How to conduct effective Open Source Investigations online

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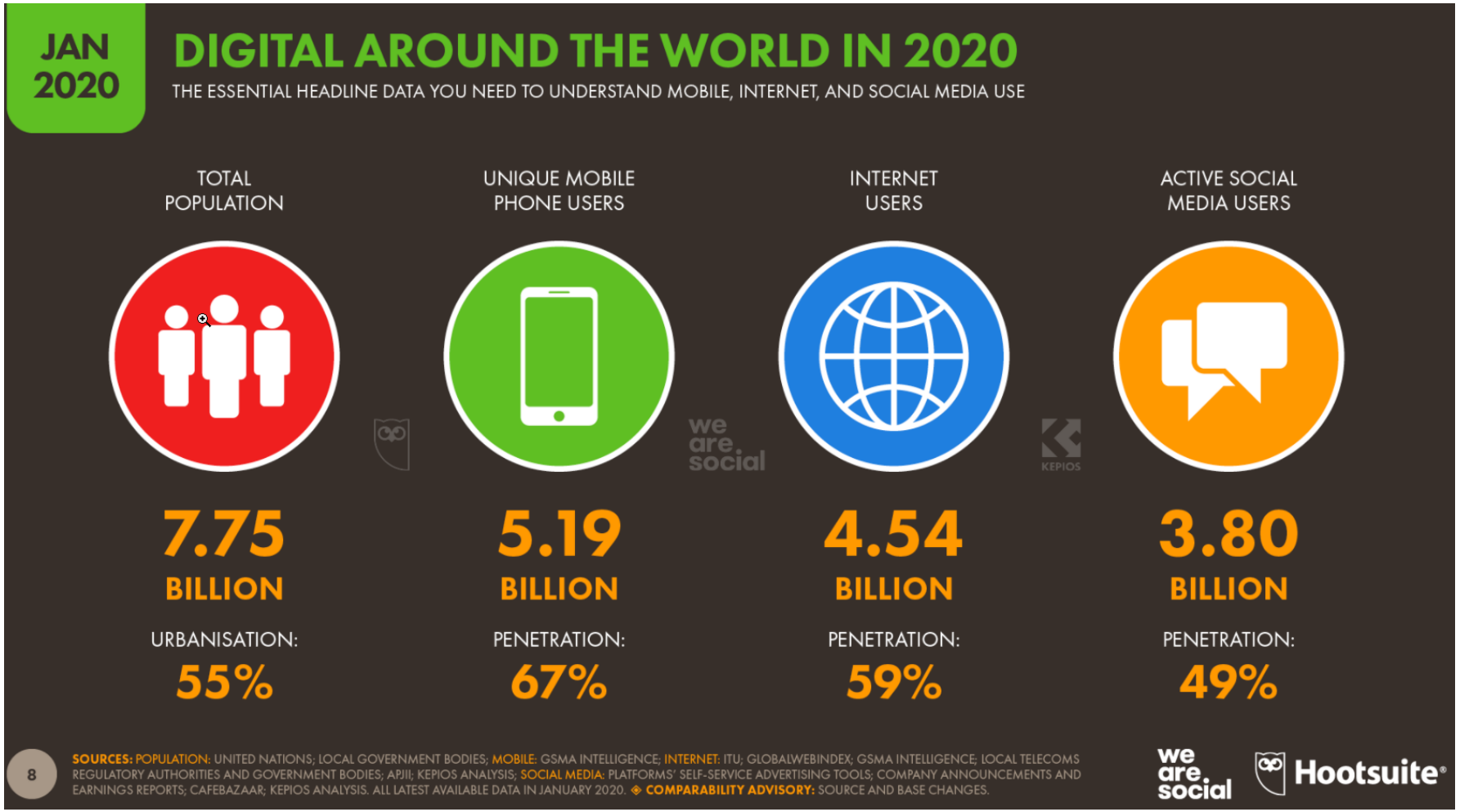
UNITED NATIONS
OFFICE OF COUNTER-TERRORISM
UN Counter-Terrorism Centre (UNCCT)

Why do we need to become good online investigators?

Malicious use of Internet

- Malicious software
- (D)DoS
- Phishing
- Radicalization
- Propaganda
- Psychological warfare, denial and deception
- Intelligence gathering
- Cyberattacks and information operations
- Money laundering
- ....

Size of internet



Technological advancements

- Infrastructure (networks, devices)
- Computing power
- Content digitization
- AI (touches every aspect)
- Mobility
- Interface and sensorics
- Cybercurrency
- IoT
- …

Myth of Anonymity

"On the Internet, nobody knows you're a dog."

Future Challenge of Internet

- The Internet will continue to fragment across regional, national and ideological lines, making the job of intelligence collection harder

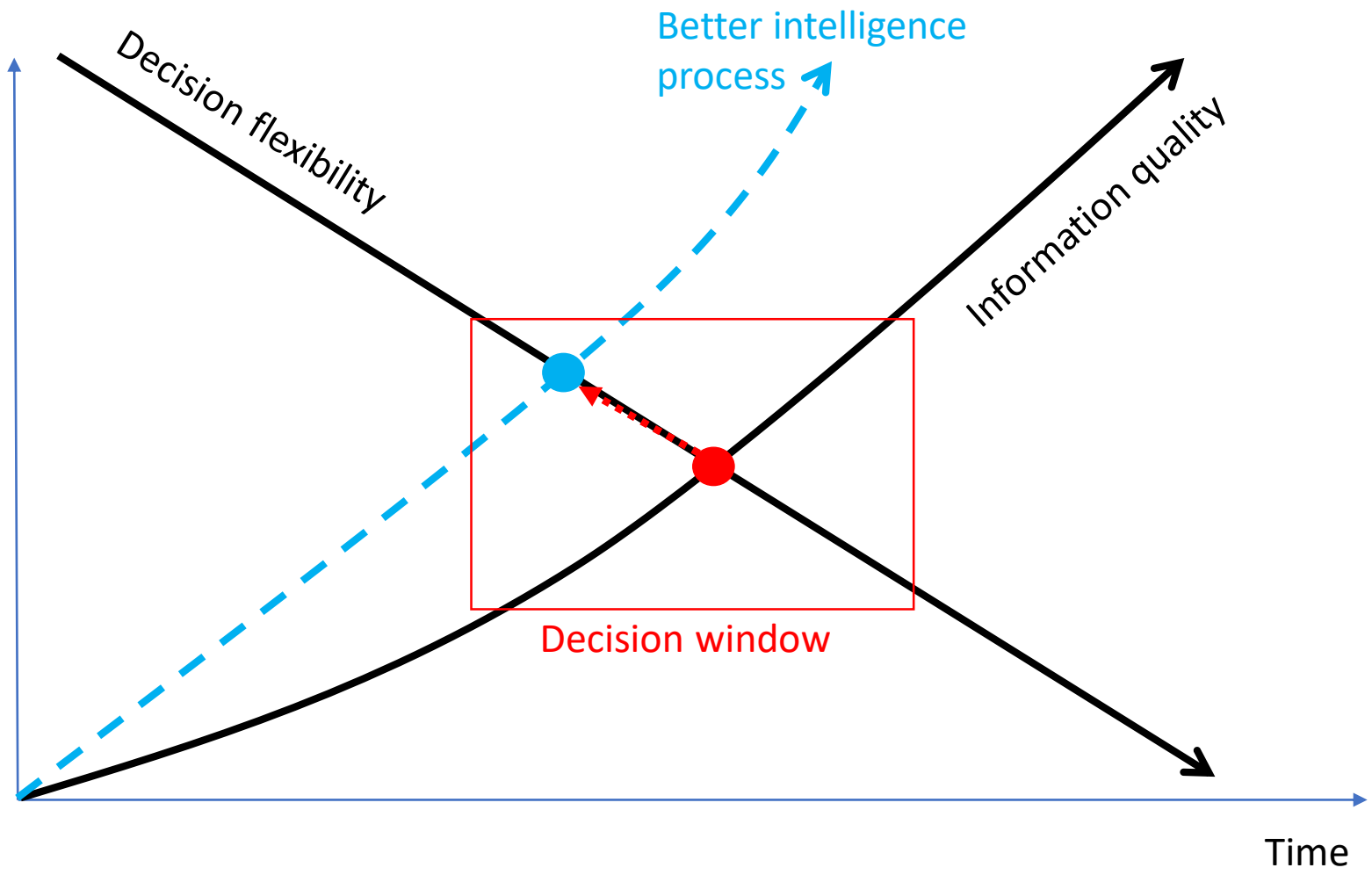
- Our reluctance to embrace OSINT literacies to enhance intelligence collection will hurt our ability to

“Meta” aspects of intelligence

What is intelligence?

- Business of managing uncertainty
- Informant to decision making
- A form of knowledge, a form of organization and a form of activity *(Sherman Kent)*

Decision window



Important Role of OSINT

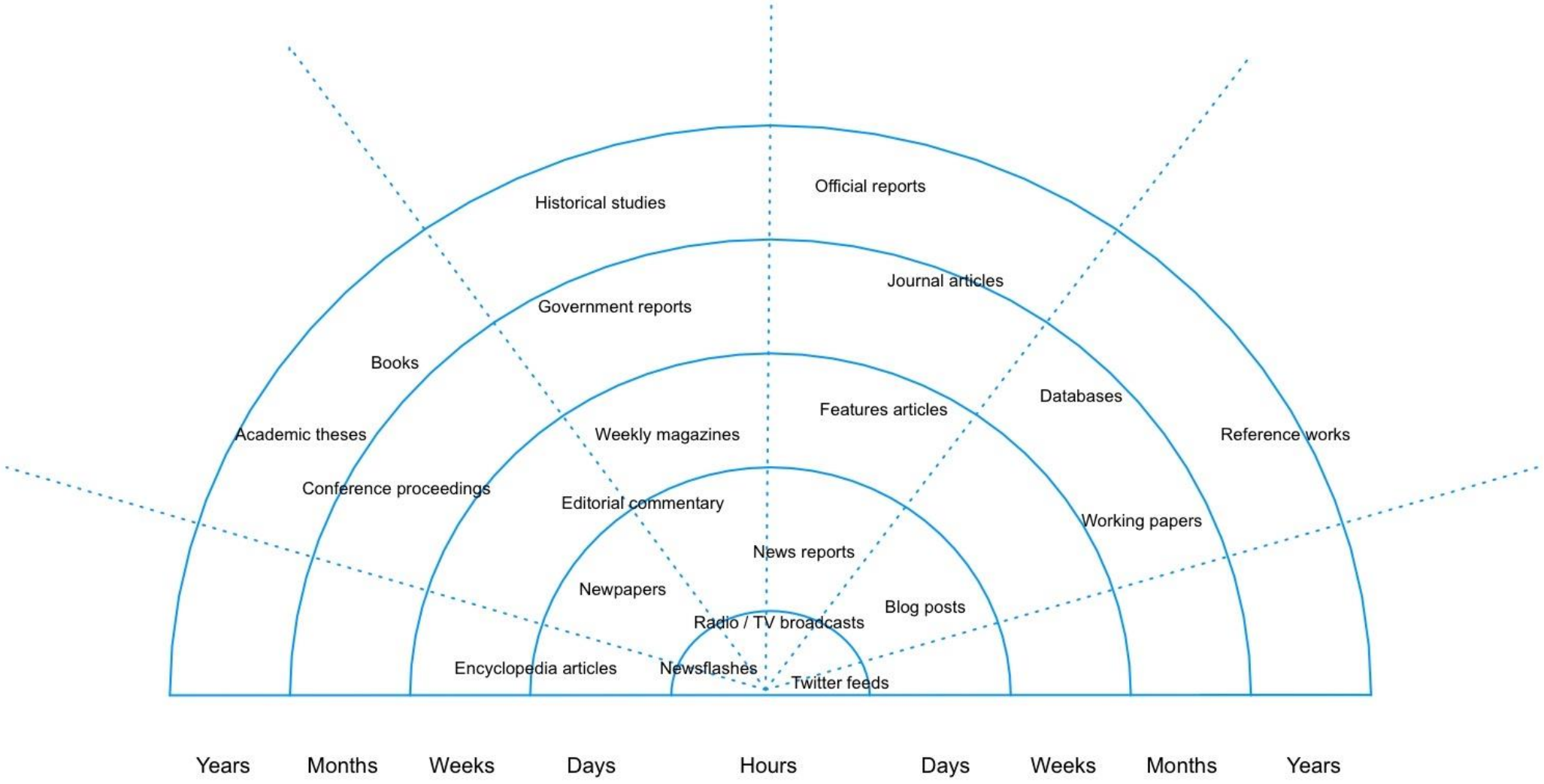
“We have no need of spies. We have the Times of London.” Tsar Nicholas II (1818-1881)

“A proper analysis of the intelligence obtainable by these overt, normal, and aboveboard means would supply us with over 80 percent, I should estimate, of the information required for the guidance of our national policy.” Allen Dulles, Head of the CIA (1893 – 1969)

“More can be deduced by an intelligent study of public sources than by any number of ‘reliable' but unintelligent 'agents' listening at keyholes or swapping drinks at bars.

Hugh Trevor-Roper (1914 – 2003)

Important Role of OSINT



Legal and ethical considerations

- Information is your basic tool of work
- Information is subject to laws, which are never very clear
- The more information you collect, greater the risk you will break the law
- Technology amplifies the risks as well as the mistakes we make
- Thus, information should always be handled with care

Legal and ethical considerations

- Copyright
- Defamation
- Privacy
- Legislation: local vs. global
- Jurisdiction
- Social attitudes and values

Avoid legal headaches

- Educate yourself
- Question your motives
- If in doubt, ask a lawyer

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OSINT frameworks

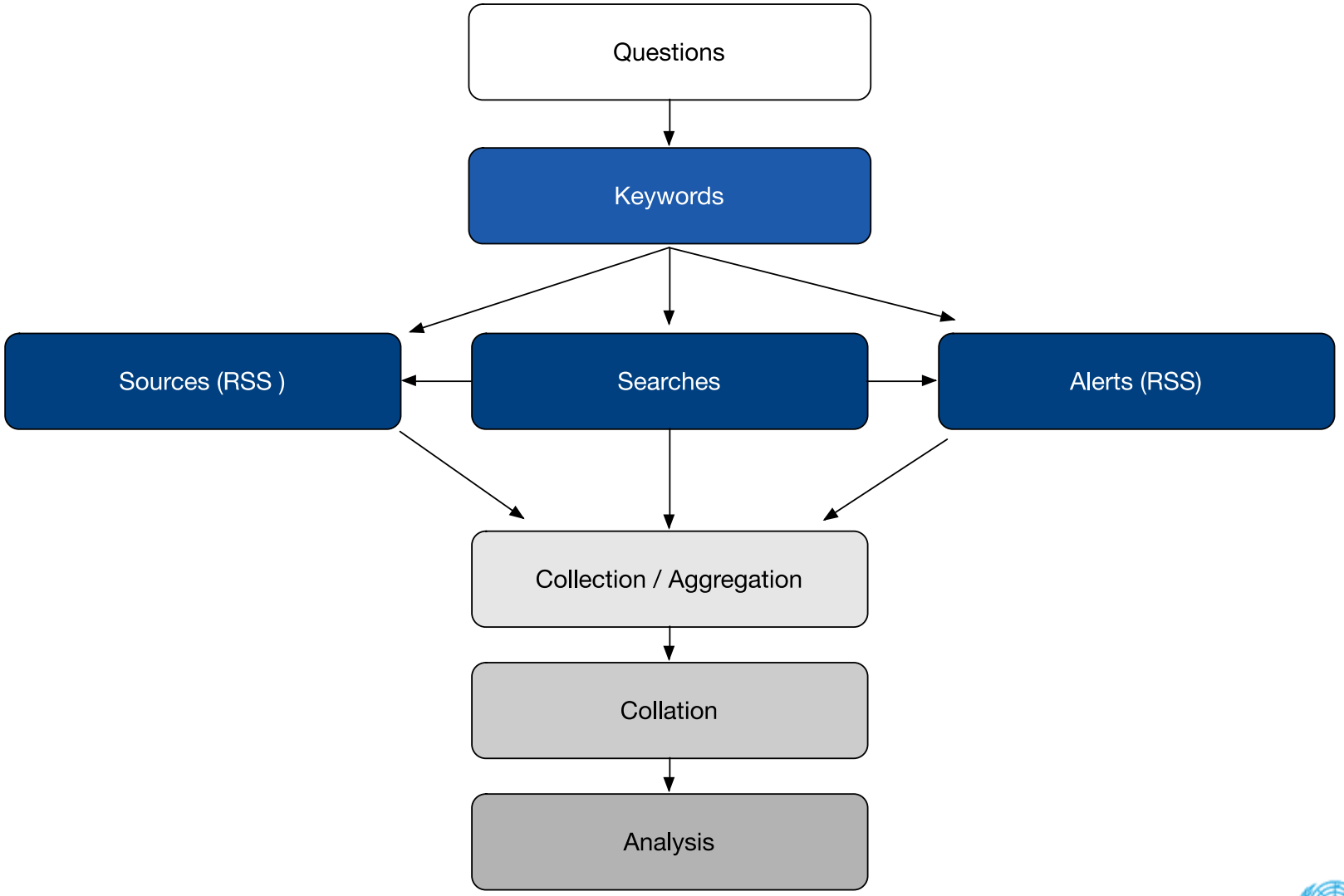
Raison d'être for structured approach

- Have a map to navigate the “chaos”
- Produce an audit trail
- Pave the way for improvement

OSINT frameworks

- Research and monitoring
  - Keywords index
  - Source management
  - Risks/Threats early warning setup
  - Automated collection
- Investigation
  - Technical, procedural and analytical tools to scope one's target
  - Hypothesis building / evidence collection
  - Process cannot be automated

Lean Intelligence



Requirements

Learn to ask questions

Effective intelligence begins by addressing the following questions:

- What do we need to know?
- Why do we need to know it?
- Who might have the information we need?
- How should we perform the research?
- What will we do with the results?
- Does the effort justify the cost?

Requirements planning

What needs to be achieved:

- Clarified requirements
- Clarified goals and priorities
- Resources allocated
- Realistic timeline defined
- Relevant stakeholders engaged

Requirements planning

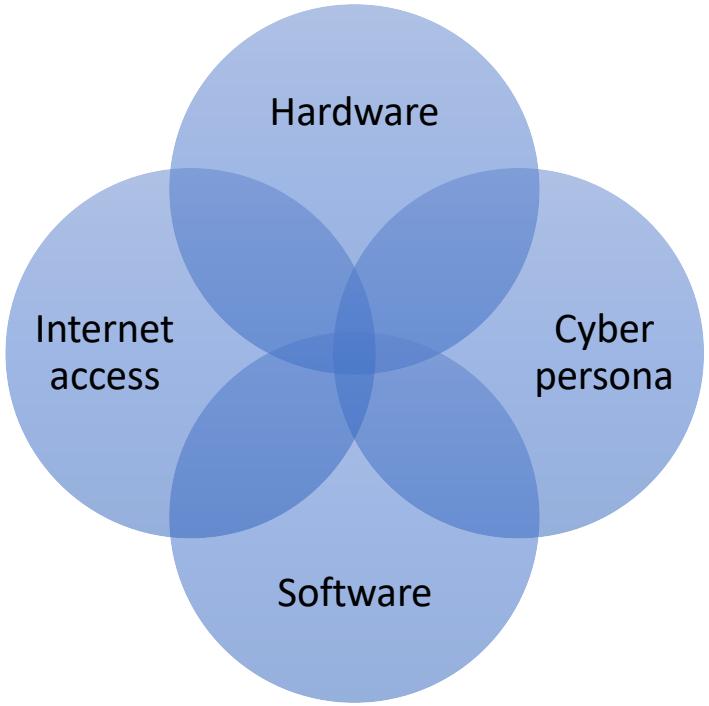
How to do it?

- Structured brainstorming techniques (Starbursting, KIT)
- Requirements frameworks and templates
- Technology aid (notetaking, mind mapping, researching)

Online Security

Setting up work environment

- Comprehensive management of all elements



+ Operating Process

Setting up work environment

- Hardware
  - Acquired with cash, wiped out, installed with bare bones
  - Disabled camera / mic/sound / location / Bluetooth
- Internet connection
  - Cash prepaid anonymous SIM card with prepaid data plan
  - Cash paid basic mobile device that tethers internet
  - Public hotspot (but be careful!)
  - Always privacy software layer on top

Setting up work environment

- Software tools to hide your identity
  - VPN (for ex. Proton VPN) - kill switch is a must!
  - Virtual Machine (VirtualBox + some Linux version for ex. Parrot OS)
  - TOR / Various privacy-oriented browsers

- Software tools to collect / automate evidence gathering
  - Hunchly ($)
  - Screenshot grabbers (Greenshort / Fireshot / Lightshot)
  - Maltego Casefile
  - Evidence collection templates

Setting up work environment

- Cyber personas
  - If required, created using secure email and prepaid sim card (for verification)
  - Meticulous buildup of cyber personas: consistency of the narrative with time zone, language settings, browser agent ID, VPN

Evidence collection process

- Operating process
  - Threat model for privacy / security
  - Lean Intelligence / People Search model (or others)
  - Templates to structure your information (for ex. Person Profile)
  - Selection of proper skillsets required: monitoring / investigation
  - Success criteria and measurement of progress against it

Online Security

- Who Are We Protecting Ourselves From?
  - Our targets
  - Hackers and cybercriminals
  - Internet Service Provider (ISP)
  - Advertisers and corporations
  - Employers
  - Other governments

Investigation techniques: People Search

People Search: Introduction

People search opportunities

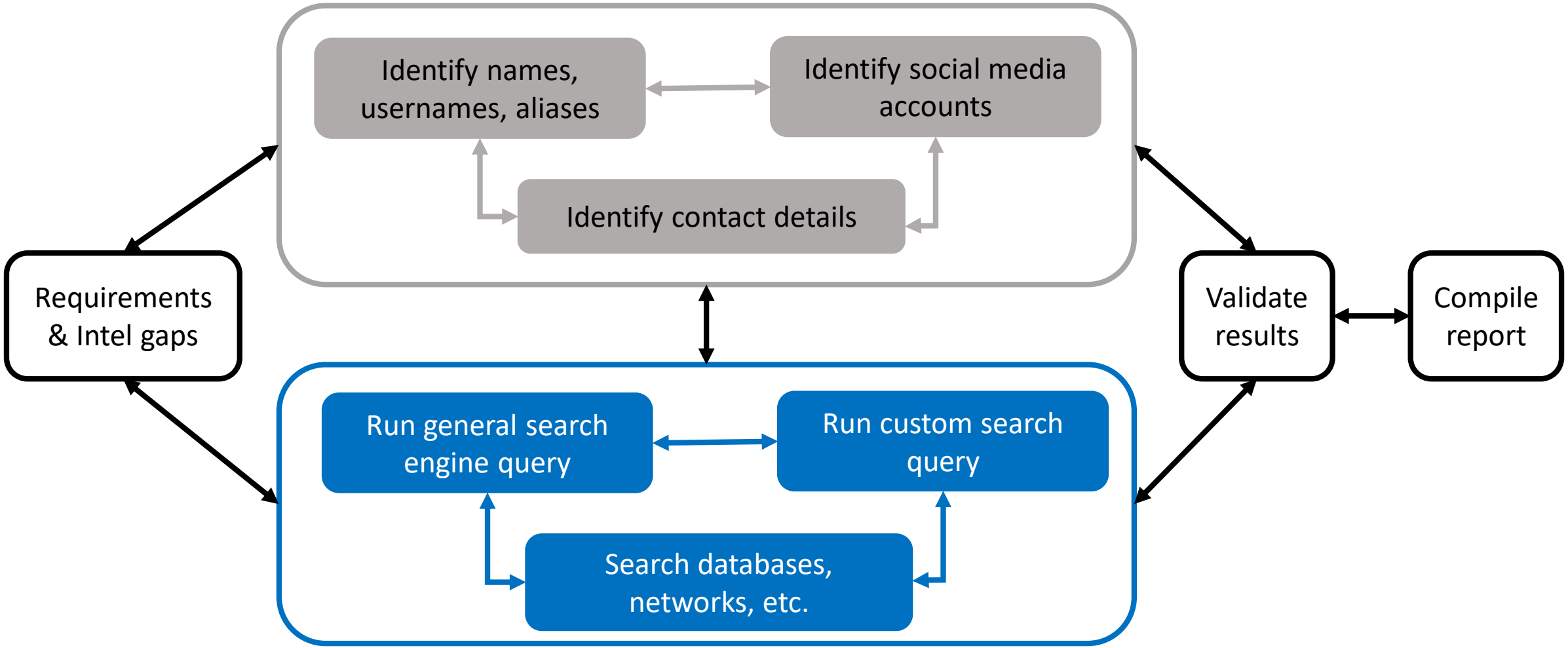
Easier to obtain:

- The growth of available information
- Our interactions with the web
- The popularity of social networks
- Commercial value of people's data

Face challenges:

- Not everyone has a digital footprint
- Information is dispersed
- Name match
- Intense time and labor required

People search process



People search process

Category	Examples
Identifying phrases	Names, aliases, usernames, titles, etc.
Basic Information	Age, gender, ethnicity, nationality, spoken language, etc.
Contact Details	Telephone number, e-mail, Skype handle, etc.
Residence	Country of residence, current / past home address, profile of neighbourhood, etc.
Family	Marital status, spouse / partner, children, parents, siblings, cousins, etc.
Work	Employment status, current / past employer(s), office colleagues, etc.
Education	Level of education, attended educational institutions, classmates, studied subjects, etc.
Friends	Best friend(s), other friends, colleagues, acquaintances, etc.
Hobby & Interests	Key hobbies, online interests, listened music, read books, watched movies, etc.
Views & Opinions	Religion views, political views, likes / dislikes, etc.

People search process

- Decide how to organize / collate data
- Don’t break the law
- Identify formal names
- Identify titles and honorifics
- Identify the target’s social media profiles
- Identify the target’s contact details
- Identify the target’s usernames
- Identify the target’s locations
- Identify the target’s affiliations

Usernames

- Run usernames through discovery tools
- Verify as tools may not be perfect
- Check variations
- More popular tools:
  - Knowem: http://knowem.com
  - NameChk: www.namechk.com
  - *More tools: https://lnkd.in/d_4K9HG*

Email search

- Usernames often associate with emails
- Run Google queries / setup Google Alerts
- Check breached data (https://haveibeenpwned.com etc)
- Find private email address (constructs and guesses, socmint)
- Find professional email address (www.hunter.io etc)
- Run email validator (www.email-validator.net etc)
- Reverse email checks (www.pipl.com etc)
- Check email provider for business emails (www.mxtoolbox.com etc)
- Check blacklists (www.mxtoolbox.com etc)

Phone numbers

- Start with phone directories (www.numberway.com etc)
- Run Google queries / setup Google Alerts
- Check reverse phone lookup (www.truecaller.com etc)
- Check Skype, Social media accounts

Google Hacks for People Search

- Master Search Engine operators

  Ex: “username” site:facebook.com inurl:photos; “username” inurl:profile

- Check online spaces (websites, blogs, wikis etc)

  Ex: site:wix.com “username”

- Check Q&A sites (quora, stackexchange, answers etc)

  Ex: “username” site:stackexchange.com

- Check user groups

  Ex: “username” site:groups.google.com

- Search document repositories (Docs, Aws, OneDrive, Slideshare etc)

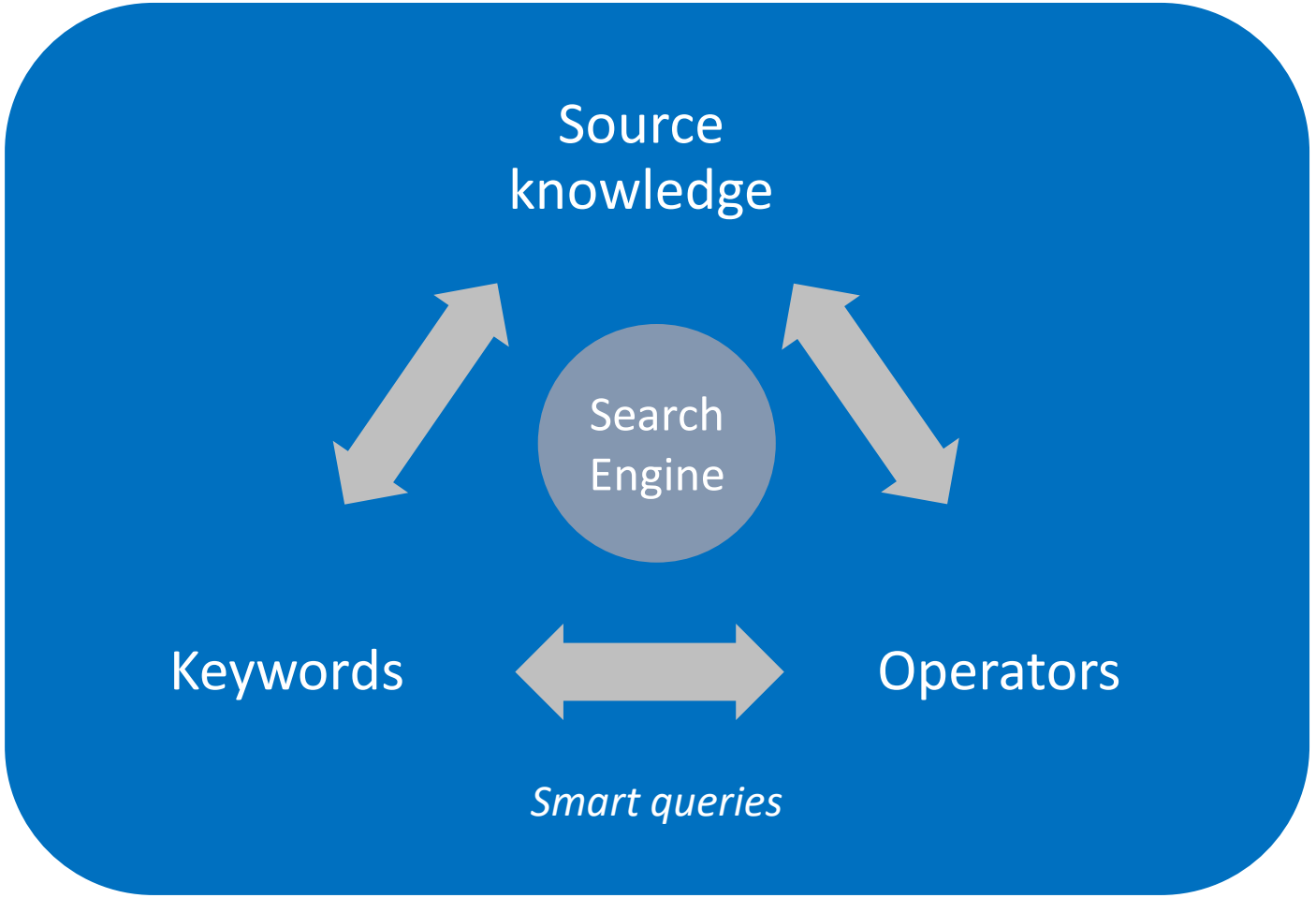
Google Search

Operator	Use
OR	Used to find synonymous or related content (write in uppercase)
-	The NOT operator hides / excludes unwanted keywords
“Quote marks”	Returns the exact combination of words between the quote marks
filetype:	Reduces results to specific file types
related:	Will help you identify web pages similar to your specified site
site:	Results limited to a specific website or domain
intitle: / allintitle:	Results limited to those pages with the keywords in the title
inurl: / allinurl:	Results limited to those sites with the keyword in the URL
intext: / allintext:	The query is limited to the text of a page only
*	Use the wildcard operator for spelling and phrase variations variations
..	Use the range operator to search for a range of numbers

Google Hacks for People Search

- Search for CVs (ex: “Name” “CV” inurl:resume OR intitle:resume
- Check dating sites (username + “site” operator)
- Check online marketplaces (username + site or inurl; ex: alibaba.com)
- Education history (site: + domain or education institution)
- Validate credentials through complex queries (ex: intitle:“TARGET NAME” inurl:speaker OR inurl:speakers OR inurl:author OR inurl:authors OR inurl:instructor OR inurl:instructors OR inurl:expert OR inurl:experts

Effective search model



Working with images

Reverse Image search

- Reverse search for image
  - Google: www.google.com/images
  - Tin Eye: www.tineye.com
  - RootAbout: http://rootabout.com
  - Yandex: https://yandex.com/images
  - Baidu: http://image.baidu.com
- Analyze metadata (exif + content on the host site)
  - Jeffrey Friedl's Exif Viewer: http://exif.regex.info/exif.cgi
  - Megapicz: http://metapicz.com/#landing
- Forensic analysis
  - Fotoforensics http://fotoforensics.com
  - Image forensic https://www.imageforensic.org

WEBINT

Digital data hierarchy

Individual Data	Organisational Data	Network Data
• Key personnel • Contact details • Email addresses • Email conventions • Phone numbers	• Business locations • Company addresses • Phone numbers • Security policies • Web service providers • Social media assets	• IP Data • Internal domain names • Name servers • Email servers • Web technologies • System technologies

WEBINT Toolkits

- Central Ops: http://centralops.net
- Domain Big Data: https://domainbigdata.com
- Domain Tools: http://research.domaintools.com
- Hacker Target: https://hackertarget.com/ip-tools
- Kloth: www.kloth.net/services
- Network Tools: www.network-tools.com
- MX Toolbox: www.mxtoolbox.com
- You Get Signal: www.yougetsignal.com

Investigate websites/domains

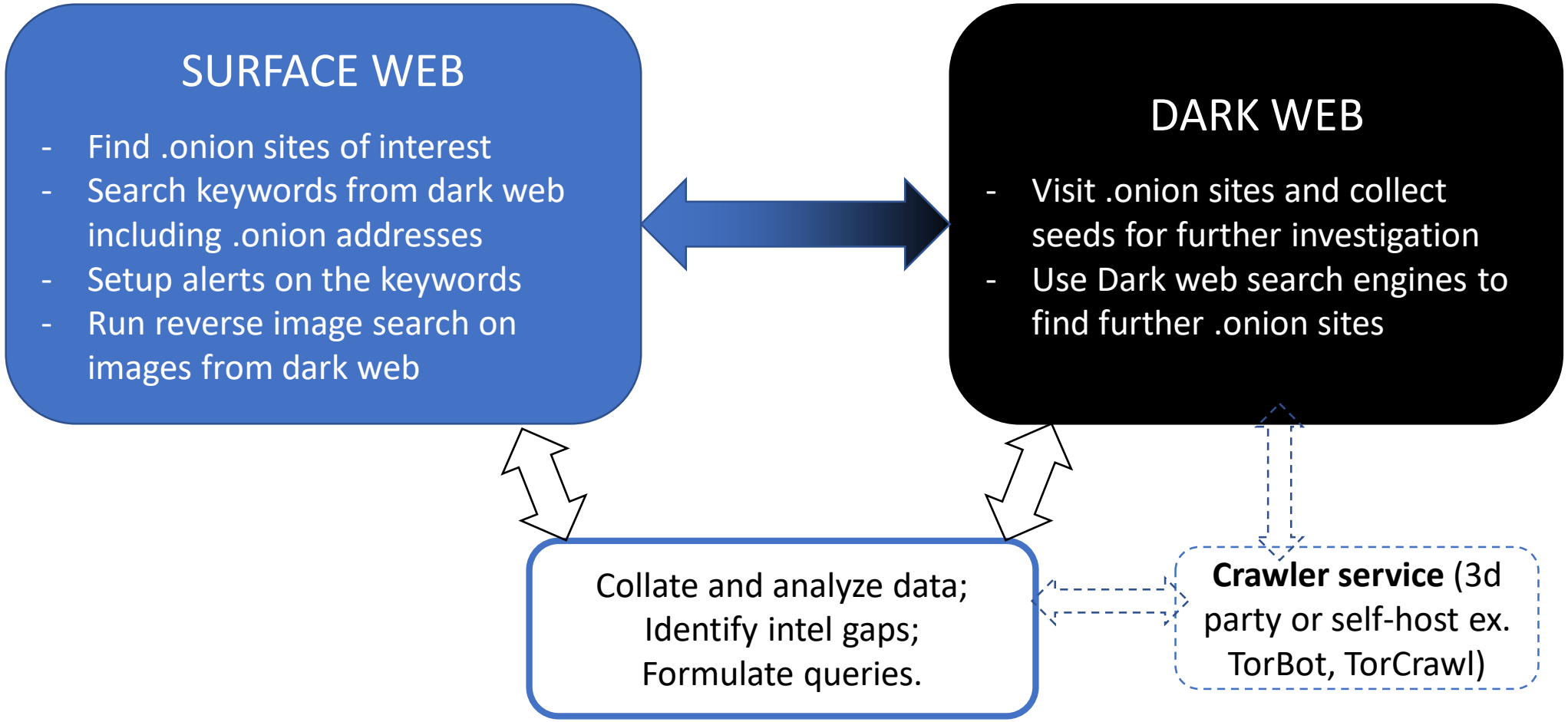
1. Identify the Whois Data
2. Reverse IP / DNS Lookup
3. Check a Website's IP History
4. Analyze Hosts [DNS Dumpster / Yougetsignal]
5. Investigate Subdomains [Security Trails etc]
6. Identify Other Services Running on a particular IP
7. IP Mapping

Investigate websites

8. Examine Digital Certificates
9. Study the Website's HTML Data (traces, tracking IDs)
10. Check Robots.txt / Sitemap
11. Check site's security and reputation [VirusTotal etc]
12. Site technologies
13. Backlinks using SEM tools [Linkminer, Semrush etc]
14. Access historical versions [Archive.org]

Tor Investigations

Tor Investigations Framework



Setup your workplace

- Access the Tor network using a “clean” device / sensors disabled
- Run Tor engine inside a virtual machine
- Choose carefully your entry network node
- Setup data capturing solution

Operational security tips

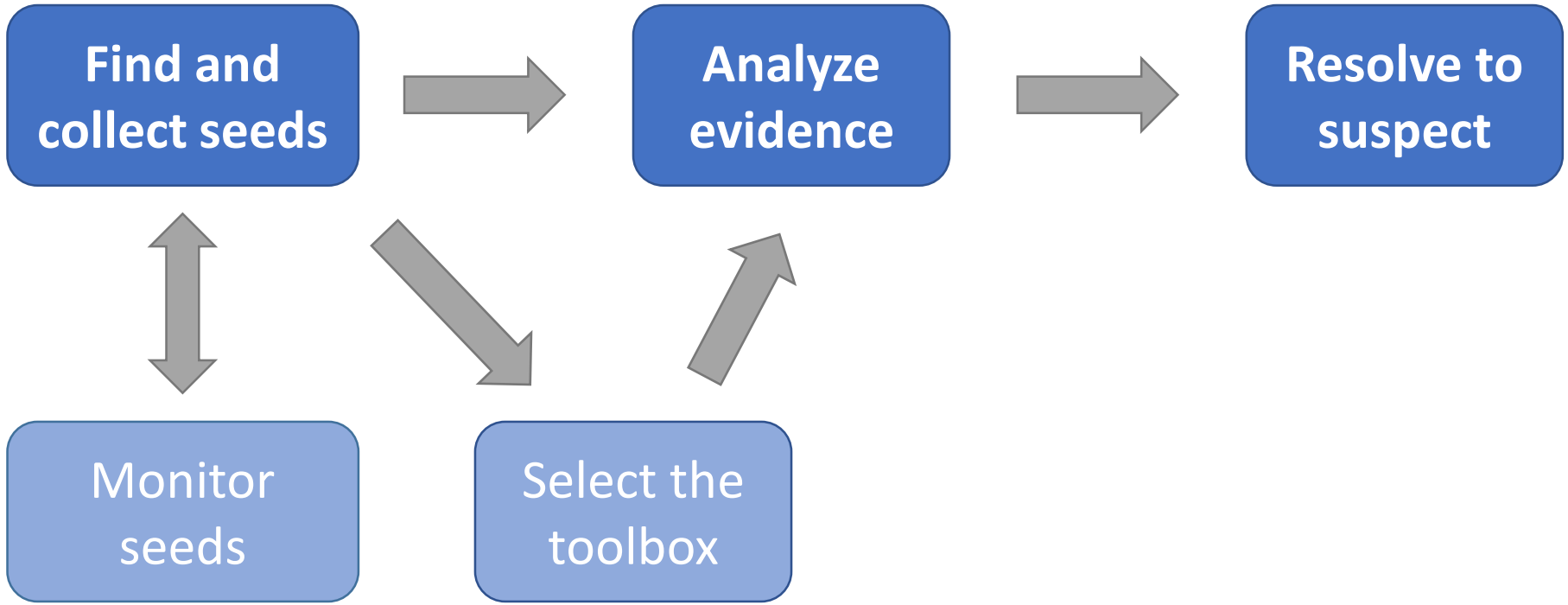
- Before opening the Tor browser, close all other software running on your system and disable any plugins in the browser
- Generate “New Identity” or “New Tor Circuit” every time you access a new .onion link
- Do not download any content unless necessary
- Use sock puppet accounts

Tor Investigations

- Take note…
  - The Tor network's popularity has been rather steady over last few years
  - Tor is a high priority target for security services, which are busy identifying and exploiting vulnerabilities in the browser
  - For this reason, maintaining one's security while using Tor is now more important than ever

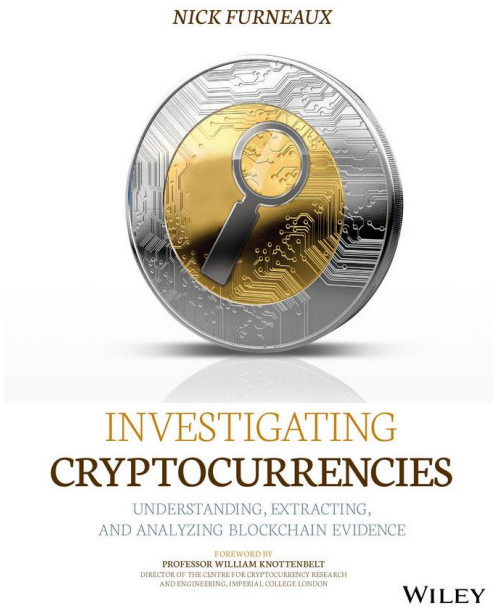
Cryptocurrency Investigations

Cryptocurrency investigation framework



Cryptocurrency investigation resources

Books, articles



Web tools

Address Checker	http://addresschecker.eu
Aware Online: Cryptocurrency Search Tool	https://www.aware-online.com/osint-tools/cryptocurrency-search-tool
Bitcoin Abuse	https://www.bitcoinabuse.com
Bitcoin Block Resources	http://explorer.b.tc
Bitcoin.org	https://bitcoin.org
Bitcoin WhosWho	http://bitcoinwhoswho.com
BitInfoCharts	https://bitinfocharts.com
Bitnodes	https://bitnodes.io
bitonic	https://bitonic.nl
BitRef	https://bitref.com
Blockchain.com	https://www.blockchain.com
Blockchain	https://blockchain.info
Blockchain Engine	https://blocksearchengine.com
Blockchain Explorers	https://btc.cryptoid.info
Blockchair	https://blockchair.com
BlockCypher	https://live.blockcypher.com
Blockonomics	https://www.blockonomics.co
Blocks.Press	https://blocks.press
BTC.com	https://btc.com
BTCsniffer	https://btcsniffer.com
Bytc.io	https://bytc.io

Specialized products

Chainalysis

CIPHERTRACE

DataWalk

ELLIPTIC

Bitcoin investigation online tools

Tracking Bitcoin transactions

- After finding a dark web website or a content, note any cryptocurrency addresses and other related identifiers you can find
- Run them through surface and dark web-based cryptocurrency explorers:
  - Wallet Explorer: www.walletexplorer.com
  - Blockchain Block Explorer: www.blockchain.com/explorer
  - Bitcoin WhosWho: https://bitcoinwhoswho.com
  - Bitcoin Abuse Database: www.bitcoinabuse.com

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