National College of Ireland

Configuration Manual

MSc Research Project

MSc in Cyber Security

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School of Computing

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MSc Project Submission Sheet

School of Computing

Student Name: Paul Gibbons

Student ID: X22167846

Programme: MSCCYBETOP **Year:** 2024

Module: MSc in Cyber Security

Supervisor: Mustafa Ul Raza

Submission Due Date: 16th August 2024

Project Title: A Quantitative Analysis of Cyber Crime in Ireland

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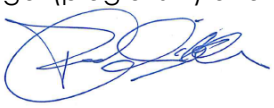

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Contents

Configuration Manual

Paul Gibbons

Student ID: x22167846

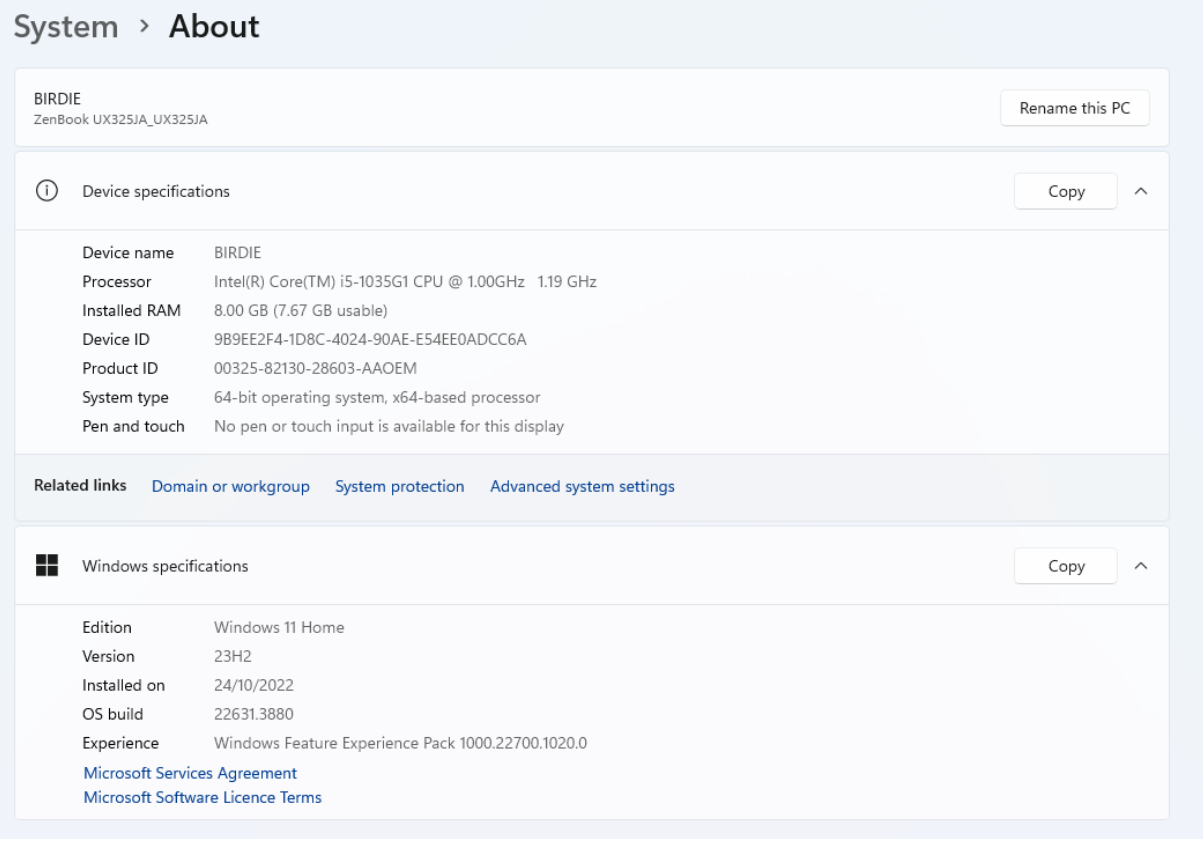
1 Environment Configuration for Running Analysis with R code

I used two devices over the course of my work as described below.

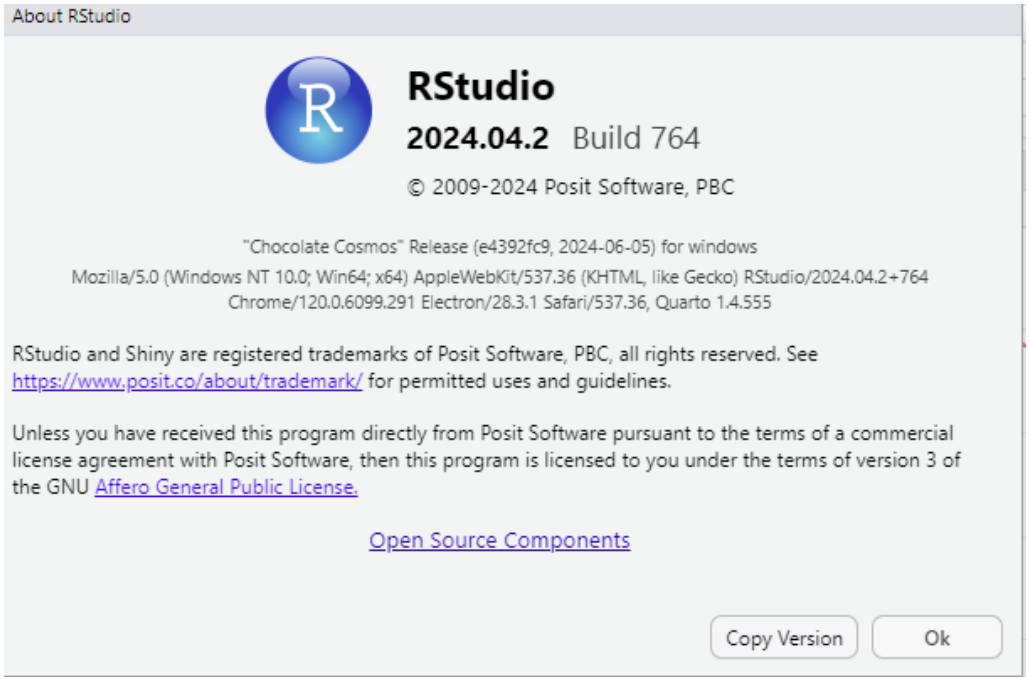
Device Number 1.
Laptop: Apple MacBook Pro M3
OS: Sonoma v.14.5

R Code Integrated Development Environment: R Studio for Apple Mac version RStudio-2024.04.1-748

Device Number 2.
Laptop: Asus Zenbook
Operating System: Windows 11 Home
Operating System Build Version: 226331.3880



R Code Integrated Development Environment:
R Studio for Windows version 2024.04.2-764



2 R Code Script for Trending Analysis of Central Statistics Office Data and export of statistics to CSV file.

```
# Install and load necessary packages
install.packages("dplyr")
install.packages("ggplot2")
install.packages("plotly")
install.packages("tidyr")
library(dplyr)
library(ggplot2)
library(plotly)
library(tidyr)

# Load the data from the CSV file
# file_path <- file.choose()  # Select the CSO-DataSet.csv file
# data <- read.csv(file_path, stringsAsFactors = FALSE)
data <- read.csv("CSO-DataSet2.csv", stringsAsFactors = FALSE)


# Print the first few rows to verify the data
head(data)

# Check for non-numeric values in year columns and remove them
cols_to_check <- c("X2018", "X2019", "X2020", "X2021", "X2022", "X2023")

# Convert all year columns to numeric, coercing non-numeric values to NA
data[all_of(cols_to_check)] <- lapply(data[all_of(cols_to_check)], function(x)
as.numeric(as.character(x)))

# Remove rows with NA values
data <- na.omit(data)

# Reshape data for analysis
data_long <- data %>%
```

```
  pivot_longer(cols = all_of(cols_to_check), names_to = "Year", values_to = "Cases") %>%
  mutate(Year = as.numeric(gsub("X", "", Year)))

# Summary statistics for each incident type
summary_stats <- data_long %>%
  group_by(Incident.type) %>%
  summarise(
    Mean = mean(Cases, na.rm = TRUE),
    Median = median(Cases, na.rm = TRUE),
    SD = sd(Cases, na.rm = TRUE)
  )

# Print summary statistics
print(summary_stats)

# Create a line plot for cases over the years
ggplot(data = data_long, aes(x = Year, y = Cases, color = Incident.type, group =
Incident.type)) +
  geom_line(linewidth = 1) +
  geom_point(size = 2) +
  labs(title = "Incidents Over Years",
       x = "Year",
       y = "Number of Cases",
       color = "Incident Type") +
  theme_minimal()

# Create an interactive plot
plot <- plot_ly(data = data_long, x = ~Year, y = ~Cases, type = 'scatter', mode =
'lines+markers',
                color = ~Incident.type, colors = c('blue', 'red', 'green', 'orange')) %>%
  layout(title = "Interactive Plot of Incidents",
         xaxis = list(title = "Year"),
         yaxis = list(title = "Number of Cases"),
         hovermode = "closest")

# Show the plot
plot


# Print 30 rows of  summary statistics to a CSV
write.table(summary_stats , file = "summary_stats-SD-CSO-DataSet2.csv", sep=",",
row.names=FALSE)
```

3 R Code Script for Trending Analysis of An Garda Síochána National Cyber Crime Data

```
# Create a data frame
cases <- data.frame(
  Year = c(2018, 2019, 2020, 2021, 2022),
  New_Cases = c(493, 529, 400, 490, 488),
  Closed_Cases = c(465, 405, 333, 431, 692 )  # Assume missing 2018 data as 0
)
# Summary statistics for new cases
summary_stats_new <- summary(cases$New_Cases)
```

```
sd_new <- sd(cases$New_Cases)

# Summary statistics for closed cases
summary_stats_closed <- summary(cases$Closed_Cases)
sd_closed <- sd(cases$Closed_Cases)

# Print summary statistics
print(summary_stats_new)
print(sd_new)
print(summary_stats_closed)
print(sd_closed)


# Load library for plotting
library(ggplot2)

# Create a line plot for cases over the years
ggplot(data = cases, aes(x = Year)) +
  geom_line(aes(y = New_Cases, colour = "New Cases"), linewidth = 5) +
  geom_line(aes(y = Closed_Cases, colour = "Closed Cases"), linewidth = 4) +
  labs(title = "New vs Closed Cases Over Years",
       x = "Year",
       y = "Number of Cases",
       color = "Cases Type") +
  theme_minimal()


# Calculate proportion of closed cases
cases$Proportion_Closed = cases$Closed_Cases / cases$New_Cases

# Print proportion of cases closed
print(cases$Proportion_Closed)

# # Create a data frame
# cases <- data.frame(
#   Year = c(2018, 2019, 2020, 2021, 2022),
#   New_Cases = c(493, 529, 400, 490, 488),
#   Closed_Cases = c(465, 405, 333, 431, 692 )  # Update this if you have the correct value for
2022 closed cases
# )
# Reshape data for plotting
cases_long <- cases %>%
  pivot_longer(cols = c(New_Cases, Closed_Cases), names_to = "Type", values_to = "Cases")

# Create an interactive plot
plot <- plot_ly(data = cases_long, x = ~Year, y = ~Cases, type = 'scatter', mode =
'lines+markers',
                color = ~Type, colors = c('blue', 'red')) %>%
  layout(title = "Interactive Plot of GNCCB Cases",
         xaxis = list(title = "Year"),
         yaxis = list(title = "Number of Cases"),
         hovermode = "closest")

# Show the plot
plot
```

4 R Code Script for Trending Analysis of FBI Internet Complaints Annual Data

```
# Load necessary libraries
library(dplyr)
library(tidyr)
library(ggplot2)
library(scales)  # for comma formatting

# Load the data from the CSV file
# file_path <- file.choose()  # Select the FBI-DataSet.csv file
data <- read.csv("FBI-DataSet.csv", stringsAsFactors = FALSE)

# Verify the structure of the data
print(head(data))
str(data)

# Ensure Year is treated as a numeric or factor
data$Year <- as.numeric(as.character(data$Year))

# Convert all other columns to numeric
data[ , -1] <- lapply(data[ , -1], function(x) as.numeric(gsub(",", "", x)))


# Verify Year conversion
print(head(data$Year))

# Check for any NA values after conversion
if(any(is.na(data$Year))) {
  stop("Year conversion resulted in NA values. Please check the Year column in the CSV file.")
}

# Transform data for plotting
data_long <- data %>%
  pivot_longer(-Year, names_to = "Category", values_to = "Volume")

# Plot all data
ggplot(data_long, aes(x = Year, y = Volume, color = Category, group = Category)) +
  geom_line() +
  geom_point() +
  labs(title = "Trends of U.S. Cyber Crime by Volume Since 2018",
       x = "Year",
       y = "Volume") +
  theme_minimal() +
  scale_y_continuous(labels = comma) +  # Use comma formatting for y-axis labels
  theme(legend.position = "bottom")
```

5 R Code Script for Trending Analysis of FBI Internet Top 5 Complaints Annual Data with some statistical analysis and plot of the results

```
# Load necessary libraries
library(dplyr)
library(tidyr)
library(ggplot2)
library(scales)

# Read the data
data <- read.csv(file.choose())
# data <- read.csv("FBI-DataSet2.csv", stringsAsFactors = FALSE)

# Verify the structure of the data
print(head(data))
str(data)

# Ensure Year is treated as a numeric
data$Year <- as.numeric(as.character(data$Year))

# Convert all other columns to numeric
data[ , -1] <- lapply(data[ , -1], function(x) as.numeric(gsub(",", "", x)))

# Verify the conversion
print(head(data))
str(data)

# Identify the top 5 items by year
top_5_items_per_year <- data %>%
  pivot_longer(-Year, names_to = "Category", values_to = "Volume") %>%
  drop_na(Volume) %>%
  group_by(Year) %>%
  slice_max(order_by = Volume, n = 10)



# Get the unique top 5 categories across all years
top_categories <- top_5_items_per_year %>%
  ungroup() %>%
  distinct(Category)

# Filter the original data for these top categories
top_categories_data <- data %>%
  pivot_longer(-Year, names_to = "Category", values_to = "Volume") %>%
  filter(Category %in% top_categories$Category)

# Calculate summary statistics across all years for each category
summary_stats <- top_categories_data %>%
  group_by(Category) %>%
  summarize(
    mean_volume = mean(Volume, na.rm = TRUE),
    sd_volume = sd(Volume, na.rm = TRUE),
    min_volume = min(Volume, na.rm = TRUE),
    max_volume = max(Volume, na.rm = TRUE)
```

```
  )

# Print summary statistics
print(summary_stats)

# Plot the top categories across all years
ggplot(top_categories_data, aes(x = Year, y = Volume, color = Category, group =
Category)) +
  geom_line() +
  geom_point() +
  labs(title = "Top 5 Fraud Categories by Volume Over the Years",
       x = "Year",
       y = "Volume") +
  theme_minimal() +
  scale_y_continuous(labels = comma) +
  theme(legend.position = "bottom")


# Print 30 rows of summary statistics
print(summary_stats, n=30)

# Print 30 rows of  summary statistics to a CSV
write.table(summary_stats , file = "summary_stats-SD-Top10.csv", sep=",", row.names=FALSE)
```

6 R Code Script for Trending Analysis of FBI Annual Cybercrime Costs Data with some statistical analysis and plot of the results

```
# Load necessary libraries
library(ggplot2)
library(reshape2)

# Read the data from CSV file
data <- read.csv("FBI-DataSet-CyberCosts.csv")

# Melt the data frame for easy plotting
data_melted <- melt(data, id.vars = "Complaint.Type", variable.name = "Year", value.name =
"Loss")

# Convert Year to numeric
data_melted$Year <- as.numeric(gsub("\\D", "", data_melted$Year))

# Plotting the data
ggplot(data_melted, aes(x = Year, y = Loss, color = Complaint.Type)) +
  geom_line() +
  geom_point() +
  theme_minimal() +
  labs(title = "US CyberCrime Annual Loss Trends (2018-2023)",
       x = "Year",
       y = "Losses ($)",
       color = "Complaint Type") +
  scale_y_continuous(labels = scales::comma)

# Statistical Analysis: Summary Statistics
summary_stats <- data.frame(
  Complaint.Type = data$Complaint.Type,
```

```
  Mean = rowMeans(data[, -1]),
  Median = apply(data[, -1], 1, median),
  Std_Dev = apply(data[, -1], 1, sd)
)

print(summary_stats)

# Print 30 rows of  summary statistics to a CSV
write.table(summary_stats , file = "summary_stats-SD-FBI-DataSet-CyberCosts.csv", sep=",",
row.names=FALSE)
```

7 R Code Script for Trending Analysis of FBI Annual Top 5 CyberCrime Categories by Costs Since 2018

```
# Load necessary libraries
library(dplyr)
library(tidyr)
library(ggplot2)
library(scales)

# Read the data
 data <- read.csv("FBI-DataSet-CyberCosts-2.csv", stringsAsFactors = FALSE)



# Verify the structure of the data
print(head(data))
str(data)

# Ensure Year is treated as a numeric
data$Year <- as.numeric(as.character(data$Year))

# Convert all other columns to numeric
data[ , -1] <- lapply(data[ , -1], function(x) as.numeric(gsub(",", "", x)))

# Verify the conversion
print(head(data))
str(data)

# Identify the top 5 items by year
top_5_items_per_year <- data %>%
  pivot_longer(-Year, names_to = "Category", values_to = "Volume") %>%
  drop_na(Volume) %>%
  group_by(Year) %>%
  slice_max(order_by = Volume, n = 4)



# Get the unique top 5 categories across all years
top_categories <- top_5_items_per_year %>%
  ungroup() %>%
  distinct(Category)

# Filter the original data for these top categories
```

```
top_categories_data <- data %>%
  pivot_longer(-Year, names_to = "Category", values_to = "Volume") %>%
  filter(Category %in% top_categories$Category)

# Calculate summary statistics across all years for each category
summary_stats <- top_categories_data %>%
  group_by(Category) %>%
  summarize(
    mean_volume = mean(Volume, na.rm = TRUE),
    sd_volume = sd(Volume, na.rm = TRUE),
    min_volume = min(Volume, na.rm = TRUE),
    max_volume = max(Volume, na.rm = TRUE)
  )

# Print summary statistics
print(summary_stats)

# Plot the top categories across all years
ggplot(top_categories_data, aes(x = Year, y = Volume, color = Category, group =
Category)) +
  geom_line() +
  geom_point() +
  labs(title = "Top 5 CyberCrime Categories by Costs Since 2018",
       x = "Year",
       y = "Cost in $") +
  theme_minimal() +
  scale_y_continuous(labels = comma) +
  theme(legend.position = "bottom")


# Print 30 rows of summary statistics
print(summary_stats, n=30)

# Print 30 rows of  summary statistics to a CSV
write.table(summary_stats , file = "summary_stats-SD-Top10-2.csv", sep=",", row.names=FALSE)
```

8 Ancillary R Libraries Installed

Clippr
Clippr is an R package designed to simplify and automate the process of generating visual content, such as images or visual summaries, from datasets. It is particularly useful for quickly producing high-quality, publication-ready visuals that can be easily embedded in reports or presentations.

Readr
Readr is an R package that provides a fast and friendly way to read rectangular data (like CSV, TSV, and other tabular data) into R. It focuses on making data import easier, faster, and more user-friendly compared to base R functions. Readr also provides functions that automatically parse data types, handle missing values, and manage data import errors efficiently.

ggplot2
ggplot2 is a widely-used R package for data visualization. It implements the "Grammar of Graphics" concept, allowing users to create complex and multi-layered visualizations by adding components such as scales, themes, and geometries in a structured manner. It is

known for its flexibility and power in creating detailed and aesthetically pleasing visualizations.

reshape2
reshape2 is an R package used for data reshaping, particularly in the context of converting data between wide and long formats. It provides functions like melt() and dcast() that allow users to manipulate the shape of their data frames, which is often a necessary step in data analysis and visualization workflows.
These libraries are commonly used in R for data processing, visualization, and automation of tasks

Plotly
Plotly is an R package that allows users to create interactive, web-based visualizations directly from R. Built on top of the plotly.js JavaScript library, it supports a wide range of chart types, including scatter plots, line charts, bar charts, and 3D plots. Plotly is particularly useful for creating dynamic and interactive visualizations that can be embedded in web pages or shared online. It also integrates well with other R packages, such as ggplot2, allowing users to convert static ggplot2 plots into interactive ones.

Tidyr
Tidyr is an R package designed to help clean and organize data, particularly by converting data into a "tidy" format. In tidy data, each variable is a column, each observation is a row, and each type of observational unit forms a table. Tidyr provides functions like gather(), spread(), separate(), and unite() to reshape data, making it easier to analyze and visualize. It's commonly used in conjunction with other packages in the Tidyverse ecosystem.

Dplyr
Dplyr is an R package that provides a set of tools for efficiently manipulating data frames. It is part of the Tidyverse ecosystem and is known for its intuitive and expressive syntax, making data manipulation tasks simpler and more readable. Key functions include filter() for subsetting rows, select() for choosing columns, mutate() for adding new variables, summarize() for aggregating data, and arrange() for sorting data. Dplyr also supports operations on grouped data, enabling complex transformations and summaries with ease.

Scales
Scales is an R package that provides tools for scaling data and controlling the appearance of axes and legends in visualizations. It is often used in conjunction with ggplot2 to customize the way data is represented on plots, such as adjusting axis labels, setting scales for continuous or discrete variables, and formatting numbers, dates, and times. Scales makes it easier to control the mapping between data and visual elements, enhancing the clarity and readability of plots.

9 Case Law Searches

9.1 WESTLAW.IE

https://libguides.ncirl.ie/databases/westlaw

Westlaw.ie is an online research tool that lets you carry out legal research quickly and easily. It gives you instant access to Irish reported and unreported case law, legislation, journals and legal news.

Key Westlaw Journals

The following key resources may be accessed once you log in to **Westlaw**, and search for them by title:

- Annual Review of Irish Law
- Bar Review
- Commercial Law Practitioner
- Conveyancing and Property Law Journal

This study used the case law search facility for Irish case law to develop the dataset in section 9.4

https://login.westlaw.ie/maf/wlie/api/tocectory?sttype=stdtemplate&stnew=true

9.2 BAILII.ORG

https://www.bailii.org/bailii/

As per their website:
"The British and Irish Legal Information Institute (BAILII) provides access to the most comprehensive set of British and Irish primary legal materials that are available for free and in one place on the internet. In August 2019, BAILII included 102 databases covering 10 jurisdictions The system contains around 169 gigabytes of legal materials and around 1,001,463 searchable documents.

BAILII is legally constituted in the UK as a company limited by guarantee (No 4131252) and as a charitable trust (registered charity no 1084803) and has been supported by a number of major donors and is assisted by many other organisations and individuals. BAILII is hosted in the UK and Ireland by the Institute of Advanced Legal Studies, London and the Law Faculty, University College Cork.

The databases on BAILII are derived from a number of sources. Some of the data comes from existing free to air sites. Most of the databases are based on published and unpublished CD-ROMs or rely upon direct and indirect feeds by relevant courts, government departments and other organisations. All of the data have been converted into a consistent format and a generalised set of search and hypertext facilities have been added. Further details as to where databases come from are provided on the database home pages."

This study used the Multidatabase search facility for Irish case law to develop the dataset in section 9.4

https://www.bailii.org/form/search_multidatabase.html

9.3 JUSTIS.VLEX.COM

vLex is a global legal intelligence platform that provides legal professionals with access to the most extensive collection of legal and regulatory information in the world, all on one award-winning and unique platform. vLex develops cutting-edge technology, including artificial intelligence and data analytics, to help millions of users access the most relevant and accurate information.

Authoritative primary and secondary materials
Access the Justis Irish Cases, the Judgments in the Law Library, the Irish Reports and Digests, the Irish Tax cases, both reported and unreported cases, statutes, and statutory instruments, all on one platform.

- Justis Irish Cases (JIC)
- Judgments in the Law Library (JILL)
- Legislation
- Case Law
- Administrative Materials
- Books
- Journals
- Dockets
- Blogs
- News

This study used the case law search facility for Irish case law to develop the dataset in section 9.4

https://app.vlex.com

9.4 IRISH CASE LAW SEARCH TERMS AND RESULTS

The three databases were searched for the same terms outlined in the FBI datasets in order to attempt to derive some legal case data for these. These online resources are limited to case law, and do not record criminal law outcomes.

Crime Type (Search Term	Total Hits	Total Cyber crime related hits	Westlaw.ie	Justis Vlex	Baillii.org	notes
Extortion	133	1	52	39	42	1 duplicated across all three databases - DORIAN SZAMOTA - for crimes relating to malware, botnet and DDOS

						deployment - for extradition to poland
Personal Data Breach	19		5	7	7	
Phishing/Vishing/Smishing/Pharming	3		1	1	1	
BEC/EAC "business email compromise" "email account compromise"	0		0	0	0	
Confidence Fraud/Romance	0		0	0	0	
Harassment/Threats of Violence	0					
Advanced Fee /"Advanced Fee"	9		3	2	4	
Identity Theft	22		8	9	5	
Spoofing	0		0	0	0	
Credit Card Fraud	2		1	1	0	
Government Impersonation	0		0	0	0	
Hacktivist	0		0	0	0	
SIM Swap	3		1	1	1	
Botnet	3		1	1	1	
	194	1	72	61	61	

10 CSO Data Tables

10.1 CJA07 - Recorded crime incidents by Garda Station, Type of Offence, Year.

Last Updated: 26/06/2024 11:00:00
https://data.cso.ie/table/CJA07

Offences Listed - none with specific cybercrime references

#	Type of Offence
1	Attempts/threats to murder, assaults, harassments and related offences

2	Dangerous or negligent acts
3	Kidnapping and related offences
4	Robbery, extortion and hijacking offences
5	Burglary and related offences
6	Theft and related offences
7	Fraud, deception and related offences
8	Controlled drug offences
9	Weapons and Explosives Offences
10	Damage to property and to the environment
11	Public order and other social code offences
12	Offences against government, justice procedures and organisation of crime

10.2 CJQ06 - Recorded crime incidents by Garda Division, Type of Offence, Years and Quarter Years.

Last Updated: 26/06/2024 11:00:00
https://data.cso.ie/table/CJQ06

71 Offences Listed - none with specific cybercrime references

#	Type of Offence
1	Homicide offences
2	Murder
3	Manslaughter
4	Infanticide
5	Dangerous driving leading to death
6	Sexual offences
7	Rape and sexual assault
8	Other sexual offences
9	Attempts/threats to murder, assaults, harassments and related offences
10	Murder-attempt
11	Threat to kill or cause serious harm
12	Harassment and related offences
13	Assault causing harm, poisoning
14	Other assault
15	Dangerous or negligent acts
16	Dangerous driving causing serious bodily harm
17	Driving/in charge of a vehicle while over legal alcohol limit
18	Driving/in charge of a vehicle under the influence of drugs
19	Endangerment with potential for serious harm/death
20	Abandoning a child, child neglect and cruelty
21	Unseaworthy/dangerous use of boat or ship
22	False alarm/interference with aircraft or air transport facilities
23	Endangering traffic offences
24	Kidnapping and related offences

25	False imprisonment
26	Abduction of person under 16 years of age
27	Human trafficking offences
28	Robbery, extortion and hijacking offences
29	Robbery of an establishment or institution
30	Robbery of cash or goods in transit
31	Robbery from the person
32	Blackmail or extortion
33	Carjacking, hijacking/unlawful seizure of aircraft/vessel
34	Burglary and related offences
35	Aggravated burglary
36	Burglary (not aggravated)
37	Possession of an article (with intent to burgle, steal, demand)
38	Theft and related offences
39	Theft/taking of vehicle and related offences
40	Theft from person
41	Theft from shop
42	Other thefts, handling stolen property
43	Fraud, deception and related offences
44	Controlled drug offences
45	Importation of drugs
46	Cultivation or manufacture of drugs
47	Possession of drugs for sale or supply
48	Possession of drugs for personal use
49	Other drug offences
50	Weapons and Explosives Offences
51	Explosives, chemical weapons offences
52	Discharging a firearm
53	Possession of a firearm
54	Offensive weapons offences (n.e.c.)
55	Fireworks offences
56	Damage to property and to the environment
57	Arson
58	Criminal damage (not arson)
59	Litter offences
60	Public order and other social code offences
61	Disorderly conduct
62	Trespass offences
63	Liquor licensing offences
64	Prostitution offences
65	Regulated betting/money, collection/trading offences
66	Social code offences (n.e.c.)
67	Offences against government, justice procedures and organisation of crime
68	Offences against government and its agents
69	Organisation of crime and conspiracy to commit crime

70	Perverting the course of justice
71	Offences while in custody, breach of court orders

11 Communications with GNCCB

Communications Summary

I first met the GNCCB representative at a meeting of Cyber Ireland in June. We briefly discussed my research and he asked to follow up with an email exchange. This happened from late July to the 8th of August and consisted of queries I had around operational procedures and tools. There was a second phone call on Wednesday the 31st of July 2024, which discussed some general operating methods of the GNCCB.

12 Communications with CSO

Communications Summary
An email exchange was started on June 7th 2024 by contacting Crime@cso.ie.

The exchange consisted of an information request for CSO Data relating to cybercrime (see section 16 below) and clarifications around AGS annual reporting authors and data contained therein.

13 Communications with Garda Research Unit (GRU)and Press Office

Communications Summary
A phone call was made to An Garda Síochána Press Office on the 22nd of July 2024. On the back of the advice received therein, I emailed the details of my request as per below to the Garda Press Office and they were kind enough to advise me on how to contact the Garda Research Unit directly. I received response from them on Saturday the 10th of August 2024 as clarifying that they do not assemble the AGS annual reporting data and were not able to clarify queries relating to that data. They went on to advise I should contact the CSO in relation to the annual AGS reporting.

14 U.S. FBI Data Set by Volume of Incidents from 2018-2023

This is a sample of the dataset collated from the FBI annual reports to reflect the volume of cyber incidents/complaints reported to the FBI:

Filename: FBI-DataSet-2.csv

Year	Non-Payment/Non-Delivery	Extortion	Personal Data Breach	Phishing/Vishing/Smishing/Pharming	BEC/EAC
2018	65,116	51,146	50,642	26,379	20,373
2019	61,832	43101	38218	114702	23775
2020	108,869	76741	45330	241342	19369
2021	82,478	39360	51829	323972	19954

2022	51,679	39416	58859	300497	21832
2023	50,523	48223	55851	298878	21489

15 U.S. FBI Data Set by Cost of Incidents from 2018-2023

This is a sample of the dataset collated from the FBI annual reports to reflect the estimated cost of cyber incidents/complaints reported to the FBI:

Filename: FBI-DataSet-CyberCosts-2.csv

Year	BEC/EAC	Confidence Fraud/Romance	Investment	Non-Payment/Non-Delivery	Personal Data Breach
2018	1297803489	362500761	252955320	183826809	148892403
2019	1718361273	475014497	401873986	205879765	189374587
2020	1828060985	600249392	575847391	216897645	204194862
2021	2420847533	956355802	1036249538	329583741	284632147
2022	2368620465	987603827	1187450936	396158027	317495826
2023	2456321928	1034759382	1253482763	420184932	330592173

16 CSO Dataset for cybercrime (Cybersecurity Act 2017) 2018-2023

This is the entire dataset generated by the CSO for all cybercrime offences logged in the PULSE system for the years 2018 to 2023.

Filename: FBI-DataSet-CyberCosts-2.csv

Recorded Crime incidents of Cyber related crime incidents 2018-2023						
Incident type	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Accessing information systems without lawful authority	23	63	53	71	63	38
Intercepting data transmissions without authority	1	4	2	1	2	3
Interference with data without authority	6	10	5	15	15	22
Interference with information systems without authority	1	9	5	19	17	12

17 An Garda Síochána (AGS) Garda National Cyber Crime Bureau (GNCCB) Dataset for cybercrime investigations 2018-2023

This the entire dataset collated from the AGS GNCCB annual reports to reflect the cyber incident investigations conducted by the GNCCB:

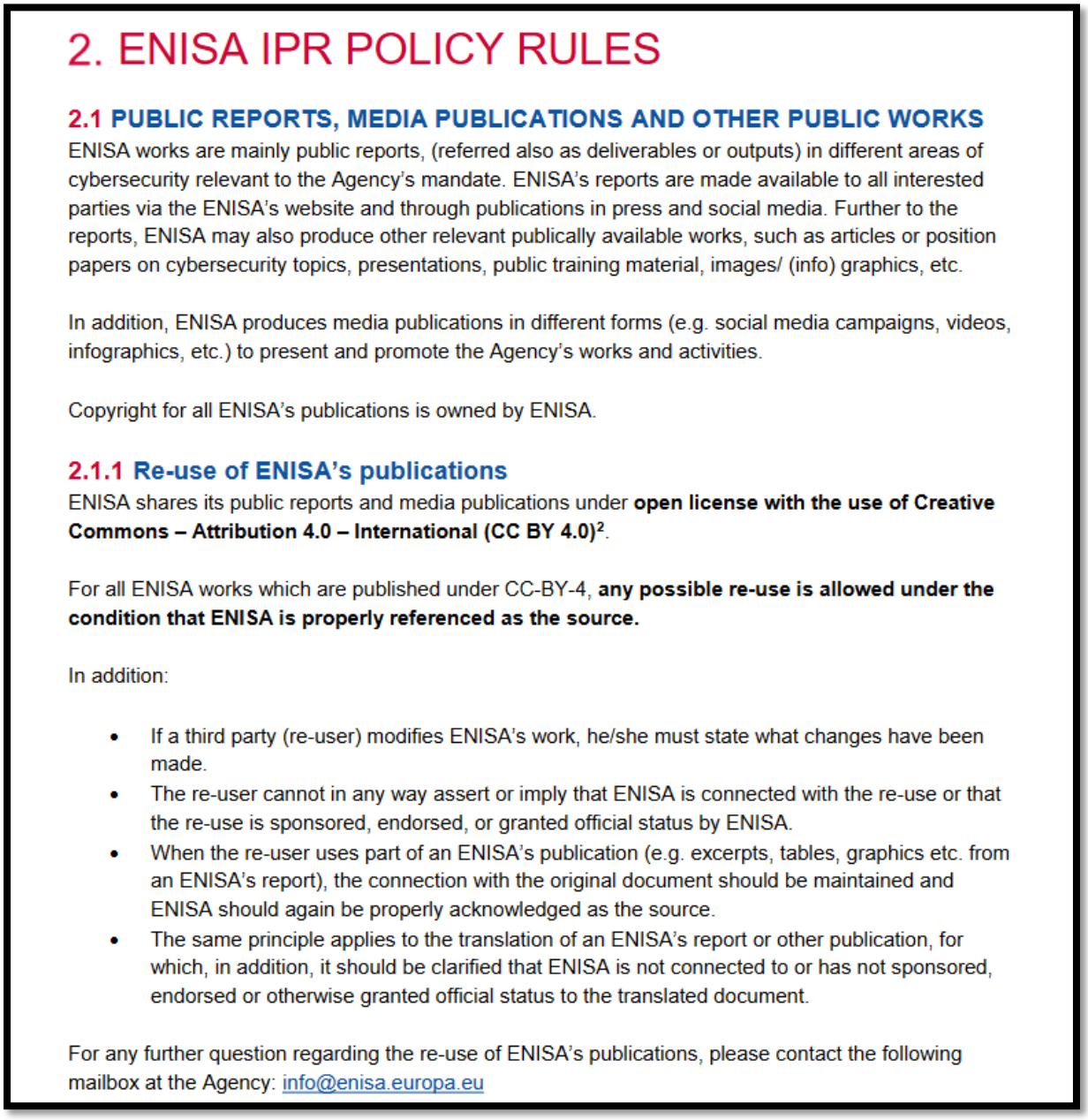
Year	New Cases	Closed Cases
2018	493	465
2019	529	405
2020	400	333
2021	490	431
2022	488	692

18 ENISA Data and Licensing

This study referenced and attributed correctly any data used from ENISA as per below.

From the ENISA Intellectual Property Rights Policy available here:

https://www.enisa.europa.eu/about-enisa/legal-notice/enisa-ipr-policy-public-version



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