

FW: [Non-DoD Source] Virus contact tracing

From: "Watson, Ian D. EOP/OSTP" (b)(6)
To: "Bonyun, Sean C. EOP/OSTP" (b)(6) >
Cc: "Taylor, Jake M. EOP/OSTP" (b)(6)
Date: Thu, 26 Mar 2020 09:44:03 -0400
Attachments: Craxel - Building a National Contact Tracing System.pdf (267.35 kB)

Another cell phone tracking proposal. Got it. Jake is trying to establish a portal/clearinghouse for capabilities such as this, so I am copying him as well.

Ian D. Watson
Assistant Director for Biotechnology & Biosecurity
Office of Science & Technology Policy
Office: EEOB (b)(6)
Unclass: (b)(6)
SIPR: (b)(6)
JWICS: (b)(6)
Desk: (b)(6)
Cell: (b)(6)

From: Bonyun, Sean C. EOP/OSTP (b)(6)
Sent: Wednesday, March 25, 2020 7:29 PM
To: Watson, Ian D. EOP/OSTP (b)(6)
Subject: Fwd: [Non-DoD Source] Virus contact tracing

Good evening Ian - no need to respond tonight. Jack is a former colleague who was Aaron's predecessor. Would appreciate any guidance. Hope you and your family are all doing great.

Best,
Sean

Begin forwarded message:

From: "Wilmer, John W (Jack) SES OSD DOD CIO (USA)" (b)(6) >
Date: March 24, 2020 at 6:29:18 PM EDT
To: "Bonyun, Sean C. EOP/OSTP" <(b)(6)>
Subject: FW: [Non-DoD Source] Virus contact tracing

Sean,

Not sure if you all are looking at technologies which might be able to help manage the pandemic, but I thought I would pass this along. If interested, please let me know & I'll be happy to do a warm intro to whomever you recommend and Dave.

Thanks,
jack

From: David Enga (b)(6) >
Sent: Tuesday, March 24, 2020 1:59 PM
To: Wilmer, John W (Jack) SES OSD DOD CIO (USA) (b)(6)
Subject: [Non-DoD Source] Virus contact tracing

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

Jack,

Understand this isn't in your purview and you are likely swamped. However, our technology could be used for a really secure, virus contact tracing system using location data. I'm socializing it with a few smart people I know to get some feedback before we start really pushing it. If you have any thoughts, we'd appreciate it. If not, no worries. Hope you and your family are staying safe. Thanks! -Dave

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David Enga
Craxel, Inc.

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BUILDING A NATIONAL VIRUS CONTACT TRACING SYSTEM

CRAXEL

Document Date: March 2020

Email: (b) (6) | **Web:** <https://craxel.com>

ABSTRACT

Imagine the impact on the current crisis if you could answer the following question for 230 million people – “In the last 10 days, have I been within 100 yards of an individual with a positive COVID-19 test?” The ability to answer this question could allow millions of people to go back to work.



INTRODUCTION

This paper describes a technical approach to quickly implement a nationwide emergency virus contact tracing system in order to suppress the spread of COVID-19 while enabling a return to high levels of economic activity. Craxel’s technical breakthroughs enable the rapid deployment of this system with security and safeguards against misuse based on strong encryption, state of the art searchable encryption, and split encryption keys for multi-signature digital authorization/access control. It is our hope that this paper will provide the detailed information necessary to make informed decisions about creating and deploying such a system. It also identifies several key questions that must be addressed to determine if such a system will be effective.

- The COVID-19 pandemic is stark proof of our nation’s vulnerability to global pandemics and germ warfare. The countries of the world have a choice in how to combat these pandemics. They can do nothing and potentially allow their health care systems to be overrun and millions to die. They can try to slow infection rates through social distancing, so that health care infrastructure can function until a vaccine is ready. Unfortunately, this requires shutting down large portions of economic activity for months at a time. After the first week of an initial 15-day period of widespread social distancing, the US population already appears to be losing patience with this approach as large numbers of people lose their jobs. A better option that would allow the economy to largely function could be **targeted virus suppression**, with the objective of reducing the spread of the virus ($R_0 < 1$) until the epidemic grinds to a halt.

Effective testing is an essential component of any suppression strategy. You can suppress a virus in the United States without shutting down large segments of the economy if you test hundreds of millions of people repeatedly and strictly quarantine those with positive results. Repeated testing is essential because of asymptomatic community spread. With the current spread of the COVID-19 virus, widespread testing and quarantine is likely the most effective way to suppress the outbreak. The problem is that executing this repeated testing on a nationwide scale is extraordinarily difficult and the materials for billions of tests may



not even be available. Technology offers an opportunity to reduce the amount of testing through targeted, aggressive contact tracing.

Cell phones have become ubiquitous in the United States. It is entirely feasible for location data to be collected from wireless network providers in order to maintain several weeks of location history for ~230 million Americans. It is also entirely feasible to combine this location history of individuals with the location history of subjects with positive test results to identify individuals that should be tested and isolated. Possibly more importantly, you can identify those that are very unlikely to have been exposed. This would allow most of society to continue while small subsets are shut down and isolated. This is a powerful idea that makes suppression a feasible strategy for dealing with an epidemic while minimizing the economic impact. Because of asymptomatic transmission, it is impossible to guarantee that someone has not been exposed simply because they've not been colocated with an individual that has tested positive. There would inevitably be "leakage". This leakage is why rapid testing is so important, to minimize the amount of transmission and drive R_0 to less than 1. The purpose of a nationwide emergency virus contact tracing systems would be targeted testing of asymptomatic individuals. While everyone that has any symptoms should be tested as soon as possible, asymptomatic individuals that have been colocated with individuals with positive tests can also be identified and tested. If this approach works, large portions of the country could function as we effectively suppress an outbreak.

However, there are many important questions to be considered as a naïve implementation of such a system could do more harm than good. Can testing be rapidly performed at the scale required? Placing cell phone location data in the hands of government threatens the privacy of every citizen. Location history is incredibly sensitive and even data for a small time period can be revealing for a long period of time. Throughout the history of our country, millions of Americans have given their lives for freedom, essentially choosing freedom over life. Allowing the government to maintain a history of the location of every American with a phone is a significant threat to that freedom.

Craxel's recent breakthroughs make it possible to rapidly implement an emergency virus contact tracing system with extraordinary security and safeguards against misuse. Craxel has developed several revolutionary technologies that we believe uniquely solve these key challenges at the required scale and with unprecedented security and privacy. These breakthroughs include:

- Spatial/temporal indexing at massive scale for rapid risk scoring
- Searchable encryption for organizing the data with unprecedented security
- Compartmentalization using strong encryption and many encryption keys to safeguard the data
- Multi-signature access control using secret sharing to protect against abuse

It is technically possible to implement a nationwide virus contact tracing system with unprecedented security and privacy protections. It is an open issue exactly how effective aggressive contact tracing like this would be in reducing the amount of testing required for suppression. However, given the economic chaos caused by the COVID-19 pandemic, developing and testing this system should begin as soon as possible. This paper describes the challenges, solutions, and technical implementation details for developing such a system. Please contact David Enga at (b) (6) if you have interest in discussing this implementation or reviewing the rest of this paper.

