	+	+	+	+
	Informed personnel could watch out for terror MOs and exclude those exhibiting terrorist behaviours.	Staffed facilities with restricted and recorded access could increase risk and effort for terrorist	Targeting of a secure facility would demonstrate that no bike is safe, signalling insecurity.	Staffed and surveyed facilities assist in target hardening	Staffed and surveyed facilities will deter terrorists	Capable guardians, motivated, informed and empowered are effective formal preventers. Appropriate lighting and surveillance assists formal preventers.	Denies clandestine mis-use of facility by careless promoters.

## Compatibility e.g. surveillance & guardianship

---

Guardianship/ surveillance/ lighting is a factor of high confluence with terrorism prevention. Appropriate training and education of guardians will provide formal preventers. Deployment of appropriate technology (sniffers/ digital recognition/ Video Content Analysis) will aid formal preventers.



# Mediating risk

---

These frameworks combined with knowledge of terrorist MO's ('what is', 'what does' scenarios) enable designers to deal proportionately with 'what if', 'what could' scenarios without resorting to vulnerability led design.

This approach enables designers to amplify compatibilities and mediate conflicts between user accommodation and abuser exclusion.

## BikeOff cycle parking advice for high risk areas:

---

- i) Large scale with convenient and controlled access (possibly with a fee charged),
- ii) Well managed, lit and maintained; and
- iii) Regularly surveyed by appropriate informed and empowered guardians.
- iv) The design of the site should facilitate good surveillance (sight lines) and deny opportunities for concealment.
- v) Ideally, the parking should be situated within a robust enclosure (to contain an explosion should the worst happen).

## BikeOff cycle parking advice for high risk areas:

---

- vi) Layout and spacing should facilitate easy observation and access for security equipment as well as users.
- vii) Signage should communicate with users as to appropriate usage i.e. 'no bags to be left on bikes', 'please report any bags left on bikes'.
- viii) Long-term facilities can readily accommodate these requirements. Short-term facilities will find it harder to implement these measures but in high risk areas should consider the principles above and apply them where possible.
- ix) All facilities should prohibit bags or other containers being left unattended on bikes in parking facilities.

## (4) Biciberg: an informed reappraisal

---

Biciberg is an automated bicycle parking solution which stores bicycles under the ground. Initial reaction deemed Biciberg inappropriate as it appeared vulnerable to terrorism. Let's look again.

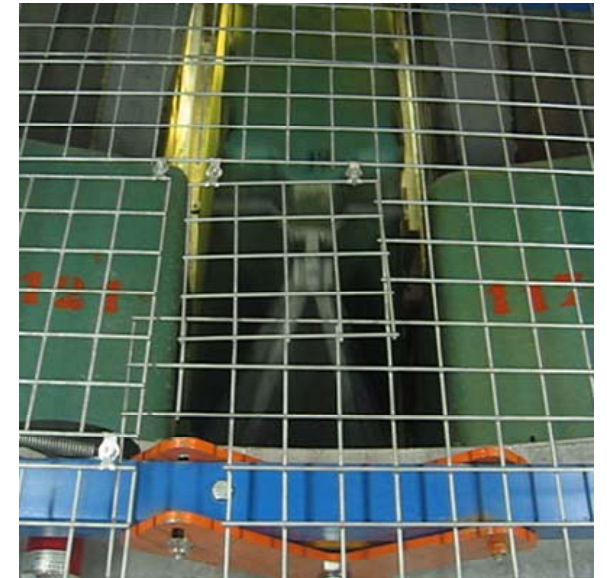


# Bicicberg: an informed reappraisal

---

i) Large scale with convenient and controlled access (possibly with a feecharged)

\* 46, 69 or 96 bikes per facility (2,3 or 4 carousels)





# Bicicberg: an informed reappraisal

---

ii) Well managed, lit and maintained

\*Anti-graffiti/vandal materials and construction

\*Managed and serviced facility



# Bicicberg: an informed reappraisal

---

- iii) Regularly surveyed by appropriate informed and empowered guardians.
- iv) The design of the site should facilitate good surveillance (sight lines) and deny opportunities for concealment
- v) Layout and spacing should facilitate easy observation and access for security equipment as well as users.

- \* 6 cameras monitor what is introduced and retrieved from the facility and by whom.
- \* Other sniffing and monitoring devices may be integrated if required.



# Bicicberg: an informed reappraisal

vi) Signage should communicate with users as to appropriate usage i.e. ‘no bags to be left on bikes’, ‘please report any bags left on bikes’.





## Bicicberg: an informed reappraisal

---

vii) Long-term facilities can readily accommodate these requirements. Short-term facilities will find it harder to implement these measures but in high risk areas should consider the principles above and apply them where possible.

viii) All facilities should prohibit bags or other containers being left.

\*Biciberg is a long-term facility compatible with security requirements

\*Signage and surveillance can prevent bag storage

## Bicicberg: an informed reappraisal

---

Biciberg is a good solution for high risk environments (with the proviso that bags are not left in the facility).

This finding is counter-intuitive and indicates the value of a rigorous and systematic evaluation.

## (4) Conclusions

---

- \* Design decisions should be based on research not ‘moral panic’ if we are to maintain liberty in pursuit of safety.
- \* In depth knowledge of terrorist perpetrator techniques enables designers to deal with ‘what is, what does’ scenarios rather than ‘what if’, ‘what could’ scenarios.
- \* Mindfulness of user (cyclist) accommodation AND abuser (terrorist) exclusion is necessary for a balanced address to liberty and safety.
- \* Frameworks and guidelines such as CTO and Bikeoff are useful to designers when considering the conflicts and compatibilities between user (cyclist) accommodation AND abuser (terrorist) exclusion.