



Critical Infrastructure: Security Preparedness and Maturity

Sponsored by Unisys

Independently conducted by Ponemon Institute LLC

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Part 1. Introduction

Ponemon Institute is pleased to present the results of the “Critical Infrastructure: Security Preparedness and Maturity” study, sponsored by Unisys. The purpose of this research is to learn how utility, oil and gas, alternate energy and manufacturing organizations are addressing cyber security threats. These industries have become a high profile target for security exploits. Moreover, it has been reported that if their industrial controls systems (ICS) and supervisory control and data acquisition (SCADA) systems were attacked the damage could be enormous.

For example, an unnamed natural gas company hired an IT firm to test its corporate information system. POWER Magazine reported, “The consulting organization carelessly ventured into a part of the network that was directly connected the SCADA system. The penetration test locked up the SCADA system and the utility was not able to send gas through its pipelines for four hours. The outcome was the loss of service to its customer base for those four hours.”¹

As the findings reveal, organizations are not as prepared as they should be to deal with the sophistication and frequency of a cyber threat or the negligence of an employee or third party. In fact, the majority of participants in this study do not believe their companies’ IT security programs are “mature.” For purposes of this research, a mature stage is defined as having most IT security program activities deployed. Most companies have defined what their security initiatives are but deployment and execution are still in the early or middle stages.

We surveyed 599 Global IT and IT security executives in 13 countries. A list of participating countries is presented in the appendix of this report. To ensure a knowledgeable and quality response, only IT practitioners whose job involves securing or overseeing the security of their organization’s information systems or IT infrastructure were permitted to complete the survey. They are also familiar with security standards such as NERC, CIP, NIST, ISO, PCI DSS, Sarbanes Oxley and other regulations on the protection of information assets and the critical infrastructure.

Key findings of this research

Most companies have not fully deployed their IT security programs. Only 17 percent of companies represented in this research self-report that most of their IT security program activities are deployed. Fifty percent of respondents say their IT security activities have not as yet been defined or deployed (7 percent) or they have defined activities but they are only partially deployed (43 percent). A possible reason is that only 28 percent of respondents agree that security is one of the top five strategic priorities across the enterprise.

The risk to industrial control systems and SCADA is believed to have substantially increased. Fifty-seven percent of respondents agree that cyber threats are putting industrial control systems and SCADA at greater risk. Only 11 percent say the risk has decreased due to heightened regulations and industry-based security standards.

¹Cyber Threats to SCADA Systems Are Real, POWER Magazine, by Kennedy Maize, July 18, 2012

Security compromises are occurring in most companies. It is difficult to understand why security is not a top priority because 67 percent of respondents say their companies have had at least one security compromise that led to the loss of confidential information or disruption to operations over the last 12 months. Twenty-four percent of respondents say these compromises were due to an insider attack or negligent privileged IT users.

Upgrading existing legacy systems may result in sacrificing mission-critical security. Fifty-four percent of respondents are not confident (36 percent) or unsure (18 percent) that their organization would be able to upgrade legacy systems to the next improved security state in cost-effective ways without sacrificing mission-critical security.

Many organizations are not getting actionable real-time threat alerts about security exploits. According to 34 percent of respondents, their companies do not get real-time alerts, threat analysis and threat prioritization intelligence that can be used to stop or minimize the impact of a cyber attack. If they do receive such intelligence, 22 percent of respondents say they are not effective. Only 15 percent of respondents say threat intelligence is very effective and actionable.

Part 2. Key Findings

In this section, we provide an analysis of the key findings. The complete results of the study are presented in the appendix of this report. We have organized the report according to the following themes:

- The current state of security preparedness and maturity
- Implementation of security practices and governance
- Security threats and incidents
- Barriers to addressing threats and incidents

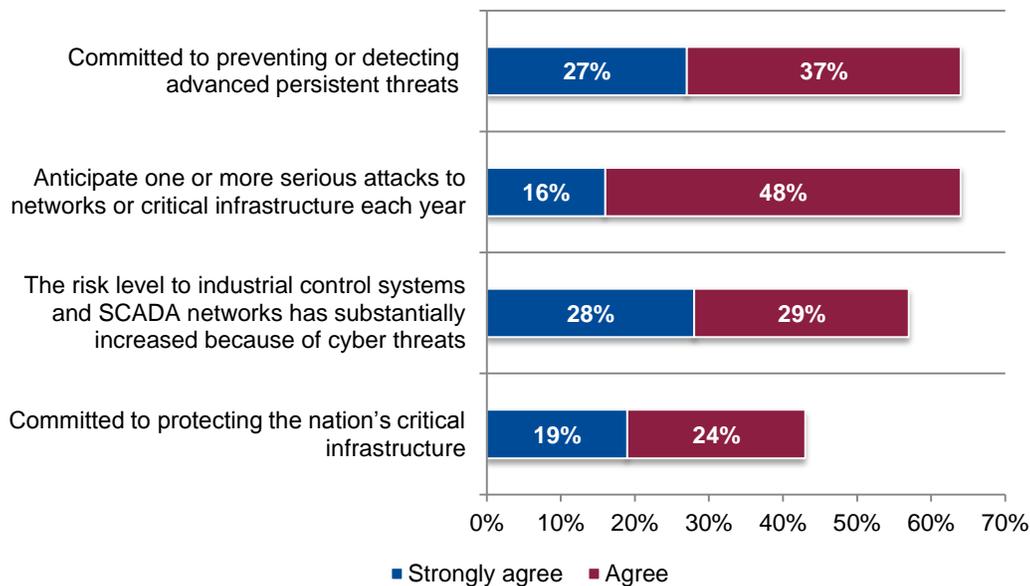
The current state of security preparedness and maturity

Security threats are recognized but companies are not fully committed to preventing attacks. As shown in Figures 1 and 2, there is a gap between concerns about security threats and what companies are actually doing to stop attacks.

In Figure 1, 64 percent of respondents say their organizations want to prevent or anticipate APTs and another 64 percent believe there will be one or more serious attacks per year. The majority (57 percent) also believe risk level to SCADA and ICS has increased due to cyber threats. Forty-three percent also say their security operations are committed to protecting the nation's critical infrastructure.

Figure 1. Awareness of the risk is high

Strongly agree and agree response combined
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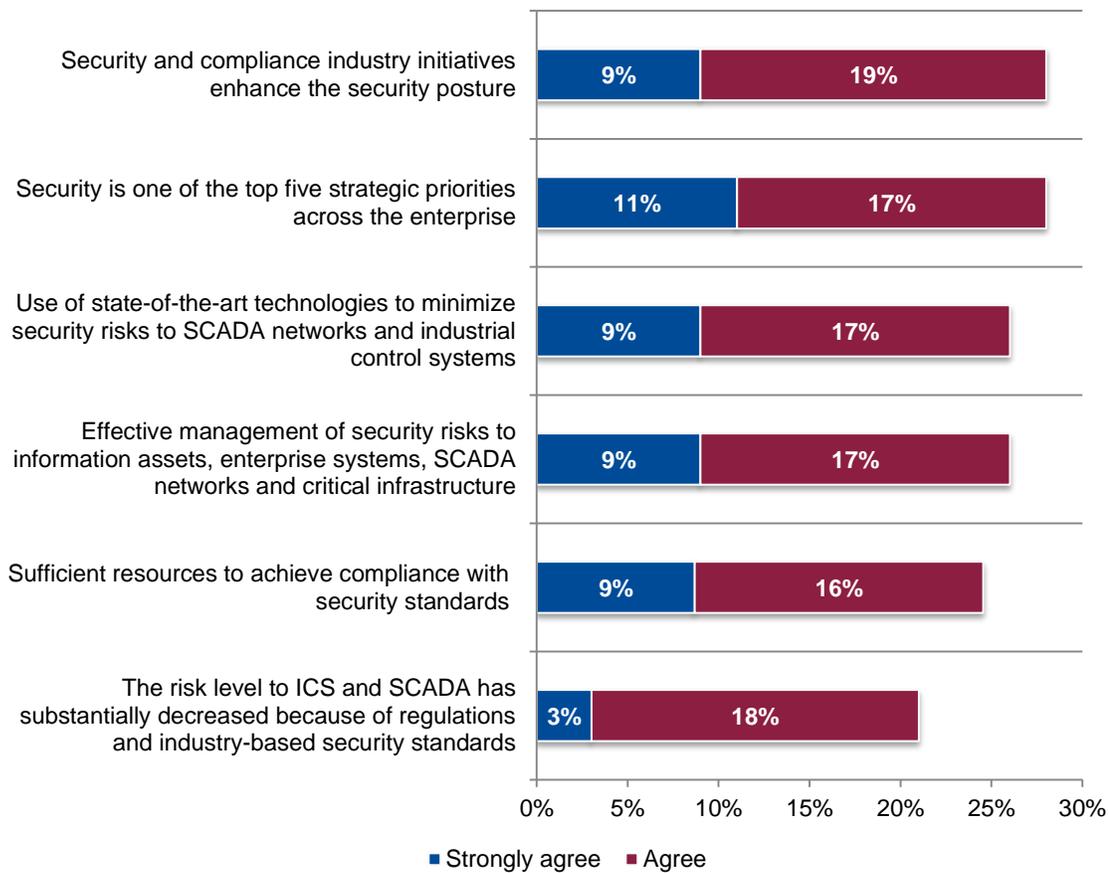


Despite recognition of the threats facing their companies, the majority of respondents, as shown in Figure 2, believe they are not effective at managing security risks, have state-of-the-art technologies to minimize risk to SCADA and ICS and have sufficient resources to achieve compliance. Further, very few believe regulations and standards have decreased the risk level to SCADA and ICS.

Figure 2. As a strategic priority, reducing the risk of cyber threats is low

Strongly agree and agree response combined

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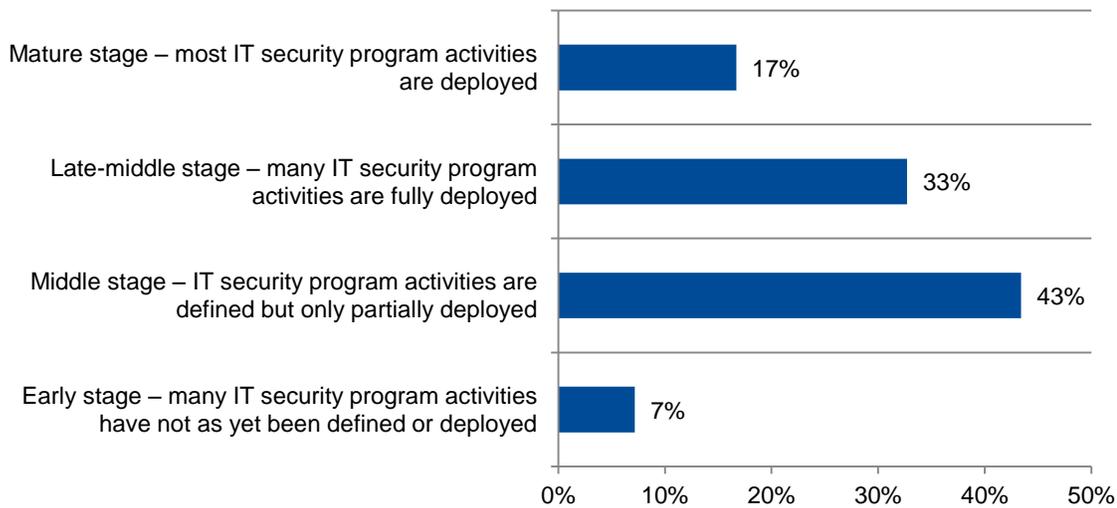


Security maturity levels are mostly at the early or middle stage. Figure 3 reveals that most companies in this research are stuck in the early or middle stage of maturity. For purposes of this research, an early stage is one where many IT security programs have not as yet been defined or deployed and a middle stage is described as having security activities defined but only partially deployed.

One-third of respondents say many IT security program activities are fully deployed (late-middle stage) and only 17 percent say they have achieved a mature stage where most IT security programs are deployed.

Figure 3. Security maturity levels of participating organizations

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Implementation of governance and security practices

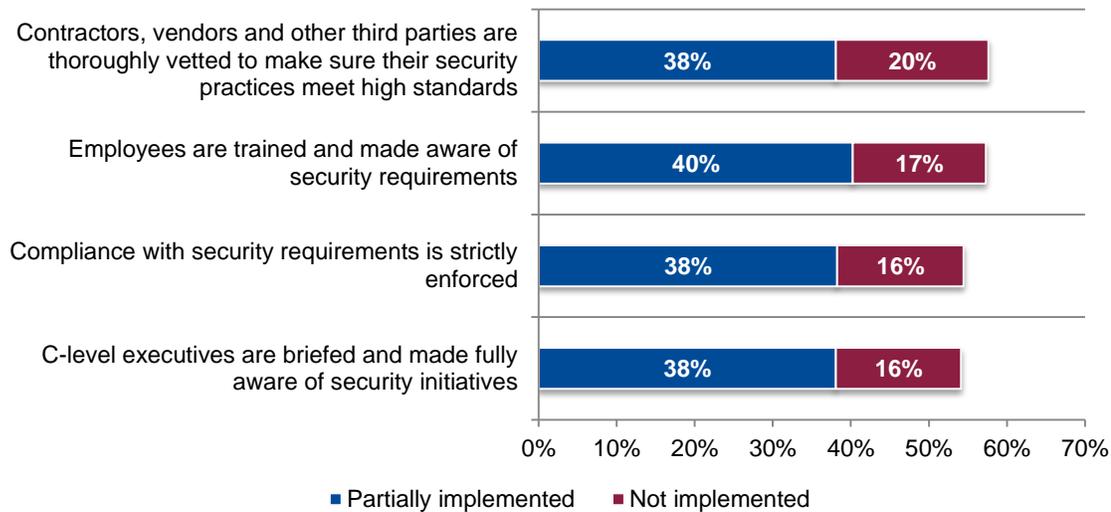
Organizations fall short in terms of security governance. According to Figure 4, the majority of companies say important security governance activities are only partially or not implemented at all. Specifically, 58 percent of respondents say their organizations are only partially or not vetting contractors, vendors and other third parties to make sure they have high security standards. Similarly, compliance with security requirements are only partially or not strictly enforced.

Fifty-seven percent of respondents do not have fully implemented training and awareness programs about security requirements. Finally, 54 percent of C-level executives are not often or never briefed and made fully aware of security initiatives.

Figure 4. Implementation of security governance practices

Partially implemented and not implemented response combined

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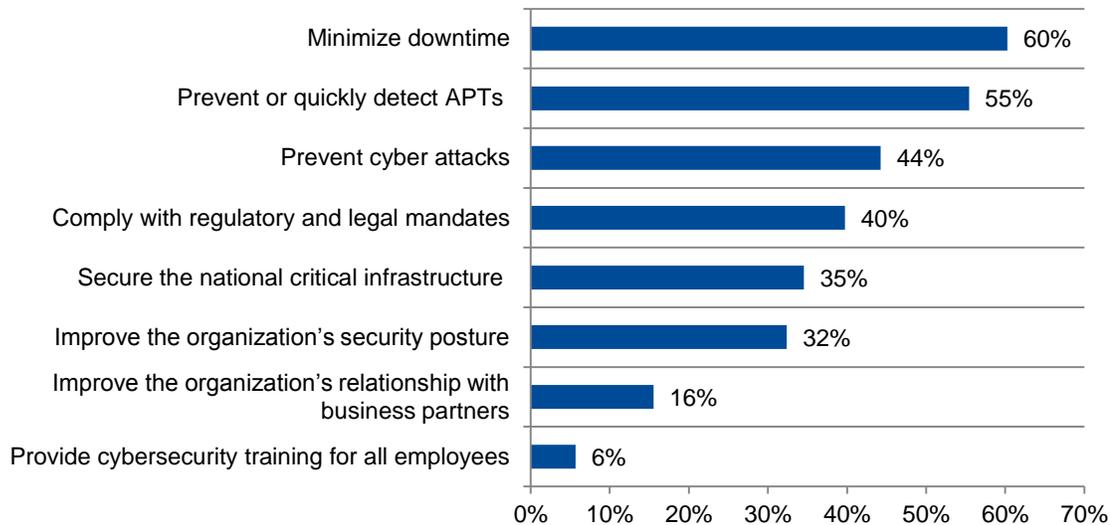


Top security objectives focus on immediate concerns rather than proactive measures to secure the infrastructure. Minimization of downtime takes precedence over the prevention of cyber attacks and compliance, as shown in Figure 5. Only 32 percent say improving the security posture of the company is a top security objective and a very small percentage cite cybersecurity training for all employees as a goal.

Figure 5. Top security objectives

Three choices permitted

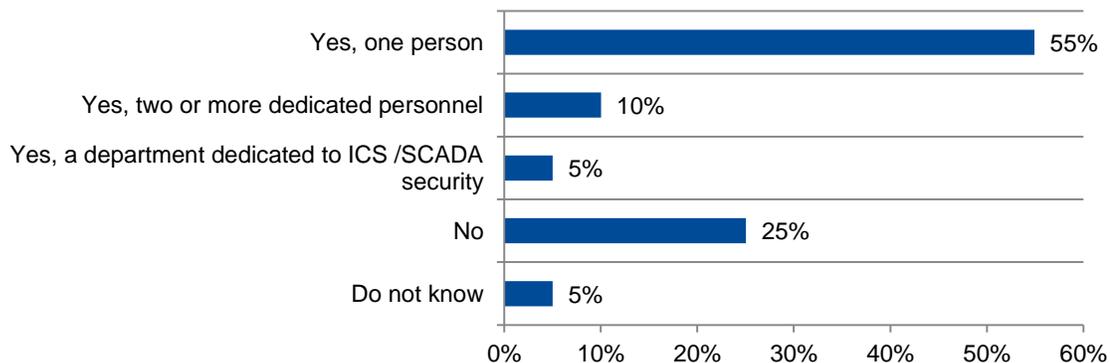
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Who is responsible for security? The individuals most likely to be responsible for achieving security objectives are the CIO/CTO, CSO, CISO and in some cases the business unit leader. When asked if their company has dedicated personnel and/or departments responsible for industrial control systems and SCADA security, 25 percent say they do not have anyone assigned, according to Figure 6. The majority (55 percent) say they have one person responsible.

Figure 6. Do you have dedicated personnel responsible for industrial control systems and SCADA security?

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Although they say they are committed to stopping threats (Figure 1), most only have one person assigned to cybersecurity

The majority of respondents do not believe their technologies for security and compliance are effective. Figure 6a shows the five most effective security systems. They are: ID and access management and perimeter or location surveillance and database scanning.

Figure 6a. Most effective security technologies

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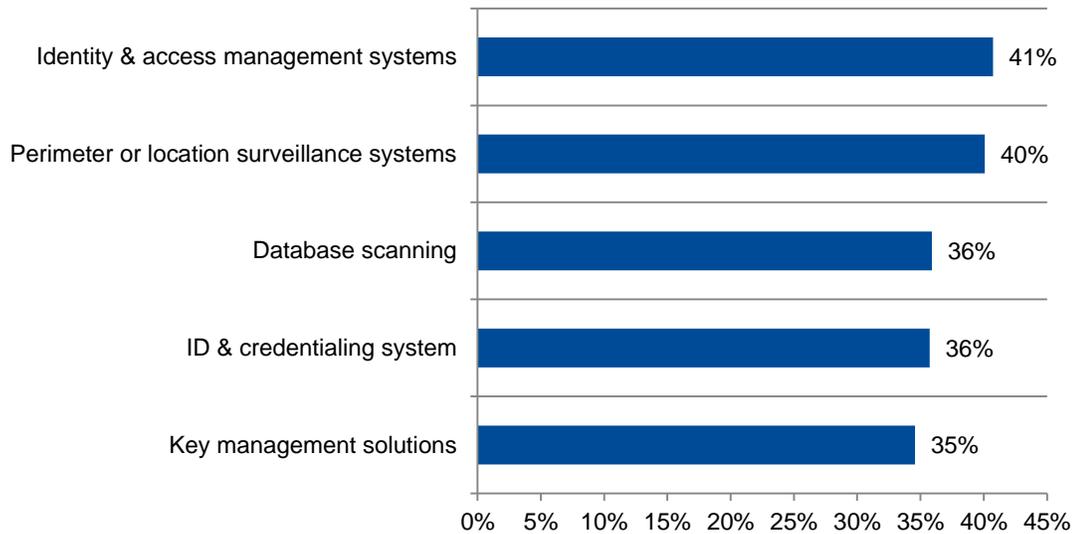
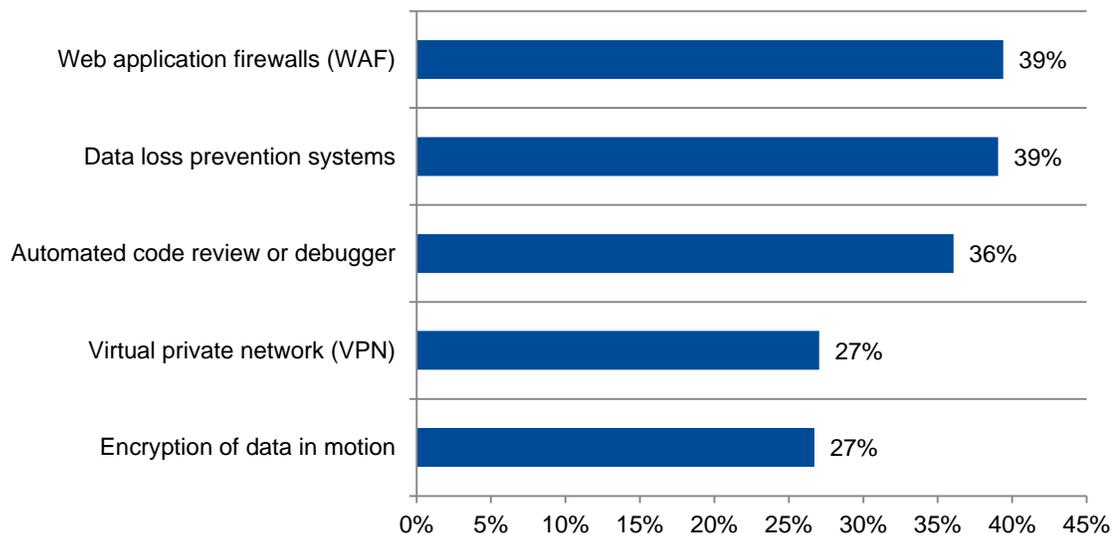


Figure 6b reveals what respondents believe are the least effective security technologies in addressing cybersecurity threats. These are web application firewalls (WAF), data loss prevention systems and automated code review or debugger.

Figure 6b. Least effective security technologies

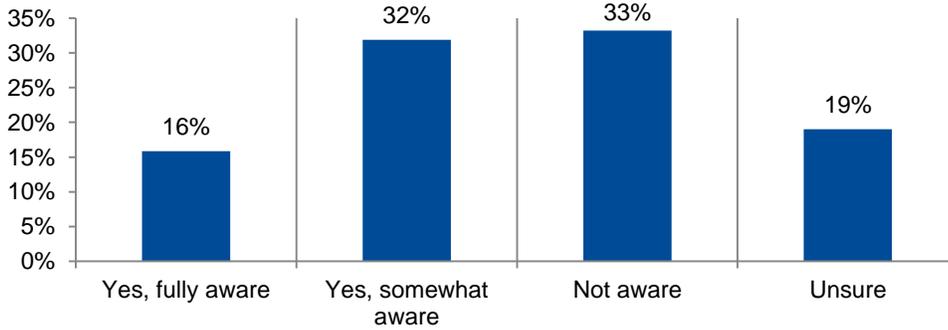
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The majority of respondents are either not aware or unsure about the potential vulnerabilities in its ICS/SCADA environment. Figure 7 reveals that only 16 percent of respondents are fully aware of the vulnerabilities that exist. This could explain why sufficient staff is not assigned to the security of these systems.

Figure 7. Awareness of potential vulnerabilities to ICS/SCADA environments

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Security Threats and Incidents

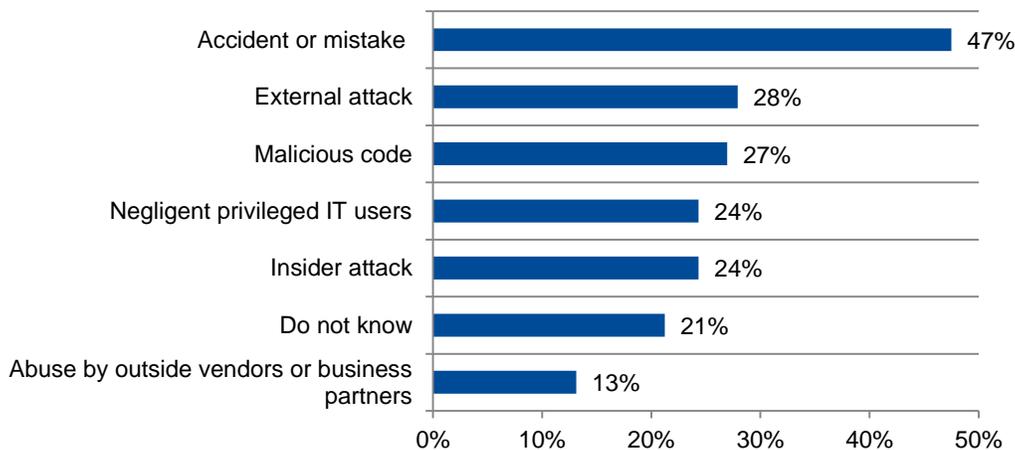
The majority of companies have had at least one security compromise in the past 12 months. Sixty-seven percent of companies represented in this research have had at least one incident that led to the loss of confidential information or disruption to operations.

According to Figure 8, the root cause of the breach was most likely a negligent employee (47 percent of respondents). Twenty-four percent of security incidents were due to a negligent employee with privileged access. However, 21 percent of respondents say they were not able to determine the source of the incident.

Figure 8. Root cause of security breaches over the past 12 months

Two choices permitted

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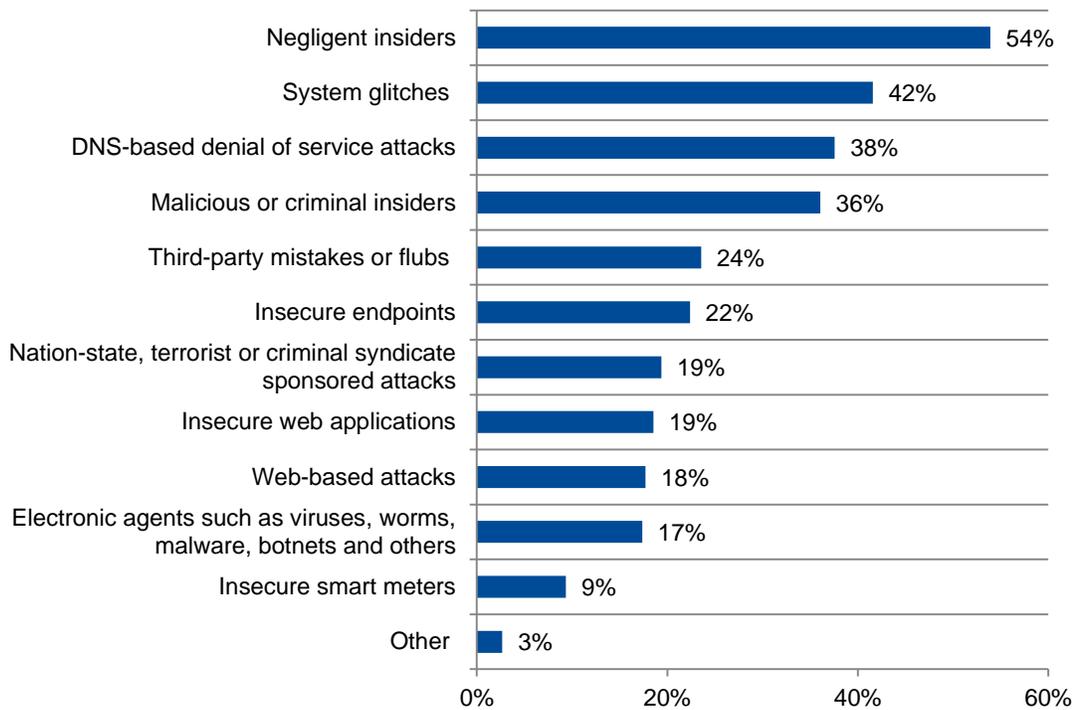


Negligent insiders are recognized as the biggest security threat. As discussed, the root cause of the security incident could be traced back to employee negligence or a careless insider with privileged user access. Accordingly, 54 percent of respondents say they are most concerned about negligent insiders followed by system glitches (42 percent of respondents), as shown in Figure 9. Low on the list are electronic agents such as viruses and worms, web-based attacks and insecure smart meters.

Negligent insiders account for most threats, yet only 6% (Figure 5) train their employees

Figure 9. Top security threats

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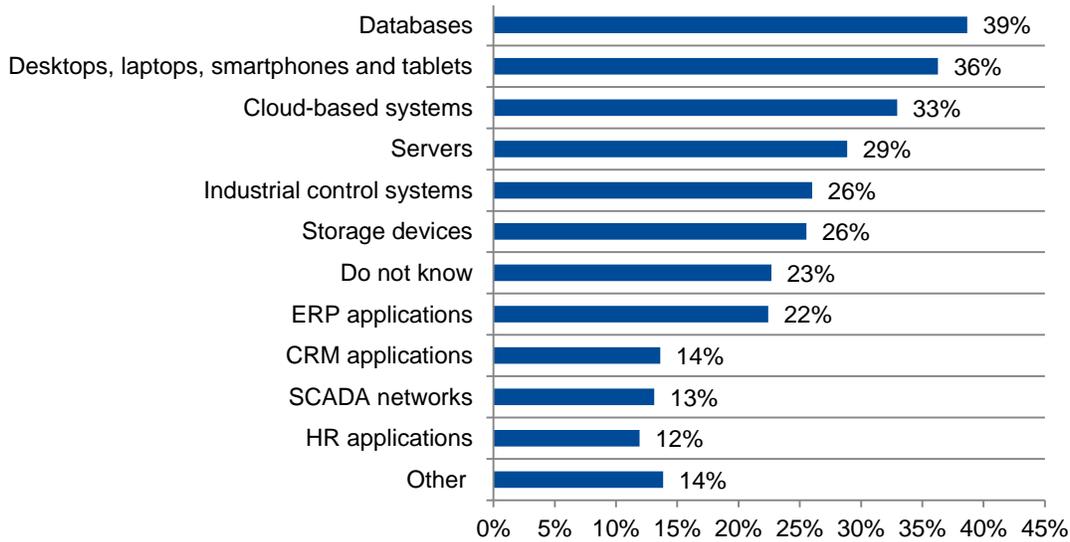


What was the target of these security incidents? As shown in Figure 10, there was no one major target of the attacks. However databases and personal devices were the most often mentioned.

Figure 10. What was attacked?

More than one choice permitted

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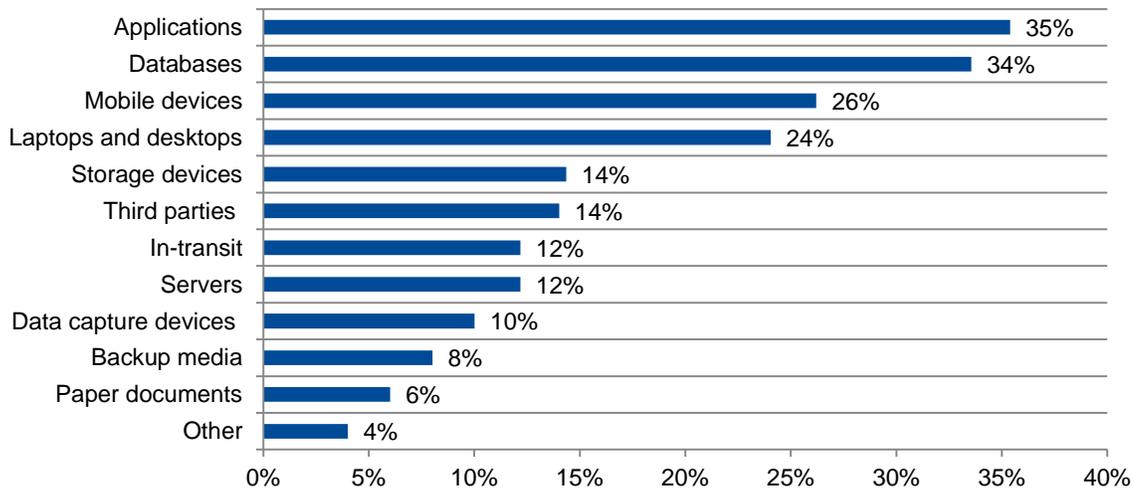


Data in applications and databases are considered most vulnerable. According to Figure 11, data is most susceptible to loss, theft or misuse or other security compromise in applications, databases and mobile devices.

Figure 11. Data most susceptible to loss

Two choices permitted

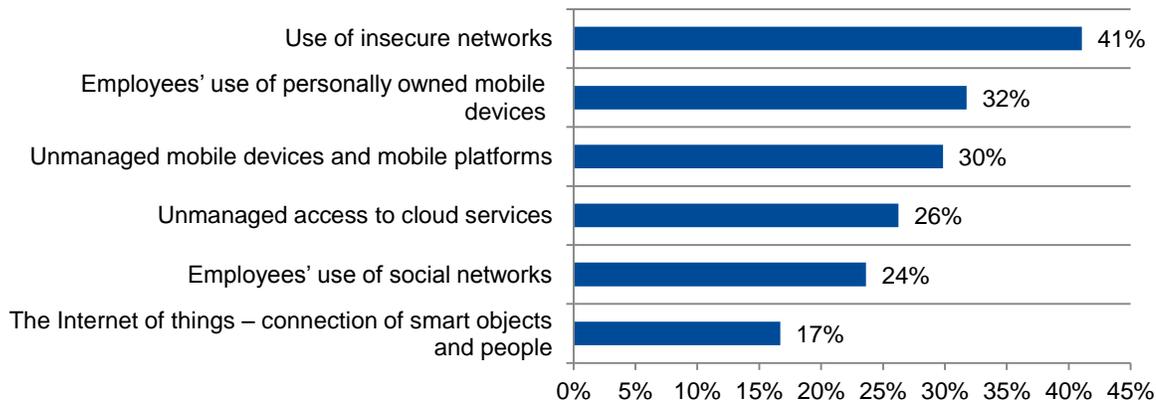
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Key targets for attack are networks and personal mobile devices. As shown in Figure 12, use of insecure ad networks and employee use of personal mobile devices were most often attacked. Social networks and the Internet of things were not as much a target.

Figure 12. Specific security incidents

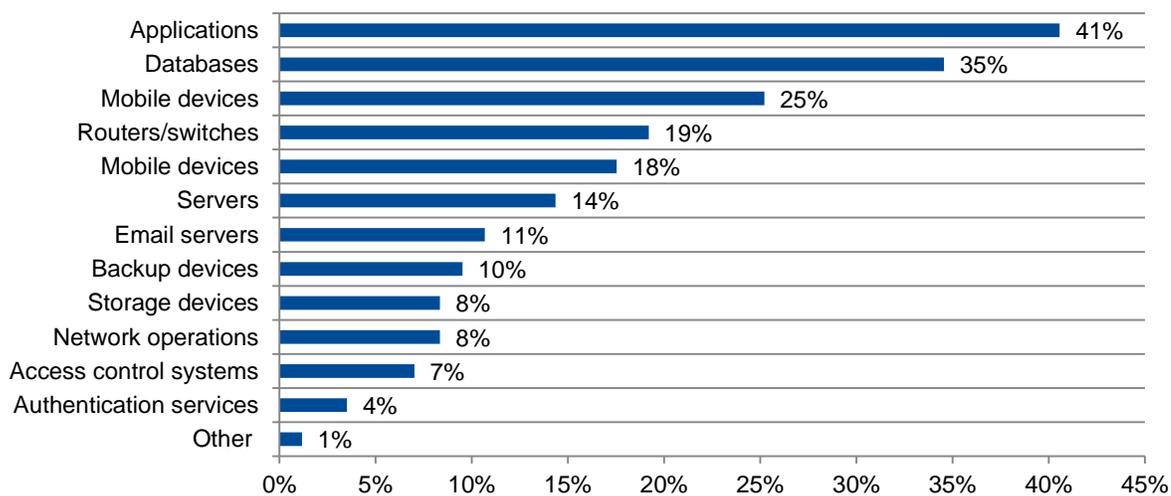
More than one choice permitted
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Applications and databases are network areas with the highest vulnerability. When asked if there are certain areas of their networks that are most vulnerable to a cyber attack, respondents by far say applications and databases (41 percent and 35 percent of respondents, respectively). Also shown in Figure 13 are the least vulnerable are authentication services and access control systems.

Figure 13. Network areas vulnerable to attack

Two choices permitted
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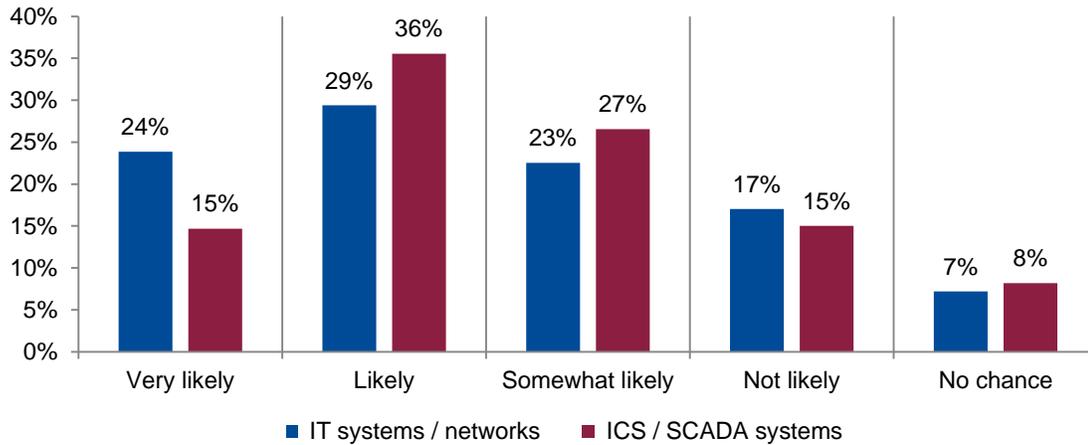


The likelihood of successful attacks seems high. Respondents believe both attacks on their IT systems/networks and ICS/SCADA systems are likely to occur in the next 24 months, as shown in Figure 14. This perception can be traced back to the perceptions that security is not a top strategic priority and resources are not available to prevent and detect cyber threats.

Even though likelihood of attack is high over the next two years, only 16% (Figure 7) are fully aware of their vulnerabilities

Figure 14. Likelihood of attack in the next 24 months

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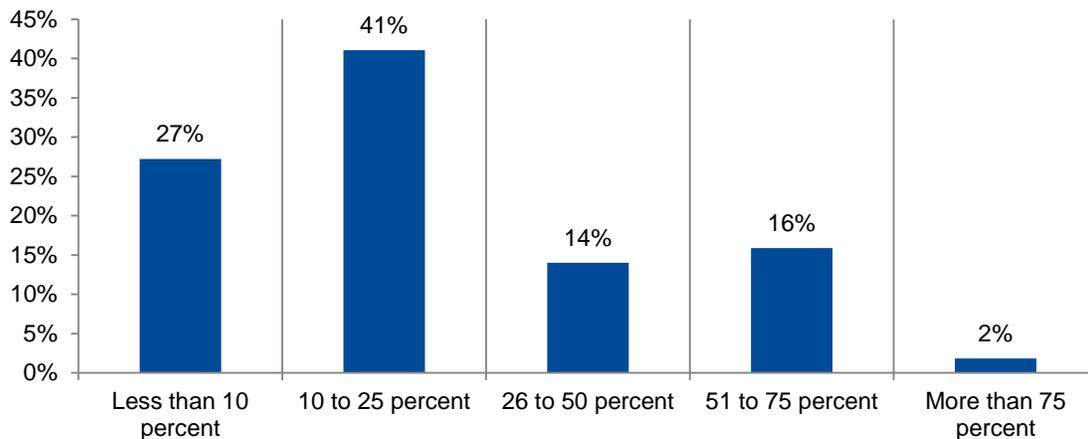


Barriers to addressing threats and security incidents

Nearly one-third of respondents say that more than a quarter of their network components are outside their control. Figure 15 reveals the percentage of network components, including third party endpoints such as smartphones and home computers are outside the direct control of their organization’s security operations.

Figure 15. What is outside your control?

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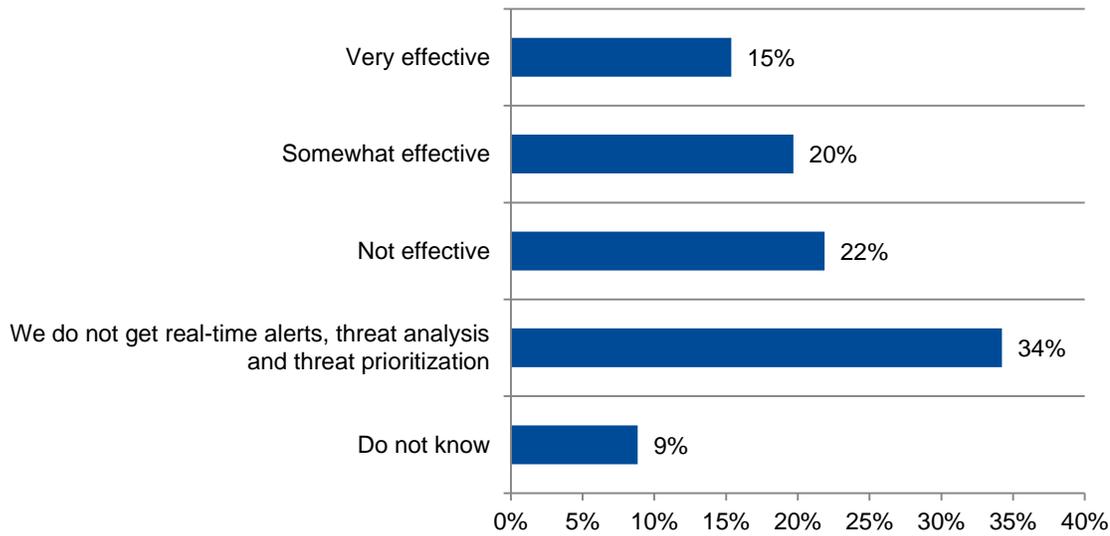


Real-time alerts are not effective. In fact, more than 80 percent are false positives.

Respondents were asked to self-report how effective their organization's security initiatives are in terms of providing actionable intelligence such as real-time alerts, threat analysis and prioritizations about actual and potential exploits. As shown in Figure 16, only 15 percent say they have an effective process for getting actionable intelligence.

Figure 16. Effectiveness of security initiatives in providing actionable intelligence

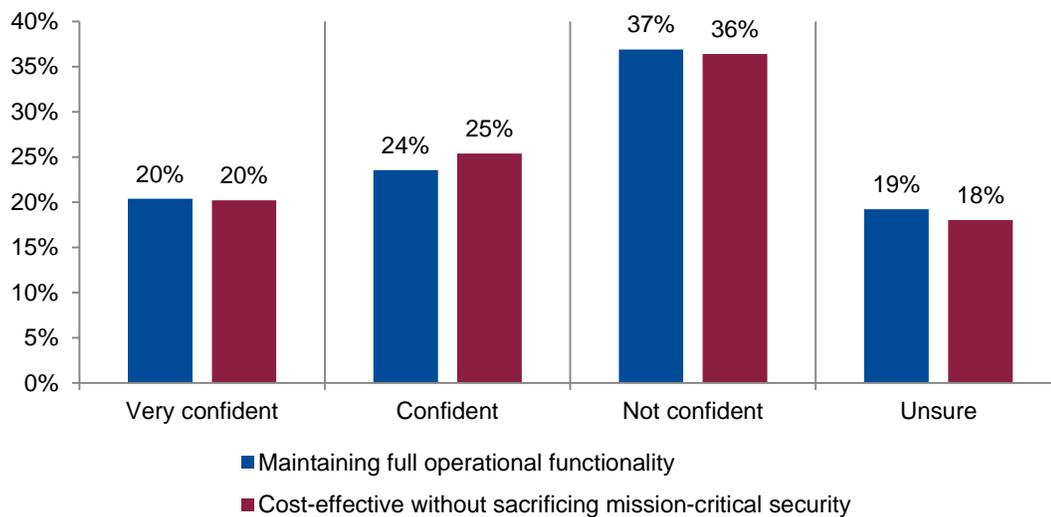
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Confidence in upgrading to strengthen security is low. Figure 17 shows that only 20 percent of respondents are very confident that their organizations are able to upgrade legacy systems in order to improve security while maintaining operational functionality and cost effectiveness without sacrificing mission-critical security.

Figure 17. Confidence in upgrading to a more secure state

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Unisys Perspective on Critical Infrastructure Security

Keeping the “lights on” and facilities safe are the primary concerns for companies in the critical infrastructure sectors. The number and severity of cyber-attacks on these companies is escalating and endangering those important goals, however. As this report shows, a majority of industrial, utility, and manufacturing sector enterprises have already experienced security breaches first-hand, and expect more to come in the future. What is particularly disconcerting is that many of these targeted enterprises believe they do not have mature, fully secured systems in place. This presents clear risks in downtime, loss of intellectual property and safety of their infrastructures.

The Unisys/Ponemon research provides strong evidence that critical infrastructure companies are not prepared to deal with a plethora of attacks against IT and industrial control systems (ICS). More disconcerting is the fact that this lack of preparedness seems to be a global phenomenon. We believe our study findings should serve as a wake-up call to organizations and their leaders.

Why should critical infrastructure companies act now? It is generally known that the sophistication and frequency of cyber-attacks is on the rise. Energy, utilities, industrial and chemical manufacturing companies are prime targets, especially to attackers that are financed by unfriendly nation-states or criminal organizations. These hackers have the resources and ability to crack data centers as well as supervisory control and data acquisition (SCADA) systems. Just imagine the catastrophic impact of a successful cyber attack that brings down an electric utility or petroleum refinery for several days or weeks. While some might see this as a science fiction scenario, most security experts agree that this scenario can, will or has already happened.

ICS and SCADA vulnerabilities are well-documented and acknowledged within the industries, but many enterprises have few resources for addressing the issue—either by design, lack of expertise, budget constraints, or a combination of all these factors. This unwillingness to allocate resources will continue until a major cyber incident occurs that causes crippling financial or business disruption. Additionally, safety and 100 percent uptime are crucial, and enterprises may see implementation of new security measures as a potential disruption to their current, stable systems. Further complicating their security posture, most companies do not get actionable intelligence on advanced persistent threats (APTs), insider attacks, or any other alerts to contain or even repel cyber-threats. As a result, they must rely on reactive tactics to cyber-threats. With this strategy, damage is often already done, and typical remediation consists of an endless cycle of upgrades, patches, and maintenance.

Unisys believes a proactive approach to critical infrastructure security is a more thorough and cost effective strategy. Preventing attacks with non-disruptive, forward-thinking architecture and practices can drastically diminish cyber incidents, now and in the future. Suggested actions include:

1. Develop an all-encompassing security strategy that aligns security with business strategies and goals, providing a roadmap to follow
2. Manage identities and entitlements to provide the highest level of identity assurance and reduce critical employee errors, and
3. Isolate and cloak end-point devices to hide them from probing malware.

No enterprise is completely immune to cyber-attack, but a comprehensive proactive strategy can eliminate many threats with the following:

- Implement agile and non-disruptive security: In implementing security measures for critical infrastructures, tactical security tools should not disrupt operations, during installation or routine maintenance. Reliability, safety, and zero downtime are paramount. In addition, these tactics should be easily adaptable to changing business and infrastructure needs. For example, a significant number of new ICS/SCADA and smart grid devices will come on line in the next five years— Security systems must be agile enough to address the security requirements of a wide array of these devices and their deployment with minimal effort.
- Deploy better authentication for applications and users: User mistakes, system glitches, and disgruntled employees may be the most prevalent threats to enterprise infrastructure reliability and safety. Strictly enforced user credentials are needed to shore-up existing network segmentation and security. Accidents happen—but they can be prevented.
- Reduce attack surfaces or targets: Common security measures still present too many targets, or “attack surfaces,” to external hackers and malicious code. In fact, the very discovery of a firewall or intrusion detection and prevention device is often seen as a challenge to hackers. Masking the number and types of targets can greatly reduce the number of incidents and hacking attempts. Similarly, by reducing the attack surface using compartmentalization techniques, they can only see the data, applications, and files they are allowed to access.
- Protect mobile data: Mobile data, accessed via smart phones or laptops, is particularly vulnerable to outside attacks. Many plants, pipeline controls, and SCADA endpoints use mobile communications. As data travels across public carriers or even private wireless networks, hackers already have well-developed toolsets for intercepting and capturing data from mobile communications. These interception tools are growing in sophistication. Proactively and non-disruptively protecting this data with strong encryption greatly reduces this risk to any enterprise that relies on wireless communications.
- Secure BYOD: Employee and partner use of BYOD devices introduces yet another attack surface for hackers and an entry point for malicious code. Encrypting wireless data eliminates a vast number of potential vulnerabilities.
- Isolate endpoints and devices: ICS/SCADA and other intelligent control devices should be isolated and masked, much like users on the network. Again, this presents fewer attack surfaces, and reduces incidents that potentially can take down an electrical grid or halt factory production.

Unisys believes that higher reliability, safety, and compliance can come from a pre-emptive security posture. It is also essential that a proactive approach be as non-disruptive and agile as possible, helping enterprises reduce security costs while achieving more. The stakes are high, and the attacks are becoming more sophisticated. All critical industries and utilities have a goal of zero safety incidents and zero downtime, yet these goals increasingly depend on zero *security* incidents.

Part 3. Methods

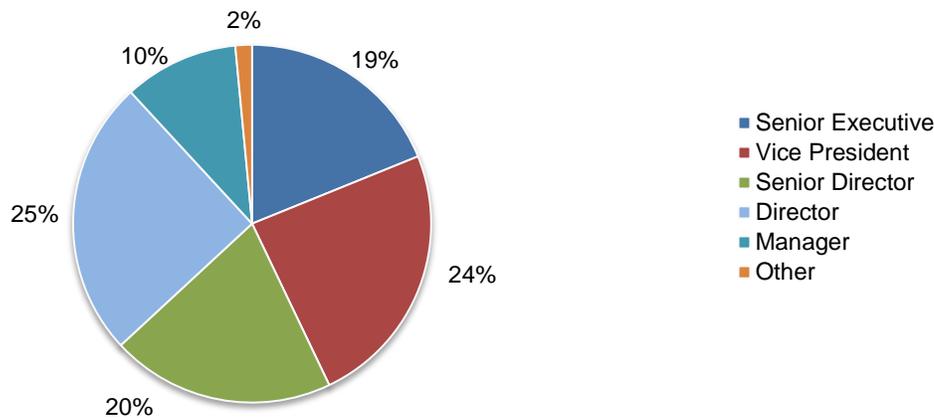
A sampling frame of 9,880 experienced IT and IT security practitioners located in 13 countries were selected as participants to this survey. To ensure knowledgeable responses, all participants in this research are responsible for securing or overseeing the security of their organization's information systems or IT infrastructure. Table 1 shows 760 total returns. Screening and reliability checks required the removal of 161 surveys. Our final sample consisted of 599 surveys or a 6.1 percent response rate.

Table 1. Sample response	Freq	Pct%
Total sampling frame	9,880	100.0%
Total survey returns	760	7.7%
Rejected and screened surveys	161	1.6%
Final sample	599	6.1%

Pie Chart 1 reports the respondent's organizational level of their current position within the organization. By design, 63 percent of respondents are at or above the senior director level.

Pie Chart 1. Current position within the organization

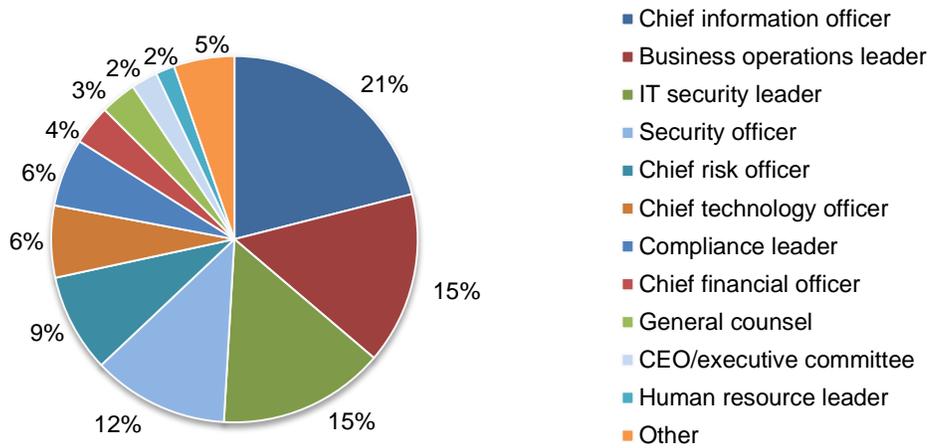
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Pie Chart 2 reports the primary person the respondent or their IT security leader reports to within the organization. Twenty-one percent of respondents report to the CIO, 15 percent report to the business operations leader and another 15 percent report to the IT security leader.

Pie Chart 2. Department or function that best describes where respondents are located

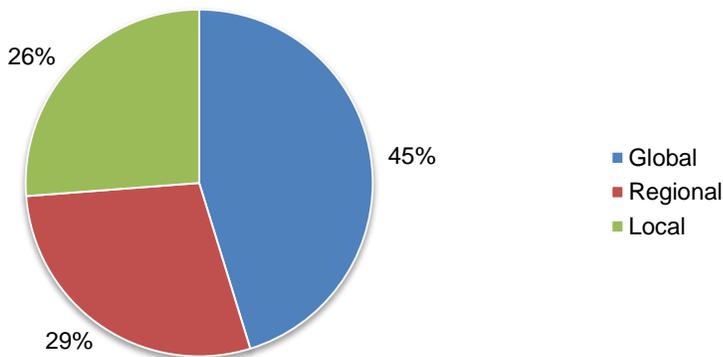
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According to Pie Chart 3 almost half (45 percent) of respondents are from organizations with a global footprint.

Pie Chart 3. Organization's global footprint

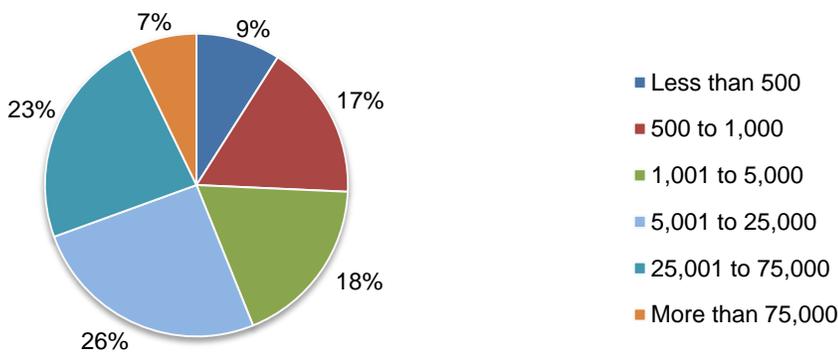
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As shown in Pie Chart 4, 74 percent of respondents are from organizations with a worldwide headcount of 1,000 or more employees.

Pie Chart 4. Worldwide headcount of the organization

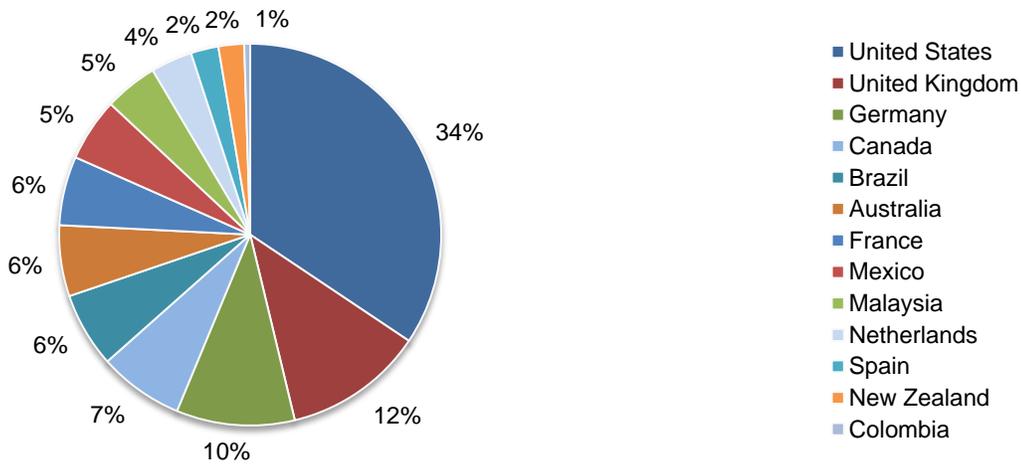
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Pie Chart 5 identifies the 13 countries represented in this study. Thirty-four percent of respondents were from the United States and 12 percent were from the United Kingdom.

Pie Chart 5. Department or function that best describes where respondents are located

n=599



Part 4. Caveats to this study

There are inherent limitations to survey research that need to be carefully considered before drawing inferences from findings. The following items are specific limitations that are germane to most web-based surveys.

- **Non-response bias:** The current findings are based on a sample of survey returns. We sent surveys to a representative sample of individuals, resulting in a large number of usable returned responses. Despite non-response tests, it is always possible that individuals who did not participate are substantially different in terms of underlying beliefs from those who completed the instrument.
- **Sampling-frame bias:** The accuracy is based on contact information and the degree to which the list is representative of individuals who are IT or IT security practitioners. We also acknowledge that the results may be biased by external events such as media coverage. Finally, because we used a web-based collection method, it is possible that non-web responses by mailed survey or telephone call would result in a different pattern of findings.
- **Self-reported results:** The quality of survey research is based on the integrity of confidential responses received from subjects. While certain checks and balances can be incorporated into the survey process, there is always the possibility that a subject did not provide accurate responses.

Appendix: Detailed Survey Results

The following tables provide the frequency or percentage frequency of responses to all survey questions contained in this study. All survey responses were captured in the late April, early May 2014 timeframe.

Survey response	Freq	Pct%
Total sampling frame	9880	100.0%
Total survey returns	760	7.7%
Rejected and screened surveys	161	1.6%
Final sample	599	6.1%

Screening

S1. What sector best describes your organization's focus?	Pct%
Electric utility	21%
Gas utility	10%
Water utility	8%
Oil & gas exploration/production	15%
Oil & gas retailer	11%
Alternative energy	6%
Chemical manufacturer	14%
Industrial manufacturer	15%
None of the above (stop)	0%
Total	100%

S2. Does your job involve securing or overseeing the security of your organization's information systems or IT infrastructure? Please mark yes even if your job is only partially involved in the security function.	Pct%
Yes	100%
No (stop)	0%
Total	100%

S3. How familiar are you with security standards such as NERC CIP, NIST, ISO, PCI DSS, Sarbanes Oxley and others on the protection of information assets and the critical infrastructure?	Pct%
Very familiar	29%
Somewhat familiar	57%
Not familiar	15%
No knowledge (stop)	0%
Total	100%

Attributions: Please rate each one of the following six statements using the scale provided below each item.	
Q1a. My organization has sufficient resources to achieve compliance with security standards such as NERC CIP, NIST, ISO, PCI DSS, Sarbanes Oxley and others.	Pct%
Strongly agree	9%
Agree	16%
Unsure	48%
Disagree	20%
Strongly disagree	8%
Total	100%

Q1b. My organization sees security as a one of the top five strategic priorities across the enterprise.	Pct%
Strongly agree	11%
Agree	17%
Unsure	42%
Disagree	22%
Strongly disagree	9%
Total	100%

Q1c. My organization effectively manages security risks to information assets, enterprise systems, SCADA networks and critical infrastructure.	Pct%
Strongly agree	9%
Agree	17%
Unsure	46%
Disagree	21%
Strongly disagree	8%
Total	100%

Q1d. My organization's security operations and/or business continuity management team anticipate one or more serious attacks to networks or critical infrastructure each year.	Pct%
Strongly agree	16%
Agree	48%
Unsure	23%
Disagree	12%
Strongly disagree	1%
Total	100%

Q1e. My organization's security operations are committed to preventing or detecting advanced persistent threats (APTs).	Pct%
Strongly agree	27%
Agree	37%
Unsure	22%
Disagree	12%
Strongly disagree	2%
Total	100%

Q1f. My organization uses state-of-the-art technologies to minimize security risks to SCADA networks and industrial control systems (ICS).	Pct%
Strongly agree	9%
Agree	17%
Unsure	22%
Disagree	45%
Strongly disagree	8%
Total	100%

Q1g. My organization's security operations are committed to protecting the nation's critical infrastructure.	Pct%
Strongly agree	19%
Agree	24%
Unsure	32%
Disagree	17%
Strongly disagree	8%
Total	100%

Q1h. Security and compliance industry initiatives enhance the security posture of my organization.	Pct%
Strongly agree	9%
Agree	19%
Unsure	52%
Disagree	12%
Strongly disagree	8%
Total	100%

Q1i. The risk level to industrial control systems and SCADA networks has substantially increased because of cyber threats.	Pct%
Strongly agree	28%
Agree	29%
Unsure	24%
Disagree	15%
Strongly disagree	5%
Total	100%

Q1j. The risk level to industrial control systems and SCADA networks has substantially decreased because of heightened regulations and industry-based security standards.	Pct%
Strongly agree	3%
Agree	8%
Unsure	22%
Disagree	51%
Strongly disagree	16%
Total	100%

General security questions

Q2. What best describes the maturity level of your organization's IT security program or activities?	Pct%
Early stage – many IT security program activities have not as yet been defined or deployed	7%
Middle stage – IT security program activities are defined but only partially deployed	43%
Late-middle stage – many IT security program activities are fully deployed	33%
Mature stage – most IT security program activities are deployed	17%
Total	100%

Following are governance activities for meeting security objective or mission. Please use the scale provided below each item to indicate whether or not each task is implemented within your organization.

Q3a. C-level executives are briefed and made fully aware of security initiatives.	Pct%
Fully implemented	15%
Mostly implemented	31%
Partially implemented	38%
Not implemented	16%
Total	100%

Q3b. Employees are trained and made aware of security requirements.	Pct%
Fully implemented	14%
Mostly implemented	29%
Partially implemented	40%
Not implemented	17%
Total	100%

Q3c. Compliance with security requirements is strictly enforced.	Pct%
Fully implemented	15%
Mostly implemented	31%
Partially implemented	38%
Not implemented	16%
Total	100%

Q3d. Contractors, vendors and other third parties are thoroughly vetted to make sure their security practices meet high standards.	Pct%
Fully implemented	14%
Mostly implemented	28%
Partially implemented	38%
Not implemented	20%
Total	100%

Q4. What are the top security objectives or missions within your organization? Check only the top three choices.	Pct%
Prevent or quickly detect APTs	55%
Prevent cyber attacks	44%
Minimize downtime	60%
Comply with regulatory and legal mandates	40%
Secure the national critical infrastructure (including the smart grid)	35%
Improve the organization's security posture	32%
Improve the organization's relationship with business partners	16%
Provide cybersecurity training for all employees	6%
None of the above	3%
Other (please specify)	4%
Total	195%

Q5. What are the top security threats that affect your organization? Check only the top three choices.	Pct%
Negligent insiders	54%
System glitches (including process failure)	42%
Malicious or criminal insiders	36%
Web-based attacks	18%
Insecure web applications	19%
Insecure endpoints	22%
Insecure smart meters	9%
Third-party mistakes or flubs (including cloud providers)	24%
DNS-based denial of service attacks	38%
Electronic agents such as viruses, worms, malware, botnets and others	17%
Nation-state, terrorist or criminal syndicate sponsored attacks	19%
Other (please specify)	3%
Total	300%

Q6. Where is data (information assets) most susceptible to loss, theft, misuse or other security compromise? Please select the top two choices.	Pct%
Applications	35%
Databases	34%
Storage devices	14%
Servers	12%
In-transit	12%
Laptops and desktops	24%
Data capture devices (including smart meters)	10%
Mobile devices (including smartphones)	26%
Third parties (including cloud providers)	14%
Backup media	8%
Paper documents	6%
Other (please specify)	4%
Total	200%

Q7. Who are most responsible for ensuring security objectives are achieved within your organization? Please select the top three choices.	Pct%
CEO	6%
COO/CFO	23%
CIO/CTO	56%
IT security leader (CISO)	42%
Security leader (CSO)	45%
Compliance	17%
Law department	11%
Business unit leader	31%
Operations leader	17%
Facilities or data center management	8%
No one role has overall responsibility	13%
Other (please specify)	5%
Total	274%

Q8. Does your organization have dedicated personnel and/or department that is responsible for industrial control system / SCADA security?	Pct%
Yes, one person	55%
Yes, two or more dedicated personnel	10%
Yes, a department dedicated to ICS /SCADA security	5%
No	25%
Do not know	5%
Total	100%

Q9. Following are technologies that foster security objectives and compliance with standards. For each item, indicate the effectiveness of each technology using the following scale: 1= high effectiveness, 2 = moderate effectiveness, 3 = low effectiveness.	High%	Low%
Access governance systems	30%	3%
Anti-virus / anti-malware solution	31%	2%
Automated code review or debugger	23%	36%
Content aware firewalls (NGFW or UTM)	25%	26%
Data loss prevention systems	20%	39%
Database activity monitoring (DAM)	32%	4%
Database scanning	36%	3%
Encryption of data in motion	25%	27%
Encryption or tokenization of data at rest	33%	2%
ID & credentialing system	36%	0%
Identity & access management systems	41%	0%
Incident & event management systems (SIEM)	22%	26%
Industrial control systems	32%	14%
Intrusion detection or prevention systems	28%	3%
Key management solutions	35%	3%
Mobile device management	27%	24%
Network or traffic intelligence systems	31%	5%
Perimeter or location surveillance systems	40%	0%
Public key infrastructure (PKI)	27%	24%
Virtual private network (VPN)	25%	27%
Web application firewalls (WAF)	20%	39%
Web and email content filtering	31%	2%

Exploits & security breaches

Q10a. How often has your organization suffered a security compromise that resulted in the loss of confidential information or disruption to operations over the past 12 months?	Pct%
None (skip to Q11)	30%
1 incident	32%
2 to 5 incidents	18%
More than 5 incidents	17%
Cannot determine	2%
Total	100%

Q10b. To the best of your knowledge, what was the root cause of the security breaches experienced by your company over the past 12 months? Please select two top choices.	Pct%
External attack	28%
Insider attack	24%
Accident or mistake (negligence)	47%
Abuse by outside vendors or business partners	13%
Negligent privileged IT users	24%
Malicious code	27%
Other (please specify)	15%
Do not know	21%
Total	200%

Q10c. What core systems were compromised as a result of the security breaches experienced by your company over the past 12 months? Please select all that apply.	Pct%
Servers	29%
Databases	39%
SCADA networks	13%
Industrial control systems	26%
CRM applications	14%
ERP applications	22%
HR applications	12%
Desktops, laptops, smartphones and tablets	36%
Storage devices	26%
Cloud-based systems	33%
Other (please specify)	14%
Do not know	23%
Total	286%

Q10d. Has your organization had any security incidents related to the following areas?	Pct%
Employees' use of personally owned mobile devices (BYOD)	32%
Unmanaged access to cloud services (BYOC)	26%
Unmanaged mobile devices and mobile platforms	30%
The Internet of things – connection of smart objects and people	17%
Employees' use of social networks	24%
Use of insecure networks	41%
Total	169%

Q11. What is the likelihood of a successful exploit on your organization's IT systems / networks over the next 24 months?	Pct%
Very likely	24%
Likely	29%
Somewhat likely	23%
Not likely	17%
No chance	7%
Total	100%

Q12. What is the likelihood of a successful exploit on your organization's ICS / SCADA systems over the next 24 months?	Pct%
Very likely	15%
Likely	36%
Somewhat likely	27%
Not likely	15%
No chance	8%
Total	100%

Q13. Approximately what percentage of your network components, including third-party endpoints such as smart phones and home computers, are outside the direct control of your organization's security operations?	Pct%
Less than 10 percent	27%
10 to 25 percent	41%
26 to 50 percent	14%
51 to 75 percent	16%
More than 75 percent	2%
Total	100%

Q14. Are there certain areas of your network that present the highest level of threat or vulnerability to your organization? Please only provide your top two choices.	Pct%
Servers	14%
Routers/switches	19%
Applications	41%
Databases	35%
Network operations	8%
Mobile devices	25%
Storage devices	8%
Backup devices	10%
Email servers	11%
Mobile devices	18%
Access control systems	7%
Authentication services	4%
Other (please specify)	1%
Total	200%

Q15. How effective are your organization's security initiatives in terms of providing actionable intelligence (such as real-time alerts, threat analysis and prioritization) about actual and potential exploits?	Pct%
Very effective	15%
Somewhat effective	20%
Not effective	22%
We do not get real-time alerts, threat analysis and threat prioritization	34%
Do not know	9%
Total	100%

Q16. Is your organization aware of the potential vulnerabilities in its ICS/SCADA environment?	Pct%
Yes, fully aware	16%
Yes, somewhat aware	32%
Not aware	33%
Unsure	19%
Total	100%

Q17. How confident are you that your organization is able to upgrade legacy systems to the next improved security state while maintaining full (100 percent) operational functionality?	Pct%
Very confident	20%
Confident	24%
Not confident	37%
Unsure	19%
Total	100%

Q18. How confident are you that your organization is able to upgrade legacy systems to the next improved security state in cost-effective ways without sacrificing mission-critical security?	Pct%
Very confident	20%
Confident	25%
Not confident	36%
Unsure	18%
Total	100%

Your role & organization

D1. What organizational level best describes your current position?	Pct%
Senior Executive	19%
Vice President	24%
Senior Director	20%
Director	25%
Manager	10%
Other (please specify)	2%
Total	100%

D2. Check the Primary Person you or your IT security leader reports to within the organization.	Pct%
CEO/executive committee	2%
Chief financial officer	4%
General counsel	3%
Chief information officer	21%
Chief technology officer	6%
Business operations leader	15%
IT security leader	15%
Compliance leader	6%
Human resource leader	2%
Security officer	12%
Chief risk officer	9%
Other (please specify)	5%
Total	100%

D3. What best describes your organization's geographic footprint?	Pct%
Global	45%
Regional	29%
Local	26%
Total	100%

D4. What is the worldwide headcount of your organization?	Pct%
Less than 500	9%
500 to 1,000	17%
1,001 to 5,000	18%
5,001 to 25,000	26%
25,001 to 75,000	23%
More than 75,000	7%
Total	100%

D5. Countries represented	Pct%
United States	34%
Canada	7%
United Kingdom	12%
France	6%
Germany	10%
Spain	2%
Netherlands	4%
Australia	6%
New Zealand	2%
Malaysia	5%
Mexico	5%
Brazil	6%
Colombia	1%
Other	0%
Total	100%

Ponemon Institute

Advancing Responsible Information Management

Ponemon Institute is dedicated to independent research and education that advances responsible information and privacy management practices within business and government. Our mission is to conduct high quality, empirical studies on critical issues affecting the management and security of sensitive information about people and organizations.

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Unisys brings together services and technology into solutions that solve mission-critical problems for organizations around the world. With 23,000 employees in over 100 countries, we help our clients secure their operations, increase the efficiency and utilization of their data centers, enhance support to their end users and constituents, and modernize their enterprise applications.

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To drive future growth, Unisys is focusing its resources and investments in four targeted market areas: security; data center transformation, including our server business; end user outsourcing; and applications modernization.

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