



The Use of Random Sampling in Investigations Involving Child Abuse Material

By

Michael Wilkinson, Brian Jones and Syd Pleno

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The Use of Random Sampling in Investigations Involving Child Abuse Material

Michael Wilkinson – Champlain College

Brian Jones – NSW Police Force

Syd Pleno – Australian Federal Police

Overview

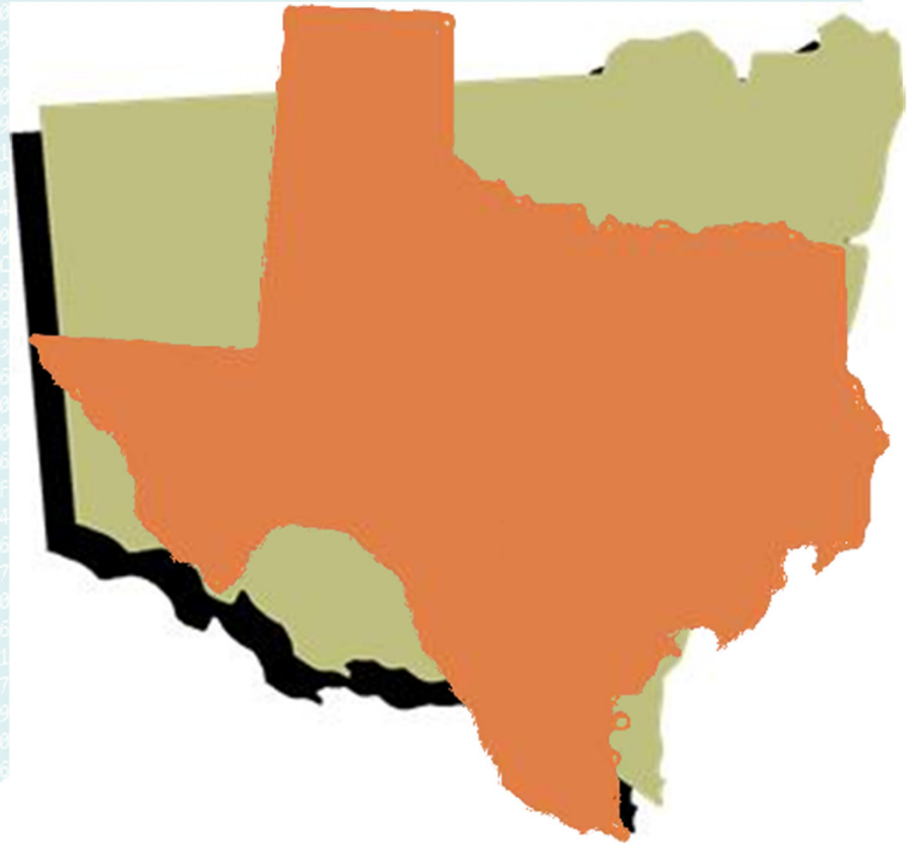
- Putting things in context
 - NSW Police Force
 - Relevant NSW & Australian Laws
- Sampling & Statistics
- Implementation
- Benefits

Australian LE Agencies



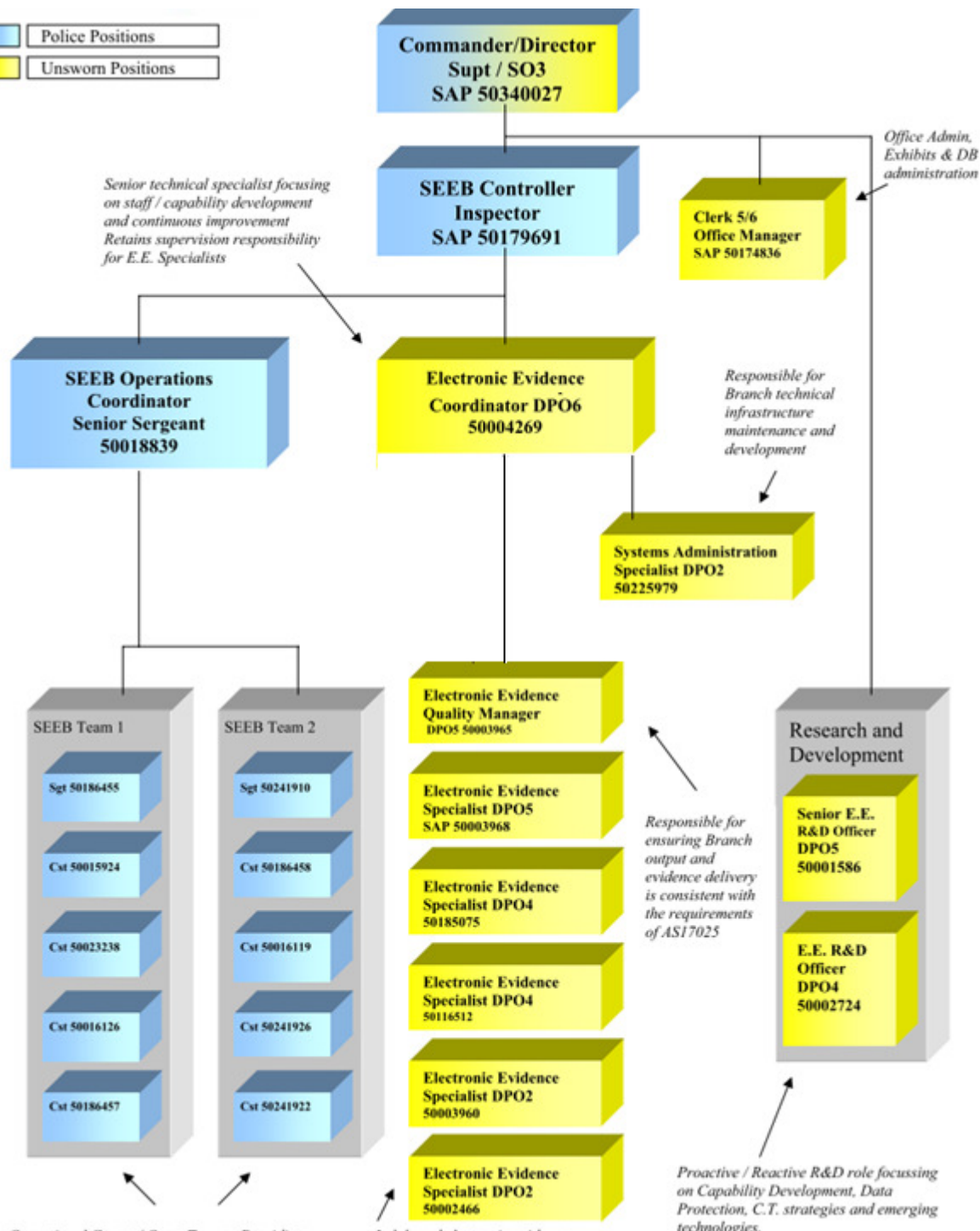
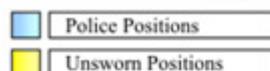
About NSW

- Pop: 6.5 million
- Area: 309,432mi²
(area of Texas:
268,600mi²)
- Police Force:
~20,000 (~17,000
sworn)



State Electronic Evidence Branch (SEEB)

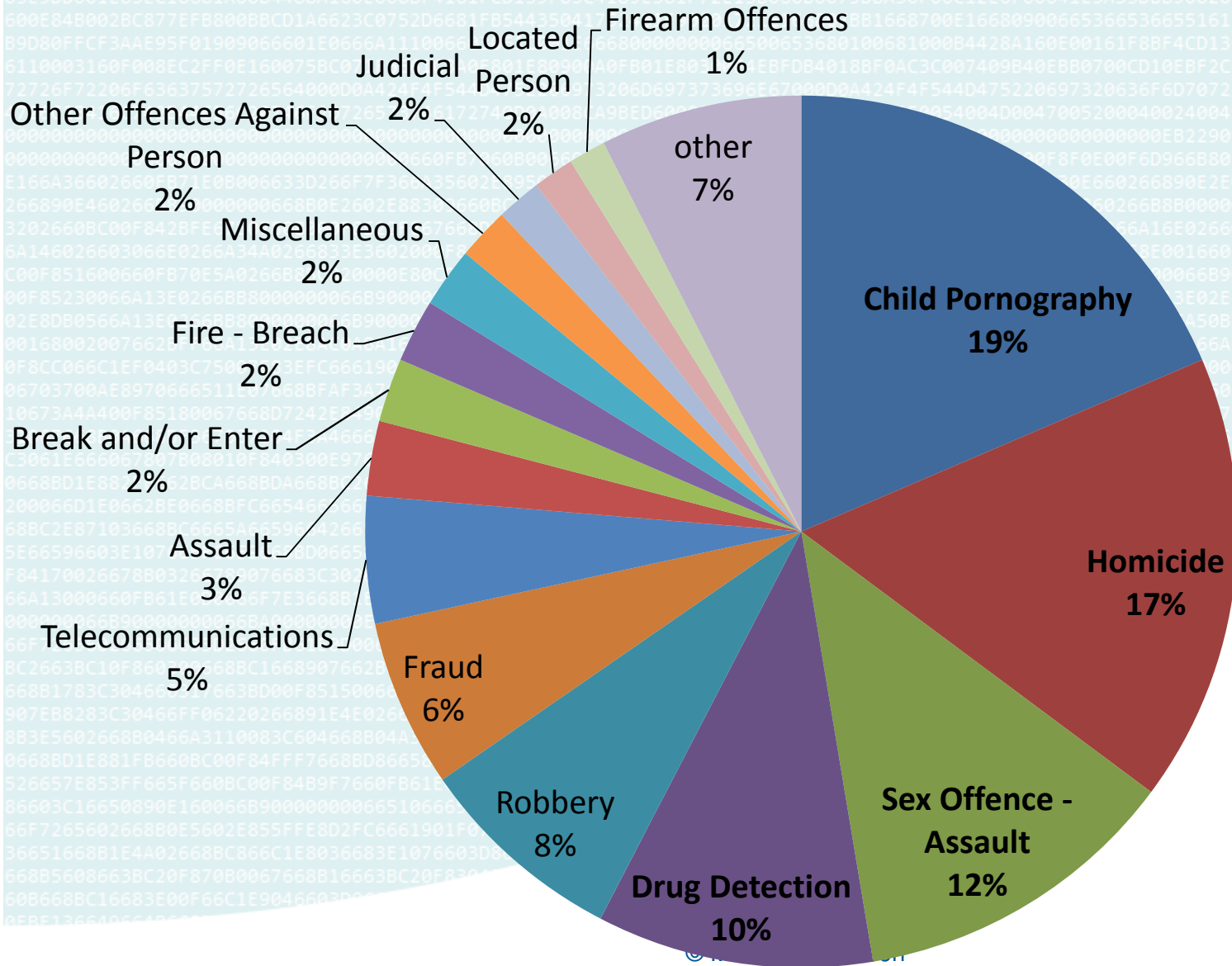
- Created in 2003
- Funded in response to terrorism threat presented by 9/11 & Bali bombings
- Provide a response to “serious major crime”
- NSW Police also have:
 - Computer Crime Unit
 - Internet Child Protection Unit



SEEB Capabilities

- Computers (duh)
- Mobile phones
- GPS
- CCTV
- Embedded devices (ECM etc)
- Hardware level recovery
- Covert activities

SEEB Business July 2010 – July 2011



Child Pornography – investigation issues

- Data volumes
- High plea rate (~80%)
- ‘Criminality’ concepts – material quantity and severity.
- Investigation risks,
 - OH&S
 - child at risk
 - prosecution time frames.



Australian Offences relating to CAM

- Federal
 - Telecommunications
 - Travel
 - Access overseas
- NSW
 - Possession
 - Disseminate
 - Produce

Definitions - Federal

- (a) material that **depicts** a person, or a representation of a person, who:
- (i) is, or **appears** to be, under **18** years of age;
- (b) material that **describes** a person who:
- (i) is, or is **implied** to be, under **18** years of age;

Definitions – NSW State

"child" means a person who is under the age of **16** years.

"child abuse material" means material that depicts or describes, in a way that **reasonable** persons would regard as being, in all the circumstances, offensive:

- (a) a person who is, **appears** to be or is **implied** to be, a child as a victim of torture, cruelty or physical abuse, or
- (b) a person who is, **appears** to be or is **implied** to be, a child engaged in or apparently engaged in a sexual pose or sexual activity (whether or not in the presence of other persons),

Guilty

1 Picture

or

1 Movie

or

1 Story

Sentence

Determined by:

- Severity
- Quantity

Severity – CETS scale

Category	Description	Guide
1	No Sexual Activity	Depictions of Children with No Sexual Activity - Nudity, surreptitious images showing underwear nakedness, sexually suggestive posing, explicit emphasis on genital areas, solo urination
2	Child Non-Penetrative	Non-Penetrative Sexual Activity Between Children or Solo Masturbation By A Child
3	Adult Non-Penetrative	Non-Penetrative Sexual Activity between Child(ren) and Adult(s). Mutual masturbation and other non-penetrative sexual activity
4	Child/Adult Penetrative	Penetrative Sexual Activity Between Child(ren) or between Child(ren) and Adult(s) - Including, but not limited to, intercourse, cunnilingus and fellatio.
5	Sadism/Bestiality/ Child Abuse	Sadism, Bestiality or Humiliation (urination, defecation, vomit, bondage etc.) or Child Abuse as per CCA 199
6	Animated or Virtual	Anime, cartoons, comics and drawings depicting children engaged in sexual poses or activity.

Quantity

- 500,000+ porn collections common
- Movies take time to watch
- Each offending file must be categorised!
- Health risk to SEEB staff
- SEEB staff != reasonable people
 - Due to over exposure

Solution = Take Sample



Challenges

- Must be representative
- Must be reliable
- Must be able to convince NSW Police officers
- Must be able to convince the court....

Unbiased Sample

- Assign random numbers to each picture & movie
- Sort by random number
- Select x files where x gives 99% confidence that sample is representative

What about error?

- Influenced by % of CAM files found
- Tested 3 formulas
 - Adjusted Wald
 - Jefferys
 - Wilson

Testing Objective

- Does sampling work?
- Which error rate is most accurate?

Testing

- Picture populations between 5,488 and 520,610.
- The recommended sample or a selection of 300 (whichever comes first)
- Actual picture of interest counts between 3 and 47,000.
- Actual percentage of pictures of interest compared to population between 0.0057% and 50%

Test results

- It worked!
- Adjusted Wald gave best results

Implementation

- View files in random order
- As files selected display confidence & error rates
- When Confidence level & error rate acceptable generate report
- Implemented with enscript®

Discovery Process

Exhibit
“booted” into a
controlled
environment to
facilitate
forensic
interrogation
by room
supervisor

All valid
allocated
images,
movies and
documents are:

- Identified through signature analysis
- Counted,
- Randomised

Registry files
exported
automatically
and a
system/registry
report created
for SEEB.

A statistically
representative
sample is
isolated for
examination.

Sample is then
examined by
case officer for
prohibited
material
against the
CETS scale.

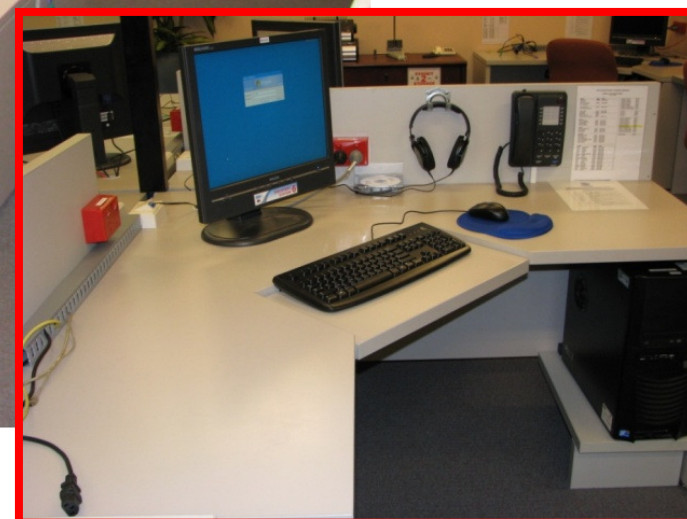
Report and
statement
generated and
printed at
conclusion of
examination.

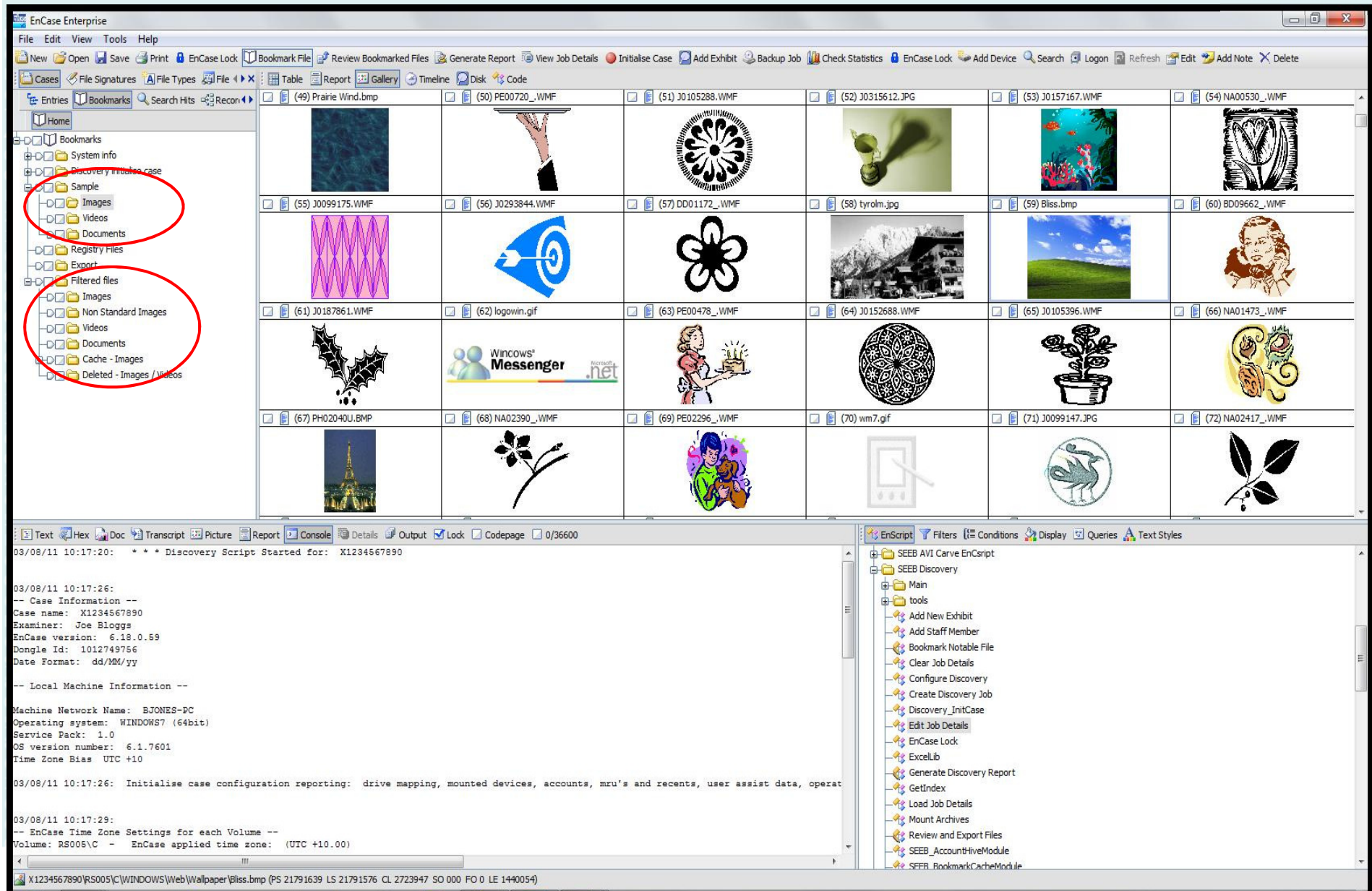
The report
given to the
investigator
contains:

- Basic job, device, OS and user account information.
- Selected files with file information.
- Statistical analysis for each file type.

NO IMAGING!

Discovery room





SEEB Job : Enter New Exhibit Details

Please enter the details of the exhibit below

Client Exhibit Reference (e.g. D12345)

Item Number

X1234567890 /

Client Exhibit Location (e.g. Surry Hills Police Station)

SEEB Exhibit Reference (OPTIONAL)

☐ Exhibit contains other items.

Description of Exhibit.

Exhibit model number

Exhibit serial number

< Back

Next >

Cancel

Bookmark Picture file to Discovery Report

Filename	Located In Folder
Bliss.bmp	X:\234567890\RS005\C\WINDOWS\Web\Wallpaper

Quick CETS categorisation buttons


Category 1	Depictions of children with no sexual activity - Nudity, surreptitious images showing underwear/nakedness, sexually suggestive posing, explicit emphasis on genital areas, solo urination.
Category 2	Non-penetrative sexual activity between children or solo masturbation by a child - Explicit sexual activity not involving an adult.
Category 3	Non-penetrative sexual activity between child(ren) and adult(s) - Mutual masturbation and other non-penetrative sexual activity.
Category 4	Penetrative sexual activity involving child(ren) or both child(ren) and adult(s) - Including, but not limited to, intercourse, cunnilingus and fellatio.
Category 5	Sadism or bestiality - Sexual imagery involving pain, humiliation or animals.
Category 6	ANIMATED or Virtual depicting CETS scales 1-5 - Anime, cartoons, comics, CGI and drawings depicting any of the CETS scales (1-5)

*** When finished viewing images, record the INDEX NUMBER of the LAST file viewed ***

☐ Bookmark multiple selected files as the SAME CETS scale.

Not Child Exploitation. Bookmark to other files of interest.

Image Preview



Statistics Information - ** must view at least the recommended sample unless 300 files selected

RECOMMENDED SAMPLE	VIEWED	SELECTED
1796	59	1
ESTIMATE	RELIABILITY	RELATIVE STANDARD ERROR
1 - 126	UNRELIABLE ESTIMATE	25.21%

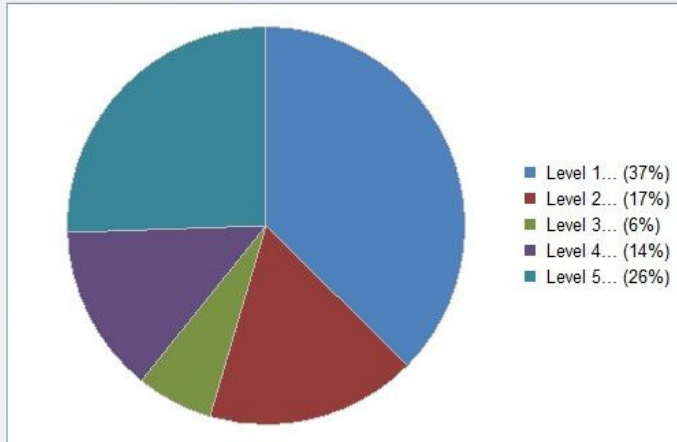
A lower Relative Standard Error indicates a more reliable estimate

OK

Cancel

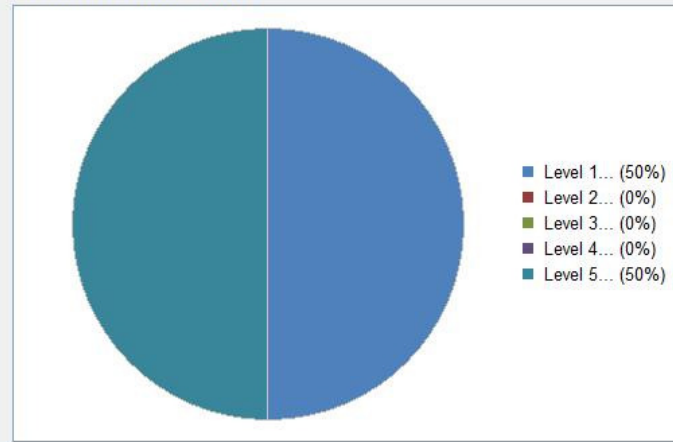
Review and Export files of interest

Picture files of interest selected: 227



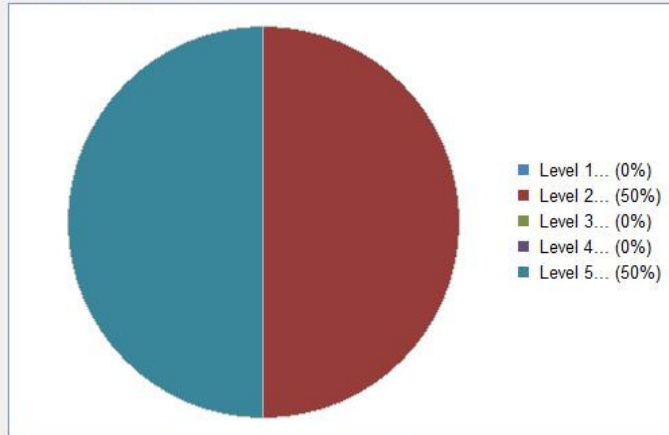
Review pictures

Multimedia files of interest selected: 2



Review multimedia files

Documents of interest selected: 2



Review document files

Other files of interest selected: 4



Review other files

If you have finished your examination of files on this exhibit click the Next button

< Back

Next >

Cancel



COMPLAIN

tools ab

Page 1 of 21

View Options X Close



State Electronic Evidence Branch
Special Services Group
New South Wales Police Force

Electronic Evidence Discovery Report SEEB Task Number E01/0001

Investigator Name	Detective Senior Constable John Smith
Accused Name	John DOE
Accused Date of Birth	12 March 1980

WARNING: This report contains offensive material.
Disclosure is subject to the Sensitive Evidence Provisions under
Chapter 6, Part 2A of the Criminal Procedure Act 1986

2 Exhibit Item X1234567890

2.1 Description

Exhibit Reference	X1234567890
Exhibit Location	Surry Hills
SEEB Exhibit Reference	
Exhibit Description	A silver HP EliteBook laptop computer
Date/Time of examination	03/08/11 10:13:49

2.2 Device Summary

2.2.1 RS005

Name	RS005
Model	
Serial Number	884025581685
Drive Type	DRIVEFIXED
Total Size	19.1GB

2.2.1.1 C

Volume Label	C
Volume Name	
File System	NTFS
Total Capacity	20538490880, 19.1GB
Unused Space	14GB

2.3 Operating System No 1

Operating System Name:	Microsoft Windows XP Service Pack 3
Path:	RS005/C
Time Zone Information:	(GMT+10:00) Canberra, Melbourne, Sydney
Registered Owner:	John Smith
Registered Organisation:	John Smith
Installed Date:	08/04/09 11:19:38


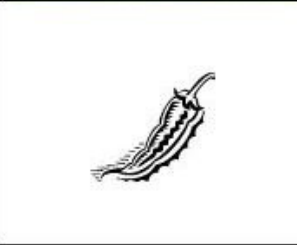


2.3.1 User Account 1

Account Name:	Administrator
User Name:	
Last Logon:	21/05/09 09:34:00
Number of Logons:	8
Password present:	Yes
Screensaver Password:	disabled

2.3.2 User Account 2

Account Name:	Guest
User Name:	
Last Logon:	
Number of Logons:	0
Password present:	No
Screensaver Password:	disabled

2.4.2 CETS Level 1 Depictions of children with no sexual activity

	<p>File Index: 2</p> <p>File Name: Bliss.bmp</p> <p>File Path: X:\1234567890\RS005\C\WINDOWS\Web\Wallpaper\Bliss.bmp</p> <p>File Created: 08/04/09 11:14:26</p> <p>File Modified: 08/04/09 11:14:26</p> <p>MD5 Hash Value: 216D20DF62AF34D39089E066D1D4B3AF</p> <p>CETS Scale: 1</p>
	<p>File Index: 3</p> <p>File Name: FD00336.WMF</p> <p>File Path: X:\1234567890\RS005\C\Program Files\Microsoft Office\CLIPART\PUB60\COR\FD00336.WMF</p> <p>File Created: 09/03/98 18:57:04</p> <p>File Modified: 09/03/98 18:57:04</p> <p>MD5 Hash Value: BBF4FC8018EF952896B561358561A0C0</p> <p>CETS Scale: 1</p>
	<p>File Index: 4</p> <p>File Name: J0099167.JPG</p> <p>File Path: X:\1234567890\RS005\C\Program Files\Microsoft Office\CLIPART\PUB60\COR\J0099167.JPG</p> <p>File Created: 06/02/98 02:00:00</p> <p>File Modified: 06/02/98 02:00:00</p> <p>MD5 Hash Value: 8C462AFB795E218F3CD5984E04FE2F04</p> <p>CETS Scale: 1</p>
	<p>File Index: 5</p> <p>File Name: J0239079.WMF</p> <p>File Path: X:\1234567890\RS005\C\Program Files\Microsoft Office\CLIPART\PUB60\COR\J0239079.WMF</p> <p>File Created: 30/07/02 17:38:30</p> <p>File Modified: 30/07/02 17:38:30</p> <p>MD5 Hash Value: 0A2394D123EB2FB9AE251AD4CAD2BA1</p> <p>CETS Scale: 1</p>

Video Files with description



Electronic Evidence Discovery Report - SEEB Task Number E11/001
Prepared by Detective Senior Constable Joe Bjugge



2.5.2 CETS Level 1 - Depictions of children with no sexual activity

File Index:	14	Description:
File Name:	Sample.mov	A description of a video viewed by the case officer
File Path:	X:\1234567890\RS005\C\Program Files\QuickTime\Sample.mov	
File Created:	05/01/09 17:18:48	
File Modified:	05/01/09 17:18:48	
MD5 Hash Value:	0E242AB2D25193687BFFDF12813E6E67	
CETS Scale:	1	

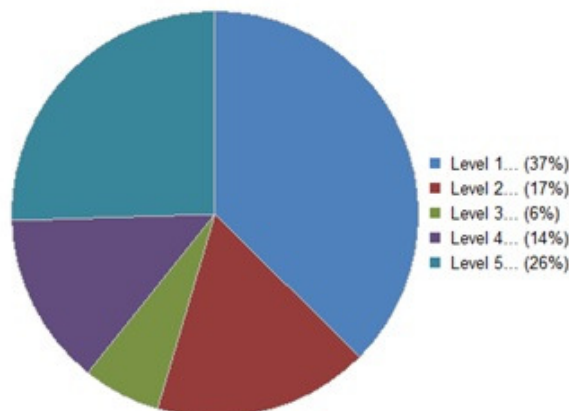
3 Statistical Analysis

The files of interest identified as child pornography in this report are the result of a randomised sampling of a filtered set of files found on each exhibit item.

The statistical breakdown of each exhibit item compares the number of files of interest for each CETS level with the total number of files examined for each file type.

3.1 Exhibit Item X1234567890

3.1.1 Picture files of interest



The percentage values in the above chart have been rounded to the nearest whole number. Refer to the following table for an accurate quantity value.

Description	Total
Valid Picture files on this exhibit	30789
Picture files in sample examined	7548
CETS Level 1 - Depictions of children with no sexual activity	85
CETS Level 2 - Non-penetrative sexual activity between children or solo masturbation by a child	39
CETS Level 3 - Non-penetrative sexual activity between child(ren) and adult(s)	14
CETS Level 4 - Penetrative sexual activity involving child(ren), or both child(ren) and adult(s)	31
CETS Level 5 - Sadism or bestiality	58
Picture files of interest selected from sample	227
Percentage of Picture files of interest in sample	3.01%
Estimated number of valid Picture files of interest on this exhibit	790 to 1061

Limitations

- Only suitable for estimating quantities
- Additional victims and offenders may not be identified

Results

- Backlog down from 3 months to 24 hours
- Reduced exposure of SEEB staff to CAM
- Favourable feedback from court
- Criminal Procedures Act amended to accept sampling in CAM cases

Questions?

Contact: Mike Wilkinson

wilkinson@champlain.edu

[@mikewilko](mailto:mikewilko@writeblocked.org)

www.writeblocked.org