COMP 152-1: Human Factors in Security and Privacy

Vulnerable Populations

Lecture 23

Prof. Daniel Votipka
Spring 2022

(some slides courtesy of Adam Aviv)

Administrivia

- Homework 3 is due by midnight
- Any papers from week 10 or week 11 will count toward this week's require reading responses
- Meet your professor 1:1 by end of the month for **5 points on your final grade**

What we did last time!

- Developers are not the enemy either!
- Secure development ecosystem
- Why do developers make mistakes?
- Developers support forums
    - How can we make them more secure

What are we doing today?

- Vulnerable populations
  - Journalists
  - Undocumented Immigrants
  - Victims of intimate partner abuse
- What makes these user groups different?
- Other groups?

What are we doing today?

- Vulnerable populations
  - Journalists
  - Undocumented Immigrants
  - Victims of intimate partner abuse
- What makes these user groups different?
- Other groups?

High Profile Leakers and Whistle Blowers

WikiLeaks

Remember that Glenn couldn’t encrypt

Edward Snowden

Glenn Grenwald

But Laura Poitras could!

Edward Snowden

Laura Poitras

Reality Winner

Leaked information about 2016 Russian Election Interference

The Intercept_

https://theintercept.com/2017/06/05/top-secret-nsa-report-details-russian-hacking-effort-days-before-2016-election/

TOP-SECRET NSA REPORT DETAILS RUSSIAN HACKING EFFORT DAYS BEFORE 2016 ELECTION

A top-secret National Security Agency report details a months-long Russian hacking effort against the U.S. election infrastructure.

Matthew Cole, Richard Esposito, Sam Biddle, Ryan Grim

June 5 2017, 3:44 p.m.

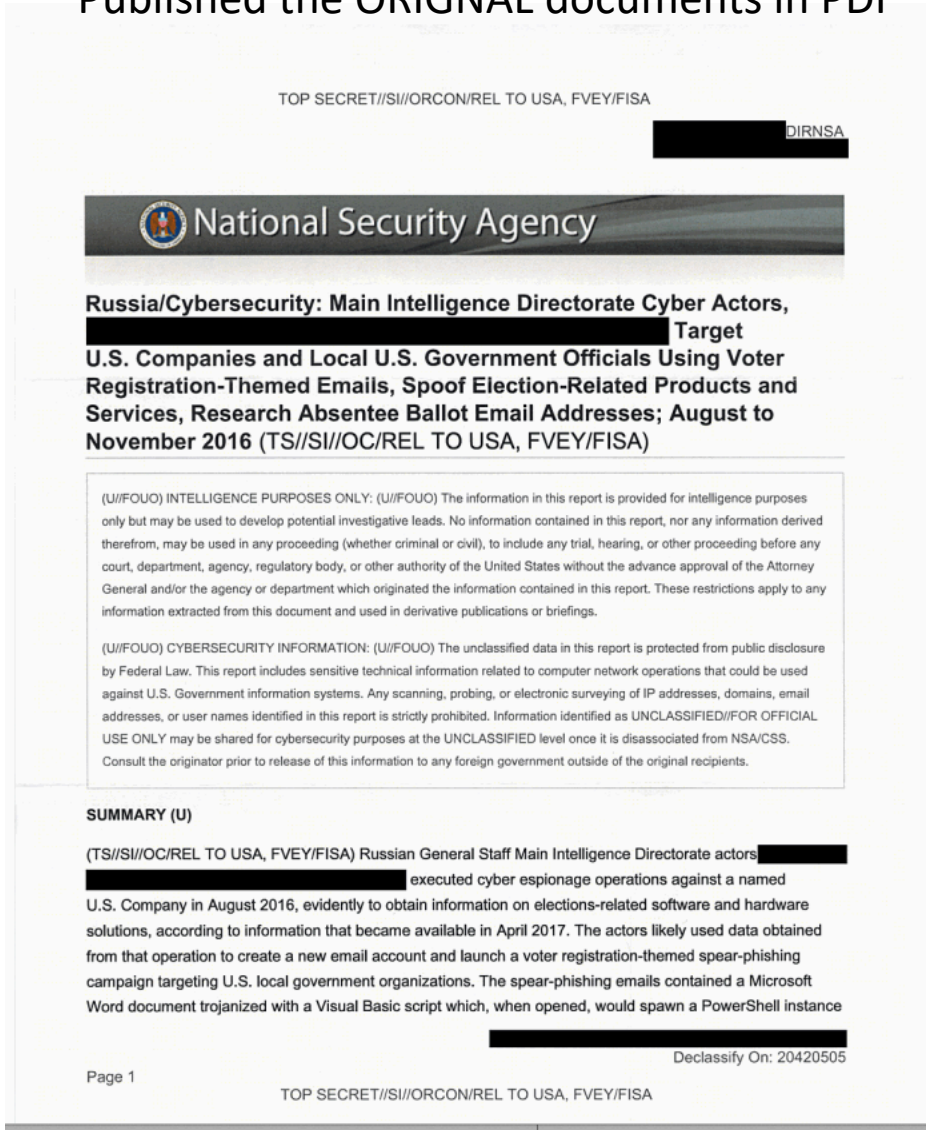
June 5, 2017

LEIA EM PORTUGUÊS →

RUSSIAN MILITARY INTELLIGENCE executed a cyberattack on at least one U.S. voting software supplier and sent spear-phishing emails to more than 100 local election officials just days before last November's presidential election, according to a highly classified intelligence report obtained by The Intercept.

The top-secret National Security Agency document, which was provided anonymously to The Intercept and independently authenticated, analyzes intelligence very recently acquired by the agency about a months-long Russian intelligence cyber effort against elements of the U.S. election and voting infrastructure. The report, dated May 5, 2017, is the most detailed

Published the ORIGNAL documents in PDF



TOP SECRET//SI//ORCON/REL TO USA, FVEY/FISA

[redacted] DIRNSA

National Security Agency

Russia/Cybersecurity: Main Intelligence Directorate Cyber Actors, [redacted] Target U.S. Companies and Local U.S. Government Officials Using Voter Registration-Themed Emails, Spoof Election-Related Products and Services, Research Absentee Ballot Email Addresses; August to November 2016 (TS//SI//OC/REL TO USA, FVEY/FISA)

(U//FOUO) INTELLIGENCE PURPOSES ONLY: (U//FOUO) The information in this report is provided for intelligence purposes only but may be used to develop potential investigative leads. No information contained in this report, nor any information derived therefrom, may be used in any proceeding (whether criminal or civil), to include any trial, hearing, or other proceeding before any court, department, agency, regulatory body, or other authority of the United States without the advance approval of the Attorney General and/or the agency or department which originated the information contained in this report. These restrictions apply to any information extracted from this document and used in derivative publications or briefings.

(U//FOUO) CYBERSECURITY INFORMATION: (U//FOUO) The unclassified data in this report is protected from public disclosure by Federal Law. This report includes sensitive technical information related to computer network operations that could be used against U.S. Government information systems. Any scanning, probing, or electronic surveying of IP addresses, domains, email addresses, or user names identified in this report is strictly prohibited. Information identified as UNCLASSIFIED//FOR OFFICIAL USE ONLY may be shared for cybersecurity purposes at the UNCLASSIFIED level once it is disassociated from NSA/CSS. Consult the originator prior to release of this information to any foreign government outside of the original recipients.

SUMMARY (U)

(TS//SI//OC/REL TO USA, FVEY/FISA) Russian General Staff Main Intelligence Directorate actors [redacted] executed cyber espionage operations against a named U.S. Company in August 2016, evidently to obtain information on elections-related software and hardware solutions, according to information that became available in April 2017. The actors likely used data obtained from that operation to create a new email account and launch a voter registration-themed spear-phishing campaign targeting U.S. local government organizations. The spear-phishing emails contained a Microsoft Word document trojanized with a Visual Basic script which, when opened, would spawn a PowerShell instance

[redacted]

Declassify On: 20420505

Page 1

TOP SECRET//SI//ORCON/REL TO USA, FVEY/FISA

https://www.nytimes.com/2017/06/06/business/media/intercept-reality-winner-russia-trump-leak.html

The New York Times June 6, 2017

After Reality Winner's Arrest, Media Asks: Did 'Intercept' Expose a Source?

Sharing an original document when asking questions of government officials, as The Intercept appears to have done, can expose metadata and high-tech watermarks that may reveal a leaker's identity. And an affidavit asserts that The Intercept revealed to a second contractor that the document was mailed from Augusta, Ga., where Ms. Winner resides.

Reality Leigh Winner. Instagram, via Reuters

possession of what it believed to be a classified document authored by the U.S Government Agency. The News Outlet provided the U.S. Government Agency with a copy of this document. Subsequent analysis by the U.S. Government Agency confirmed that the document in the News Outlet's possession is intelligence reporting dated on or about May 5, 2017 (the "intelligence reporting"). This intelligence reporting is classified at the Top Secret level, indicating that its unauthorized disclosure could reasonably result in exceptionally grave damage to the national security, and is marked as such. The U.S. Government Agency has since confirmed that the reporting contains information that was classified at that level at the time that the reporting was published on or about May 5, 2017, and that such information currently remains classified at that level.

14. The U.S. Government Agency examined the document shared by the News Outlet and determined the pages of the intelligence reporting appeared to be folded and/or creased, suggesting they had been printed and hand-carried out of a secured space.

15. The U.S. Government Agency conducted an internal audit to determine who accessed the intelligence reporting since its publication. The U.S. Government Agency determined that six individuals printed this reporting. These six individuals included WINNER. A further audit of the six individuals' desk computers revealed that WINNER had e-mail contact with the News Outlet. The audit did not reveal that any of the other individuals had e-mail contact with the News Outlet.

16. The U.S. Government Agency determined that WINNER had e-mail communication with the News Outlet on or about March 30, 2017, and March 31, 2017. The first

What went wrong? Why is this so hard?

What technologies and skills do journalists need to protect sources?

- What are the general practices of journalists in communicating with their sources?
- What are the security concerns and threat models of journalists with respect to source communication?
- What, if any, defensive strategies (technical or otherwise) do journalists employ to protect themselves or their sources? How and why do some possible defensive strategies succeed and others fail?
- What are the needs of journalists in their communications with sources that are currently hampered or unfulfilled by computer security technologies?

USENIX Security 2015

Investigating the Computer Security Practices and Needs of Journalists

Susan E. McGregor
Tow Center for Digital Journalism
Columbia Journalism School

Polina Charters, Tobin Holliday
Master of HCI + Design, DUB Group
University of Washington

Franziska Roesner
Computer Science & Engineering
University of Washington

Abstract

Though journalists are often cited as potential users of computer security technologies, their practices and mental models have not been deeply studied by the academic computer security community. Such an understanding, however, is critical to developing technical solutions that can address the real needs of journalists and integrate into their existing practices. We seek to provide that insight in this paper, by investigating the general and computer security practices of 15 journalists in the U.S. and France via in-depth, semi-structured interviews. Among our findings is evidence that existing security tools fail not only due to usability issues but when they actively interfere with other aspects of the journalistic process; that communication methods are typically driven by sources rather than journalists; and that journalists' organizations

and sources cross the line from legal consequences to the potential for physical harm [42, 57, 58].

Responses to these escalating threats have included guides to best computer security practices for journalists (e.g., [17, 43, 47, 62]), which recommend the use of tools like PGP [67], Tor [22], and OTR [14]. More generally, the computer security community has developed many secure or anonymous communication tools (e.g., [4, 10, 14, 21–23, 63, 67]). These tools have seen relatively little adoption within the journalism community, however, even among the investigative journalists that should arguably be their earliest adopters [48].

To design and build tools that will successfully protect journalist-source communications, it is critical that the technical computer security community understand the

Contact with sources

Please think about a specific story that you have published in approximately the last year for which you spoke with a source. (There is no need to tell us the specific story or source, unless you believe this information is not sensitive and would like to share it.)

- Whether they had a relationship with the source prior to this story;
- How they first contacted the source about the story;
- Primary form(s) of communication with the source;
- Whether they would feel comfortable asking this source to use a specific communication method; and
- How representative this example is of their communication with sources in general.

How they work as a journalist

- Their note-taking and storage process, and whether they take any steps to protect or share their notes;
- Problems that might arise if their digital notes or communications were revealed;
- Any non-technological strategies they use to protect themselves or their sources;
- Whether someone has ever recommended they use security-related technology in their work;
- How they define "sensitive" information or sources in their work;
- Any specific security-related problems to which they wish they had a solution;
- What kinds of devices they use, and who owns and/or administers them;
- Whether they have anyone, inside or outside of their organization, to whom they can go for help with computer security or other technologies; and
- Their self-described comfort level with technology and security-related technology.

Recruitment

		Participant		Interview			Technical Expertise	
Number	*Identifier*	*Gender*	*Organization (Type)*	*Location*	*Language*	*Length*	*General*	*Security*
1	P0	Male	Large, established	France	English	32 min	High	High
2	P1	Female	Large, new	USA	English	31 min	High	Medium
3	P2	Female	Large, established	France	English	39 min	Medium	Low
4	P3	Female	Large, established	France	English	39 min	High	Medium
5	P4	Female	Large, established	France	English	42 min	Medium	Low
6	P5	Male	Large, established	France	French	24 min	Medium	Low
7	P6	Male	Large, established	France	French	23 min	Medium	Medium
8	P7	Female	Large, established	France	English	27 min	High	Low
9	P8	Male	Large, established	France	English	20 min	High	Medium
10	P9	Male	Large, new	USA	English	41 min	High	Medium
11	P10	Female	Large, new	USA	English	31 min	Medium	Medium
12	P11	Female	Large, new	USA	English	19 min	Medium	Low
13	P12	Female	Small, new	USA	English	17 min	Medium	Low
14	P13	Female	Small, new	USA	English	34 min	High	Low
15	P14	Female	Small, established	USA	English	25 min	Medium	Medium

What would you expect?

Key Findings

- Concern levels
  - More expected: govt. surveillance, disciplinary action against sources
  - Less expected: financial impact on organizations
- Usability and adoption
  - Conflict between privacy needs and journalistic needs
    - Authenticating anonymous sources
  - Better general knowledge management, e.g., don’t just use google doc or evernote
- Driven by the source
  - Communication level set by the source, not the journalists
  - What the source is comfortable with is what the journalist will use
- Digital divide
  - Source populations do not have access to or knowledge about technology
  - Habits of sources are a bigger hindrance than that of journalists

Choice of communication technology

- Conflict between removing barriers for communication and keeping the source safe

[The source] probably understand[s] the threat model they're under better than I would. So, it brings up an interesting question: do you

and being paternalistic about it.

Tool or technology	Number of participants (of 15)	Inter-coder agreement (κ)
Phone	15	1.00
Email (unencrypted)	15	1.00
Evernote	3	1.00
Text editor	2	1.00
Chat (unencrypted)	1	1.00
Scrivener	1	1.00

Table 2: **Non-security-specific tools.** This table reports the number of participants who mentioned using various non-security-specific tools or technologies in their work.

Security Concerns

Category	Concern	Number of participants (of 15)	Inter-coder agreement (κ)
Threats to sources	Discovery by government	6	0.88
	Disciplinary action (e.g., lost job)	6	0.88
	Reputation/personal consequences	6	0.88
	Generally vulnerable populations (e.g., abuse victims)	4	0.65
	Discovery by others wishing to reveal identity	3	0.80
	Physical danger	3	0.86
	Prison	2	1.00
Threats to journalist or organization	Reputation consequences (incl. loss of source's trust)	9	0.89
	Being "scooped" (i.e., journalistic competition)	6	1.00
	False or misleading information from a source	4	0.36
	Physical threats (incl. theft)	2	0.50
	Financial consequences	1	1.00
Threats to others	Political / foreign relations consequences	1	0.50
	Other	1	1.00

Table 3: **Security concerns.** We report how many participants mentioned various threats to themselves, to their sources, to their organizations, or to others. These are not necessarily threats that participants have directly encountered or acted on themselves — that is, they discussed threats both in a hypothetical sense (concerns they have) and a concrete sense (real issues they have encountered).

Defensive Strategies

Category	Defense	Number of participants (of 15)	Inter-coder agreement (κ)
Technical defenses	Encrypting digital notes	6	1.00
	Keeping files local (not in the cloud)	5	0.89
	Encrypted communication with colleagues	3	0.81
	Circumventing organization's admin rights on computer	2	0.50
	Encrypted communication with sources	2	0.50
	Anonymous communication (e.g., over Tor)	2	1.00
	Air-gapping a computer (keeping it off the internet)	1	1.00
	Using additional, secret devices or temporary burner phones	1	1.00
	Visually obscuring information in photos/videos (e.g., blurring)	1	0.50
Ad hoc non-technical strategies	Using code names in communications or notes	8	1.00
	Claiming bad handwriting as a defense for written notes	3	1.00
	Contacting sources through intermediaries	2	0.81
	Citing multiple sources to create plausible deniability	1	1.00
	Using some method to authenticate source	1	1.00
Explicitly avoiding technology	Communicating in person	7	0.72
	Self-censoring (avoiding saying things in notes/email)	6	0.86
	Communicating only vague information electronically	5	0.83
	Physically mailing digital data (e.g., on USB stick)	2	1.00
Physical defenses	Home alarm system	1	1.00
	Physical safe (e.g., to store notes)	1	1.00
	Shredding paper documents	1	1.00

Table 4: **Defensive techniques.** We report the number of participants who mentioned using various defensive techniques to protect themselves, their notes, and/or their sources.

What security tools are used

	Number of participants (of 15)				Inter-coder
Encrypted chat (e.g., OTR, CryptoCat)	5	0	0	10	0
Encrypted email (e.g., GPG, Mailvelope)	4	4	0	7	4
Encrypted messaging (e.g., Wickr, Telegram)	0	1	0	14	1.00
Encrypted phone (e.g., SilentCircle)	0	2	0	13	1.00
Other encryption (e.g., hard drive, cloud)	5	1	0	9	1
Password manager	1	0	1	13	1.00
SecureDrop	0	0	1	14	1.00
Tor	2	1	0	12	0.89
VPN	2	1	0	12	1.00

Table 5: **Security tools.** This table lists security technologies discussed by participants. We report on the number who regularly use, have tried but don't regularly use, and haven't tried each tool. We consider use to be "regular" even if it depends on the sensitivity of the source or story, i.e., if the journalist regularly employs that tool when appropriate, even if not in every communication.

Reasons for not using security tools

Usability, reliability, and education

In addition to the well-known usability challenges with many security tools, participant P10 described the difficulty of knowing which tools to trust:

> *A lot of services out there say they're secure, but having to know which ones are actually audited and approved by security professionals — it takes a lot of work to find that out.*

Institutional Support

Though some participants described supportive organizations, 9 of 15 mentioned that they did *not* have anyone to go to for help with computer security issues who was both within their organization and whose role explicitly involved providing technical support of this nature.

Digital Divide

As our participants described, this challenge applies particularly to vulnerable populations, such as low-income communities, abuse victims, homeless people, etc. To take just one example, P12 discussed the digital divide as follows:

> *Most of the [sensitive sources] I've worked with [are] also people who probably aren't very tech-savvy. Like, entry-level people in prisons, or something like that. So if they were really concerned about communication, I don't quite know what a secure, non-intimidatingly-techy way would be. [...] Some of them don't even necessarily have email addresses.*

Functions impeded by security technology

- Anonymous communication may make it difficult for journalists to authenticate sources, or to authenticate themselves to sources
- Using security tools may impede communications with colleagues who don't use or understand them.
- Constraints on communications with sources may reduce the quality of information journalists can get

In order to develop computer security technologies that will be widely adopted by journalists, the computer security community must understand such failures of existing tools. We emphasize that these failures are not merely the result of computer security tools being hard to use (a common culprit [65]) but often arise when a tool did not sufficiently account for functions important in a journalist's process, such as the ability to authenticate sources.

First Contact Problem

The first contact is never or very rarely anonymous or protected. If someone wants to give me some information and we don't already know each other, how would he do it? He could send me an email, yeah, okay—but then how could I be sure it's him? Unless he contacts me with his real identity first. It's very difficult to have the first contact secure.

Recommendations for Security Community

- Understanding the journalistic process
  - Differs from a typical user
- First contact and authentication
  - Post special sentence on twitter
  - Use tools similar to keybase
- Focus on Sources
  - Who and what is being protected is slightly different than traditional threat models
- Metadata protection
  - Legally and largely unprotected
- Knowledge Management
  - Do not have a clear systemization of good practices
- Broader applicability
  - Useful beyond journalists, like lawyers and dissidents

What’s going on today with news sites?

https://www.nytimes.com/tips

Got a confidential news tip?

Do you have the next big story? Want to share it with The New York Times? We offer several ways to get in touch with and provide materials to our journalists. No communication system is completely secure, but these tools can help protect your anonymity. We've outlined each below, but please review any app's terms and instructions as well. Please do not send feedback, story ideas, pitches or press releases through these channels. For more general correspondence visit our contact page.

WhatsApp

Signal

The free and oper
messages, photos
when you first reg
metadata surroun
messages to self-
phones (once it's

Add us: +1 646-95

Instructions

Email

You may se
is an encryp
documents.
makes it ea
email you're
recipient, subject or information about when the email was sent. This metadata will be available to your email provider.

Fingerprint: 44B6 6121 3CE6 66D6 5403 B4CC 44A3 475A E1AA A9EB
Email: tips@nytimes.com

SecureDrop

This encrypted submission system set up by The Times uses the Tor anonymity software to protect your identity, location and the information you send us. We do not ask for or require any identifiable information, nor do we track or log information surrounding our communication.

We strongly recommend that tips be sent using a public Wi-Fi network, and that the computer you use is free of malware. If the computer is compromised, communications using SecureDrop may be compromised as well. The steps below outline best practices for use of SecureDrop, as well as the steps that we take to protect your privacy.

Details

Confidential Tips

Maximize your data security

The Washington Post offers several ways to securely send information and documents to Post journalists. No system is 100% secure, but these tools attempt to create a more secure environment than that provided by normal communication channels. Please review the fine print before using any of these tools so you can choose the best option for your communication needs.

See more

Signal

This is a free, end-to-end encrypted messaging app, which allows you to communicate directly with The Post. You can send text messages, images and video. It also allows you to talk securely with a reporter by calling them via the Signal app. No metadata is retained by Signal. It can be downloaded from the app store. Signal can be configured to delete messages automatically at a designated time interval.

The Post's Signal phone number: **202-222-5862**

Download Signal from iTunes

WhatsApp

This is a free messaging app with end-to-end encryption that also allows the transfer of documents, photos and videos. WhatsApp can be used to make secure phone calls. It is owned by Facebook. Some data is retained by WhatsApp.

The Post's WhatsApp phone number:
202-222-5862

Download WhatsApp

Encrypted Email

If you use PGP encryption, here is our fingerprint and link to our public key. If you use our public key with a mail encryption plugin, for example Mailvelope or Enigmail, this encrypts the contents of your message but not the subject line or the name of the sender.

Fingerprint: **88D9 812E D074 7AEA EA1E C219 DC81 6CC4 FE3D 535C**

Email: **lockbox@washpost.com**

The Post's public key

Maybe this is a usability success story?

- Panama Papers
  - 2TB of leaked documents about private bank accounts in Panama
- Large journalistic collaboration
  - Using privacy preserving tools
  - Keep project secret until publication
- Survey study of 118 participating journalists
- Semi structured interviews with the designers and implementers of the technical systems

USENIX Security 2017

When the Weakest Link is Strong:
Secure Collaboration in the Case of the Panama Papers

Susan E. McGregor
Columbia Journalism School

Elizabeth Anne Watkins
Columbia University

Mahdi Nasrullah Al-Ameen
Clemson University

Kelly Caine
Clemson University

Franziska Roesner
University of Washington

Abstract

Success stories in usable security are rare. In this paper, however, we examine one notable security success: the year-long collaborative investigation of more than two terabytes of leaked documents during the "Panama Papers" project. During this effort, a large, diverse group of globally-distributed journalists met and maintained critical security goals–including protecting the source of the leaked documents and preserving the secrecy of the project until the desired launch date–all while hundreds of journalists collaborated remotely on a near-daily basis.

Through survey data from 118 participating journalists, as well as in-depth, semi-structured interviews with

Mexico, Pakistan, and others [42].

Facilitated by the International Consortium of Investigative Journalists (ICIJ), the Panama Papers project [31] represents a uniquely positive security case study, wherein systems designed, implemented, and managed by a handful of ICIJ staffers helped meet and maintain the organization's security goals for the project. While it is impossible to state definitively that this (or any) system could *not* have been compromised, ICIJ's efforts appear to have been successful in maintaining their primary security goals, including: (1) protecting the identity of the source of the Panama Papers' documents (2) maintaining control of the documents within

Built/Refined Special Tools for Journalists

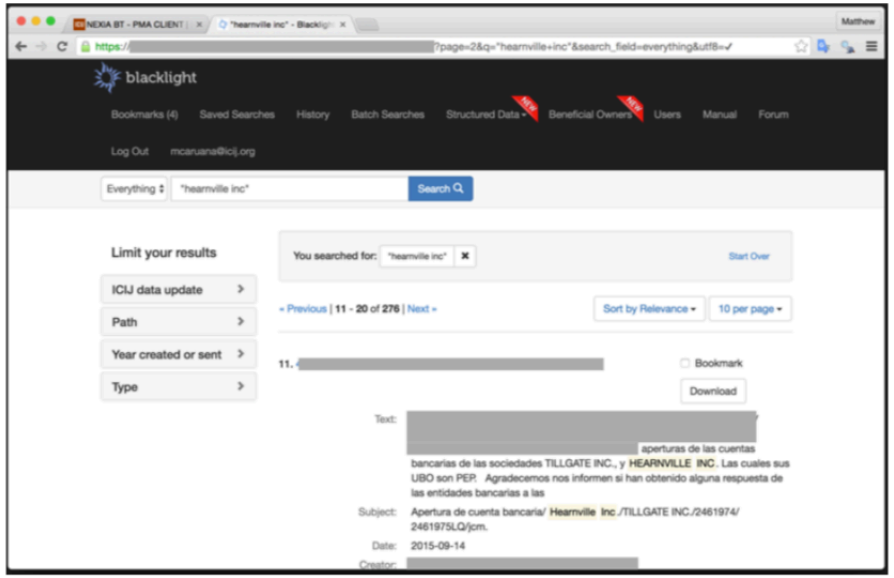


Figure 1: **Blacklight.** Screenshot of the document search platform. *Courtesy: ICIJ.*

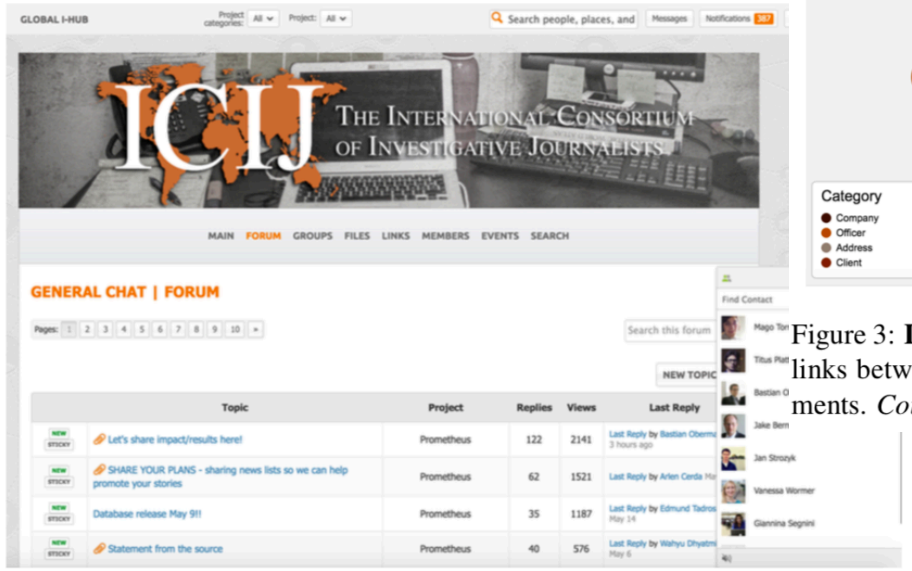


Figure 2: **I-Hub.** Screenshot of the collaboration and communication platform. *Courtesy: ICIJ.*

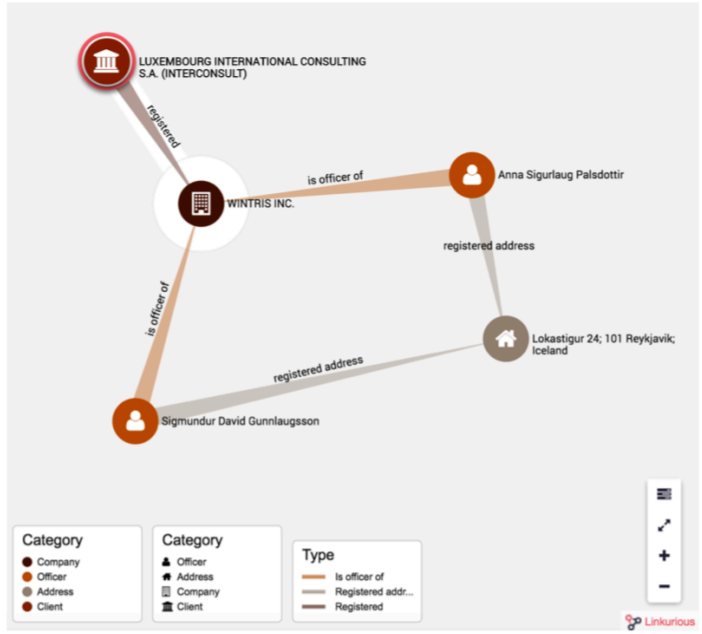


Figure 3: **Linkurious.** Screenshot of the system that visualizes links between entities mentioned in the Panama Papers documents. *Courtesy: ICIJ.*

Prior Security Experience/Practices

Are these surprising?

Security Practice	Unaware	Never	Few	Occasionally	Frequently
Passphrase	9%	21%	13%	15%	52%
Two-factor	16%	29%	14%	13%	42%
PGP	14%	34%	10%	17%	25%

High or low?

Table 1: **Familiarity with and Usage of Security Practices Prior to Project (N=118).** Scale items were "Never heard of it before" (Unaware); "Knew about it, hadn't used" (Never); "Had used a few times" (Few); "Used occasionally" (Occasionally) and; "Used frequently" (Frequently).

Feedback about security

The Google Authentificator [sic] tool... when I changed my phone (twice during the investigation) I had to communicate with the support team to reboot the passwords. (J118)

At certain times security turned into a barrier into getting more done... Every time a cellphone died or went missing (frequently) I needed to reconfigure authentication. (J68)

This is sensitive data that has been leaked to ICIJ for a reason, and that those sources are trusting us with being...guardians of that information and protectors. So it's not for us to give away to anybody, not even a trusted colleague. (E2)

Making Security Required

It was not a choice... If somebody did not get themselves a PGP, he did not get access to the forum and to the I-Hub. (E1)

We had a rule in our team that whatever is about the Panama Papers—and if it's only about, I don't know, "Let's meet at nine, okay?" then we encrypt it because we encrypt everything that has to do with the Panama Papers. So that was our rule... the automatic step was to encrypt. (E1)

Good or a bad thing?

What made this successful?

- Useful and necessary system functionality
  - Journalists had to use security and also had to use the systems to do their jobs
- Normalizing and sustained emphasis on Security
  - Security practice was the norm, everyone used it, so not using it would be ineffective
- Multiple forms of secure communication
  - Not just pgp, but also secure messengers like Signal
- Mutual respect and reciprocity through relationships built on trust
  - Journalists respected work of developers in building in security
  - Developers respect the work of journalists

Discussion

- How do we compare the Panama papers article to the prior article?
- What other factors do you think made this such a success?
  - Why might this have worked better than other settings?
- Can these successes be replicated in other settings?
  - What about at a university setting?

What we did today!

- Vulnerable populations
  - Journalists
  - Undocumented Immigrants
  - Victims of intimate partner abuse

What’s next?

- Vulnerable populations
  - Journalists
  - Undocumented Immigrants
  - Victims of intimate partner abuse