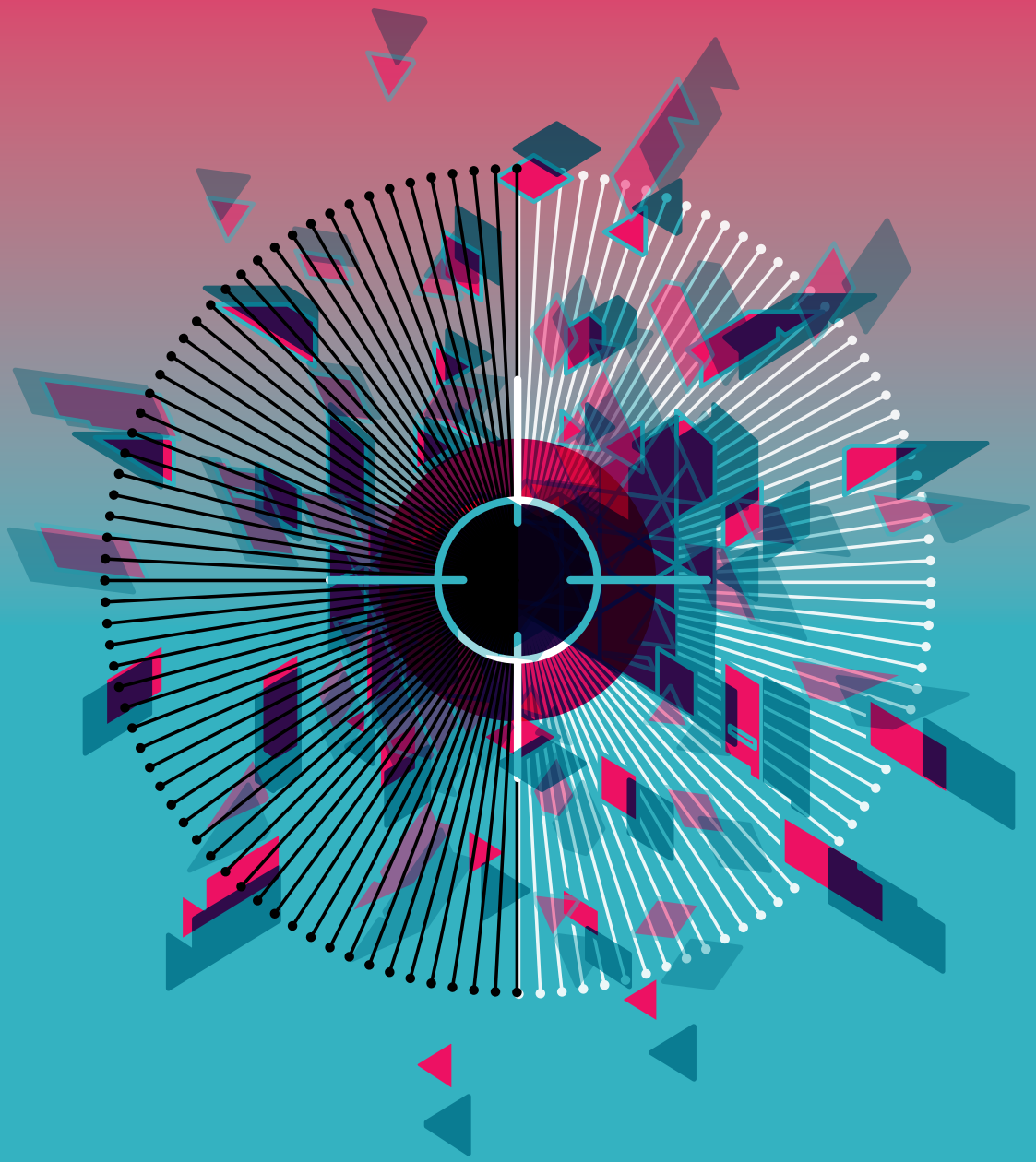
CENTRE FOR
CYBER SECURITY
BELGIUM

CYBER SECURITY
COALITION.be

CYBER SECURITY
INCIDENT MANAGEMENT GUIDE

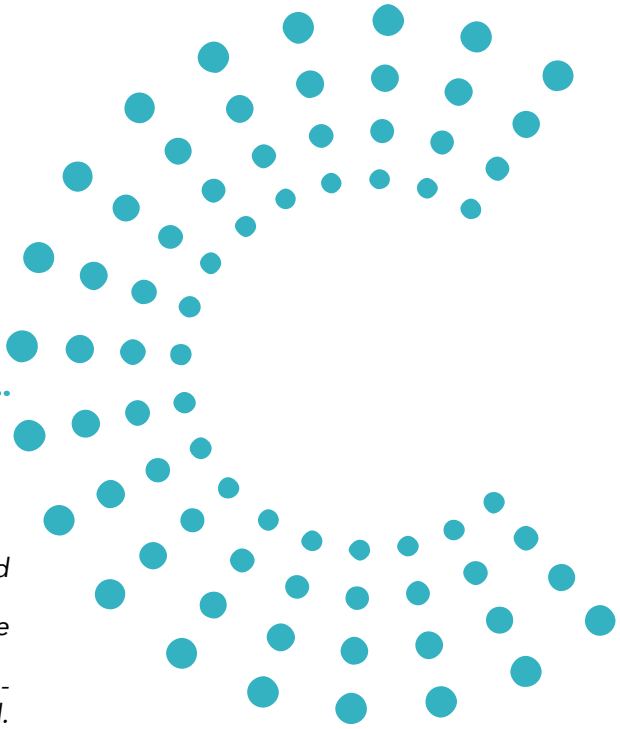


ABOUT

The Cyber Security Coalition is a unique partnership between players from the academic world, the public authorities and the private sector to join forces in the fight against cybercrime. Currently more than 50 key players from across these 3 sectors are active members contributing to the Coalition's mission and objectives.

The Coalition answers to the urgent need for a cross-sector collaboration to share knowledge and experience, to initiate, organise and coordinate concrete cross-sector initiatives, **to raise awareness among citizens and organisations**, to promote the development of expertise, and to issue recommendations for more efficient policies and regulations.

The objective of this guide is to raise awareness with companies of all sizes about the importance of planning the management of cyber security incidents ahead in time.



EXECUTIVE SUMMARY

This Guide aims to draw attention to the importance of planning how to manage a cyber security incident ahead of time.

Cyber security incident management is not a linear process; it's a cycle that consists of a **preparation phase**, an incident **detection** phase and a phase of incident **containment, mitigation and recovery**. The final phase consists of drawing lessons from the incident in order to improve the process and **prepare for future incidents**. During this cycle **communication** with both internal and external stakeholders is of critical importance.

Many organisations may not have the necessary in house expertise and skills to respond adequately to a cyber security incident. When they are facing an incident, they may need to call **upon experts** to contain the incident and/or to carry out forensic investigations. This does not mean that they cannot do anything themselves. On the contrary, there are a lot of things that can and should be done before an actual incident occurs.

Drawing up an organisation's **cyber security incident response plan** is an important first step of cyber security incident management. It is also crucial that **top management validates** this plan and is **involved** in every step of the cyber security incident management cycle.
The following elements should be included in the cyber security incident response plan:

- Identification of the **assets** that need to be protected;
- Identification and assignment of **responsibilities** in the context of a cyber security incident;
- **In house capabilities** or contracts with **external experts** for incident response and/or forensic investigation in case of an actual cyber security incident;
- The **equipment and technology** to detect and address a cyber security incident;
- A basic **containment** strategy: disconnect the systems immediately in order to recover as quickly as possible? Or take the time to collect evidence against the cybercriminal who perpetrated the system?
- A **communication** strategy for both internal and external stakeholders and for authorities such as law enforcement and the Privacy Commission.

Finally organisations should consider taking out a cyber insurance. The cost of cyber security incidents often amounts to hundreds of thousands or even millions of euros. A reliable cyber insurance will cover at least a part of this cost.

CONTENTS

EXECUTIVE SUMMARY 3

FOREWORD 5

BASIC PRINCIPLES & KEY DEFINITIONS 6

01 PREPARING FOR A CYBER SECURITY INCIDENT 8

I. Draft a cyber security incident response plan and keep it up to date
II. Content of a cyber security incident response plan
III. Assigning responsibilities and creating a cyber security incident response team
IV. Call upon external experts
V. Equip your organisation to address a cyber security incident
VI. Prepare your communication strategy
VII. Cyber insurance

02 DETECTING AND IDENTIFYING POTENTIAL CYBER SECURITY INCIDENTS 19

I. Categories of incidents
II. Methods to detect incidents

03 HANDLING AN ACTUAL INCIDENT: CONTAIN, ERADICATE AND RECOVER 21

I. Convene your cyber security incident response team
II. Situational awareness
III. Containing a cyber security incident
IV. Eradication and clean-up
V. Recovery

04 COMMUNICATION DURING A CYBER SECURITY INCIDENT 26

I. Tools
II. Incident specific communication plan

05 INCIDENT FOLLOW-UP AND CLOSURE: LEARN FROM EACH INCIDENT! 30

I. Evaluation of lessons learned and future actions: organise a post-incident review
II. Incident tracking and reporting

GLOSSARY 32

BIBLIOGRAPHY 34

AKNOWLEDGEMENTS 35

ANNEX 36

FOREWORD

There are only two types of companies, those who got hacked and those who will be.

Robert Mueller

The Internet is revolutionising the way we do business: the amount of data that we transfer over the Internet and our dependency on the availability of it keeps on increasing. It is crystal clear that connecting to the world does not only bring great opportunities, it also generates new risks. Cybercrime is big business and even the smallest malicious attack can seriously damage an organisation's reputation, productivity, ICT-system, etc.

No organisation should think it is safeguarded from cybercrime. Cybercriminals do not just target large organisations. On the contrary, a small organisation may be a more interesting victim because of the information it processes or even the partners it works with.

This guide draws attention to the importance of knowing that one day or another your organisation could be the target of a cyber-attack. And when that happens, you want to be prepared! A good cyber security incident response plan can make the difference between a cyber security incident and a cyber security crisis. The pace at which an organisation is able to recognise, analyse and respond to an incident will influence the damage done and the cost of recovery.

Such a cyber security incident response plan should not be limited to technology! Processes, people and other organisational aspects are also important elements to take into consideration.

Reading this guide will not make you a cyber security incident management expert right away. Why? The reason is simple: it takes time and experience to build up the necessary expertise to be able to efficiently handle cyber security incidents. So bear in mind that it often involves a growth process of trial and error.

Christine Darville
Chairwoman of the Cyber Security Coalition

Miguel De Bruycker
Director Centre for Cyber security Belgium (CCB)

BASIC **PRINCIPLES** & **KEY DEFINITIONS**

While reading this Cyber Security Incident Management Guide, you should keep the following basic principles and key definitions in mind.

KEY DEFINITIONS

At the end of this guide you will find a complete glossary. Hereafter we will highlight a number of definitions that are key for understanding the scope and the content of this guide.

CYBER SECURITY EVENT
A cyber security change that may have an impact on organisational operations (including mission, capabilities, or reputation).

CYBER SECURITY INCIDENT
A single or a series of unwanted or unexpected cyber security events that are likely to compromise organisational operations.

CYBER SECURITY INCIDENT MANAGEMENT
Processes for preparing, for detecting, reporting, assessing, responding to, dealing with and learning from cyber security incidents.

1.

There is no simple one-size-fits-all solution

Always keep in mind that every organisation is different. When it comes to Cyber Security **there is no one-size-fits-all solution.** What will work for your organisation will depend on its mission and goals, the kind of infrastructure and information you are protecting, available resources, etc. Finally, recognise that some techniques will only be learned with **time and experience**. This should not, however, stop you from getting started!

2.

Top management's commitment

Cyber security incidents are a risk that should be incorporated in the overall risk management policy of your organisation. Furthermore, managing cyber security incidents does not just mean applying technology. It also requires the development of a plan that is integrated into the existing processes and organisational structures, so that it enables rather than hinders critical business functions. Therefore, top management should be **actively involved** in defining an organisation's cyber security prevention and incident response plan, because top management's explicit support through appropriate internal communication and the **allocation of personnel and financial resources** is key to the success of the plan.

A well informed top manager will be aware both of the risks of cybercrime and of his own **exemplary role** in encouraging all members of the organisation to assume their responsibility.

3.

Involve every member of your organisation

It is often said that humans are the weakest link when it comes to cyber security. Having said that, it is also important to realise that the members of your organisation have great potential to help you detect and identify cyber security incidents. Make sure that every member of your organisation is **aware of your cyber security incident response plan and of their own role** within it, even if this just means informing the right person about the ICT anomalies they stumble upon.

4. **Keep an offline copy of the documents you need during an incident**
Bear in mind that when a cyber security incident occurs, you may not always have access to the files on your computer. It is always a good idea to keep a **hard copy/offline copy** of any document you are likely to need during a cyber security incident or crisis.

5. **Don't link backups to the rest of your system**
When it comes to backups, it is not only crucial to have them. It is also very important to have **a backup that is not linked in any way to the rest of your system.** If your backup is linked to your system, chances are that the infection of your system also spreads to your backup, which makes your backup useless.

6. **The importance of logging and keeping those logs during a certain time (up to 6 months)**
Logs can help you to trace back the origin of the cyber security incident. This is not only important to be able to identify the cybercriminal; it can also help your organisation to get back to business as soon as possible.

7. **Keep your cyber security response plan and all related information and documents up to date!**

8. **Make sure you take all legal aspects into account when managing a cyber security incident**
Evidence will only be admissible in court if it has been collected in respect of all applicable laws and regulations. Furthermore in some cases, e.g. when a data subject's data have been compromised, you might have to comply with a notification duty to this data subject and/or the Belgian Privacy Commission.

9. **Document every step of a cyber security incident**
In times of crisis, don't just rely on your head! Make sure you write down any action that is taken, such as the reporting of the incident, the collecting of evidence, conversations with users, system owners and others, etc. This documentation is your 'time machine'. When something goes wrong it may allow you to look back and evaluate where and why the problem started. Furthermore documenting the cyber security incident response will ensure that the knowledge regarding what is going on is not just in a few people's heads.

01. PREPARING FOR A CYBER SECURITY INCIDENT

DRAFT A CYBER SECURITY INCIDENT RESPONSE PLAN AND KEEP IT UP TO DATE

When facing a cyber security incident, an organisation should be able to react in a prompt and appropriate manner. This is why it is important to decide how you will handle certain situations ahead of time instead of when you encounter them for the first time during an incident. Make a plan (on paper, not just in your head) to limit damage, to reduce costs and recovery time and to communicate with both internal and external stakeholders.

REVIEW YOUR CYBER SECURITY INCIDENT RESPONSE PLAN

A cyber incident response plan is not a static document. It is important to integrate it into your business processes and to review and update it regularly, on a yearly basis and as part of the post incident review.

CYBER SECURITY INCIDENT RESPONSE PROCEDURES

Building on your cyber security incident response plan, you can define a number of standard operation procedures for common incidents that are likely to occur within your organisation. Such a procedure should explain step by step how a specific issue can be tackled. These quick response guides for likely scenarios should be easily accessible.

KEY ELEMENTS OF A CYBER SECURITY INCIDENT RESPONSE PLAN

II. CONTENT OF A CYBER SECURITY INCIDENT RESPONSE PLAN

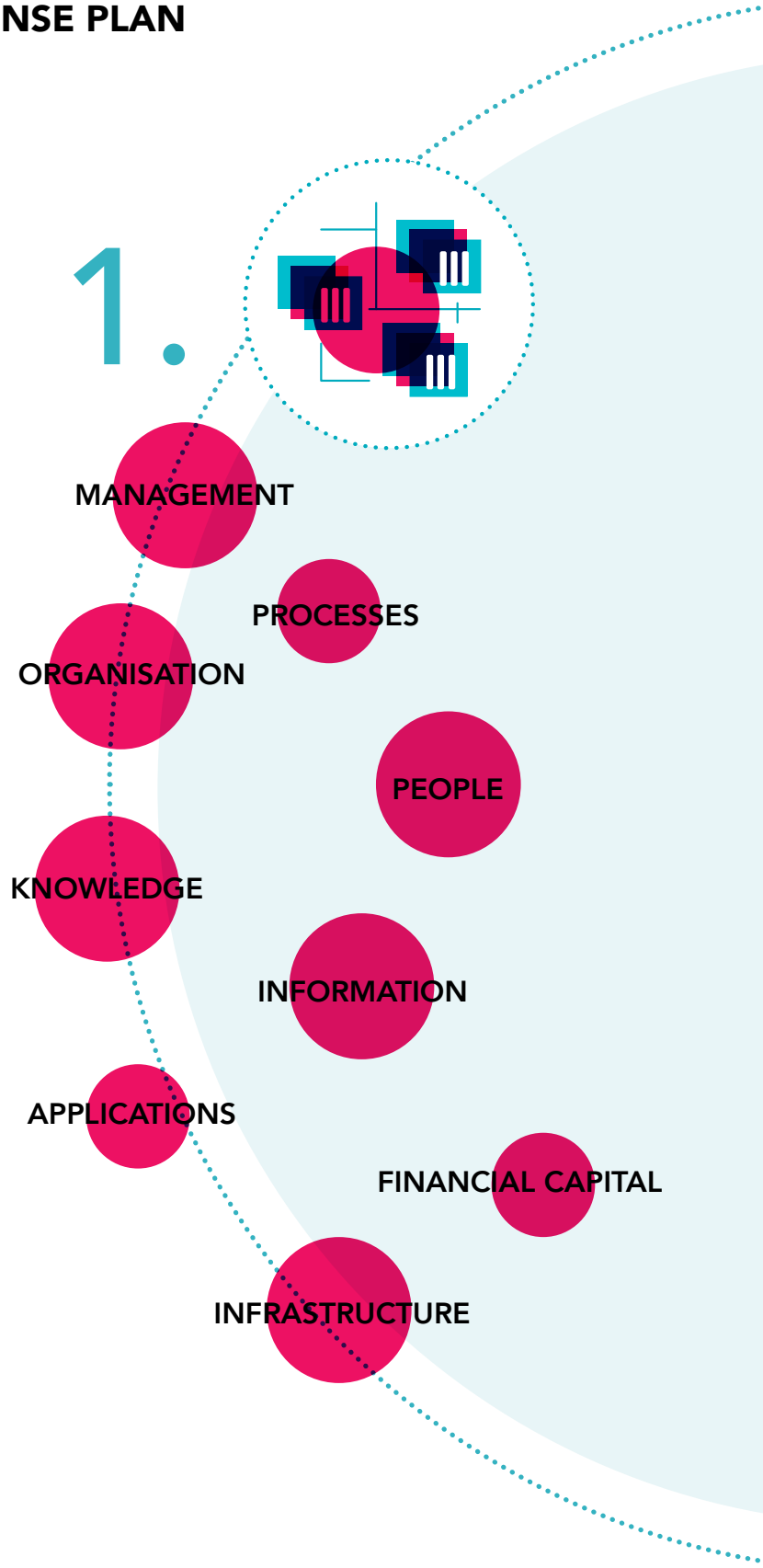
KNOW WHAT TO PROTECT

IDENTIFY YOUR ASSETS AND POTENTIAL THREATS

When hit by an incident the first questions that will arise are: which assets are at risk? And which of those assets are vital for your business's activity? You will have to decide which assets need your attention first in order to remain in business and keep the damage to your business as low as possible.

That's why it is crucial to **identify, document and categorise your organisation's 'vitals'**: the assets your organisation depends on to conduct its core activities. This will help you identify where to apply which protective measures and to take quick and justified decisions during the incident management process.

The following give you an idea of what those 'vitals' could be: management, organisation, processes, knowledge (e.g. intellectual property has been stolen), people, information (e.g. data sets have been stolen or altered), applications (e.g. website is down or defaced, infrastructure (e.g. system and/or network connections are down), financial capital (e.g. bank accounts).
It's also a good idea to identify vulnerabilities and potential threats.

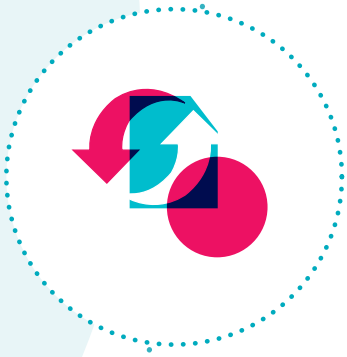


2.

HOW TO IDENTIFY, DOCUMENT AND CATEGORISE YOUR ORGANISATION'S VITALS, VULNERABILITIES AND POTENTIAL THREATS?

A. Identify the business and the resources that need to be protected

- Determine which are your core business activities that enable your organisation to exist, to achieve its corporate objectives and generate income: produce goods, sell goods, deliver the goods, etc.
- For each of those activities, identify which ICT systems (databases, applications, control systems) and network connections are supporting them
- Determine also where these ICT systems are located: on your own servers or in the cloud
- When identifying these assets, don't forget flows of information to third parties (suppliers, clients, etc.) or industrial control system flows.



B. Determine what your crown jewels are

Determine now which assets, data, processes or network connections are so important for your organisation that if you lose (control of) them, you are in big trouble or even out of business?

C. Assign business priorities for recovery

This priority will determine the order in which the systems will be re-established. In most cases the underlying network will need the highest priority, as this is not only the path for your system administrators to reach your assets but also the path that cyber criminals use to attack your systems. As long as criminals can use your network connections, any other recovery activity might be undone by them. When assets have equal priorities, parallel recovery activities might be considered.

D. Document how your systems work and keep this documentation up to date

Ensure that the way your systems works is documented and that this information is kept up to date and available on the incident response team's documentation systems. Especially needed documents are:

Network Scheme displaying the network architecture with internal network segmentation and the different gateways to external networks, DMZ, VPN, IP-address ranges used.This scheme should also include the different security devices in place that might contain logging information of network activity (firewalls, (reverse) proxy servers, intrusion detection systems, security incident event management systems). For larger companies with complex networks, it is also necessary to have a high level version of the network architecture so that one can quickly get an idea of the network in case of emergency

Equipment and services inventory. This inventory will include, for the vital assets in your environment, all the different servers and the network components used for delivering the different corporate services. As some of these (physical) servers might be servicing multiple business functions it is important to know per server which services are running on them.

Account and access lists. At all times it is important to know who has the right to access, use and or manage your network and the different systems in it. This will allow you to detect any strange or abused accounts during an incident.

Make sure your systems are not just a bunch of cables and computers to you! It is crucial that your system manager knows how your network works and is able to explain it to experts, police, etc.

III. ASSIGNING RESPONSIBILITIES AND CREATING A CYBER SECURITY INCIDENT RESPONSE TEAM

ASSIGNING RESPONSIBILITIES AND ROLES TO PEOPLE WITH THE RIGHT SKILLS

It is important that the roles and responsibilities in case of a cyber security incident are documented in your cyber security incident response plan. When drafting the description of these roles and responsibilities, you should ask yourself the following questions:

1. Who is the internal contact point for cyber security incidents? And how can he be contacted?
2. What are the different incident response tasks? And who is responsible for doing what?
3. Who is managing the incident from business/technical side? This should be someone within your company with decision-making authority, who will follow the incident from the beginning until the end.
4. Who will liaise with senior management?
5. Who can engage the external incident response partner?
6. Who can file a complaint with law enforcement/inform the regulatory bodies?
7. Who is entitled to communicate with the press and external parties?

You will realise that in order to adequately address a cyber security incident, different skills are needed to take up the different responsibilities and necessary roles of an efficient incident response.

SKILLS	RESPONSIBILITIES	ROLES
Incident management	Manage the cyber security incident from the moment of its detection until its closure.	Cyber security Incident response manager
Business decision capability	Assessing the business impact and act upon it. Engage the right resources. Take decisions on how to proceed e.g. decide if the internet connection of a compromised system can be shut down and when is the most appropriate time. Decide when to start clean-up activities. Decide whether to file a complaint or not.	Management
Network management capabilities	Technical know-how on the organisation's network (firewall, proxies, IPS, routers, switches,…). Analyse, block or restrict the data flow in and out of your network. IT operations Information security and business continuity	ICT technical support staff
Workstation and server administrator capabilities (admin rights)	Analyse and manage compromised workstations and servers.	ICT technical support staff
Legal advice	Assess the contractual and judicial impact of an incident.Guarantee that incident response activities stay within legal, regulatory and the organisation's policy boundaries. Filing a complaint.	Legal department/company lawyer
Communication skills	Communicate in an appropriate way to all concerned stakeholder groups. Answer customer, shareholders, press questions right away.	Communications or Public Relations department
Forensic skills	Gather and analyse evidence in an appropriate way i.e. in a way that the evidence is acceptable by a court of law	ICT technical support staff
Physical security	Handle the aspects of the incident that are linked to • the physical access to the premises • the physical protection of the cyber infrastructure.	Security Officer
Crisis management	Crisis management	Crisis manager

CYBER INCIDENT RESPONSE TEAM

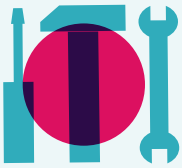
In an ideal world every organisation has an incident response team that is convened whenever there is an incident. Of course, the size of the company determines the size and the structure of the incident response team. Smaller companies that do not have the resources for an actual team could designate a *first responder* – ideally someone with business decision capability – amongst their personnel. In case of a cyber security incident, he or she should contact external help, but remains the person ultimately responsible for the incident response within the organisation.

The composition of this incident response team will be determined by the different skills that are needed to handle an incident (see also: page 11 table). For smaller companies, some of these skills may have to be found outside the organisation and contacted by the first responder.

A MINIMAL INCIDENT RESPONSE TEAM SHOULD INCLUDE FOLLOWING ROLES

INCIDENT RESPONSE MANAGER

The person that will manage the incident as soon as it is brought to his attention until it has been contained and remediated. He will liaise with management, and possibly with other internal staff and with external resources to handle the incident. This person has to have knowledge about your organisation's business activities because he will be the first one to take business decisions.



ICT TECHNICAL SUPPORT STAFF

This person needs to have a good knowledge of your ICT infrastructure as he will be responsible for the investigation of the indicators, the confirmation of the incident and developing the technical solutions to manage the incident.

YOUR ORGANISATION'S SIZE WILL DETERMINE IF MORE ROLES ARE NECESSARY

Smaller organisations often have the flexibility to quickly upscale to corporate management in order to manage the incident. This is not the case for larger organisations that might have to handle several incidents in a more autonomous mode, so that corporate executives will only be engaged in incident response actions when a very serious incident is at hand.

Larger organisations. The bigger your organisation, the more differentiated the composition of your Incident response team will have to be. For larger organisations, next to the incident response team, a crisis management team composed of corporate management representatives might be set up to take over the responsibility for strategic and business-related decisions and communications when confronted with serious incidents. This will enable the incident response manager to focus more on the technical issues of the incident.

IV. CALL UPON EXTERNAL EXPERTS

EXPERTS ON CYBER INCIDENT RESPONSE

Whether your organisation is an SME or a large organisation, it is costly to develop and maintain all needed expertise and skills for incident response in house. This is especially true for forensic and legal advisory cyber security incident response skills. So bear in mind that it might be more cost-effective to call upon external cyber security incident response partners to close the gap in your organisation's skills.

- Their professional incident responders with their knowledge of possible threats and scenarios might reduce the **time** for diagnosing the incident.
- They work in a forensically sound way so that any evidence will be secured and documented according to a **legally valid** chain of custody. This evidence can then be presented later on in court if that is needed.
- They have experience of doing things in the right order and have **tooling** for recovering traces from RAM memory, from virtual machines, from hard disks and from networks.
- These experts will help you to identify **the causes** of the incident and will offer advice on how to contain, eradicate and remediate the incident.

WHEN TO CONTACT AN EXPERT?

A. During the preparation phase vs. B. When a cyber security incident occus

You can either contract and retain a cyber security incident response partner during the preparation phase, or wait until an actual cyber security incident occurs. Bear in mind that establishing such a contract takes time and effort. So if you are sure you will need external help, it might be better not to wait. This way you will win precious time at the beginning of the cyber security incident. Several specialised consulting firms for incident response services and law offices offer subscriptions that keep their incident response capabilities on retainer for the subscriber. Furthermore most of these include training sessions with your incident response team to facilitate cooperation between them when an incident happens.

The police might ask your organisation not to shut your system down right away. If you do, the attacker will notice and retreat, which often makes it impossible to trace him afterwards. For your organisation the fastest way to get back to business might be to shut down immediately and start with a clean slate.

AUTHORITIES MIGHT BE OF HELP TO YOUR INVESTIGATION

Other parties like industry regulators, the Privacy Commission, Cert.be and law enforcement (police and magistrates) might be of importance when you're confronted with a cyber security incident of criminal nature or in case of a personal data leak. Some legislation even obliges you to inform these parties when you have detected an incident of a specific nature (see also : page 27 Reporting to authorities).
These parties can often help with information on the threat and with practical guidelines based on previous incidents they have handled. Most of these investigations are covered by professional secrecy. Bear in mind that the objective of law enforcement is to identify and catch the attacker. It is not their task to get your business up and running again. It is also possible that the most effective way to catch the attacker is not equal to the fastest way to get back to business as usual.

Furthermore, most of these investigations are covered by professional secrecy, which makes it rather difficult to obtain information about their results. They might, however, disclose information that will help you to identify the attacker and his modus operandi, which can possibly improve the speed of the analysis of your cyber security incident.

V.

EQUIP YOUR ORGANISATION TO ADDRESS A CYBER SECURITY INCIDENT

YOUR NETWORK OF EXPERTS – MAKE A CONTACT LIST

Seeking help from the right professionals at the right time is crucial during an incident, as it might help limit the physical and reputational damage to your company. A contact list that includes all of these people or organisations will help you in this process.This list contains the names, roles, contact and backup details of the different persons of the cyber incident response team, the external parties on retainer, law enforcement,etc.

Contact information that is recorded should include fixed and mobile phone numbers, business email addresses (including public encryption keys for confidentiality & integrity of communications) and physical addresses for traditional mail and packages. Make sure you also have alternative contact options (secondary mail addresses, fax numbers), because it is possible that the incident response team will not be able to use the internal network during the incident.
This contact information should be available in a central, offline location, such as a physical binder or an offline computer. Next to 'raw' contact information, this emergency information should also include escalation procedures. This information must both be readily available and be kept extremely physically secure. One method of securing and making this information readily available is to encrypt it on a dedicated security portable computer that is placed in a secure vault and limit access to the vault to authorised individuals such as the incident response team leader and the Chief Information Officer (CIO) or the Chief Technology Officer (CTO).

For a comprehensive fill in form see **Sans Institute**

NAME	ORGANISATION	ROLE	CONTACT DETAILS
Ms. Incident Response Manager	In house/external	Cyber incident response management	Address Telephone Email **Weekend and backup** contact info
Mr. Lawyer	In house/external	Legal expert	
Ms. Forensic	External	Forensic expert	
Mr. Police	Law enforcement	Law enforcement	

HARDWARE AND SOFTWARE FOR CYBER SECURITY INCIDENT MANAGEMENT

To improve the maturity and efficiency of the incident response team, the appropriate tools need to be in place. It is important that the incident response team disposes of autonomous systems and tools that permit them to take care of an incident even if the corporate network has been compromised. This means that when your organisation's systems or networks are no longer available, the system of the incident response team still is. Incident procedures and contact lists have to be available on these systems.

VI. PREPARE YOUR COMMUNICATION STRATEGY

Communication is a **vital component** of every step in cyber security incident response. You want to control the communication flow to ensure **the right information** is communicated **at the right moment** by the **right senders** to the **right receivers**. This is valid both for internal communication and communications towards the outside world. We recommend coordinating all external communications both with the Legal and Public Affairs representatives.

WHAT TO COMMUNICATE AND WHOM TO COMMUNICATE IT TO?

The type of incident and its (potential) impact will define the type of communication that is required. For example, an *internal* fraud case or *internal* hacking attempt will most likely not warrant communication with the media to disclose the incident. On the contrary, when the personal data of an organisation's customers are leaked it would be a good idea to contact at least those customers and the Privacy Commission, and to prepare a press statement. Furthermore, all communications should strike the right balance between openness and protection. In most cases, internal communication will be more open as opposed to external communication. Even for internal communication, however, a principle of 'need-to-know' should be respected.

IDENTIFY INTERNAL AND EXTERNAL STAKEHOLDERS

During the incident response activities, there will be a constant need for information from many different stakeholders. Each of them will need a different type of information. Make your own list of potential stakeholders and ensure that the right contact information is available! (see also: page 14 table) It should be noted that the organisation should have this contact information available, but should not always communicate with all parties.

WHO? INTERNAL STAKEHOLDERS	WHAT? TYPE OF INFORMATION THIS STAKEHOLDER NEEDS
Senior management	What is impacted? What is the response? What is the expected outcome and when will operations be back to normal?
Impacted business managers	When will normal operations be resumed?
Employees	What should an employee do? How long is this situation expected to last?

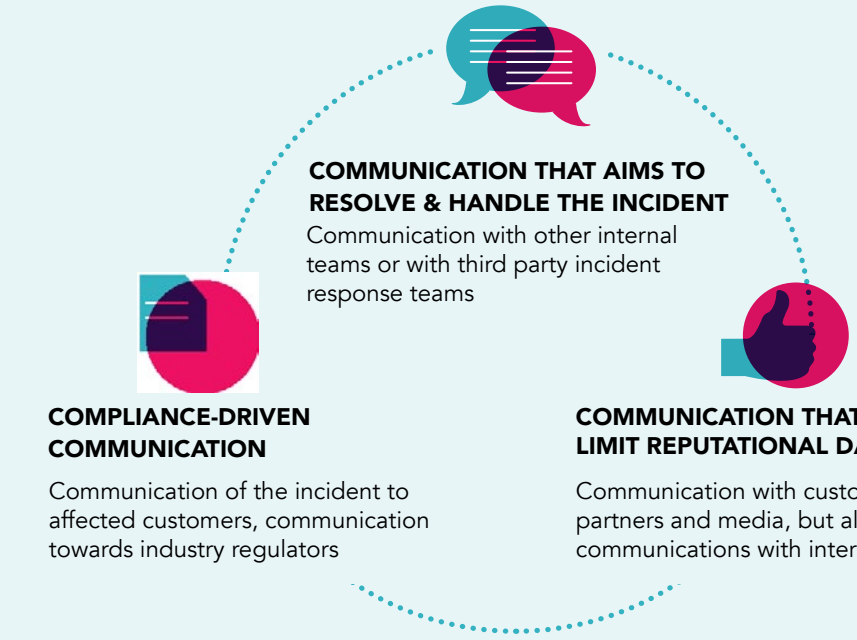
WHO? EXTERNAL STAKEHOLDERS	WHAT? TYPE OF INFORMATION THIS STAKEHOLDER NEEDS
Media	A statement on the incident and its impact. For higher profile companies and/or incidents, the media might be involved. Media attention to a security incident is rarely desirable, but can sometimes be unavoidable. Media attention can enable your organisation to take a proactive stance in communicating the incident, thereby showing your commitment and capability of handling the incident. The communication plan should clearly define the individuals authorised to speak to media representatives (typically public relations or legal departments).
Customers	Are they potentially impacted by the cyber security incident? Were their (personal) data lost or stolen? Are they potentially the primary target of the attack? In some cases there is a legal obligation to contact the industry regulator (see also : page 27 Reporting to authorities).
Suppliers	Are they potentially impacted by the cyber security incident? Are they potentially the primary target of the attack?
Other (partner) cyber security response team	Communication with other incident response teams can provide technical assistance, thereby offering faster resolution (e.g. they might have seen / handled this type of incident before). This type of communication would typically include technical details on the evidences identified.
Internet service provider	Communication with your Internet service provider can provide technical assistance, thereby offering faster resolution (e.g. they might have seen / handled this type of incident before). This type of communication would typically include technical details on the evidences identified.

WHO? OFFICIAL STAKEHOLDERS	WHAT? TYPE OF INFORMATION THIS STAKEHOLDER NEEDS
Privacy Commission	Was there a data breach? Which data subjects are concerned? In some cases there is a legal obligation to contact the Privacy Commission (telecom and future European legislation). (See also : page 27 Reporting to authorities).
Cert.be	Technical details on the evidence identified
Police	Do you wish to file a complaint? If the event caused a substantial impact and there is a suspicion of criminal intent, you might want to report the incident to law enforcement authorities. They will need legal and technical information.
Industry regulators	What kind of incident? What is the status of the incident? In some cases there is a legal obligation to contact the industry regulator (see also : page 27 Reporting to authorities).

Organisations should take into account that once a party has been informed, they will request periodical updates related to the incident at hand. There is typically no 'one-off' and the communication schedule should take these periodical updates into account.

THE IMPACT OF THE INCIDENT WILL DETERMINE THE COMMUNICATION OBJECTIVES

In order to know what to communicate to whom, an organisation should assess the (potential) impact of the cyber security incident: e.g. are only internal or also external stakeholders concerned? Is there a data leak? Depending on this impact, your cyber security incident communication will have different objectives, for example:



ENSURE MULTIPLE COMMUNICATION CHANNELS ARE AVAILABLE

The incident could impact existing communication channels (e.g. compromise e-mail systems). As an organisation, alternative, secure communication channels should be available. Several communication methods are available and it is up to the organisation to select the method most suitable for a particular incident.

A **best practice** used by many organisations is to use a conference bridge number that can be set up instantly. The incident response team and all stakeholders should be informed about the access numbers but not about the control number necessary to set up a conference. This is typically done by a crisis manager who is responsible for managing, controlling and organising crisis calls.

POSSIBLE COMMUNICATION METHODS

- Email (preferably using PGP for confidentiality and integrity of communications)
- Website (Intranet for employees, public web site,…)
- Telephone calls
- In person (e.g., daily briefings)
- Paper (e.g., post notices on bulletin boards and doors, hand out notices at all entrance points).

VII.

CYBER INSURANCE

Certain insurers offer customised insurance policies that are always preceded by an analysis of the risks specific to the organisation in question. This analysis allows the organisation to determine if and to which extent it needs cyber security insurance. The risk analysis will also be used by the insurer to determine the cover required. Factors that are taken into account are:

- business exposure: high technology with exclusive production process and heavy Research & Development
- type of distribution network: e-commerce
- amount and type of data (critical or not), the existence of a legal framework.

ITEMS POTENTIALLY COVERED BY A CYBER INSURANCE

RECOVERY COSTS IN CASE OF LOSS OF DATA

POTENTIAL LOSS OF TURNOVER

ADDITIONAL COSTS ASSOCIATED WITH THE DETECTION AND RESOLUTION OF INCIDENTS

COST OF COMMUNICATION IN THE EVENT OF AN INCIDENT

Compensation is paid out above an excess negotiated with the policyholder. The amounts insured per claim and/or per insurance year are always determined according to the needs of the company and the capabilities of the insurance company.

02 DETECTING AND IDENTIFYING POTENTIAL CYBER SECURITY INCIDENTS

CATEGORIES OF INCIDENTS

DEFINE CYBER SECURITY INCIDENT AND RELATED TERMS

To start of, it is a good idea to define 'cyber security incident' and related terms within your organisation. This will make the communication on the incident a lot more fluent. You can find inspiration for these definitions in the preliminary chapter of this guide on Basic principles and key definitions. You should, for example, decide when a cyber security event becomes a cyber security incident for your organisation. In other words, what kinds of cyber security events are likely to have an adverse impact on your organisation's activities?

IDENTIFY POSSIBLE CATEGORIES OF CYBER SECURITY INCIDENTS

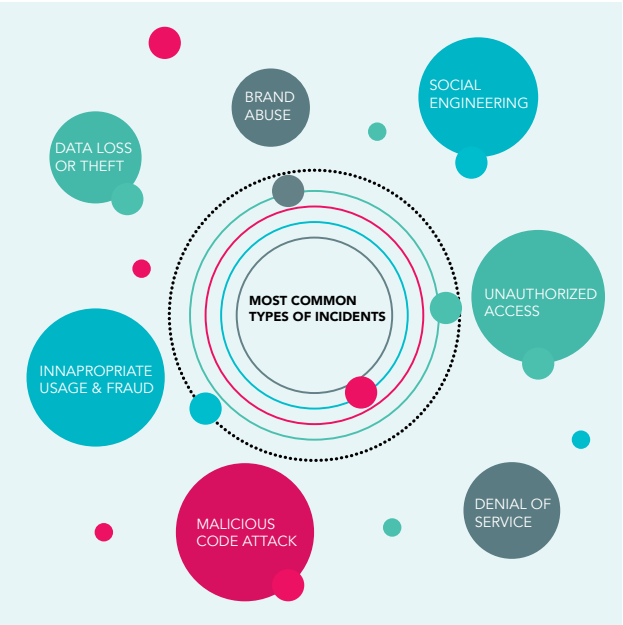
To be able to detect and identify cyber security incidents, you need to have at least an idea of what you are looking for. Therefore, having a list of the categories of cyber security incidents that are most likely to hit your organisation is no luxury. Furthermore, when you detect a cyber event, it is often difficult to know how bad the consequences will be from the start. This doesn't however change the fact that you have to proceed. Categories of incidents allow you to prioritise cyber events and take decisions accordingly. This section offers a typology of a number of cyber security incidents. The intention is not to present a 'definitive' overview of all types of incidents, but simply to give you an idea of the most common types of incidents (at the time of writing). Incidents can belong to more than one category. A more detailed explanation of these incident types can be found in the Annex.

USB STICK OR USB SPY?

In 2013 Russia hosted a meeting of the G20 leaders. At the end of this event all participants, amongst them Herman Van Rompuy, received a gift bag containing a USB pen drive and a mobile phone charging device. Although the Kremlin has always denied it, both devices were reported to be capable of secretly downloading information, such as e-mails, text messages and phone calls from laptops and phones.

A CRYPTOLOCKER CAN ALSO ENCRYPT YOUR BACKUP

A company receives an e-mail with an invoice in attachment that looks like one of their suppliers'. The company's accountant clicks on the attachment and a few seconds later a message appears on his screen: "All your information has been encrypted! If you want the key to unlock the encryption, you need to pay me 1.000 Bitcoins". The company doesn't want to pay the cybercriminal. After all, there is no guarantee that he will actually return the lost data once he has received the ransom. To recover its data, the company decides to restore from a backup. When the company wants do this, the employees notice that, since the backup was linked to the system, it has also been encrypted...



II. METHODS TO DETECT INCIDENTS

YOUR ORGANISATION'S PERSONNEL HAS POTENTIAL TO DETECT

People are often considered the weakest link when it comes to cyber security. They have, however, also the greatest potential to help an organisation detect and identify cyber security incidents. Make sure that every member of your organisation is aware of cyber security risks and of the role that they can play in detecting them. Turn them into your human firewall! Every member of your organisation should know how to report if they notice something abnormal on their computer or mobile device. Make sure that the contact details for doing so are easily accessible and that the way to contact this person is low-threshold How to organise incident reporting by personnel (and other partners) concretely?

- A phone number should be established for reporting emergencies
- An e-mail address for informal incident reporting
- A web-based form for formal incident reporting.

TECHNOLOGY AND ENDPOINT PROTECTION

To avoid malicious code: keep your software, virus scanners, etc. up to date!
Regularly update your software or install patches when they are available.

Don't use unsupported versions of software such as Windows XP and Windows 2003. Unsupported means that the software is no longer updated so that your computer is no longer protected against new, known malware.

TECHNOLOGY

Technology is one of the main enablers when it comes to fastening your incident detection, investigation, eradication and recovery. When an incident has occurred, ad-hoc deployment of technology is still possible, but your investigation will often be limited to the current events. Implementing the right technology during the preparation phase will allow you to get a comprehensive picture of current and past events. This gives your organisation a better chance of tracing the incident back to its roots.

ENDPOINT PROTECTION

An endpoint is a device that is connected to your organisation's network, such as laptops, smartphones, etc. Each of these devices is a potential entry point for cybercriminals. Therefore it is important that all of those devices are adequately protected.

DETECTION TOOLS

Each detection tool (E.g. IDS) has its specific purpose and is able to monitor from a different perspective: network-based or host-based. Given the variety of different threats, the tools should be using the correct inputs and be tuned towards these.

FROM A NETWORK PERSPECTIVE

A good start would be the implementation of an intrusion prevention system, such as Snort network IDS sensor, on the Internet uplink.Additionally, many organisations already have a lot of information available, which can be used to detect an incident without knowing it. This can be in the form of:

- access logs to servers and appliances;
- operational logs from systems (e.g. process creation);
- firewall policy logs.

This data can be used to create rules and trends, which help in detecting unexpected or invalid traffic (E.g. traffic to uncommon websites, login attempts of non-existing users, etc.).

FROM A HOST PERSPECTIVE
Anti-virus solutions are not sufficient against advanced attacks against endpoints. Many malwares today are polymorphic (they change depending on the behaviour of the host), which makes it hard to detect based on static signatures by classic anti-viruses. Advanced end-point protection tools investigate suspicious behaviour and can thus be more effective in many cases.
This does not mean however that anti-virus solutions should not be deployed. On the contrary, anti-virus is needed to cover most of the more widely recognised threats.

03 HANDLING AN ACTUAL INCIDENT: CONTAIN, ERADICATE AND RECOVER

In this chapter you will find out what you should do to regain control once you have detected a cyber security incident. Important decisions will have to be taken about how to contain the incident, how to eradicate it and how to recover from it. Validation of these decisions by your organisation's top management is absolutely necessary. Incidents can belong to more than one category.

I. CONVENE YOUR CYBER SECURITY INCIDENT RESPONSE TEAM

When an actual incident is detected, it is very important to evaluate the risks fast in order to take the right measures. The cyber security incident manager should be informed immediately and convene a meeting of the cyber security incident response team, if your organisation has one (see also : page 12 Cyber security incident response team). The cyber security incident manager and his team will report to the CEO, who will have to validate their decisions.

II. SITUATIONAL AWARENESS

After the detection of an incident, it is key to collect all available information on the activities around the incident's timeframe. Central collection and archiving of security information (e.g. system logs, firewall policy logs) provides the analyst with easy access to this information. Important factors to take into account are integrity of the information and indexation.
A forensic investigation might be required to collect all artefacts and to examine the magnitude and depth of the attack. Tools to create and analyse full disk images, take (remote) memory dumps of a suspicious machine and write-blockers come in handy to perform this analysis.

To detect the magnitude of the incident, the artefacts or the indicators collected as part of the initial investigation can be subsequently used to search for further intrusions on a large scale over all managed devices. Having a central management point that is able to query them can speed up this process. You should also verify if any data have been lost/stolen.

III.

CONTAINING A CYBER SECURITY INCIDENT

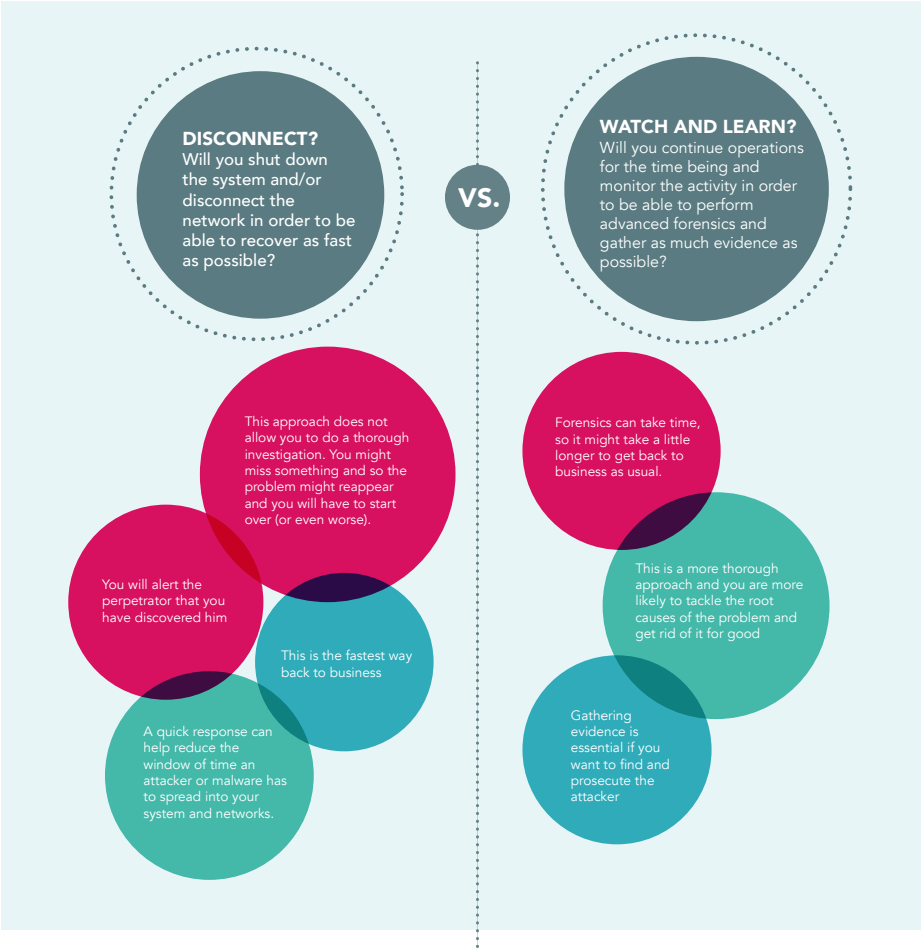
RECOVER QUICKLY OR GATHER EVIDENCE?

Containing a cyber security incident is all about limiting the damage and stopping the attacker. You have to find a way to both limit the risk to your organisation and keep it running at the same time. You need to prevent the incident from spreading further into other systems, devices and networks both within your organisation and beyond.

At the beginning of this phase, your organisation will have to make an important strategic decision: disconnect the systems immediately in order to recover as quickly as possible? Or take the time to collect evidence against the cybercriminal who perpetrated the system?

You will probably have to find a balanced solution between these two options. Which decision your organisation will make will depend on the scope, magnitude and impact of the incident. The following criteria can help you to evaluate:

1. What could happen if the incident were not contained?
2. Is the attack or breach doing immediate severe damage?
3. Is there (potential) damage and/or theft of assets?
4. Is it necessary to preserve evidence? And if so, what sources of evidence should the organisation acquire? Where will the evidence be stored? How long should evidence be retained?
5. Is it necessary to avoid alerting the hacker?
6. Do you need to ensure service availability or is it OK to take the system offline? (for example, services provided to external parties)



In some cases returning (directly) to business as usual will not be possible at all. When this happens, the objective of containment should be to make the best efforts to return to functionality as usual, i.e. to get the system usable by preserving access for legitimate users, while locking out the attacker.

During an incident, the pressure will be high to act fast. To avoid unnecessary mistakes, it is however very important to take a step back and think before you act!

INVESTIGATING : GATHERING EVIDENCE

If you want to tackle the problem at its root and identify the perpetrator for prosecution, you will need to preserve the evidence. To gather evidence, forensic **investigation** must be performed before you eradicate the incident. If you do not have the necessary in-house expertise to perform forensics yourself, call upon external experts who have the right tools to collect the evidence in a legally sound way (see also : page 13 Experts on incident response).
Bear in mind that, even if your organisation has a very competent ICT-team, you may still need external help in case of a complex cyber security incident. This doesn't mean that your ICT-professionals have failed; on the contrary, it means that they have identified in a timely manner that the incident is so complex that complementary expertise is necessary.

TO TACKLE A DDOS ATTACK YOU NEED EXPERIENCE

A DDOS attack is a targeted attack to put your system down. It thus has the potential to have a very important impact on the availability of your system. Those attacks are very sophisticated and difficult to get rid of. Most organisations will not be able to solve a DDOS attack by themselves and will have to call upon external experts when they are hit by such an attack.

Try to remember that, in order to admissible in court, evidence should be collected according to procedures that meet all applicable laws and regulations. You should avoid compromising evidence. For example, **it is <u>not</u> a good idea** to

IMMEDIATELY SHUT DOWN YOUR SERVER

- You might not be able to identify the cause of the incident, or the perpetrator. If you shut the server down, you clear out the memory on the server. This means you will not be able to perform memory forensics, because you will have nothing left to analyse.
- You might be destroying crucial evidence, because RAM memory often contains a lot of traces of malware. Before shutting down your server, it needs to be dumped on a USB drive.

IMMEDIATELY CUT OFF THE SERVER FROM THE INTERNET

- You might be destroying crucial evidence. An immediate shutdown does not allow to determine the extent of the compromise of your infrastructure, because a server that has been shut down and cut off from the internet no longer communicates with its command and control server on the internet , nor with other infected workstations/servers in your network.
- You might be alerting the cybercriminal that you are onto him and, at this stage, that is not a good idea yet.

RESTORE YOUR SYSTEM FROM A BACK-UP, IF YOU ARE NOT SURE THE BACKUP IS NOT INFECTED ITSELF

Your backup may be infected: ATPs can infect your network for a long period without you noticing. That makes the risk of a backup infection likely. Installing an infected backup could recreate the infection.

REINSTALL ON THE SAME SERVER WITHOUT A FORENSIC COPY

MOST COMMON TYPES OF INCIDENTS

At this point the list of the categories of incidents that are most likely to hit your organisation (see also: page 19 Identify possible categories of cyber security incidents) will come in handy. This list should contain the types of incidents that are most likely to hit your organisation and basic instructions on how to resolve these typical incidents. For an example take a look at Annex .

IV. ERADICATION AND CLEAN-UP

Once the investigation has been concluded, you can start the eradication. In this phase you should remove all components related to the incident, all artefacts left by the attacker (malicious code, data, etc.) and close every hole or vulnerability that was used by the hacker to intrude in the first place.

Don't start the clean-up before you have a full picture of the incident! This means that should start by determining its root cause. This is not an easy task. Furthermore, you should make sure you have at least looked at all machines with the same vulnerability; they may also be infected. Whenever the decision is taken to start eradicating the incident, it is important to be fast, synchronised and thorough, in order to give the adversary as little chance as possible (ideally none) to respond.

The eradication can take many forms. It often implies actions such as:

- Running a virus or spyware scanner to remove the offending files and services
- Updating signatures
- Deleting malware
- Disabling breached user accounts
- Changing passwords of breached user accounts
- Identifying and mitigating all vulnerabilities that were exploited
- Identifying security gaps and fixing them
- Informing employees about the threat and giving them instructions on what to avoid in the future
- Informing external stakeholders such as the media and your customers (See also: page 26 Communication during a cyber security incident)

Top management should be informed about the eradication and clean-up results and the network situation.

Individual files can be detected, quarantined or deleted from systems by the anti-virus solution. This solution should be open to accept specific virus definitions provided by you.

Phishing e-mails can be blocked on the mail gateway by blocking based on the sender, the mail relay or parts of the content.

IP and domain-based indicators can be blocked based on network traffic, by adding them to access lists, firewall policies or proxy policies. Therefore, it is important to have the necessary capability to implement these changes in an ad-hoc manner.

V. RECOVERY

When we talk about recovery, we refer to the restoring of the system(s) in order to return to normal operation and (if applicable) remediate vulnerabilities to prevent similar incidents. There are multiple ways to restore following a cyber security incident. All of them have a different impact on recovery time, cost limitations or data loss:

	RECOVERY TIME	COST	DATA LOSS	REMARKS
Clean the malicious artefacts and replacing the compromised files with clean versions	Fast	Cost-effective		You might leave undiscovered artefacts behind
Restore from a backup	Medium	Cost-effective		This is only possible if you have a known good backup. In some cases, it is hard to determine the timestamp of the initial incident, or the incident might have been going on for a long time, with no backup from the period before the incident.
Rebuild the system(s) or environment from zero	Slow, not time-efficient	Very costly	Chances of data loss	This is, however, the only way to be 100% sure that you got rid of the perpetrator.

Statistics show that very often incidents are only revealed after several months. How far back does your organisation's backup go?

The type of recovery will not only depend on the time and financial means you have at your disposition. It will also depend on the damage the incident has caused to your infrastructure. For example, it is possible that you don't have an uninfected backup, because even your oldest backup was made after the attacker entered your system. Therefore, it is important to check your backup for viruses, rootkits and backdoors before you restore from it. If no known good backup can be found, then the system must be reinstalled from scratch (including the operating system!). After restoring the system, you need to remediate the vulnerabilities that allowed the perpetrator to access you system.

This will include actions such as: installing patches, both at the operating system and at application level, changing passwords, changing accounts, tightening network perimeter security e.g. changing firewall, boundary router access control lists, etc and locking down services.

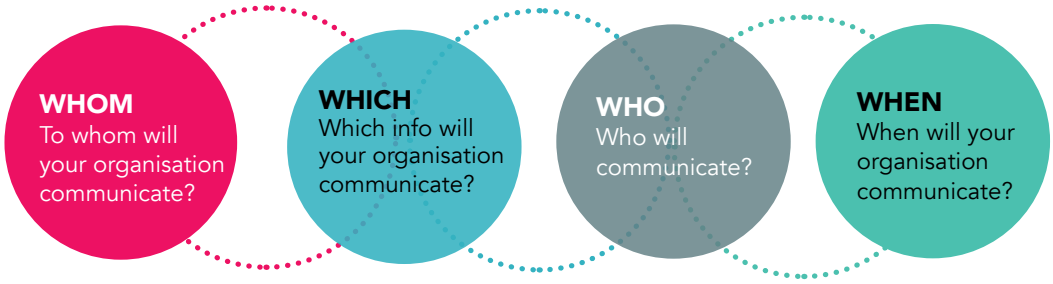
You should also take into account that once a resource has been successfully attacked, chances are that it will be attacked again, or other resources within your organisation might be attacked in a similar manner. Therefore you should consider improving your defences, for example by applying a higher level of system logging or network monitoring.

Finally, before the system is put back online, it should be validated for both security and business functions. Security-wise, your system can be validated by scanning it with a tool that checks for remaining vulnerabilities. To validate the business functions, the competent person needs to check that all functions that are necessary for the business are working properly.

Once again: if you don't have the necessary expertise within your organisation, call upon external experts. And don't forget to check if your cyber insurance covers this cost.

04 COMMUNICATION DURING A CYBER SECURITY INCIDENT

When an actual cyber security incident occurs, the cyber security incident response team should immediately draw up a concrete communication plan for the specific incident. Make this communication plan based on the general preparations you already made during the preparation phase (see also: page 15 Prepare your communication strategy). You will basically need to answer the following questions: Remember that we recommend coordinating all external communications both with the Legal and Public Affairs representatives. Think before you communicate!



I. TOOLS

If you are well prepared, your cyber security incident response team will already have a number of tools at its disposition. During preparation, your organisation has drawn up (see also: page 15 Prepare your communication strategy) a list of all potential stakeholders to contact (internal, external and official stakeholders) and a list with the contact details of these potential stakeholders (a specific person and his backup).

II. INCIDENT SPECIFIC COMMUNICATION PLAN

WHOM TO COMMUNICATE TO AND WHAT TO COMMUNICATE TO EACH CATEGORY OF STAKEHOLDERS

The first step in your incident specific communication plan is to determine to whom you will communicate. In order to do so, you need to identify which potential stakeholders might be (adversely) affected by the cyber security incident you are confronted with and if you are legally bound to notify certain entities such as the Privacy Commission – this is the Belgian data protection authority – or the industry regulator.

- Internal stakeholders: Top management, impacted managers, employees
- External stakeholders: media, customers, suppliers, other partners, etc.
- Official stakeholders: Privacy Commission, Industry regulator, Cert.be, Police

When you determine what you will communicate and to whom, a good basic rule to keep in mind is to communicate on a need-to-know-basis only. There will be stakeholders you want to communicate to in order to contain the cyber security incident, and there will be stakeholders you will have to communicate to, either because they pressure you for information (e.g. the media) or because you are legally bound to notify them (e.g. Privacy Commission, Industry regulators, persons whose data was compromised).

PERSONAL DATA

If personal data are lost or stolen (data breach) it is advisable to notify the Privacy Commission. In some cases you will be legally compelled to do so. For example:

- A legal obligation to report personal data breaches to the Privacy Commission and to the individuals whose data were compromised exists for providers of a publicly available electronic communication service (telecom providers).
- In the near future (2018) there will be a legal obligation to notify every personal data breach that is likely to result in a high risk for the persons whose data was compromised to both the Privacy Commission (within 72 hours) and the people whose personal data were compromised[1].

CRITICAL NATIONAL AND MARKET INFRASTRUCTURE

In the near future (2017-2018), operators of critical national and market infrastructure will be required by law to report cyber security incidents with a significant impact to regulators and even to the public[2].

WHEN TO COMMUNICATE?

Once you've established whom you will communicate to and what you will tell them, you need to decide when you will contact them. The timing should be based on the communication's objectives (see also: illustration on page 17).

Timing is important:

- Some stakeholders will need information as soon as possible, because they can help in containing the cyber security incident (e.g. your organisation's top management, employees);
- Other stakeholders have to be contacted within a certain legally imposed timeframe (e.g. Privacy Commission); and, finally,
- Others may contact you and in such a case you should have your answers ready (e.g. media).

Bear in mind that in order not to alert the perpetrator that you are onto him, it may be necessary to insert a **no-communication phase** from the moment of the detection of the incident until the moment when you have a full picture of the incident and an action plan. If the perpetrator is alerted, he will probably retreat and erase all his traces, or even worse, do some final damage such as stealing the last part of your organisation's crown jewels or install backdoors. In order to avoid a leak during this no-communication phase you can keep a list of people that are aware of the cyber security incident. This will make it easier to discover who is responsible when it appears that information has been leaked. Legal actions can be taken against the person who leaked information.

REPORTING TO AUTHORITIES

Reporting to authorities is a very specific part of communication. It is important for different reasons:

- In some cases, reporting data leakage or other security incidents is **legally mandatory**
- Certain authorities can **help** you. The cyber security incident you are faced with may not be an isolated incident. Authorities may have information that can help you contain your incident faster.
- In case you want to file a complaint against the criminal behind the cyber security incident, you need to contact the law enforcement authorities. In principle this will be **the police**.
- Furthermore, reporting to the authorities is a necessary step, allowing the **stocktaking and measuring of cybercrime** in the country. Increased knowledge and understanding of the phenomenon and its prevalence will help to improve the overall security landscape, e.g. through the shaping of preventive measures and countermeasures.

[1] Future General Data Protection Regulation

[2] Future Network Information Security (NIS) Directive

The support of the CERT is free of charge and in the strictest confidence, helping with the initial fire-fighting and providing advice on how to solve the issues.
Report a cyber security incident to cert@cert.be or if you prefer via a telephone call to: +32 (0)2 790 33 85 (every working day from 08.00 to 18.00).

After your report, you get a receipt and an incident number. With this incident number, you can always refer to your report. CERT.be will get in touch with you as soon as possible to answer your questions.

NL EN FR

By default you should go to your local police station or the police station of your choice. Information about police zones is available here:

NL FR

REPORTING TO THE CERT

Organisations should always seriously consider reporting cyber security incidents to the federal Cyber Emergency Response Team, CERT.be. In order to prevent attacks on other computer systems, CERT.be is especially interested in what they call "Indicators Of Compromise" (IOCs). These are artefacts observed on a network or an operating system and that indicate that it is very likely that there has been an intrusion. Reporting to the CERT is vital in determining whether the incident is isolated or not and allows to keep track of threat trends in Belgium. The CERT will be able to provide some information and advice related to the incident that can help the victim to take effective countermeasures. Furthermore, the information your organisation provides may help to prevent attacks on other computer systems.

THE FOLLOWING INFORMATION SHOULD BE REPORTED

1. Your contact details
2. The type of the incident
3. The date of the incident
4. Is the incident ongoing?
5. How did you notice this incident?
6. What's the impact of the incident?
7. Have you already taken actions or measures? If so, which ones?
8. Do you have logs or other useful data?
9. Who have you already informed?
10. What are you expecting from your report?

FILING A COMPLAINT WITH LAW ENFORCEMENT

Communication to law enforcement authorities must be made as soon as possible after discovery of the cyber security incident, given the volatility of traces and actions that need to be taken (Internet identification, etc.). For prosecution to be successful, the chain of custody needs to be preserved in a legally accepted manner, which requires the evidence to be preserved immediately after the detection of the incident .
Judicial authorities need to possess the available information regarding the incident in order to make a qualification of the offence and proceed with the identification of the suspect. The information that should be communicated to the police in case of Internet fraud (a 'traditional' crime committed by electronic means) may not be entirely the same as the information the police needs in case of ICT crime (hacking, sabotage, espionage). In the course of the investigation, additional information will be requested, collected and searched for by the investigators. It is of the outmost importance that your services provide the assistance and input requested by law enforcement, to help advance the investigation.

I. POLICE

If your organisation is impacted by an incident and as such has been the victim of an offence, you can decide to lodge a complaint. By default you should go to your local police station or the police station of your choice. For more complex cases, the local police will get support from the Regional Computer Crime Units (RCCU), specialised in dealing with ICT crime (hacking, sabotage, espionage) and/or the Federal Computer Crime Unit (FCCU). If the case concerns a critical infrastructure or a sector with specific rules, a special procedure may apply.

II. INVESTIGATING JUDGE

It is also possible to file a complaint directly with a magistrate (investigating judge). This should be an exceptional measure. Furthermore, your organisation will probably have to advance the costs of the investigation, because the magistrate is conducting it at your specific demand.

REPORTING A PERSONAL DATA BREACH TO THE PRIVACY COMMISSION

Currently there is no general obligation to report cyber security incidents. It is however advisable and good practice to do so when personal data, i.e. alll data related to an identified or identifiable natural person, risks being unlawfully lost, damaged, altered or disclosed (data breach).

The Privacy Commission has issued a recommendation, stating that it considers data breach notifications to be an inherent part of the general security obligations incumbent on any organisation that stores personal data or has personal data stored for it. The notification to the Privacy Commission has to be made by the person responsible for the processing of personal data. The Privacy Commission advises notifying within 48 hours after the breach has been identified. In case there is little information regarding the breach, the data processor can report in two phases.

Notification to the Privacy Commission can be made via a secure e-form application. All this information is explained in detail in the manual for the notification form.

NL FR

When your organisation notifies the Privacy Commission, the latter will be able to estimate the impact of the data breach in cooperation with the person in charge of processing the data breached and can make recommendations regarding the rules on data processing and the need to secure this. In addition, the person(s) responsible for data processing will have to reconsider the manner in which the data processing is organised and secured, now and in the future. Organisations from specific sectors, such as providers of financial services or electronic communications networks, should bear in mind that they are already subject to an obligation to report to the Privacy Commission any incident involving a breach of personal data.

NOTIFYING INDIVIDUALS WHOSE PERSONAL DATA WERE COMPROMISED

In certain cases, the persons whose data are involved in the data breach need to be informed. The person responsible for the data processing has to notify the data breach to the persons involved via communication means that guarantee that the information is received as soon as possible. When it is not possible to identify the victims of the breach, the data processor can inform them via the public media, while at the same time pursuing the identity of the persons in order to inform them on a personal basis.

DATA BREACH

Rex mundi has obtained your company's data. It contains sensitive information about your clients, so their privacy is at stake. He threatens to publish everything on the internet on his twitter account.

The notification to the persons involved needs to be clear and easy to understand. The Privacy Commission recommends providing as a minimum the following information:

- Name of responsible for data processing;
- Contact information for further information;
- Short description of the incident during which the data breach occurred;
- (Probable) date of the incident;
- Type and nature of personal data involved;
- Possible consequences of the breach for the persons involved;
- Circumstances in which the data breach occurred;
- Measures taken by the data processor to prevent the data breach;
- Measures which the person responsible recommends the involved persons to take to limit possible damages.

05

INCIDENT FOLLOW-UP AND CLOSURE: LEARN FROM EACH INCIDENT!

All cyber security incidents, like any other incident, need to be properly closed. Furthermore, it is very important that lessons are learned from each incident, to evaluate future improvements.

EVALUATION OF LESSONS LEARNED AND FUTURE ACTIONS: ORGANISE A POST-INCIDENT REVIEW

A post-incident review is a very useful document because it shows actual data and real impacts. It can help your organisation to evaluate your cyber incident response plan and budget.

OBJECTIVE	All cyber security incidents should be formally reviewed after the incident resolution to verify if security mechanisms or mitigating controls need to be put in place or adapted to prevent similar incidents in the future.
WHY?	Cyber security incidents can indicate important shortcomings in your security strategy or practice. Every important incident needs to be analysed to evaluate if lessons for future improvement can be learned.
WHAT SHOULD THIS POST INCIDENT REVIEW LOOK LIKE?	A post-incident review and possible lessons learned must be part of the handling of all cyber security incidents. Checklist of questions that can help to evaluate: • Were the cyber security incident management plan and procedures followed? Were they adequate? Should the plan be adapted on certain points? • Was information available in time? If no, would it have been possible to have it sooner and how? • Were there any steps or actions you have taken that might have inhibited the recovery? • Could your information sharing with other organisations be improved? • What corrective actions could prevent similar incidents in the future? • Are there precursors or indicators that should be monitored to detect similar incidents more easily in the future? • What additional tools or resources are needed to detect, analyse, mitigate future cyber security incidents? • Did the cyber security response team have the right organisational authority to respond to the incident? Should you recruit more people or place a consulting firm, lawyer,…on retainer in case of a future cyber security incident?

11. INCIDENT TRACKING AND REPORTING

It is important to document every incident and the actions you have taken and to keep all of this documentation together. Similar incidents might happen again and might require the same handling procedures, or a small incident might turn out to be a part of a bigger incident that you discover later. Furthermore, it is also necessary to report the incident to relevant stakeholders, both internal and external. Use the results of your post-incident review to determine which stakeholders should be contacted. Internally, the organisation's top management should always be considered a relevant stakeholder and thus receive a documented report on what happened, what actions were taken, where it went well/wrong, etc.

OBJECTIVE	**TRACKING** All cyber security incidents and their resolution must be documented. **REPORTING** All cyber security incidents and their resolution must be reported to top management and, if this function exists within your organisation, to the Information Security Officer.
WHY?	**TRACKING** Similar incidents might happen again and might require the same handling procedures, or a small incident might turn out to be a part of a bigger incident that you discover later. **REPORTING** Top management and/or the people within your organisation that analyse your organisation's risks (e.g. Operational Risk Committee or equivalent) need to be aware of cyber security incidents.
WHAT SHOULD THIS TRACKING AND REPORTING DOCUMENT LOOK LIKE?	A documented report must be written for all cyber security incidents and kept together with other cyber security incident reports. You can base this report on the conclusions of the post-incident review. All major security incidents should be reported immediately to top management. At least once a year all cyber security incidents must be reported and explained to top management and the people within your organisation that analyse your organisation's risks.

GLOSSARY

APT	APT is short for Advanced Persistent Threat. It is a set of stealthy and continuous computer hacking processes. In case of an APT, the perpetrator uses multiple phases to break into a network, in order to avoid detection, and harvest valuable information over the long term.
Artefact	Artefact is an object of digital archaelogical interest.
Asset	Any Resource or Capability. Assets of a Service Provider include anything that could contribute to the delivery of a Service. Assets can be one of the following types: Management, Organisation, Process, Knowledge, People, Information, Applications, Infrastructure, and Financial Capital.
Backdoor	In software or a computer system is a method of bypassing security mechanisms. It can be used by system administrators or programmers in a legitimate way. But in this guide we refer to the illegitimate version, namely a secret portal that hackers and intelligence agencies use to gain illicit access to computer systems, while staying undetected.
Backup	Backup procedures are used to copy files to a second medium such as a disk, tape or the cloud. Backup files should be kept at an offsite location. Backups are usually automated using operating system commands or backup utility programs. Most backup programs compress the data so that the backups require fewer media.
Botnet	A collection of computers (often tens of thousands) that are operated by one or more persons (called botmasters) using malware. Botnets can be used to send out spam, to start a DDOS attack, to spread malware, etc.
Command and control server	A centralised server that can send commands and receive information from the computers that are part of a botnet. The command and control server allows a bot master to control the group of computers in his botnet remotely.
DDOS	DDOS is short for Distributed Denial of Service. In case of a DDOS, a botmaster commands the computers of his botnet to access a determined website. The server of this website will end up overcharged and will stop functioning correctly.
DMZ	DMZ is short for demilitarised zone, and refers to is the physical or logical subnetwork (zone) that separates an internal local area network from other untrusted networks, such as the Internet. The purpose of a DMZ is to add an additional layer of security. The name is derived from the term "demilitarised zone", an area between nation states in which military operation is not permitted.
Host	A computer that stores a website or other data that can be accessed over the Internet or that provides other services to a network.
IDS	IDS is short for Intrusion Detection System, which is an automated system that aims to detect hacking an unauthorised access to a computer system or network.
IPS	IPS is short for Internet Protocol address. It is a numerical label assigned to each device participating in a computer network. IP addresses are used both to identify and to locate the device.

Network	A telecommunications network that allows computers or other devices to exchange data. The best-known computer network is the Internet.
Patch	Patch is a small piece of software, often developed by the producers of specific software in order to update, fix (bugs or vulnerabilities) or improve this software. It allows you to change the software without reinstalling it from scratch.
PGP	PGP is short for Pretty Good Privacy, which is a data encryption and decryption computer program that provides cryptographic privacy and authentication for data communication. PGP can be used for signing, encrypting, and decrypting texts, e-mails, files, directories, and whole disk partitions and to increase the security of e-mail communications.
RAM	RAM is short for Random Access Memory. RAM is the most common type of data storage found in computers and other devices, such as printers. In a RAM device all data items can be accessed in (almost) the same amount of time, irrespective of the physical location of data inside the memory.
Rootkit	A collection of computer software, often malicious, designed with a double objective: (1) to enable access to a computer or areas of its software that would not otherwise be allowed while at the same time (2) masking its existence or the existence of other software. Rootkit detection is difficult because a rootkit may be able to subvert the software that is intended to find it. Removal can be complicated or practically impossible.
SNORT	Snort is a free and open source network intrusion prevention system and network intrusion detection system. www.snort.org
Spoofing	A spoofing attack is a situation in which a person or program successfully poses as another by falsifying data and thereby gaining an illegitimate advantage. For example, email spoofing is the creation of email messages with a forged sender address.
VPN	VPN is short for Virtual Private Network. This is a group of computers networked together over a public network such as the Internet. Businesses use VPNs to connect remote datacenters or to allow employees to securely access the corporate intranet while traveling outside the office.
Vulnerability	A weakness in a system, application or network that is subject to exploitation or misuse.
Workstation	A computer (hardware).

BIBLIOGRAPHY

CERT-EU (2012), *Guidelines of the CERT-EU for data acquisition for investigation purposes*
Retrieved from http://cert.europa.eu/static/WhitePapers/CERT-EU-SWP_12_04_Guideline_DataAcquisition_v1_4_4.pdf

CREST (2013), *Cyber Security Incident Response Guide*
Retrieved from http://www.crest-approved.org/wp-content/uploads/CSIR-Procurement-Guide.pdf

ENISA (2010), *Good Practice Guide for Incident Management*
Retrieved from https://www.enisa.europa.eu/activities/cert/support/incident-management

FEB, ICC, B-CCentre, Isaca, EY, Microsoft (2013), *Belgian Cyber Security Guide*
Retrieved from
ISO/IEC 20000-1 (2011), *Information technology -- Service management -- Part 1: Service management system requirements*
Retrieved from http://www.iso.org/iso/catalogue_detail?csnumber=51986

ISO/IEC 27001 (2013), *Information technology -- Security techniques -- Information security management systems -- Requirements*
Retrieved from http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=54534

Marsh (2015), *European 2015 Cyber Risk Survey Report*
Retrieved from http://belgium.marsh.com/Portals/95/Documents/15%2010-023%20European%20Cyber%20survey%20report.pdf

Microsoft TechNet, *Responding to IT Security Incidents*
retrieved from https://technet.microsoft.com/en-us/library/cc700825.aspx

NIST (2012), *Framework for Improving Critical Infrastructure Cyber Security – Version 1.0*
Retrieved from http://www.nist.gov/cyberframework/upload/cybersecurity-framework-021214.pdf

NIST (2012), *Computer Security Incident Handling Guide – Recommendations of the National Institute of Standards and Technology*
Retrieved from http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-61r2.pdf

SANS Institute, *SCORE Security Checklist on APT Incident Handling*
Retrieved from https://www.sans.org/media/score/checklists/APT-IncidentHandling-Checklist.pdf

SANS Institute (2003), Sample Incident Handling Forms
Retrieved from https://www.sans.org/score/incident-forms/

SANS Institute (2007), *An Incident Handling Process for Small and Medium Businesses*
Retrieved from https://www.sans.org/reading-room/whitepapers/incident/incident-handling-process-small-medium-businesses-1791

SANS Instiute (2008), *Incident Handling for SMEs (Small to Medium Enterprises)*
Retrieved from https://www.sans.org/reading-room/whitepapers/incident/incident-handling-smes-small-medium-enterprises-32764

SANS Institute (2008), *Security Incident Handling in Small Organizations*
Retrieved from https://www.sans.org/reading-room/whitepapers/incident/security-incident-handling-small-organizations-32979

AKNOWLEDGEMENTS

DRAFTING GROUP

Anneleen Dammekens (FEB)
Daniel Letecheur (FEDICT)

Georges Ataya (Solvay Brussels School)
Luc Beirens (Deloitte)
Ferdinand Casier (Agoria)
Phédra Clouner (CCB)
Walter Coenraets (FCCU)
Miguel De Bruycker (CCB)
Dirk De Nijs (ModuleBuilder)
Pedro Deryckere (FCCU)
Nathalie Dewancker (Proximus)
Steven Goossens (Proximus)
Ann Mennens (B-CCENTRE)
Philippe Mermuys (Allianz)
Benoit Montens (Assuralia)
Ronny Tronquo (KBC)
Erik Van Buggenhout (Nviso)

ANNEX

Most common incident types and how to neutralise them

INCIDENT TYPE	DEFINITION	POSSIBLE TARGET	VULNERABILITIES THAT MIGHT BE EXPLOITED	POSSIBLE REACTIONS
Social engineering: (spear) phishing, vishing (phone phishing)	Manipulating and tricking someone into revealing information that (e.g. password or financial information) that can be used to attack systems or networks.	CEO Accounting		
(spear) phishing, vishing (phone phishing)	Attempt to acquire sensitive information (e.g. customer logins & passwords) from customers by impersonating a legitimate and trusted person or organisation.			
Unauthorised access	When a person gains logical or physical access without permission to a network, system, application, data, or other IT resource.	Customer information Credit card information Applications creating or processing payments Websites and services	Password cracked or sniffed Unpatched system vulnerabilities Social engineering Careless users or weak procedures	Patch vulnerabilities or block exploitation Check for malware (rootkits, backdoors, Trojans, …) Change passwords or inactivate accounts Forensic evidence gathering Block (network) access to the targeted resources
Denial of service	Any attack that prevents or impairs the authorised use of networks, systems or applications by exhausting resources.	Mail system Network appliances Application servers Web sites and services	Spam filter weaknesses Unpatched system vulnerabilities Weak configuration of systems or appliances	Block traffic Contact ISP Disconnect infected system(s)
Malicious code attack **Ransomware**: is a type of malware that restricts access to the computer system that it infects, and demands a ransom paid to the creator(s) of the malware in order for the restriction to be removed. Some forms of ransomware encrypt files on the system's hard drive while some may simply lock the system and display messages intended to coax the user into paying.	A malicious code attack is any (large-scale) infection or threat of infection by a virus, worm, Trojan horse, or other code-based malicious entity.	Any server or even appliance in the network could be the target of a malicious code attack, but some systems have a higher risk profile (e.g. systems directly or indirectly connected to the outside world) Any end user workstations could be targeted via e-mail, USB storage devices, visits to web sites and web applications, etc.	Unpatched system vulnerabilities (e.g. Flash or JavaScript) Anti-virus not installed, not active or signature file not up to date Inappropriate or imprudent user behaviour (e.g. using infected USB memory device)	Block malicious web traffic Apply patches Update anti-virus signature files Run virus clean-up tool if available Run vulnerability assessment tool to list vulnerable resources Completely reinstall infected system Shut down vulnerable services Shut down or disconnect infect system(s)

INCIDENT TYPE	DEFINITION	POSSIBLE TARGET	VULNERABILITIES THAT MIGHT BE EXPLOITED	POSSIBLE REACTIONS
Inappropriate usage	An inappropriate usage incident is any incident involving an internal employee or contractor violating a code of conduct or a computer policy. Inappropriate behaviour is not always malicious and targeted. Sometimes a user will simply act carelessly or even be completely unaware of the policy or code of conduct he has infringed. The inappropriate behaviour will sometimes constitute a serious security incident in itself, but it can also be the cause or trigger of a serious incident (like malware infection, loss of critical data)	Payment transactions Credit card information Customer commercial and personal information Confidential information in general	Weak management or control of confidential data Bad user password management Lack of segregation of duties, accumulation of access rights Lack of application security or monitoring Lack of procedures or control to enforce policies and codes of conduct	Inform and get advice from Compliance and/or the legal department Inactivate users or withdraw access rights Make forensic copies of logs and other crucial information to trace and prove what happened Check logs and other information for traces of the infringement
Fraud	Fraud is a kind of inappropriate behaviour that is inherently malicious in nature, and aimed at personal enrichment by abusing company systems, applications or information.			
Data loss or theft	This is an incident that involves the loss or theft of confidential information. Information can be confidential because of the value it has for the company, or because it is protected by internal or external regulations. Data loss incidents can have a big financial impact, due to possible financial liability or damage done to the company image, should the information itself or the fact that is has been lost become public or known to the wrong people.	Personal information about employees or customers (protected by privacy laws or concerns) Credit card information Customer commercial information Confidential balance sheet information Confidential information about company strategy, on-going projects and decisions, etc.	Improper handling of portable storage devices (USB memory stick, CD, back-up tape, etc.) Improper handling of mobile equipment (laptop PC, smart phone, etc.) Improper handling of confidential printed information Breach of clean desk policy	Assess the level of protection of the data, if any (encryption, password protection, specific device required to read the data) Inform and get advice from Compliance and/or the legal department or from your external legal adviser Inform Communications department and management, define a communication strategy Inform the owner of the lost or stolen data
Brand abuse	This is an incident where someone is abusing your brand and registered trademarks.	Registration of DNS names containing the brand Spoofing of website designs Spoofing of e-mail addresses and e-mail templates	Not applicable	Inform police (in case of theft) Request a takedown of the website Inform customers about the existence of this