Urban Security and Counterterrorism: An Approach to Proportionality

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Abstract

As cities and crowded areas increasingly become targets of terrorist plots and attacks, there is ample demand for risk assessment tools that consider proportional measures that reduce the threat, vulnerability, and possible impacts, whilst providing 'security returns' for those investments. There is a risk in this process of over- or under-fortifying places based on practitioners' subjective biases, experiences, dead reckoning and conflicting agendas. Currently, risk assessments rely on qualitative tools that do not consider proportionality that removes these inherent biases. Critiquing well-known urban design strategies and national risk assessments, this article therefore seeks to develop a supplementary assessment tool – an equation for proportionality – that is more objective and is created to help practitioners make good choices, in particular on: (1) reducing the threat, (2) vulnerability, (3) impact, (4) accepting risk, and (5) measuring a security measure's ability to deter, delay or stop an attack. It concludes that while no assessment is truly objective, the equation works to remove as much subjectivity as possible when assessing proportional urban security.

Introduction

European countries have witnessed numerous terrorist attacks over the past two decades, including vehicle explosions and ramming, and firearm and knife attacks. Vehicle ramming caused a considerable number of casualties in the 2010s alone.[1] These took place in crowded vulnerable urban places that were attractive for violent political actors and included bridges, shopping streets, markets, and promenades. As recently as 2020, deliberate vehicle ramming by right-wing extremists during the Black Lives Matter protests has kept the threat in the spotlight.[2] The Taliban's renewed stronghold in Afghanistan means that there is considerable uncertainty about what this means for domestic security in the West and the wider world. The costs of implementing physical urban interventions—barrier systems, traffic calming measures, or Hostile Vehicle Mitigation Measures (HVM)—in cities runs into the billions.

Over the years, local authorities in cities have incorporated *"resilience thinking"* into urban planning, where the dynamics and complexities of urban systems require consideration into the efficiency, spatial factors and the effects on people who use these spaces. Negotiating the trade-offs between security and freedom often requires complex political and negotiation processes between a plethora of different actors with sometimes mismatched agendas, including the emergency services, urban planners, architects, local authorities, business owners and security professionals. Local authorities often must decipher the complex needs of different end-users of different urban spaces whilst maximizing security and safety in a proportional and holistic way. While national risk assessments help in understanding threats, vulnerability, and potential impact, no study, thus far, has attempted to provide an objective approach to proportionality that eliminates inherent biases, intuitions, and experiences that goes into securing vulnerable urban spaces.

Bias and intuitions can contaminate both the risk assessment process and measuring cost-effectiveness. The risk assessment maker and the risk assessment user are both biased.[3] Bias is largely cognitive, swayed by terrorist risk discourses, positivist and subjective approaches to risk,[4] case selection bias of security measures,[5] hindsight bias,[6] practitioner experience, exposure to certain information of various quality, and even political affiliation. Bias can be influenced by the often-limited resources and finances available to secure urban spaces, as well as the

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environmental, historical, or cultural conditions relevant to the urban space, which may consider both hard (overt measures with open surveillance) or soft measures (more people-centric and livable green spaces, for example). This may be further compounded when working in multidisciplinary groups with varying skills, expertise, responsibilities, and agendas. The time context is also important: A risk assessor may draw different conclusions if the threat is moderate, against one working more rapidly in response to an emerging, highly likely threat. Overall, this can result in over- or under-estimating the threat, vulnerability, impact, and the effectiveness of the countermeasures.

The goal with this article is to put forward a supplementary framework, one that ties today's assessments of security risk in urban areas to urban design strategies and thus completes or complements the process. Proportionality is the objective for achieving these ends, and it focuses on HVM measures as an example. This article first situates the concept of proportionality with the security in depth concept and situational crime and situational terrorism prevention strategies, arguing that these approaches do not explicitly consider proportionality in urban counterterrorism strategies. A similar argument is attached to Norwegian, European, and American risk assessments. It then attempts to translate proportionality into the urban counterterrorism context.[7] Since proportionality is a measure of correspondence, it is a fair assumption that it can be illustrated as a weight scale or, even more applicably, as an equation. On one side, there is the apparent security risk; on the other, there are the security measures and their ability—or their performance—to help manage the risk.

Proportionality, Security in Depth, and Situational Crime / Terrorist Prevention

Proportionality is a concept used in many different contexts to exercise judgement of what measures are most appropriate for a given situation; from law (what punishment is appropriate to the crime committed) to the security of vulnerable urban spaces. A proportionality assessment seeks to strike a balance between the over-fortification and under-fortification of a vulnerable urban space. The consequences of the former might act as a deterrent but may conjure bunker-like feelings of a place, while the latter may mean the area remains an attractive terrorist target and make users feel exposed. Questions might therefore arise about whether, for example, overt security measures could provide reassurance, or whether security measures should be hidden or covert.

Ultimately, these considerations introduce subjective biases into the risk assessment process.

Target hardening also considers the principle of Defense-in-Depth that similarly disregards objective assessment of proportionality. Defense-in-Depth is a multi-layered security mechanism, strategy, theory, and principle, which has been used for centuries. Its foundations are based on the premise that a succession of barriers, either physical or technical, will have to be overcome in order for the offender's goal to be achieved, and if one security mechanism fails, another security mechanism will provide security to protect the asset: A succession of barriers will not only deny or delay access to the target (a vulnerable urban space, for example), it may allow time for those protecting the target to detect, react and respond to the issue.[8] Hence, the performance of security measures is an important aspect in the negotiation between over and under-fortification, but could suffer the same problem of bias and inconsistent agendas between different actors invested in the security of vulnerable urban spaces.

Situational crime prevention (SCP) or situational terrorism prevention efforts rarely consider proportionality in an objective, non-biased way. When considering all facets of deterrence, detection, delay and response, proportional measures are only considered to increase the effort for the terrorist to attack vulnerable urban spaces (and thus deter them), to increase the risk to the offender (of failing or getting caught), and, ultimately, reduce the rewards (impact, shock, and political attention) that violent political actors typically want to achieve. These assessments can be mostly based on intuition and dead reckoning, and not the same degree of objectivity as risk assessments allow.

In summary, proportionality is deeply contextual and is not considered explicitly in these processes; it relies on a range of different actors assessing the vulnerability (the gaps and weaknesses) of a space and the impact (people, assets, societal, economic) it might have based on their own subjective biases. There will inevitably be consequences, but the question is what consequences are more acceptable and proportional to the situation? There is also the issue of being prohibited by costs: Practitioners are prohibited by space, time, and money, and this influences certain biases when assessing what solutions are most appropriate. Securing urban spaces is also influenced by cost-effective perspectives of multifunctionality: Will a concrete bench provide more return to users of urban spaces than a bollard system, for example?

Overall, these conflicts of interests are necessary, but contaminate the process of deciding what proportionate security is.

One final aspect of proportionality is the utilization of risk assessments and how they influence the decision-making process. The next sections provide a brief perspective, and thereafter the article provides an equation of proportionality that could supplement existing risk assessment guides and approaches.

Risk Assessments: A Brief Country-by-Country Perspective

Security risk assessments are complex procedures, and different countries offer different evaluations depending on their strategies and security culture. On the international level, there are a few risk assessments that contribute to a universal language and therefore should be mentioned. These include the *Integrated Security and Resilience* framework, *Disaster Risk Reduction*, the European Union project *Designing Safer Urban Spaces* (DESURBS), and the Federal Emergency Management Agency (FEMA) 400-series guidance manuals against potential terrorist attacks in the United States.[9]

At a national level, there are pyramidic structures with the more generic assessment contents on top—like the international frameworks—and an increasing level of detail lower down. To understand the process, the Norwegian framework is worthy of investigation. The Norwegian Standard no. *5832 Societal Security—Protection Against Intentional Undesirable Actions* is Norway's official framework for assessing security risk.[10] It describes a linear process that takes users through the identification of threats, vulnerability assessment, risk determination, identification of ways to reduce risk, and prioritization of security measures. Since it is a standard risk assessment, it remains on an arbitrary level and, as a result, the assessors must fill in necessary context and required specifics. To help them do so, there are two additional national frameworks: First is the *Supervision Guide for Risk Assessments in Norwegian Municipalities* by the Directorate of Civil Protection.[11] Second is the *Guidance for Managing Security Risk* by the National Security Authority.[12] Combined, these three documents account for the Norwegian security risk assessment framework.

None of the listed national and international guides and frameworks address proportionality explicitly or provide a method for dealing with proportionality. The most useful, perhaps, is the FEMA 400-series' security ambition and the DESURBS' Decision Support System Portal

tool, although the latter does not distinguish sufficiently between safety and security risk. However, the existing frameworks are still helpful for mapping the assessors' habits and means. Additionally, they provide a set of qualitative scales to build upon. As an abstraction, any asset can be scored 0–5 based on its vulnerability to a specific threat. From there on, assessors can determine the apparent security risk and prioritize resources.

However, this way of assessing security risk has two shortcomings that are similarly found in situational crime/terrorism prevention and Defense-in-Depth: First, it is reliant on the interpretation and rational thinking of the people taking part in the assessment, meaning that two assessments with the exact same conditions may show different results. Second, it fails to address proportionality. As a result of these two interrelated shortcomings, there is a risk that the security measures considered will not correspond to the threats. There will always be many imagined threats with high potential consequences in a city center and assessors will often apply a one to one response to manage them without considering vulnerable urban spaces and city centers holistically.[13]

What is forgotten is that such responses leave out urban design strategies that aim to deter and delay the threat from happening in the first place. As a result, it can be argued that the shortcomings go hand in hand with unproportionate security measures. Due to a thin arsenal of tools, practitioners are left to trust their gut feelings derived from related experience or unqualified guesses.[14] The question now is how to strengthen the assessment and create a supplementary framework that allows assessors to successfully secure our cities without sacrificing urban livability.

Urban Design Strategies—Towards an Equation of Proportionality

There are several urban design strategies that help secure urban areas in the form of HVM measures and some of them are known to provide better results than others in accordance with the known threats and resultant vulnerabilities.[15] These strategies function alongside or supplement the previously mentioned frameworks and supervision guides. Two of the more well-known strategies are Crime Prevention Through Environmental Design and SCP. Of note is Elliot's *Planning for Protection*, later altered by Harre-Young et al. into *A New Philosophy for Urban Security*.[16] Elliot introduced a set of criteria for securing the

built environment against blast effects. These design criteria were then adapted into five generic principles that could be applied to any urban environment. The reworked principles are:

- Deflect a terrorist attack by showing that the chance of success is reduced.
- Disguise valuable parts of a site or a building.
- Disperse potential targets to reduce the impact of an attack.
- Stop an attack from reaching its target.
- Blunt the impacts of an attack should it reach its target(s).

These kind of broader design principles provide appropriate and informed guidance towards best practices on securing urban areas. But how this is performed is the next issue.

An Equation for Proportionality

The goal with this section is to put forward a supplementary framework: One that ties today's assessment of security risk in urban areas to urban design strategies and thus completes it. Proportionality is the key for achieving these ends. It should first be translated into the urban security context. Since it is a measure of correspondence, it is a fair assumption that it can be assessed as an equation. On one side, there is the security risk. On the other, there are the security measures and their ability—or their performance—to help manage the risk. This results in the following equation for proportionality P1:

$$(P1) \quad Security\ risk = Security$$

This is where a balanced equation is equivalent to a proportional level of urban security. This is, however, a simplification of the truth. There are a few more parameters that need to be part of the assessment. For instance, holistic security, cost and consequences, urban design strategies and people's perception of security—should be understood as a bare minimum.[17] As a result, it should expand each side of the equation with a set of conditions. On the left side (security risk), there is the urban area's vulnerability to a specific threat (A) and society's security ambition (S). On the right side (security), there is the sum of the proposed security measures' performance to the specific threat ($\sum_{i=1}^{n} M_{P_i}$). This leads to the complete equation for proportionality:

$$(P1) \quad A - S = \sum_{i=1}^{n} M_{P_i}$$

The left side of the equation details how much needs to be done. The next step is to give the equation adequate input (numbers). One way of doing so is to adapt the qualitative scales where values can be scored 0–5 by their degree of presence as shown in Table 1.

Table 1: Conversion Table for Qualitative Scales based on Degree of Presence

None	Very low	Low	Medium	High	Very high
0	1	2	3	4	5

Source: Authors

An Urban Area's Vulnerability to a Specific Threat (A)

To assess an urban area's vulnerability to a specific threat, a set of subordinate abilities are introduced. The abilities are extracted from terrorist targeting preferences and thus informs whether an urban area is considered attractive for an attack.[18] By cross-examining a set of studies, it concludes with five abilities for the A:

- Asset value is a measure of the threat's possible impact on an urban area's assets. Typical parameters are damage, mortality rates or physical and economic impact.
- Availability is a measure of an urban area's accessibility in the context of attackers' means of attack and capability. An available site is one that fits either the opportunities or the incentive for the attack.
- Compliance is a measure of the urban area and its contents match with the attackers' motive. For example, a mosque is likely a desirable target for right-wing terrorists wanting to achieve fatalities and media impact.
- Fragility is a measure of additional consequences that occurs when the attack takes place. Falling glass from nearby facades or the lack of possible evacuation routes are two example conditions that are likely to make an urban area fragile.
- Suitability is a measure of the current security control's ability to stop the attack from reaching its desired assets. If there are already (overt) security measures in place, the urban area is likely to be less attractive in the eyes of the attackers since it will increase the required effort.

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With the abilities listed, it expresses the A as follows:

Calculating the A

$$A = \sum_{i=1}^{5} Abilities_i$$

A is calculated by scoring each ability 0–5 according to their degrees of presence, and then adding them together, giving a score between zero and 25.

Security Ambition (S)

The security ambition (S) is defined as society's accepted level of an apparent security risk.[19] It is another way of expressing risk acceptance. In this context, society is represented by the assessors, such as preparedness planners in a municipality, police, and other first responders, as well as a variety of stakeholders. It is unrealistic to expect to eliminate all security risk; often a certain amount of risk must be accepted. What an assessor can do, however, is define a threshold for how much risk is acceptable and how much can be managed.
This threshold is key for proportionality, as without it, there is a potential for overdoing security. To help define the threshold, it is necessary to look at it from a new perspective, for instance, regarding the security ambition (S) as a chosen, or at least accepted, level of vulnerability.[20] This way it can be assessed bottom-up by looking at the A abilities. Although the purpose of the S is to help us sustain a livable urban environment while securing urban areas, it entails great responsibility and challenges ethics by adding price tags to lives.

Therefore, it is appropriate to avoid assessing it on a subordinate ability level by using a set of intervals that are adaptable to the A abilities. Since the A is limited to a total of 25, dividing the S into a similar framework is appropriate (as was done for the qualitative scales). This is depicted in Table 2.

Table 2: Conversion Table for the S

	None	Very low	Low	Medium	High	Very high
Interval	0	1-5	6-10	11-15	16-20	21-25
Suggested value	0	5	10	15	20	25

Source: Authors

Where the assessors decide on which category they are aiming for as their security ambition, it is suggested to use the higher end of the intervals. Subtracting the chosen S value from the urban area's A allows one to solve the left side of the P1 equation.

Security Measures' Performance (M_P)

From the A and the S, the assessor has a measure for how much they need their security measures to perform, but they will also need a way of determining the security measures' performance (M_P) in the P1 equation. However, there is one important difference: While an urban area's vulnerability A and the assessor's security ambition S are singular, there might be more than one security measure addressing a specific threat. As a result, the M_P value must be assessed as a sum of *n* number of measures. This will help practitioners consider urban security in a holistic manner.

The M_P is built on five abilities. This makes it comparable to the A and S and allows the use of the same qualitative scales for scoring them. The abilities constitute a sum, and even though there is no upper limit for how many urban security measures that can be applied, it sustains itself by the A upper limit of 25.

The five M_P abilities are rooted in urban design strategies and are the same as listed earlier. Their descriptions are, however, slightly extended:

- Deflect is the security measure's ability to show potential attackers that their attack is unlikely to be successful due to layout, defenses in place or present security. Deflection goes hand in hand with overt security measures and is the counterpart of an urban area's availability.
- Disguise is the security measure's ability to mislead attackers so that they fail to achieve their desired consequences. Covert security measures are key.
- Disperse is the security measure's ability to spread out the assets they seek to protect. It is a way of controlling an urban area's asset value.
- Stop is the security measure's ability to stop an attack from reaching its desired target or destination. It is the counterpart of suitability. Key for a high degree of stopping ability is to assess the

security measures through a holistic lens and to see to that they are in cooperation with each other and are preferably layer based.

- Blunt is the security measure's ability to reduce the consequences of an attack once it has happened. It is the counterpart of fragility and is best dealt with by building in resilience into the urban environment.

The M_P abilities are a mix of target hardening and environmental changes that affect the incentives of attacks. The idea is that all proposed security measures are scored 0–5 and then their sum is used in the P1 equation. It is important to assess the measures interdependently because they often affect each other's performance. The M_P can be addressed accordingly:
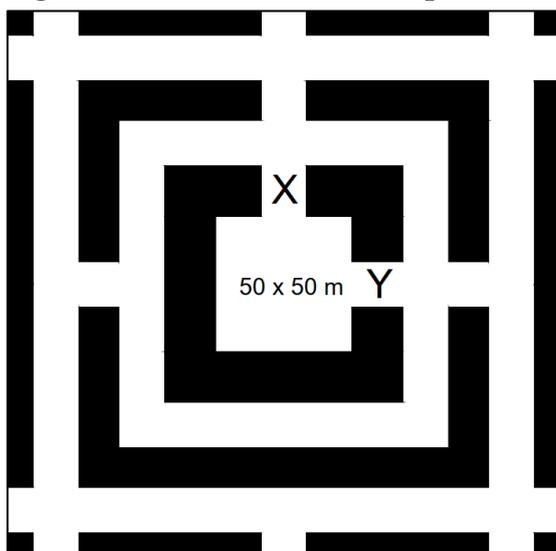
Calculating the M_P

$$\sum_{i=1}^{n} M_{P_i} = M_{P_1} + M_{P_2} + \cdots M_{P_n}$$

An Example

The following example is a crowded public square. It can be accessed by vehicles passing point X and Y. The example covers a walkthrough of the P1 equation as shown in Figure 1.

Figure 1: A Crowded Public Square

Source: Authors

The area's vulnerability to vehicle ramming attacks (A):

- Asset value is very high (5). It is a crowded public square.
- Availability is high (4). The square can be accessed by vehicles from two directions, both with sufficient acceleration distance to achieve lethal velocity.
- Compliance is very high (5). Clusters of people are ideal targets when wanting to cause the most harm possible using a car as a weapon.
- Fragility is low (1). There are few conditions present that add to the consequences of a vehicle ramming attack.
- Suitability is moderate (3). There are no current security measures mitigating vehicle ramming, but a two-way traffic pattern in the inner perimeter could minimize acceleration and hence the opportunity.

As a result, the area's vulnerability to vehicle ramming is:

$$A = \sum_{i=1}^{5} Abilities_i = 5 + 4 + 5 + 1 + 3 = 18$$

Next is the security ambition (S). For the sake of the example, it is set to 10 (low):

$$(P1) \quad 18 - 10 = \sum_{i=1}^{n} M_{P_i}$$

The final part of the assessment is to check whether a set of retractable bollards in point X (n_1) and reinforced square furniture in point Y (n_2) are proportional.

The security measures' performance (M_P):

- Deflect is low (2) for the retractable bollards (n_1) and none (0) for the reinforced square furniture (n_2). The bollards communicate to potential attackers that the square is protected, but they have no effect on access point Y.
- Disguise is none (0) for the n_1 and low (2) for the n_2. Reinforced furniture is a covert measure and is thus able to disrupt or surprise attackers.
- Disperse is none (0) for both measures.
- Stop is moderate (3) for the n_1 and none (0) for the n_2. Retractable bollards have a chance of malfunction as well as tailgating.

- Blunt is none (0) for the n_1 and low (1) for the n_2. The reinforced furniture can split crowds during an evacuation towards point Y.

This gives the following M$_P$:

$$\sum_{i=1}^{n} M_{P_i} = \sum_{i=1}^{2} M_{P_i} = (2 + 0 + 0 + 3 + 0) + (0 + 2 + 0 + 0 + 1) = 5 + 3 = 8$$

Which makes it possible to solve the P1 equation:

$$(P1) \quad A - S = \sum_{i=1}^{n} M_{P_i} \quad \Rightarrow \quad 18 - 10 = 8 \quad \Rightarrow \quad 8 = 8$$

The equation is balanced, and the proposed measures are proportional.

Discussion

Before the P1 equation can be used, there are a few topics that must be elaborated on. Especially relevant are the equation's objectivity, limitations, and utility. The equation is a result of methodological trial and error and while the abilities are rooted in existing literature in the field, they are, at least in some degree, cherry-picked. The equation can expand to incorporate other variables but with the risk of becoming over-complex and not user-friendly. Further testing, research, and scrutiny is required.

Regarding limitations, the equation does not consider urban security cost-consequentiality. For example, which consequences would a disruptive urban intervention, like pedestrianization, have on specific users of that location, like delivery drivers or the elderly or disabled? It is therefore important to also compare the security measures' performance with their requirements. It is encouraged to consider at least the security measures' competence in use, implications for everyday life, life cycle cost, monitoring and maintenance, as well as the space they seize in an already developed urban environment.[21]

The requirement abilities can also be scored 0–5 based on their degree of presence. However, this comparison should only see that requirements do not exceed performance. Furthermore, actions will always have consequences and installing security measures in urban areas is no exception. The security measures will affect the urban area

and its surrounding—positively, negatively, or both—and consequences should therefore also be part of the comparison. As a result, it is encouraged to consider the security measures' positive consequences along with their performance, and their negative consequences along with their requirements.

Even though it is more difficult to score the consequences, discussing them will paint a picture of which direction they weigh. Finally, there is a limitation in regards of complexity. Since the A is limited to the total of 25, the P1 equation might be difficult to use in complex urban areas like large city squares. This can, however, be dealt with by scaling up both sides of the equation equally. The FEMA 400-series can be used as a comparison. It uses a 0–10 range that might be better fitted for larger and more complex vulnerable urban spaces on the premise that security risk increases accordingly to the area's size, content, and overall complexity.

In terms of utility, the P1 equation presupposes two things: Effective interdisciplinary cooperation as well as adaption of something new and untraditional. Additionally, it creates additional work for the assessors and requires knowledge for using it properly. In some (smaller) municipalities, this might be an unrealistic requirement.

A final note is that the P1 equation is brand new. It requires testing and improving, and there are currently no factual results to highlight. Similarly, whilst this article has focused on HVM, its application to other attack methods requires further analysis. The equation is thus limited when it comes to scenario depth: The extent at which the security layers can prevent, mitigate, and help responses to, a broad spectrum of risks and threats. For example, one security layer may be effective against a specific attack method (vehicle ramming), but less effective for other probabilities. The consequence is that it may require investing in more security systems to cover a broader spectrum of risks that current systems are incapable of allaying. But fundamentally, the equation could supplement existing risk assessments, and could also be adapted to assess different threats and urban interventions.

Conclusion

As a result of cities and crowded areas increasingly becoming targets of terrorist plots and attacks, there is ample demand for risk assessment tools that consider proportional measures that reduce the threat,

vulnerability, and possible impacts, while providing security returns for those investments. Traditional urban design strategies and qualitative risk assessments, while useful, still present the risk of over- or under-fortifying places based on practitioner's own subjective biases, experiences, dead reckoning and conflicting agendas. This could lead to disproportionate measures that negatively impact urban areas. This article offers a supplementary assessment tool—an equation for proportionality— that is more objective and that is created to help practitioners make better choices on reducing the threat, vulnerability, impact, and measuring risk acceptance and the performance of security measures.

While no assessment is truly free of subjective biases, the P1 equation supplements the existing framework for assessing urban security. It helps measure vulnerability and the performance of security measures according to well-known urban design strategies. As a result, practitioners can check for correspondence between vulnerability and security, which allows them to secure our cities and urban areas proportionally.

While using the P1 equation, its limitations and utility need to be carefully considered. There is more to proportionality than what the equation takes as input, such as security measures' requirements for use and the consequences of installing them into the vulnerable urban spaces. It is essential that assessors also consider this before they determine proportionality. As a conclusion, the equation only works— and should therefore only be used—in a supplementary capacity and be kept open for improvements. It does, however, in both theory and in practice, provide the only available means by which proportionality can be measured, giving users the ability to weigh often complex and interdependent variables in a more objective, conceptual way.

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