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2020 COST OF INSIDER THREATS GLOBAL REPORT

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 **IBM Security**

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INTRODUCTION

Ponemon Institute is pleased to present the findings of the 2020 Cost of Insider Threats Global Report study. Sponsored by ObserveIT and IBM, this is the third benchmark study conducted to understand the direct and indirect costs that result from insider threats. The first study was conducted in 2016 and focused exclusively on companies in the United States. Represented in this study are companies located in North America, Europe, the Middle East and the Asia-Pacific region.

In the context of this research, insider threats are defined as:

- A careless or negligent employee or contractor
- A criminal or malicious insider or
- A credential thief

Executive Summary

The key takeaway is that, across all three insider threat types outlined above, both the frequency and cost of insider threats have increased dramatically over the course of two years. For example, the overall cost of insider threats is rising, with a 31% increase from \$8.76 million in 2018 (Ponemon) to \$11.45 million in 2020. In addition, the number of incidents has increased by a staggering 47% in just two years, from 3,200 in 2018 (Ponemon) to 4,716 in 2020. This data shows that insider threats are still a lingering and often under-addressed cybersecurity threat within organizations, compared with external threats.

We interviewed 964 IT and IT security practitioners in 204 organizations in North America (United States and Canada), Europe, Middle East & Africa and Asia-Pacific. Interviews were completed in September 2019. Each organization experienced one or more material events caused by an insider. Our targeted organizations were business organizations with a global headcount of 1,000 or more employees. These organizations experienced a total of 4,716 insider incidents over the past 12 months.

The following are some key statistics on the cost of insider-related incidents over a 12-month period:

Total number of benchmarked organizations

204

Total number of insider incidents

4,716

Total average cost

\$11.45M

Incidents relating to negligence

62%

Incidents relating to criminal insider

23%

Incidents relating to user credential theft

14%

Annualized cost for negligence

\$4.58M

Annualized cost for criminal insider

\$4.08M

Annualized cost for credential theft

\$2.79M

ANNUALLY, THESE TYPES OF INCIDENTS COST EACH ORGANIZATION AN AVERAGE OF \$2.79 MILLION.

CRIMINAL AND MALICIOUS INSIDERS COST THE ORGANIZATIONS REPRESENTED IN THIS RESEARCH AN AVERAGE OF \$755,760 PER INCIDENT.

Negligent insiders represent most incidents, but credential theft is costliest per incident

The cost of insider threat varies significantly based on the type of incident. If it involves a negligent employee or contractor, each incident can average \$307,111. However, given this type of incident is the most frequent (comprising 62% of incidents), the total costs can add up to an average of \$4.58 million per year within each organization.

The average cost per incident almost triples if the incident involves an imposter or thief who steals credentials (\$871,686). The costliest type of credential theft involves the theft of privileged users' credentials. In this research, 14% of incidents involved the theft of privileged users' credentials. Annually, these types of incidents cost each organization an average of \$2.79 million.

Criminal and malicious insiders cost the organizations represented in this research an average of \$755,760 per incident. Even though malicious incidents are often the most publicized, they comprise only 23% of overall incidents. However, their impact can add up over the course of the year, costing each organization an average of \$4.08 million.

Investigation is the fastest-growing activity cost center

The activities that drive costs are: monitoring & surveillance, investigation, escalation, incident response, containment, ex-post analysis and remediation. The fastest-growing cost center among these activities is investigation, with the average cost across all incident types rising 86% in only two years to \$103,798.

It takes an average of more than two months to contain an insider incident

It takes an average of 77 days to contain each insider threat incident. Only 13 percent of incidents were contained in less than 30 days.

Organizational size and industry affect the cost per incident

The cost of incidents varies according to organizational size. Large organizations (with a headcount between 25,001 and 75,000) spent an average of \$17.92 million over the past year to resolve insider-related incidents. To deal with the consequences of an insider incident, smaller-sized organizations (those with a headcount below 500) spent an average of \$7.68 million. The fastest-growing industries for insider threat were retail (38.2% two-year increase) and financial services (20.3% two-year increase).

All types of threat of insider risks are increasing

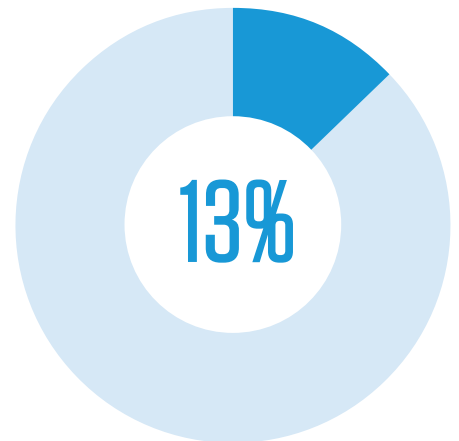
Since 2018, the average number of incidents involving employee or contractor negligence has increased from 13.2 to 14.5 per organization. The average number of credential theft incidents has almost tripled over the past two years, from 1.0 to 2.7 per organization. That said, sixty percent of organizations had more than 30 incidents per year.

Five signs that your organization is at risk

1. Employees are not trained to fully understand and apply laws, mandates, or regulatory requirements related to their work and that affect the organization's security.
2. Employees are unaware of the steps they should take at all times to ensure that the devices they use—both company issued and BYOD—are secured at all times.
3. Employees are sending highly confidential data to an unsecured location in the cloud, exposing the organization to risk.
4. Employees break your organization's security policies to simplify tasks.
5. Employees expose your organization to risk if they do not keep devices and services patched and upgraded to the latest versions at all time.

77 DAYS

to contain each insider threat incident



of incidents were contained in less than

30 DAYS



of organizations had more than 30 incidents per year.

ABOUT THE STUDY

Our research focuses on actual insider-related events or incidents that impact organizational costs over the past 12 months. Our methods attempt to capture both direct and indirect costs, including, but not limited to, the following business threats:

- Theft or loss of mission critical data or intellectual property
- Impact of downtime on organizational productivity
- Damages to equipment and other assets
- Cost to detect and remediate systems and core business processes
- Legal and regulatory impact, including litigation defense cost
- Lost confidence and trust among key stakeholders
- Diminishment of marketplace brand and reputation

This research utilizes an activity-based costing (ABC) framework. Our fieldwork was conducted over a two-month period concluding in September 2019. Our final benchmark sample consisted of 204 separate organizations. A total of 964 interviews were conducted with key personnel in these organizations. Activity costs for the present study were derived from actual meetings or site visits for all participants conducted under strict confidentiality. Targeted organizations were:

- Commercial and public sector organizations
- Global headcount of 1000 or more employees
- Locations throughout the following regions: North America, Europe, Middle East & Africa and Asia-Pacific
- Central IT function with control over on-premise and/or cloud environment
- Experienced one or more material incidents caused by careless, malicious or criminal insiders

**THE RESEARCHERS
UTILIZED DIAGNOSTIC
INTERVIEWS AND
ACTIVITY-BASED
COSTING TO CAPTURE
AND EXTRAPOLATE
COST DATA.**

In this report, we present an objective framework that measures the full cost impact of events or incidents caused by insiders. Following are the three case profiles that were used to categorize and analyze insider-related cost for 204 organizations:

- Careless or negligent employee or contractor
- Criminal insider including employee or contractor malice
- Employee/user credential theft (a.k.a. imposter risk)

Our first step in this research was the recruitment of global organizations. The researchers utilized diagnostic interviews and activity-based costing to capture and extrapolate cost data. Ponemon Institute executed all phases of this research project, which included the following steps:

- Working sessions with ObserveIT and IBM to establish areas of inquiry
- Recruitment of benchmark companies
- Development of an activity-based costing framework
- Administration of research program
- Analysis of all results with appropriate reliability checks
- Preparation of a report that summarizes all salient research findings

BENCHMARKED SAMPLE

In benchmark research, the unit of analysis is the organization. The following pie chart shows the percentage distribution of companies across 13 industry segments. The three largest segments are financial services, services and industrial & manufacturing. Financial service organizations include banking, insurance, investment management and brokerage. Service organizations represent a wide range of companies, including professional service firms.

Figure 1.

Industry sectors of participating organizations

n=204 companies

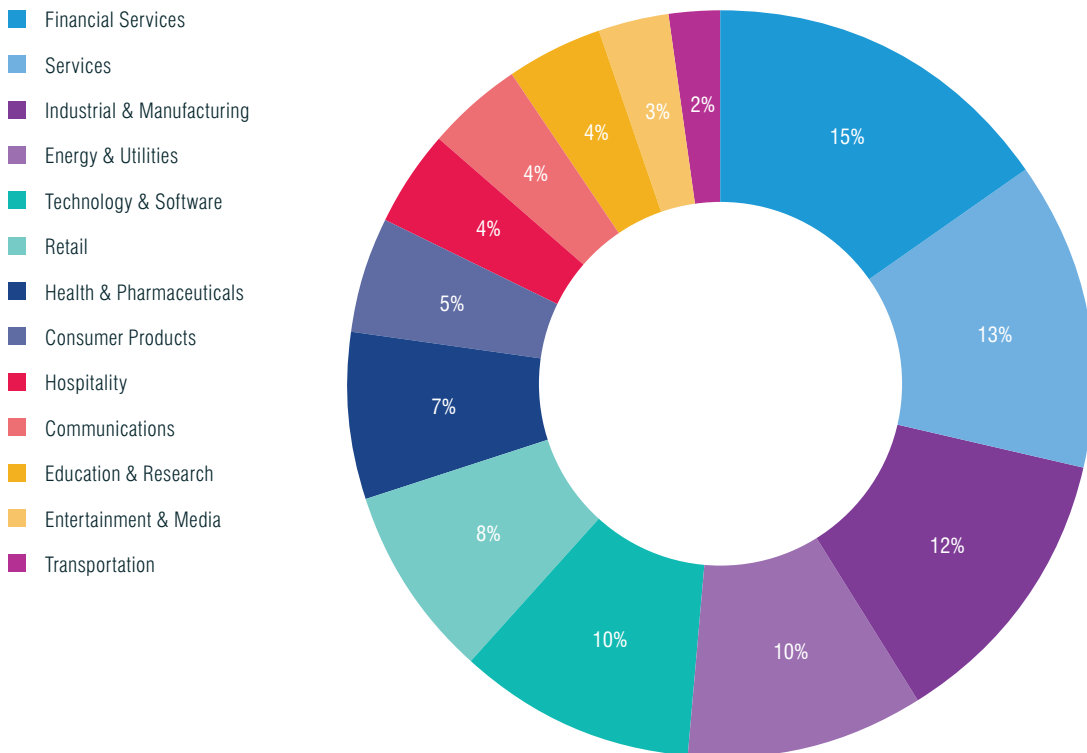
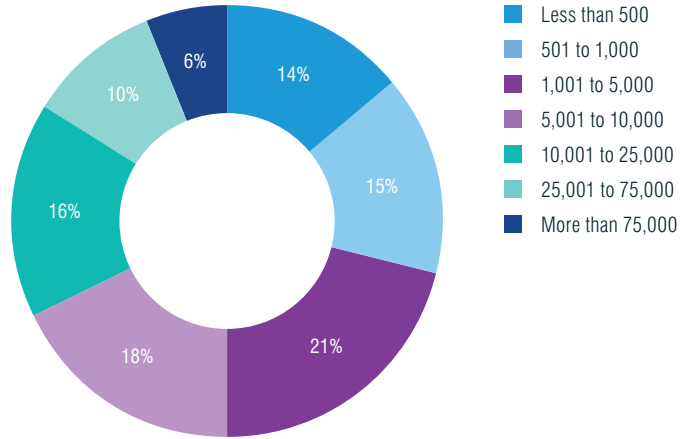


Figure 2 shows the percentage distribution of companies according to global headcount, which is a surrogate for organizational size. As can be seen, 50 percent of the sample includes larger-sized companies with more than 5,000 full-time equivalent employees.

Figure 2.

Headcount size for participating organizations

n=204 companies



According to Figure 3, 964 individuals participated in field-based interviews. Each case study involved an average of 4.7 individuals. The three largest segments include: IT operations (15 percent), CISOs (14 percent) and IT technicians (14 percent).

Figure 3.

Interviewees by position level or function

n=964 individuals

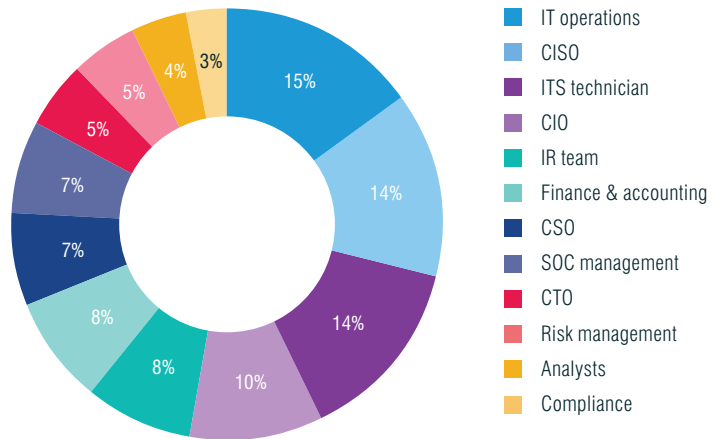
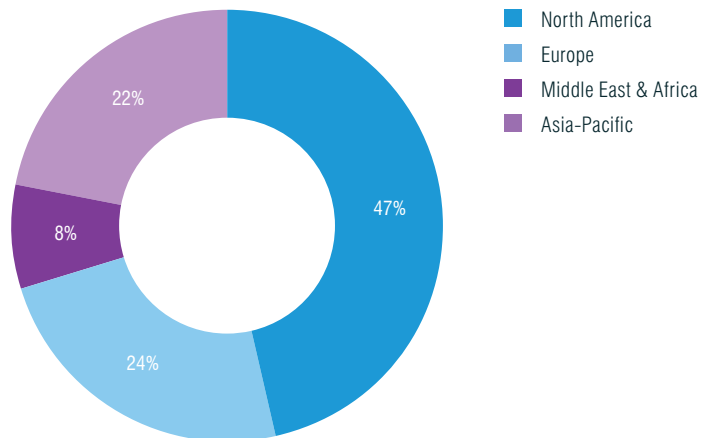


Figure 4 shows the global regions participating in this research. North America represents the largest segment (47 percent of companies) and the Middle East is the smallest segment (8 percent of companies). Because of small sample size, we combined Europe and the Middle East to form the EMEA segment.

Figure 4.

Regional distribution of global organizations

n=204 companies



ANALYSIS OF INSIDER INCIDENTS

Figure 5 shows the distribution of 4,716 reported attacks analyzed in our sample. A total of 2,962 attacks (or 62 percent) pertained to employee or contractor negligence. Criminal or malicious insiders caused another 1,105 attacks (or 23 percent).

There were 649 attacks (or 14 percent) that involved credential theft (a.k.a. imposter risk). Of these, 191 involved privileged user credential theft. The largest number of reported incidents for a given company is 45 and the smallest number of incidents is one per participating company.

Figure 5.

Frequency of 4,716 incidents for three insider profiles

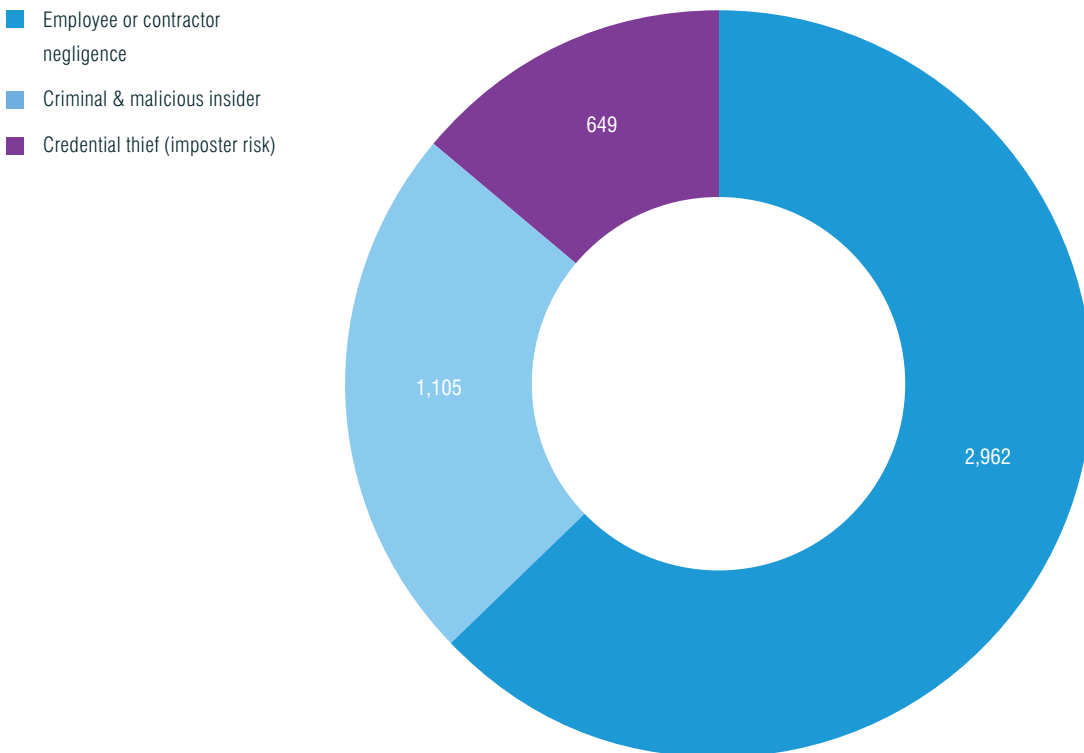
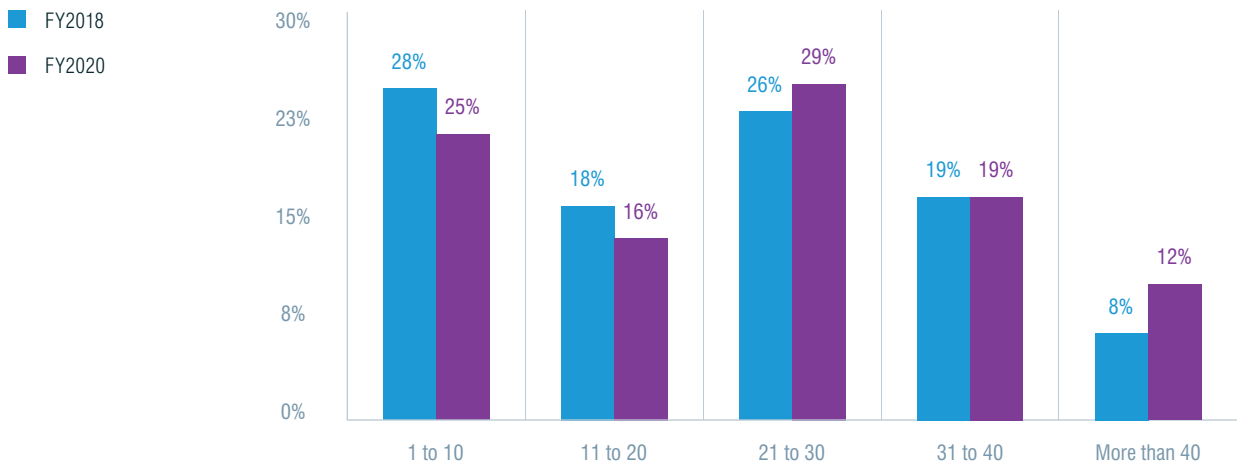


Figure 6 provides a graph that shows a histogram of insider incidents for our sample of 204 companies over the past 12 months. As shown, 60 percent of companies experienced an average of more than 30 incidents per year.

Figure 6.

Percentage frequency of insider-related incidents per company

Consolidated for three profiles

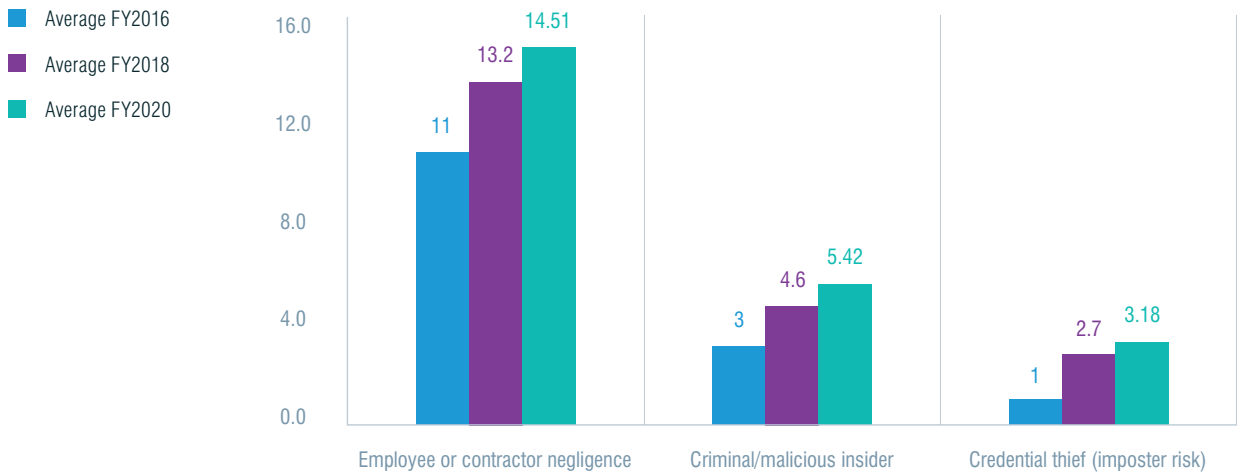


All types of insider threats are steadily increasing

As shown in Figure 7, since 2016 the average number of incidents involving employee or contractor negligence has increased from 10.5 to 14.5 in 2020. The average number of credential theft incidents per company have increased from 1 in 2016 to 3.2¹ in 2020.

Figure 7.

Frequency for three profiles of insider incidents



¹ The 2016 data only pertains to US companies. The 2020 data includes North America, Europe, Middle East & Africa and Asia-Pacific. We believe the data is comparable because US companies represented in the 2016 report are multinationals.

Companies in the Middle East experience the most insider incidents and Asia-Pacific had the least incidents

Figure 8 presents the frequency of insider incidents in the four regions represented in the research. In all regions, employee or contractor negligence occur most frequently. North America and the Middle East are most likely to experience credential theft.

Figure 8.

Average incident frequency for three profiles

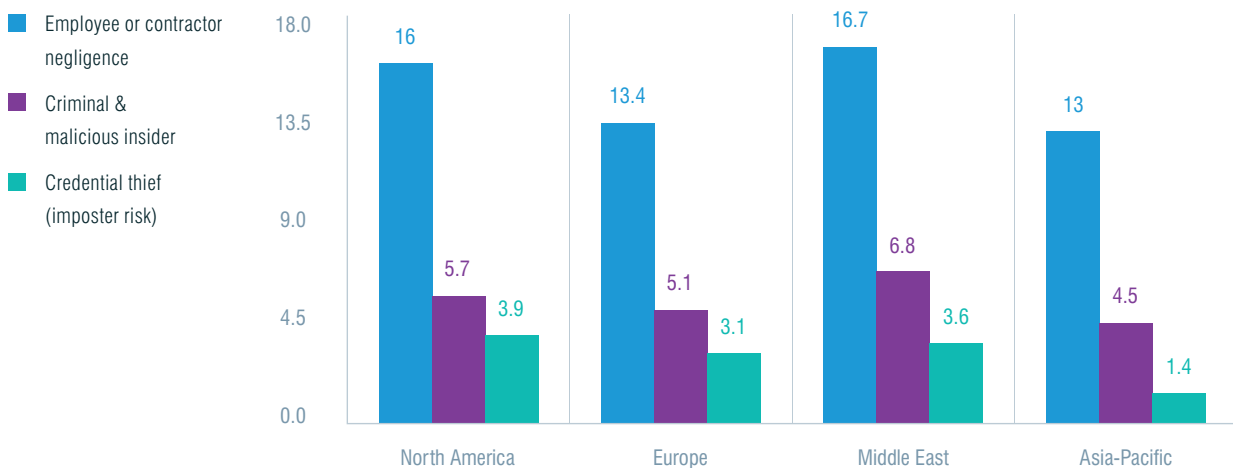


The frequency of insider threats varies across global regions

As shown in Figure 9, North American and Middle Eastern companies experienced the highest number of insider-related incidents over the past 12 months. In contrast, APAC companies had the lowest number of insider-related incidents.

Figure 9.

Frequency for three profiles of insider incidents by global region



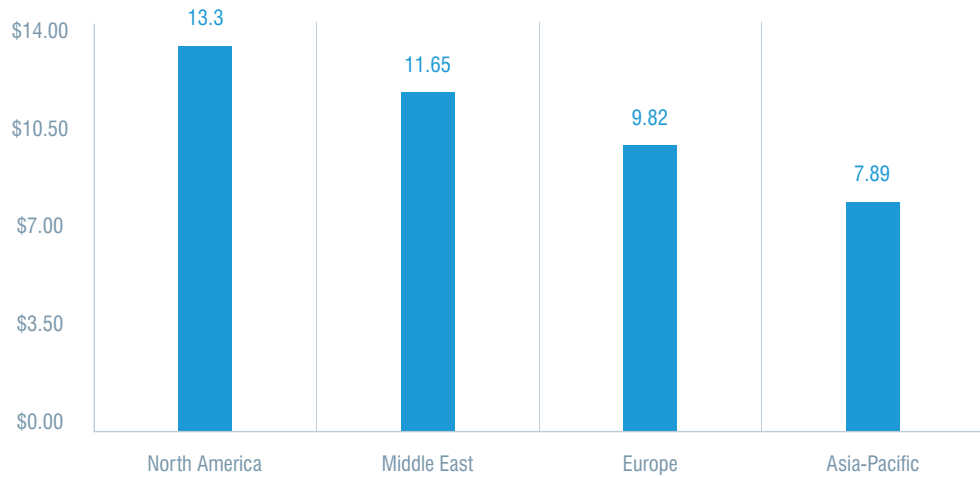
North American companies had an average annual cost higher than the average cost

Total annualized cost for four global regions is reported in Figure 10. Companies in North America experienced the highest total cost at \$13.3 million. Middle East companies had the next highest cost at \$11.65 million. Europe and Asia-Pacific had an average cost much lower than average total cost for all 204 companies.

Figure 10.

Average activity cost by global region

Mean=\$11.45 (US\$ millions)



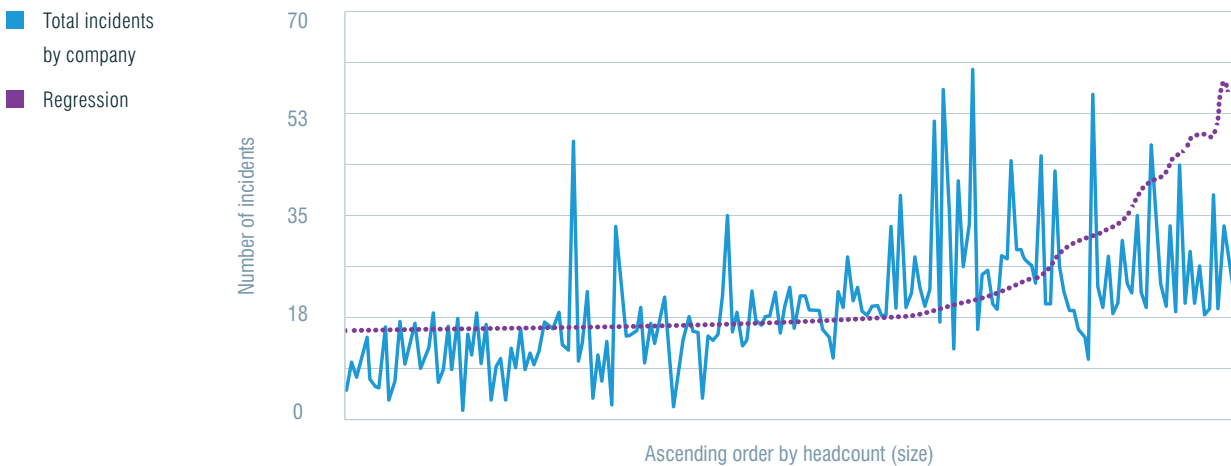
The larger the organization, the more insider incidents

Figure 11 shows the distribution of insider incidents in ascending order by headcount or size of the participating companies. As can be seen, the upward slope suggests that the frequency of insider incidents is positively correlated with organizational size. The correlation is most salient for larger-sized companies.

Figure 11.

Insider incidents in ascending order by headcount (size)

Mean=\$11.45 (US\$ millions)

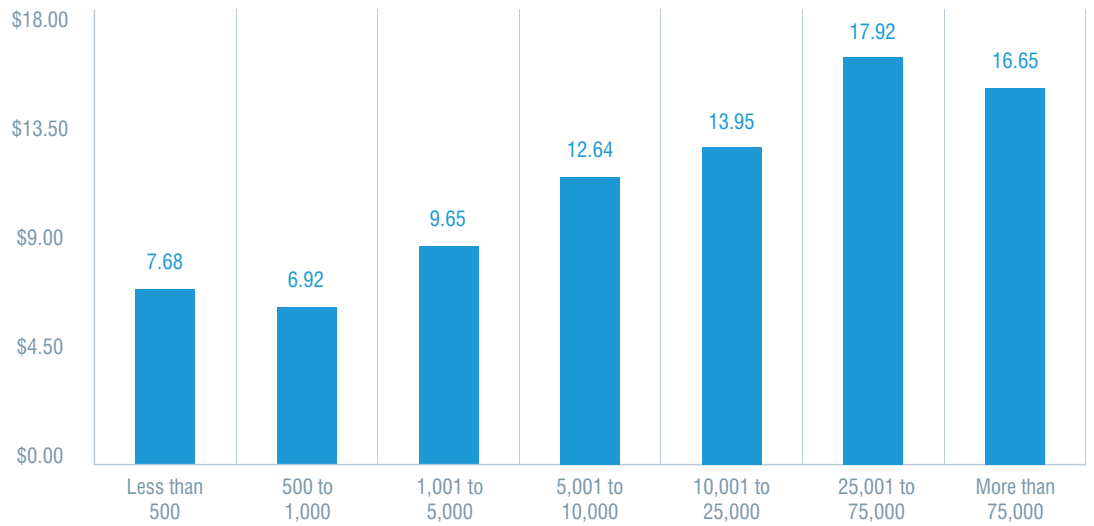


Total annualized cost adjusted for companies' worldwide headcount is reported in Figure 12. Companies with between 25,001 and 75,000 employees experienced the highest total cost at \$17.92 million, while those with 500 to 1,000 employees had the lowest annualized cost at \$6.92 million.

Figure 12.

Average activity cost by headcount

Mean=\$11.45 (US\$ millions)



COST ANALYSIS

This study addresses the core process-related activities that drive a range of expenditures associated with a company's response to insider-related incidents. The seven internal cost activity centers in our framework are defined as follows:²

Monitoring and surveillance:

Activities that enable an organization to reasonably detect and possibly deter insider incidents or attacks. This includes allocated (overhead) costs of certain enabling technologies that enhance mitigation or early detection.

Investigation:

Activities necessary to thoroughly uncover the source, scope, and magnitude of one or more incidents.

Escalation:

Activities taken to raise awareness about actual incidents among key stakeholders within the company. The escalation activity also includes the steps taken to organize an initial management response.

Incident response:

Activities relating to the formation and engagement of the incident response team including the steps taken to formulate a final management response.

Containment:

Activities that focus on stopping or lessening the severity of insider incidents or attacks. These include shutting down vulnerable applications and endpoints.

Ex-post response:

Activities to help the organization minimize potential future insider-related incidents and attacks. It also includes steps taken to communicate with key stakeholders both within and outside the company, including the preparation of recommendations to minimize potential harm.

Remediation:

Activities associated with repairing and remediating the organization's systems and core business processes. These include the restoration of damaged information assets and IT infrastructure.

² Internal costs are extrapolated using labor (time) as a surrogate for direct and indirect costs. This is also used to allocate an overhead component for fixed costs such as multiyear investments in technologies.

Companies spend an average of \$644,852 on each incident

Table 1 summarizes the average cost of insider-related incidents for the three types of incidents and seven activity centers. As reported, containment and remediation represent the most expensive activity centers. Least expensive are ex-post analysis and escalation.

Table 1. Cost Activity Centers (per incident)	Employee or contractor negligence	Criminal & malicious insider	Credential theft	Average cost
Monitoring & surveillance	\$21,538	\$21,857	\$22,977	\$22,124
Investigation	\$49,441	\$114,524	\$147,429	\$103,798
Escalation	\$9,282	\$29,513	\$26,619	\$21,805
Incident response	\$62,877	\$159,398	\$132,677	\$118,317
Containment	\$75,903	\$175,962	\$382,794	\$211,553
Ex-post analysis	\$21,035	\$19,282	\$18,121	\$19,480
Remediation	\$67,036	\$235,223	\$141,069	\$147,776
Total	\$307,111	\$755,760	\$871,686	\$644,852

Companies are spending more on investigations and escalation. Table 2 shows the percentage increase in cost for each activity. The cost of remediation has not increased as sharply as the other activities.

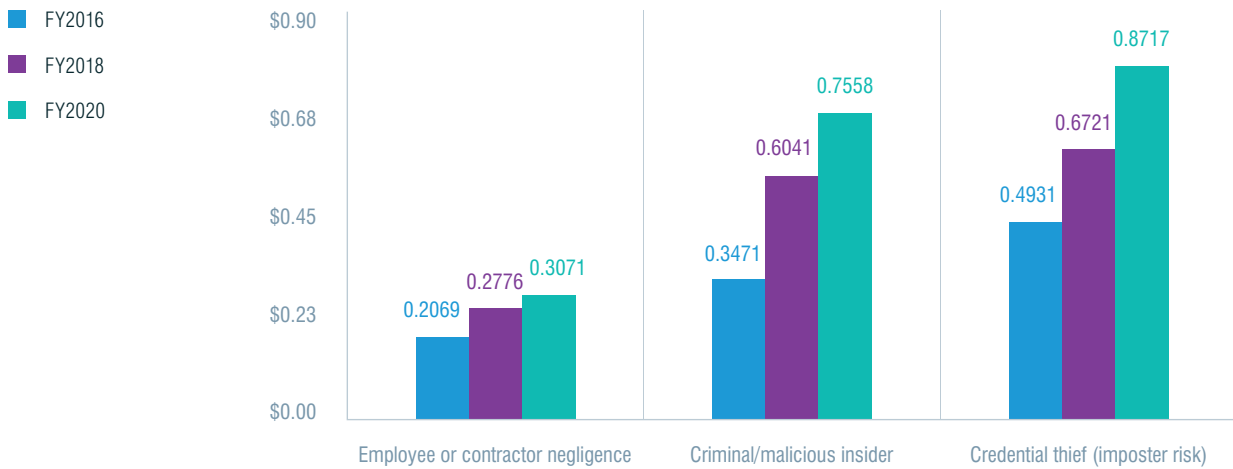
Table 2. Activity Cost Centers	FY 2016	FY 2018	FY 2020	Net Increase over 3 years
Monitoring & surveillance	\$9,610	\$12,634	\$22,124	79%
Investigation	\$41,461	\$78,398	\$103,798	86%
Escalation	\$8,919	\$12,542	\$21,805	84%
Incident response	\$66,370	\$91,263	\$118,317	56%
Containment	\$122,796	\$173,060	\$211,553	53%
Ex-post analysis	\$8,498	\$11,491	\$19,480	78%
Remediation	\$91,397	\$138,532	\$147,776	47%
Total	\$349,052	\$517,920	\$644,852	60%

As shown in Figure 13, the costliest insider incidents involve credential theft – which is more than 2.5 times as expensive for incidents involving employee or contractor negligence.

Figure 13.

Average cost per incident for three profiles

US\$ millions



On an annual basis, employee or contractor negligence costs companies the most

Figure 14 reports the extrapolated annualized insider-related costs for three profiles. In terms of total annual costs, it is clear that employee or contractor negligence represents the most expensive insider profile. While credential theft is the most expensive on a unit cost basis, it represents the least expensive profile on an annualized basis.

Figure 14.

Average annualized cost for three profiles

US\$ millions

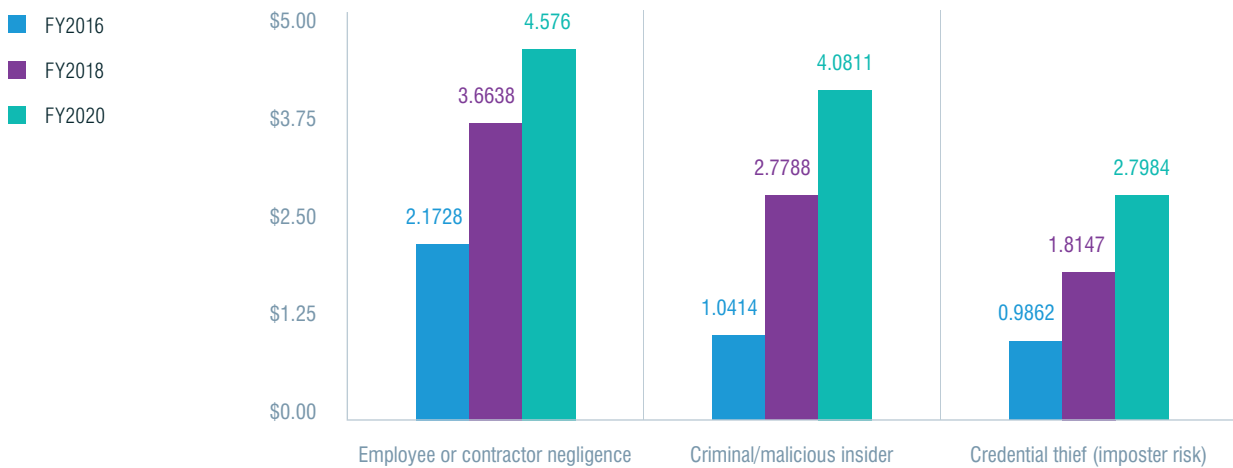
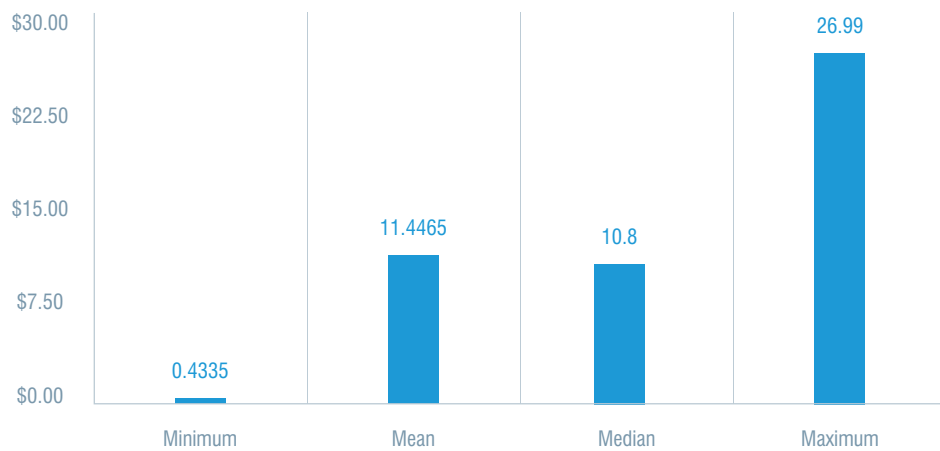


Figure 15 reports the median, mean, minimum and maximum values for insider cost (combining three profiles) over the past 12 months. The mean and median are \$11.45 and \$10.80 million, respectively. The minimum cost value is \$.43 million and the maximum cost value is \$26.99 million.

Figure 15.

Sample statistics on the cost of insider incidents over the past 12 months

Consolidated for three profiles | US\$ millions



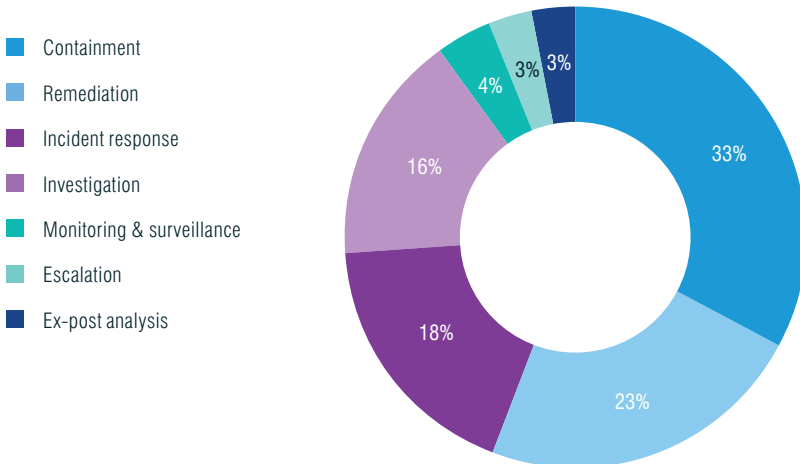
Containment accounts for one-third of all costs

The following pie chart shows the percentage cost for seven activity centers. According to Figure 16, containment represents 33 percent of total annualized insider-related costs. Activities relating to remediation and incident response represent 23 percent and 18 percent of total cost, respectively.

Figure 16.

Percentage cost of insider incidents by activity center

n=204 companies



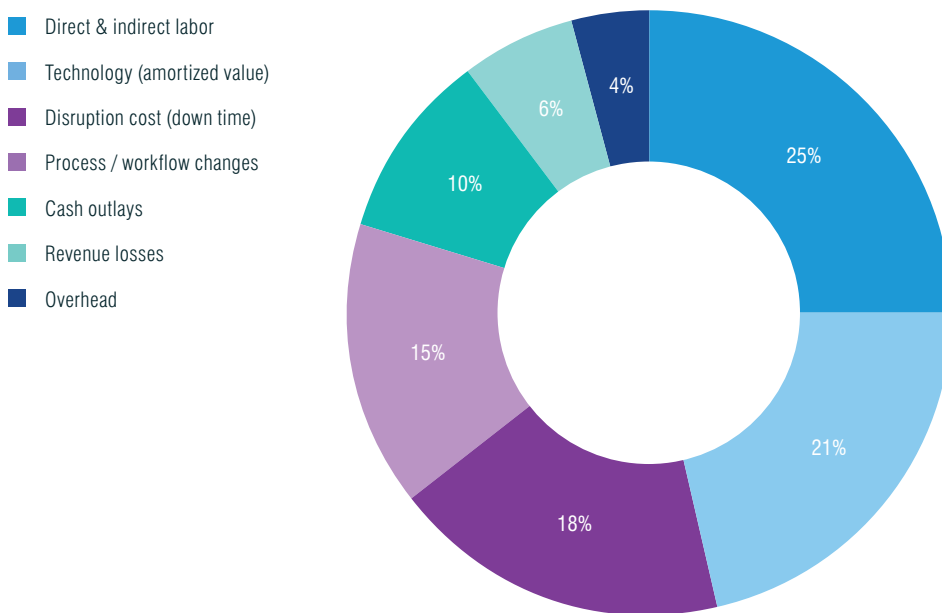
Companies are spending the most on personnel and technology to resolve insider incidents

Figure 17 reports the percentage of insider cost for careless or negligent employees, criminal insiders and credential theft according to seven cost categories. The largest cost category (direct & indirect labor) includes both direct and indirect costs associated with in-house personnel and temporary and contract workers. This is followed by technology, which includes the amortized value and the licensing for software and hardware that are deployed in response to insider-related incidents (21 percent).

Process costs include governance and control system activities in response to threats and attacks. The cost of disruption includes diminished employee/user productivity as a result of insider incidents. Overhead includes a wide array of miscellaneous costs incurred to support personnel as well as the IT security infrastructure.

Figure 17.

Percentage of insider cost by standard categories

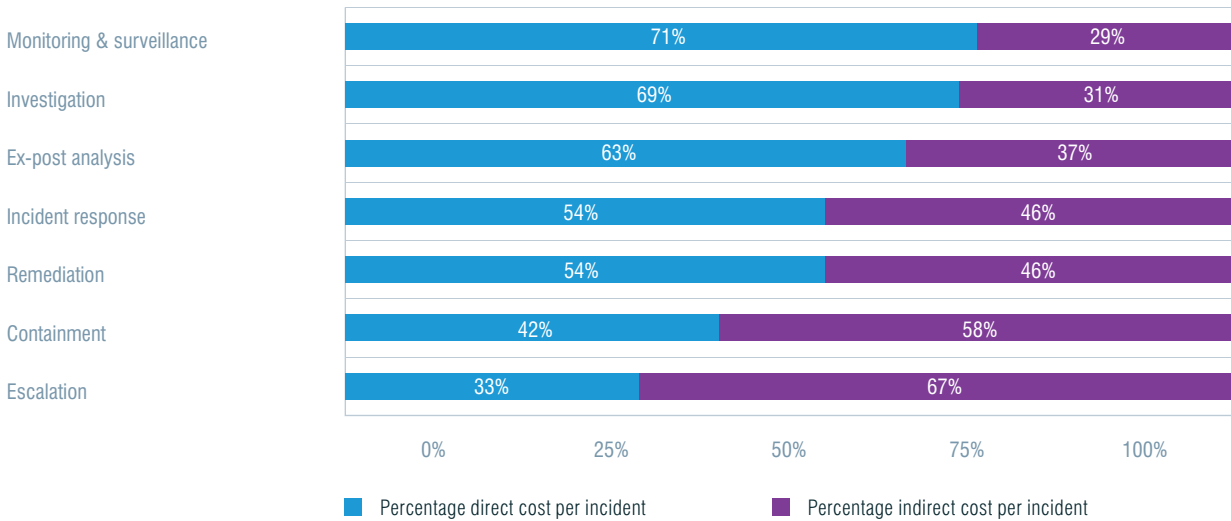


Companies were asked to estimate the direct costs spent to accomplish a given activity and the amount of time, effort and other resources spent, but not as a direct cash outlay (i.e. indirect costs). Figure 18 shows the proportion of direct and indirect costs for seven internal activity cost centers. As can be seen, the cost relating to monitoring and surveillance has the highest direct cost percentage. In contrast, escalation has the highest percentage of indirect cost.

Figure 18.

Percentage of direct vs. indirect costs for activity centers

Consolidated for three profiles



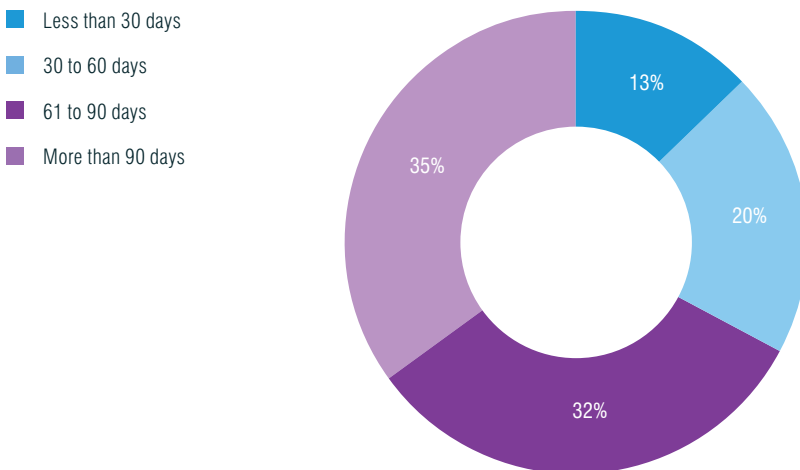
Companies are spending an average of more than two months to contain the incident

According to Figure 19, the time to contain insider-related incidents in our benchmark sample took an average of 77 days to contain the incident. Only 13 percent of incidents were contained in less than 30 days.

Figure 19.

Percentage distribution of insider-related incidents based on the time to contain

Average=77 days



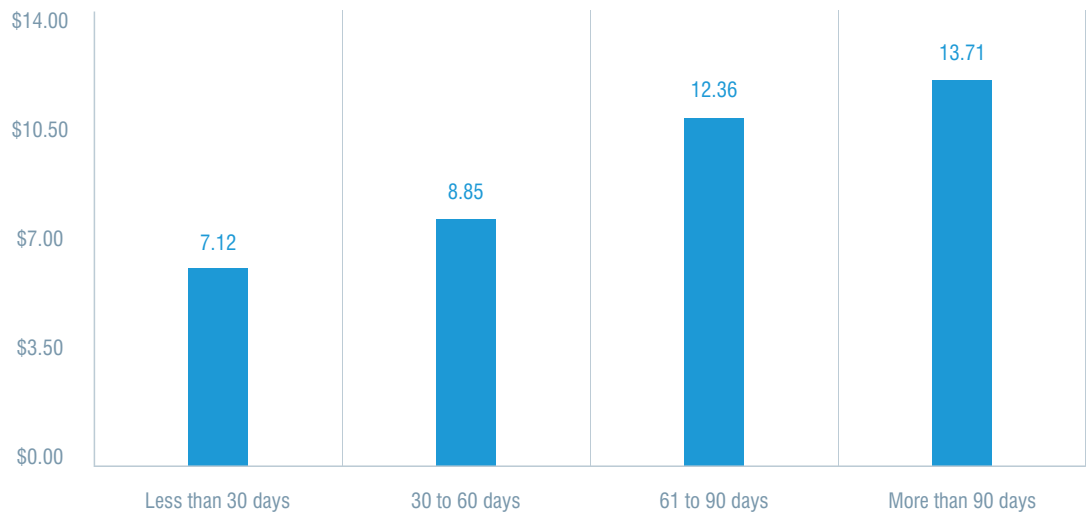
The faster containment occurs, the lower the cost

Total annualized cost appears to be positively correlated with the time to contain insider-related incidents. As shown in Figure 20, incidents that took more than 90 days to contain had the highest average total cost per year (\$13.71 million). In contrast, incidents that took less than 30 days to contain had the lowest total cost. (\$7.12 million). The average annual cost is \$11.45 million.

Figure 20.

Average activity cost by days to contain the incidents

Mean=\$11.45 (US\$ millions)



Total annualized cost for 13 industry sectors is reported in Figure 21³. At \$14.50 million, companies in financial services experienced the highest total cost. Services and technology & software had the next highest costs at \$12.31 million and \$12.30 million, respectively. In contrast, companies in education and research had the lowest total annualized cost at \$8.85 million.

³ Care should be taken when reviewing industry sector differences because of small subsample sizes.

Figure 21.

Annualized activity cost by industrial sector

Mean=\$11.45 (US\$ millions)

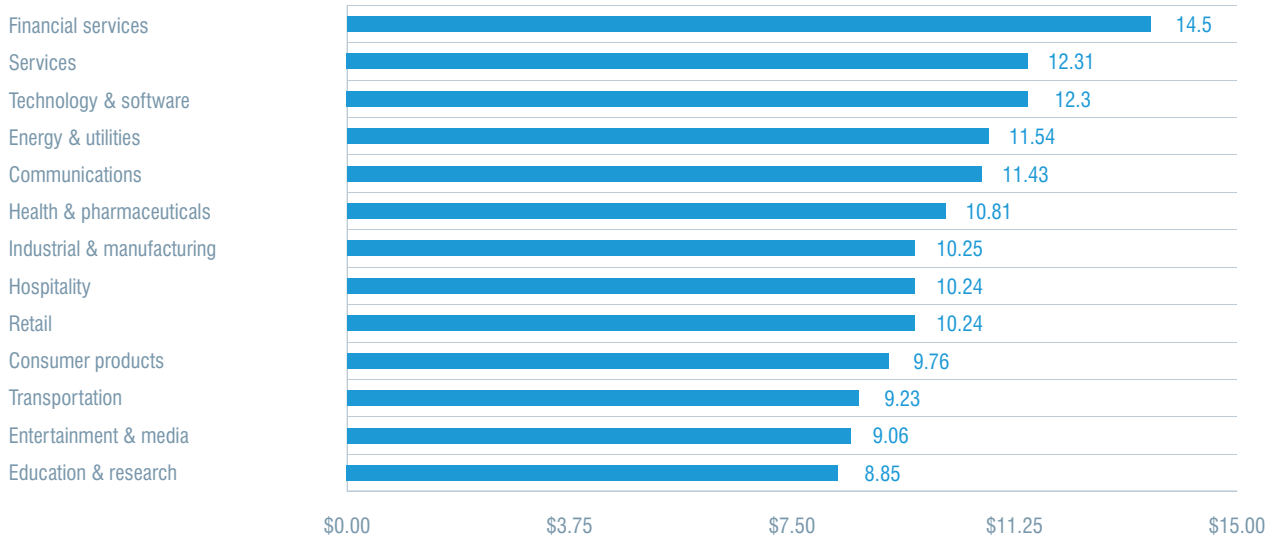
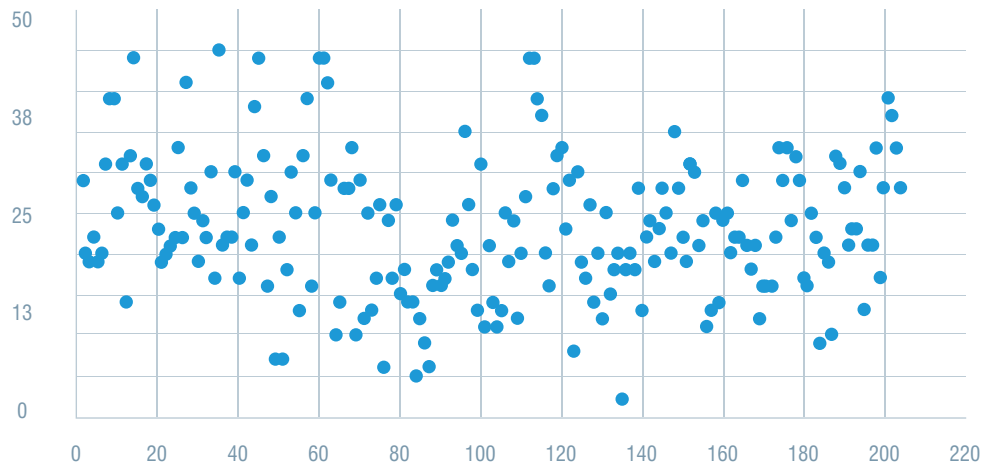


Figure 22 shows a scattergram on the total annualized cost of insider incidents per company. Of the 204 participating companies, 124 companies (61 percent) of companies had an average total cost at or below the mean of \$11.45 million over the past 12 months. The remaining 80 companies (39 percent) are above the average of \$11.45 million. This finding suggests that the distribution is skewed.

Figure 22.

Scattergram of insider-related incidents by company

Mean=\$11.45 (US\$ millions)



The majority of companies are deploying user training awareness (55 percent), data loss prevention (54 percent) and user behavior analytics (50 percent) to prevent insider threats, as shown in Table 3.

Table 3. Tools and activities that reduce insider Security tools & activities	Frequency of companies	Percentage of companies
User training & awareness	112	55%
Data loss prevention (DLP)	110	54%
User behavior analytics (UBA)	102	50%
Employee monitoring & surveillance	96	47%
Security incident & event management (SIEM)	91	45%
Incident response management (IRM)	89	44%
Strict third-party vetting procedures	87	43%
Threat intelligence sharing	85	42%
Privileged access management (PAM)	80	39%
Network traffic intelligence	77	38%



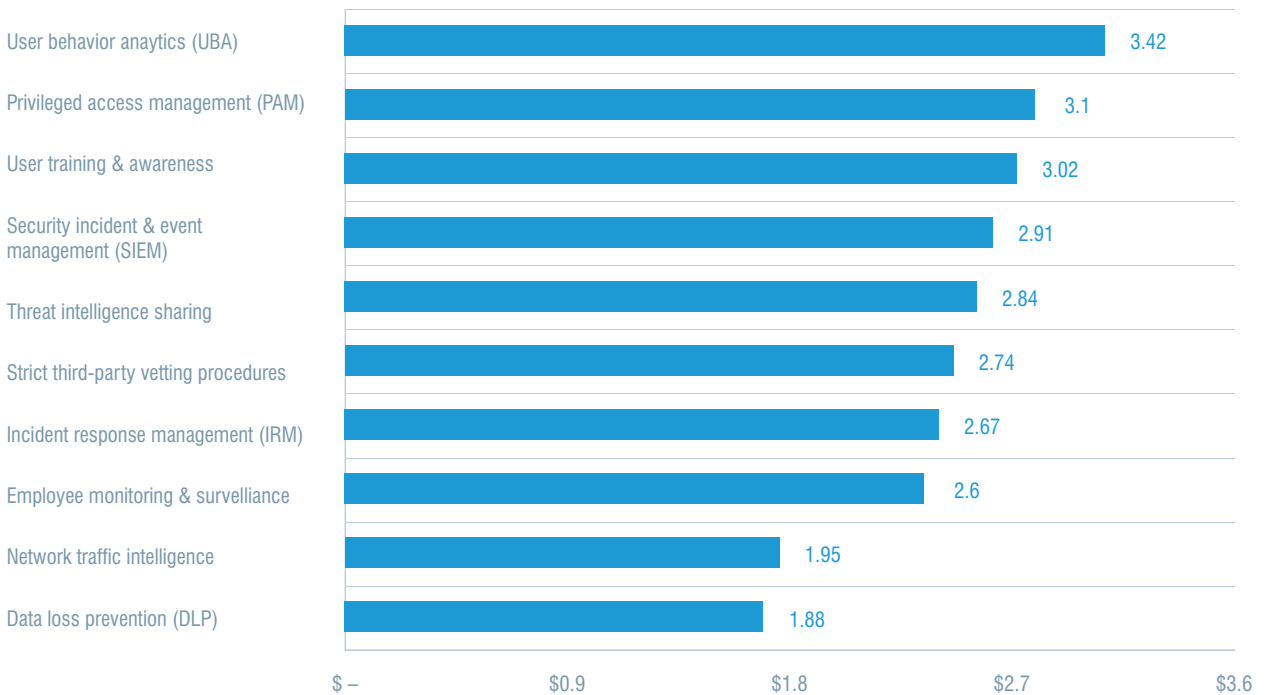
UBA, PAM and user training awareness are the most cost effective tools and activities

According to Figure 23, companies can save an average of \$3.4 million and \$3.1 million when deploying UBA and a privileged access management (PAM) solution. The most frequently deployed tools and activities are shown in Figure 23. Accordingly, 112 companies conduct training programs to raise employee awareness about insider threats. The number of companies that utilize data loss prevention is 110 and 102 companies deploy user behavior analytics (UBA) to spot suspicious network activities.

Figure 23.

Cost savings resulting in the deployment of cyber risk reducing tools and activities

Mean = \$11.45 (US\$ millions)



CONCLUSIONS – INSIDER THREAT MANAGEMENT

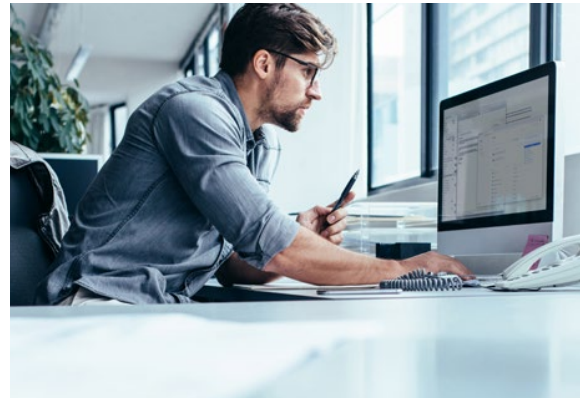
With insider threats on the rise, an increase in the average cost per incident from \$8.76 million in 2018 (Ponemon) to \$11.45 million in 2020, and an increase from 73 to 77 days (Ponemon) to contain an incident, organizations need to build an effective Insider Threat Management program. Such a program would ensure that the organization can respond quickly if an incident happens and minimize the overall impact to the business.

Whether they are caused accidentally or maliciously, insider threat incidents cannot be mitigated with technology alone. Organizations need an Insider Threat Management program that combines people, processes, and technology to identify and prevent incidents within the organization.



People

- Insider threat detection and prevention is a team sport. Ensure the right groups and stakeholders are involved in the organization's secure operations center.
- Limit user access to non-essential data or attempt to limit the duration of time privileged users can access the information needed to complete a task.
- Look for leading behavioral indicators to uncover a potentially malicious insider threat.

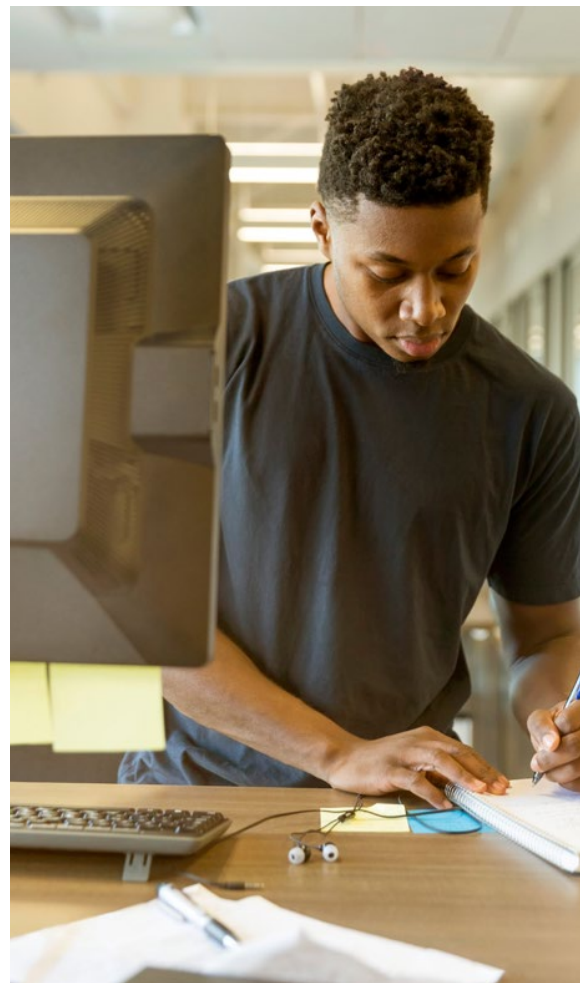


Process

- Evaluate the organization's risk and develop a dedicated insider threat function in the organization, especially if data is particularly sensitive or valuable.
- Establish consistent, repeatable processes that are fair to all employees, using technology to enable and support these processes.
- Invest in training for users, empowering them in areas such as secure data handling, security awareness, and vigilance.

Technology

- Consider the performance impact, as well as ease of management, deployment, stability, and flexibility of any insider threat solution.
- Choose a solution that can scale with the organization as it grows.
- Keep in mind a vendor's expertise on insider threat vs. external detection and prevention.
- Determine if the solution gives visibility into what users are doing, particularly privileged users.



THIS COST STUDY IS
UNIQUE IN ADDRESSING
THE CORE SYSTEMS
AND BUSINESS
PROCESS-RELATED
ACTIVITIES THAT
DRIVE A RANGE OF
EXPENDITURES.

FRAMEWORK

The purpose of this research is to provide guidance on what an insider threat can cost an organization. This cost study is unique in addressing the core systems and business process-related activities that drive a range of expenditures associated with a company's response to insider negligence and criminal behaviors. In this study, we define an insider-related incident as one that results in the diminishment of a company's core data, networks or enterprise systems. It also includes attacks perpetrated by external actors who steal the credentials of legitimate employees/users (i.e., imposter risk).

Our benchmark methods attempt to elicit the actual experiences and consequences of insider-related incidents. Based on interviews with a variety of senior-level individuals in each organization we classify the costs according to two different cost streams:

- The costs related to minimizing insider threats or what we refer to as the internal cost activity centers.
- The costs related to the consequences of incidents, or what we refer to as the external effect of the event or attack.

We analyze the internal cost centers sequentially—starting with monitoring and surveillance of the insider threat landscape and ending with remediation activities. Also included are the costs due to lost business opportunities and business disruption. In each of the cost activity centers we asked respondents to estimate the direct costs, indirect costs and, when applicable, opportunity costs. These are defined as follows:

- Direct cost – the direct expense outlay to accomplish a given activity.
- Indirect cost – the amount of time, effort and other organizational resources spent, but not as a direct cash outlay.
- Opportunity cost – the cost resulting from lost business opportunities as a consequence of reputation diminishment after the incident.

External costs such as the loss of information assets, business disruption, equipment damage and revenue loss, were captured using shadow-costing methods. Total costs were allocated to seven discernible cost vectors.⁴

⁴ We acknowledge that these seven cost categories are not mutually independent and they do not represent an exhaustive list of all cost activity centers.

This study addresses the core process-related activities that drive a range of expenditures associated with a company's response to insider-related incidents.

The seven internal cost activity centers in our framework include:⁵

- **Monitoring and surveillance:** Activities that enable an organization to reasonably detect and possibly deter insider incidents or attacks. This includes allocated (overhead) costs of certain enabling technologies that enhance mitigation or early detection.
- **Investigation:** Activities necessary to thoroughly uncover the source, scope, and magnitude of one or more incidents.
- **Escalation:** Activities taken to raise awareness about actual incidents among key stakeholders within the company. The escalation activity also includes the steps taken to organize an initial management response.
- **Incident response:** Activities relating to the formation and engagement of the incident response team including the steps taken to formulate a final management response.
- **Containment:** Activities that focus on stopping or lessening the severity of insider incidents or attacks. These include shutting down vulnerable applications and endpoints.
- **Ex-post response:** Activities to help the organization minimize potential future insider-related incidents and attacks. It also includes steps taken to communicate with key stakeholders both within and outside the company, including the preparation of recommendations to minimize potential harm.
- **Remediation:** Activities associated with repairing and remediating the organization's systems and core business processes. These include the restoration of damaged information assets and IT infrastructure.

In addition to the above process-related activities, organizations often experience external consequences or costs associated with the aftermath of incidents. Our research shows that four general cost activities associated with these external consequences are as follows:

- **Cost of information loss or theft:** Loss or theft of sensitive and confidential information as a result of an insider attack. Such information includes trade secrets, intellectual properties (including source code), customer information and employee records. This cost category also includes the cost of data breach notification in the event that personal information is wrongfully acquired.
- **Cost of business disruption:** The economic impact of downtime or unplanned outages that prevent the organization from meeting its data processing requirements.
- **Cost of equipment damage:** The cost to remediate equipment and other IT assets as a result of insider attacks to information resources and critical infrastructure.
- **Lost revenue:** The loss of customers (churn) and other stakeholders because of system delays or shutdowns as a result of an insider attack. To extrapolate this cost, we use a shadow costing method that relies on the "lifetime value" of an average customer as defined for each participating organization.

⁵ Internal costs are extrapolated using labor (time) as a surrogate for direct and indirect costs. This is also used to allocate an overhead component for fixed costs such as a multiyear investment in technologies.

OUR BENCHMARK INSTRUMENT IS DESIGNED TO COLLECT DESCRIPTIVE INFORMATION FROM IT.

BENCHMARKING

Our benchmark instrument is designed to collect descriptive information from IT, information security and other key individuals about the actual costs incurred either directly or indirectly as a result of insider-related incidents or attacks actually detected. Our cost method does not require subjects to provide actual accounting results, but instead relies on estimation and extrapolation from interview data over a four-week period.

Cost estimation is based on confidential diagnostic interviews with key respondents within each benchmarked organization. Data collection methods did not include actual accounting information, but instead relied upon numerical estimation based on the knowledge and experience of each participant. Within each category, cost estimation was a two-stage process. First, the benchmark instrument required individuals to rate direct cost estimates for each cost category by marking a range variable defined in the following number line format.

How to use the number line

The number line provided under each data breach cost category is one way to obtain your best estimate for the sum of cash outlays, labor and overhead incurred. Please mark only one point somewhere between the lower and upper limits set above. You can reset the lower and upper limits of the number line at any time during the interview process.

Post your estimate of direct costs here for [presented cost category]

LL _____ | _____
 UL

The numerical value obtained from the number line rather than a point estimate for each presented cost category preserved confidentiality and ensured a higher response rate. The benchmark instrument also required practitioners to provide a second estimate for indirect and opportunity costs, separately.

Cost estimates were then compiled for each organization based on the relative magnitude of these costs in comparison to a direct cost within a given category. Finally, we administered general interview questions to obtain additional facts, including estimated revenue losses as a result of the insider-related incident or attack.

The size and scope of survey items was limited to known cost categories that cut across different industry sectors. In our experience, a survey focusing on process yields a higher response rate and better quality of results. We also used a paper instrument, rather than an electronic survey, to provide greater assurances of confidentiality.

To maintain complete confidentiality, the survey instrument did not capture company-specific information of any kind. Subject materials contained no tracking codes or other methods that could link responses to participating companies.

We carefully limited items to only those cost activities considered crucial to the measurement of cost to keep the benchmark instrument to a manageable size. Based on discussions with learned experts, the final set of items focused on a finite set of direct or indirect cost activities. After collecting benchmark information, each instrument was examined carefully for consistency and completeness. In this study, a few companies were rejected because of incomplete, inconsistent or blank responses.

Field research was launched in March 2019. To maintain consistency for all benchmark companies, information was collected about the organizations' experience was limited to four consecutive weeks. This time frame was not necessarily the same time period as other organizations in this study. The extrapolated direct and indirect costs were annualized by dividing the total cost collected over four weeks (ratio = 4/52 weeks).

RESEARCH LIMITATIONS

Our study utilizes a confidential and proprietary benchmark method that has been successfully deployed in earlier research. However, there are inherent limitations with this benchmark research that need to be carefully considered before drawing conclusions from findings.

- **Non-statistical results:** Our study draws upon a representative, non-statistical sample of organizations experiencing one or more insider-related incidents during the past 12 months. Statistical inferences, margins of error and confidence intervals cannot be applied to these data given that our sampling methods are not scientific.
- **Non-response:** The current findings are based on a small representative sample of benchmarks. In this study, 159 companies completed the benchmark process. Non-response bias was not tested so it is always possible companies that did not participate are substantially different in terms of underlying data breach cost.
- **Sampling-frame bias:** Because our sampling frame is judgmental, the quality of results is influenced by the degree to which the frame is representative of the population of companies being studied. It is our belief that the current sampling frame is biased toward companies with more mature privacy or information security programs.
- **Company-specific information:** The benchmark information is sensitive and confidential. Thus, the current instrument does not capture company-identifying information. It also allows individuals to use categorical response variables to disclose demographic information about the company and industry category.
- **Unmeasured factors:** To keep the interview script concise and focused, we decided to omit other important variables from our analyses such as leading trends and organizational characteristics. The extent to which omitted variables might explain benchmark results cannot be determined.
- **Extrapolated cost results:** The quality of benchmark research is based on the integrity of confidential responses provided by respondents in participating companies. While certain checks and balances can be incorporated into the benchmark process, there is always the possibility that respondents did not provide accurate or truthful responses. In addition, the use of cost extrapolation methods rather than actual cost data may inadvertently introduce bias and inaccuracies.

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We uphold strict data confidentiality, privacy and ethical research standards. We do not collect any personally identifiable information from individuals (or company identifiable information in our business research). Furthermore, we have strict quality standards to ensure that subjects are not asked extraneous, irrelevant or improper questions.