CYBERSECURITY CAPSTONE SIMULATION

Student Manual

University of Maryland University College

Version 4.2 (April 24, 2013)

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1. Introduction

Welcome to the Cybersecurity Capstone Simulation (CCS). It is a fully online, multiplayer simulation that can be played by students from anywhere, as long as they have with a working Internet connection. It is browser- and device-agnostic; it can be played on PCs, Macs, and major mobile devices such as the Apple iPad and the Galaxy Tab, and on the major browsers: Internet Explorer, Firefox, Chrome, and Safari.

The CCS supports three roles; a game master role that is primarily administrative, an instructor role that is facilitative, and a student role, your role. The roles are mapped to different privileges and actions; the game master has the highest privileges, followed by the instructor and then the student. Each role is mapped to a "console," an operational mode with the corresponding user interface that is specific to that role.

1.1 About this Manual

This manual is your guide to the CCS. It:

- Provides an overview of the CCS from a student viewpoint.
- Details your responsibilities and privileges.
- Explains the features and functionalities of the CCS.
- Provides best practices for working with your instructor.

1.2 CCS Documentation

The following documents accompany the CCS.

Table 1: CCS Documentation

Number	Document	Description
1.	Student Manual (this document)	A document that details the CCS structure, the task flows, best practices, and the student console user interface.
2.	Application Model Reference for Students	A document that details the decisions and indicators in the CCS for your reference.

2. CCS Framework

This section is aimed at giving you an overview of the CCS' themes, features, setup, and flow. It is vital to understanding how everything fits together in the CCS.

2.1 Themes

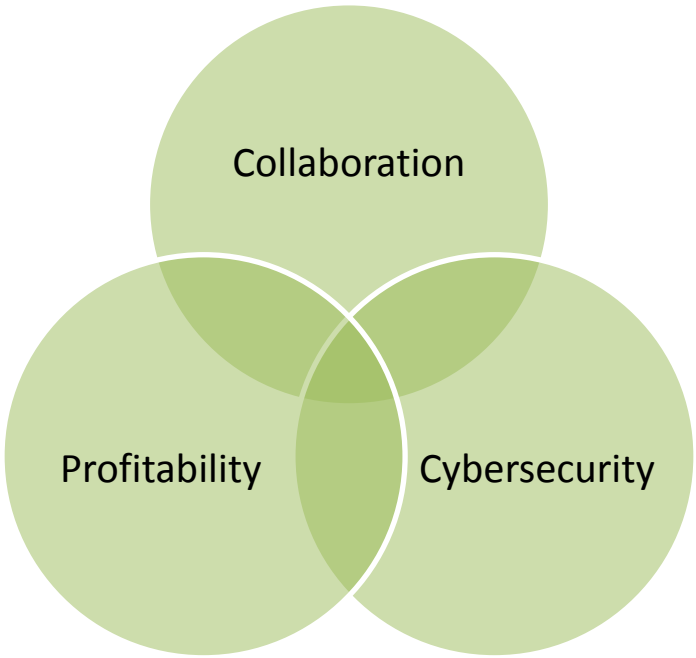

Figure 1: Themes

The themes of the CCS are:

- **Cybersecurity**: an organization must keep its systems secure.
- **Profitability**: an organization must be profitable or viable.
- **Collaboration**: an organization cannot exist in a vacuum with respect to security; it must collaborate on security with the government and other entities.

2.2 Learning Objectives

The themes extend into the following learning objectives:

- Analyze and respond to cybersecurity issues at a local and national level.
- Appreciate the merits of collaboration and competition in the backdrop of a natural conflict of interest between private and public organizations.
- Weigh the costs of cybersecurity initiatives against their benefits.
- Enumerate ways to maximize national security.

- Assess the relationships between cybersecurity and local and national events in unrelated areas.

2.3 CCS Simulation Instances

The CCS application allows the creation and play of multiple simulation instances at any time. We refer to these as simulations. See the diagram below, where we have shown two simulations as part of the CCS.

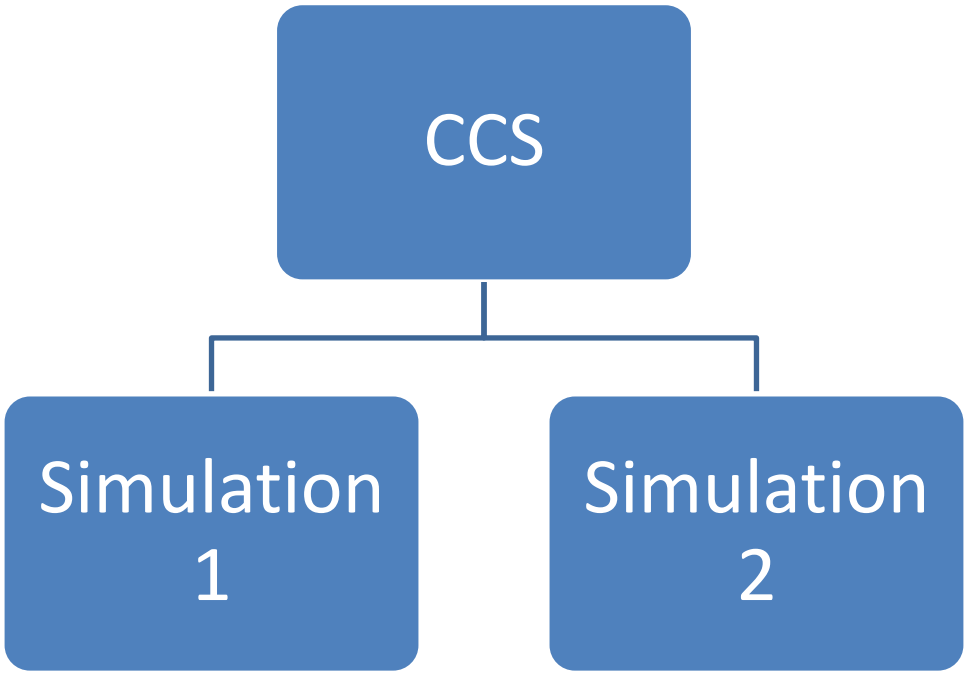

Figure 2: Simulation Level

2.4 CCS Simulation Sections

How does the CCS know which simulation you will play? It knows because you are assigned to a simulation through the actions of the game master and instructor.

Students of a particular class get assigned to a section, and it is this section that gets assigned in turn to a simulation.

So our earlier diagram looks like this:

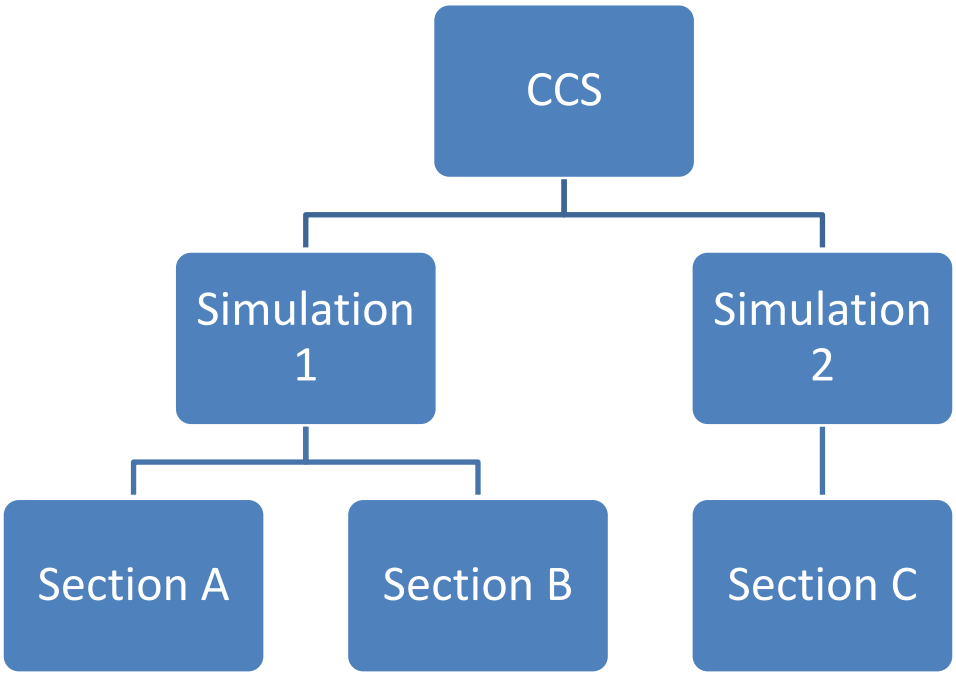

Figure 3: Section Level

As a student, you cannot belong to more than one section.

2.5 CCS Simulation Teams

In the CCS, sections are further divided into teams. You and your fellow students will make decisions as part of one of five organizations whose operations relate to and are affected by cybersecurity concerns.

These five organizations are as follows:

Table 2: CCS Teams

Team Type	Name	Icon
Federal Government	Federal Government	
Telecommunications	Avisitel	
Power	DTL Power	
Financial Services	Mistral Bank	
Defense Contractor	Hytema	

Each section, therefore, has these five teams under it, no more, no less.

2.5.1 Team Profiles

Let's detail the profile for each of these teams:

Avisitel

Avisitel is an American multinational telecommunications corporation headquartered near Rochester, New York. It is the third-largest provider of mobile and landline telephone services in the United States, and it is also a provider of broadband and subscription television services. It is the 39th-largest mobile telecommunications operator in the world, with more than 74 million mobile customers.

The company is a global Internet carrier, and it makes up a portion of the Internet backbone. In the United States, the company is the third-largest long-distance provider, and it also owns a majority share of the company operating the largest wireless broadband network. It operates two separate wireless technologies, CDMA and iDEN.

Avisitel was in the news two years ago following leaks of customer data because of a major vulnerability in a Web application. The company compensated its affected consumers and comprehensively overhauled its cybersecurity setup.

DTL Power

DTL Power Corporation is an electricity generating and distributing company headquartered in the Chase Tower in Santa Fe, New Mexico. DTL Power has 5.4 million electricity customers and 485,000 natural gas customers.

DTL Power has full or majority ownership of 14 nuclear reactors in 12 nuclear power plants. It also has two hydropower plants in the Midwest and five wind energy centers along the East Coast. Last year, incidents around the world involving nuclear reactors have led the company to tighten security and safety regulations at its nuclear plants. The company is also researching additional environmentally friendly options such as geothermal energy.

Federal Government

The Cyber Security Command (CSC) is a branch of the Department of Homeland Security (DHS) that was set up in 2011 as a means of unifying cybersecurity responses at the national level. CSC was established in response to increasing cyber attacks against U.S. infrastructure, both public and private. In the 2011 fiscal year, it was allocated a budget of $38.8 billion and spent $27.4 billion.

CSC's stated goal is to prepare for, prevent, and respond to cyber emergencies. The command has given $15.6 billion in grants to state and local governments for cybersecurity and to improve their ability to identify and protect against cyber threats. CSC coordinates its actions with other branches of DHS and other agencies like CERT to fulfill its objectives.

The CSC's primary responsibilities can be described as follows: prescribe a uniform technical setup for federal agencies across the United States, define operational cybersecurity policies for federal agencies across the United States, and control the areas of technical advisories, co-operation with the private sector, and funding cybersecurity research.

Hytema

Hytema is an American global aerospace, defense, and security company with worldwide interests. It is headquartered in Atlanta, Georgia. The company employs 110,000 people worldwide. It is one of the world's largest defense contractors. Last

year, 83 percent of Hytema's revenues came from military sales. It received 5.1 percent of the Department of Defense's expenditures.

The company operates in four business segments. These include, with respective percentages of $55.4 billion in last year's total net sales, Aeronautics (27 percent), Electronic Systems (37 percent), Information Systems and Global Solutions (22 percent), and Space Systems (14 percent). Last year's contracts with the U.S. government accounted for $37.4 billion (68 percent), foreign government contracts $1.8 billion (3 percent), and commercial and other contracts $16.2 billion (29 percent).

The company has received the Collier Trophy twice, most recently receiving it 6 years ago for leading the team that developed the F-45 Raider fighter jet.

Mistral Bank

Mistral Bank is an American global financial services company. It is the third-largest bank holding company in the United States by assets held on deposit, and the fourth-largest by market capitalization. Mistral Bank serves clients in more than 40 countries, and has relationships with 24 percent of U.S. Fortune 500 companies and 38 percent of the Fortune Global 500. Mistral Bank is regulated by the Office of the Comptroller of the Currency (OCC) and deposits are insured by the Federal Deposit Insurance Corporation (FDIC). Mistral Bank is a component of both the S&P 500 index and the Dow Jones Industrial Average.

Their acquisition of a major regional bank 6 years ago made Mistral Bank the world's third-largest wealth manager and a major player in the investment banking industry.

The company holds 4.7 percent of all U.S. deposits, as of August. According to its latest annual report, the bank operates in all 50 states and the District of Columbia, as well as more than 40 non-U.S. countries. It has a retail banking footprint that covers approximately 75 percent of the U.S. population, and in the U.S., it serves approximately 41 million consumer and small-business relationships at 3,200 branches and 22,770 ATMs.

2.5.2 Team Goals

Each of these teams has goals that it must fulfill. The diagram below summarizes the principal goals.

Figure 4: Generic Team Goals

The table below details the nuances for the goals by team.

Table 3: Team Goals

Name	Icon	Goals
Federal Government		• Keep the popular sentiment in the U.S. high, in relation to matters of cybersecurity. • Ensure that the national cybersecurity of the U.S. is strong.
Avisitel		• Maximize telecom network uptime (keep downtime at a minimum). • Ensure the company's security is strong. • Stay profitable as a company.

Name	Icon	Goals
DTL Power		• Maximize power network uptime (keep downtime at a minimum). • Ensure the utility's security is strong. • Stay profitable as a company.
Mistral Bank		• Maximize banking services network uptime (keep downtime at a minimum). • Ensure the bank's security is strong. • Stay profitable as a company.
Hytema		• Maximize defense services uptime (keep downtime at a minimum). • Ensure the company's security is strong. • Stay profitable as a company.

In addition to the above-stated goals, teams have a shared goal of maximizing national security. This is a direct goal for the Cybersecurity Command of the Federal Government and an indirect goal for the four companies: By maximizing their own security, they contribute towards maximized security for the nation.

As a federal agency, the CSC need not be concerned about profitability as a goal, but the four companies need to stay profitable.

The "Federal Government" team name stands for the Cyber Security Command agency that is part of the federal government, and the team is not representative of the whole of the federal government. The team is not responsible for ensuring the profitability or direct cybersecurity of the other companies. It has its own goals to work towards.

Each of the above goals is measured through an index, a metric that ranges from 0 to 200 with a default baseline of 100. The aim is to maximize the value of this index, with values above 100 being good, and below it being bad.

The teams must balance these competing objectives to achieve the optimal result that advances their interests as well as the interests of the virtual U.S. represented in the simulation.

2.6 CCS Student Roles

Our diagram now looks like this with the addition of the teams.

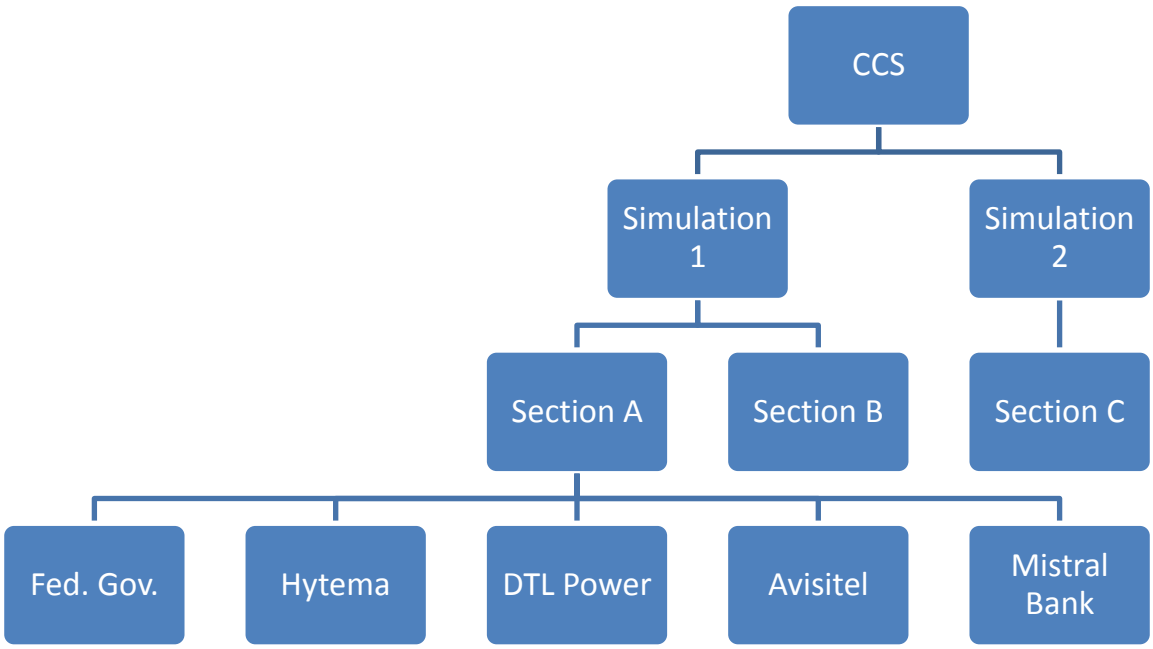

Figure 5: Team Level

Teams in the CCS have the following characteristics:

- Each team can have one student at a minimum. Ideally, there should be five students per team.
- Each of these five teams will play the role of one up of the five team types: federal government, defense contractor, finance, power generation, and telecommunications.
- When you log in to the CCS, you will be informed of your team assignment.

So, our diagram becomes:

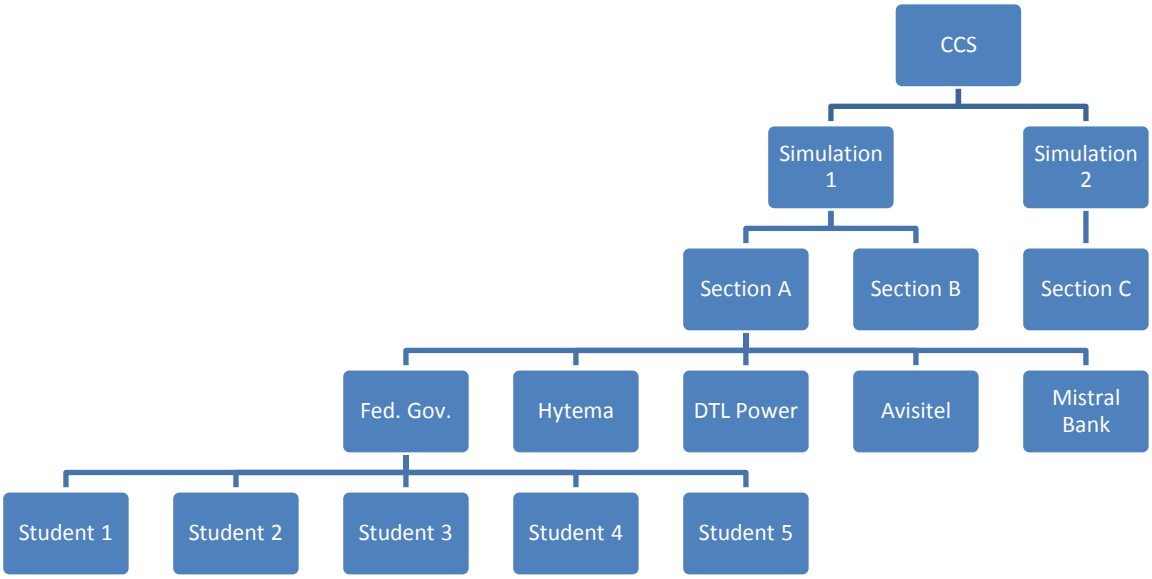

Figure 6: Student Level

Within each team, students can choose the responsibilities they want by mutual consent; this will be locked in by the instructor for the duration of the simulation. These roles are strongly enforced, so it is not possible for students within the same team to make decisions ”belonging to” another student unless the instructor allows it in special circumstances such as the absence of the student playing a role.

You are not given pre-defined roles to choose from; instead, you must choose your set of decisions from the set of decisions, and then give yourself a role designation that fits.

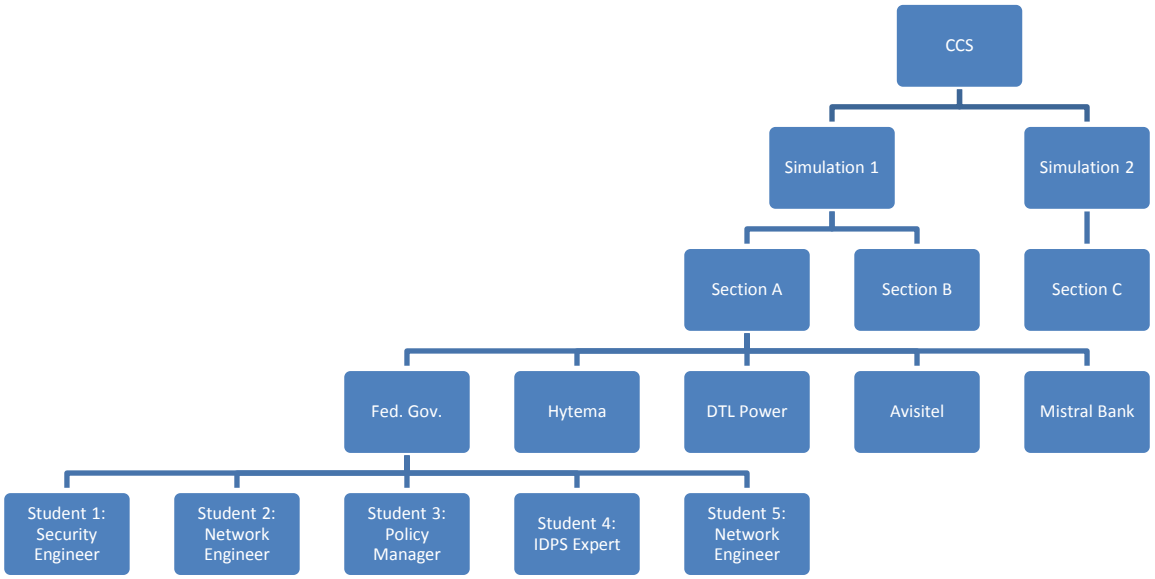

Figure 7: CCS Student Roles

Since it is up to the instructor to vet the role designations your team members give themselves, it's perfectly possible for there to be multiple instances of the same role or incorrect designations. These could include roles that do not map to any decisions within the simulation world, e.g., Chief Financial Officer, or wholly made-up roles that map poorly to the decisions available to you, e.g., Network Protocol Programmer).

2.7 The Game Master and Instructor

So far, we've seen primarily how your student role fits into the CCS structure. Where do the instructor and game master come in?

The instructors are in charge of a particular section or sections, depending on the assignment. It is possible to have one instructor in charge of one section or multiple sections or for there to be multiple instructors in charge of one section. Your Teaching Assistant (TA) may take up this role.

On the other hand, the game master(s) oversee the CCS as a whole; all simulations in the CCS are under the purview of the game master(s).

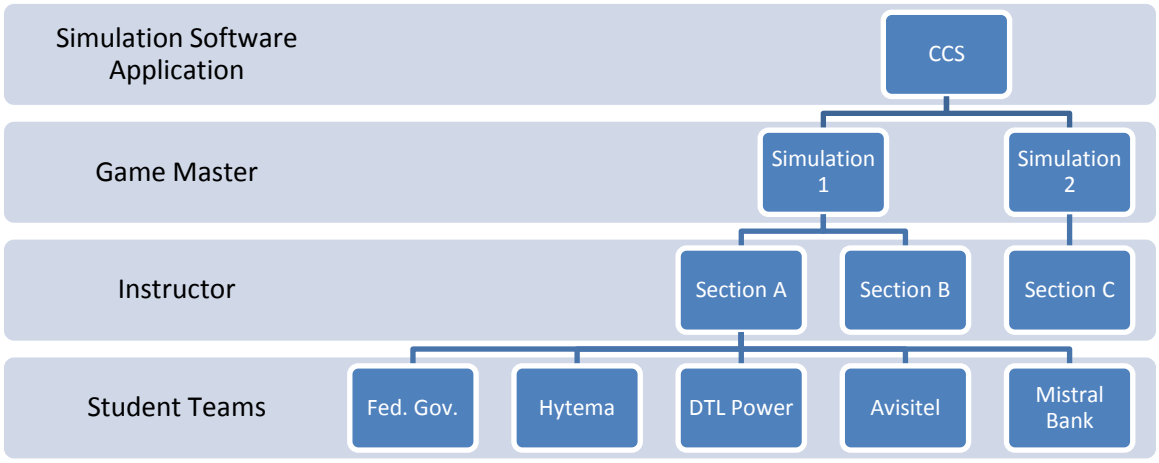

Figure 8: Roles and Levels

Now that we've been introduced to all three roles, let's look at the tasks each role has.

2.8 Role Responsibilities

There are three roles at play in the CCS, the game master, the instructor, and the student.

The broad responsibilities of each role are as follows:

Game Master

- Create simulations.
- Modify existing simulations.
- Assign and de-assign sections in simulations.
- Use feedback from instructors in the creation of new simulations.

Instructor

- Divide sections into teams.
- Approve the role choices for students.
- Debrief students on their performances.
- Provide feedback to the game master on the effectiveness of the simulation.

Student

- Define a role within the simulation.
- Make decisions for that role in collaboration with fellow team members.
- Submit written team reports to the instructor for every round, explaining the rationale behind the decisions made.
- Participate in the debrief session with the instructor to review performance.

Figure 9: Role Responsibilities

2.9 CCS Details

The following are details about the CCS that will help you play the simulation effectively.

2.9.1 Duration and Playing Opportunities

- Normally, the simulation will be played over a period of six weeks. All of the rounds will be played for one week each. These settings may change, however, so please refer to the Dashboard in the CCS for more information.
- You will probably take an average of 30 minutes per round for entering your decisions. This time does not take into account the additional time needed for performance debriefs, discussion time, and analysis, etc., which could take from four to five hours per round.
- You can play a round in the simulation, as well as the entire simulation, only once. There will not be any retakes for the rounds or the simulation as a whole, unless the Program Director authorizes them. Once a simulation ends, you will no longer have access to it.

2.9.2 CCS Core Components

These four elements form the basis of the CCS' operations from round to round:

Decisions

These are the virtual levers that you can use as a student to respond to the events within the game world, and to create results that that improve the state of your own organization and the virtual USA. You choose the decisions you will use before the simulation starts.

Events

Events are 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. You will see events in the form of media items within the simulation and must respond to them by adjusting your decisions. These events are accessible in the simulation from the **Dashboard**.

Outcomes

The outcome is 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. You see outcomes in terms of their effects: a successful worm intrusion creates downtime as an outcome. Media items and internal notifications are also linked to these outcomes.

Indicators

Indicators are how the CCS measures outcomes. They constitute the output of the CCS. Because several events or decisions can lead to the same outcome, the CCS aggregates these effects to produce an impact on a particular indicator, which is then reported. For example, Security Index is an indicator that measures the overall strength of an organization's security measures. The indicators range in value from 0 to 200, with a baseline value of 100, and are capped at 200.

2.9.3 CCS Interface Components

In the previous section, we detailed the components that drive the CCS. In this section, we see how they are portrayed in the user interface of the CCS.

Media Items:
You will get media inputs each round, depending on the events that play in that round. These are broadcast to all teams in the simulation in the form of short video clips of fictitious news reports. Media inputs are intended as warnings to set the tone for the round.

For example, an event involving a worm intrusion will show a news report video clip about a worm attacking servers throughout the world.

Advisories:
Advisories are graphical inputs automatically generated by the simulation based on the events set by the game master.

The difference between the advisory and the media input is that while the media input gives a general idea of what the event entails, the advisory describes:

- the chance the event has of impacting the team.
- the actual impact the event will have on the team if it does impact it.
- the teams that will be affected by the event.

Therefore, you must read both the media items and advisories to prepare a good strategy for the round.

Outcomes:
Outcomes are feedback inputs that arise from events that have impacted the teams, and hence are team-specific. For example, if a team's in-simulation systems were compromised by a virus intrusion, a notification gets sent to the team to that effect. These notifications are not shared with other teams.

You must look out for these outcomes to appreciate the interplay of your decisions and the events in the CCS, as well as with the results you are seeing in the reports.

Reports:
Reports are the most vital component of the CCS interface; they help you and your team members assess the effect of the outcomes on your teams in a numerical

manner. Reports contain the values for indicators over rounds, and also show the decisions that your team has made and the events that have affected them.

Consequently, reports are the focus of the CCS in terms of understanding the effect of decisions on the outcomes obtained.

You can view the indicators for all five teams in your section, but not the decisions these other teams have made.

2.9.4 Required Equipment and Resources

You will work fully online in the CCS. Any offline activities, such as grading and debrief, will not be linked directly to the CCS.

Internet access is a must, as is knowledge of the username and password assigned by UMUC.

You must use one of the following browsers:

- Internet Explorer 9 or later
- Firefox 4.0 or later
- Safari 3.0 or later
- Google Chrome 15.0 or later

The following operating systems and/or devices can be used:

- Desktop with Windows XP/Vista/7
- Desktop with Mac OS X
- Galaxy Tab with Android version 2.3
- Apple iPad or later with iPad OS 4.2/4.3

2.9.5 Facilitation

The game master is the administrative head of the CCS in terms of execution. He or she will take inputs from the program director of UMUC's cybersecurity program.

The instructors will be responsible for grading your performance and debriefing you.

The instructor is therefore your first point of contact for any academic issues in the CCS.

2.9.6 Communication

In terms of *online* communication, the simulation will automatically issue relevant notifications to you, *through the simulation*. Certain vital notifications will also be sent as e-mails to your UMUC e-mail addresses.

Any communication that you feel is necessary must be undertaken through the UMUC LMS or other resources.

2.9.7 Supporting Resources

The following resources are provided with the CCS:

- An online help component that provides usage instructions for each of the screens in the application.
- The student user manual (this document you are now reading) enables you to understand and use the features of the simulation.
- Browser-based Captivate guides that demonstrate the critical actions that you will take.

3. Simulation Flow

We move on to an important section in understanding how the CCS works, namely, the flow.

3.1 Flow Details

Take a look at the diagram below to understand the flow of the simulation.

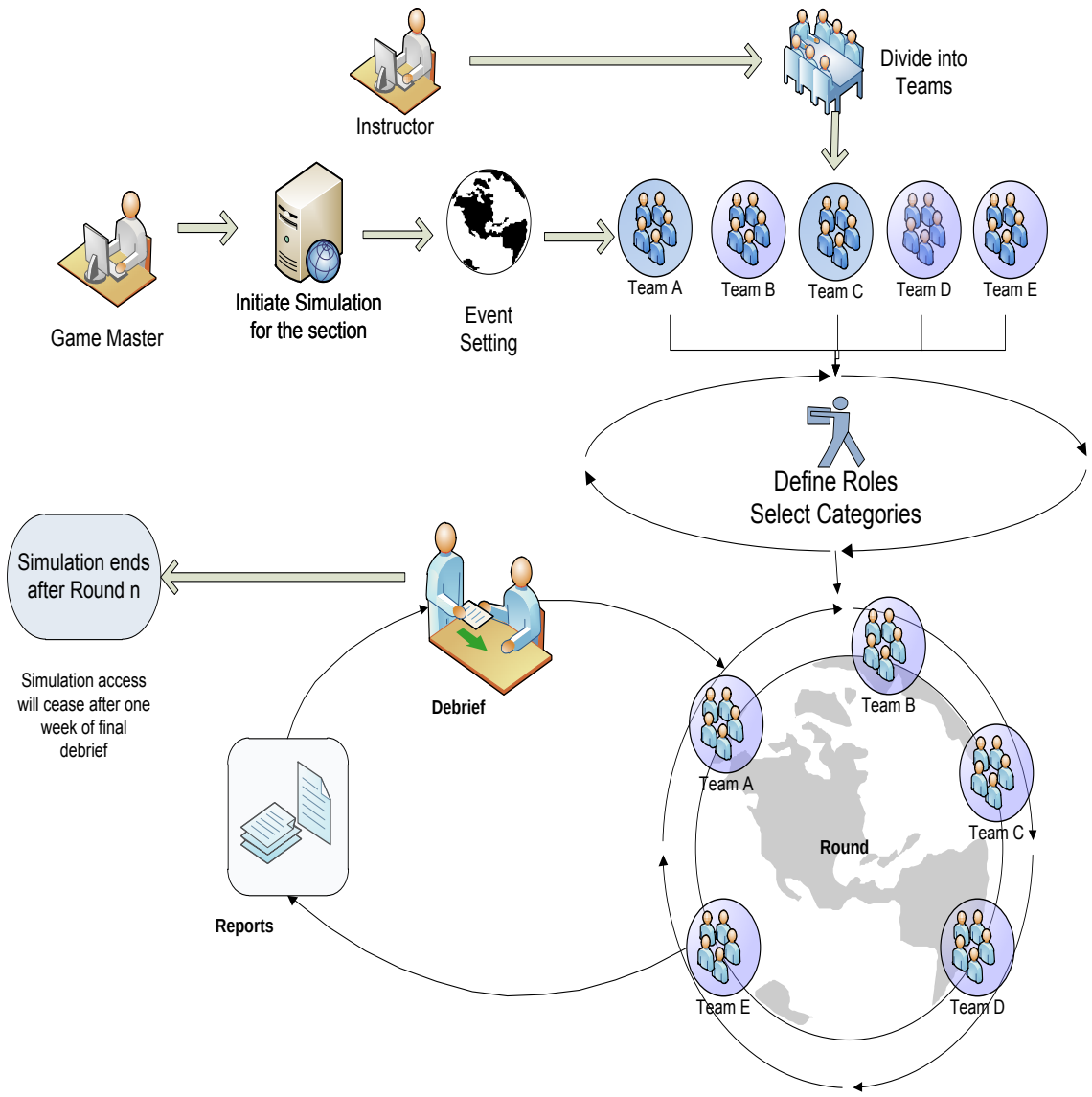

Figure 10: Flow Overview

There are three phases in the simulation, the contents of which are as follows:

Preparatory phase:

- The game master creates the simulation with set timelines and assigns sections to it. Each section contains one or more instructors and students.
- The instructors in your section divide the section into teams.
- Your team members distribute the decisions among themselves. Team members do not share decisions.

Decision phase:

- The simulation starts as per the set timelines, with Round 1.
- You make and enter decisions in Round 1; the CCS automatically considers the decisions at the end of the round without a need for you to submit decisions manually.
- The CCS generates outcomes based on the decisions and the events, with detailed reports.
- The instructor debriefs you and your team in between rounds. Debriefing is an offline activity.
- The simulation proceeds to the next round, where the cycle above repeats.
- This cycle continues to repeat till all rounds are completed.

Final debrief phase:

- The instructor holds a final debrief for all the teams in the section. This is an offline activity.
- The simulation ends.

4. Role and Responsibilities

As a student, your role is the focus of the CCS; the simulation is aimed at helping you aggregate the themes and concepts of cybersecurity in a collaborative manner.

You will need to operate the CCS through your student console, using the login that has been provided to you by the UMUC IT team.

4.1 Responsibilities

Your responsibilities in the CCS are as follows:

4.1.1 Role Definition

During the preparatory phase, the instructor in charge of your section will assign you to a particular team. Your assignment enables your access to the simulation.

On accessing the simulation, your vital first task is to define the role you want to play in the simulation. This choice will need to be made in collaboration with your fellow team members.

Defining your role involves two actions: designating a role for yourself, and choosing the decisions that you would like to make for the duration of the simulation. Once the instructor approves these choices for the whole team, you and your team members are cleared to play in the simulation.

4.1.2 Make Decisions

When the simulation enters the decision phase, you and your team members must log in every round to the simulation and make your decisions.

Because each team member has his or her own decisions to make, and because the whole team operates from a single shared budget, you will need to coordinate your decision making. This team strategy must also consider the events occurring in the simulation world.

Prior to the first round, you will participate in a briefing session with the instructor. At the end of the first round and for succeeding rounds, you will also need to participate in debrief sessions with the instructor. The instructor can ask all teams to submit a written team report for each round explaining the strategy involved in the team's decisions for that round. You will also provide a brief rationale in every round within the CCS that describes the reasoning behind your decisions for your role in that round. The instructor will be able to see the separate rationales that you and each of your team members will have entered by the end of each round.

4.1.3 Final Debrief

At the end of the simulation, you will participate in a final debrief session with the instructor. The instructor may request the submission of a final team report encompassing your team's performance and lessons learned in the simulation.

4.2 Impact of Your Actions

Listed below are the impacts that your actions have:

- Your decisions determine the performance of your team.
- They also indirectly affect the performance of the other teams and the state of the virtual U.S. in the simulation world.

5. Preparing for the Simulation

You've been introduced to the elements of the CCS, as well as your roles and responsibilities. Let's jump in to see how you would prepare for the simulation.

5.1 Logging In

You can visit the CCS login page by clicking the link from the UMUC LMS. It will open the CCS login page in the browser that is currently set to be your default on your system.

You can copy and paste the link that shows up in the browser window to another browser if desired.

Remember that you can log in only after you have been assigned to a particular simulation. You will get an e-mail to that effect once the instructor has assigned you to a particular team.

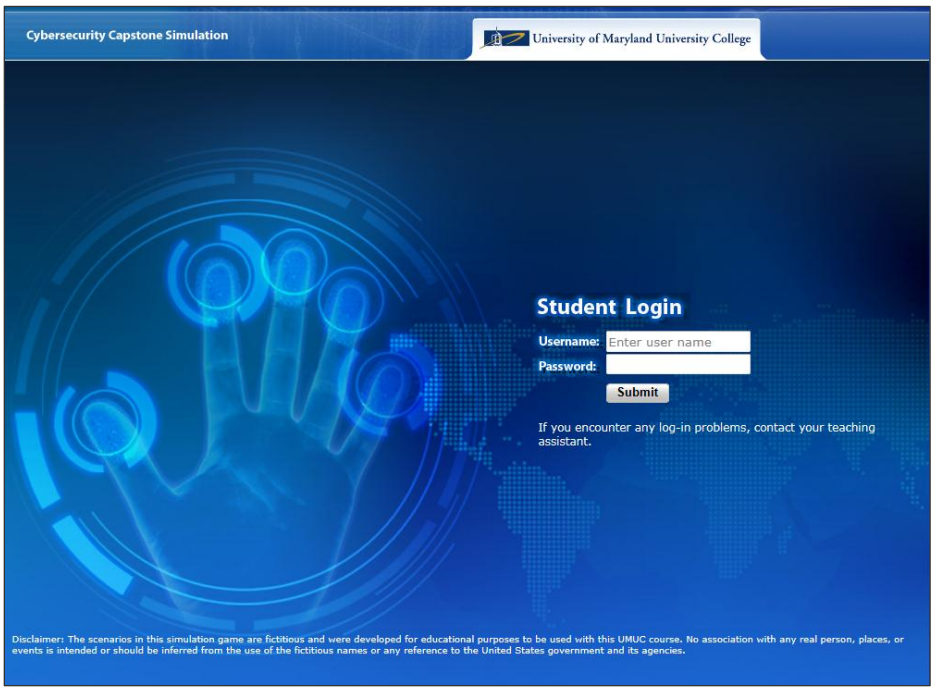

Figure 11: Login

To log in, type your UMUC username and password and click **Submit**.

5.2 Welcome to the CCS Simulation

When you log in to the CCS simulation for the first time, the simulation is in the role definition phase. The series of screens that we will see now explain your role in the CCS.

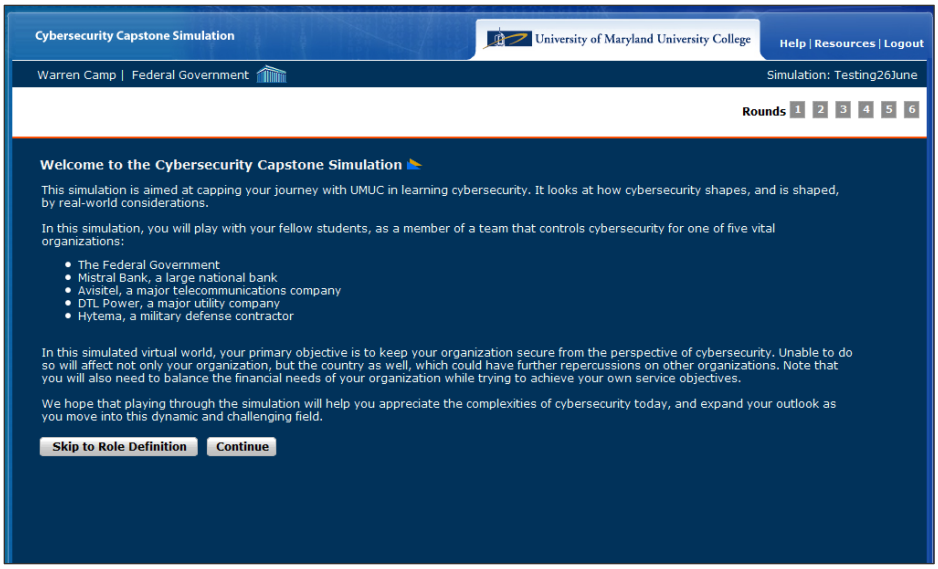

Figure 12: Welcome to the CCS

First is the **Welcome** screen that explains the aim of the simulation. On this screen, as well as some of the following screens, you will see the option to skip to the **Role Definition** screen. You can exercise this option, but you are advised to read this screen, as well as the following screens all the way through the **Role Definition** screen at least once.

The icon at the top, next to the **Welcome** screen, specifies the team you have been assigned to.

Click **Continue** to proceed, taking you to the next screen.

5.2.1 Popups in the CCS

A general note, before we proceed, about popups in the CCS. Quite a lot of additional details and information are presented through popups, and they share some common features:

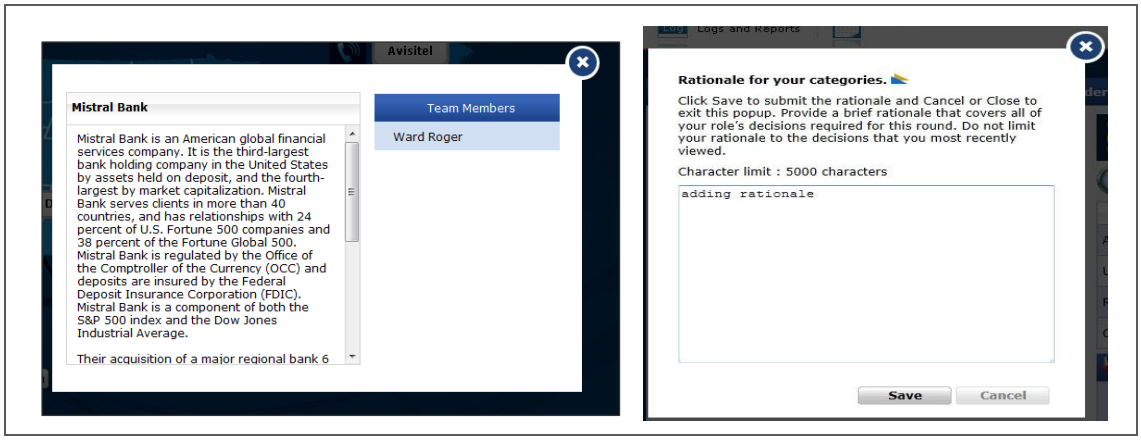

Figure 13: CCS Popups

- Clicking the **X** icon in the top corner closes the popup and returns you to the screen you were on. This is generally present if the popup is informational in nature, as opposed to requiring actions or decisions.
- Clicking the **Close** button, if present, will achieve the same effect as clicking the **X** icon above.
- The **Cancel** button, if present, returns you to the previous screen and aborts any changes you have made to the settings in the popup screen.
- Finally, clicking the **Save** button will save any changes to the settings made on the popup screen.

5.3 Viewing Team Profiles

On this screen, you can view the team profiles for the simulation. You will be part of one of these teams.

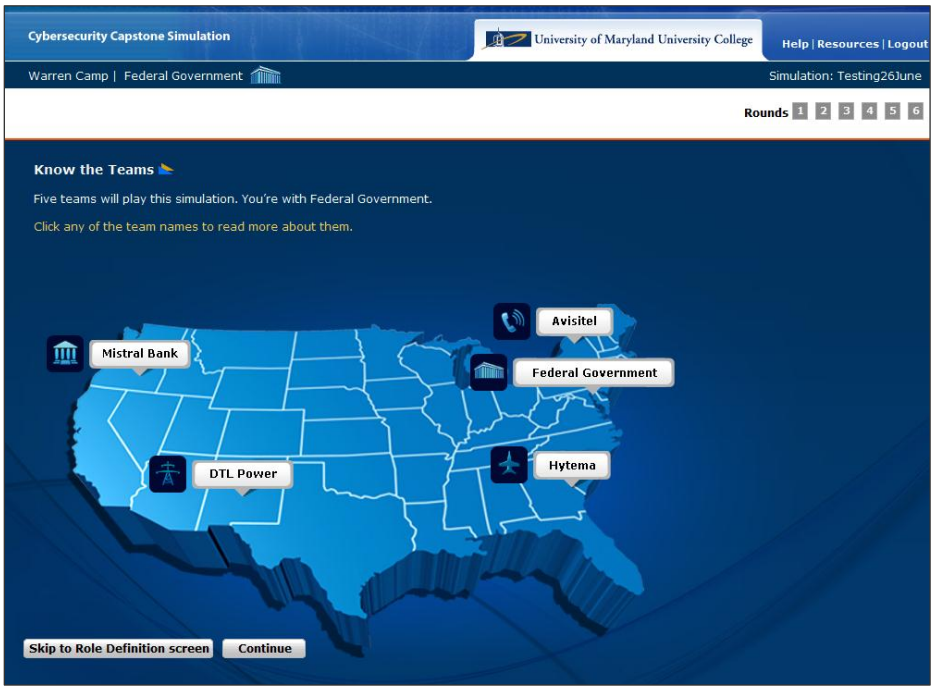

Figure 14: Team Profiles

You can skip this screen to proceed to the **Role Definition** screen, or click **Continue**.

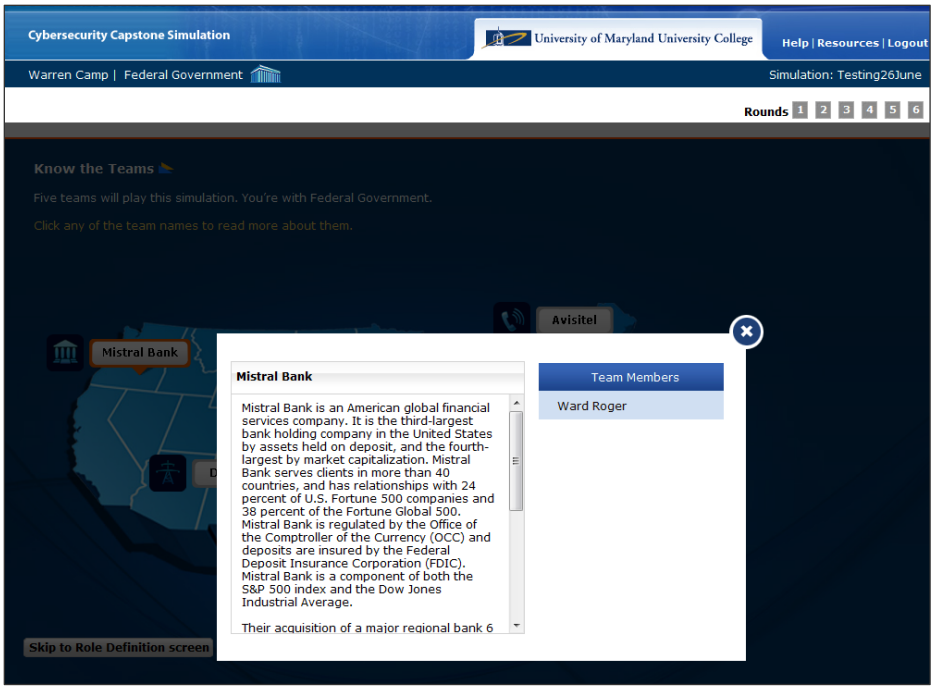

Figure 15: Specific Team Profile

Click each of the team names to open a popup window containing a short profile of the team, as well as a list of the team members. Click the **X** icon to close the window.

5.4 The Next Steps

The Next Steps is a screen you'll see a few times over the course of the simulation. It tracks the phase of the simulation and highlights the tasks that you'll do for that phase.

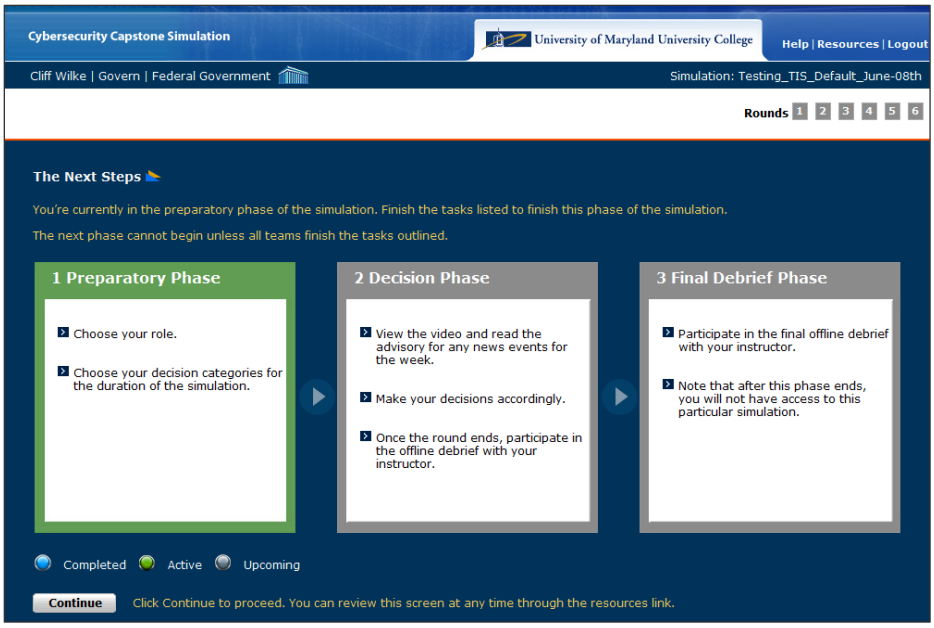

Figure 16: The Next Steps

Because the simulation is in the preparatory phase, you'll see the first block highlighted, with your tasks being choosing a role and the decision categories to go with it. As the simulation proceeds and the phase changes, this screen will reflect that.

Click **Continue** to proceed to the **Role Definition** screen.

5.5 Role Definition

The role definition screen is where you will perform the vital task of defining the role you will adopt for the duration of the simulation.

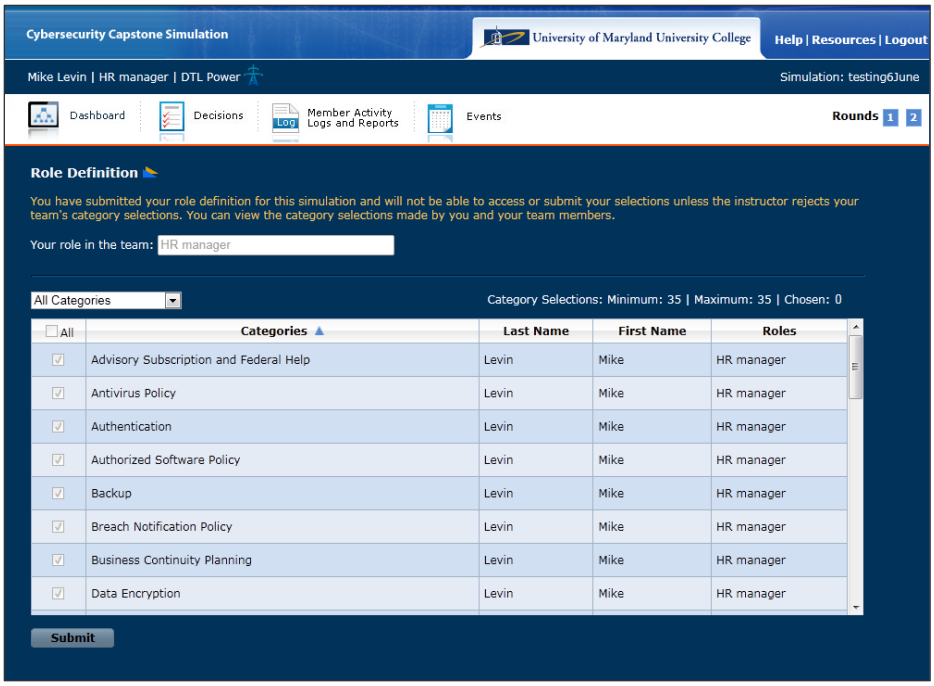

Figure 17: Role Definition

5.5.1 Submitting Roles

Start off by entering a role in the text box above the category table. The role you designate is up to you.

Then, define your role by selecting the categories you wish to control for the simulation from the table.

Some sample roles for your consideration follow:

- Chief Executive Officer
- Cyber Forensics Examiner
- Chief Information Security Officer
- Chief Privacy Officer
- Chief Risk Officer
- Chief Technology Officer

- Cyber Security Policy Analyst
- General Counsel (Legal)
- Information Security Officer
- Internal Auditor
- Network Administrator
- Network Engineer
- Technical Services Manager

These are not the only roles you may choose, however, so feel free to choose a role that most closely suits the categories you choose.

From the drop-down above the category table, you can choose to view:

- all categories
- categories that have been chosen by your team as a whole
- categories that have not yet been chosen (free categories)
- categories that you have chosen

Because you will be working as part of a team, it's a good idea to meet and determine the roles and decision categories that each team member will choose.

The CCS will try to enforce the most even split of decision categories across team members. Based on the number of decision categories available, and the number of team members, the CCS determines a minimum and maximum number of categories that each team member must select. It also maintains a count of the categories currently chosen. You can see these three numbers above the category list on the right.

Once you have selected the categories you wish to assign to yourself, click **Submit**.

If a team member has already chosen any categories when you come to this screen, you will not be able to select them for yourself. You can see their names and the roles they have chosen in the category table.

Also, if a team member is making selections at the same time as you, and selects one or more free categories, then the "winner" is the one who submits first.

Note:

- If you or another team member has chosen categories in error, you must contact the instructor and ask him or her to reject the team's submissions. All team members must then resubmit their decision choices.
- If all your team members have submitted their roles and categories, and you have not, you must choose all the remaining categories and submit them to proceed. This is to ensure that no categories remain unselected.

Once all team members have chosen all categories, the CCS will automatically forward the submission to the instructor.

5.5.2 Role Definition Acceptance and Rejection

Above all, keep in mind that the instructor can decide to grade you on the role designation and how appropriate it is given the rest of your selections. So choose carefully.

If the instructor rejects your team's role definitions, you will get a message to that effect, with the instructor's rationale for the rejection. *The decision category selections will be reset, and all team members will need to resubmit their role definitions.*

If the instructor accepts your team's role definitions, that completes your only task for the preparatory phase. You will then need to wait, along with the other students, till the simulation proper begins.

You cannot access any other part of the CCS till that point.

6. Playing the Simulation

Once the simulation starts according to the timelines defined, you and your team will get access to the simulation. Specifically, you will get access at 12.00 AM Eastern on Day 1 of Round 1 in the simulation. The CCS will deliver an e-mail two days prior to the start of Round 1.

6.1 Taking Stock

You'll arrive at the **Dashboard** screen on login.

Globally, you can see your name, your role, and your team in the status bar at the top of the screen. On the right side in the status bar, you can also see the code of the simulation you have been assigned to. This information may be required in communication with instructors and UMUC support.

Also note the rounds display below the simulation name. The currently active round is colored green, past rounds are colored blue, and rounds yet to be played are colored grey.

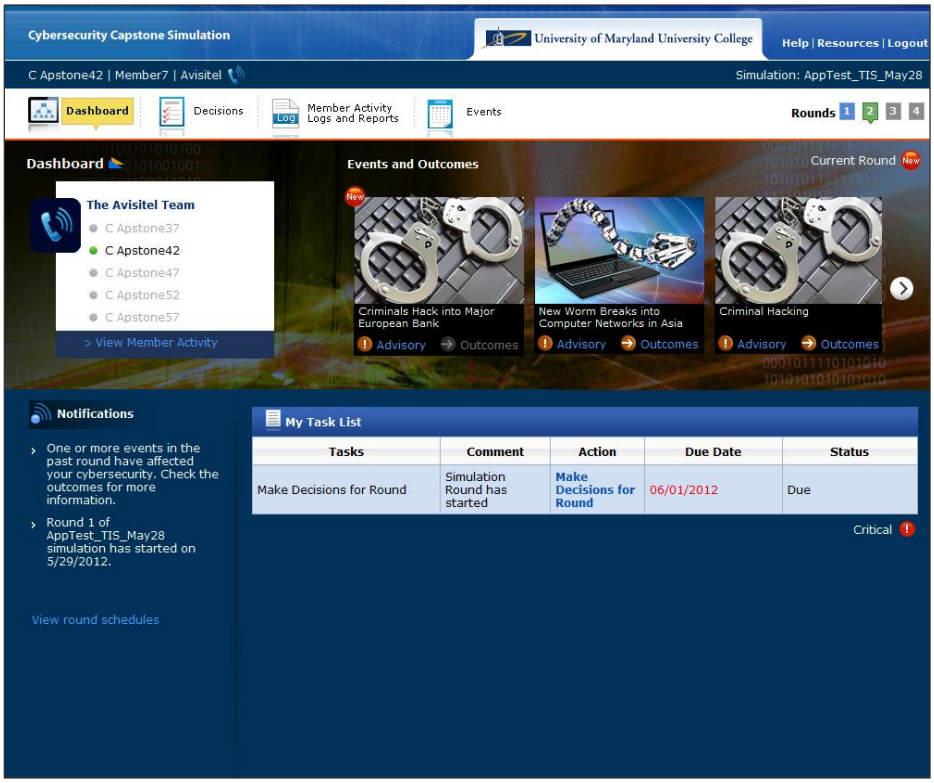

Figure 18: Dashboard

The **Dashboard** screen enables you to take stock of the elements of the simulation at a glance. Let's look at how you can use the dashboard to good effect.

6.1.1 Team Member Status

First, you need to know whether any team members are currently online because their decisions draw from the same budget that you use for your decisions. Also, you may wish to plan the decision settings in tandem with them.

This area shows the login status of you and your team members. Members who are currently accessing the simulation show with a green circle next to their names. Members who are not accessing the simulation have their names greyed out and a gray circle next to their names. You cannot contact them through the simulation, but you can use this information to contact them through the LMS communication features.

Clicking the **View Member Activity** link lets you view a log of your team members' activity.

Together, these features help you coordinate team member activity in the simulation.

6.1.2 Events and Outcomes

The next task is knowing what events are going to affect your team in the current round, as well as assessing the effects of events that impacted your team in the previous round.

Each event is represented by a clickable thumbnail image with two links, **Advisory** and **Outcomes**, underneath it. These images are strung together into a filmstrip.

Only three events are shown at any time in the filmstrip, and by default, the newest three events are shown first. Newer events appear on the left end of the filmstrip, and older events get pushed out to the right.

Note that it is possible for there to be no new events in a round. Also, events can appear over the course of the week in which the round is played.

You can click the left and right arrows in the filmstrip to navigate through it.

For events in the current round:

These thumbnails are marked **New!** in red. Clicking the thumbnail takes you to the relevant event video in a separate screen. The video is aimed at providing an update on the nature of the event.

There is also an **Advisory** link to the event **Advisories** where you can learn how significant the event will be.

For outcomes of events in past rounds:

Once a round ends the CCS checks to see if the events in the round had an outcome for your team, in which case the event graphic will have an active **Outcomes** link. This link takes you to the **Outcomes** tab under **Events**, where you can review the outcomes for the past rounds. Note that outcomes will therefore not be accessible for current rounds.

6.1.3 Notifications

The third task to do on the dashboard is tracking any significant events from the simulation perspective.

The following incidents are tracked by the **Notifications** list, but only for the simulations assigned to you:

- Simulation round starts and ends.
- Simulation round ends in two days.
- You or a team member has submitted his or her choice of decision categories as part of role definition.*
- Your instructor approves or rejects your team's role definitions.*
- New event(s) show up in the videos section for the round in the CCS.
- Events in the previous round have affected your team.
- The simulation has been rescheduled or delayed.
- The simulation has entered the final debrief period.

*: this is relevant only if the departure of a team member necessitates a repeat of the role definition process.

As new notifications come in, old notifications will be removed from the **Dashboard** list.

The **View Round Schedules** link at the bottom of the list can be used to view the round start and end times; it will open in a separate popup.

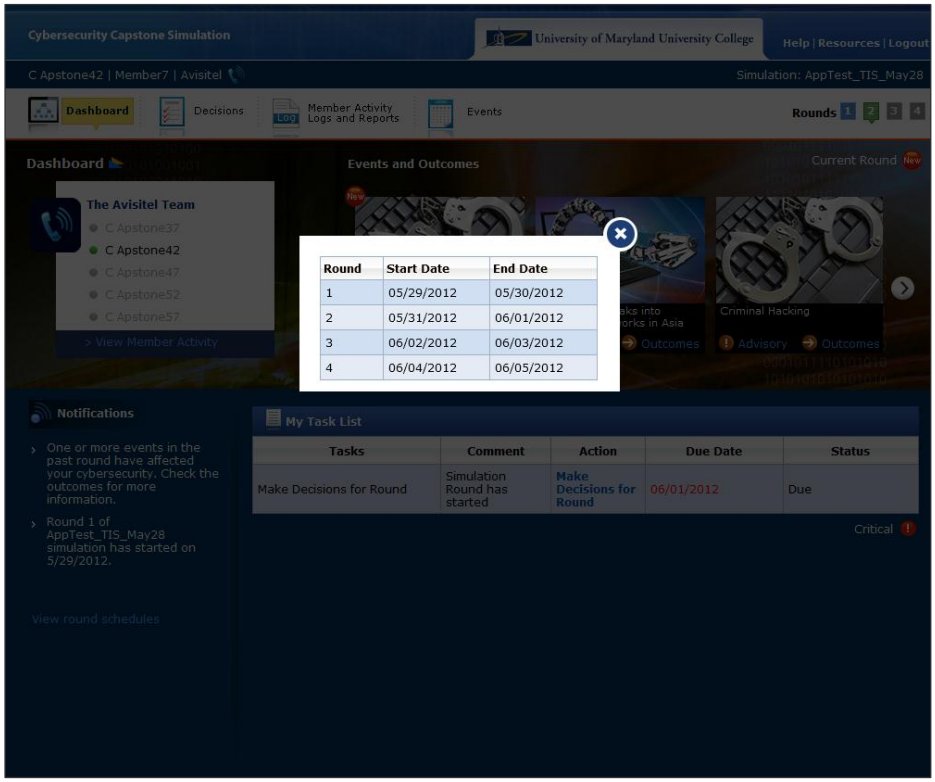

Figure 19: Round Schedules

6.1.4 My Task List

The **My Task List** table relates to the fourth task on the dashboard. It provides reminders as to the tasks you need to get done in the CCS.

For each task, the section describes:

- Comments that specify the issue
- The actual task
- The due date for the task
- Task status

The table will track the following tasks for you:

Table 4: My Task List

Task	Condition
Make decisions for the current round	The current round has started.
Team decision required in the round	An event's outcome requires a team decision to resolve.

Click the link opposite the task to visit the relevant screen. The task status is marked as **Due** by default and **Overdue** when past the due date. A task that is in **Due** status with today's date being the due date, or **Overdue** status for any date, will be marked with a red exclamation mark icon indicating **Critical** status.

6.1.5 E-mail Updates

You've read that you get e-mail updates for the critical activities in the simulation. Here's a complete list of the cases where you get an e-mail:

- You are assigned to a simulation.
- Your instructor approves or rejects your team's choices of role definition.
- Your instructor has taken too long to approve your team's choices of role definition.
- A team member has dropped out of the simulation.

6.1.6 Global Links

At the top of the simulation screen, you will find three global links: **Help**, **Resources**, and **Logout**. Let's look at what each of these do:

Help:

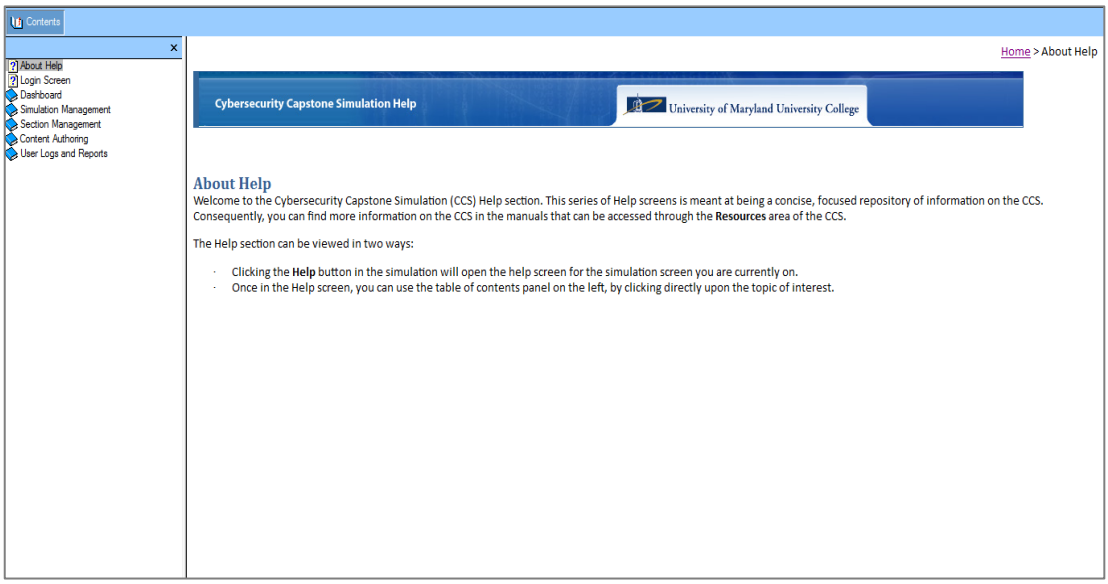

Figure 20: Help

The Help section provides help for every screen in the CCS. It will open as a separate screen in the browser. Click a topic on the left to open a list of subtopics. Click any subtopic to view the screen help information.

Resources:

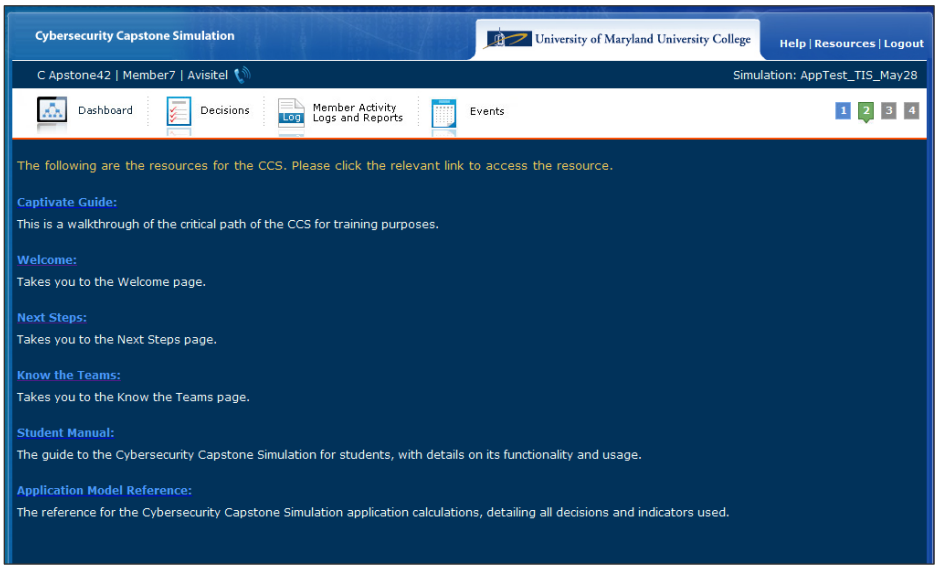

Figure 21: Resources

The **Resources** window has a list of CCS resources. Each resource has a description of what it does. The **Captivate** guide shows the essential steps for your role in the CCS by opening a Captivate movie in a new browser tab. The next three links, **Welcome**, **Next Steps**, and **Know the Teams**, allow you to revisit the information in those screens.

The **Manuals** link opens the relevant PDF document versions of the manual.

Logout:

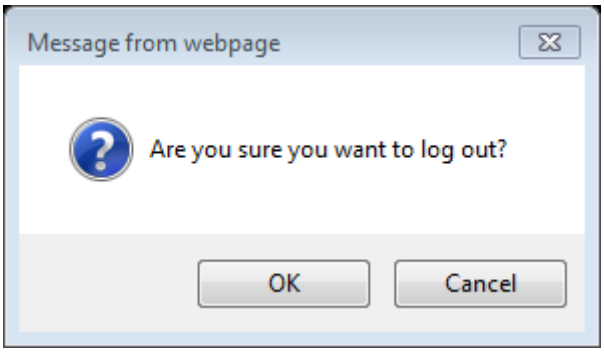

Figure 22: Logout

Clicking the **Logout** link will ask you to confirm that you want to log out. Click Cancel to abort the logout.

6.1.7 Adjusting the Viewing Area

You can adjust the viewing area in the CCS by utilizing the view adjustment settings on the browser you are using.

In Mozilla Firefox, you can do this by clicking **View** from the menu bar and then **Zoom** from the submenu. Adjust the zoom level as necessary.

In Internet Explorer 9, click the **Settings** icon in the upper right corner and then the **Zoom** from the submenu that appears.

For Safari, click the **Menu** icon in the upper right corner and **Zoom** from the submenu that appears.

In Chrome, click the **Menu** icon in the upper right corner and the **+** or **-** icons from the submenu that appears.

In all browsers, you can engage a full screen mode by pressing **F11** on the keyboard. You can also zoom in and out by pressing **Ctrl-plus** or **Ctrl-minus** on the keyboard.

6.2 Viewing Events

Once you take stock of the current round using the information found on the **Dashboard**, the next task should be to view event details: which events does the CCS introduce in this round, and how strong a threat, if they are a threat, are they?

Keep in mind that event information can show up on any day in the round. So you need to keep logging in every day to be sure that your decisions at the end of the round meet requirements of all the events that will occur. It's also possible, though rare, for no events to show up in a round.

To this end, you can click the **Events** tab, which opens the **Videos** tab in the **Events** screen, or click an event thumbnail as described in the previous section. If you take the latter path, you end up on the **Events** screen with that particular event highlighted in the **Videos** tab.

6.2.1 Viewing Videos

The **Videos** tab displays a list of events on the left, and clicking an event will play the video for it. Newer events are shown first in the list. The video will give your team an idea of the threat or effect involved, through the medium of the Cybersecurity News Network. The video might contain hints as to the action needed.

Figure 23: Videos

You can view the video as many times as needed. Remember that the videos are generic information; they tell you what an event can do, but not its specifics. You'll need to refer to the advisories for that.

6.2.2 Viewing Advisories

The **Advisories** tab, like the **Videos** tab, has a list of the events on the left. Clicking an event shows the event advisory, which specifies certain important event parameters:

- **Impact Probability:** What's the chance that the event will impact your team? This is rated from zero to five stars with increasing probability the more stars it has.
- **Impact Strength:** What's the degree of impact from the event if it does impact a team? This is rated from zero to five stars with increasing impact the more stars it has.
- **Target Profile:** Some events can affect certain teams; some events can impact all teams. The list of team icons tells you whether your team can be affected; if you see your team's icon there, your team is a target.

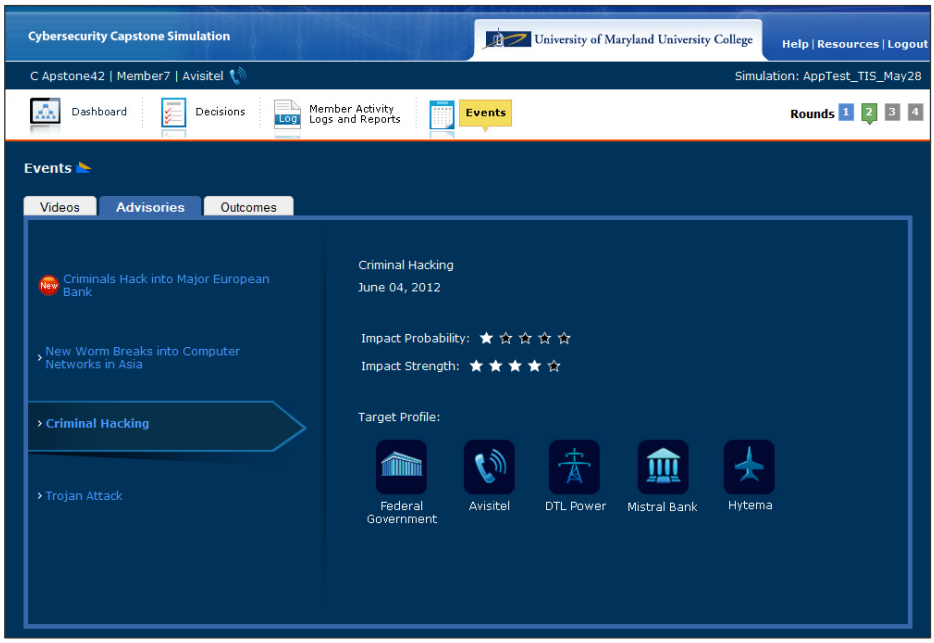

Figure 24: Advisories

Read the advisory to understand how this specific event can affect your team.

6.2.3 Viewing Outcomes

If you want to check to see if past events have affected your team, the **Outcomes** tab helps.

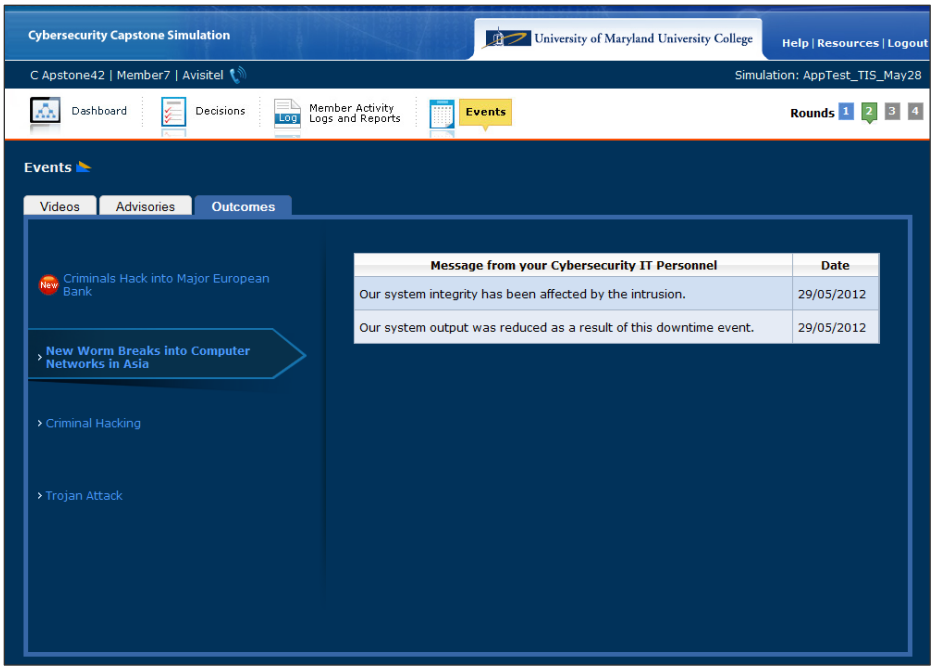

Figure 25: Outcomes

Click an event from the list to view the outcomes for that event on the right.

The outcomes are presented as messages from your agency or company's virtual IT team that implements your decisions and those of your team members. These describe the impact the events had on your team. If an event did not have an outcome for your team, there will be a message to that effect.

You will need to review this information in conjunction with the reports for the rounds to appreciate the full impact of events on your team.

6.3 Making Decisions

We come to the vital part of the round activities, which is making your decisions.

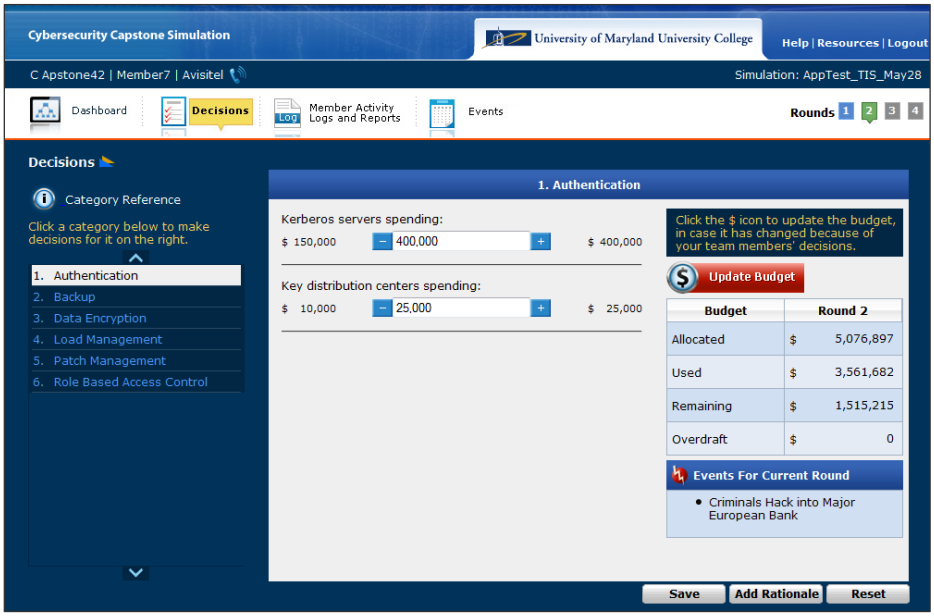

Figure 26: Decisions

Click the **Decisions** tab to visit the **Decisions** screen.

The screen is organized into three areas, each with its own function:

6.3.1 Browse Decision Categories

First, the decision category list on the left shows all available decision categories for you. Click the arrows at the top and bottom to navigate the categories in case there are more than 12 of them assigned to you. Click a decision category to show the decisions it contains.

Above the decision category list is the **Category Reference** link that opens a PDF. The PDF has detailed information about the decisions you can make in each category, with options, costs, and the indicators that can be affected. You can keep the PDF open or print it as you browse decision categories and make your decisions.

6.3.2 Reading Budget and Event Information

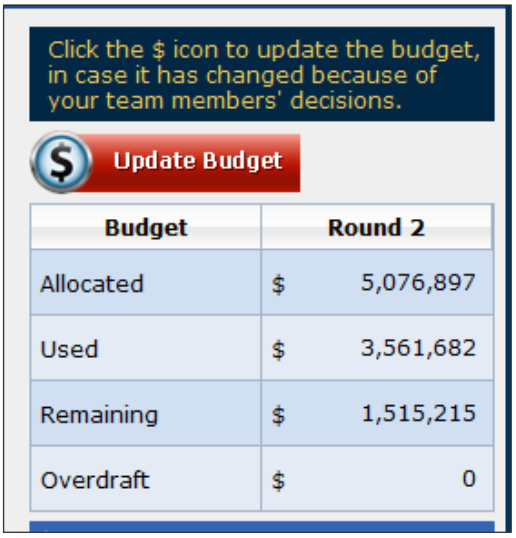

Figure 27: Budget Section

You can also use the budget and event information on the right to factor in to your decisions. The budget area displays:

- Budget available for the round; this is the total budget your team worked with in the round.
- Budget used in the round; this is the budget your team spent.
- Budget remaining in the round; this is the budget left. This is not carried forward.
- Any overdraft amount used, i.e., spending beyond the budget allocated.

All these budget entries are *for the current round only*, and *for the whole team*.

Note:

Because the budget can change behind the scenes as your team members utilize it to make their decisions, click the **$** icon to update the budget figures to reflect the latest decisions made by all your team members.

If your team spends beyond the budget allocated, the CCS will allot you an overdraft; you cannot go beyond the overdraft. Using an overdraft will affect your profitability, so avoid that if possible.

The figure below is an example of a warning message that will appear the first time the cost of a decision requires overdraft funding. (The overdraft amount identified in the warning message will be up to 10 percent of the team's budget.) Note that it is only a warning and requires no action other than to select **OK**. If you do not want to use any overdraft funding, then you must reverse or reset your previous decisions.

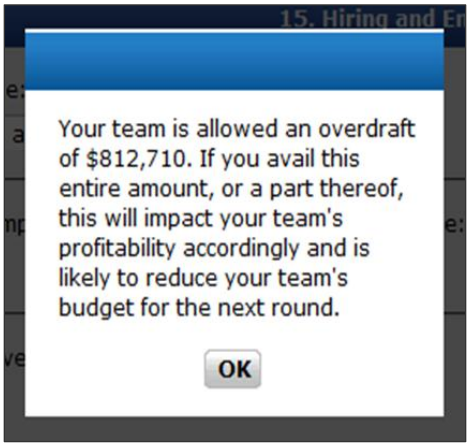

Figure 28: Overdraft Warning

The list below the budget entries area displays the events that will be occurring in the current round. It serves as a quick reminder of the threats you have to take into account when making decisions.

6.3.3 Making Decisions

The central area shows the decisions in the currently selected decision category. Make your decisions for the category, and click **Save**. Then click another category to make your decisions for it, and continue through all the decision categories.

By default, the simulation has a set of decisions already chosen, which are *generally* the weakest or least expensive options, leaving you with a large amount of unused budget. These are "business as usual" decisions; and the lowest amount of investment necessary to keep the company or agency functional.

If you were to keep the decisions as they are and proceed through the rounds, your team would have decent budgets throughout the simulation but would suffer in terms of security and availability because of the weakness of your systems. So your team needs to revisit all decisions once during each round to determine whether they need changing. Intra-team collaboration is vital here so that your team works coherently towards a common strategic goal for the round.

Every decision has a capital cost and an operating cost that varies according to the decision setting. The capital cost is applied in the round whenever a change is made to

a decision setting, while the operating cost is applied every round irrespective of whether the decision setting is changed or kept the same.

For example, upgrading encryption level will incur a higher capital cost and the higher operating cost for that setting, while keeping it at the same level will apply only the operating cost for that setting. Downgrading similarly incurs a lowered capital cost and a lowered operating cost.

If you do not save your decision settings for a category, the simulation will ask for confirmation when you move away from the current decisions to any other screen. You can choose to save or discard your changes, and then the simulation will take you to the category or other tab you clicked.

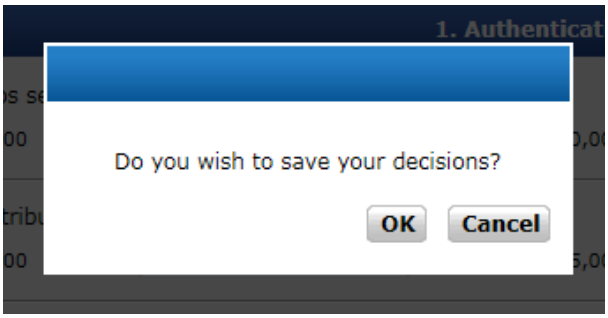

Figure 29: Save Confirmation

You should also submit a rationale for your decisions by clicking the **Add Rationale** button. Note that this rationale is a common rationale for all of the decisions you have made in your role for that entire round. Your entry should *not* be a per-decision rationale.

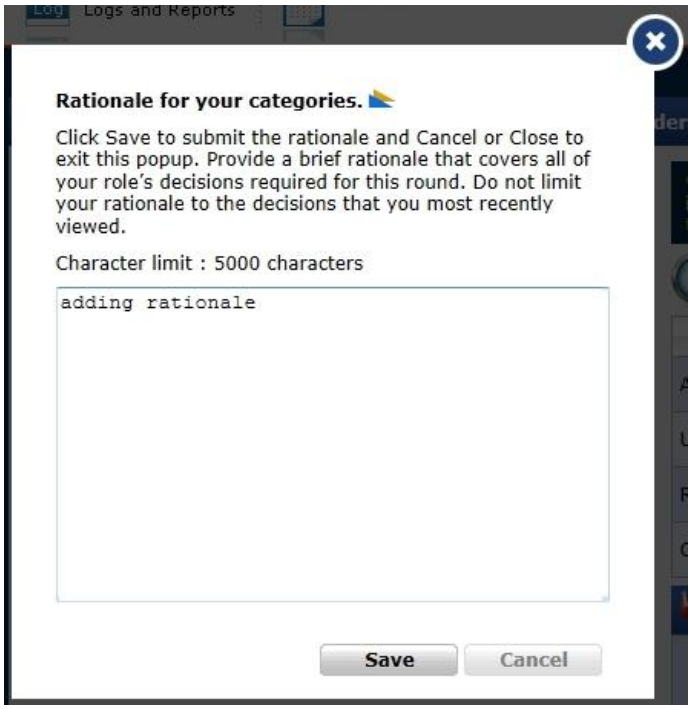

Figure 30: Rationale

This rationale need not be very detailed; details are better reserved for the team report you submit at the end of every round. Click **Save** to save your rationale for the round, or **Cancel** to abort. You can also click the **X** icon in the upper right corner to close the popup and return to the **Decisions** screen.

6.3.4 Making Team Decisions

Sometimes events will trigger outcomes that need the entire team to make a decision in the subsequent round. The team decision will appear as an entry in **My Task List** with the label "Make Tactical Decision". Click the entry to open the popup and respond to the question.

Any and all team members can respond to these decisions, and the decisions can be altered any number of times until the round ends.

6.4 When Decisions Exceed Available Funds

Occasionally, as a team, you will make very expensive cost decisions over the rounds. A combination of high spending and lowered budgets because of poor decisions can lead to a "debt spiral" condition.

This generally happens at the start of a new round; you may find that your team's budget for the round cannot support all of your team's high-cost decisions, because the total budget for the round, even with the provision of a special overdraft amount, has dropped below the total costs of all your team members' decisions. The simulation will not accept any decisions that result in the team exceeding the maximum allocated budget.

When this condition occurs, you will receive the following warning message:

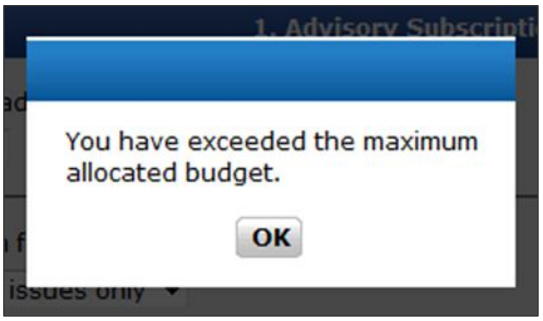

Figure 31: Warning of Exceeded Budget

Your recourse in this situation is to start opting for lower-cost decisions, thus reducing your total costs. When this occurs, you have four possible courses of action:

1. Use the **Reset** button to reverse all of your decisions to their settings at the beginning of the round.
2. Reverse some of your individual decisions to lower-cost options.
3. Have one or more team members change their decisions to lower-cost options.
4. Do nothing. Your earlier decisions that resulted in an out-of-funds condition will not be accepted.

If you decide on option 1, you will receive the following confirmation message:

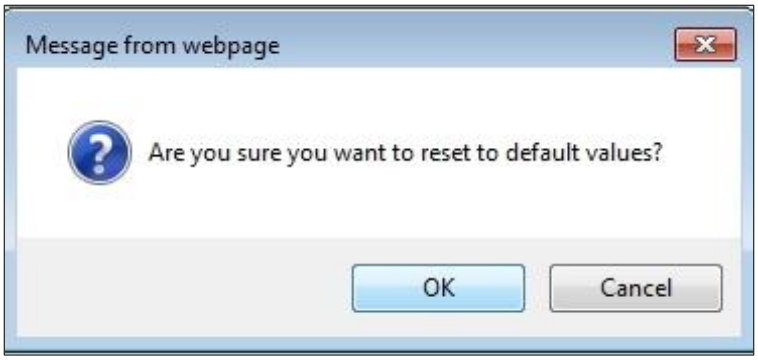

Figure 32: Resetting Decisions: Confirmation

Click the **Reset** button in the Decisions screen if you want to reverse all decisions to what they were at the beginning of the round. When the simulation asks for confirmation, click **OK** to have the simulation reset all of your decisions, or click **Cancel** to abort.

The **Reset** feature provides a quick method for the team to return its decisions to the way they were at the beginning of the round and start making decisions again.

Note:

Please contact your instructor immediately if your team enters a frozen state in which the simulation will no longer allow you to change or add decisions. The **Reset** feature will not be any help to you when your team is frozen. The game master and instructor must intervene so that your team can resume entering decisions.

6.5 Tracking Team Members' Decisions

You can use the **Member Activity Logs** to track team member login activity. So if a team member hasn't logged in for some time in a given round, this screen will help you determine the behavior and then proceed to discuss any difficulties they might be having. A proactive team is a successful team.

Note:

The member activity logs only tracks login activity and not individual actions once logged in.


Cybersecurity Capstone Simulation
University of Maryland University College
Help | Resources | Logout
Duncan Burris | Role1 | Hytema
Simulation: test_cross_team
Dashboard
Decisions
Member Activity Logs and Reports
Events
Rounds 1 2 3 4 5 6
User Logs and Reports
Reports Summary | Custom Reports | Decision and Event Reports | Cross-Team Impact Report | Member Activity Log

Member Activity Log

Enter a valid date range and click View to see team member activity logs. Sort the logs by date, name, and role if required.

From Date : 8/26/2012 To Date : 9/29/2012 View

Simulation	Date	Last Name	First Name	Role	Activities	Sections
test_cross_team	9/12/2012 6:17:40 AM	Burris	Duncan	Student	The student has visited the Next Steps screen.	T0011_Sec0012
test_cross_team	9/12/2012 6:17:40 AM	Burris	Duncan	Student	The student has visited the Next Steps screen.	T0011_Sec0012
test_cross_team	9/12/2012 6:17:40 AM	Burris	Duncan	Student	The student has visited the Next Steps screen.	T0011_Sec0012
test_cross_team	9/12/2012 6:17:40 AM	Burris	Duncan	Student	The student has visited the Next Steps screen.	T0011_Sec0012
test_cross_team	9/12/2012 6:17:40 AM	Burris	Duncan	Student	The student has visited the Next Steps screen.	T0011_Sec0012
test_cross_team	9/11/2012 9:56:32 AM	Burris	Duncan	Student	All team members of the team have defined their roles.	T0011_Sec0012
test_cross_team	9/11/2012 9:56:32 AM	Burris	Duncan	Student	All team members of the team have defined their roles.	T0011_Sec0012
test_cross_team	9/11/2012 9:56:32 AM	Burris	Duncan	Student	All team members of the team have defined their roles.	T0011_Sec0012
test_cross_team	9/11/2012 9:56:32 AM	Burris	Duncan	Student	All team members of the team have defined their roles.	T0011_Sec0012
test_cross_team	9/11/2012 9:56:32 AM	Burris	Duncan	Student	All team members of the team have defined their roles.	T0011_Sec0012

« Back 1 | 2 | 3 | Next »

Print Excel

Figure 33: Member Activity Log

To view the log, enter dates in the **From Date:** and **To Date:** fields and click the **View** button to see the desired log.

You can print this report or export it to an Excel worksheet using the icons at the bottom.

6.6 Team Member Leaving the Simulation

It's a very rare occurrence, but if a team member leaves the simulation for good, the CCS will require the remaining team members to take up the decision categories the team member owned. The next time you and your fellow team members log in, you will find that you no longer have access to the decision screen or the dashboard.

You will be taken to the role definition screen where you will need to distribute the former team member's decision categories amongst yourselves as a team and resubmit them. This process unfolds in the same manner as the formal role definition you went through before the simulation began.

As soon as all team members have submitted their decision categories, with all decision categories assigned, they regain access to the simulation.

Note that for the duration of this process, the simulation "clock" continues to run; therefore, it is vital for you and your team members to finish the redistribution as early as possible.

7. Reading Reports

Reports are where you can view the results of your team's decisions. Given their importance in the CCS, they convey all the important information in terms of decisions made, events that had an impact, and the outcomes in chronological order. They also have a high degree of customization in terms of filters for a more focused outlook.

Reports are generated by the CCS automatically at the end of each decision-making round. You don't need to wait for any instructor intervention; as soon as the round is finished, the results get generated.

Let's look at how each of the report types in the system can be used to best effect.

A general note for all indicator-based reports:

The indicators on your report will be blank during Round 1. This is because all indicators are at their default values and your team's decisions will be evaluated only at the end of that round. All indicators are at a default value of 100 before Round 1 evaluations come through.

7.1 Reports Summary

The summary screen is the screen you view by default in the **User Logs and Reports** tab. The aim of the summary report is to give you a quick overview of where your team stands in the simulation in the current round.

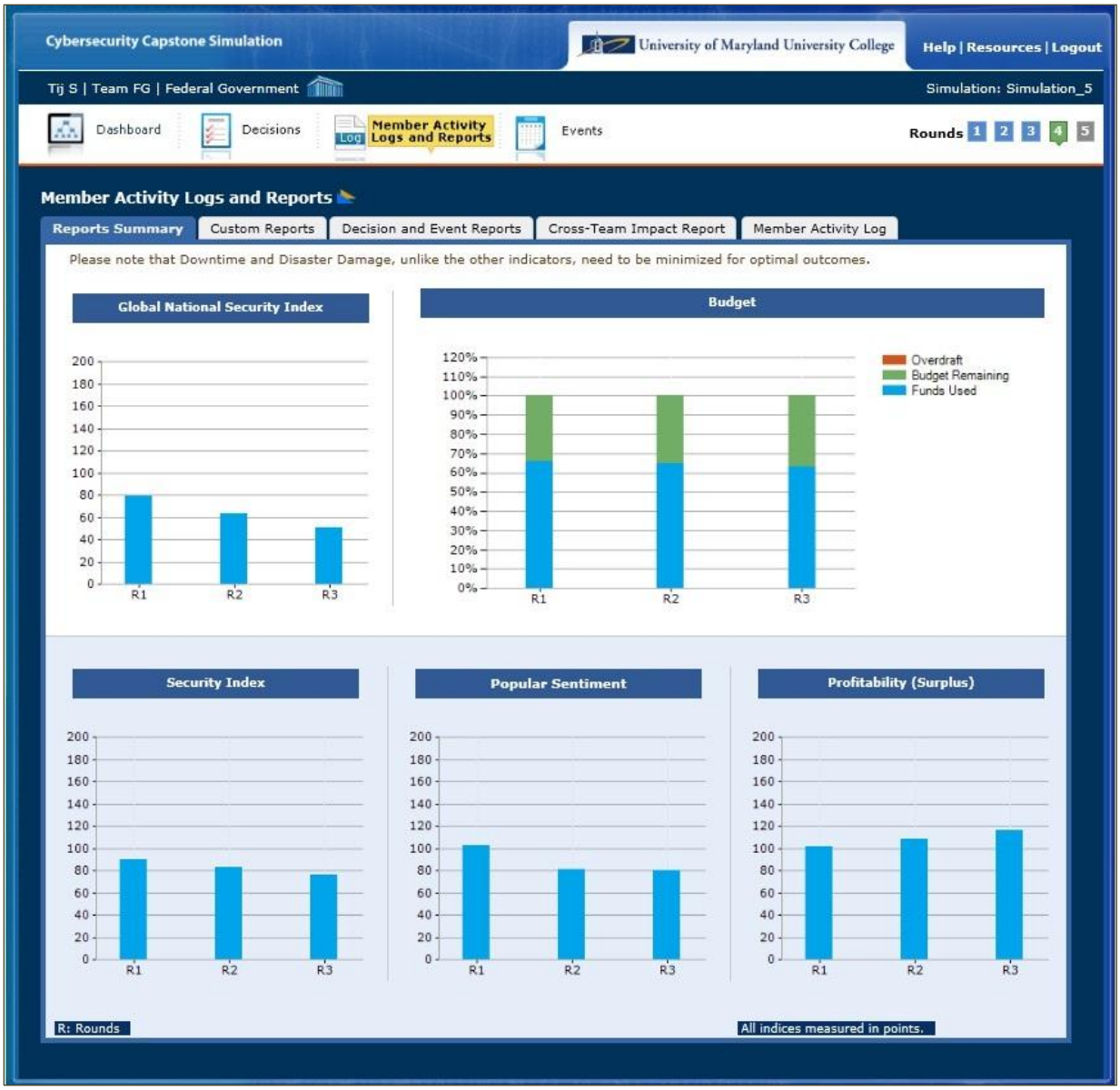

Figure 34: Reports Summary

The screen shows the **key indicators** in the CCS:

- National Security Index
- Security Index
- Downtime
- Profitability

Note:

The National Security Index is a global indicator of the security status of the "nation" rather than merely one individual team's contribution to the National Security Index. All teams' National Security Index will have the same value.

The values for these key indicators are displayed across all rounds that have been completed so far.

It also displays the budget utilization. The Budget graph displays the budget used, the budget available in each round, and any overdraft used.

Each of these graphs is on a scale of 0 to 200, except for the Budget graph that shows percentage usage of the budget.

Using this screen, you can quickly identify areas of strength and weakness for your team in terms of the key performance indicators. For the full story, however, you need to use the other reporting features.

7.2 Custom Reports

Custom reports are where the complete power of the reporting feature lies. This screen allows you to generate customized reports based on your reporting requirements at that time.

Custom reports are essentially organized around three questions: **Who? What?** and **How?**

Who? determines the extent of the custom report in terms of whose reports you want to view. Do you want to drill down to a single team within your section? Or do you want to view all the teams in your section?

What? determines which indicators you can view. You can choose either a single indicator, or choose to view the report for all indicators.

How? is about arranging the report output in the order you need. There are two subdivisions here: one is about whether you want the table to be sorted by **Team** first, and then the **Indicator**, or the other way around.

The second subdivision is more straightforward; do you want to view this report in a tabular form or graphical form? You can use graphical representation to identify trends, and then tabular representation for more precise figures.

You'll notice that there is no **When?** element to be chosen here because the simulation will always show data across all available rounds.

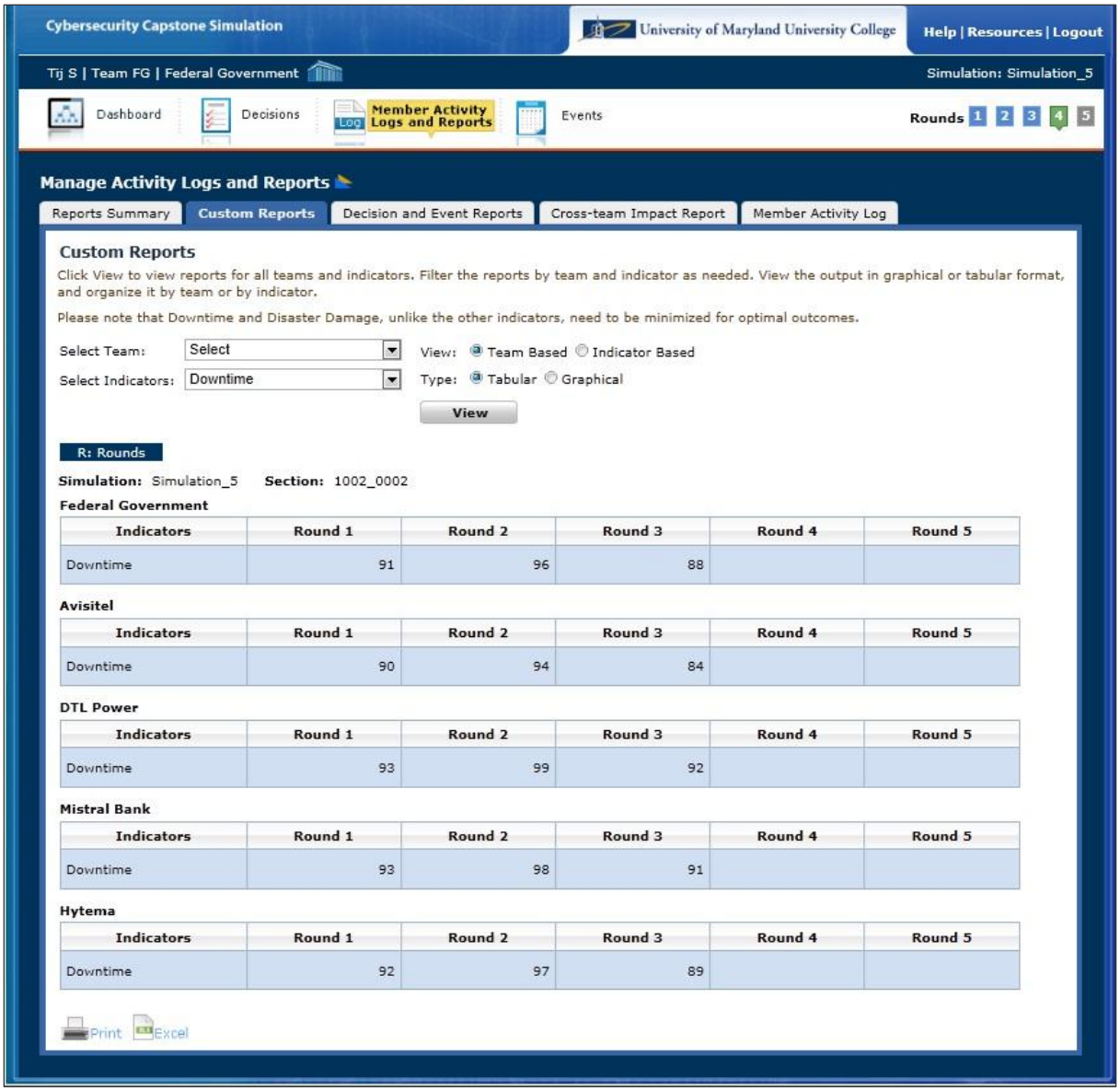

Figure 35: Custom Reports

Here's how the elements above map to the screen:

- **Who:** Choosing the simulation, section, and team
- **What:** Choosing the indicator
- **How:** Choosing the view and the type

So, for example:

- To view only the Security Index in graphical form for the Federal Government team, you would need to select the Federal Government team and Security Index. And since we want a graphical format, we change the type to Graphical.
- If you wanted to view all of the indicators in tabular form for all teams in your section, you would not make any selections in the indicator field or the team field, and click **View**. This instructs the CCS to make a report for all teams and indicators for the section.
- Keep in mind that because of space constraints, the CCS will not display a graphical view of all indicators across all teams. You will need to narrow down either the indicator or team selection, or choose a tabular report.
- Continuing from the above, if you wanted to compare each indicator *across* teams, you would choose **Indicator Based**. However, if you wanted to compare indicators *within* each team, you would choose **Team Based**.

Once you generate a report, you can print it or export it to an Excel worksheet using the icons at the bottom.

7.3 Decision and Event Reports

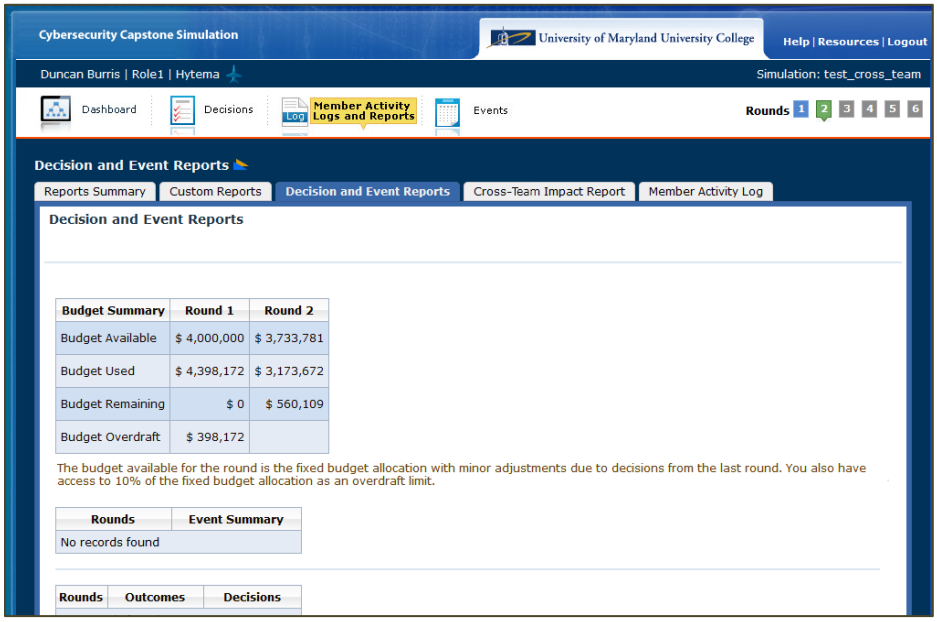

Figure 36: Decision and Event Reports

The decision and event reports complement the custom reports; here you can see the decisions made in the past rounds by you and your team members, along with logs of events in past rounds and their outcomes.

The report itself consists of the following sections:

- Budget summary
- Event summary
- Team decision summary
- Decision summary

The first table displays the following budget-related figures:

- Budget available for the round; this is the total budget the team worked with in the round. This is the sum of the allocated budget (a fixed amount given per round) and any adjustments due to your team's profitability.
- Budget used in the round; this is the budget spent by the team.
- Budget remaining in the round; this is the budget left. This is not carried forward to the next round.
- Any overdraft amount used i.e. spending beyond the budget allocated.

The second table displays the events that were observed in the round and whether they managed to impact your team.

The third table displays the rounds, the outcomes, and the team decisions made, if applicable. Certain outcomes have additional decisions that the team must make; the decisions made are shown in this table.

Rounds	Events	Affected
Round 1	New Worm Breaks into Computer Networks in Asia	Yes
Round 1	Criminal Hacking	Yes
Round 1	Trojan Attack	Yes

Rounds	Outcomes	Decisions
No records found		

Student Name: C | **Role:** Member38

Category	Decisions	Round 1	Round 2
Firewall	Filtering strictness	Low	Low
DNS Redundancy	DNS server redundancy	No	No
	Split DNS topology	Yes	Yes
Database Security	Frequency of forcing password changes in days	90	90
	Degree of separation of roles for admin and operator roles	None	None
	Control privileges	Distributed	Distributed
	OS services and associated ports	Disable	Disable
	Database honeypots	Disable	Disable

Figure 37: Decision and Event Reports

The fourth table is a summary of all decisions made by you and your team members. Each of the team members' decisions is presented separately, one below the other. The table displays the decision category name, the decision, and the option chosen for it, for each round.

Below each decision table for a team member, the rationale the team member entered is provided by round.

You can print this report or export it to an Excel worksheet using the icons at the bottom.

7.4 Cross-Team Impact Report

The final report related to the performance of the team in the simulation is the cross-team impact report. The CCS ties the performance of the teams playing the simulation together; for example, a rise in downtime from a service provider such as Avisitel affects the profitability of the other teams.

In this report, you can view the cross-team impacts for all teams in your section, for a particular round.

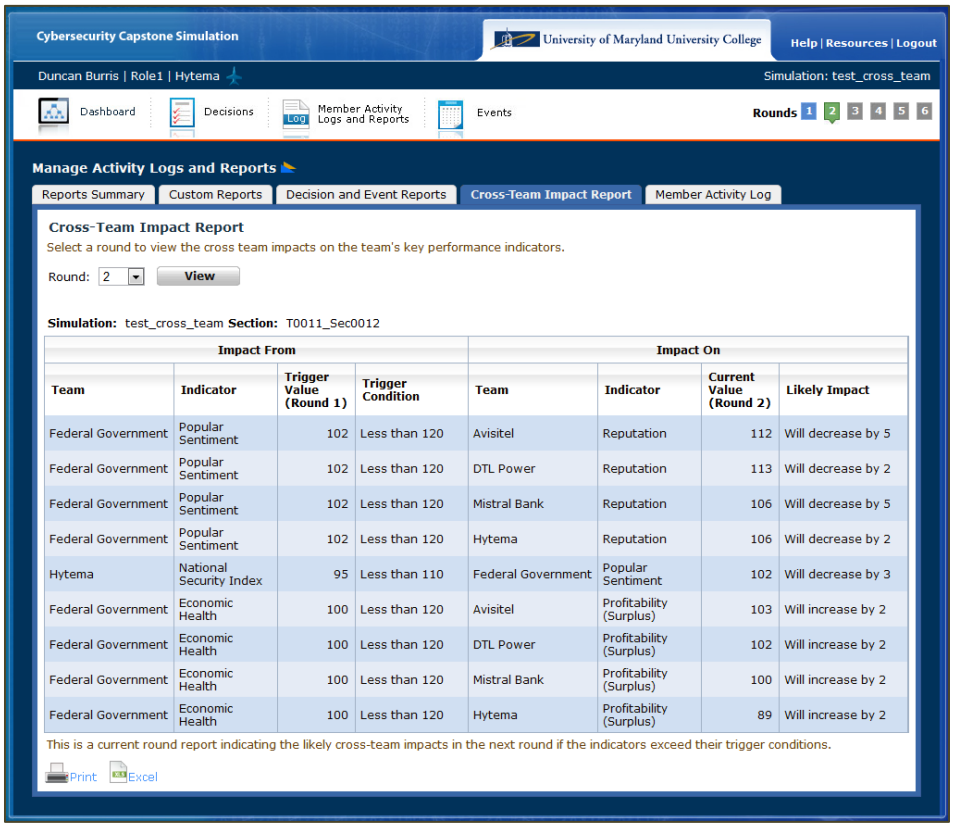

Figure 38: Cross-Team Impact Report

To generate the appropriate cross-team report, select a round and click **View**. Note that cross-team reports detail the impacts to be applied at the end of the round, and are available for viewing from Round 2 onwards.

The table in the cross-team report displays the following:

- The team and the indicator that triggered the cross-team impact
- The trigger condition that was satisfied
- The team and the indicator affected

- The degree of the likely impact on the affected team's indicator

Using this table, you can determine the benefits or disadvantages that the teams carry on their indicators going into each round; a team that has a loss of 3 points on profitability going into a round has to work harder to restore it with their decisions.

8. Putting it Together

The previous sections detailed the functionalities available to you as a student. Now, we move on to understanding how you can use these functionalities most effectively. To that end, this section focuses on strategies and procedures that will help you maximize the learning you and your team get from the simulation.

8.1 Preparatory Phase Tasks

There is one primary task involved in this phase: role definition.

8.1.1 Preparatory Phase: Role Definition

Points to be considered in executing this task include:

- Go over the complete decision list with your team so you can divide the categories among yourselves.
- You are free to provide any role designation you choose, but make sure you have a solid rationale for the role designation and that the designation matches the decisions you choose.
- You might be teamed up with students that are not from the same track. Be sure that the team takes advantage of the team members' respective strengths. If the entire team belongs to either the technical or the policy track, you will need to identify members who can make the decisions corresponding to the other track and support them as necessary.
- Appoint a team leader who will informally be in charge of monitoring the team's progress. You can rotate this responsibility between members every week or every other week if needed.
- Identify a date by which all team members will have defined their roles, and stick to it. Organize a team review of roles and decision choices.
- If the instructor rejects the role definitions, do not rush to resubmit. Read the instructor's rationale for the rejection, and work as a team to resubmit.
- Once the instructor approves the role definitions, there is no further task in the simulation until the decision phase starts. You can use this time as a team to define your lines of communication and overall strategy and to read the manuals.
- Identify times that your team members can be called for discussion.

8.2 Decision Making

Once the simulation starts, your role is to make decisions in collaboration with your fellow team members. Let's look at how you can guide the phases involved in this section of the simulation:

8.2.1 Simulation Briefing

On Day 1 of Round 1 of the simulation, you will be briefed by your instructor.

The following pre-work for the briefing is recommended:

- Read up on the latest issues in cybersecurity for your team.

The instructor may share an agenda with you prior to the briefing. A sample agenda follows, where the instructor:

- Details the themes and objectives of the CCS.
- Explains the online portion of the CCS.
- Explains the offline portion of the CCS: Student teams will need to submit a written report at the end of every round explaining the rationale behind the decisions they have made, given their results in the previous round. Additional assignments may be given.
- Details the contents of subsequent debrief sessions to be held every round.

8.2.2 Making Decisions

In every round, you are required to make decisions so as to get the best performance for your team. Here are some best practices to get the best experience:

- Divide each round as a team into segments: feedback, strategic discussion, and implementation. The feedback stage is where the team aggregates the results of the CCS and information provided by the instructor. The strategic discussion is a team discussion where you will translate the feedback into a viable strategy for this round. Finally, each team member implements the decisions as arrived at by the team.
- Set up timelines by which team members must have their decisions entered in the CCS.
- Each team member must log in to the CCS at least once every day. This enables the team to be up to date as to any new information in the simulation, such as new events that have been identified for the round.

- Coordinate the decision entries for team members in the CCS. Remember that the team operates from a single budget. It is a good idea to try to have multiple entry sessions on the CCS so the team can change decisions on the fly as they see the budget update itself.
- Use the online Help and the Application Model Reference document in the team discussions.
- You do not need to re-enter your decisions every round. The CCS will retain the decisions you made last round, so if you feel you have a winning combination, there is no need to manually enter any decisions again.
- Decisions are automatically submitted at 12.00 AM Eastern, at midnight of the last day of the round. It is possible to alter your decisions as many times as you need before that deadline.
- When entering your rationale, keep it brief and precise. The rationale is meant to give the instructor a quick overview; the details are submitted in a written team report.

8.2.3 The Debrief Session

Get the best out of the debrief session by considering these items:

- There are no uniquely correct outcomes for the simulation. There are key performance indicators that need to be kept at high levels, but you may choose to maximize different indicators based on your perception of their situation. The threats will change from round to round through the events, so a team that was prioritizing security may switch to maximizing profitability between rounds.
- Understand how each key performance objective translates into your performance in the round. Be prepared to discuss the trends in each of the followin indicators. Was the movement in accordance with your strategy? Or did your strategy not work?
    - National Security Index: How secure is the nation as a whole? This is a common indicator derived from the respective contributions of each team to national security.
    - Security Index: How secure is your particular team?
    - Downtime: How low are you keeping your principal service's downtime?
    - Profitability: how profitable is the organization for which the team is controlling security? The government team will need to look at their surplus instead.

  - Other important indicators include Revenues, Customer Satisfaction, Performance, and Productivity.

- You may be asked to research related occurrences for events that happened in the round and how these might affect corporate and governmental working. Tie these in to the simulation results for a more fruitful discussion.
- Consider how the cross-team effects enable your team to impact and be impacted by other teams' decisions.
  - Explain how other teams' decisions that affect their key indicators may impact the index values for your team.
  - Explain how your team's decisions that affect your key indicators may impact the index values for other teams.

8.3 Interpreting Results

It's important to be able to interpret the results of your decisions for a simulation so that you can change your strategy accordingly.

8.3.1 Impact Assessment

The process of interpreting results involves analyzing the impact of outcomes on indicators. We know that decisions and events can affect an indicator.

8.3.2 Effect of Events

First, we see if any events might have impacted the indicator.

For example, if the Security Index indicator for your team rose by 10 points, and you know that a worm intrusion event and a phishing attack have successfully impacted the team, you can see that these events might not weaken Security Index; rather they might increase Downtime.

So we can chalk off the events' effects on your team's Security Index.

8.3.3 Effect of Decisions

The second effect is that of the decisions. The Application Model Reference has a list of decisions and the indicators they impact. Use this list to see if there are indicators that affect Security Index directly.

In our example, for Security Index, there are no decisions that affect it directly. However, there are decisions that affect Technical Security Index and Internal Security Index, which in turn should affect Security Index.

8.3.4 Cross-Team Effects

Finally, we have the cross-team effects to consider. The Application Model Reference details the working of the cross-team feature. Depending on the performances of a team in a round, you will see changes in the indicators going into the next round for other teams. Refer the cross-team reports to assess the impact of cross-team influences on your team.

8.3.5 Summary

So, for our team who had a rise in the Security Index, we can put it down to their decisions made that affected Technical Security Index and Internal Security Index. You can therefore ask all the team members to revisit their decisions and see how their decisions increased security.

8.3.6 Process

So if we were to list the above as a process, here's what we get:

1. What indicator are we looking at?

2. What events in the round may have affected this indicator?

3. What decisions in the round directly affected this indicator?
   Refer to the decision table in the Application Model Reference document.
   Did any decisions that affect the indicators that affect this indicator?

Figure 39: Process of Report Interpretation

8.4 Communicating with Other Users

The CCS does not have an inbuilt feature for communication with other CCS users, whether game master, instructors, or students. It will deliver simulation-related messages automatically to the participants of the CCS.

However, for specific communications, you can utilize the communication features of the UMUC Learning Management System (LMS). Since section information is included as part of the LMS, you can message instructors and students directly for communication.

Regarding the rules of communication and the mechanics of communicating through the LMS, please contact UMUC LMS support.

9. Frequently Asked Questions

This section details the most frequently asked questions for the CCS from a student perspective. These are the essential questions; for answers to more specific queries, please read through the manual and use the index if necessary.

How long can a round go?

A minimum of two days onwards to any maximum number.

How many teams are there in a section?

Five. There cannot be more or fewer teams.

Can students in the same team share the same decisions?

No. The CCS explicitly prevents this.

Can students in different teams choose the same decisions?

It is possible, but decision distributions across teams are independent; they do not affect each other.

Can I change my decisions during a round?

Yes, as many times as needed before the deadline.

What's the deadline for decision submission?

12.00 AM Eastern, midnight on the last day of the round.

It's the fifth day of the round, but I don't see any event threats. Why?

Events may not always appear on the first day of the round; they may appear on any day right up till the last day. There is also the remote possibility that there may not be any events in the round at all. In any case, ensure that you keep logging in each day to check for event threats.

What is the overdraft amount do?

The overdraft is an additional budgetary spending amount that has been provided to your team as a whole. This is to help you consider critical decisions that may require additional funds (when your budget is completely utilized) than what was provided to you as a budget allocation.

What is the maximum overdraft I can avail?

The maximum overdraft your team can avail is 10 percent of the available budget. For instance, if your Allocated Budget for the round is $5,000,000, the maximum overdraft will be $500,000.

However, as a team, you may decide to either use up the entire amount, only a part of it, or not use it at all by keeping the spending under the available budget.

If we decide to avail the overdraft, will it negatively impact our performance in this round?

Availing the overdraft will decrease the profitability in the current round and reduce your budget for the next round.

Why does my performance in this round impact the budget for next round?

When you make decisions that reduce your profitability in the current round, the organization will reduce the net allocated budget for the next round.

How do I calculate the cost of my decisions?

All decisions have two components—capital costs and operating costs. Details of these are provided in the **Category Reference Guide** available in the **Decision Screen** of the simulation, and also the **Application Model Reference** document that is available through the **References** section. In Round 1, you will notice all decisions have default settings. If you choose to maintain these default settings, only the operating costs will be calculated for as long as you maintain those values. However, if you make changes to these decisions, both **Capital Costs** and **Operating Costs** will be applied. Similarly, in the next round, if you choose to maintain the decisions you made in the current round, only **Operating Costs** will be applied again. This means that you should aim for a strategy of restrained changes instead of changing most or all decisions in every round.

When I moved from one round to the next, I saw that the used budget or overdraft increased. But I haven't made any changes to the decisions!

Please refer to the question above. When you move from one round to the next, even if you maintain your default decisions, there will be an increase in the used budget and/or overdraft, because the operating costs have been applied.

I availed an overdraft and now I get a message that I cannot make any more decisions! What do I do?

You or your teammates seem to have made very high cost decisions over the rounds. If you are unable to make new decisions or change existing decisions, it is because the capital costs and operating costs of these decisions are so high that the total costs exceed the total budget available to you, including the overdraft amount. Your team will have to decide to either:

1. Do nothing and accept the current decisions.
2. Reset your decisions back to the beginning of the round.
3. Reverse individual decisions by teammates to lower cost options to free up budget for the funding of more critical controls.

I seem to have made the right decisions and also kept a close watch on the budget. My key performance indicators are still not as good as they should be. Why?

While you make your decisions, ensure that you have understood the impact of those decisions on the key indicators. You should refer to the Application Model Reference for understanding the relationships involved both between the decisions and the indicators.

What are the indicators I see in the reports measured in? What does a Downtime of 135 mean?

The CCS generally measures your team's performance metrics as indices, which means that they are measured in terms of points falling within a set range, namely, 0 to 200, instead of the real world units you might normally expect, such as hours or service percentages. This is done to enable quick visual comparison by harmonizing units of measurement across disparate metrics. This also prevents variations in team budgets and industry standards from complicating these comparisons. So a Downtime of 135 would correspond to a downtime that is "bad" by industry standards, with 200 being the worst.

Indices start off at 100, and can drop or rise relative to this number. The implication of this rise or fall depends on the index in question. Downtime is harmful to an organization, so a Downtime index going over 120 is a cause for concern. On the other hand—and this is true for all other indicators except Disaster Damage—the higher the indicator, the better your performance on that indicator.

How do I know whether my decisions are appropriate? How do I know if I'm performing well?

There are no right or wrong decisions in this simulation. You are playing as a team to improve the key indicators of your organization. Your performance is governed by how challenging the events are and your team's dynamics. Decisions that get you through for less challenging events might not serve you well in more challenging events. Look at the Advisories tab in the simulation under Events to understand the impact of events, discuss what indicators they might impact, and then arrive at decisions that are likely to improve your performance on those indicators. The base index values for all indicators are 100 points. You should always try to increase it upwards from 100 except for Downtime and Disaster Damage, which you need to reduce as far as you can.

Why do I need to collaborate with my team members?

Decisions made in isolation will not help you achieve a unified strategic response for the team. You as a team will need to decide which indicators should be given more weightage and make decisions accordingly. In the absence of a coherent set of decisions from your team members, not only will the spending exceed the budget, but you'll also see diffused changes in your indicators that won't help you defend against threats.

10. Application Interface Reference

10.1 Login Screen

The login screen allows you to log into the CCS with your UMUC login details.

To log in, type your username and password and click **Submit**. If successful this will take you to the **Welcome** screen on your first visit. On subsequent logins, you will be taken to the **Role Definition** screen until your role is defined successfully. When the simulation starts, you will be taken directly to the **Dashboard**.

10.2 Welcome

The **Welcome** screen introduces the Cybersecurity Capstone Simulation to you. From this screen, you can skip to the **Role Definition** screen directly, or click **Continue** to proceed to the **Know the Teams** screen.

Note that the simulation will display your name and team assignment at the top. If you are in the **Role Definition** phase, the round display is greyed out. If you are in the **Decision** phase, the round display shows the active, completed, and upcoming rounds.

10.3 Know the Teams

The **Know the Teams** screen introduces the team profiles that are part of Cybersecurity Capstone Simulation. You will be part of one of these teams, having been assigned by your instructor.

Click each of the team names to open a popup window containing a short profile of the team. Click the **X** icon to close the window.

You can skip to the **Role Definition** screen directly, or click **Continue** to proceed to the **The Next Steps** screen.

10.4 The Next Steps

This screen explains the tasks that you will perform as a student in the CCS in each of the three phases. The appropriate phase is highlighted based on the active phase of the simulation you are playing.

Click **Continue** to proceed to the **Role Definition** screen if you are in the role definition phase, or the **Dashboard** if you are in the **Decision** or **Final Debrief** phases.

10.5 Role Definition

On this screen, you will define your role in the simulation by providing a designation and choosing decision categories.

You will need to provide a designation in the **Your role in the team:** field. You will also need to choose the categories from the table provided.

The table displays the category name as well as the names of your fellow team members that have chosen these against the category and the role that the particular team member has chosen.

Also, above the table, on the right hand side, you can see the category selections in terms of a minimum, maximum, and the categories that you have currently chosen. The minimum and maximum categories are calculated by the simulation, depending on the number of team members.

Above the table on the left hand side, you will see a drop-down that allows you to view:

- all categories
- categories that have been chosen by your team as a whole
- categories that have not yet been chosen
- categories that you have chosen

You will therefore need to choose categories till you have chosen more or as many categories as the minimum, and less or as many categories as the maximum. You can ”release” categories by simply deselecting them. Once you have finished, click **Submit**.

This action will freeze your choices on this screen until they are reviewed by the instructor for your team as a whole, so it is recommended that you coordinate your choices with those of your team members.

If the instructor rejects your choices or those of any member of your team, the screen will be once again open for modifications. You may or may not need to modify your settings, based on whether the reason for rejection involves your choices. You will need to coordinate with your team members; if there is redistribution of decisions involved, you will need to release decisions if another team member should have them, and vice versa. Click **Submit** once you are finished; this repeats the submission and approval process.

When the instructor accepts your team’s submission, you are cleared to participate in the simulation and are directed to the **Dashboard** on future logins.

10.6 Dashboard

The dashboard screen serves as the central monitoring station for the CCS. The dashboard has the following sections:

10.6.1 Team Member Status

This area lists the members of your team. Members who are currently accessing the simulation show with a green circle next to their names. Members who are not accessing the simulation have their names greyed out and a gray circle next to their names.

The **View Member Activity** link takes you to the **Member Activity Logs and Reports** screen, where you can view a log of your team members' activity.

10.6.2 Notifications

The Notifications list helps you keep track of your actions and actions related to you for the CCS.

The following incidents are tracked by the Notifications list, but only for the simulations assigned to you:

- Round start and end announcements
- Simulation "round ends in two days" announcements
- Approval or rejection of your team's role definitions by the instructor.

As new notifications come in, old notifications will be removed from the **Dashboard** list.

The **View Round Schedules** link at the bottom of the list can be used to view the round start and end times; it will open in a separate popup.

10.6.3 Events and Outcomes

This area tracks the event notifications for the rounds in the form of a filmstrip. It also provides links to advisories and event outcomes for your team.

Each event that appears in the simulation is shown by a graphic. Only three events are shown at any time in the filmstrip; and by default, the newest three events are shown first. Newer events appear on the left end of the filmstrip, and older events get pushed out to the right.

You can click the left and right arrows in the filmstrip to navigate through it.

Each event in the filmstrip has a graphic you can click to view the event video under the **Videos** tab under **Events**. The video provides an update on the nature of the event. There is also an **Advisory** link to the event **Advisories**, under the graphic, where you can learn how significant the event will be. You will need to review this information when making your decisions.

When a round ends, the CCS checks to see if the events in the round had an outcome for your team, in which case the event graphic will have an active **Outcomes** link. This link takes you to the **Outcomes** tab under **Events**, where you can review the outcomes for the past rounds. Note that outcomes will therefore not be accessible for the current round.

10.6.4 My Task List

The "My Task List" section helps you track the tasks to be done. For each task, the section describes:

- Comments that specify the issue
- The actual task
- The due date for the task
- Task status

The Action column contains links that take you to the relevant screen. The task status is marked as **Due** by default and **Overdue** when past the due date.

A task that is in **Due** status with today's date being the due date, or **Overdue** status for any date, will be marked with a red exclamation mark icon indicating **Critical** status.

By default, the tasks in the table will be sorted with **Critical** tasks first and with the rest of the tasks sorted by date.

10.7 Decisions

Clicking the **Decisions** tab shows the **Decisions** screen, where you and your fellow team members will make the choices that determine the functioning and performance of your teams, and to a limited extent, that of the other teams in your class as well.

All available decisions are split into categories that are arranged on the left.

Click a category to show the decisions it contains. Make your selections for it. Click the **up** and down arrow buttons above and below the list to navigate to the other categories.

Above the decision category list is the **Category Reference** link that opens a PDF. The PDF has detailed information on the decisions you can make in each category, with options, costs, and the indicators that can be affected. You can keep the PDF open or print it as you browse decision categories and make your decisions.

On the right of the screen you will see the budget figures for the current round. These include the funding available for the round for your team, the funds currently used by your team, the funds left, and any overdraft amounts. Below the budget entries you will see a list of current events in the round.

Click the **$** icon to update the budget figures. This step is useful if the team is simultaneously making decisions; it ensures that team members have the latest budget figures on hand as they work. In any case, the simulation will not let you go over budget; it will notify you accordingly.

You can also enter a rationale for your decisions in the **Rationale** text box. This is a common rationale applied across all categories.

Click **Save** to store your decisions for all categories, including the categories not shown on the screen; and the rationale you have entered, if any. If you do not save your decision settings for a category, the simulation will ask for confirmation when you move away from the current decisions to any other screen. You can choose to save or discard your changes, and then the simulation will take you to the category or other tab you clicked.

Click **Reset** at any time to restore your decisions to the decision settings at the beginning of the round. This works only for the decisions that belong to you.

10.8 Member Activity Logs and Reports

The **Member Activity Logs and Reports** tab enables you to review your team members' activity in terms of simulation activity, decisions made, and results obtained.

The following tabs are found in this screen:

- **Reports Summary** provides a summary of the principal indicators for the teams
- **Custom Reports** allows you to generate a report by the indicator of your choice across rounds and teams.
- **Decision and Event Reports** details the decisions and events that impacted your team in each round.
- **Cross-Team Impact Report** provides details of the cross-team impacts.
- **Member Activity Log** provides records of a limited subset of your activities and those of your fellow team members pertaining to the simulation.

10.8.1 Reports Summary

This screen provides you a quick summary of the status of your team and a quick comparison for any indicator with other teams.

The screen has five indicators: National Security Index, Security Index, Downtime Index, Profitability Index, and Budget. The values for these are displayed across all concluded rounds.

The first four indicators are indices and hence range between 0 and 200. The Budget graph shows a percentage representation of budget used, unused, and any overdraft use. Refer the legend next to the Budget graph.

10.8.2 Custom Reports

This tab is where you can generate and view reports customized by team and indicator. You can then arrange them by team or by indicator and choose between a graphical or tabular representation. These reports can be printed and exported to an Excel worksheet.

To generate the appropriate custom report for your needs, consider the following:

- To generate a report for all teams in your class, keep the selection as **Select** in the **Select Team:** drop-down. To do this for a particular team, select a particular team in the same drop-down.

- For any of the above cases, if you wish to see all indicators in the report, keep the selection as **Select** in the **Select Indicators:** drop-down. To filter the report for a particular indicator, select that indicator in the drop-down.
- If there are multiple teams and/or indicators chosen, you can choose whether the report arranges the data by indicator or by team. Make your selection using the **View:** field.
- Finally, you can choose to view the report in graphical or tabular format, using the **Type:** field.
- The CCS does not allow generation of reports with all indicators across all teams in a section, for purposes of clarity. You must narrow down the selection by team, indicator, or choose a tabular view.

Once you generate a report, you can print it or export it to an Excel worksheet using the icons at the bottom.

10.8.3 Decision and Event Reports

This tab lists all decisions and events for your team by round, for all past rounds. Current round decisions and events are not displayed here.

The first table, **Budget Summary**, displays the following budget-related figures. This section is important to understanding how your team worked around the constraints of the budget in each round.

- Budget available for the round; this is the total budget your team worked with in the round.
- Budget used in the round; this is the budget your team spent.
- Budget remaining in the round; this is the budget left. This is not carried forward.
- Any overdraft amount used, i.e., spending beyond the budget allocated.

The second table, **Event Summary**, displays the events that were observed in the round, and whether they managed to impact your team.

The table will display the event name, the round involved, and whether the event impacted your team.

The third table, **Team Decision Summary**, only displays events which triggered an outcome that required a team decision to be made. It will display the event, the team decision required, and the decision made.

The fourth table, **Decision Summary**, is a summary of all decisions made by you and your team members. Each of the team members' decisions are presented separately, one below the other. The table displays the decision category name, the decision, and the option chosen for it, for each round.

Below each decision table for a team member, the rationale the team member entered is provided by round.

You can print this report or export it to an Excel worksheet using the icons at the bottom.

10.8.4 Cross-Team Impact Report

This tab details the cross-team impacts. As a student, this will help you keep track of the cross-team impacts in the simulation.

To generate the appropriate cross-team report, select a round and click **View**.

The table in the cross-team report displays the following:

- The team and the indicator that triggered the cross-team impact
- The trigger condition that was satisfied
- The team and the indicator affected
- The degree of the likely impact on the affected team's indicator

10.8.5 Member Activity Log

The **Member Activity Log** tab displays the activity for you and your team members in the CCS.

To view the log, enter dates in the **From Date:** and **To Date:** fields and click the **View** button to see the desired log.

The table displays the following details:

- The name of the simulation
- The date of the activity
- The last and first names of the team member involved
- The activity itself

You can print this report or export it to an Excel worksheet using the icons at the bottom.

10.9 Events

On the **Events** screen, you can view the video for the events, the associated advisories, and the outcomes if the events end up affecting your team.

The screen has three sections, accessible through the tabs:

- The **Videos** tab, where you can view the video for the event
- The **Advisory** tab, where you view the advisory for the event
- The **Outcomes** tab, where outcomes are viewable, provided the event affected your team

10.9.1 Videos

The **Videos** screen is the default screen opened when the **Events** tab is clicked.

On this screen you can view the video for each event that has been identified to occur for the round. On the left, you can see a list of all events with the latest ones first. Click an event from the list, and click the **Play** icon in the video area to start playing the video.

You can skip forward or backward in the video, pause it, or restart as needed. Clicking another event in the list will cause the current video to stop playing and open up the video for that event instead.

You can click the **Maximize** icon under the video area to play the video at the maximum screen size possible on your machine or mobile device.

10.9.2 Advisories

On this screen, you can view advisories for the events in the simulation, which help you identify the degree and probability of impact that an event will have.

On the left, you can see a list of all events with the latest ones first. Click an event from the list to view the advisory for that event on the right.

The advisory covers the following details:

- **Impact Probability:** What's the chance that the event will impact the teams in the simulation? This is rated from zero to five stars with increasing probability the more stars it has.
- **Impact Strength:** What's the degree of impact from the event if it does impact the teams? This is rated from zero to five stars with increasing impact the more stars it has.

- **Target Profile:** Some events are prognosticated to affect certain teams; some events can impact all teams. The list of team icons tells you whether your team can be affected; if you see your team's icon there, you can be affected.

Make sure you review the advisory for events for the current round so you can adjust your decisions accordingly.

10.9.3 Outcomes

On this screen, you can view outcomes for the events in the simulation, which help you identify the impact the event had on your team. Note that outcomes appear only if the event in question had an impact on your team.

On the left, you can see a list of all events with the latest ones first. Click an event from the list to view the outcomes for that event on the right.

The outcomes are presented as messages from the virtual cybersecurity team that implements your decisions and those of your team members. These describe the impact the outcomes had on your team.

You will need to review this information in conjunction with the reports for the rounds to appreciate the full impact of events on your team.

10.10 Global Links

At the top of the simulation screen, you will find three global links: **Help**, **Resources**, and **Logout**. Let's look at what each of these do:

Help

The Help section provides help for every screen in the CCS; it is what you are reading now. It will open as a separate screen in the browser. Click a topic on the left to open a list of subtopics. Click any subtopic to view the screen help information.

Resources

The **Resources** window has a list of CCS resources. Each resource has a description of what it does. The **Captivate** guide shows the essential steps for your role in the CCS by opening a Captivate movie in a new browser tab. The next three links, **Welcome**, **Next Steps**, and **Know the Teams**, allow you to revisit the information in those screens.

Clicking the **Student Manual and Application Model Reference** links opens the relevant PDF documents.

Logout

Clicking the **Logout** link will ask you to confirm that you want to log out. Click Cancel to abort the logout.

11. Glossaries

This section provides definitions of terminology that can be helpful when using the CCS and working with your fellow team members.

11.1 CCS Terminology

This subsection details frequently used terms of the CCS.

Table 5: 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 *budget* and *allocated budget* 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.

11.2 Cybersecurity Technology and Policy Terminology

The subsection is a collection of terminology commonly used by experts in cybersecurity technology and cybersecurity policy.

Table 6: Glossary of Cybersecurity Terminology

Term	Description
Cyberterrorism	Terrorist activities committed by state or nonstate actors that utilize various information technologies to harm or destroy information or physical assets. For example, cyberterrorist activities can range from simple Web site defacements to large-scale attacks on government and corporate computer networks.
Database Honeypots	This is a popular countermeasure used against common types of SQL injection attacks.
Distributed Denial of Service (DDoS) Attack	A common type of network attack in which multiple remote computers (often zombies) are used to flood a target's network so that it will be overwhelmed by a volume of data packets beyond the technical processing capacity of the network's server(s).
Domain Name Server (DNS) Redundancy	A network architecture technique used to implement more than one DNS server for networking or internetworking of services, so that in the event of an attack on one of the organization's DNS servers, another server or multiple servers will be immediately available as backup.
Emergency Bypass	A procedure that involves bypassing normal segregation of duties among information systems department personnel when there is an emergency (e.g., a system crash or unexpected downtime). While rare in practice, this process normally involves programmers and developers working with information in the live production environment.
Gramm-Leech-Bliley Act (GLBA) of 1999	A U.S. federal law governing the financial services industry with three main rules related to cybersecurity: financial privacy, safeguards, and pretexting protection.
Host-Based Intrusion Detection System (HIDS)	A specific type of intrusion detection system that focuses on analyzing the dynamic changes that occur within a host computer.
Hybrid Cloud Computing Model	In this variation of cloud computing, certain parts of the cloud are public, whereas others are private.
InfraGard	An FBI-sponsored program that promotes a broad range of cybersecurity information sharing between the U.S. government and the private sector.
Industrial Control Systems	Common types of remote supervisory control and data acquisition (SCADA) information systems that are used to control the various components that exist in critical infrastructures.

Information Classification	A process whereby organizational information is categorized according to its level of sensitivity, as well as criteria for releasability to internal and external parties.
Interpol	The International Criminal Police Organization, headquartered in Lyons, France. This organization facilitates cooperation among the national law enforcement agencies of more than 185 countries; works to locate missing and wanted persons; and combats human trafficking, child pornography, and other serious crimes.
Intrusion Detection and Prevention System (IDPS)	A cybersecurity technology that both prevents and detects network intrusions.
Information Sharing and Analysis Centers (ISACs)	Government-supported information-sharing programs specifically focused on individual industries within the framework of the U.S. critical infrastructure.
Kerberos Servers	A specialized configuration of client-servers that utilizes the Kerberos cryptographic protocol, which enforces mutual authentication between devices in order to provide countermeasures against eavesdropping and relay attacks.
Key Distribution Center	A central component of the cryptographic key exchange process. Its primary security function is to mitigate the risks inherent in exchanging keys (i.e., verifiable authentication and permission management).
Load Balancing	A common technique used by network engineers and network administrators to efficiently use and monitor the activities on a computer network.
Load Management	An effort focused on ensuring that there is sufficient electrical flow to all of the computing devices being used within an enterprise.
Network Intrusion Detection System (NIDS)	A system that tries to prevent intrusions into an organization's computer network before they occur and that conducts traffic pattern analysis for the purpose of identifying unusual activity.
Network Isolation	An important concept that originates in the field of network engineering. This technique includes segmenting an entire wide area network (WAN), and then utilizing software to create multiple, smaller segments (often referred to as *nodes*). This approach has been found to be effective in creating partitions and guards that will help prevent the spread of malware and other types of malicious attacks.
Penetration Testing	Also known as *attack and penetration testing*. This process involves attempting to gain unauthorized access to an organization's most sensitive systems and information.

Privacy Officer	The executive in an organization who is responsible for all policies, procedures, and communications related to the protection of personal information and intellectual property, as well as the dissemination of information regarding security breaches.
Private Cloud Computing Model	A type of cloud access that is restricted to the employees of a single organization. This is viewed by industry experts as the most secure and safe method of using cloud computing services.
Process Control System (PCS)	An individual type of information system that is designed to maintain control over a specific type of commercial or industrial business process.
Public Cloud Computing Model	A variation of cloud computing in which users from multiple organizations share computing resources that are furnished by a third-party provider.
Redundant Array of Inexpensive Disks (RAID) Levels	The range for this type of technology is from Level 0 to Level 6, whereby virtualization techniques are used to make multiple backups of data files.
Role-Based Access Control (RBAC)	A popular approach to managing employee privileges on a need-to-know basis on a local area network (LAN) or wide area network (WAN). Groups can be added at any time, and changes to their passwords and lists of members can be made easily.
Rootkit	A sophisticated form of computer malware that often incorporates worms, keyloggers, network sniffers, and other malicious tools.
Round	A portion of the simulation exercise that is defined by the Game Master to include one or more cybersecurity events.
Supervisory Control and Data Access (SCADA) Systems	Systems that are used extensively in the main infrastructures in the United States. For instance, natural gas providers and information systems companies use a pipeline model that provides for monitoring and control over a large physical area.
Sarbanes-Oxley Act of 2002 (SOX)	A U.S. federal law that has enhanced corporate governance, independent auditor requirements, and management reporting with regard to internal controls (i.e., including IT controls) related to financial reporting requirements. The Sarbanes-Oxley Act applies to publicly traded companies.
Split DNS Topology	An approach to network management that provides for separate servers that are outward-facing in addition to internal servers that are used strictly by the organization's workforce.
Single Sign-On (SSO)	An identification and authentication technique whereby a user gains access to all of his or her system resources with a single log-in.
SYN Flood	A specific type of distributed denial of service (DDoS) attack in which very large numbers of synchronization data packets are sent from numerous client devices to all open ports on a computer server, with the objective of overwhelming the available computing resources.

Virtualization	A popular technique used by IT professionals to create multiple images of the software, hardware, or memory of a physical computing device, using specialized software.

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