Evidence Solutions, Inc.

And the

Ohio Judicial Conference

Present:

You Can do that?

September 13, 2018

Presented by:

Scott Greene, SCFE, CEO

Evidence Solutions, Inc.

A Digital Forensics Firm

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Cell Phone Forensics Expert Ohio

Computer Forensics Expert OH

You Can Do That?

2018 Ohio Judicial Conference

Faculty:

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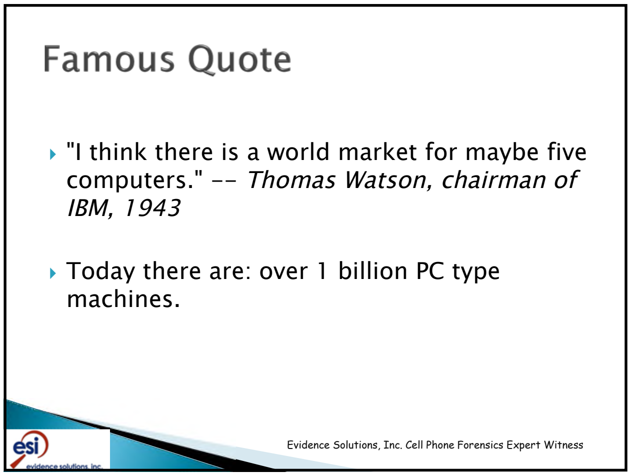
Evidence Solutions, Inc. Computer Forensics Expert Witness



Famous Quote

- "I think there is a world market for maybe five computers." -- *Thomas Watson, chairman of IBM, 1943*
- Today there are: over 1 billion PC type machines.

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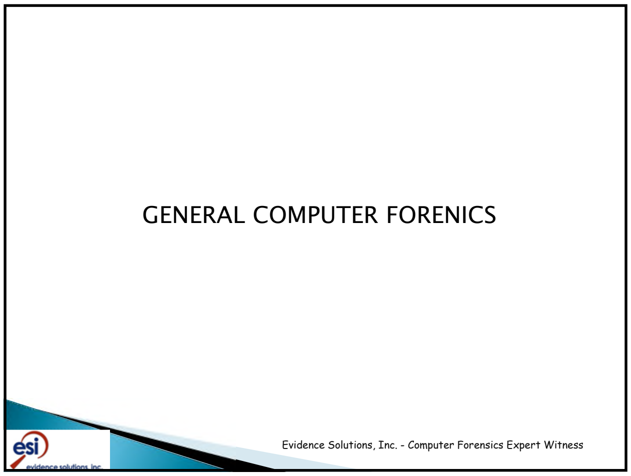

GENERAL COMPUTER FORENICS

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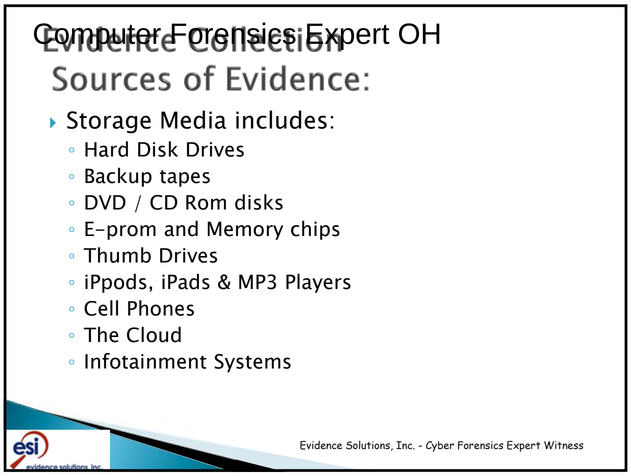

Evidence Collection
Sources of Evidence:

- Storage Media includes:
  - Hard Disk Drives
  - Backup tapes
  - DVD / CD Rom disks
  - E-prom and Memory chips
  - Thumb Drives
  - iPpods, iPads & MP3 Players
  - Cell Phones
  - The Cloud
  - Infotainment Systems

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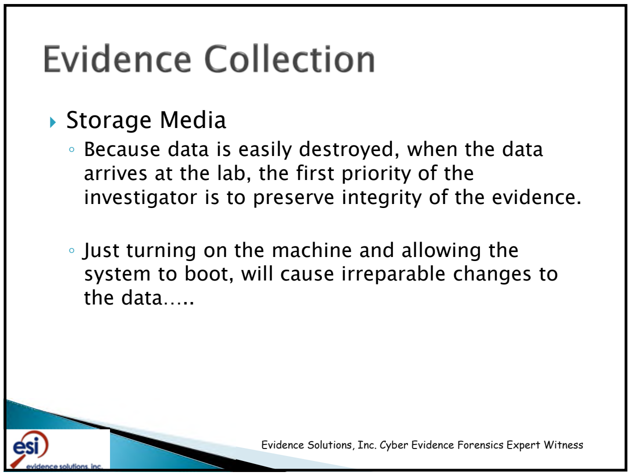

Evidence Collection

- Storage Media
  - Because data is easily destroyed, when the data arrives at the lab, the first priority of the investigator is to preserve integrity of the evidence.
  - Just turning on the machine and allowing the system to boot, will cause irreparable changes to the data…..

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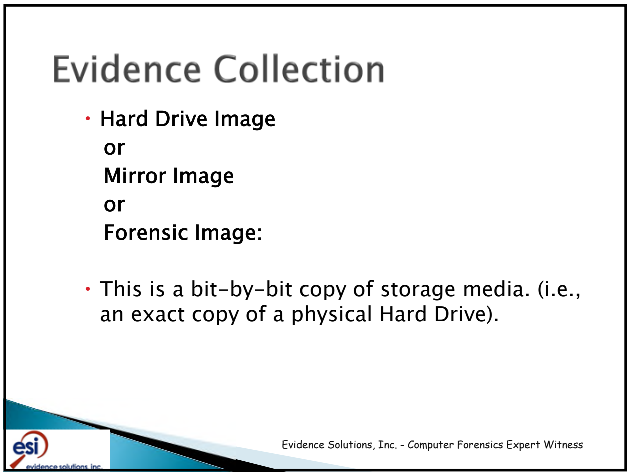

Evidence Collection

- Hard Drive Image
  or
  Mirror Image
  or
  Forensic Image:
- This is a bit-by-bit copy of storage media. (i.e., an exact copy of a physical Hard Drive).

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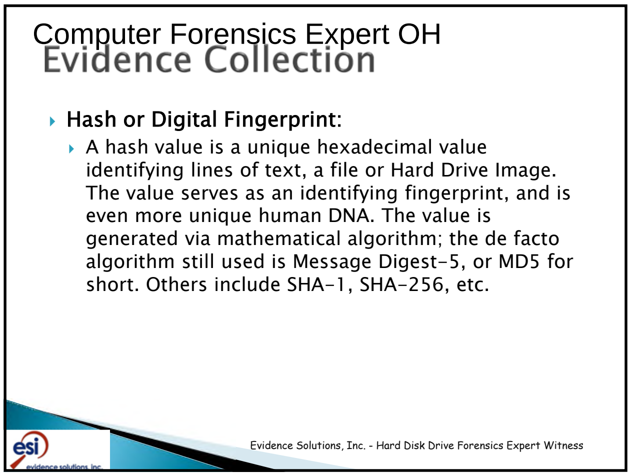

Evidence Collection

- **Hash or Digital Fingerprint:**
  - A hash value is a unique hexadecimal value identifying lines of text, a file or Hard Drive Image. The value serves as an identifying fingerprint, and is even more unique human DNA. The value is generated via mathematical algorithm; the de facto algorithm still used is Message Digest-5, or MD5 for short. Others include SHA-1, SHA-256, etc.

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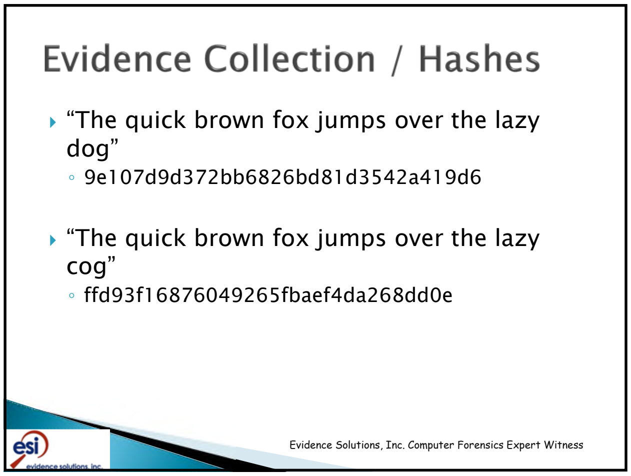

Evidence Collection / Hashes

- “The quick brown fox jumps over the lazy dog”
  - 9e107d9d372bb6826bd81d3542a419d6
- “The quick brown fox jumps over the lazy cog”
  - ffd93f16876049265fbaef4da268dd0e

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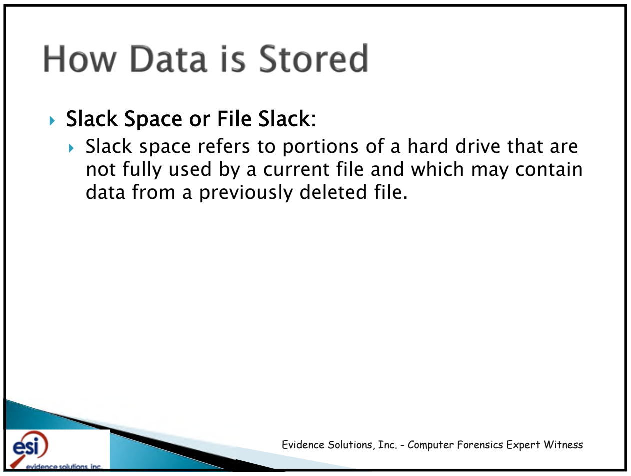

How Data is Stored

- **Slack Space or File Slack:**
  - Slack space refers to portions of a hard drive that are not fully used by a current file and which may contain data from a previously deleted file.

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How Data is Stored

- **Free Space or Unallocated Space:**
  - The area of a data storage device that is available for more data storage. Unallocated space is where deleted but recoverable data may be found

File Dates

- **Date Created:**
  - The date and time that this file was created on this machine, this would include the date downloaded from the Internet.
- **Date Modified:**
  - The date and the time the file was last modified. This may also include downloading from the Internet. This date normally follows the file around and doesn't change unless the file changes.
- **Date Accessed:**
  - This is the last date that the file was accessed for reading by the machine or user.

INFOTAINMENT SYSTEMS

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Infotainment Systems

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Infotainment Systems

- BMW
- Buick
- Cadillac
- Chevrolet
- Chrysler
- Dodge
- FIAT
- Ford
- GMC
- HUMMER
- Jeep
- Lincoln
- Maserati
- Mercury
- Pontiac
- Ram
- Saturn
- SEAT
- Skoda
- SRT
- Toyota
- Volkswagen

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Infotainment Systems

- **Vehicle/System Information**
  - Serial Number
  - Part Number
  - Original VIN Number
  - Build Number
- **Installed Application Data**
  - Weather
  - Traffic
  - Facebook
  - Twitter
- **Connected Devices**
  - Phones
  - Media Players
  - USB Drives
  - SD Cards
  - Wireless Access Points
- **Navigation Data**
  - Tracklogs and Trackpoints
  - Saved Locations
  - Previous Destinations
  - Active and Inactive Routes
- **Device Information**
  - Device IDs
  - Calls
  - Contacts
  - SMS
  - Audio
  - Video
  - Images
  - Access Point Information

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Infotainment Systems

- Events
  - Doors Opening/Closing
  - Lights On/Off
  - Bluetooth Connections
  - Wi-Fi Connections
  - USB Connections
  - System Reboots
  - GPS Time Syncs
  - Odometer Readings
  - Gear Indications

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CELL PHONES

- Cell Phones & Tablets
  - Text messages
  - Photos?
    - GeoTagging
  - Calendars
  - Phone Books
  - Call Logs
  - Complete information about where the phone has been….

- Digital Evidence: Cell Phone Forensics

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- Cell Phones & Tablets
  - Browsing History
  - Documents
  - Email accounts
  - Online data storage accounts

- Digital Evidence: Cell Phone Forensics

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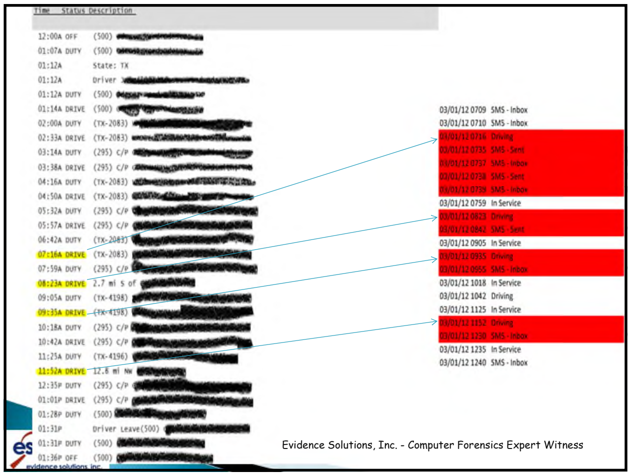

```
Time   Status Description
12:00A OFF   (500) [redacted]
01:07A DUTY  (500) [redacted]
01:12A       State: TX
01:12A       Driver [redacted]
01:12A DUTY  (500) [redacted]
01:14A DRIVE (500) [redacted]
02:00A DUTY  (TX-2083) [redacted]
02:33A DRIVE (TX-2083) [redacted]
03:14A DUTY  (295) C/P [redacted]
03:38A DRIVE (295) C/P [redacted]
04:16A DUTY  (TX-2083) [redacted]
04:50A DRIVE (TX-2083) [redacted]
05:32A DUTY  (295) C/P [redacted]
05:57A DRIVE (295) C/P [redacted]
06:42A DUTY  (TX-2083) [redacted]
07:16A DRIVE (TX-2083) [redacted]
07:59A DUTY  (295) C/P [redacted]
08:23A DRIVE 2.7 mi S of [redacted]
09:05A DUTY  (TX-4198) [redacted]
09:35A DRIVE (TX-4198) [redacted]
10:18A DUTY  (295) C/P [redacted]
10:42A DRIVE (295) C/P [redacted]
11:25A DUTY  (TX-4196) [redacted]
11:52A DRIVE 12.8 mi NW [redacted]
12:35P DUTY  (295) C/P [redacted]
01:01P DRIVE (295) C/P [redacted]
01:28P DUTY  (500) [redacted]
01:31P       Driver Leave(500) [redacted]
01:31P DUTY  (500) [redacted]
01:36P OFF   (500) [redacted]
```

```
03/01/12 0709  SMS - Inbox
03/01/12 0710  SMS - Inbox
03/01/12 0716  Driving
03/01/12 0735  SMS - Sent
03/01/12 0737  SMS - Inbox
03/01/12 0738  SMS - Sent
03/01/12 0739  SMS - Inbox
03/01/12 0759  In Service
03/01/12 0823  Driving
03/01/12 0842  SMS - Sent
03/01/12 0905  In Service
03/01/12 0935  Driving
03/01/12 0955  SMS - Inbox
03/01/12 1018  In Service
03/01/12 1042  Driving
03/01/12 1125  In Service
03/01/12 1152  Driving
03/01/12 1230  SMS - Inbox
03/01/12 1235  In Service
03/01/12 1240  SMS - Inbox
```

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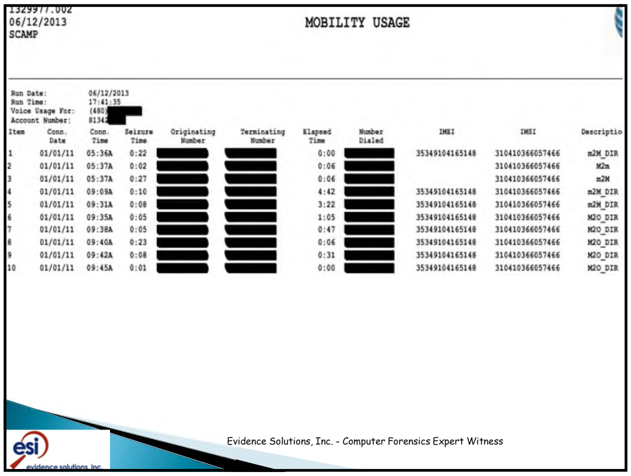

1329977.002
06/12/2013
SCAMP

MOBILITY USAGE

Run Date: 06/12/2013
Run Time: 17:41:35
Voice Usage For: (480)[redacted]
Account Number: 81342[redacted]

Item	Conn. Date	Conn. Time	Seizure Time	Originating Number	Terminating Number	Elapsed Time	Number Dialed	IMEI	IMSI	Descriptio
1	01/01/11	05:36A	0:22	[redacted]	[redacted]	0:00	[redacted]	35349104165148	310410366057466	m2M_DIR
2	01/01/11	05:37A	0:02	[redacted]	[redacted]	0:06	[redacted]		310410366057466	M2m
3	01/01/11	05:37A	0:27	[redacted]	[redacted]	0:06	[redacted]		310410366057466	m2M
4	01/01/11	09:09A	0:10	[redacted]	[redacted]	4:42	[redacted]	35349104165148	310410366057466	m2M_DIR
5	01/01/11	09:31A	0:08	[redacted]	[redacted]	3:22	[redacted]	35349104165148	310410366057466	m2M_DIR
6	01/01/11	09:35A	0:05	[redacted]	[redacted]	1:05	[redacted]	35349104165148	310410366057466	M2O_DIR
7	01/01/11	09:38A	0:05	[redacted]	[redacted]	0:47	[redacted]	35349104165148	310410366057466	M2O_DIR
8	01/01/11	09:40A	0:23	[redacted]	[redacted]	0:06	[redacted]	35349104165148	310410366057466	M2O_DIR
9	01/01/11	09:42A	0:08	[redacted]	[redacted]	0:31	[redacted]	35349104165148	310410366057466	M2O_DIR
10	01/01/11	09:45A	0:01	[redacted]	[redacted]	0:00	[redacted]	35349104165148	310410366057466	M2O_DIR

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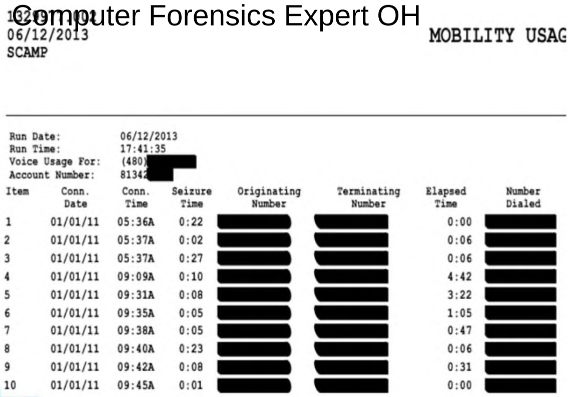

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06/12/2013
SCAMP

MOBILITY USAG

Run Date: 06/12/2013
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Voice Usage For: (480)[redacted]
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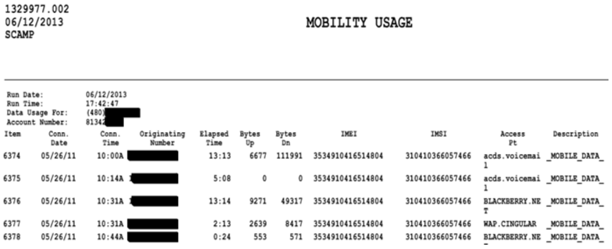
Item	Conn. Date	Conn. Time	Seizure Time	Originating Number	Terminating Number	Elapsed Time	Number Dialed
1	01/01/11	05:36A	0:22	[redacted]	[redacted]	0:00	[redacted]
2	01/01/11	05:37A	0:02	[redacted]	[redacted]	0:06	[redacted]
3	01/01/11	05:37A	0:27	[redacted]	[redacted]	0:06	[redacted]
4	01/01/11	09:09A	0:10	[redacted]	[redacted]	4:42	[redacted]
5	01/01/11	09:31A	0:08	[redacted]	[redacted]	3:22	[redacted]
6	01/01/11	09:35A	0:05	[redacted]	[redacted]	1:05	[redacted]
7	01/01/11	09:38A	0:05	[redacted]	[redacted]	0:47	[redacted]
8	01/01/11	09:40A	0:23	[redacted]	[redacted]	0:06	[redacted]
9	01/01/11	09:42A	0:08	[redacted]	[redacted]	0:31	[redacted]
10	01/01/11	09:45A	0:01	[redacted]	[redacted]	0:00	[redacted]

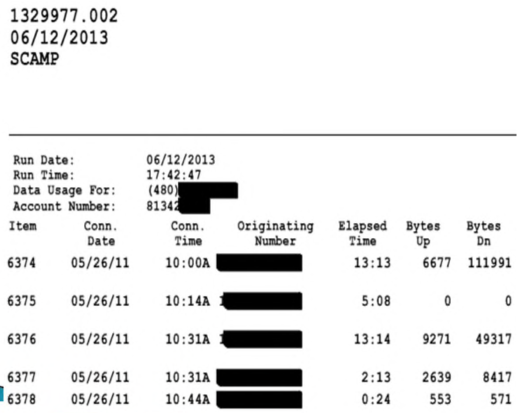


1329977.002
06/12/2013
SCAMP

MOBILITY USAGE

Run Date: 06/12/2013
Run Time: 17:42:47
Data Usage For: (480)[redacted]
Account Number: 81342[redacted]

Item	Conn. Date	Conn. Time	Originating Number	Elapsed Time	Bytes Up	Bytes Dn	IMEI	IMSI	Access Pt	Description
6374	05/26/11	10:00A	[redacted]	13:13	6677	111991	3534910416514804	310410366057466	acds.voicemail	_MOBILE_DATA_
6375	05/26/11	10:14A	[redacted]	5:08	0	0	3534910416514804	310410366057466	acds.voicemail	_MOBILE_DATA_
6376	05/26/11	10:31A	[redacted]	13:14	9271	49317	3534910416514804	310410366057466	BLACKBERRY.NET	_MOBILE_DATA_
6377	05/26/11	10:31A	[redacted]	2:13	2639	8417	3534910416514804	310410366057466	WAP.CINGULAR	_MOBILE_DATA_
6378	05/26/11	10:44A	[redacted]	0:24	553	571	3534910416514804	310410366057466	BLACKBERRY.NE	_MOBILE_DATA_



1329977.002
06/12/2013
SCAMP

Run Date: 06/12/2013
Run Time: 17:42:47
Data Usage For: (480)[redacted]
Account Number: 81342[redacted]

Item	Conn. Date	Conn. Time	Originating Number	Elapsed Time	Bytes Up	Bytes Dn
6374	05/26/11	10:00A	[redacted]	13:13	6677	111991
6375	05/26/11	10:14A	[redacted]	5:08	0	0
6376	05/26/11	10:31A	[redacted]	13:14	9271	49317
6377	05/26/11	10:31A	[redacted]	2:13	2639	8417
6378	05/26/11	10:44A	[redacted]	0:24	553	571

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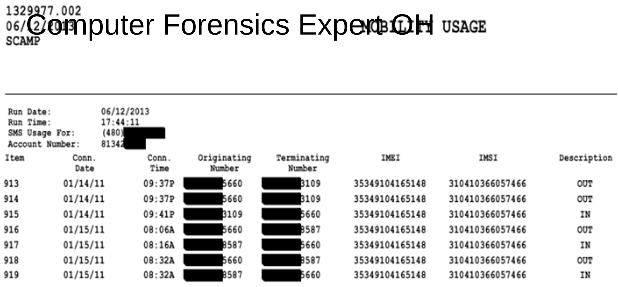


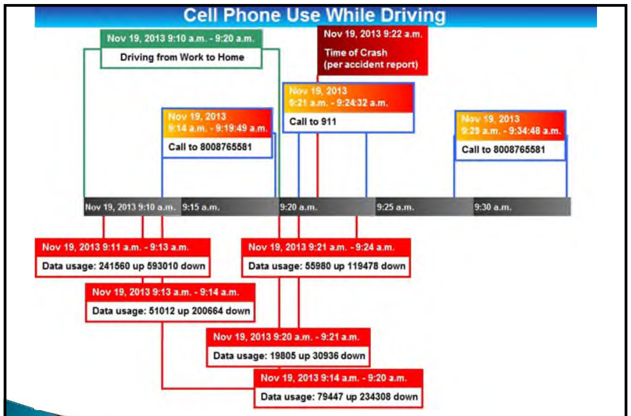
1329977.002
06/12/2013 MOBILITY USAGE
SCAMP

Run Date: 06/12/2013
Run Time: 17:44:11
SMS Usage For: (480)[redacted]
Account Number: 81342[redacted]

Item	Conn. Date	Conn. Time	Originating Number	Terminating Number	IMEI	IMSI	Description
913	01/14/11	09:37P	[redacted]5660	[redacted]3109	35349104165148	310410366057466	OUT
914	01/14/11	09:37P	[redacted]5660	[redacted]3109	35349104165148	310410366057466	OUT
915	01/14/11	09:41P	[redacted]3109	[redacted]5660	35349104165148	310410366057466	IN
916	01/15/11	08:06A	[redacted]5660	[redacted]8587	35349104165148	310410366057466	OUT
917	01/15/11	08:16A	[redacted]8587	[redacted]5660	35349104165148	310410366057466	IN
918	01/15/11	08:32A	[redacted]5660	[redacted]8587	35349104165148	310410366057466	OUT
919	01/15/11	08:32A	[redacted]8587	[redacted]5660	35349104165148	310410366057466	IN

Cell Phone Forensics Expert Ohio

Cell Phone Use While Driving



Nov 19, 2013 9:10 a.m. - 9:20 a.m.
Driving from Work to Home

Nov 19, 2013 9:22 a.m.
Time of Crash
(per accident report)

Nov 19, 2013
9:14 a.m. - 9:19:49 a.m.
Call to 8008765581

Nov 19, 2013
9:21 a.m. - 9:24:32 a.m.
Call to 911

Nov 19, 2013
9:29 a.m. - 9:34:48 a.m.
Call to 8008765581

Nov 19, 2013 9:11 a.m. - 9:13 a.m.
Data usage: 241560 up 593010 down

Nov 19, 2013 9:21 a.m. - 9:24 a.m.
Data usage: 55980 up 119478 down

Nov 19, 2013 9:13 a.m. - 9:14 a.m.
Data usage: 51012 up 200664 down

Nov 19, 2013 9:20 a.m. - 9:21 a.m.
Data usage: 19805 up 30936 down

Nov 19, 2013 9:14 a.m. - 9:20 a.m.
Data usage: 79447 up 234308 down

WEB BROWSING ARTIFACTS

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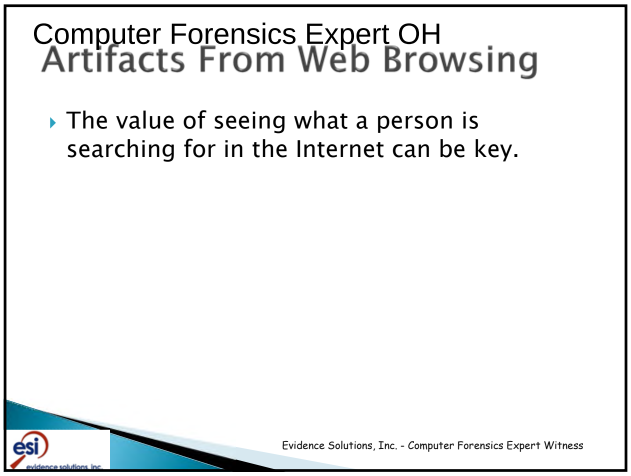
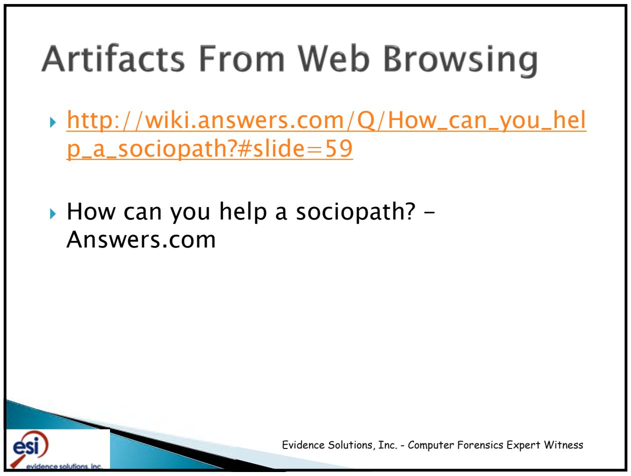


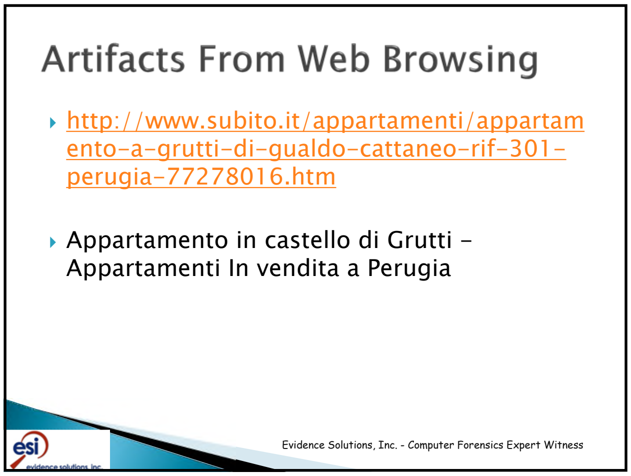
Artifacts From Web Browsing

- The value of seeing what a person is searching for in the Internet can be key.



Artifacts From Web Browsing

- http://wiki.answers.com/Q/How_can_you_help_a_sociopath?#slide=59
- How can you help a sociopath? - Answers.com



Artifacts From Web Browsing

- http://www.subito.it/appartamenti/appartamento-a-grutti-di-gualdo-cattaneo-rif-301-perugia-77278016.htm
- Appartamento in castello di Grutti - Appartamenti In vendita a Perugia

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Artifacts From Web Browsing

- http://mysecurewallet.nl/payment/islive/isliveeu/?p=199&pi=typein_isliveeu&flash=1&m=bellaluna
- My Secure Wallet

SOCIAL MEDIA

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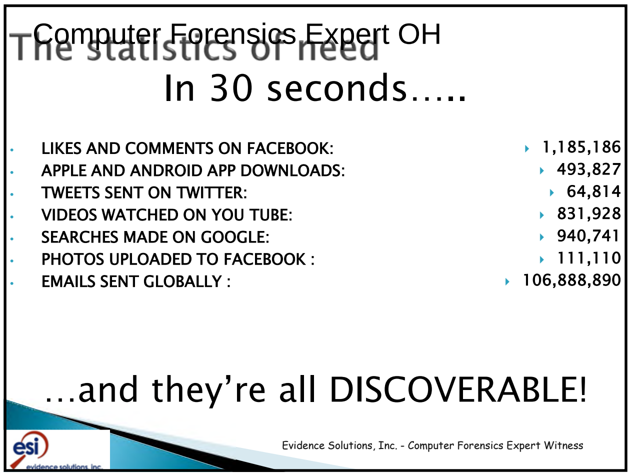

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The statistics of need

In 30 seconds…..

LIKES AND COMMENTS ON FACEBOOK:	1,185,186
APPLE AND ANDROID APP DOWNLOADS:	493,827
TWEETS SENT ON TWITTER:	64,814
VIDEOS WATCHED ON YOU TUBE:	831,928
SEARCHES MADE ON GOOGLE:	940,741
PHOTOS UPLOADED TO FACEBOOK :	111,110
EMAILS SENT GLOBALLY :	106,888,890

…and they're all DISCOVERABLE!

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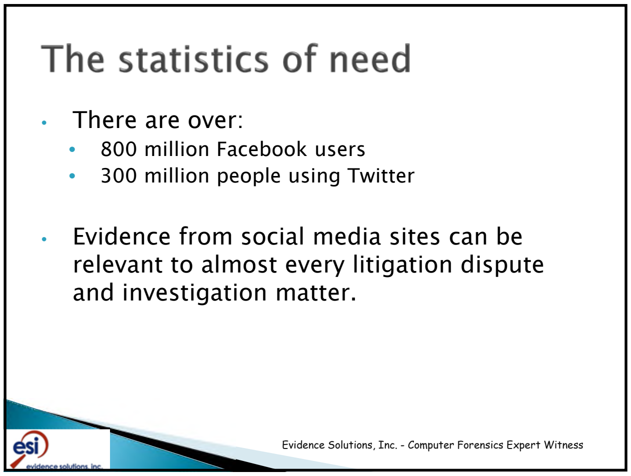
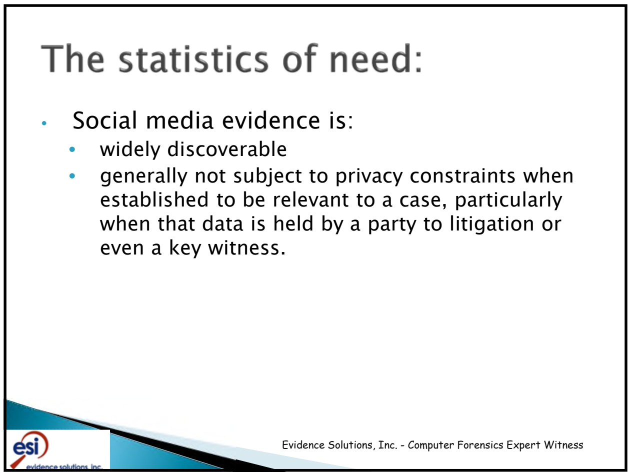
Cell Phone Forensics Expert Ohio



The statistics of need

- There are over:
  - 800 million Facebook users
  - 300 million people using Twitter
- Evidence from social media sites can be relevant to almost every litigation dispute and investigation matter.

Evidence Solutions, Inc. - *Computer Forensics Expert Witness*



The statistics of need:

- Social media evidence is:
  - widely discoverable
  - generally not subject to privacy constraints when established to be relevant to a case, particularly when that data is held by a party to litigation or even a key witness.

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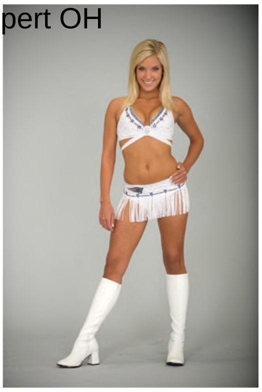
OH Digital Forensics Expert

Here is what is out there

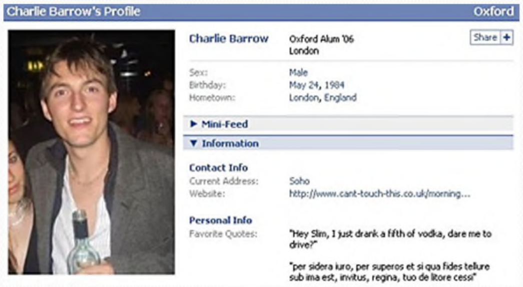
- New England Patriots Cheerleader, Caitlin Davis, 18



Here is what is out there

Caitlin lost her job after photos appeared on Facebook showing her holding a Sharpie marker up to a passed out man with offensive graffiti all over him. Davis was booted from the Patriots squad.

Here is how they use it....



Charlie Barrow's Profile — Oxford

Charlie Barrow — Oxford Alum '06
London

Sex: Male
Birthday: May 24, 1984
Hometown: London, England

Contact Info
Current Address: Soho
Website: http://www.cant-touch-this.co.uk/morning...

Personal Info
Favorite Quotes: "Hey Slim, I just drank a fifth of vodka, dare me to drive?"

"per sidera iuro, per superos et si qua fides tellure sub ima est, invitus, regina, tuo de litore cessi"

"Hey Slim, I just drank a fifth of vodka, dare me to drive?"

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Here is how they use it…

- A juror posted details of the case she was serving on. The she wrote, "I don't know which way to go, so I'm holding a poll."
- An anonymous tip resulted in the woman being immediately dismissed from the jury.

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ETHICAL CONSIDERATIONS

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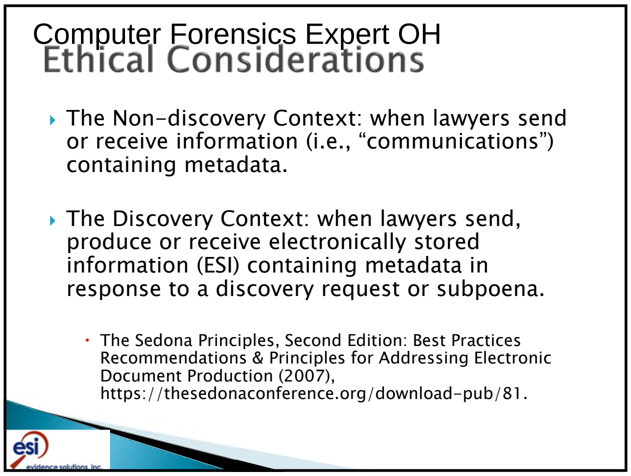
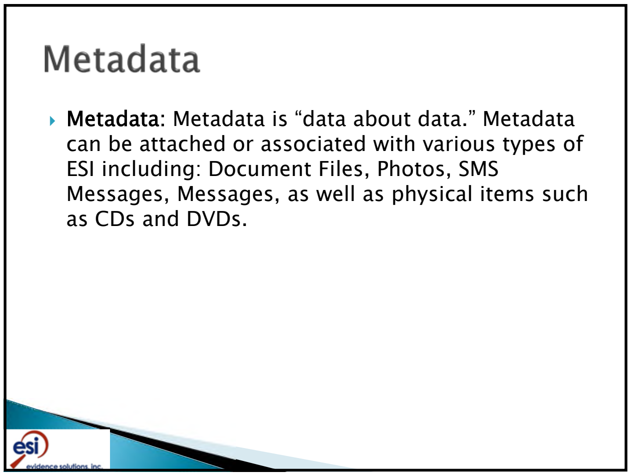


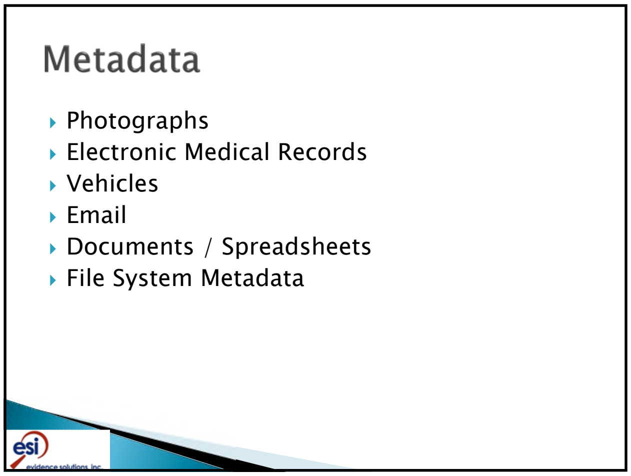
Ethical Considerations

- The Non-discovery Context: when lawyers send or receive information (i.e., “communications”) containing metadata.
- The Discovery Context: when lawyers send, produce or receive electronically stored information (ESI) containing metadata in response to a discovery request or subpoena.
  - The Sedona Principles, Second Edition: Best Practices Recommendations & Principles for Addressing Electronic Document Production (2007), https://thesedonaconference.org/download-pub/81.



Metadata

- **Metadata**: Metadata is “data about data.” Metadata can be attached or associated with various types of ESI including: Document Files, Photos, SMS Messages, Messages, as well as physical items such as CDs and DVDs.



Metadata

- Photographs
- Electronic Medical Records
- Vehicles
- Email
- Documents / Spreadsheets
- File System Metadata

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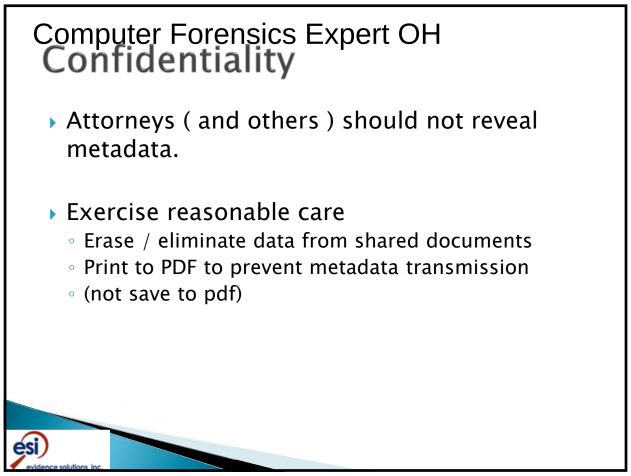
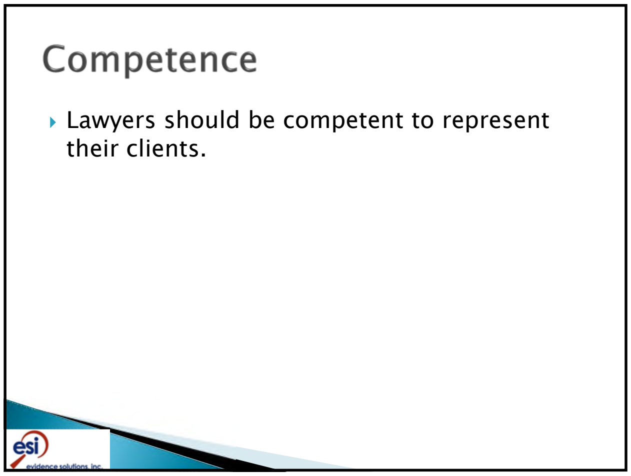


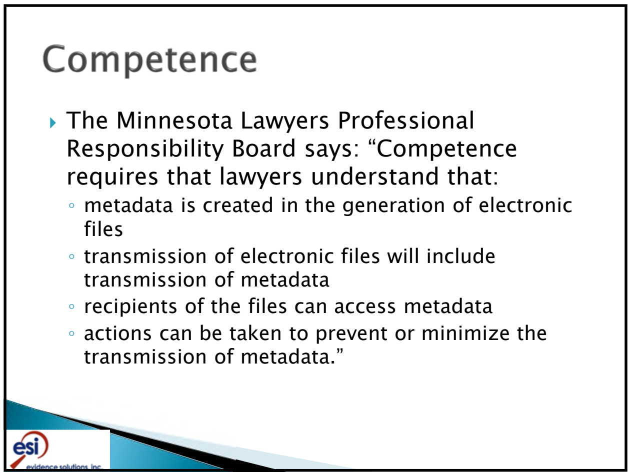
Confidentiality

- Attorneys (and others) should not reveal metadata.
- Exercise reasonable care
  - Erase / eliminate data from shared documents
  - Print to PDF to prevent metadata transmission
  - (not save to pdf)



Competence

- Lawyers should be competent to represent their clients.



Competence

- The Minnesota Lawyers Professional Responsibility Board says: “Competence requires that lawyers understand that:
  - metadata is created in the generation of electronic files
  - transmission of electronic files will include transmission of metadata
  - recipients of the files can access metadata
  - actions can be taken to prevent or minimize the transmission of metadata.”

American Bar Association

- ABA Ethics 20/20 revision of the model ethics rules. Rule 1.1 Competence.
  - "A lawyer shall provide competent representation to a client. Competent representation requires the legal knowledge, skill, thoroughness and preparation reasonably necessary for the representation."

Preservation

- This means metadata should be preserved and disclosed.
- If litigation is reasonably anticipated, care should be taken to prevent the routine deletion of certain metadata, especially embedded metadata in potentially relevant Electronically Stored Information (ESI).

Preservation

- Deletion of metadata may constitute spoliation.
- Removing metadata from certain evidentiary files may even be illegal.

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CHAIN OF CUSTODY

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What is Chain of Custody

- Chain of custody
  - Is the chronological documentation, showing the seizure, custody, control, transfer, analysis, and disposition of evidence, physical or electronic.

What is Chain of Custody

- Evidence which can be used in court to convict persons of crimes, must be handled in a very careful manner to avoid later allegations of tampering, altering, or misconduct.

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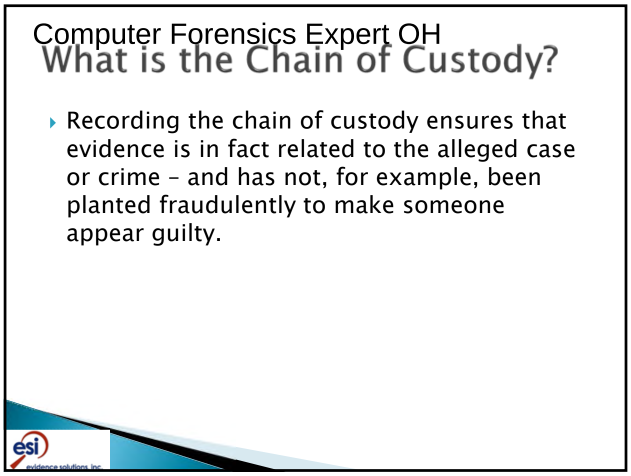
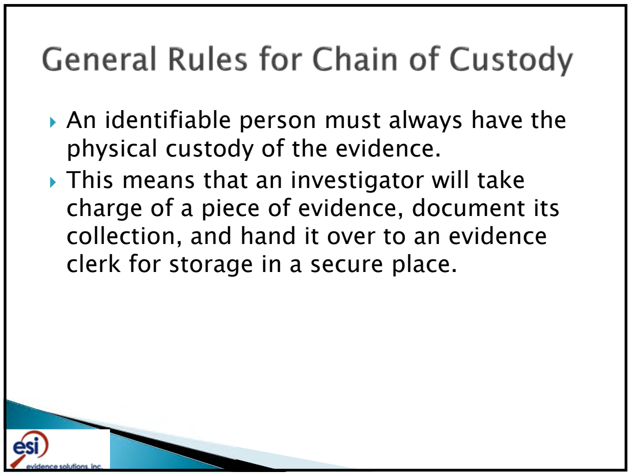


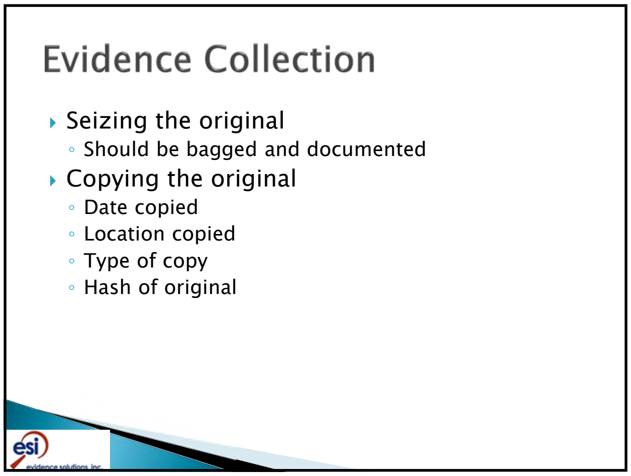
What is the Chain of Custody?

- Recording the chain of custody ensures that evidence is in fact related to the alleged case or crime – and has not, for example, been planted fraudulently to make someone appear guilty.



General Rules for Chain of Custody

- An identifiable person must always have the physical custody of the evidence.
- This means that an investigator will take charge of a piece of evidence, document its collection, and hand it over to an evidence clerk for storage in a secure place.



Evidence Collection

- Seizing the original
  - Should be bagged and documented
- Copying the original
  - Date copied
  - Location copied
  - Type of copy
  - Hash of original

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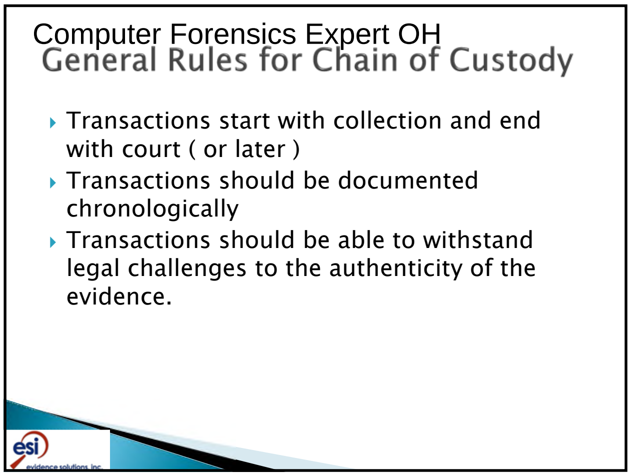

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General Rules for Chain of Custody

- Transactions start with collection and end with court (or later)
- Transactions should be documented chronologically
- Transactions should be able to withstand legal challenges to the authenticity of the evidence.

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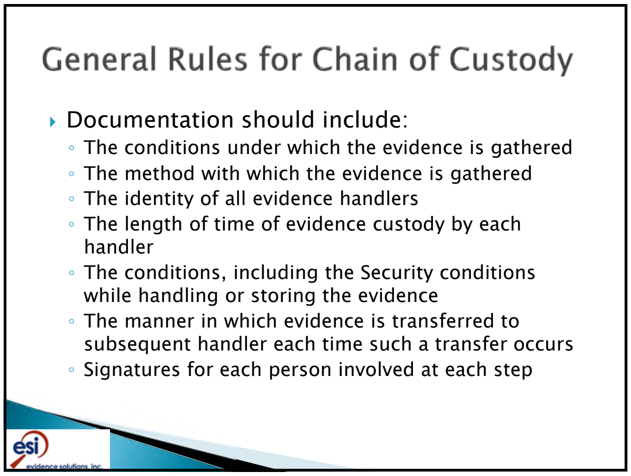
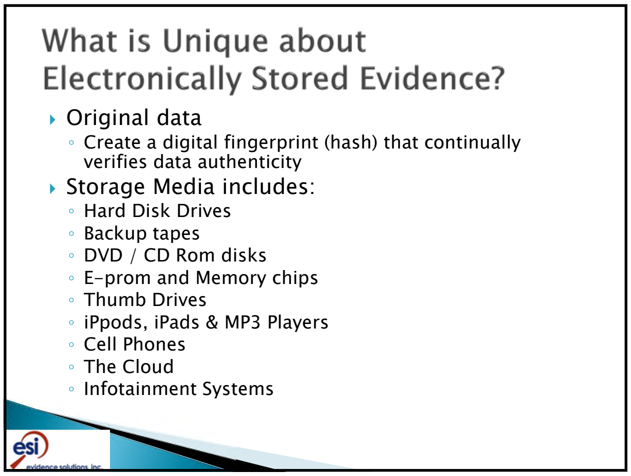


General Rules for Chain of Custody

- Documentation should include:
  - The conditions under which the evidence is gathered
  - The method with which the evidence is gathered
  - The identity of all evidence handlers
  - The length of time of evidence custody by each handler
  - The conditions, including the Security conditions while handling or storing the evidence
  - The manner in which evidence is transferred to subsequent handler each time such a transfer occurs
  - Signatures for each person involved at each step



What is Unique about Electronically Stored Evidence?

- Original data
  - Create a digital fingerprint (hash) that continually verifies data authenticity
- Storage Media includes:
  - Hard Disk Drives
  - Backup tapes
  - DVD / CD Rom disks
  - E-prom and Memory chips
  - Thumb Drives
  - iPpods, iPads & MP3 Players
  - Cell Phones
  - The Cloud
  - Infotainment Systems

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What is Unique about Electronically Stored Evidence?

- Servers
  - Most companies intend for data to be stored on servers
  - Ha!
  - Workstations, Laptops are an incredible source of information

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What is Unique about Electronically Stored Evidence?

- Workstations
  - When someone is doing something that they shouldn't be doing, it is more likely that you will find it on their workstation than you will find it on the server.

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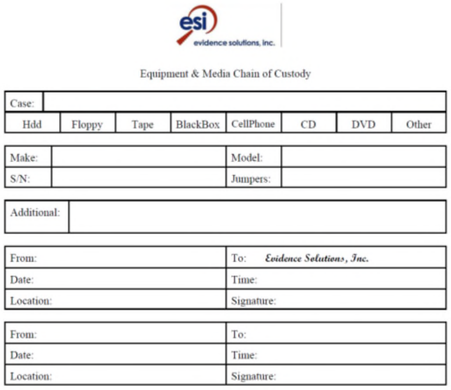

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Equipment & Media Chain of Custody

Case:							
Hdd	Floppy	Tape	BlackBox	CellPhone	CD	DVD	Other

Make:		Model:	
S/N:		Jumpers:	

Additional:	

From:	To: *Evidence Solutions, Inc.*
Date:	Time:
Location:	Signature:

From:	To:
Date:	Time:
Location:	Signature:

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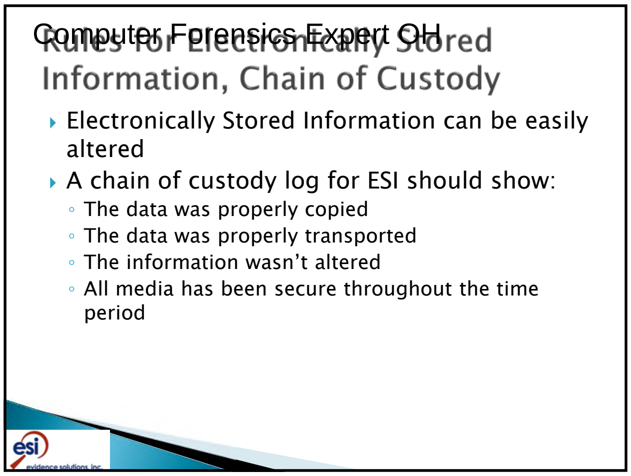

Rules for Electronically Stored Information, Chain of Custody

- Electronically Stored Information can be easily altered
- A chain of custody log for ESI should show:
  - The data was properly copied
  - The data was properly transported
  - The information wasn't altered
  - All media has been secure throughout the time period

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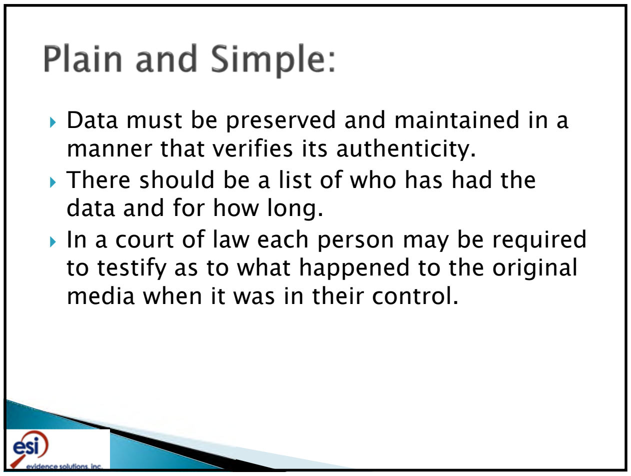
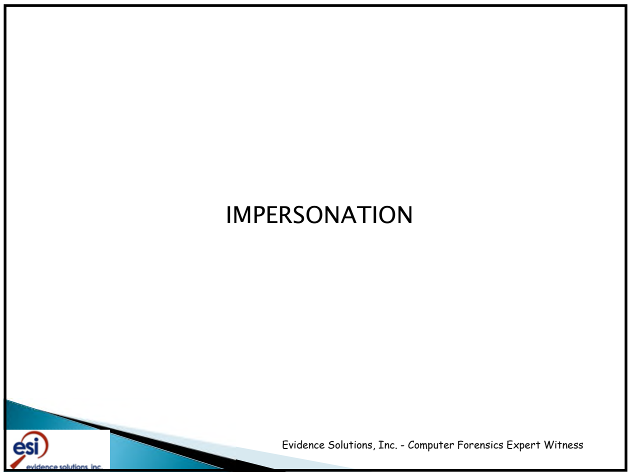


Plain and Simple:

- Data must be preserved and maintained in a manner that verifies its authenticity.
- There should be a list of who has had the data and for how long.
- In a court of law each person may be required to testify as to what happened to the original media when it was in their control.



IMPERSONATION

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Security is paramount

- Spammers & Scammers account for as much 40 percent of the accounts on social-media sites!

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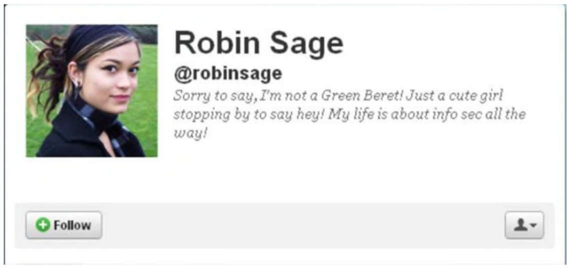
Scammers are Everywhere



Robin Sage

@robinsage

Sorry to say, I'm not a Green Beret! Just a cute girl stopping by to say hey! My life is about info sec all the way!

Scammers are Everywhere

- Graduate of Massachusetts Institute of Technology
- Cyber Threat Analyst – US Navy Network Warfare Command
- She had
  - 141 Twitter Followers
  - 110 Facebook Friends
  - 148 LinkedIn Connections
  - Including: Joint Chiefs of Staff, NSA, US Marines, US House of Representatives, Pentagon, DoD, Lockheed Martin, Northrup Grumman, Boos Allen Hamilton.

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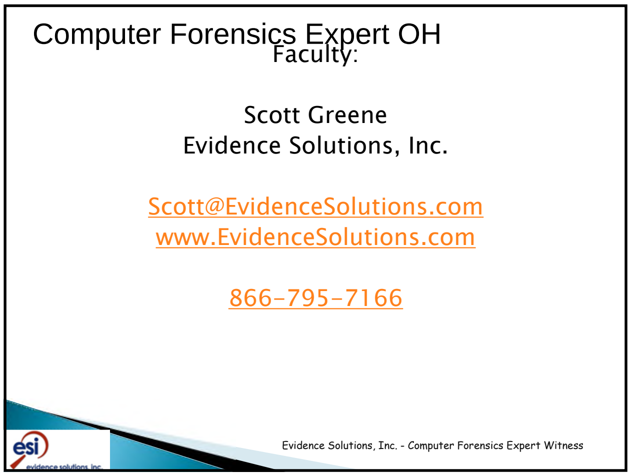

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