Reducing Computer Fraud Through Situational Crime Prevention

ROBERT WILLISON
Computer Security Research Centre / IS Department, The London School of Economics.

Abstract: Although computer fraud continues to be a thorn in the side of many
              organizations, fresh perspectives to addressing this type of crime are rare.
              This paper advances a preventive approach which reduces those criminal
              opportunities that permit computer fraud to take place. The construction of
              crime specific opportunity structures, which enable the relevant parties to
              conceptualize the fraud environment, is advocated. This aids and promotes an
              inter-departmental preventive effort, so vital to combating and containing
              fraud.

1.   INTRODUCTION.

Fraud continues to plague organizations of all sizes. Although it is difficult to find accurate figures regarding the impact of fraud on companies, a 1996 UK survey by PA Consulting estimated that the annual cost to British business alone amounted to £20bn per annum [12]. At a more global level, Comer estimated the cost to leading industrial countries as 2-5% of their gross turnover [8]. The evidence for computer fraud is equally sketchy because some victim companies, worried about their public reputation, have proven reluctant to liaise with law enforcement agencies, preferring to deal with the matter in-house. However, the evidence that does exist does not make good reading for security practitioners. The latest UK Audit Commission Report, for example, cites that half of public bodies and a third of companies had fallen victim to some kind of computer fraud [1].

Figures like these give some indication of the sheer scale of the problem faced by companies.   Yet one of the biggest-if not the biggest-threat organizations face is to be found within their own walls.

2.   CRIMINAL OPPORTUNITY

Despite the scope and nature of the problem, fresh approaches to combating computer fraud instigated by organizational staff, are few and far between.   One alternative worth considering is to attempt to reduce the criminal opportunities for this type of fraud, which exist within a corporate environment.

At a general level, the existing literature relating to criminal opportunity and computer crime falls into two categories.   The first looks at how opportunities may be created due to the absence and poor implementation of security controls, while the second examines how opportunities have increased as a result of changes in organizational structures and environments.

Although the literature concerned with the creation of criminal opportunities in the workplace environment has proven useful in highlighting the problem areas, certain deficiencies need to be addressed.

The most glaring has been the failure to actually define the term 'opportunity'.   Instead, there appears to be an acceptance of an implicit common sense (CS) understanding of what constitutes an opportunity.   An opportunity might be described as a computer not logged off at lunch-time, a file left on the desk, etc. The major flaw in this CS understanding is that it cannot explain why in some circumstances, some of these so-called opportunities are acted on in some instances and not others.   This points to the interplay of other factors which the CS approach cannot explain.   A true understanding of this interplay and how these factors combine to form an opportunity would, however, be invaluable to security practitioners.   Given the predominance of the CS understanding, the prescriptive value of material founded on the former will be limited.   Instead, if we are to assume that opportunities arise through the daily workings of staff in their environments, then any theory that is developed must be able to explain how the interplay between the pertinent factors create an opportunity.

This then begs the questions:

How does one know which factors are influential and which are not?

How does one address the interaction between such factors?

How can one assume a group of these factors will create an opportunity?

We are thus faced with the not inconsiderable problem of identifying those factors which together constitute an opportunity.

3.   SITUATIONAL CRIME PREVENTION

One approach that could be in a position to provide a solution to the above problem is the criminological theory known as Situational Crime Prevention (SCP).   This preventive approach focuses on reducing the opportunities for crime through the introduction of measures into the environment. These measures are:

1, aimed at highly specific forms of crime.

2, involve the design, management or manipulation of the immediate environment.

3, designed to increase the effort and risk of crime and make it less rewarding.

Examples of these measures are target hardening techniques (designed to increase the effort e.g. bandit barriers in post offices), entry/ exit screening (designed to increase the risks e.g. baggage screening in airports), and target removal (designed to reduce the rewards e.g. removable car radios) [4].

4.   THEORETICAL ORIGINS OF SCP

The following section traces the theoretical development of SCP culminating in the presentation of 'The Opportunity Structure for Crime', a synthesis of like-minded criminological theories.   This discussion will introduce the reader to these pertinent theories and provide a basis for understanding the workings of the opportunity structure.

The origins of SCP can be traced to a series of UK studies centered on probation hostels and approved schools [6, 19]. These studies indicated that the chances of youths re-offending or absconding depended not so much on their personality or background but more on the institutional environment. Of paramount importance was how such environments appeared to provide the opportunities for aberrant behavior [20]. The proposition was thus put forward that, if the physical layout of these regimes could be changed, it might be possible to 'design out' the opportunities. It followed further that, if criminal behavior could be changed in this context, why not others? Such findings (which were analyzed within a social learning theory), did not sit happily with dispositional theories of crime that emphasized biological, psychological, or sociological factors. This research, however, found more amiable allies in the guise of psychological research into personality and behavioral traits, which pointed to the surprising extent of the influence of situational factors, and even questioned the concept of personality as a useful hypothetical construct [14]. In this period, work in the field of sociology was doubting the idea of deep motivational commitment to conformity [13],

and as with the psychological research further evidence was being provided as to the role of situational factors [22, 18].

Taken together, this body of work indicated that criminal conduct was far more susceptible to variations in opportunity, inducements, and transitory pressures, than had been allowed by dispositional theories. Further supporting evidence was to be found in the form of interviews with residential burglars [17, 2, 16, 21] which highlighted how target-selection decisions were dependent to a large extent on the perceived risks and effort of the situation.

In the light of these factors, a simple 'choice' model was forwarded by Clarke [3] which later evolved into a rational choice approach [9] that assumes offenders seek to benefit themselves through their behavior. Such behavior entails the making of decisions and choices about whether or not to commit a crime. The attendant choices are dependent on the perceived risks, efforts and rewards of the situation. Criminal choices are seen to occur when the perceived benefits are seen to outweigh the risks and effort of the situation.

SCP has also been theoretically bolstered by routine activity theory [7], which examines the minimal elements required for certain crimes; i.e., it looks at the 'chemistry' of crime. Rather than focusing on the offender's motivation (which it assumes as given), routine activity theory looks at the convergence of these elements in time and space. Early work focused on direct-contact predatory crime (examples), asserting that for such a crime to take place there is required a 'suitable target', a 'likely offender' and the absence of a 'capable guardian'. To illustrate this theory, Cohen and Felson point out how, during the decade 1960-1970 in the USA, there was an increase in residential burglary. They argue that as a result of increasing numbers of females in the workforce and people living alone, a corresponding increasing number of properties were left without the presence of a 'capable guardian', and hence were deemed to be a suitable target.

Felson has attempted to address the minimal elements required for other crimes, and proposed a fourth element for direct-contact predatory crimes, in the form of 'the intimate handler' who as a result of personal association (e.g., neighbor) may act as a brake on the potential offender's activities [11]. To increase the potential utility of routine activity theory to SCP Clarke [4] has advocated the use of a fifth category, that of 'crime facilitators', used by offenders to help undertake a crime (e.g., getaway cars and weapons).

An allied area is 'lifestyles' theory, which examines the relationship between the risks of victimization and people's exposure to potential offenders. While demographic factors have an influence, so too do lifestyles, since work and leisure activities may increase one's exposure to

potential offenders (e.g., late night use of public transport). Moreover, this theory predicates that changes in behavior can reduce victimization

5.   THE OPPORTUNITY STRUCTURE FOR CRIME

Cusson [10] argues that the differences between the aforementioned will, given time, be a matter of historical interest, and that a synthesis is inevitable. With this in mind, Clarke [5] attempts such a synthesis in what he terms 'The Opportunity Structure for Crime' (See Appendix, Fig.1.).

Fig. 1 is an attempt by Clarke to conceptualize (albeit at a generic level) those factors constituting an opportunity. The model is further able to incorporate both situational and dispositional variables. Located within the model is the 'Crime Opportunity Structure' comprised of victims (e.g. lone women), targets (e.g., cars and banks), and crime facilitators (e.g., getaway cars, guns, etc.) which also include disinhibitors.

Targets are supplied by both the *physical environment* and *lifestyle/routine activities*. The former includes features such as housing, technology, and communications. The latter relate to the leisure and work patterns of the population. Depending on the nature of these patterns, they can be seen to either afford (or not, as the case may be) guardianship. In addition lifestyle and routine activities in addition provide victims, while the physical environment provides the facilitators for crime.

At a higher level, the *socio-economic structure* - aside from determining the physical environment and lifestyle/routine activities - also partly determines the number of *potential offenders* through mechanisms (e.g., alienation, sub-cultural influences) which are commonly the subject-matter of criminology. A second influential factor on the number of offenders is the extent to which social control is practiced by *intimate handlers* through lifestyle and routine activities.

While situational factors are obviously a key aspect of the model, the theoretical influence of the rational choice approach is of equal importance. Hence Fig 1 does not represent merely a physical entity, but includes the perceptive/reasoning element (denoted in the model by 'search/perception' and 'information modeling'), whereby the potential offender, who interacts with victims, targets and facilitators, will make the decision to commit a crime depending on the perceived, risks, efforts, and rewards. It is during this interaction that the offender gathers 'information' and uses it to 'model' the potential commission of a crime.

6.   SCP AND COMPUTER FRAUD PREVENTION

The following section explains how SCP may be applied through the development of crime-specific opportunity structures. As briefly touched on earlier, SCP measures are crime specific in nature. This reflects the belief that each specific crime depends upon the grouping of a number of particular environmental factors; and as a consequence these factors may need to be blocked in highly specific ways. If not introducing what are perceived as broad catch-all measures may fail to have any effect, given the idiosyncrasies of specific crimes. Distinctions must be made not at the crude level of categorizations such as robbery and burglary, but rather at the level of the different types of offenses that fall under these categories. So, for example, Poyner and Webb [15] point to the need for different measures to combat domestic burglaries which target electronic goods, compared with domestic burglaries that target cash or jewelry.

Given this, might it not be possible to take the generic crime opportunity structure for crime constructed by Clarke and develop crime-specific ones? Fig. 2 (see Appendix) represents an attempt at to sketch a crime opportunity structure for computer input fraud. Aside from the crime-specific focus, there are a number of changes made to the original model. As is evident, the 'victims' box has been removed. In Fig. 1, the victims box represent how people's lifestyle may play an active role in determining the chances of their own victimization. When considering the constituent opportunity structure elements for computer input fraud, it was felt that the victims box had little relevance. Although companies are obviously victims of fraud, the relevance of this box and its theoretical implications when, addressing the 'chemistry' of this type of crime, seemed minor.

At a macro level, the *socio-economic structure* determines commercial organization. This duly determines the *routine activity* and *physical environment*, represented respectively by the *everyday work performed by staff* and *departmental offices*. The *targets* are partly supplied by the physical environment (*computer systems*) and to some degree by the work patterns of the staff as represented by the phrase, *guardianship factors*. In the context of departmental offices, the issue of guardianship partly relates to the compliance by staff to security procedures. Non-compliance would result in a lack of guardianship, whereas compliance would provide it. Also included in guardianship factors are other measures that can help to create a secure environment - e.g. segregation of duties, the use of authorized signatories etc. Per Fig. 1 *facilitators* are solely provided by the physical environment. However, consideration of the fact that Fig. 2 relates to criminal opportunities as perceived by departmental staff puts a somewhat different slant on the concept of facilitators. It is true that the physical

environment can provide facilitators in the form of standardized systems. If everyone in the department uses the same types of machines with the same operating systems and programs, then this facilitates the potential offender since knowledge of multiple systems is not required and, as a consequence the offender already has the working requisite knowledge of their co-workers'computer systems. More interesting perhaps is the idea that potential offenders acquire facilitators in the course of their work. Unlike their physical counterparts, these facilitators are cognitive in nature, and include computer literacy, an in-depth knowledge of the environment, controls and any security vulnerabilities. Facilitators such as these are assimilated by staff the day they begin working for a particular company. Whether or not such knowledge is used for dishonest means will also depend on other factors; but this line of thought dovetails well with the routine activities approach which examines how illegal activities feed off legal ones.

As per Fig. 1, the socio-economic structure also partly determines the number of potential offenders as indicated by external factors. The economic climate (threat of job cuts), marital breakdown, and gambling/drug addictions may act as motives for committing fraud. However, actions taking place within an organization (denoted in the model by 'internal factors') may also act as catalysts for criminal behavior. Poor departmental relations, pressure of work, and being overlooked by management for promotion could motivate illegal actions by a member of staff. The amount of supervision given by staff in terms of intimate handlers (e.g., line managers and co-workers) may also play an active role in determining the number of potential offenders.

7.   BENEFITS OF DEVELOPING OPPORTUNITY STRUCTURES

The first benefit of developing crime-specific opportunity structures is that it provides a fresh perspective and approach to tackling fraud. Organizations find it difficult to conceptualize an environment conducive to fraud.

This is compounded where the task of combating fraud is, or at least should be, addressed by a number of departments - i.e., human resources, physical security, information security, and internal audit. A unified inter-departmental approach to fraud prevention is vital. However, input from a number of departments has its own share of problems. Practitioners from each department may have their own work agendas and conceptualize the problem accordingly. What is needed is a holistic perspective, allowing

different departments to recognize their role in relation to others, thereby encouraging a unified preventive approach.

Via the use of such structures as a conceptual tool in the development of preventive programs, organizational resources are more prudently employed, and not based on a scatter-gun approach. An added bonus is that through the employment of the crime-specific approach a greater understanding of such crimes could feasibly develop, and with such understanding would come a greater knowledge of preventive points of intervention.

The practitioner is further given an important theoretical grounding which could be leveraged in their work. Once opportunity structures have been constructed, the idea would be to take such structures and look at ways of manipulating them to benefit the organization and inhibit the offender. Such manipulation could take place with the theoretical insight garnered from the rational choice perspective, environmental criminology, and the like. However, it must be stressed that the theoretical development of SCP has always been with the intention of instituting more effective crime-prevention programs. The rational choice perspective, for example, gives the practitioner an understanding of the decision making process undertaken by potential offenders. This enables the practitioner to consider ways of increasing the risks, efforts and rewards of the relevant opportunity structure.

8.   CONCLUSION

The use of SCP enables the practitioner to draw on a comprehensive body of knowledge that over the years has matured theoretically. This maturation, has come about as a result of the desire to provide practical solutions to the problems posed by crime, and this is reflected by the considerable, and continual, number of research studies undertaken in the name of SCP.

From an academic perspective SCP, provides a source of knowledge that may allow for new insights into old problems. This input is timely for the academic study of information security, where compared to other fields of study, there is a relative paucity of theory.

With the ever present threat of computer fraud facing organizations, fresh approaches to overcome this problem are rare. Taking a preventive stance in terms of reducing the opportunities for criminal behavior, allows for a new perspective on combating fraud. The strength of developing crime specific opportunity structures lies in its ability to potentially aid practitioners in taking the complex context of the fraud environment, and helping them to conceptualize this domain.
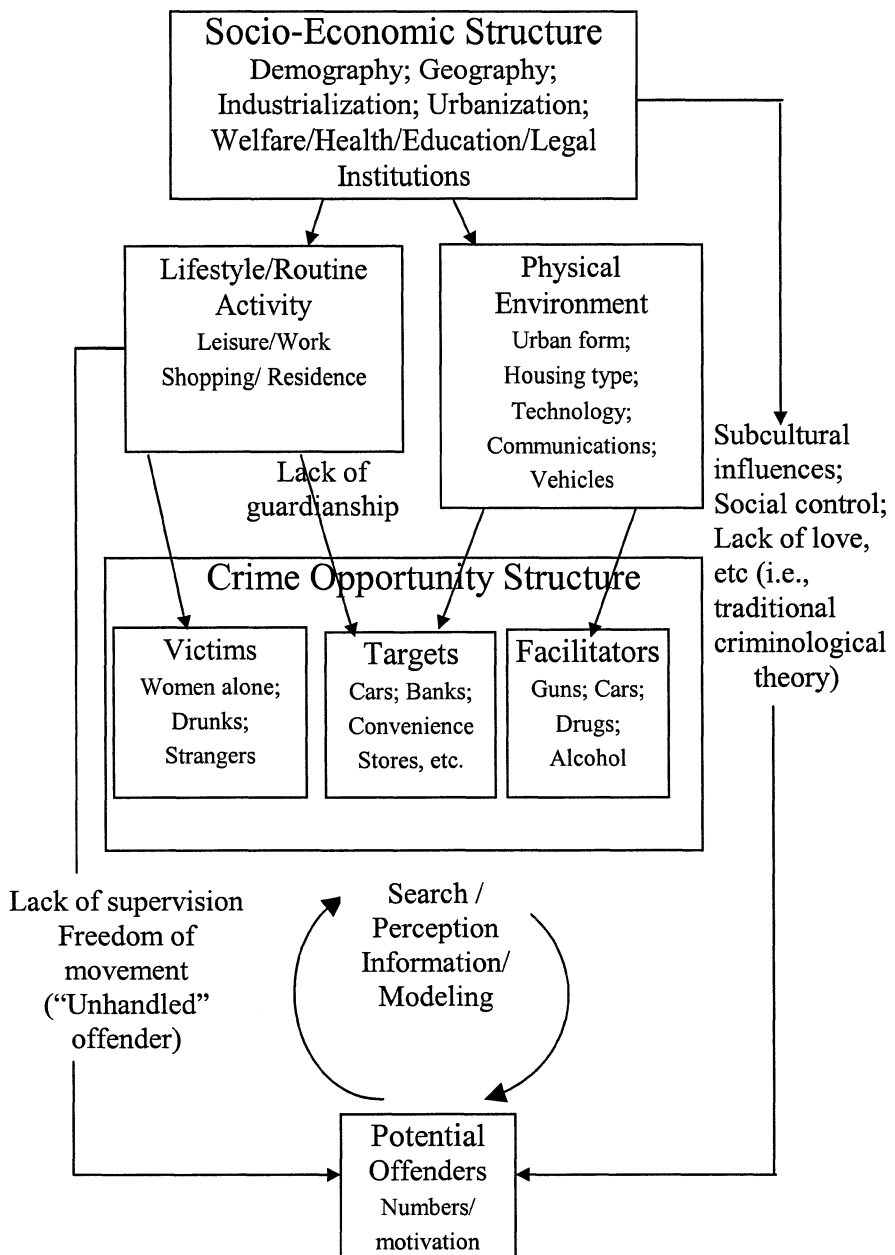
APPENDIX.

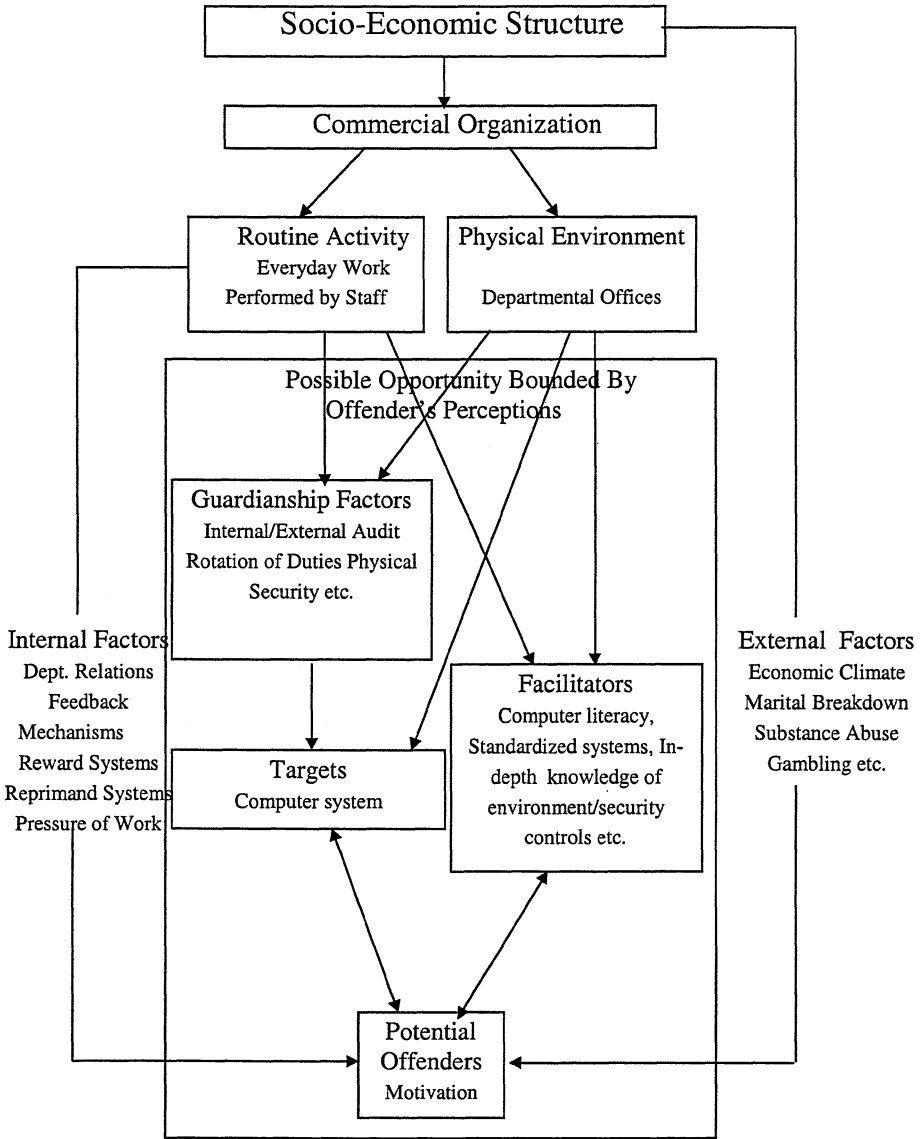*Figure 1.* The Opportunity Structure For Crime.

Figure 2. The Opportunity Structure For Computer Input Fraud

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