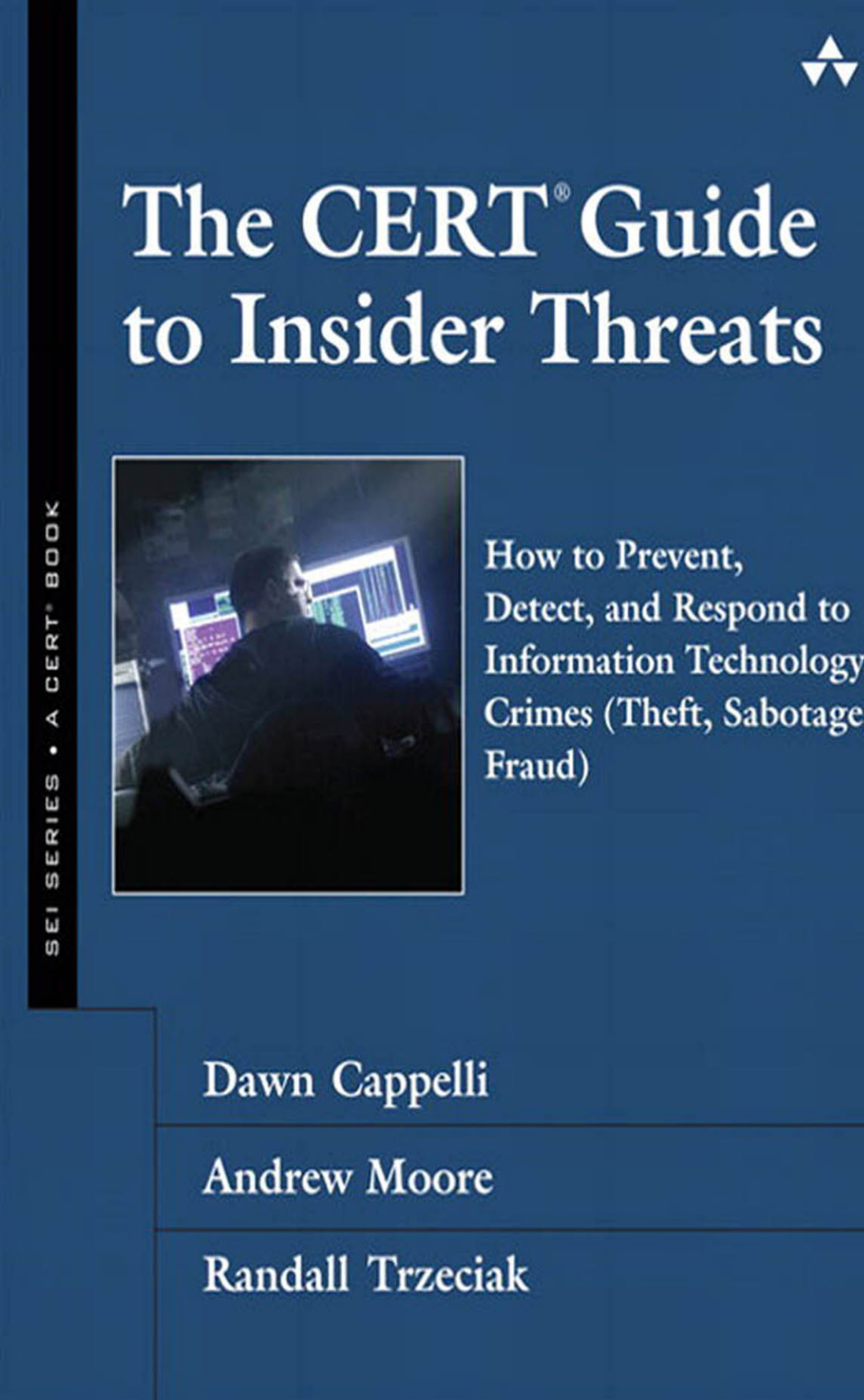

The CERT® Guide to Insider Threats

How to Prevent, Detect, and Respond to Information Technology Crimes (Theft, Sabotage, Fraud)

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exfiltration method. You should carefully consider the balance between security and personal use of email and Web services from your network.

As mentioned, most insiders steal IP within 30 days of leaving an organization. You should consider a more targeted monitoring strategy for employees and contractors when they give notice of their exit. For instance, check your email logs for emails they sent to competitors or foreign governments or organizations. Also check for large email attachments they sent to Gmail, Hotmail, and similar email accounts.

Further, you should consider inspecting available log traffic for any indicators of suspicious access, large file transfers, suspicious email traffic, after-hours access, or use of removable media by resigning employees. Central logging appliances and **event correlation**[20] engines may help craft automated queries that reduce an analyst's workload for routinely inspecting this data.

Host Data Exfiltration

Host-based exfiltration was the second most common method of removing IP from organizations; close to half of the cases involved an insider removing data from a host computer and leaving the organization with it. In these cases, insiders often used their laptops to remove data from the organization. We had difficulty determining the exact ownership and authorization of the laptops used. However, we do know that about one-sixth of the insiders who stole IP used laptops taken from the organization's site during normal work hours. Half of them transferred proprietary software and source code; the other half removed sensitive documents from the organization.

In one case, the insider worked for a consulting company and stole proprietary software programs from a customer by downloading them to a laptop. He attempted to disguise the theft by deleting references to the victim organization contained in the program, and then attempted to sell portions of the program to a third party for a large sum of money.

Another case involved an insider who accessed and downloaded trade secrets to his laptop after he accepted an offer from a foreign competitor. He gave his employer two weeks' notice, and continued to steal information until he left.

20. **Event correlation:** a technique for making sense of a large number of events and pinpointing the few events that are really important in that mass of information (Wikipedia).

By far, the most common method of host-based exfiltration in the database was removable media; 80% of these cases involved trade secrets, and the majority of those insiders took the stolen trade secrets to a competitor. The type of removable media used varied. Where information was available, we determined that insiders most often used writable CDs. Thumb drives and external hard disks were used in just 30% of the cases. However, the type of removable media used has changed over time. Insiders primarily used CDs prior to 2005. Since 2005, however, most insiders using removable media to steal IP use thumb drives and external hard drives. This trend indicates that changes in technology are providing new and easier methods of stealing data from host computers.

In one case, an insider resigned from his organization after accepting a position at another organization. He downloaded personal files as well as the organization's proprietary information onto CDs. Despite signing a nondisclosure agreement, the insider took the trade secrets to a competitor.

In a similar example, an insider received an offer from a competitor three months prior to resignation. He lied about his new position and employment status to coworkers. Only days before leaving the organization, he convinced a coworker to download his files to an external hard drive, supposedly to free up disk space. He came into work at unusual hours to download additional proprietary information onto a CD. Finally, he took this information with him to his new position at a competing organization.

What Can You Do?

It is unlikely that the victim organizations in our database prohibited removable media in their daily computing environments. You should consider carefully who in your organization really needs to use removable media. Perhaps access to removable media is a privilege granted only to users in certain roles. Along with that privilege could come enhanced monitoring of all files copied onto such devices. In addition, understanding who requires removable media and for what purposes can help you to determine what may constitute normal and healthy business use, and to monitor for usage patterns that deviate from that. Inventory control, as it pertains to removable media, may also be helpful. For example, you could allow use of removable media only on company-owned devices prohibited from leaving your facility. Organizations requiring the highest-assurance environment should consider disallowing removable media completely, or allowing it only in special situations that are carefully audited.

Finally, recall the 30-day window in our theft of IP cases. Can you log all file transfers to removable media? You might not have the resources to review all of those logs (depending on how restricted your use of such media is). However, if the logs exist, you can audit them immediately on the hosts accessed by any employee who has announced his resignation. This would provide one quick mechanism for detecting IP that might be exfiltrated by an employee on his way out the door.

Physical Exfiltration

Only 6% of the theft of IP cases involved some sort of physical exfiltration. We found that physical exfiltration usually occurs in conjunction with some other form of exfiltration that would have produced a more obvious network or host-based observable event.

Exfiltration of Specific Types of IP

Once we determined what kinds of IP were stolen and how, we determined what methods of exfiltration were associated with the different types of IP. Several interesting findings surfaced. In particular, business plans were stolen almost exclusively through network methods, particularly using remote access. Conversely, proprietary software and source code involve a much higher use of non-network methods. This may be due in part to the volume of data associated with different asset types. Software and source code files are often large, but business plans are usually smaller documents that are easier to move over a VPN or as an email attachment. Enumerating the most frequent methods by which particular assets are exfiltrated may help steer monitoring strategies with respect to computers that house particular types of assets or are allowed to access given assets over the network.

Concealment

Some insiders attempted to conceal their theft of IP through various actions. These cases signify a clear intent to operate covertly, implying the insiders may have known their actions were wrong. In one case, an insider was arrested by federal authorities after stealing product design documents and transferring them to a foreign company where he was to be employed. After being arrested, he asked a friend to log in to his personal email account, which was used in the exfiltration, and delete hundreds of emails related to the incident.

Another case involved an insider who used an encryption suite to mask the data he had stolen when moving it off the network.

Trusted Business Partners

Trusted business partners accounted for only 16% of our theft of IP cases, but this is still a complicated insider threat that you need to consider in your contracting vehicles and technical security strategies.

For example, a telecommunications company was involved in a lawsuit, and had to hand over all of its applicable proprietary information to its attorneys, which it did in hard-copy form. The law firm subcontracted with a document imaging company to make copies of all of the information. One of the employees of the document imaging company asked his nephew, a student, if he would like to make a little extra spending money by helping him make the copies at the law firm. The nephew realized that he had access to proprietary access control technology that the telecommunications company used to restrict its services based on fees paid by each individual customer. He felt, like many others, that the company unfairly overcharged for these services, so he posted the information online to the Internet underground. This basically released the telecommunications company's "secret sauce," and now it was easy for members of that community to obtain free services. When the post was discovered, law enforcement investigated the source of the post and traced the activity back to the student.

It is important that you consider these types of threats when drawing up contracts with your business partners. Could that scenario happen to you? Do you write legal language into your contracts that dictates how your confidential and proprietary information can and cannot be handled?

It is important that you understand the policies and procedures of your trusted business partners. You establish policies and procedures in order to protect your information. When you enlist the support of a trusted business partner, you should ensure that their policies and procedures are at least as effective as your safeguards. This includes physical security, staff education, personnel background checks, security procedures, termination, and other safeguards.

In addition, you should monitor intellectual property to which access is provided. When you establish an agreement with a trusted business partner, you need assurance that IP you provide access to is protected. You need to get assurances that access to and distribution of this data will be monitored. You should verify that there are mechanisms for logging the dissemination of data, and review their procedures for investigating possible disclosure of your information.

These are just a few recommendations. We detail eight recommendations in Chapter 9, Conclusion and Miscellaneous Issues, regarding trusted business partners.

Mitigation Strategies: Final Thoughts

We devoted a good deal of this chapter to technical countermeasures. Figure 3-9 depicts organizational issues of concern in the theft of intellectual property cases in our database. We addressed the technical issues in the previous section, but there are nontechnical issues worth noting as well. For instance, notice that the most prevalent issue of concern is an employee who went to work for a competitor. Therefore, you might want

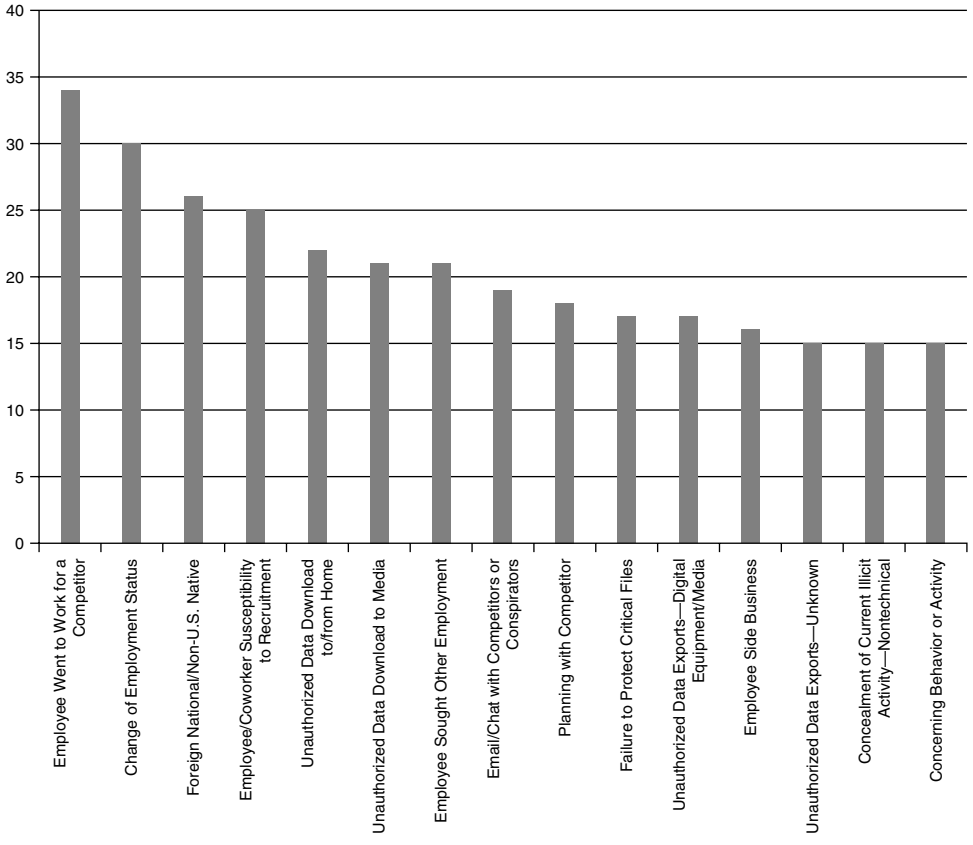

Figure 3-9 *Issues of concern*

to monitor emails going to a competitor. We provide a control for doing that in Chapter 7, Technical Insider Threat Controls. Also, note the second most prevalent issue of concern: change in employment status, which would account for the insiders who stole information within 30 days of resignation. The third most prevalent issue is foreign national/non-U.S. native, which we covered in depth in the section Theft of IP inside the United States Involving Foreign Governments or Organizations earlier in this chapter. The fourth issue, employee/coworker susceptibility to recruitment, applies in all of the Ambitious Leader cases.

One final thought regarding the 30-day window: You should review your access-termination procedures associated with employee and contractor exit procedures. Several cases provided evidence that insiders remotely accessed systems by using previously authorized accounts that were not disabled upon the employee's exit. Precautions against this kind of incident seem to be common sense, but this trend continues to manifest in newly cataloged cases.

NOTE

For more details of technical controls you can implement to prevent or detect insider theft of IP, see Chapter 7, where we describe new technical controls from our insider threat lab.

Summary

Insiders who steal intellectual property are usually scientists, engineers, salespeople, or programmers. The IP stolen includes trade secrets, proprietary information such as scientific formulas, engineering drawings, source code, and customer information. These insiders typically steal information that they have access to, and helped to create. They rarely steal it for financial gain, but rather they take it with them as they leave the organization to take to a new job, give to a foreign government or organization, or start their own business.

These insider threats fall into two groups. The first is the Entitled Independent, an insider who acts alone to take the information with him as he leaves the organization. The second is the Ambitious Leader, an insider who creates a "ring" of insiders who work together to steal the information. Ambitious Leaders want to steal more than just the information they created—they want the entire product line, or whole suite of source code, for example.