CYBERSECURITY CAPSTONE SIMULATION

Application Model Reference



Student Edition

Version 4.2 (April 24, 2013)

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1. Introduction

Welcome to the Cybersecurity Capstone Simulation (CCS).

1.1 About this Document

This reference is your guide to the CCS model. It details:

- The theoretical constructs of the model at the core of the CCS
- The calculation methods used

1.2 Prerequisites

This document is designed to help you, the student, understand the model that underlies the Cybersecurity Capstone Simulation, hereafter referred to as the CCS in this document.

Please use this reference in conjunction with the Student Manual. Reading the manual first is recommended.

1.3 CCS Documentation

The following documents accompany the CCS.

Table 1: CCS Documentation

#	Document	Description
1.	Application Model Reference (this document)	A reference document that details the working of the application and the elements that go into its calculations.
2.	Student Manual	A document that details the CCS structure, the task flows, best practices, and the student console user interface.

2. Basics of the CCS Model

This section details the basics of the CCS model.

2.1 Reviewing Model Components

Let's briefly review the components of the CCS model.

Table 2: Model Components

Component	Description
Decisions	You will make these every round; this will change how your systems behave. These are organized into groups called categories, which are then again clubbed into three supergroups: technical decision categories, policy decision categories, and other decision categories.
Events	Events triggered by the simulation that affect the teams and the virtual USA. They are defined to create certain outcomes in the CCS.
Indicators	Provide feedback to you on how your teams' systems and the virtual USA are doing in terms of cybersecurity and related aspects. Are generally measured as indices in the range of 0 to 200; some financial indicators like Budget are measured in dollars.
Outcomes	They are the results of the interaction between the events and the decisions; they affect the indicators in the CCS.
Round	One pass or turn of decision input, event impact, and outcome calculation.

3. Decision Reference

This section details the contents of the decisions area of the CCS.

Decisions in the CCS are of two types:

Numerical inputs: Wherever a numerical input is required; e.g., *Spending on Kerberos servers* where you have to input a value between cost ranges specific to that decision.

Dropdowns: Whenever you have to make a single choice out of the options available; e.g., the decision *Encryption Strength* has options of:

- 32 bits
- 64 bits
- 128 bits

For this part, the reference we need to use is the *decision to indicator mapping*, with sections 1.1 through 3.5 of this document.

Every decision impacts one or more indicators based on the option selected by the user or the input value entered in case of a numerical input. Associated with the variable is the degree of impact which lies in the range of -5 to 5. This relationship defines how the inputs entered by the user change the indicators in the model.

Additionally, the points below need to be taken into consideration:

- The dropdown options are not arranged in cost-ascending or cost-descending order; do not use order as an indication of cost. Refer the actual cost figures or check the in-simulation budget changes.
- The decision option providing the most security is not necessarily the most costly. It may be possible with some decisions to have diminishing returns of security vs. cost.
- You should not mechanically choose the last option because it is necessarily
 the "best"; you will need to think through the options. For example, a decision
 on frequency of patch updates would have "yearly" as the last option, but an
 option like "weekly" is actually more secure.
- Causal relationships and their degree of impact upon the indices in the CCS will sometimes be difficult for you to identify. This is because in the current practice of cybersecurity, decisions are sometimes made with some uncertainty (e.g., lack of perfect information and other factors).

• For example, you may find that the relationships in the simulation are not readily apparent among some events, decision controls, and the resulting outputs of a round.

The decision indicator tables start from the next page, organized by team.

3.1 Avisitel

Table 3: Avisitel Decision Reference

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Kerberos servers servers for	Minimum	150,000	5,000	Technical Security Index	
Authentication		servers for	Maximum	400,000	10,000	Performance
	Key distribution centers spending	Key distribution centers centers centers centers centers centers for	Minimum	10,000	4,000	Technical Security Index
Authentication			Maximum	25,000	8,000	PerformanceDowntime
		What's the RAID level of your	0	5,000	10,000	
Backup	RAID levels		1	10,000	15,000	PerformanceCompliance
Васкир	server b	server backup?	5	15,000	17,500	Downtime
			6	17,500	20,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Pomoto backup	Remote backup spend on spending remote backup	Minimum	10,000	40,000	Performance
Backup			Maximum	20,000	80,000	DowntimeCompliance
			No encryption	10,000	-	
Data	Level of encryption		File	20,000	5,000	Technical Security Index
Encryption			Folder	30,000	14,000	Productivity
			Drive	35,000	25,000	
		•	32 bits	10,000	10,000	
Data Encryption	Encryption strength in bits		64 bits	20,000	15,000	Technical Security Index
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			128 bits	25,000	20,000	Performance

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Load	DDOS protection	Delay binding to protect against	Disable	-	-	Technical Security Index
Management	through delayed binding	DDOS attacks.	Enable	30,000	25,000	Performance
Load	HTTP security through load	Use load balancing to	Disable	-	-	Technical Security Index
Management	balancing	improve security.	Enable	60,000	20,000	Performance
Network	Isolate affected areas of the	Choose whether to isolate areas of the network	Yes	25,000	5,000	 Contribution to National Security Index Network Load Customer
Isolation	network as needed	affected by cyber or physical attacks.	No	1	ı	Satisfaction Downtime Popular Sentiment
		How long will	1	10,000	100,000	 Contribution to National Security Index
Network Isolation	Period of isolation in weeks	you isolate affected areas of the network?	2	20,000	200,000	Network LoadCustomer
			3	30,000	300,000	Satisfaction

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		Determine the frequency of	Critical updates only	10,000	10,000	Productivity
Patch Management	Frequency of patch management	rolling out updates to	Critical and important updates	20,000	20,000	ProductivityPerformanceTechnicalSecurity Index
		systems.	All updates	40,000	40,000	occurry macx
	Degree of patch testing prior to installation		Low	10,000	5,000	
Patch Management			Medium	20,000	10,000	PerformanceTechnicalSecurity Index
			High	40,000	15,000	,
		Will you rely only on official patches, or are	Unofficial	5,000	2,500	
Patch Management	Trustworthiness of patch you will use und commu	you willing to use unofficial or	Trusted	10,000	5,000	DowntimePerformance
		community workarounds?	Official	15,000	7,500	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		degree of	Low	20,000	10,000	Technical
Role Based Access Control	Degree of role- based access control	implementation of access control by	Medium	30,000	20,000	Security Index • Employee
		employee role?	High	44,000	30,000	Morale
Minteralization	Choose	Choose virtualization or	Virtualization	10,000	5,000	
Virtualization OR Cloud Computing	virtualization or cloud computing	cloud computing for your systems to improve security.	Cloud computing	50,000	10,000	Technical Security Index
	Degree of virtualization	To what degree	Limited	2,000	10,000	
If Virtualization Chosen			Significant	7,000	20,000	Technical Security Index
			Full	20,000	40,000	
If	Spending on underlying physical network	1 ' -	Minimum	10,000	-	Technical Security
Virtualization Chosen		the underlying physical network?	Maximum	50,000	-	Technical Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	_	How isolated is the network	Minor	10,000	20,000	
If Virtualization Chosen	Degree of isolation of network	under the virtualization	Medium	30,000	30,000	PerformanceTechnicalSecurity Index
		schema?	Complete	60,000	50,000	·
16	T . (f)	Choose the	Limited	10,000	5,000	D. C.
If Virtualization Chosen	Traffic monitoring on network	extent of traffic monitoring on the network.	Significant	20,000	20,000	PerformanceTechnicalSecurity Index
			Full	30,000	30,000	·
	Cloud hosting model Cloud hosting for sec infr shadel oth	Choose the cloud hosting model for your systems. Will	Private	22,000	12,571	
If Cloud Computing Chosen		you pay more for a more secure private infrastructure or share deployment with other companies for less cost?	Hybrid	16,500	8,250	Technical Security IndexPerformance
			Public	8,800	6,600	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	l on a care and will	Software as a service	10,000	20,000		
If Cloud Computing Chosen	Services offered by the cloud	<i>y</i>	Platform as a service	20,000	30,000	Technical Security IndexPerformance
			Infrastructure as a service	40,000	60,000	
		Contiguired to	Low	5,000	5,000	
Firewall	Filtering		Medium	10,000	7,500	ProductivityTechnical
Tilewali	strictness		Medium-high	12,500	10,000	Security Index • Performance
			High	17,500	12,500	
DNS	DNS server redundancy		Yes	10,000	15,000	
Redundancy			No	5,000	-	Downtime

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
DNS	Split DNS	Use a split DNS topology to reduce	Yes	5,000	15,000	Downtime
Redundancy	topology	downtime.	No	10,000	-	Downtime
		How frequently	15	40,000	5,000	
Database	Frequency of forcing	does the database ask for	30	30,000	5,000	ProductivityTechnical
Security	password changes in days	a change of password?	60	20,000	5,000	Security Index
			90	10,000	5,000	
	Degree of separation of roles for admin	Degree of separate admin and operator roles for admin and operator database roles	None	10,000	-	
Database Security			Limited	20,000	250,000	ProductivityTechnical Security Index
	roles		Complete	30,000	350,000	,
Database	Control privileges	Are database control privileges restricted or distributed?	Restricted	10,000	90,000	Productivity
Security			Distributed	5,000	180,000	Technical Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Database	OS services and associated	Will you enable or disable database-related OS	Disable	-	-	ProductivityPerformanceTechnical Security Index
Security	ports	services and associated ports?	Enable	-	-	
Database	Database	Will you employ database honeypots to	Disable	-	-	ProductivityTechnical
Security	honeypots	trap and redirect attacks?	Enable	-	-	Security Index
	Type of a network-based IDS, a host-based IDS, or both?		Network-based intrusion detection (NIDS)	10,000	100,000	
IDPS		IDS, a host- based IDS, or	Host-based intrusion detection (HIDS)	30,000	80,000	Technical Security Index
		both?	Both	36,000	160,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
IDPS Class of honeypot to deploy		Will you use a production honeypot or go	Production honeypot	20,000	90,000	Technical Security
	for a research honeypot with better analytics?	Research honeypot	10,000	70,000	Index	
IDPS honey		Strength of honeypot to deploy How strong is the honeypot you deploy?	Pure honeypot	10,000	90,000	
	Strength of honeypot to		Low interaction honeypot	20,000	60,000	Technical Security Index
			High interaction honeypot	30,000	90,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What strength will you keep your IT teams at, in relation to	Less than average	10,000	600,000	 Productivity
Hiring and Employee Policy	IT team size		Average	30,000	900,000	EmployeeMoraleTechnical
		the industry average?	More than average	50,000	1,400,000	Security Index
	Full-time	Will you choose to bolster your IT team with temporary or part-time hires?	All	8,800	4,224	Productivity
Hiring and Employee Policy	employees as a percentage of the workforce		0.9	16,500	3,960	EmployeeMoraleTechnical
	the workloice		0.8	22,000	5,867	Security Index
			3	8,800	12,941	
Hiring and Employee	Hiring by	What's the average experience	5	16,500	21,000	Internal Security
Policy	average experience in years	you're looking for when you hire for IT teams?	7	22,000	26,400	Index
			8	24,000	27,429	
			9	25,000	29,310	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Hiring and	Hiring and Employee Policy Forced rotation of employees	Will you make employee rotation	Disable	-	-	ProductivityEmployeeMorale
		mandatory?	Enable	25,000	45,000	Internal Security Index
Hiring and Employee	Forced vacation	Will you make employee	Disable	-	-	ProductivityEmployeeMorale
Policy	for employees	vacations mandatory?	Enable	75,000	85,000	Internal Security Index
	To what degree does your	None	-	-		
Advisory Subscription and Federal Help	and Federal advisory referral	organization rely on security advisories from the federal government?	Limited	30,000	150,000	Technical Security Index
	D. II	To what degree will you rely on	None	-	-	
Advisory Subscription and Federal	Reliance on federal government	federal government support?	For critical issues only	300,000	170,000	Technical Security IndexReputation
Help support	support	support	Ongoing	400,000	250,000	
Training	Training by	What is the extent of funding	Minimum	1,000	50,000	Internal Security IndexProductivity
Trailling	Training by funding	for cybersecurity training?	Maximum	2,000	100,000	Employee Morale

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	A	How much will you reimburse employees for technical	25% of fees	5,000	20,000	
Average compensation Training bonus as a fraction of technical certification fees	compensation bonus as a		50% of fees	10,000	40,000	Technical Security IndexProductivity
	certification for security	75% of fees	15,000	60,000	Froductivity Employee Morale	
	Certification rees	training?	100% of fees	20,000	80,000	
Training	Link training	Will you link training	Yes	10,000	10,000	Technical Security Index
Incentives outcomes to promotion	outcomes to promotion?	No	1	ı	ProductivityEmployeeMorale	
Training Link training outcomes to evaluation	•	Will you link training	Yes	15,000	7,000	Technical Security Index Productivity
	outcomes to evaluation?	No	-	-	ProductivityEmployeeMorale	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Training and	Focus on training area:	ng area: ork rabilities	Minimum	1	1	Technical Security Index
Auditing	network vulnerabilities		Maximum	-	-	Compliance
Training and	Focus on training area:	Choose whether to focus your security auditing	Minimum	-	-	Technical Security Index
Auditing	controls	efforts on network	Maximum	-	-	Compliance
Training and training area:	vulnerabilities, controls,	Minimum	-	-	Technical Security Index	
Auditing	encryption	encryption, and penetration.	Maximum	-	-	Compliance
Training and	Focus on training area:		Minimum	-	-	Technical Security Index
Auditing	penetration testing		Maximum	-	-	Compliance
	Frequency of physical audits of the equipment	How often will you run physical audits of system equipment?	Every three months	10,000	20,000	
Training and Auditing			Every six months	7,500	10,000	Technical Security Index
			Once a year	5,000	5,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How much	Low	5,000	5,000	
Business Continuity Planning	Degree of IT data storage redundancy	redundancy will you build in for IT data storage?	Medium	10,000	10,000	Disaster Readiness
	,	Tr data storage.	High	15,000	20,000	
		How much	Low	7,500	20,000	
Business Continuity Planning	Degree of IT network redundancy	redundancy will you build in for IT networks?	Medium	12,500	30,000	Disaster Readiness
_			High	20,000	50,000	
		How much	1	5,000	25,000	
Business Continuity Planning	Levels of power backup redundancy	redundancy will you build in for power backup?	2	10,000	45,000	Disaster Readiness
	·	power backup?	3	15,000	67,500	
	Number of backup sites	How many backup sites will you maintain?	1	5,000	75,000	
Business Continuity Planning			2	10,000	150,000	Disaster Readiness
riallillig			3	15,000	200,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Number of	How many backup	1	5,000	10,000	
Business Continuity Planning	redundant backup communication	communication links will you	2	10,000	17,500	Disaster Readiness
	links	maintain?	3	15,000	25,000	
			3	-	100,000	
Business Continuity	Policy review frequency in months	How often will you review disaster recovery policy?	6	-	75,000	Disaster Readiness
Planning			9	-	50,000	Disaster Neadiness
			12	-	25,000	
		To what extent does the	High - full disclosure	8,800	1,760	
Information Sharing	Degree of information sharing on attacks	organization share cybersecurity attack information publicly?	Medium - non- sensitive disclosure	16,500	4,125	ProfitabilityDisaster
Snaring			Low - no disclosure	-	-	Readiness

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	_	does the organization share routine cybersecurity information	High - full disclosure	16,500	3,536	
Information crisis	information		Medium - non- sensitive disclosure	8,800	1,760	ProfitabilityDisasterReadiness
	snaring		Low - no disclosure	-	-	
Public	Public Spending on public relations	How much will you spend on public relations?	Minimum	50,000	25,000	Poputation
Relations			Maximum	100,000	100,000	- Reputation
Emergency Bypass Policy	Spending on emergency bypass policy	How much will you spend on emergency bypass policy?	Minimum	5,000	1,000	Disaster Readiness
			Maximum	10,000	2,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Response to	What is the response to violations of typical Separation of	Not allowed	25,000	12,500	Technical
Emergency Bypass Policy	violations of typical separation of		Permitted with limitations	15,000	20,000	Security Index • Disaster
	duties protocol	Duties protocol?	Allowed	2,500	35,000	Readiness
		What punitive	Focus on warnings	-	-	
Emergency	Violation penalties	actions will you use for violations of emergency bypass policy?	Focus on fines	1	-	Employee Morale
Bypass Policy			Focus on suspensions	-	-	
			Focus on termination	-	-	
		How many	2	17,600	12,000	
	No. of people in groups to	How many people will you put in groups to overlook and enforce information sharing?	3	33,000	22,164	Productivity
Sharing Policy	overlook and enforce internal		4	44,000	30,000	Technical Security IndexEmployee
	information sharing		5	48,000	31,304	Morale
			6	50,000	30,357	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Internal	is the system for internal sharing of information?	Strictly need-to-know	15,000	50,000	Productivity
Information Sharing Policy	information sharing by role- based access		Limited access	10,000	35,000	Technical Security Index Employee
·	control		Open system	1,000	-	Morale
Do	Degree of external information	How restrictive is the system for external sharing of information?	Strictly need-to- know	15,000	50,000	Productivity Technical
Information Sharing Policy			Limited access	10,000	35,000	Security Index • Customer
	sharing		Open system	1,000	ı	Satisfaction • Compliance
		How frequently will you share	7 days	30,000	2,500	
Information	Frequency of disclosure for	information for the InfraGard service of	14 days	25,000	5,000	Contribution to National
Sharing Policy	InfraGard communication in days	information sharing between private and public entities?	21 days	12,500	7,500	Security Index • Profitability
			28 days	10,000	10,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive actions will you use for violations of	Warnings	-	1	
Information Sharing	Violation		Fines	-	-	Employee Morale
Policy	penalties	information sharing policy?	Suspensions	-	-	Employee Morale
			Termination	-	-	
	Degree of openness of breach notification	How open is your organization about breaches that have happened to its systems?	All incidents	24,000	50,000	
Breach Notification			Critical and significant incidents	22,000	35,000	ReputationCustomerSatisfaction
Policy			Only critical incidents	16,500	20,000	 Contribution to National Security Index
			None of the incidents	8,800	0	•
		Which investigative	Private investigators	8,800	12,571	Reputation
Breach Notification	Investigative agencies to call in for major	agencies will you approach	Forensic investigators	16,500	24,750	Employee MoraleContribution to
Policy	security breaches	for major security breaches?	CERT	-	-	National Security Index
			FBI/NSA	-	-	 Downtime

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive actions will you use for violations of	Focus on warnings	-	-	
Breach Notification	Violation		Focus on fines	-	-	Employee Morale
Policy	penalties	breach notification	Focus on suspensions	-	-	Employee Morale
		policy?	Focus on termination	-	-	
	Information Privacy program investment spending	How much will you spend on your organization's privacy program?	Minimum	10,000	5,000	Employee
			Maximum	50,000	10,000	Morale • Customer Satisfaction
Information	Appoint a dedicated	Will you appoint a dedicated	Yes	8,800	10,560	• Employee Morale
Privacy Policy privacy officer	privacy officer?	No	-	-	Customer Satisfaction	
Privacy Policy	Privacy training spending for employees	How much will you spend on training employees on privacy policies?	Minimum	10,000	5,000	EmployeeMoraleCustomerSatisfaction
			Maximum	40,000	10,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What sort of	Critical information	25,000	20,000	
Information Privacy Policy	Degree of information and record retention	information will you retain?	Operational information	15,000	75,000	PerformanceEmployeeMorale
			All information	37,500	110,000	
		What punitive	Focus on warnings	-	-	
Information	Violation penalties	actions will you use for violations of information privacy policy?	Focus on fines	-	-	Employee Morale
Privacy Policy			Focus on suspensions	-	ı	Employee Morale
		,	Focus on termination	-	ı	
	Degree of freedom given		Restricted	12,500	50,000	
General Access Policies	to employees regarding communications	to communicate over the	Time-limited	12,500	50,000	EmployeeMoraleProductivity
	over the Internet	Internet?	Free -	-	- Froductivity	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Degree of	How free are	Restricted	5,000	50,000	
General Access Policies	freedom over browsing non- business sites	your employees to browse non- business sites?	Time-limited	10,000	50,000	EmployeeMoraleProductivity
	Dusiness sites		Free	-	-	·
		Choose the degree to which	None	-	-	
General Access	Degree of logging of Internet access	Internet access and other system actions and access are	Limited actions	10,000	20,000	Internal Security Index
Policies	and other system actions and accesses		Critical system access only	25,000	75,000	Employee Morale
		logged.	All actions	50,000	125,000	
Access perm	-444-		3	-	-	Employee
		number of permitted login attempts.	5	-	-	Morale Productivity Technical
		attompto.	7	-	-	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How long will	15	20,000	30,000	Employee
General Access Policies	Password validity in days	passwords set be valid?	30	20,000	15,000	Morale Productivity Technical
			45	20,000	10,000	
	Password characters long should the requirements password be?		4	20,000	10,000	Employee
General Access Policies		_	6	30,000	10,000	Morale Productivity Technical
		P 	8	45,000	10,000	Security Index
General Access Policies	Non-use of prior passwords	How many prior passwords are set to be invalid for use?	1	-	-	Employee
			3	-	-	Morale Productivity Technical
			6		Security Index	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive	Focus on warnings	-	-	Employee Morale Technical Security Index Productivity Disaster Readiness Technical Security Index
General Access	Violation	actions will you use for violations of	Focus on fines	-	-	
Policies	penalties	general access policy?	Focus on suspensions	-	-	
		. ,	Focus on termination	-	-	
	isolate rooms containing	Control the degree of physical access to servers.	Free access	10,000	-	
Physical Security			Limited access	25,000	20,000	
			Restricted access	30,000	15,000	
	Restricting	Control the degree of	Free access	5,000	1	Productivity
Physical Security	physical access through role based access	physical access to servers through role-	Limited access	12,500	12,500 2,000 • Disa Rea • Tec	Disaster Readiness
	control	based access control.	Restricted access	15,000		Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			Free access	10,000	1	
		Control the	Limited access	20,000	10,000	Productivity Technical Security Index Employee Morale
Physical Security	Degree of access given to visitors	degree and quality of access for visitors.	Accompanied free access	30,000	150,000	
		ioi visitors.	Accompanied limited access	40,000	250,000	
			Restricted access	50,000	300,000	
		What punitive	Focus on warnings	ı	ı	
Physical Security	Violation	actions will you use for	Focus on fines	cus on	Employee Morale	
	penalties	violations of physical security policy?	Focus on suspensions			
		,	Focus on termination		-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		For which	Executive management only	10,000	2,500	
Remote	Degree of remote access	employee grades is	Upper management	15,000	7,500	Technical Security Index
Access Policy	by employee grade	remote access available?	Middle management	20,000	25,000	Productivity
			All professional staff members	35,000	100,000	
	Access privileges permitted	What are the maximum remote access privileges allowed?	Low - read only	10,000	5,000	Technical
Remote			Medium - read/write	15,000	5,000	
Access Policy			High - read/write/delete	20,000	10,000	Security Index • Productivity
			Very high - administrator level	35,000	10,000	
	Violation penalties	What punitive actions will you use for violations of remote access policy?	Focus on warnings	-	-	
Remote Access Policy			Focus on fines	-	-	Employee Morale
			Focus on suspensions	1	-	Employee Morale
		, ,	Focus on termination		-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			Freeware	1	1	
Authorized Software	Type of software permitted for	How lenient are you in terms of software usage?	Games	20,000	30,000	Employee Morale
Policy	use by employees		Open-source	-	-	 Technical Security Index
			Approved software	100,000	150,000	
	Software evaluation frequency in months	How frequently will you evaluate systems for presence of unauthorized software?	6	25,000	85,000	ProductivityTechnical Security Index
Authorized Software Policy			12	35,000	50,000	
			18	45,000	40,000	·
		What punitive	Focus on warnings	-	-	
Authorized Software Policy	Violation	actions will you use for	Focus on fines	-	-	Employee Morale
		violations of authorized software policy?	Focus on suspensions	-	-	Employee Morale
		. ,	Focus on termination			

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Intensity of	your quality ance assurance	Low	40,000	50,000	Employee
Systems Development Testing	quality assurance		Medium	60,000	150,000	Morale • Technical
C	testing		High	90,000	300,000	Security Index
	Degree of reliance on external vendor	Choose the degree of reliance on external vendors for systems	Usability and other minor testing	10,000	50,000	
Systems Development Testing			Supplementary testing	20,000	100,000	ProductivityTechnical Security Index
		development testing.	Comprehensive testing	30,000	200,000	
	Quality of antivirus solution used	Choose the quality of the antivirus solution used across the	Baseline	30,000	50,000	Performance
Antivirus Policy			Strong	50,000	100,000	ProductivityTechnical
		organization.	State-of-the-art	state-of-the-art 70,000	180,000	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			Multiple times per day	24,000	28,800	
Antivirus	Frequency of	How frequently does the	Once daily	22,000	3,846	ProductivityTechnical
Policy	scans	antivirus scan run?	Once per week	16,500	15,000	Security Index
			Once per month	8,800	8,800	
	Frequency of patch updates	How frequently will you update your antivirus solution with patches?	Always once released	22,000	66,000	
Antivirus Policy			Only for major and critical updates	16,500	39,286	ProductivityTechnical Security Index
			Only for critical updates	8,800	18,857	
	Degree of	How high will you prioritize	Low	8,800	88,000	
Insurance Policy	insurance used against a cyberattack	insurance against a cyberattack?	Medium	16,500	32,000	Disaster ReadinessCompliance
			High	22,000	330,000	

3.2 DTL Power

Table 4: DTL Power Decision Reference

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Authentication	Kerberos servers	How much will you spend on Kerberos servers	Minimum	150,000	5,000	Technical Security Index
Admentication	spending	for authentication?	Maximum	400,000	10,000	PerformanceDowntime
Authortication	Authentication Centers Spending	How much will you spend on key distribution	Minimum	10,000	4,000	Technical Security Index
Authentication		centers for authentication?	Maximum	25,000	8,000	PerformanceDowntime
		What's the RAID level of your server backup?	0	5,000	10,000	
Backup	RAID levels		1	10,000	15,000	PerformanceCompliance
·			5	15,000	17,500	• Downtime
			6	17,500	20,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Backup	Remote backup	Choose the amount to spend	Minimum	10,000	40,000	PerformanceDowntime
	spending	on remote backup services.	Maximum	20,000	80,000	Compliance
		What is the	No encryption	10,000	1	
Data		average scale of	File	20,000	5,000	Technical Security Index
Encryption	encryption		Folder	30,000	14,000	 Productivity
			Drive	35,000	25,000	
		The strength of encryption you	32 bits	10,000	10,000	Today
Data Encryption	Encryption strength in bits	will use; the higher the bit strength, the	64 bits	20,000	15,000	Technical Security Index Performance
		stronger the encryption.	128 bits	25,000	20,000	r sinoimanes
Load	DDOS protection	Delay binding to protect against	Disable	-	-	Technical Security Index
Management through delayed binding	DDOS attacks.	Enable	30,000	25,000	Performance	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Load Management	HTTP security through load balancing	Use load balancing to improve security.	Disable	-	-	Technical Security Index Performance
			Enable	60,000	20,000	
Network	Isolate affected areas of the	Choose whether to isolate areas of the network	Yes	25,000	5,000	Contribution to National Security Index Network Load
Isolation	network as needed	affected by cyber or physical attacks.	No	-	-	Customer SatisfactionDowntimePopular Sentiment
		How long will you isolate affected areas of the network?	1	10,000	100,000	Contribution to National Security Index
Network isola	Period of isolation in weeks		2	20,000	200,000	Network LoadCustomerSatisfaction
	the hetwork?	3	30,000	300,000	DowntimePopularSentiment	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		Determine the	Critical updates only	10,000	10,000	Productivity
Patch Management Frequency of patch management	frequency of rolling out updates to systems.	Critical and important updates	20,000	20,000	Performance Technical Security Index	
			All updates	40,000	40,000	
D. I. I.	Degree of patch	How rigorously will you test patches before installing them?	Low	10,000	5,000	Performance
Patch Management	testing prior to installation		Medium	20,000	10,000	Technical Security Index
			High	40,000	15,000	
		Will you rely only on official	Unofficial	5,000	2,500	
Patch Management	Trustworthiness of patch	patches, or are you willing to use unofficial or community workarounds?	Trusted	10,000	5,000	DowntimePerformance
			Official	15,000	7,500	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Role Based	Degree of role-	What is the degree of	Low	20,000	10,000	Technical
Access Control	based access control	implementation of access control by employee	Medium	30,000	20,000	Security Index • Employee Morale
		role?	High	44,000	30,000	iviorale
Virtualization	Choose	Choose virtualization or	Virtualization	10,000	5,000	Tankaisal Canuits
OR Cloud Computing	virtualization or cloud computing	cloud computing for your systems to improve security.	Cloud computing	50,000	10,000	Technical Security Index
lf		To what degree	Limited	2,000	10,000	
Virtualization Chosen	Degree of virtualization	will you implement virtualization?	Significant	7,000	20,000	Index
			Full	20,000	40,000	
If	Spending on underlying physical network How much will you spend on the underlying physical network?	you spend on	Minimum	10,000	ı	Technical Security
Chosen phy		Maximum	50,000	-	Index	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
If	Degree of	How isolated is	Minor	10,000	20,000	Performance
Virtualization Chosen	isolation of network	under the virtualization	Medium	30,000	30,000	Technical Security Index
		schema?	Complete	60,000	50,000	
If	If Traffic	Choose the	Limited	10,000	5,000	Performance
Virtualization Chosen	monitoring on network	extent of traffic monitoring on the network.	Significant	20,000	20,000	Technical Security Index
			Full	30,000	30,000	
		Choose the cloud hosting model for your systems. Will you pay more for a more secure private infrastructure or share deployment with other companies for less cost?	Private	22,000	12,571	
If Cloud Computing Chosen	Cloud hosting model i		Hybrid	16,500	8,250	Technical Security IndexPerformance
			Public	8,800	6,600	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		At what level of engagement will you operate off the cloud? Will you stick with software, or will you go all the way to infrastructure?	Software as a service	10,000	20,000	
If Cloud Computing Chosen	Services offered by the cloud		Platform as a service	20,000	30,000	Performance
			Infrastructure as a service	40,000	60,000	
	Filtering strictness	How strict is the firewall configured to be?	Low	5,000	5,000	
Firewall			Medium	10,000	7,500	Technical Security Index
			Medium-high	12,500	10,000	
			High	17,500	12,500	
DNS	DNS server redundancy	Enable DNS server redundancy to reduce downtime.	Yes	10,000	15,000	D 1
Redundancy			No	5,000	-	Downtime

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
DNS Redundancy	Split DNS topology	Use a split DNS topology to reduce	Yes	5,000	15,000	Downtime
Reduitabley	topology	downtime.	No	10,000	-	
		How frequently	15	40,000	5,000	
Database	Database forcing doe data a cl	does the database ask for	30	30,000	5,000	ProductivityTechnical
Security		a change of password?	60	20,000	5,000	Security Index
			90	10,000	5,000	
	Degree of separation of	Choose to separate admin	None	10,000	-	Productivity
Database Security	roles for admin and operator	and operator roles for database	Limited	20,000	250,000	Technical Security Index
	roles	systems.	Complete	30,000	350,000	
Database	Control	Are database control privileges restricted or distributed?	Restricted	10,000	90,000	ProductivityTechnical
Security privileges	privileges		Distributed	5,000	180,000	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Database	OS services and associated	Will you enable or disable database-related	Disable	-	-	ProductivityPerformance
Security	ports	OS services and associated ports?	Enable	-	-	Technical Security Index
Database Security	Database honeypots	Will you employ database honeypots to trap and redirect attacks?	Disable	-	-	ProductivityTechnical
Coounty	Попсурско		Enable	-	-	Security Index
	Type of intrusion detection system to install Will you employ a network-based IDS, a host-based IDS, or both?	a network-based IDS, a host- based IDS, or	Network-based intrusion detection (NIDS)	10,000	100,000	
detection			Host-based intrusion detection (HIDS)	30,000	80,000	Technical Security Index
		Both	36,000	160,000		

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
IDDO	Class of	Will you use a production honeypot or go	Production honeypot	20,000	90,000	Technical Security
IDPS	honeypot to deploy for a research honeypot with better analytics?	Research honeypot	10,000	70,000	Index	
	Strength of How strong is the honeypot deploy you deploy?	Pure honeypot	10,000	90,000	Technical Security Index	
IDPS		Low interaction honeypot	20,000	60,000		
			High interaction honeypot	30,000	90,000	-
Hiring and		What strength will you keep	Less than average	10,000	600,000	ProductivityEmployee
_	IT team size	your IT teams at, in relation to the	Average	30,000	900,000	Morale Technical
		industry average?	More than average	50,000	1,400,000	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Hiring and	Full-time	Will you choose to bolster your IT	All	8,800	4,224	ProductivityEmployee
Employee Policy	employees as a percentage of the workforce	team with temporary or	0.9	16,500	3,960	Morale Technical
	the workforce	part-time hires?	0.8	22,000	5,867	Security Index
		erage experience	3	8,800	12,941	
Hiring and	Hiring by average experience in		5	16,500	21,000	Internal Security Index
Employee Policy			7	22,000	26,400	
	years		8	24,000	27,429	
			9	25,000	29,310	
I Employee	Forced rotation employee	Will you make employee	Disable	-	-	ProductivityEmployeeMorale
Policy	of employees	rotation mandatory?	Enable	25,000	45,000	Internal Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Hiring and Employee	Forced vacation	Will you make employee vacations	Disable	-	-	ProductivityEmployeeMorale
Policy	for employees	mandatory?	Enable	75,000	85,000	Internal Security Index
Advisory Subscription	Degree of	To what degree does your organization rely on security advisories from the federal government?	None	-	-	Technical Security
Help	and Federal advisory referral Help		Limited	30,000	150,000	Index
Advisory	Reliance on	To what degree will you rely on	None	-	-	Tankaisal
Subscription and Federal Help	federal government support	federal government support?	For critical issues only	300,000	170,000	Technical Security IndexReputation
·			Ongoing	400,000	250,000	
Training	Training by	What is the extent of funding for cybersecurity training?	Minimum	1,000	50,000	Internal SecurityIndexProductivity
	funding		Maximum	2,000	100,000	Employee Morale

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Average	How much will you reimburse employees for	25% of fees	5,000	20,000	Technical
Training Incentives	compensation bonus as a		50% of fees	10,000	40,000	Security Index • Productivity
incentives	fraction of technical certification fees	technical certification for security training?	75% of fees	15,000	60,000	EmployeeMorale
	certification rees see		100% of fees	20,000	80,000	_
Training	I outcomes to	Will you link training outcomes to promotion?	Yes	10,000	10,000	Technical Security IndexProductivity
Incentives	promotion		No	-	-	Employee Morale
Training	Training Incentives Link training outcomes to evaluation	Will you link training outcomes to evaluation?	Yes	15,000	7,000	Technical Security IndexProductivity
incentives			No	-	-	Employee Morale

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Training and Auditing	Focus on training area: network		Minimum	-	-	 Technical Security Index
Additing	vulnerabilities		Maximum	-	1	Compliance
Training and	Focus on training area:	Choose whether to focus your security auditing	Minimum	-	1	 Technical Security Index
Auditing	controls	efforts on network	Maximum	-	1	Compliance
Training and	i training area.	vulnerabilities, controls, encryption, and penetration.	Minimum	-	-	Technical Security Index
Auditing	encryption		Maximum	-	1	Compliance
Training and	Focus on training area:		Minimum	-	1	 Technical Security Index
Auditing	penetration testing		Maximum	-		Compliance
	Frequency of	hysical audits you run physical audits of system	Every three months	10,000	20,000	
Training and physical of the equipme			Every six months	7,500	10,000	Technical Security Index
			Once a year	5,000	5,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Business	Degree of IT	How much	Low	5,000	5,000	
Continuity Planning	data storage redundancy	redundancy will you build in for IT data storage?	Medium	10,000	10,000	Disaster Readiness
		data ciorago:	High	15,000	20,000	
Business	Degree of IT	How much	Low	7,500	20,000	
Continuity Planning	network redundancy	redundancy will you build in for IT networks?	Medium	12,500	30,000	Disaster Readiness
			High	20,000	50,000	
Business	Levels of power	How much	1	5,000	25,000	
Continuity Planning	backup redundancy	redundancy will you build in for power backup?	2	10,000	45,000	Disaster Readiness
		power backup:	3	15,000	67,500	
Business	Number of backup sites	How many	1	5,000	75,000	
Continuity Planning		backup sites will you maintain?	2	10,000	150,000	Disaster Readiness
			3	15,000	200,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Business	Number of redundant	How many backup	1	5,000	10,000	
Continuity Planning	backup communication	communication	2	10,000	17,500	Disaster Readiness
links	links		3	15,000	25,000	
		uency in disaster recovery	3	-	100,000	
Business Continuity	Policy review frequency in		6	-	75,000	Disaster Readiness
· · · · · ·	months		9	1	50,000	Disaster Readilless
			12	-	25,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Downsorf	To what extent does the organization share cybersecurity attack	High - full disclosure	16,500	3,300	
Information Sharing	Degree of information sharing on attacks		Medium - non- sensitive disclosure	8,800	2,200	ProfitabilityDisasterReadiness
	information publicly?	Low - no disclosure	-	-		
	Dograp of non	To what extent does the organization share routine cybersecurity information publicly?	High - full disclosure	16,500	3,536	
Information Sharing	Degree of non- crisis information sharing		Medium - non- sensitive disclosure	8,800	1,760	ProfitabilityDisasterReadiness
			Low - no disclosure	-	-	
	Spending on you	How much will you spend on public relations?	Minimum	50,000	25,000	Reputation
			Maximum	100,000	100,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Emergency	Spending on emergency	How much will you spend on	Minimum	5,000	1,000	Disaster Readiness
Bypass Policy	bypass policy	emergency bypass policy?	Maximum	10,000	2,000	
	mergency ypass Policy Response to violations of typical separation of duties protocol	What is the response to	Not allowed	25,000	12,500	Technical
Emergency Bypass Policy		ypical violations of typical separation of Separation of	Permitted with limitations	15,000	20,000	Security Index • Disaster Readiness
		Duties protocol?	Allowed	2,500	35,000	
		What punitive	Focus on warnings		-	
Emergency Bypass Policy	Violation penalties	actions will you use for violations	Focus on fines		-	Employee Morale
		of emergency bypass policy?	Focus on suspensions		-	
		Focus on termination		-		

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How many people will you put in groups to overlook and enforce information sharing?	2	17,600	12,000	
Information	No. of people in groups to		3	33,000	22,164	ProductivityTechnical
Sharing ove enfo	overlook and enforce internal information		4	44,000	30,000	Security Index Employee Morale Productivity Technical Security Index Employee
	sharing		5	48,000	31,304	
			6	50,000	30,357	
Information	Internal information sharing by role- based access control	How restrictive is the system for internal sharing of information?	Strictly need-to-know	15,000	50,000	
Sharing Policy			Limited access	10,000	35,000	
			Open system	1,000	-	Morale

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Information Sharing Policy Degree of external information sharing	Degree of	How restrictive is	Strictly need-to-know	15,000	50,000	ProductivityTechnical
	the system for external sharing of information?	Limited access	10,000	35,000	Security Index • Customer Satisfaction	
			Open system	1,000	1	Compliance
		How frequently will you share information for the InfraGard service of information sharing between private and public entities?	7 days	24,000	2,000	
Information Sharing	Frequency of disclosure for InfraGard		14 days	22,000	4,400	 Contribution to National
Policy	communication in days		21 days	16,500	9,900	Security Index • Profitability
			28 days	8,800	8,800	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
la fa waa aki a a		What punitive	Warnings	-	-	
Information Sharing Policy	Violation penalties	actions will you use for violations of information sharing policy?	Suspensions	-	-	Employee Morale
			Termination	-	-	
		openness of about breaches that have	All incidents	24,000	50,000	
Breach Notification Policy Degree of openness of breach notification	openness of		Critical and significant incidents	22,000	35,000	 Reputation Customer Satisfaction Contribution to National Security Index
	notification		Only critical incidents	16,500	20,000	
		None of the incidents	8,800	0		

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Investigative	Which	Private investigators	8,800	12,571	Reputation Employee
Breach Notification	agencies to call in for major	investigative agencies will you approach for	Forensic investigators	16,500	24,750	Morale • Contribution to
Policy	security breaches	major security breaches?	CERT	-	-	National Security Index Downtime
			FBI/NSA	,	-	Downline
	Violation penalties	What punitive actions will you use for violations of breach notification policy?	Focus on warnings	1	-	
Breach Notification			Focus on fines	-	-	Employee Morale
Policy			Focus on suspensions	1	-	
			Focus on termination	1	-	
Information	Privacy program investment spending	How much will you spend on your organization's privacy program?	Minimum	10,000	5,000	Employee Morale Customer
Privacy Policy			Maximum	50,000	10,000	Customer Satisfaction

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Information Privacy Policy	l dedicated	Will you appoint a dedicated privacy officer?	Yes	8,800	10,560	Employee Morale Customer
Filvacy Folicy	privacy officer		No	-	ı	Customer Satisfaction
Information	Privacy training	How much will you spend on	Minimum	10,000	5,000	Employee Morale
Privacy Policy spending for employees	training employees on privacy policies?	Maximum	40,000	10,000	 Customer Satisfaction 	
	Degree of information and record retention	What sort of information will you retain?	Critical information	25,000	20,000	Dorformon
Information Privacy Policy			Operational information	15,000	75,000	PerformanceEmployeeMorale
			All information	37,500	110,000	
		NA/I	Focus on warnings	-	-	
Information	Violation	What punitive actions will you use for violations	Focus on fines	,		Employee Morale
Privacy Policy	penalties	of information privacy policy?	Focus on suspensions	-	-	
			Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
General	Degree of freedom given to employees	reedom given How free are	Restricted	12,500	50,000	Employee
Access Policies	regarding communications	to communicate over the	Time-limited	12,500	50,000	Morale • Productivity
	over the Internet	Internet?	Free	-	-	
General	General Access Policies Degree of freedom over browsing nonbusiness sites	How free are your employees to browse non-business sites?	Restricted	5,000	50,000	Employee
			Time-limited	10,000	50,000	Morale • Productivity
			Free	-	-	
	Degree of	Choose the degree to which	None	-	-	
General Access	logging of Internet access and other	Internet access and other system	Limited actions	10,000	20,000	Internal Security Index Employee
Policies	system actions and access are logged.	access are	Critical system access only	25,000	75,000	EmployeeMorale
		loggeu.	All actions	50,000	125,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
General Access Policies	Number of permitted login attempts	Choose the number of permitted login attempts.	357	-	-	 Employee Morale Productivity Technical Security Index
General Access Policies	Password validity in days	How long will passwords set be valid?	15 30 45	20,000 20,000 20,000	30,000 15,000 10,000	 Employee
General Access Policies	Password length requirements	How many characters long should the password be?	468	20,000 30,000 45,000	10,000 10,000 10,000	 Employee Morale Productivity Technical Security Index
General Access Policies	Non-use of prior passwords	How many prior passwords are set to be invalid for use?	36	-	-	 Employee Morale Productivity Technical Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			Focus on warnings	-	-	
General Access	Violation	What punitive actions will you use for violations	Focus on fines	-	-	Employee Morale
Policies	penalties	of general access policy?	Focus on suspensions	-	-	
			Focus on termination	-	-	
	Physically isolate rooms	Control the degree of physical access to servers.	Free access	10,000	-	Index
Physical Security	containing important		Limited access	25,000	20,000	
	infrastructure		Restricted access	30,000	15,000	
	Restricting	Control the degree of	Free access	5,000	-	Productivity
Physical Security	physical access through role based access control	physical access to servers through role- based access control.	Limited access	12,500	2,000	 Disaster Readiness Technical Security Index
			Restricted access	15,000	15,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			Free access	10,000	-	
		Control the	Limited access	20,000	10,000	
Physical Security	Degree of access given to visitors	degree and quality of access	Accompanied free access	30,000	150,000	ProductivityTechnicalSecurity Index
	VISILOIS	for visitors.	Accompanied limited access	40,000	250,000	Security Index
			Restricted access	50,000	300,000	
			Focus on warnings	-	-	
Physical	Violation	What punitive actions will you use for violations	Focus on fines	-	-	Employee Morale
Security	penalties	of physical security policy?	Focus on suspensions	-	-	Employee Morale
			Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Remote Access Policy	remote access employ is remote	For which employee grades is remote access	Executive management only	10,000	2,500	
			Upper management	15,000	7,500	Technical Security Index
		available?	Middle management	20,000	25,000	 Productivity
			All professional staff members	35,000	100,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		privileges remote access	Low - read only	10,000	5,000	
Remote	Access		Medium - read/write	15,000	5,000	Technical
Access Policy	privileges permitted		High - read/write/delete	20,000	10,000	Security Index • Productivity
			Very high - administrator level	35,000	10,000	
	Violation penalties	What punitive actions will you use for violations of remote access policy?	Focus on warnings	-	-	
Remote			Focus on fines	-	-	Employee Morale
Access Policy			Focus on suspensions	-	-	
			Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	T of	How lenient are you in terms of	Freeware	-	-	
Authorized Software	Type of software permitted for		Games	20,000	30,000	Employee Morale
Policy	use by employees	software usage?	Open-source	-	-	Technical Security Index
			Approved software	100,000	150,000	
Authorized	Software wi	'	6	25,000	85,000	Productivity
Software Policy	evaluation frequency in months		12	35,000	50,000	Technical Security Index
	monus		18	45,000	40,000	
			Focus on warnings	-	-	
Authorized Software	Violation	What punitive actions will you use for violations	Focus on fines	1	1	Employee Morale
Policy	penalties	of authorized software policy?	Focus on suspensions	1	1	
			Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Systems	Intensity of	sity of How intense is	Low	40,000	50,000	• Employee
Development Testing	quality assurance testing	your quality assurance testing?	Medium	60,000	150,000	Morale • Technical Security Index
	testing	testing:	High	90,000	300,000	Security index
Systems	Degree of	Choose the degree of reliance on	Usability and other minor testing	10,000	50,000	Productivity
Development Testing	reliance on external vendor	external vendors for systems development testing.	Supplementary testing	20,000	100,000	 Technical Security Index
			Comprehensive testing	30,000	200,000	
	Quality of	Choose the quality of the	Baseline	30,000	50,000	Performance
Antivirus Policy	antivirus solution used	antivirus solution used across the organization.	Strong	50,000	100,000	ProductivityTechnical
			State-of-the-art	70,000	180,000	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			Multiple times per day	24,000	28,800	
Antivirus Policy	Frequency of scans	How frequently does the antivirus scan	Once daily	22,000	33,846	ProductivityTechnical
· oney	Coario	run?	Once per week	16,500	15,000	Security Index
			Once per month	8,800	8,800	
		How frequently will you update your antivirus solution with patches?	Always once released	22,000	66,000	ProductivityTechnical Security Index
Antivirus Policy	Frequency of patch updates		Only for major and critical updates	16,500	39,286	
			Only for critical updates	8,800	18,857	
SCADA Vulnerability Analysis	SCADA vulnerability analysis spending	How much will you spend on SCADA vulnerability analysis?	Minimum	100,000	10,000	Technical Security Index
			Maximum	250,000	20,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
SCADA Vulnerability	Standards review and	How much will you spend on	Minimum	250,000	15,000	Performance Productivity
Analysis	update spending	standards review and updating?	Maximum	450,000	35,000	 Technical Security Index
SCADA Vulnerability	Policy analysis	Choose your spending on SCADA	Minimum	100,000	15,000	Performance Productivity
Analysis	, I spending	vulnerability policy analysis.	Maximum	200,000	50,000	Technical Security Index
SCADA Vulnerability	Physical SVA	Determine your spending on	Minimum	100,000	25,000	Performance Productivity
Analysis test spending	physical SVA testing.	Maximum	200,000	75,000	Technical Security Index	
SCADA Vulnerability	l Risk analysis	Choose how much you spend to bring in risk analysis experts.	Minimum	125,000	25,000	Technical Security Index
Analysis			Maximum	500,000	50,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
SCADA Training	Network security	Determine your spending on	Minimum	100,000	10,000	ProductivityTechnical
Trailing	spending	network security.	Maximum	200,000	30,000	Security Index
SCADA	SCADA security	Choose your spending on	Minimum	100,000	10,000	ProductivityTechnical
Training	spending	SCADA security.	Maximum	200,000	30,000	Security Index
SCADA	Spending on training against	lainst spending on	Minimum	100,000	15,000	Productivity
Training	social engineering	training against social engineering.	Maximum	200,000	50,000	 Technical Security Index
	Degree of	nterconnection degree of interconnection	Isolated	5,000	250,000	Performance
Security with ot	with other		Limited	25,000	100,000	Technical Security Index
	networks		High	65,000	50,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		Set the sensitivity of the firewalls in the SCADA setup.	Low	10,000	20,000	
SCADA	Firewall		Medium	30,000	24,000	PerformanceTechnical
Security sensitivity	Sensitivity		Medium-high	40,000	30,000	Security Index
			High	60,000	36,000	
SCADA	Re-configure the registry of some equipment to	Re-configure the registry of SCADA equipment to make instructions	Yes	25,000	2,000	PerformanceTechnical
Security	make instructions temporarily unavailable	temporarily unavailable, which acts as a buffer against intrusion.	No	-		Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			Quarterly	300,000	1,500,000	
SCADA	SCADA security	How frequently are SCADA	Biannually	200,000	1,000,000	PerformanceProductivity
Security	patch frequency	security patches applied?	Annually	125,000	700,000	Technical Security Index
			Bienially	100,000	600,000	
SCADA	SCADA access	How will you implement SCADA backdoor access?	Weak - direct backdoor access	10,000	10,000	Performance Productivity Technical Security Index
Security	mechanism		Stronger - callback mechanism	25,000	20,000	
SCADA Security	Continuous incident monitoring	Choose whether to enable or disable continuous incident monitoring.	Enable	80,000	200,000	Technical Security
			Disable	2,000	-	Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
SCADA	Remote access	Choose whether to enable or disable remote access privileges.	Enable	50,000	50,000	Performance Productivity
Security	point privileges		Disable	1,000	-	Technical Security Index
	Risk management policy	How lenient is your policy on risk management?	Highly risk adverse	100,000	100,000	Performance
SCADA Policy Interventions			Moderately risk adverse	75,000	70,000	ProductivityTechnicalSecurity Index
			Availability inclined	20,000	50,000	Security maex
			2	15,000	20,000	
SCADA Policy	Frequency of system backups	How frequently will you backup SCADA	3	15,000	17,500	Technical Security Index
Interventions	in months	systems?	4	15,000	14,000	Compliance
			6	15,000	10,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Degree of insurance used against a cyberattack	How high will	Low	8,800	88,000	Disaster	
	you prioritize insurance against a	Medium	16,500	132,000		
	Cyberattack	cyberattack?	High	22,000	33,000	

3.3 Federal Government

Table 5: Federal Government Decision Reference

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Authentication	Kerberos	How much will you spend on Kerberos	Minimum	3,750,000	125,000	Technical Security Index
Authentication	servers spending	servers for authentication?	Maximum	10,000,000	250,000	PerformanceDowntime
Key distribution Authentication centers	How much will you spend on key distribution	Minimum	250,000	100,000	Technical Security Index	
Authentication	spending	centers for authentication?	Maximum	625,000	200,000	PerformanceDowntime
			0	125,000	250,000	
Pankun	RAID levels	What's the RAID level of	1	250,000	375,000	Performance Compliance
Backup	RAID levels	your server backup?	5	375,000	437,500	ComplianceDowntime
			6	437,500	500,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Backup	Remote backup	amount to	Minimum	250,000	1,000,000	PerformanceDowntime
Васкир	spending	remote backup services.	Maximum	500,000	2,000,000	Compliance
		What is the	No encryption	250,000	-	
Data	Level of encryption	average scale of encryption used across the organization?	File	500,000	125,000	Technical Security IndexProductivity
Encryption			Folder	750,000	350,000	
			Drive	875,000	625,000	
		The strength of encryption you will use; the	32 bits	250,000	250,000	
Data Encryption	Encryption strength in bits	higher the bit strength, the	64 bits	500,000	375,000	Technical Security IndexPerformance
,	ŭ	stronger the encryption.	128 bits	625,000	500,000	Fellollilance
Load	Load DDOS protection through delayed binding	Delay binding to protect against DDOS attacks.	Disable	-	-	Technical Security Index
Management			Enable	750,000	625,000	Performance

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Load	Load HTTP security through load	Use load balancing to improve	Disable	-	-	Technical Security Index
Management	balancing	security.	Enable	1,500,000	500,000	Performance
		Determine the	Critical updates only	250,000	250,000	Dro du ativitu
Patch Management	Frequency of patch management	atch rolling out	Critical and important updates	500,000	500,000	ProductivityPerformanceTechnicalSecurity Index
			All updates	1,000,000	1,000,000	occurry macx
	Degree of patch testing prior to installation	How rigorously will you test patches before installing	Low	250,000	125,000	
Patch Management			Medium	500,000	250,000	PerformanceTechnicalSecurity Index
		them?	High	1,000,000	375,000	ŕ
	Trustworthiness of patch	Will you rely only on official	Unofficial	125,000	62,500	
Patch Management		patches, or are you willing to use unofficial or community workarounds?	Trusted	250,000	125,000	DowntimePerformance
Management			Official	375,000	187,500	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What is the degree of	Low	500,000	250,000	T 1
Role Based Access Control	Degree of role- based access control	implementation of access control by	Medium	750,000	500,000	Technical Security IndexEmployee
Control	Control	employee	High	1,100,000	750,000	Morale
Virtualization	Virtualization OR Cloud Computing Choose virtualization or cloud computing	Choose virtualization or cloud	Virtualization	250,000	125,000	Technical Security
		computing for your systems to improve security.	Cloud computing	1,250,000	250,000	Index
		To what	Limited	50,000	250,000	
If Virtualization Chosen	Degree of virtualization	degree will you implement virtualization?	Significant	175,000	500,000	Technical Security Index
			Full	500,000	1,000,000	
If	Spending on underlying physical network	How much will you spend on the underlying physical network?	Minimum	250,000	-	Technical Security Index
Virtualization			Maximum	1,250,000	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	_	How isolated is the network	Minor	250,000	500,000	
If Virtualization Chosen	Degree of isolation of network	under the virtualization	Medium	750,000	750,000	PerformanceTechnicalSecurity Index
		schema?	Complete	1,500,000	1,250,000	ŕ
	T (6)	Choose the	Limited	250,000	125,000	D (
If Virtualization Chosen	Traffic monitoring on network	extent of traffic monitoring on the network.	Significant	500,000	500,000	PerformanceTechnicalSecurity Index
			Full	750,000	750,000	
	Cloud hosting model	Choose the cloud hosting model for your systems. Will you pay more for a more secure private infrastructure or share deployment with other companies for less cost?	Private	438,000	250,286	
If Cloud Computing Chosen			Hybrid	340,000	170,000	Technical Security IndexPerformance
			Public	200,000	150,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		At what level of engagement will you operate off the cloud? Will you stick with software, or will you go all the way to infrastructure?	Software as a service	250,000	500,000	
If Cloud Computing Chosen	Services offered by the cloud		Platform as a service	500,000	750,000	Security Index Performance
Onoscii			Infrastructure as a service	1,000,000	1,500,000	
	Filtering	How strict is the firewall	Low	125,000	125,000	
Firewall			Medium	250,000	187,500	Technical Security IndexPerformance
riiewaii	strictness	configured to be?	Medium-high	312,500	250,000	
			High	437,500	312,500	
DNS Redundancy	DNS server redundancy	Enable DNS server redundancy to reduce downtime.	Yes	250,000	375,000	- Downtime
			No	125,000	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
DNS	DNS Split DNS	Use a split DNS topology	Yes	125,000	375,000	Downtime
Redundancy	topology	to reduce downtime.	No	250,000	-	Downtime
		How frequently	15	1,000,000	125,000	
Database	Frequency of forcing	equency of does the database ask ssword for a change of	30	750,000	125,000	ProductivityTechnical
Security	password changes in days		60	500,000	125,000	Security Index
			90	250,000	125,000	
	Degree of	Choose to separate	None	250,000	-	Double that
Database Security	separation of roles for admin and operator	admin and operator roles for database	Limited	500,000	6,250,000	ProductivityTechnical Security Index
	roles	systems.	Complete	750,000	8,750,000	·
Database	Control	Are database control privileges	Restricted	250,000	2,250,000	ProductivityTechnical
	privileges restricted or distributed?	Distributed	125,000	4,500,000	Security Index	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Database	Database Security OS services and associated ports	Will you enable or disable database-related OS	Disable	-	-	ProductivityPerformanceTechnical Security Index
Security		services and associated ports?	Enable	-	-	
		Will you employ database	Disable	-	-	ProductivityTechnical Security Index
Database Security	Database honeypots	honeypots to trap and redirect attacks?	Enable	-	-	
	Type of	Will you employ a network-based IDS, a host- based IDS, or both?	Network-based intrusion detection (NIDS)	250,000	2,500,000	Technical Security
IDPS in de	intrusion detection system to install		Host-based intrusion detection (HIDS)	750,000	2,000,000	
			Both	900,000	4,000,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Class of	Will you use a production honeypot or go	Production honeypot	500,000	2,250,000	Technical Security
IDPS	honeypot to deploy	for a research honeypot with better analytics?	Research honeypot	250,000	1,750,000	Index
		How strong is	Pure honeypot	250,000	2,250,000	
IDPS	Strength of honeypot to deploy	the honeypot you deploy?	Low interaction honeypot	500,000	1,500,000	Technical Security Index
			High interaction honeypot	750,000	2,250,000	
		What strength will you keep	Less than average	250,000	15,000,000	Productivity
Hiring and Employee Policy	IT team size	your IT teams at, in relation	Average	750,000	22,500,000	Technical Security Index
,		to the industry average?	More than average	1,250,000	35,000,000	
	Full-time employees as a percentage of the workforce	e of temporary or	All	200,000	96,000	 Productivity Employee Morale Technical Security Index
Hiring and Employee Policy			0.9	340,000	81,600	
			0.8	438,000	116,800	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			3	200,000	294,118	
	Hiring by	What's the average experience	5	340,000	432,727	
Hiring and Employee Policy	average experience in	you're looking for when you	7	438,000	525,600	Internal Security Index
years	years	hire for IT teams?	8	600,000	685,714	-
			9	625,000	732,759	
Hiring and Employee	Spending on background	How much will you spend on background checks on DSS or other vendors?	Minimum	10,000	625,000	Internal Security
Policy check of DS	check of DSS or other vendors		Maximum	20,000	1,250,000	Index
Hiring and Employee Policy	Forced rotation of employees	Will you make employee rotation mandatory?	Disable	-	-	 Productivity Employee Morale Internal Security Index
			Enable	625,000	1,125,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected	
Hiring and Employee	Forced vacation	Will you make employee	Disable	-	-	ProductivityEmployeeMorale	
Policy	for employees	vacations mandatory?	Enable	1,875,000	2,125,000	Internal Security Index	
Training	Training by		What is the extent of funding for	Minimum	25,000	1,250,000	Internal Security IndexProductivity
Training	Turiding	cybersecurity training?	Maximum	50,000	2,500,000	Employee Morale	
		How much will	25% of fees	125,000	500,000		
Training	Average compensation bonus as a	you reimburse employees for technical certification for security training?	50% of fees	250,000	1,000,000	Technical Security IndexProductivity	
Incentives	fraction of technical certification fees		75% of fees	375,000	1,500,000	Employee Morale	
			100% of fees	500,000	2,000,000		

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Training	Link training outcomes to	Will you link training outcomes to promotion?	Yes	250,000	250,000	Technical Security IndexProductivity
Incentives	promotion		No	-	-	Productivity Employee Morale
Training	Link training outcomes to	Will you link training	Yes	375,000	175,000	Technical Security IndexProductivity
Incentives	Incentives outcomes to evaluation	outcomes to evaluation?	No	-	-	Employee Morale
Training and	Focus on training area:	Choose	Minimum	-	-	Technical Security Index
Auditing	network vulnerabilities	whether to focus your security	Maximum	-	1	Compliance
Training and Auditing	Focus on	auditing efforts on network	Minimum	-	1	Technical Sequity Index
Auditing	training area: controls	vulnerabilities, controls,	Maximum	-	-	Security Index • Compliance
Training and	Focus on	encryption, and	Minimum	-	-	Technical Security Index
Auditing	training area: penetrati encryption	periodation.	Maximum	-	-	Security Index • Compliance

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Training and Auditing	Focus on training area:		Minimum	-		Technical Security Index
Additing	penetration testing		Maximum	-	-	Compliance
	Frequency of	How often will you run	Every three months	250,000	500,000	
Training and Auditing	physical audits of the	physical audits of system equipment?	Every six months	187,500	250,000	Technical Security Index
	equipment		Once a year	125,000	125,000	
		How much redundancy	Low	125,000	125,000	
Business Continuity Planning	Degree of IT data storage redundancy	will you build in for IT data	Medium	250,000	250,000	Disaster Readiness
		storage?	High	375,000	500,000	
B. division	D. CIT	How much redundancy	Low	187,500	500,000	
Business Continuity Planning	Degree of IT network redundancy	will you build in for IT networks?	Medium	312,500	750,000	Disaster Readiness
			High	500,000	1,250,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How much redundancy	1	125,000	625,000	
Business Continuity Planning	Levels of power backup redundancy	will you build in for power	2	250,000	1,125,000	Disaster Readiness
J	, rought and the	backup?	3	375,000	1,687,500	
	Number of backup sites	How many backup sites will you maintain?	1	125,000	1,875,000	
Business Continuity Planning			2	250,000	3,750,000	Disaster Readiness
			3	375,000	5,000,000	
	Number of redundant backup communication links	How many backup communication links will you maintain?	1	125,000	250,000	
Business Continuity Planning			2	250,000	437,500	Disaster Readiness
			3	375,000	625,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How often will	3	-	2,500,000	
Business Continuity	Policy review frequency in	you review disaster	6	-	1,875,000	Disaster Readiness
Planning	months	recovery policy?	9	-	1,250,000	Disaster Readilless
			12	-	625,000	
	Degree of information sharing on attacks	To what extent does the organization share cybersecurity attack information publicly?	High - full disclosure	200,000	40,000	
Information Sharing			Medium - non- sensitive disclosure	340,000	85,000	ProfitabilityDisaster
			Low - no disclosure	,	-	Readiness
	Degree of non- crisis information sharing	To what extent does the	High - full disclosure	340,000	72,857	
Information Sharing		organization share routine cybersecurity information publicly?	Medium - non- sensitive disclosure	200,000	40,000	ProfitabilityDisaster Readiness
			Low - no disclosure	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Public	Spending on	How much will you spend on	Minimum	1,250,000	625,000	Reputation
Relations	public relations	public relations?	Maximum	2,500,000	2,500,000	Reputation
Emergency	Spending on	How much will you spend on emergency	Minimum	125,000	25,000	Disaster Readiness
Bypass Policy	Bypass Policy emergency bypass policy	bypass policy?	Maximum	250,000	50,000	Disaster Readiness
	Response to violations of typical	What is the response to violations of typical Separation of Duties protocol?	Not allowed	625,000	312,500	
Emergency Bypass Policy			Permitted with limitations	375,000	500,000	Technical Security IndexDisaster Readiness
	separation of duties protocol		Allowed	62,500	875,000	
		What punitive	Focus on warnings	-	-	
Emergency	Violation penalties	actions will you use for violations of emergency bypass policy?	Focus on fines	-	-	Employee Morale
Bypass Policy			Focus on suspensions	-	-	- Employee Morale
			Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How many people will you put in groups	2	400,000	272,727	
	No. of people in groups to		3	680,000	456,716	 Productivity
Information Sharing Policy	overlook and enforce internal	to overlook and enforce	4	876,000	597,273	Technical Security IndexEmployee
Š	information sharing	information sharing?	5	1,200,000	782,609	Morale
			6	1,250,000	758,929	
	Internal information sharing by role-based access	How restrictive is the system for internal sharing of	Strictly need-to- know	375,000	1,250,000	Productivity
Information Sharing Policy			Limited access	250,000	875,000	Technical Security IndexEmployee
,	control	information?	Open system	25,000	-	Morale
	Degree of external information sharing	How restrictive is the system for external sharing of information?	Strictly need-to-know	375,000	1,250,000	Productivity
Information Sharing Policy			Limited access	250,000	875,000	 Technical Security Index Customer Satisfaction
			Open system	25,000	-	Compliance

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How frequently will you share information for the InfraGard service of	7 days	600,000	50,000	
Information	Frequency of disclosure for		14 days	438,000	87,600	Contribution to National
Sharing InfraGard communication in days	information sharing	21 days	340,000	204,000	Security Index • Profitability	
		between private and public entities?	28 days	200,000	200,000	
	Violation penalties	What punitive actions will you use for violations of information sharing policy?	Warnings	-	-	
Information Sharing			Fines	-	-	Employee Morale
Policy			Suspensions	-	-	
			Termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How open is your organization about breaches that	All incidents	600,000	1,250,000	
Breach Notification	Degree of openness of		Critical and significant incidents	438,000	875,000	ReputationCustomer Satisfaction
Policy	breach notification	have happened to	Only critical incidents	340,000	500,000	 Contribution to National Security Index
		its systems?	None of the incidents	200,000	0	,
	Investigative agencies to call in for major security breaches	agencies to call you approach for major	Private investigators	200,000	285,714	Reputation
Breach Notification			Forensic investigators	340,000	510,000	EmployeeMoraleContribution to
Policy			CERT	-	-	National Security Index Downtime
			FBI/NSA	-	-	
		What punitive actions will you	Focus on warnings	-	-	
I NOTIFICATION I	Violation violation penalties use for violatio breach	use for violations of breach notification	Focus on fines	-	-	- Employee Morale
			Focus on suspensions	-	-	
		policy?	Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Information	Privacy program investment	How much will you spend on your	Minimum	250,000	125,000	Employee Morale
Privacy Policy	spending	organization's privacy program?	Maximum	1,250,000	250,000	Customer Satisfaction
Information	I dedicated	Will you appoint a	Yes	200,000	240,000	Employee Morale
Privacy Policy		dedicated privacy officer?	No	-	1	Customer Satisfaction
Information	Information Privacy Policy Privacy training spending for employees	How much will you spend on training employees on privacy policies?	Minimum	250,000	125,000	Employee Morale
			Maximum	1,000,000	250,000	 Customer
		What sort of	Critical information	625,000	500,000	
Information Privacy Policy	Degree of information and record retention	information will you retain?	Operational information	375,000	1,875,000	PerformanceEmployeeMorale
			All information	937,500	2,750,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive	Focus on warnings	-	-	
Information	Violation	actions will you use for violations of	Focus on fines	-	-	Employee Morale
Privacy Policy	penalties	information privacy policy?	Focus on suspensions	-	-	Employee Morale
		pinae, peneg	Focus on termination	-	-	
	Degree of freedom given to employees regarding	How free are your employees to communicate over the Internet?	Restricted	312,500	1,250,000	
General Access Policies			Time-limited	312,500	1,250,000	EmployeeMoraleProductivity
	communications over the Internet		Free	-	-	
	Degree of	How free are your	Restricted	125,000	1,250,000	
General Access Policies	freedom over browsing non- business sites	employees to browse non- business sites?	Time-limited	250,000	1,250,000	EmployeeMoraleProductivity
T Official			Free	-	-	- 1 Toddouvity

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Dograp of	Choose the degree to	None	-	-	
General Access	Degree of logging of Internet access	which Internet access and	Limited actions	250,000	500,000	 Internal Security Index
Policies	and other system actions and accesses	other system actions and access are	Critical system access only	625,000	1,875,000	Employee Morale
and accesse		logged.	All actions	1,250,000	3,125,000	
		Choose the number of permitted login attempts.	3	-	-	• Employee
General Access Policies	Number of permitted login attempts		5	-	-	Morale Productivity Technical
	·	attempts.	7	-	-	Security Index
	Password validity in days	How long will passwords set be valid?	15	500,000	750,000	 Employee
General Access Policies			30	500,000	375,000	Morale ProductivityTechnical
1 Olloles			45	500,000	250,000	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	_	How many	4	500,000	250,000	 Employee
General Access Policies	Password length requirements	characters long should the password be?	6	750,000	250,000	Morale ProductivityTechnical
	·	password be?	8	1,125,000	250,000	Security Index
	Non-use of prior passwords	•	1	-	-	 Employee
General Access Policies			3	-	1	Morale Productivity Technical
			6	-	-	Security Index
		What punitive	Focus on warnings	-	•	
General Access Policies	Violation	actions will you use for	Focus on fines	-	•	Employee Merelo
	penalties	violations of general access policy?	Focus on suspensions	-	1	Employee Morale
			Focus on termination	-		

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Physically	Control the degree of	Free access	250,000	-	
Physical Security	isolate rooms containing important	physical access to	Limited access	625,000	500,000	Technical Security Index
	infrastructure	servers.	Restricted access	750,000	375,000	
		Control the degree of	Free access	125,000	-	5
Physical Security Restricting physical access through role based access control	physical access	physical access to servers through role- based access control.	Limited access	312,500	50,000	 Productivity Disaster Readiness Technical Security Index
			Restricted access	375,000	375,000	
			Free access	250,000	-	
		Control the degree and	Limited access	500,000	250,000	
Physical Security	Degree of access given to visitors	quality of access for visitors.	Accompanied free access	750,000	3,750,000	ProductivityTechnical Security Index
			Accompanied limited access	1,000,000	6,250,000	
			Restricted access	1,250,000	7,500,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive actions will you	Focus on warnings	-	-	
Physical	Violation	use for violations of	Focus on fines	-	-	Employee Morale
Security	penalties	physical security	Focus on suspensions	-		Employee Morale
		policy?	Focus on termination	-	-	
	Degree of remote access by employee grade	For which employee grades is remote access ade	Executive management only	250,000	62,500	
Remote Access Policy			Upper management	375,000	187,500	Technical Security Index
, 100000 1 00,			Middle management	500,000	625,000	Productivity
			All professional staff members	875,000	2,500,000	
		M/b at any the	Low - read only	250,000	125,000	
Remote	Access	What are the maximum remote access	Medium - read/write	375,000	125,000	Technical
Access Policy	privileges permitted	privileges allowed?	High - read/write/delete	500,000	250,000	Security Index • Productivity
			Very high - administrator level	875,000	250,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive	Focus on warnings	-	-	
Remote Access Policy	Violation	actions will you use for violations of	Focus on fines	-	-	Employee Morale
Access 1 olicy	penalties	remote access policy?	Focus on suspensions	-	-	Employee Morale
		postoj.	Focus on termination	-	-	
	Type of software permitted for use by employees	How lenient are you in terms of software usage?	Freeware	-	-	
Authorized Software			Games	500,000	750,000	Employee Morale
Policy			Open-source	-	-	Technical Security Index
			Approved software	2,500,000	3,750,000	
	Software	How frequently will you evaluate	6	625,000	2,125,000	
Authorized Software Policy	evaluation frequency in months	systems for presence of unauthorized software?	12	875,000	1,250,000	ProductivityTechnicalSecurity Index
			18	1,125,000	1,000,000	Scounty much

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive actions will you	Focus on warnings	-	-	
Authorized Software	Violation	use for violations of	Focus on fines	-	-	Employee Morale
Policy	penalties	authorized software	Focus on suspensions	-	-	Employee Morale
		policy?	Focus on termination	-	-	
0	Intensity of quality assurance	How intense is your quality assurance testing?	Low	1,000,000	1,250,000	 Employee
Systems Development Testing			Medium	1,500,000	3,750,000	Morale • Technical Security Index
	testing		High	2,250,000	7,500,000	Security index
		Choose the degree of reliance on	Usability and other minor testing	250,000	1,250,000	
Systems Development Testing	Degree of reliance on external vendor	external vendors for systems development testing.	Supplementary testing	500,000	2,500,000	ProductivityTechnical
			Comprehensive testing	750,000	5,000,000	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		Choose the quality of the antivirus solution used across the	Baseline	750,000	1,250,000	Performance
Antivirus Policy	Quality of antivirus solution used		Strong	1,250,000	2,500,000	ProductivityTechnical
		organization.	State-of-the-art	1,750,000	4,500,000	Security Index
			Multiple times per day	600,000	720,000	
Antivirus	Frequency of scans	How frequently does the antivirus scan run?	Once daily	438,000	673,846	Productivity Technical
Policy			Once per week	340,000	309,091	Security Index
			Once per month	200,000	200,000	
		How frequently will you update	Always once released	438,000	1,314,000	
Antivirus Policy	Frequency of patch updates	your antivirus solution with	Only for major and critical updates	340,000	809,524	ProductivityTechnical Security Index
		patches?	Only for critical updates	200,000	428,571	
CERT	CERT funding	Choose the spending on CERT.	Minimum	1,250,000	125,000	Contribution to National Security Index
Controls			Maximum	3,000,000	250,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			4	625,000	1,875,000	
	Frequency of	How frequent is the issuance	5	500,000	1,500,000	
CERT Controls	automated advisories in	of automated advisories from	6	375,000	1,125,000	Contribution to National Security Index
	days	CERT?	8	250,000	875,000	
			10	125,000	625,000	
	Experience of	Choose the average	2	125,000	2,500,000	
			4	250,000	3,000,000	
CERT Controls	CERT responders in	experience of the CERT	6	375,000	3,375,000	Contribution to National Security Index
	years	responder.	8	500,000	3,750,000	
			10	625,000	4,375,000	
CERT	Training allocation funding	Choose the spending on CERT training.	Minimum	1,250,000	1,000,000	Contribution to National Security
Controls			Maximum	3,000,000	3,000,000	lun al a s s

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
CERT	Vulnerability database	Choose the spending on vulnerability	Minimum	500,000	250,000	Contribution to National Security
Controls	maintenance funding	database maintenance.	Maximum	1,500,000	500,000	Index
Other	Other Responders Funding for FBI responder maintenance	Choose the funding for FBI responder	Minimum	1,250,000	3,000,000	Contribution to National Security
Responders		maintenance.	Maximum	2,500,000	5,000,000	Index
Other	Funding for training FBI agents on	Choose the funding for FBI agent training	Minimum	1,250,000	500,000	Contribution to National Security
Responders	cybersecurity issues	on cybersecurity.	Maximum	3,000,000	1,250,000	Index
Other Responders	Cybersecurity school education programs spending	Specify the funding for cybersecurity school education programs.	Minimum	2,000,000	2,000,000	Contribution to National Security
			Maximum	3,500,000	4,000,000	Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Other	US Secret	Specify the funding for Secret Service	Minimum	1,000,000	1,000,000	Contribution to
Responders		investment against financial crimes.	Maximum	2,000,000	2,500,000	National Security Index
ISACs	Funding for the	Choose the funding for the	Minimum	1,250,000	1,000,000	Contribution to National Security
ISACS	ISAC	ISAC.	Maximum	2,000,000	3,000,000	Index
ISACs	Training and certification	Choose the funding for training and	Minimum	1,200,000	1,500,000	Contribution to National Security
ISACS	programs funding	certification programs for the ISACs.	Maximum	3,250,000	3,000,000	Index
Research	Cybersecurity research	Specify the funding for	Minimum	2,000,000	1,000,000	- National Security Index
Funding	funding	cybersecurity research.	Maximum	25,000,000	17,500,000	
Research	Specific	specific	Minimum	2,000,000	333,333	Contribution to
Funding technology la funding			Maximum	25,000,000	5,000,000	- National Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Research	University	Specify the funding for	Minimum	2,000,000	400,000	Contribution to
Funding	program funding	cybersecurity programs in universities.	Maximum	25,000,000	2,500,000	National Security Index
Research	Funding centers of excellence in information assurance research	Specify the funding for centers of excellence in	Minimum	2,000,000	1,000,000	Contribution to National Security
Funding		information assurance research.	Maximum	5,000,000	3,000,000	Index
Advisories	NSA security configuration	Choose the funding for creating NSA	Minimum	25,000	250,000	Contribution to National Security
guide creation spending	security configuration guides.	Maximum	1,000,000	750,000	Index	
Advisories	NIST library	Choose the funding for the	Minimum	500,000	300,000	Contribution to National Security Index
Advisories funding	funding	NIST library.	Maximum	1,000,000	500,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What is the degree of	Low	125,000	15,000,000	
Supply Tools	Degree of support offered to private	support offered to private companies for	Medium	250,000	35,000,000	Contribution to National Security Index
companies	companies	cybersecurity issues?	High	375,000	75,000,000	maex
	Nature of support offered to private	How strong are the cybersecurity tools offered to private	Low-level security tools	125,000	1,875,000	Contribution to National Security Index
Supply Tools			Sophisticated security tools	250,000	3,750,000	
	companies	companies?	Internally developed tools	375,000	3,750,000	
	Degree of collaboration with allies and Interpol	Choose the degree of collaboration with allies and Interpol.	Low	125,000	15,000,000	Contribution to
External Collaboration			Medium	250,000	35,000,000	International Policy Burden
			High	375,000	80,000,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Str			Unclassified	125,000	-	
	Strictness of	Choose the strictness of	Classified	250,000	15,000,000	Contribution to
Federal Gov. Information Classification	cybersecurity information	cybersecurity information classification.	Secret	375,000	30,000,000	National Security Index International Policy Burden
	classification		Top secret	500,000	-	
			Top secret/SCI	625,000	-	

3.4 Hytema

Table 6: Hytema Decision Reference

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Authortication	Authentication Kerberos servers spending you spend Kerberos servers for	How much will you spend on	Minimum	150,000	5,000	Technical Security Index
Authentication		servers for authentication?	Maximum	400,000	10,000	PerformanceDowntime
Authentication Key distribution centers spending	How much will you spend on key distribution	Minimum	10,000	4,000	Technical Security Index	
		centers for authentication?	Maximum	25,000	8,000	PerformanceDowntime
			0	5,000	10,000	
Dookup	RAID levels	What's the RAID level of your server backup?	1	10,000	15,000	Performance Compliance
Backup			5	15,000	17,500	ComplianceDowntime
			6	17,500	20,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Backup	Remote backup	amount to	Minimum	10,000	40,000	PerformanceDowntime
Баскир	spending	remote backup services.	Maximum	20,000	80,000	Compliance
		What is the	No encryption	10,000	-	
Data	Level of encryption	average scale of encryption used across the organization?	File	20,000	5,000	Technical Security Index Productivity
Encryption			Folder	30,000	14,000	
			Drive	35,000	25,000	
		The strength of encryption you	32 bits	10,000	10,000	
Data Encryption	Encryption strength in bits	will use; the higher the bit strength, the	64 bits	20,000	15,000	Technical Security IndexPerformance
<i>,</i> ,	J	stronger the encryption.	128 bits	25,000	20,000	Fellollilance
Load	DDOS protection	rotection to protect	Disable	-	-	Technical Security Index
Management through delayed binding	against DDOS attacks.	Enable	30,000	25,000	Security IndexPerformance	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Load	Load HTTP security through load	Use load balancing to improve	Disable	-	-	Technical Security Index
Management	balancing	security.	Enable	60,000	20,000	Performance
		Determine the	Critical updates only	10,000	10,000	Droductivity
Patch Management Frequency of patch management	patch	frequency of rolling out updates to systems.	Critical and important updates	20,000	20,000	ProductivityPerformanceTechnicalSecurity Index
			All updates	40,000	40,000	occurry macx
		How rigorously will you test patches before installing them?	Low	10,000	5,000	
Patch Management	Degree of patch testing prior to installation		Medium	20,000	10,000	PerformanceTechnicalSecurity Index
		J	High	40,000	15,000	
		Will you rely only on official	Unofficial	5,000	2,500	
Patch Management	Trustworthiness of patch	patches, or are you willing to use unofficial or community workarounds?	Trusted	10,000	5,000	DowntimePerformance
Management			Official	15,000	7,500	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What is the degree of	Low	20,000	10,000	Technical
Role Based Access Control	Degree of role- based access control	implementation of access control by	Medium	30,000	20,000	Security Index • Employee
		employee role?	High	44,000	30,000	Morale
Virtualization Choose virtualization or	Choose virtualization or cloud computing for	Virtualization	10,000	5,000	Technical Security	
OR Cloud Computing	cloud computing	your systems to improve security.	Cloud computing	50,000	10,000	Index
		To what degree	Limited	2,000	10,000	
If Virtualization Chosen	Degree of virtualization	will you implement virtualization?	Significant	7,000	20,000	Technical Security Index
		Viitualization	Full	20,000	40,000	
If Virtualization	Spending on underlying physical network	derlying the underlying ysical physical	Minimum	10,000	-	Technical Security Index
Chosen			Maximum	50,000	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		the network	Minor	10,000	20,000	
If Virtualization Chosen	Degree of isolation of network	under the virtualization	Medium	30,000	30,000	PerformanceTechnicalSecurity Index
		schema?	Complete	60,000	50,000	,
Chosen	Traffic monitoring on network	Choose the extent of traffic monitoring on the network.	Limited	10,000	5,000	
			Significant	20,000	20,000	PerformanceTechnical Security Index
			Full	30,000	30,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
If Cloud Computing Chosen Cloud hosting model		Choose the cloud hosting model for your systems. Will you pay more	Private	22,000	12,571	
	for a more secure private infrastructure or share	Hybrid	16,500	8,250	Technical Security IndexPerformance	
		deployment with other companies for less cost?	Public	8,800	6,600	
	Services offered by the cloud wit or all	At what level of engagement will you operate off the cloud? Will you stick with software, or will you go all the way to infrastructure?	Software as a service	10,000	20,000	
('omniiting			Platform as a service	20,000	30,000	Performance
			Infrastructure as a service	40,000	60,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How strict is the firewall	Low	5,000	5,000	
Firewall	Filtering		Medium	10,000	7,500	ProductivityTechnical
i iiewaii	strictness	configured to be?	Medium-high	12,500	10,000	Security Index • Performance
			High	17,500	12,500	
DNS	DNS DNS server redundancy	Enable DNS server redundancy to	Yes	10,000	15,000	- Downtime
Redundancy		reduce downtime.	No	5,000	-	
DNS	Split DNS	Use a split DNS topology to reduce	Yes	5,000	15,000	Downtime
Redundancy	topology	downtime.	No	10,000	-	Downtime
		How frequently	15	40,000	5,000	
Database	Database Security Frequency of forcing password changes in days	does the database ask for a change of password?	30	30,000	5,000	ProductivityTechnical
Security			60	20,000	5,000	Security Index
			90	10,000	5,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Degree of	Choose to separate admin	None	10,000	-	5
Database Security	separation of roles for admin and operator	and operator roles for database	Limited	20,000	250,000	ProductivityTechnical Security Index
	roles	systems.	Complete	30,000	350,000	
Database	Control	Are database control	Restricted	10,000	90,000	Productivity
Security	privileges	privileges restricted or distributed?	Distributed	5,000	180,000	Technical Security Index
Database	Database OS services	Will you enable or disable database-related OS	Disable	-	1	ProductivityPerformance
Security and associated ports	services and associated ports?	Enable	-	1	Technical Security Index	
Database Database Security honeypots	Database	Will you employ database honeypots to	Disable	-	-	ProductivityTechnical
	trap and redirect attacks?	Enable	-	1	Security Index	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Type of	Will you employ a network- based IDS, a host-based	Network-based intrusion detection (NIDS)	10,000	100,000	
IDPS	intrusion detection system to install		Host-based intrusion detection (HIDS)	30,000	80,000	Technical Security Index
	- ,	IDS, or both?	Both	36,000	160,000	
IDDS	IDPS Class of honeypot to deploy	Will you use a production honeypot or go for a research	Production honeypot	20,000	90,000	Technical Security
IDF3		honeypot with better analytics?	Research honeypot	10,000	70,000	Index
		How strong is	Pure honeypot	10,000	90,000	
IDPS	Strength of honeypot to deploy	the honeypot you deploy?	Low interaction honeypot	20,000	60,000	Index
	. ,		High interaction honeypot	30,000	90,000	
	IT team size	What strength will you keep your IT teams at, in relation to the industry average?	Less than average	10,000	600,000	 Productivity Employee Morale Technical Security Index
Hiring and Employee Policy			Average	30,000	900,000	
			More than average	50,000	1,400,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Full-time	Will you choose to bolster your	All	8,800	4,224	Productivity
Hiring and Employee Policy	employees as a percentage of	IT team with temporary or	0.9	16,500	3,960	Employee Morale Technical
	the workforce	part-time hires?	0.8	22,000	5,867	Security Index
		What's the average experience you're looking for when you hire for IT teams?	3	8,800	12,941	
	Hiring by average experience in		5	16,500	21,000	
Hiring and Employee Policy			7	22,000	26,400	Internal Security Index
	years		8	24,000	27,429	
			9	25,000	29,310	
Hiring and Employee Policy	Forced rotation of employees	Will you make employee rotation mandatory?	Disable	-	,	ProductivityEmployee
			Enable	25,000	45,000	Morale Internal Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Hiring and Employee	Forced vacation	Will you make employee	Disable	-	-	ProductivityEmployeeMorale
Policy	for employees	vacations mandatory?	Enable	75,000	85,000	 Internal Security
Advisory Subscription		To what degree does your organization rely on security	None	-	-	Technical Security
		advisories from the federal government?	Limited	30,000	150,000	Index
Advisory	D. II	To what degree will you rely on federal government support?	None	-	-	
Subscription and Federal Help	Reliance on federal government support		For critical issues only	300,000	170,000	Reputation
Пор	Зарроге		Ongoing	400,000	250,000	
Training	Training by funding	What is the extent of funding for cybersecurity training?	Minimum	1,000	50,000	Internal Security Index Productivity
			Maximum	2,000	100,000	Employee Morale

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Average	How much will you reimburse	25% of fees	5,000	20,000	
Training	Average compensation bonus as a	employees for technical	50% of fees	10,000	40,000	Technical Security IndexProductivity
Incentives	fraction of technical certification fees	certification for security	75% of fees	15,000	60,000	Employee Morale
		training?	100% of fees	20,000	80,000	
Training	Link training	Will you link training outcomes to promotion?	Yes	10,000	10,000	Technical Security Index Productivity
Incentives	outcomes to promotion		No	-	-	ProductivityEmployeeMorale
Training Link training	Will you link training	Yes	15,000	7,000	Technical Security IndexProductivity	
Incentives	1 MINOMAS IN 1	No	-	-	Employee Morale	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Training and	Focus on training area:	training area:	Minimum	-	1	Technical Security Index
Auditing	network vulnerabilities		Maximum	-	-	Compliance
Training and	Focus on training area:	Choose whether to focus your	Minimum	-	-	Technical Security Index
Auditing	controls	security auditing efforts	Maximum	-	-	Compliance
Training and	Training and Auditing Focus on training area: encryption	on network vulnerabilities, controls,	Minimum	-	-	Technical Security Index
Auditing		encryption, and penetration.	Maximum	-	-	Compliance
Training and	Focus on training area:		Minimum	-	-	 Technical Security Index
Auditing	Auditing penetration testing		Maximum	-	-	Compliance
	Frequency of	How often will you run physical audits of system	Every three months	10,000	20,000	
Training and ph Auditing of	physical audits of the		Every six months	7,500	10,000	Technical Security Index
	equipment	equipment?	Once a year	5,000	5,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How much redundancy will	Low	5,000	5,000	
Business Continuity Planning	Degree of IT data storage redundancy	you build in for IT data	Medium	10,000	10,000	Disaster Readiness
	·	storage?	High	15,000	20,000	
		How much	Low	7,500	20,000	
Business Continuity Planning	Degree of IT network redundancy	redundancy will you build in for IT networks?	Medium	12,500	30,000	Disaster Readiness
	·	TI TICLWOTKS:	High	20,000	50,000	
		How much	1	5,000	25,000	
Business Continuity Planning	Levels of power backup redundancy	redundancy will you build in for power backup?	2	10,000	45,000	Disaster Readiness
	·	power backap.	3	15,000	67,500	
	i nacklin sitas	How many backup sites will you maintain?	1	5,000	75,000	
Business Continuity Planning			2	10,000	150,000	Disaster Readiness
			3	15,000	200,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Number of	How many backup	1	5,000	10,000	
Business Continuity Planning	redundant backup communication	communication links will you	2	10,000	17,500	Disaster Readiness
	links	maintain?	3	15,000	25,000	
	Business Policy review Continuity frequency in	How often will	3	-	100,000	
Business Continuity		you review disaster recovery policy?	6	-	75,000	Disaster Readiness
Planning	months		9	-	50,000	Diodotol Moduliose
			12	-	25,000	
	Degree of information sharing on	ormation cybersecurity	High - full disclosure	16,500	3,300	
Information informatio			Medium - non- sensitive disclosure	8,800	2,200	ProfitabilityDisaster Readiness
	attaono		Low - no disclosure	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		To what extent does the	High - full disclosure	16,500	3,536	
Information Sharing	Degree of non- crisis information	organization share routine cybersecurity	Medium - non- sensitive disclosure	8,800	1,760	ProfitabilityDisasterReadiness
	sharing	information publicly?	Low - no disclosure	-	-	
Public	Spending on	How much will you spend on public	Minimum	50,000	25,000	Reputation
Relations	public relations	relations?	Maximum	100,000	100,000	reputation
Emergency	Spending on emergency	How much will you spend on emergency	Minimum	5,000	1,000	Disaster Readiness
Bypass Policy	bypass policy	bypass policy?	Maximum	10,000	2,000	Disaster Readilless
	Response to	lations of typical	Not allowed	25,000	12,500	
Emergency Bypass Policy violations of typical separation of duties protocol	violations of typical		Permitted with limitations	15,000	20,000	Technical Security IndexDisaster
	Duties protocol? Allowed	Allowed	2,500	35,000	Readiness	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive actions will you use for violations of	Focus on warnings	-	-	
Emergency Bypass Policy	Violation penalties		Focus on fines	-	-	Employee Morale
bypass Folicy	perialities	emergency bypass policy?	Focus on suspensions	-	ı	
			Focus on termination	-	1	
	No. of people in groups to	put in groups to overlook and	2	17,600	12,000	
			3	33,000	22,164	 Productivity
Information Sharing Policy	overlook and enforce internal		4	44,000	30,000	Technical Security IndexEmployee
	information sharing	information sharing?	5	48,000	31,304	Morale
			6	50,000	30,357	
	Information Sharing Policy Internal information sharing by role- based access control	How restrictive is the system for internal sharing of information?	Strictly need-to-know	15,000	50,000	Productivity
			Limited access	10,000	35,000	Technical Security IndexEmployee
			Open system	1,000	-	Morale

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How restrictive	Strictly need-to-know	15,000	50,000	 Productivity
Information Sharing Policy	Degree of external information sharing	is the system for external sharing of information?	Limited access	10,000	35,000	Technical Security IndexCustomer Satisfaction
	C		Open system	1,000	-	Compliance
		How frequently will you share information for	7 days	30,000	2,500	
Information	Frequency of disclosure for InfraGard	the InfraGard service of information sharing between private and public entities?	14 days	25,000	5,000	 Contribution to National
Sharing Policy	communication in days		21 days	12,500	7,500	-
			28 days	10,000	10,000	
		What punitive	Warnings	-	-	
Information Sharing Policy	Violation penalties	actions will you use for violations of information sharing policy?	Fines	-	-	Employee Morale
			Suspensions	-	-	Employee Morale
			Termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How open is your organization about breaches	All incidents	24,000	50,000	
Breach Notification	Degree of openness of		Critical and significant incidents	22,000	35,000	ReputationCustomer Satisfaction
Policy	breach notification	that have happened to its	Only critical incidents	16,500	20,000	 Contribution to National Security Index
		systems?	None of the incidents	8,800	0	
	Investigative agencies to call in for major security breaches	Which investigative agencies will you approach for major security breaches?	Private investigators	8,800	12,571	Reputation
Breach Notification			Forensic investigators	16,500	24,750	 Employee Morale Contribution to
Policy			CERT	-	ı	National Security Index Downtime
			FBI/NSA	-	ı	
		What punitive	Focus on warnings	-	ı	
Breach Notification Policy	Notification Violation	actions will you use for violations of breach notification policy?	Focus on fines	-	ı	Employee Marala
			Focus on suspensions	-	-	Employee Morale
			Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Information	Privacy program	How much will you spend on your	Minimum	10,000	5,000	Employee Morale
Privacy Policy	investment spending	organization's privacy program?	Maximum	50,000	10,000	Customer Satisfaction
Information	Appoint a dedicated	Will you appoint a dedicated	Yes	8,800	10,560	Employee Morale
Privacy Policy	privacy officer	privacy officer?	No	-	-	Customer Satisfaction
Information	Privacy training		Minimum	10,000	5,000	Employee Morale
Privacy Policy	spending for employees	employees on privacy policies?	Maximum	40,000	10,000	Customer Satisfaction
	Degree of information and record retention	What sort of	Critical information	25,000	20,000	
Information Privacy Policy		information will you retain?	Operational information	15,000	75,000	Performance Employee Morale
			All information	37,500	110,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive	Focus on warnings	-	-	
Information	Violation	actions will you use for violations of	Focus on fines	-	-	Employee Morale
Privacy Policy	penalties	information privacy policy?	Focus on suspensions	-	-	Employee Morale
		posses,	Focus on termination	-	-	
	Degree of freedom given	How free are your employees to communicate over the Internet?	Restricted	12,500	50,000	Employee
General Access Policies	to employees regarding communications		Time-limited	12,500	50,000	
	over the Internet		Free	-	-	
	Degree of	How free are your employees to browse non-business sites?	Restricted	5,000	50,000	
Access freedom browsing	freedom over browsing non-		Time-limited	10,000	50,000	Employee MoraleProductivity
	Dusiness sites		Free	-	-	·

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Dagge of	Choose the degree to which	None	-	-	
General Access	Degree of logging of Internet access	Internet access and other	Limited actions	10,000	20,000	 Internal Security Index
Policies	and other system actions and accesses	system actions and access are	Critical system access only	25,000	75,000	Employee Morale
	and accesses	logged.	All actions	50,000	125,000	
		Choose the number of permitted login attempts.	3	-	ı	 Employee
General Access Policies	Number of permitted login attempts		5	-	ı	Morale ProductivityTechnical
	·		7	-	-	Security Index
Δηγρας	Password validity in days	How long will passwords set be valid?	15	20,000	30,000	 Employee
			30	20,000	15,000	Morale Productivity Technical
			45	20,000	10,000	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How many	4	20,000	10,000	 Employee
General Access Policies	Password length requirements	characters long should the password be?	6	30,000	10,000	Morale ProductivityTechnical
	·	password bo:	8	45,000	10,000	Security Index
	General Access Policies Non-use of prior passwords are set to be invalid for use?	• •	1	-	-	 Employee
Access		3	-	1	Morale ProductivityTechnical	
		ioi use:	6	-	1	Security Index
		What punitive	Focus on warnings	-	1	
General Access Policies	Violation penalties	actions will you use for violations of general access policy?	Focus on fines	-	-	Employee Morale
			Focus on suspensions	-	1	Employee Morale
			Focus on termination	-	1	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Physically	Control the	Free access	10,000	-	
Physical Security	isolate rooms containing important	degree of physical access to servers.	Limited access	25,000	20,000	Technical Security Index
	infrastructure		Restricted access	30,000	15,000	
	Physical Security Restricting physical access through role based access	Control the degree of	Free access	5,000	-	Productivity
		physical access to servers through role- based access control.	Limited access	12,500	2,000	 Disaster Readiness Technical Security Index
	control		Restricted access	15,000	15,000	
			Free access	10,000	-	
		Control the degree and	Limited access	20,000	10,000	
Physical Security	Degree of access given to visitors	quality of access for visitors.	Accompanied free access	30,000	150,000	ProductivityTechnical Security Index
			Accompanied limited access	40,000	250,000	
			Restricted access	50,000	300,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive	Focus on warnings	-	1	
Physical	Violation	actions will you use for violations of	Focus on fines	-	-	Employee Morale
Security	penalties	physical security policy?	Focus on suspensions	-	-	Employee Morale
			Focus on termination	-	-	
	Degree of remote access by employee grade	For which employee grades is remote access available?	Executive management only	10,000	2,500	
Remote			Upper management	15,000	7,500	Technical Security Index
Access Policy			Middle management	20,000	25,000	Productivity
			All professional staff members	35,000	100,000	
		M/hat are the	Low - read only	10,000	5,000	
Remote	Access privileges permitted	What are the maximum remote access privileges allowed?	Medium - read/write	15,000	5,000	Technical Security Index
Access Policy			High - read/write/delete	20,000	10,000	Security Index • Productivity
			Very high - administrator level	35,000	10,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive	Focus on warnings	-	-	
Remote	Violation	actions will you use for violations of	Focus on fines	-	-	Employee Morale
Access Policy	penalties	remote access policy?	Focus on suspensions	-	-	Employee Morale
			Focus on termination	-	-	
	Type of software permitted for use by employees	How lenient are you in terms of software usage?	Freeware	-	-	
Authorized Software			Games	20,000	30,000	Employee Morale
Policy			Open-source	-	-	 Technical Security Index
			Approved software	100,000	150,000	
	Cofficient	How frequently will you	6	25,000	85,000	
Authorized Software Policy	Software evaluation frequency in months	evaluate systems for presence of unauthorized software?	12	35,000	50,000	ProductivityTechnicalSecurity Index
			18	45,000	40,000	Security index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive actions will you	Focus on warnings	-	1	
Authorized Software	Violation	use for violations of	Focus on fines	-	-	Employee Morale
Policy	penalties	authorized software	Focus on suspensions	-	-	Employee Morale
		policy?	Focus on termination	-	-	
	Intensity of quality assurance	How intense is your quality assurance testing?	Low	40,000	50,000	Employee
Systems Development Testing			Medium	60,000	150,000	Morale Technical Security Index
_	testing		High	90,000	300,000	
		ance on vendors for	Usability and other minor testing	10,000	50,000	
Systems Development Testing	Degree of reliance on external vendor		Supplementary testing	20,000	100,000	 Technical
			Comprehensive testing	30,000	200,000	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		Choose the quality of the	Baseline	30,000	50,000	Performance
Antivirus Policy	Quality of antivirus solution used	antivirus solution used across the	Strong	50,000	100,000	ProductivityTechnical
		organization.	State-of-the-art	70,000	180,000	Security Index
	Frequency of scans	How frequently does the antivirus scan run?	Multiple times per day	24,000	28,800	
Antivirus			Once daily	22,000	33,846	Productivity Tachnical
Policy			Once per week	16,500	15,000	Technical Security Index
			Once per month	8,800	8,800	
		How frequently will you update	Always once released	22,000	66,000	
Antivirus Policy	Frequency of patch updates	your antivirus solution with patches?	Only for major and critical updates	16,500	39,286	ProductivityTechnical Security Index
			Only for critical updates	8,800	18,857	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Insurance i Policy a	Degree of	How high will you prioritize insurance against a	Low	8,800	88,000	
	insurance used against a		Medium	16,500	132,000	DisasterReadinessCompliance
	cyberattack	cyberattack?	High	22,000	330,000	

3.5 Mistral Bank

Table 7: Mistral Bank Decision Reference

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Authentication	Kerberos servers	How much will you spend on Kerberos	Minimum	150,000	5,000	Technical Security Index
spending	spending	servers for authentication?	Maximum	400,000	10,000	Performance Downtime
	Key distribution centers	How much will you spend on key distribution centers for authentication?	Minimum	10,000	4,000	Technical Security Index
	spending		Maximum	25,000	8,000	PerformanceDowntime
			0	5,000	10,000	
Backup	RAID levels	What's the RAID level of your server backup?	1	10,000	15,000	PerformanceComplianceDowntime
			5	15,000	17,500	
			6	17,500	20,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Backup	Hot site maintenance	choose your spending on maintaining sites that can	Minimum	200,000	25,000	Downtime
	spending serve as it	functional sites in case of	Maximum	400,000	125,000	
Backup	Backup Remote backup spending	Choose the amount to spend on remote backup services.	Minimum	10,000	40,000	PerformanceDowntime
			Maximum	20,000	80,000	Compliance
		What is the	No encryption	10,000	-	
Data	Level of	average scale of encryption used	File	20,000	5,000	Technical Security IndexProductivity
Encryption	Encryption encryption	across the	Folder	30,000	14,000	
		organization?	Drive	35,000	25,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		The strength of encryption you will use; the	32 bits	10,000	10,000	Technical
Data Encryption	Encryption strength in bits	higher the bit strength, the	64 bits	20,000	15,000	Security Index • Performance
		stronger the encryption.	128 bits	25,000	20,000	
Load Management	DDOS protection through delayed	Delay binding to protect against DDOS attacks.	Disable	-	-	Technical Security Index
Management	binding		Enable	30,000	25,000	Performance
Load Management	HTTP security through load	Use load balancing to improve	Disable	-	-	Technical Security Index
- Management	balancing	security.	Enable	60,000	20,000	Performance
		Determine the frequency of rolling out updates to systems.	Critical updates only	10,000	10,000	Productivity
Management patch	Frequency of patch management		Critical and important updates	20,000	20,000	Performance Technical Security Index
			All updates	40,000	40,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected	
Patch	Degree of patch	How rigorously will you test	Low	10,000	5,000	Performance	
Management	testing prior to installation	patches before	Medium	20,000	10,000	Technical Security Index	
		installing them?	High	40,000	15,000	County mack	
	Patch Trustworthiness of patch	Will you rely only on official patches, or are	Unofficial	5,000	2,500		
		you willing to use unofficial or community workarounds?	Trusted	10,000	5,000	DowntimePerformance	
			Official	15,000	7,500		
Role Based	Degree of role-	Limplementation	Low	20,000	10,000	Technical	
Access Control	based access control		Medium	30,000	20,000	Security Index • Employee Morale	
		employee role?	High	44,000	30,000	iviorale	
Virtualization OR Cloud	Choose virtualization or	Choose virtualization or cloud computing	Virtualization	10,000	5,000	Technical Security	
Computing cloud computing		for your systems to improve security.	Cloud computing	50,000	10,000	iliuex	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
If	Degree of	To what degree will you	Limited	2,000	10,000	Technical Security
Virtualization Chosen	virtualization	implement virtualization?	Significant	7,000	20,000	Index
		virtualization?	Full	20,000	40,000	
If Virtualization	Spending on underlying physical	How much will you spend on the underlying	Minimum	10,000	-	Technical Security
Chosen	network	physical network?	Maximum	50,000	-	muex
If	Degree of	How isolated is the network	Minor	10,000	20,000	Performance
Virtualization Chosen	isolation of network	under the virtualization	Medium	30,000	30,000	 Technical Security Index
		schema?	Complete	60,000	50,000	ŕ
If	Traffic monitoring on network	Choose the extent of traffic monitoring on the network.	Limited	10,000	5,000	 Performance
Virtualization Chosen			Significant	20,000	20,000	 Technical Security Index
			Full	30,000	30,000	200a , 00A

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		Choose the cloud hosting model for your systems. Will you pay more for a more secure private infrastructure or share deployment with other companies for less cost?	Private	22,000	12,571	
If Cloud Computing Chosen	Cloud hosting model		Hybrid	16,500	8,250	 Technical Security Index Performance
			Public	8,800	6,600	
		At what level of engagement will you operate off the cloud? Will you stick with software, or will you go all the way to infrastructure?	Software as a service	10,000	20,000	
If Cloud Computing Chosen	Services offered by the cloud		Platform as a service	20,000	30,000	Technical Security IndexPerformance
			Infrastructure as a service	40,000	60,000	
		How strict is the	Low	5,000	5,000	- Productivity
Firewall	Filtering strictness	firewall	Medium	10,000	7,500	ProductivityTechnical
· iioiiaii		configured to be?	Medium-high	12,500	10,000	Security Index • Performance
			High	17,500	12,500	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
DNS	DNS server	DNS server server redundancy to	Yes	10,000	15,000	Downtime
Redundancy	redundancy	reduce downtime.	No	5,000	-	
DNS	DNS Split DNS to redundancy topology redundancy	Use a split DNS topology to reduce	Yes	5,000	15,000	Downtime
Redundancy		downtime.	No	10,000	-	
	Croquency of	database ask for a change of	15	40,000	5,000	
Database	Frequency of forcing		30	30,000	5,000	ProductivityTechnical
Security	password changes in days		60	20,000	5,000	
		password?	90	10,000	5,000	
5	Degree of separation of	Choose to separate admin	None	10,000	-	 Productivity
Database Security	roles for admin and operator roles	and operator roles for database systems.	Limited	20,000	250,000	Technical Security Index
			Complete	30,000	350,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Database	Control	Are database control privileges	Restricted	10,000	90,000	ProductivityTechnical
Security privileges	restricted or distributed?	Distributed	5,000	180,000	Security Index	
Database	OS services and associated	Will you enable or disable database-related OS	Disable	-	1	ProductivityPerformance
Security ports	services and associated ports?	Enable	-	-	Technical Security Index	
	Database	Will you employ database honeypots to	Disable	-	ı	ProductivityTechnical
	honeypots	trap and redirect attacks?	Enable	-	-	Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Type of	Will you employ a network-based IDS, a host- based IDS, or both?	Network-based intrusion detection (NIDS)	10,000	100,000	
IDPS	intrusion detection system to install		Host-based intrusion detection (HIDS)	30,000	80,000	Technical Security Index
			Both	36,000	160,000	
IDPS	Class of honeypot to	Will you use a production honeypot or go for a research honeypot with better analytics?	Production honeypot	20,000	90,000	Technical Security
	deploy		Research honeypot	10,000	70,000	Index
			Pure honeypot	10,000	90,000	
IDPS h	Strength of honeypot to deploy	How strong is the honeypot you deploy?	Low interaction honeypot	20,000	60,000	Technical Security Index
			High interaction honeypot	30,000	90,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Hiring and		What strength	Less than average	10,000	600,000	ProductivityEmployee
Employee Policy	IT team size	will you keep your IT teams at, in relation to the industry	Average	30,000	900,000	Morale • Technical
		average?	More than average	50,000	1,400,000	Security Index
Hiring and	Employee employees as a percentage of IT	Will you choose	All	8,800	4,224	ProductivityEmployee
Employee Policy		to bolster your IT team with temporary or part-time hires?	0.9	16,500	3,960	Morale • Technical Security Index
	the workforce		0.8	22,000	5,867	
		What's the	3	8,800	12,941	Internal Security
Hiring and	Hiring by average	average experience	5	16,500	21,000	
Employee Policy	experience in	you're looking for when you	7	22,000	26,400	Index
	years	hire for IT teams?	8	24,000	27,429	
			9	25,000	29,310	
Hiring and Employee	Spending on background	round background checks on	Minimum	1,000	10,000	 Internal Security Index
Policy check of vendors			Maximum	2,000	20,000	Compliance

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Hiring and Employee	Forced rotation of employees	Will you make employee	Disable	-	1	ProductivityEmployeeMorale
Policy	or employees	rotation mandatory?	Enable	25,000	45,000	Internal Security Index
Hiring and Employee	Forced vacation for employees	Will you make employee vacations	Disable	-	-	ProductivityEmployeeMorale
Policy	Tor employees	mandatory?	Enable	75,000	85,000	Internal Security Index
		To what degree does your organization rely on security advisories from the federal government?	None	-	-	Technical Security Index
Advisory Subscription and Federal Help	Degree of advisory referral		Limited	30,000	150,000	
		To what degree	None	-	-	
Advisory Subscription and Federal	Reliance on federal government support	will you rely on federal government support?	For critical issues only	300,000	170,000	Technical Security IndexReputation
Help			Ongoing	400,000	250,000	- Nopalation

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Training	Training by	What is the extent of funding	Minimum	1,000	50,000	Internal SecurityIndexProductivity
	funding	for cybersecurity training?	Maximum	2,000	100,000	Employee Morale
Focus on	Choose the focus of phishing	Customers only	-	-		
Training	Training phishing training by target	training: customers,	Employees only	-	1	Customer Satisfaction
	ŭ	employees, and both.	Customers and employees	-	-	
	Focus on	Choose the focus of phishing	Customers only	5,000	25,000	Customer Satisfaction
Training	phishing training on credit card fraud	training: customers,	Employees only	7,500	100,000	
		employees, and both.	Customers and employees	12,000	125,000	
Training	Investment training for the fraud investigation team	How much will you invest in training for the fraud investigation team?	Minimum	3,000	75,000	Customer Satisfaction
			Maximum	7,500	125,000	Sausiaction

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Training	Average compensation Training bonus as a	How much will you reimburse employees for	25% of fees 50% of fees	5,000	20,000	Technical Security Index
Incentives	fraction of technical certification fees	technical certification for security training?	75% of fees	15,000	60,000	ProductivityEmployeeMorale
	Certification fees		100% of fees	20,000	80,000	
Training	Link training outcomes to promotion	Will you link training outcomes to promotion?	Yes	10,000	10,000	Technical Security IndexProductivity
incentives			No	-	1	Employee Morale
Training Incentives Link training outcomes to evaluation		5 11 , 2.2	Yes	15,000	7,000	Technical Security IndexProductivity
	outcomes to evaluation?	No	-	1	Employee Morale	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Training and Auditing	Focus on training area: network		Minimum	-	-	Technical Security Index
Additing	vulnerabilities		Maximum	-	-	Compliance
Training and	Training and Auditing Focus on training area: controls	Choose whether to focus your	Minimum	-	-	Technical Security Index
Additing		security auditing efforts on network	Maximum	-	-	Compliance
Training and Auditing	Focus on training area:	vulnerabilities, controls, encryption, and penetration.	Minimum	-	-	Technical Security Index
Additing	encryption		Maximum	-	-	Compliance
Training and Auditing	Focus on training area: penetration		Minimum	-	-	Technical Security Index
Additing	testing		Maximum	-	-	Compliance
Training and	Frequency of physical audits of the equipment	How often will you run physical audits of system equipment?	Every three months	10,000	20,000	Taskwisel Casywity
Training and Auditing			Every six months	7,500	10,000	Technical Security Index
		Once a year	5,000	5,000		

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Business	Degree of IT	How much	Low	5,000	5,000	
Continuity Planning	data storage redundancy	redundancy will you build in for	Medium	10,000	10,000	Disaster Readiness
	,	IT data storage?	High	15,000	20,000	
Business	Degree of IT	How much	Low	7,500	20,000	
Continuity Planning	network redundancy	redundancy will you build in for	Medium	12,500	30,000	Disaster Readiness
		IT networks?	High	20,000	50,000	
Business	Levels of power	How much redundancy will you build in for power backup?	1	5,000	25,000	
Continuity Planning	backup redundancy		2	10,000	45,000	Disaster Readiness
9	, , , , , , , , , , , , , , , , , , , ,		3	15,000	67,500	
Business		How many	1	5,000	75,000	
Continuity Planning	Number of backup sites	backup sites will you maintain?	2	10,000	150,000	Disaster Readiness
. iaig		you mamam.	3	15,000	200,000	
Business	Number of redundant	How many backup communication links will you maintain?	1	5,000	10,000	
Continuity Planning	Continuity backup		2	10,000	17,500	Disaster Readiness
. idining	links		3	15,000	25,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How often will you review	3	-	100,000	
Business Continuity	Policy review frequency in		6	-	75,000	Disaster Readiness
Planning	months	disaster recovery policy?	9	1	50,000	Disaster Reduitiess
			12	-	25,000	
		To what extent does the	High - full disclosure	16,500	3,300	
Information Sharing	Degree of information sharing on attacks	organization share cybersecurity attack information publicly?	Medium - non- sensitive disclosure	8,800	2,200	ProfitabilityDisasterReadiness
			Low - no disclosure	-	1	
	Degree of non-	To what extent does the organization share routine cybersecurity information publicly?	High - full disclosure	16,500	3,536	
Information cris	crisis information sharing ir		Medium - non- sensitive disclosure	8,800	1,760	ProfitabilityDisasterReadiness
			Low - no disclosure	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Public	Spending on	Spending on you spend on	Minimum	50,000	25,000	Reputation
Relations	public relations	public relations?	Maximum	100,000	100,000	
Emergency Pypage Policy	Spending on emergency	How much will you spend on	Minimum	5,000	1,000	Disaster Readiness
Bypass Policy	bypass policy	emergency bypass policy?	Maximum	10,000	2,000	
	I typical	What is the response to violations of typical Separation of Duties protocol?	Not allowed	25,000	12,500	Technical
Emergency Bypass Policy			Permitted with limitations	15,000	20,000	Security Index • Disaster Readiness
	duties protocol		Allowed	2,500	35,000	Reaumess
		What punitive	Focus on warnings	-	-	
Emergency	Violation	actions will you use for	Focus on fines	-	-	Employee Marale
Bypass Policy	penalties	violations of emergency bypass policy?	Focus on suspensions	-	-	Employee Morale
			Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	No. of people in	How many people will you put in groups to	2	17,600	12,000	Dona do cativo ita e
Information	groups to overlook and		3	33,000	22,164	ProductivityTechnical
Sharing Policy	enforce internal	overlook and enforce	4	44,000	30,000	Security Index • Employee
,	information sharing	information	5	48,000	31,304	Morale
		sharing?	6	50,000	30,357	
Information	Internal	haring by role-	Strictly need-to-know	15,000	50,000	Productivity Technical
Sharing Policy	sharing by role- based access		Limited access	10,000	35,000	Security Index • Employee
	control		Open system	1,000	-	Morale
Information	Degree of external information sharing	How restrictive is the system for external sharing of information?	Strictly need-to-know	15,000	50,000	ProductivityTechnicalSecurity Index
Sharing Policy			Limited access	10,000	35,000	Customer
. 66)			Open system	1,000	-	Satisfaction • Compliance

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Frequency of	nfraGard service of information	7 days	30,000	2,500	
Information Sharing	disclosure for InfraGard		14 days	25,000	5,000	Contribution to National Contribution to
Policy	communication in days		21 days	12,500	7,500	Security Index • Profitability
			28 days	10,000	10,000	
		What punitive actions will you	Warnings	-	-	
Information Sharing	Violation	use for violations of information sharing policy?	Fines	-	-	Employee Morale
Policy	penalties		Suspensions	-	ı	
			Termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		How open is your organization about breaches that have happened to its systems?	All incidents	24,000	13,200	
Breach Notification	Degree of openness of		Critical and significant incidents	22,000	11,000	ReputationCustomer Satisfaction
Policy	breach notification		Only critical incidents	16,500	10,667	Contribution to National Security Index
			None of the incidents	8,800	8,800	
		Which	Private investigators	8,800	12,571	Reputation
Breach Notification	Investigative agencies to call in for major security breaches	investigative agencies will you approach	Forensic investigators	16,500	24,750	EmployeeMoraleContribution to
Policy		for major security breaches?	CERT	-		National Security Index Downtime
			FBI/NSA	-	-	Downline

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Breach Notification Policy	Violation penalties	What punitive actions will you use for violations of breach	Focus on warnings Focus on fines Focus on suspensions	-	-	Employee Morale
		notification policy?	Focus on termination	-	-	
Information	Information Privacy program investment spending	How much will you spend on your	Minimum	10,000	5,000	Employee Morale
Privacy Policy		organization's privacy program?	Maximum	50,000	10,000	CustomerSatisfaction
Information	Appoint a dedicated	Will you appoint a dedicated	Yes	8,800	10,560	Employee Morale
Privacy Policy	privacy officer	privacy officer?	No	-	-	Customer Satisfaction
Information	Privacy training you spend or spending for employees employees o	How much will vou spend on	Minimum	10,000	5,000	Employee
Privacy Policy spen		training employees on privacy policies?	Maximum	40,000	10,000	Morale • Customer Satisfaction

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Information	Degree of	on and information will	Critical information	25,000	20,000	Performance
Privacy Policy	information and record retention		Operational information	15,000	75,000	Employee Morale
			All information	37,500	110,000	
	What punitive actions will you use for penalties violations of information	actions will you	Focus on warnings	-	-	
Information			Focus on fines	-	-	
Privacy Policy		information	Focus on suspensions	-	-	Employee Morale
		privacy policy?	Focus on termination	-	-	
	Degree of freedom given	How free are	Restricted	12,500	50,000	
General Access	to employees regarding	your employees to communicate	Time-limited	12,500	50,000	EmployeeMorale
Policies	communications over the Internet		Free	-	-	Productivity

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
General Access Policies	Degree of freedom over browsing non-business sites	How free are your employees to browse non-business sites?	Restricted Time-limited Free	5,000 10,000	50,000	Employee MoraleProductivity
General Access Policies	Degree of logging of Internet access and other system actions and accesses	Choose the degree to which Internet access and other system actions and access are logged.	None Limited actions Critical system access only All actions	10,000 25,000 50,000	75,000 125,000	 Internal Security Index Employee Morale
General Access Policies	Number of permitted login attempts	Choose the number of permitted login attempts.	357	-	-	 Employee Morale Productivity Technical Security Index
General Access Policies	Password validity in days	How long will passwords set be valid?	15 30 45	20,000 20,000	30,000 15,000 10,000	 Employee Morale Productivity Technical Security Index

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
General Access	Password length	How many characters long	6	20,000	10,000	EmployeeMoraleProductivity
Policies	requirements	should the password be?	8	45,000	10,000	 Technical Security Index
General , .	How many prior	1	-	-	EmployeeMorale	
Access Policies	Non-use of prior passwords	passwords are set to be invalid for use?	3	-	-	ProductivityTechnical
			6	-	-	Security Index
	Violation penalties	What punitive actions will you use for violations of general access policy?	Focus on warnings	-	-	
General Access			Focus on fines	-	-	Employee Morale
Policies			Focus on suspensions	-	-	F : 7 : 2 : 2 : 2 : 2
			Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
	Physically isolate rooms	Control the	Free access	10,000	-	
Physical Security	Physical	degree of physical access to servers.	Limited access	25,000	20,000	• Productivity• Disaster
			Restricted access	30,000	15,000	
	Physical Security Restricting physical access through role based access	Control the degree of	Free access	5,000	-	
		physical access to servers through role-	Limited access	12,500	2,000	
control	based access control.	Restricted access	15,000	15,000	Security Index	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
			Free access	10,000	1	
	Dograp of	Control the	Limited access	20,000	10,000	Droductivity
Physical Security	Degree of access given to visitors	degree and quality of access for visitors.	Accompanied free access	30,000	150,000	ProductivityTechnical Security Index
	ľ		Accompanied limited access	40,000	250,000	
			Restricted access	50,000	300,000	
		What punitive	Focus on warnings	-	-	
Physical	Violation	What punitive actions will you use for violations of physical security policy?	Focus on fines	-	-	Employee Morale
Security	penalties		Focus on suspensions	-	-	
			Focus on termination	-	-	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		mote access / employee grades is remote access	Executive management only	10,000	2,500	
Remote Access Policy	Degree of remote access by employee		Upper management	15,000	7,500	Technical Security Index
grade			Middle management	20,000	25,000	 Productivity
			All professional staff members	35,000	100,000	
		What are the maximum remote access privileges allowed?	Low - read only	10,000	5,000	
	Access		Medium - read/write	15,000	5,000	Technical
Remote Access Policy	privileges permitted		High - read/write/delete	20,000	10,000	Security Index • Productivity
			Very high - administrator level	35,000	10,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive	Focus on warnings	-	-	
Remote	Violation	actions will you use for violations of	Focus on fines	-	1	Employee Morale
Access Policy	penalties	remote access policy?	Focus on suspensions	-	-	
			Focus on termination	-	-	
	Type of software permitted for	software How lenient are you in terms of use by software usage?	Freeware	-	-	
Authorized Software			Games	20,000	30,000	EmployeeMoraleTechnical
Policy	use by employees		Open-source	-	-	Security Index
			Approved software	100,000	150,000	
Authorized	Software evaluation frequency in months	How frequently will you evaluate	6	25,000	85,000	Productivity
Software Policy		systems for presence of unauthorized software?	12	35,000	50,000	Security Index
			18	45,000	40,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
		What punitive	Focus on warnings	-	-	
Authorized Software	Violation penalties	actions will you use for	Focus on fines	-	-	Employee Morale
Policy	perialities	violations of authorized software policy?	Focus on suspensions	-	-	
			Focus on termination	-	1	
Systems	Intensity of	quality your quality	Low	40,000	50,000	Employee Morale
Development Testing	assurance		Medium	60,000	150,000	Technical
recurry	testing	testing?	High	90,000	300,000	Security Index
	velopment reliance on external vendo		Usability and other minor testing	10,000	50,000	
Systems Development Testing		reliance on external vendors for systems development	Supplementary testing	20,000	100,000	ProductivityTechnicalSecurity Index
			Comprehensive testing	30,000	200,000	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
A. W. Sa	Quality of	quality of the	Baseline	30,000	50,000	Performance
Antivirus Policy	antivirus solution used	antivirus solution used across the	Strong	50,000	100,000	ProductivityTechnicalSecurity Index
		organization.	State-of-the-art	70,000	180,000	Security muex
			Multiple times per day	24,000	28,800	
Antivirus Policy	Frequency of scans	How frequently does the antivirus scan run?	Once daily	22,000	33,846	Productivity Technical
, choy			Once per week	16,500	15,000	Security Index
			Once per month	8,800	8,800	
		How frequently will you update your antivirus solution with patches?	Always once released	24,000	72,000	
Antivirus Policy	Frequency of patch updates		Only for major and critical updates	22,000	52,381	ProductivityTechnical Security Index
			Only for critical updates	16,500	35,357	

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
SOX and GLBA	Degree of control in identity provisioning	Choose the degree of control in identity provisioning.	None Limited Complete	15,000 30,000	14,000	Technical Security IndexCompliance
SOX and GLBA	Degree of customer-end SSO implementation	Choose the degree of customer-end SSO implementation.	None Limited Complete	25,000 50,000	70,000	 Customer Satisfaction Performance Technical Security Index
SOX and GLBA	SOX training and compliance spending	Choose the spending on SOX training and compliance.	Minimum Maximum	200,000	75,000 150,000	Technical Security IndexCompliance
SOX and GLBA	Quality of third- party service providers for credit card and check processing	Choose the quality grade of third-party service providers for credit card and check processing.	Grade B+ Grade A+ Grade A+	17,600 33,000 44,000 48,000	3,520 7,920 14,667 16,000	 Technical Security Index Compliance Customer Satisfaction

Category	Decision	Explanation	Options	Capital Cost (\$)	Operating Cost (\$)	Indicators Affected
Financial Security Measures Frequency of credit card usage security		edit card are credit card usage security	Low	50,000	15,000	Customer Satisfaction
	usage security		Medium	75,000	25,000	
	alerts		High	90,000	35,000	
Security		What is the mode of reception for credit card usage security alerts?	E-mail	25,000	10,000	Customer Satisfaction
	Mode of reception		SMS	75,000	12,000	
			Phone call	150,000	15,000	
Financial	Coourity	How rigorous are the security	Low	5,000	20,000	Customer
Security Measures Security questions rigor	questions	uestions Medium 7,500	27,500	Satisfaction		
		requirements?	High	10,000	32,500	
Financial	Account lockout procedure rigor		Low	5,000	10,000	Customer
Security			Medium	10,000	12,000	Satisfaction
			High	15,000	15,000	
Insurance Policy	Degree of insurance used against a cyberattack	How high will you prioritize insurance against a cyberattack?	Low	8,800	88,000	Disaster
			Medium	16,500	132,000	Readiness
			High	22,000	330,000	Compliance

4. Indicator Reference

The indicators are either indices or numeric values. Indices will be kept in the range of 0 to 200. Indices are best for teams when they are high in value (> 100) and vice versa. However, the Downtime and Disaster Damage indices are an exception, with higher values being detrimental to performance.

Financial indicators like Budget and Revenues will be numeric values in dollars. The table below details the different indicators used and how they relate to each other.

Table 8: Indicator Reference

Indicator	Description
Budget (Budget Allocated)	This is the budget allocated to a particular team. The budget is used up based on the decisions the user chooses. Budget is measured in dollars.
Compliance Index	This is a measure of compliance attained by a particular team with respect to various security policies applicable to that team. Compliance is measured as an index on a scale of 200.
Contribution to National Security Index	This indicator is the measure of the effect on National Security Index by a particular team's decisions, derived from the team's Security Index. The Contribution to National Security Index of all the teams is averaged to arrive at a single National Security Index.
Customer Satisfaction Index	This is a measure of how satisfied the customers of a particular team are. Customer satisfaction is measured as an index which is on a scale of 200.
Disaster Damage Index	Whenever there is a disaster at a national level we measure the damage caused to the organization using this indicator. Disaster Damage is an index measured on a scale of 200.

Indicator	Description			
Disaster Readiness Index	This indicator explains the readiness of a particular team in controlling the effects of a disaster. This indicator is measured as an index on a scale of 200.			
Downtime Index	This indicator is the annual downtime percentage, relating to the particular service the organization offers. This indicator is measured as an index on a scale of 200.			
Economic Health Index	This indicator is a national level indicator of the economic status of the U.S. This indicator is measured as an index on a scale of 200.			
Employee Morale Index	This indicator explains the level of employee morale in the organization. This indicator is measured as an index on a scale of 200.			
Insurance Payout Index	This is the insurance payout to the organization when downtime occurs, measured in dollars. A fraction of this is added to the budget for the next round.			
Internal Security Index	This indicator explains the state of a company's security index from the internal policy aspect. This indicator is measured as an index on a scale of 200.			
International Policy Burden Index	This is the 'policy burden' the U.S. incurs when it co-operates with other countries on cybersecurity.			
National Security Index	This indicator tells us the degree of security at the national level. This is a weighted average of the "contribution to national security" indices of various teams in the country. This indicator is measured as an index on a scale of 200. It is a shared, global indicator; all teams will have the same value of National Security Index in each round, but have a different Contribution to National Security Index.			
Network Load Index	This measures the amount of load on the network during the duration of a round. This indicator is measured as an index on a scale of 200.			
No. of Customers Index Performance	This indicator represents the number of customers of the respective teams. This indicator represents the system performance of a particular team. This indicator is measured as an index on a scale of 200.			

Indicator	Description
Popular Sentiment Index	The indicator of how the people in the U.S. feel: confidence vs. panic.
Productivity Index	This relates to the employee productivity. This indicator is measured as an index on a scale of 200.
Profitability Index	An index of how profitable a company or agency is, on a scale of 200. For the federal government team, this represents the surplus.
Reputation Index	A measure of the market reputation of a particular team. This indicator is measured as an index on a scale of 200.
Revenues	The revenues earned by the company (team) at the end of a particular round. Revenues are measured in dollars.
Security Index	This represents the level of security in a particular team. This relates to the security status of a particular team. This indicator is measured as an index on a scale of 200. It is derived from Internal Security Index and Technical Security Index.
System Health Index	This is a measure of the condition of systems of a particular team. The delay effects involved in the relationships help capture the phenomenon of recovery over time. This indicator is measured as an index on a scale of 200.
System Recovery Index	This measures the degree to which systems recover from a state of disaster or attack from the outside world per round. Measured as an index on a scale of 200.
System Resiliency Index	This affects the rate of recovery of the system. This indicator is measured as an index on a scale of 200.
Technical Security Index	A security index for the organization stemming only from technical measures. This indicator is measured as an index on a scale of 200.

5. Cross-Team Module

This section details how the CCS computes and applies cross-team effects.

The essence of the cross-team module is that the changes in the key indicators of each team impact the indicators of the other teams. This replicates real-world scenarios where different entities are linked through their performance on key individual metrics.

5.1 Flow and Architecture

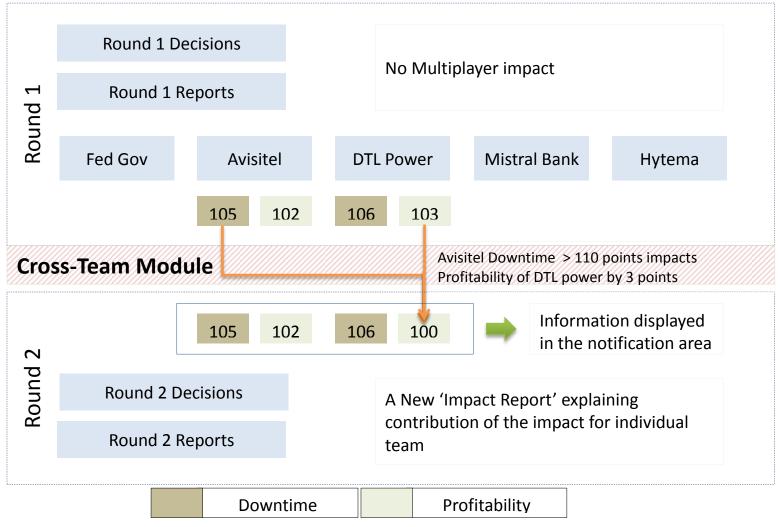


Figure 1: Cross-Team Module

The flow of the cross-team effects is detailed above.

At the end of the first round, there is no effect from the cross-team effects on the indicator values shown for each team, it being the first round.

Prior to the start of the second round, however, the values of the indicators are compared to certain benchmarks, and if the benchmarks are broken, the cross-team module will cause some changes to certain indicators of the teams for the second round. In our example above, Avisitel's Downtime crosses the 110 threshold in Round 1 and reduces the Profitability of DTL Power by 3 points.

The resulting impacts are available in the impact report in the application.

Keep in mind that these impacts will add on to the decisions made in Round 2. Therefore, in the situation above, DTL Power starts 'behind' on Profitability in Round 2 by 3 points. If it makes decisions that improve its Profitability, it can overcome this deficit.

Also remember that the cross-team module operates at the end of each round (except for the last round). So if Avisitel's Downtime were to stay above 110 for every round till the end, *the teams would get their Profitability affected similarly in every round*, not just the first time the indicator crossed 110.

6. Other Calculations

In this section we detail any calculation procedures that are not related to the model directly.

6.1 Cost Considerations

Each decision in the CCS has costs associated with it, as detailed in Section 3 of this document.

The costs are:

- Capital costs; these costs are applied only when there is a change in the decision setting from the previous round in the current round.
- **Operating costs**; these costs are applied every round whether the decision setting changes or remains the same.

For some decisions that are sliders instead of drop-downs, note that the values displayed on the slider are the capital costs alone. Therefore, increasing or decreasing the slider will also change the operating costs involved in direct proportion based on the ranges provided in the reference tables. Consequently, the change in the actual budgets will not match the change in the slider, because the budget must also take into account the operating cost change because of your decision.

Therefore, in each round, the CCS calculates the total cost as follows:

Total Cost = Capital Cost for all team members + Operating Cost for all team members

This total cost then gets used in two ways:

- It is subtracted from the Budget Allocated to obtain Budget Used.
- It is subtracted from the **Revenues**, thus indirectly affecting **Profitability**. So the higher the costs of the team, the lower its profitability. Because **Profitability** affects **Budget Allocated**, this also causes the next round budget allocation to decrease.

6.2 Budget Calculations

Budget is an indicator that is affected by other indicators in the model, but unlike other indicators, it is also linked directly to your decisions of the students through the costs of those decisions.

There are four budgetary values: **Budget Allocated**, **Budget Used**, **Budget Left**, and **Overdraft**. Note that the last three are shown on the screen. The relationships between these are as follows:

- Budget Allocated is the constant budget set by the game master at simulation creation for the whole team. This is actually the Budget used in the model.
- Budget Used indicates the actual budget used by the whole team. It is derived from the
 costs that have been set for the decisions. For each decision, the CCS sums up the cost
 corresponding to each decision (as described in Section 3 of this document), and
 calculates the total budget usage across the team.
- Budget Left is simply derived as: Budget Left = Budget Budget Used. It does not carry over into the next round.
- Overdraft is an additional budget that is fixed at 10 percent of the Budget Allocated to you.

The **Budget Allocated** round to round for a team changes somewhat based on the team's collective decisions. Factors that affect budgeting include:

- **Profitability:** If the profitability of a team exceeds 100 in a round, it increases the budget allocated in the next round, and if it drops below 100, it decreases the budget allocated in the next round. This is a lag effect, as shown in the causal loop diagram.
- Insurance Payout: If a team's downtime exceeds 100, the net insurance payout (after adjustment for premium) is a positive contribution that adds to the budget allocated for the second succeeding round. If a team's downtime drops below 100, the net insurance payout goes negative and is hence deducted from the budget allocated from the second succeeding round.

6.3 National Security Index Calculation

The National Security Index is an indicator that is shared across all teams, yet derives its value from the respective contributions made by the five teams towards their respective Security Indices. The Federal Government, given its national role, has decision categories that affect National Security Index directly as well.

From the Security Index of each team we derive their contribution to the National Security Index, and then we average these numbers to arrive at a single common National Security Index.

7. Glossary

This section details frequently used terms of the CCS.

Table 9: Glossary of CCS Terminology

Term	Description
Budget	An allotted amount of funds available for an organization (e.g., DTL Power) to spend within a single year (i.e., a round within the simulation game). An organization's annual budget may vary from year to year, depending on that organization's decisions and annual performance indicators (i.e., round outcomes).
	Budget surpluses in one year are not carried forward to the next year (i.e., round).
	A budget overdraft will become available if an organization overspends its budget for the year.
	The Cybersecurity Capstone Simulation uses the terms <i>budget</i> and <i>allocated budget</i> synonymously.
CCS	The Cybersecurity Capstone Simulation.
Decision	A virtual lever that you use to respond to the events within the game world, and create outcomes that improve the state of the virtual USA. Decisions are chosen by students at the outset and are restricted accordingly in the actual simulation play period.
Economic Downturn	A situation in which the national economy suffers due to one or more of the following macroeconomic factors: increased inflation, increased unemployment, decreased gross domestic product (GDP), lower stock market indexes, a decrease in foreign currency exchange rates for the U.S. dollar, a lack of consumer spending, or other related factors.
Economic Upturn	A situation in which the national economy improves and is strengthened. This can be attributed to one or more of the following macroeconomic factors: increased employment, higher gross domestic product (GDP), higher stock market indexes, a stronger U.S. dollar in relation to other major currencies, decreased inflation, decreased interest rates, or lower national debt.
Events	Scenarios or occurrences resembling real life that are injected by the game master into simulation rounds, such as worm and virus attacks, and natural disasters like floods. Students see events in terms of media items within the simulation.

Term	Description
Game Master	The administrative role in charge of the CCS as a whole, with ultimate privileges in terms of controlling the simulation.
Indicator	An index that the simulation uses to show the user the state of the virtual nation in the simulation.
Media Inputs/Items	Fictitious media inputs resembling real-life news notifications that are supplied to students between rounds. These may warn students of upcoming events, and detail outcomes of the events of past rounds.
Outcome	The state of the simulation after an event has occurred. Events can create multiple outcomes for a given round, which the simulation integrates to arrive at a final simulation state for that round. Students see outcomes in terms of their effects: a successful worm intrusion creates downtime as an outcome. Media items are also linked to these outcomes, as well as internal notifications.
Overdraft	A budget addition that is provided to an organization (e.g., Avisitel) when it has spent its entire allocated budget within a single year (i.e., a round within the simulation). Therefore, an overdraft enables the organization to continue considering critical decisions that might require additional funds after a budget overrun.
	The organization will receive an overdraft that is 10 percent of its allocated budget for that particular year. However, the organization is not required to spend the overdraft.
	An organization that uses an overdraft will have its profitability reduced for the current year, which will in turn reduce its budget for the following year.
Round	A decision-making cycle representing a single year. A discrete set of choices that is isolated in time, but not necessarily in terms of impact, from other such cycles.
Section	The virtual class. The student body will be divided into sections internally by UMUC.