# Designing for scale

## How to use mobile devices to recruit, train and equip the extra 18,500 defence personnel

by Tom Worthington MEd FHEA FACS CP

For the ASCILITE Mobile Learning Special Interest Group meeting, Friday, August 26, 2022

# Tom Worthington MEd FHEA FACS CP

- Honorary Senior Lecturer in Computing at the Australian National University
- Past President, Honorary Life Member and Fellow of the Australian Computer Society
- Wrote IT Policy at HQ ADF & DoD
- Blogs as the Higher Education Whisperer


At Australia/US Joint Exercise *Tandem Thrust*, November 1997
http://www.tomw.net.au/nt/tt97.html

# Why Expand the Australian Defence Force?

- Russia invaded Ukraine in February 2022
- 10 March, then PM says ADF to increase 30% by 2040
- 3 August, new Australian PM announces review of Defence
- 4 August, China air & naval exercises around Taiwan

President Zelenskyy thanks Australia for largest non-NATO military assistance to Ukraine (ANU TV, 3 August 2022)

# What New Skills Will Defence Personnel Need?

1. Conduct Cyberwarfare,
2. Coordinate Information Warfare,
3. Operate Large Armed Air, Sea & Land Drones,
4. Work with Industry.

# Conduct Cyberwarfare


Eesmaa Public Lecture, ANU, 30 July 2021

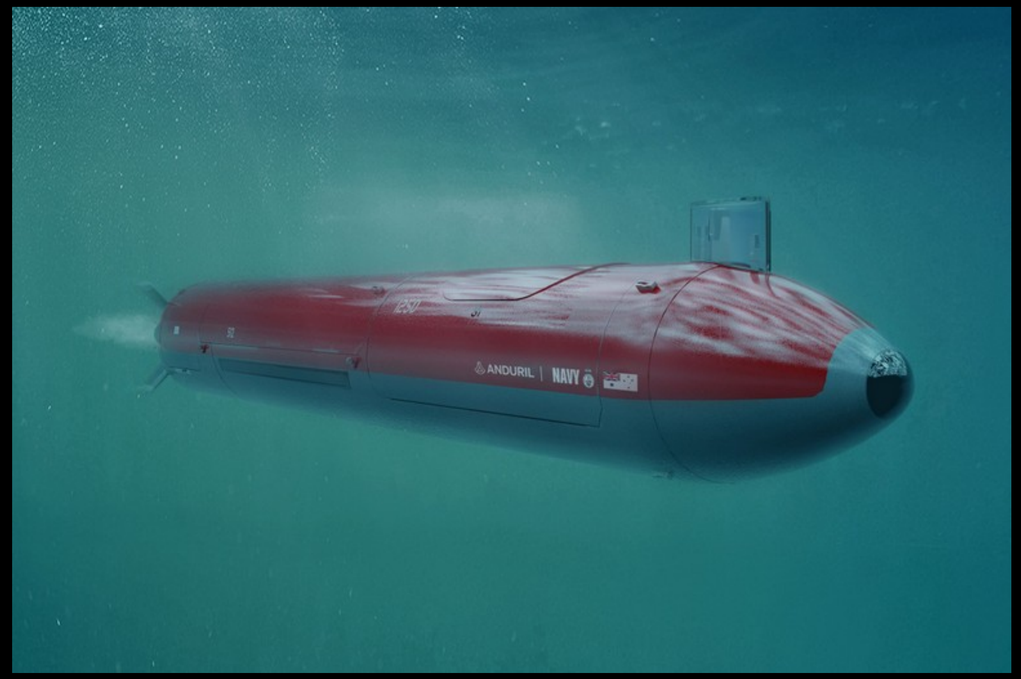

Australian Signals Directorate

# Coordinate Information Warfare


Mr Myroshnychenko, Ukraine Ambassador Designate to Australia, at ANU, 30 March 2022

Information Warfare Division, Australian Department of Defence

# Operate Armed Air, Sea & Land Drones




Anduril extra-large autonomous undersea vehicle for RAN


Loyal Wingman

Loyal Wingman UAV for RAAF

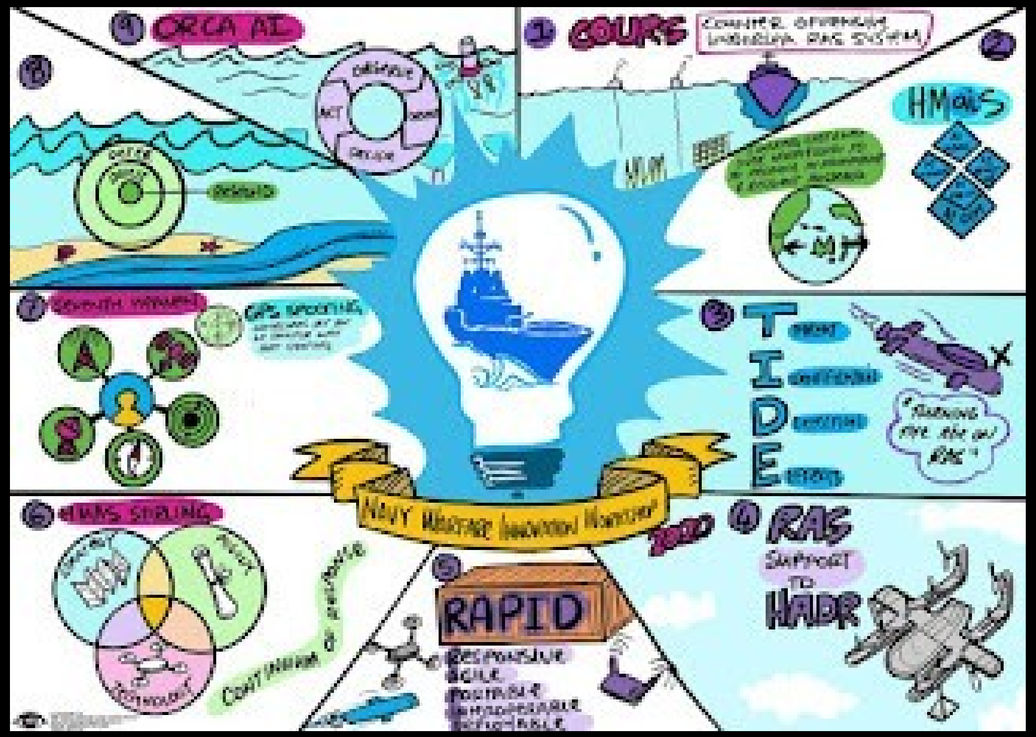
# Work with Industry

**Navy Warfare Innovation Workshop 2020**

**Hackerthon for**

- **Defence**
- **Government**
- **Industry**

**Get people working together.**




Event canvas from NWIW 2020 by Paul Telling

# How Can Mobile Devices Help With Skills?

1. **VR to Learn to Drive the Drones**
2. **Learn to Work Together using a Smartphone**
3. **Promote Reserve Defence Careers via Mobile Devices**
4. **Hackerthons for Recruitment and Training**

# VR to Learn to Drive the Drones

Integrated training, using the same equipment and interface as for operation

Ruggedised consumer derived equipment

ANU Defence Industry Workshop on XR, 5 November 2019

# Learn to Work Together using a Smartphone

Military communications equipment shrunk from truck to briefcase to pocket size.

Robert Lester sending a report from K95

# Promote Reserve Defence Careers via Mobile Devices

"Here to guide you there" (video), Open Universities Australia, 11 April 2022 https://www.youtube.com/watch?v=pHo7-hxLz64

# Hackerthons for Recruitment and Training


Shockproof, defence sponsored hackerthon run by the Australian Computer Society, 2020

# Role for Universities:

## Research & Teaching ADF via Mobile Devices

- Use skills from pandemic teaching
- Adapt VR for training from rescue (Pedram, 2018), and emergency medical personnel (Aiello, Sevigny, & Cochrane, 2021)

ASD-ANU Co-Lab located in the ANU Maths & Computer Science Building

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# Some Ways to Scale

1. Mobile Recruiting,
2. Mobile Trainers,
3. Industry Standard Training,
4. Uber War.

Preparing reports from K95, 1995

# Questions?

For links see:

"Expanding Defence Training via Mobile Devices",
Tom Worthington, Higher Education Whisperer, August 18, 2022

https://blog.highereducationwhisperer.com/2022/08/expanding-canberra-defence-training.html

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"Designing for scale: How to use mobile devices to recruit, train and equip the extra 18,500 defence personnel", by Tom Worthington, at the Mobile Learning Special Interest Group meeting of the Australasian Society for Computers in Learning in Tertiary Education, 10 am Canberra time, Friday, August 26, 2022.

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Tom Worthington, is an  Honorary Senior Lecturer, in the School of Computing, at the Australian National University. He is a Fellow of the Australian Computer Society, and the Higher Education Academy. Tom previously wrote IT policy at the Australian Department of Defence.

## Why Expand the Australian Defence Force?

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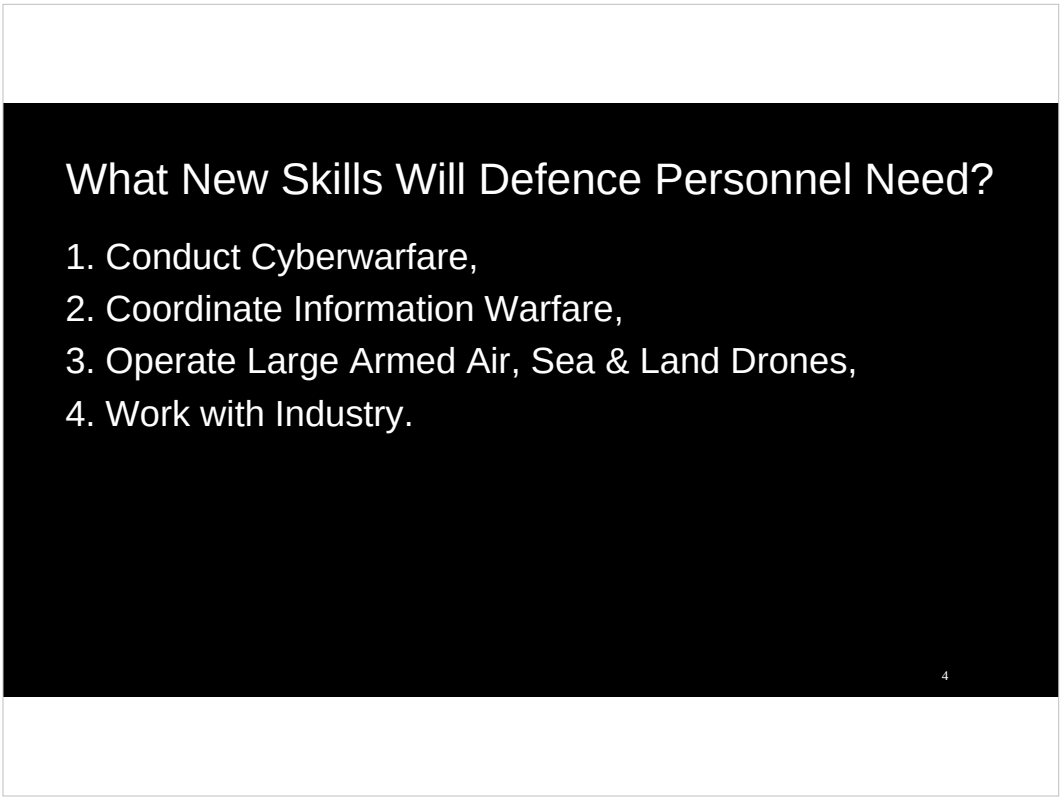
On 10 March 2022, the then Prime Minister announced that the Australian Defence Force personnel will increase 30% by 2040, at a cost of $38B. As the PM noted, “You can’t flick a switch to increase your army, navy and air force overnight, growing the type of people and skills we need to face the threats of the future takes time, so we must start now so critical skills can be taught and experience gained". While the government has changed since then, there is bipartisan support for a stronger military to meet increased challenges.

Russia invaded Ukraine in February 2022. Volodymyr Zelenskyy, President of Ukraine, made an impassioned speech to staff and students of the Australian National University, 3 August, via video. He acknowledged Australia's contribution as the largest non-NATO provider of military assistance to his country. That assistance included not only Australian made armored vehicles, but training in cyber defence.

On 4 August 2022 China commenced air and naval exercises involving live fire, around Taiwan, including ballistic missiles fired over the island. Taiwan responded with its own live-fire exercises on 7 August. Fortunately the situation has not escalated, but tension remains.

On 3 August, the new Australian Prime Minister announced a review of Australia's Defence posture and structure, to report by March 2023, for mobilization needs in 2032-33. An interim report is to be provided, but no deadline for this has been made public. While the review documentation mentions infrastructure, estate, disposition, logistics, and nuclear-powered submarines, the skills required of the members of the Australian Defence Force, and the people who support them, are not mentioned.




What New Skills Will Defence Personnel Need?

1. Conduct Cyberwarfare,
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In July 2021, Ms Kersti Eesmaa, Estonian Ambassador to Australia, talked at the ANU on how her nation was developing a sophisticated digital economy. Part of this was protecting government, and civil infrastructure from cyber-attack. In April 2007 cyber-attacks were launched against Estonia, suspected to be from Russia. In response NATO created a Cooperative Cyber Defence Center of Excellence, in Tallinn, Estonia. The Center now offers a comprehensive set of courses related to defensive and offensive cyber-warfare.


In March 2022 Ukraine's new Ambassador to Australia made an unscheduled speech at ANU on "Russia's Invasion of Ukraine". He said that the Ukraine destroyed the myth of Russian invincibility. Mr Myroshnychenko pointed out he doesn't have a background in diplomacy, but in strategic communications, and co-founded Ukraine Crisis Media. Before coming to Australia he ran Information warfare for the Ukraine. He pointed out US Starlink satellite communications system had been useful for both civilian and military communications in the Ukraine. He also pointed out how Russia sought manipulate public opinion using messages different for internal and external audiences. The Ambassador also suggested Australia could play a useful role countering Russian propaganda in the Pacific.

Mr Myroshnychenko referred to the use of talk shows by Russia, which manipulate emotions, modeled on those popularized in the USA. He then looked ahead to how difficult it will be to reeducate the people influenced by Russian messages. He pointed out how difficult this was, with people in Germany after WWII. But perhaps a better analogy today would be with those convinced by QAnon conspiracy theories.

The day after the Minister's speech, the  Australian Government announced a doubling of the staff of the Australian Signals Directorate, and expansion of offensive cyber operations. However, there was no mention of increasing the staff of the ADF Information Warfare Division.

The Australian Defence Force will need personnel with very deep technical skills in how to protect computer systems, and attack those of enemies. They will also need a deep understanding of how to provide convincing information, directly online, and through the media.


In the 2022 Australian election campaign, the Australian Liberal Party proposed an "Autonomous undersea warfare capability for Australia's navy", as part of its electoral platform. The new Labor government is reported to have accelerated this program, with the first drone submarine to be built in Sydney in 2023. These drones, at 30 metres long, are larger than the midget submarines which attacked Sydney harbor in WWII. Defence personnel will need to know how to operate, and maintain the drones.

Work is also progressing rapidly on a high performance pilot-less aircraft for the air force, the Loyal Wingman, to be built in Queensland. As well as operators, defence will need personnel to understand the complexities of the Artificial Intelligence software used, and how the aircraft will operate alongside crewed aircraft. The operators may use virtual reality headsets to fly the aircraft, while on the ground personnel would use wrist mounted controllers.

# Work with Industry

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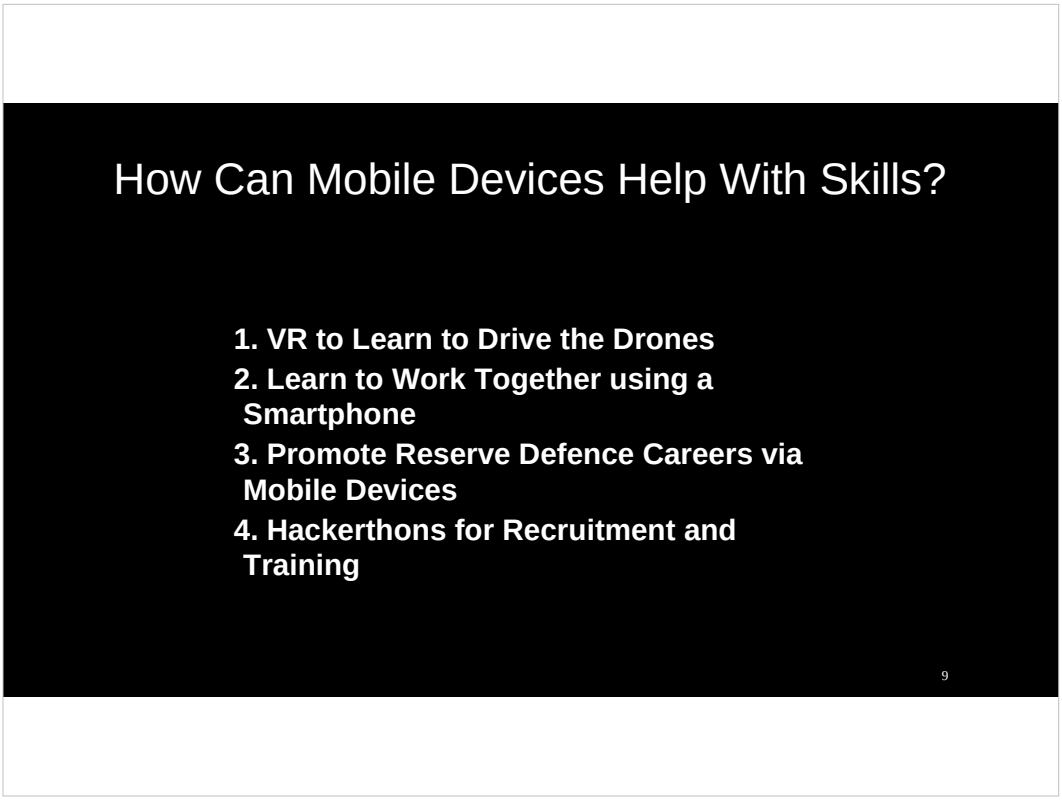
In December 2020 I facilitated a team in the Navy Warfare Innovation Workshop 2020, at the Australian Defence Force Academy, in Canberra. Mixed teams of defence personnel from Army, Navy and Air Force, worked with civilian government personnel, and staff from companies, on ways to combat treats with new technology. My team came up with TIDE: Treat Identification Detection and Effects, for dealing with swarms of RAS, Robotic Autonomous Systems. An important part of this exercise was having defence personnel get used to working in diverse teams to come up with quick solutions.

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# VR to Learn to Drive the Drones

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Virtual Reality headsets, Augmented Reality glasses, and handheld devices, are increasingly used as the interface for modern weapons and equipment. This allows for integrated training, using the same equipment and interface as for operation. Increasingly this is using ruggedized consumer derived equipment, rather than bespoke hardware. This also allows for lower cost consumer devices to be used in training, even by the personnel at home.

The Australian National University College of Engineering and Computer Science hosted a Defence Industry Workshop on Extended Reality, 5 November. 2019 as part of a national Extended Reality Cooperative Research Center  bid.

# Learn to Work Together using a Smartphone

Military communications equipment shrunk from truck to briefcase to pocket size.

Robert Lester sending a report from K95



An important military skill is working with others. This is where mobile devices can be as important as for operating drones. Personnel will need to be able to distribute

information and make decisions, with military personnel from other services, and civilians. It will not be possible to bring everyone to a central location, instead decisions have to be made on the fly (literally). Working at the Department of Defence in the 1990s, I observed military conferences in offices, in the field, and at sea. These initially required a satellite dish several metres wide, & a room full of equipment. Later this was reduced to umbrella, and briefcase size. The same capability is available in a hand held unit.

# Promote Reserve Defence Careers via Mobile Devices

"Here to guide you there" (video), Open Universities Australia, 11 April 2022 https://www.youtube.com/watch?v=pHo7-hxLz64



Australian can't afford to pay for all of the personnel with advanced technical skills to be employed full time in the Australian Defence Force. This requires expansion of reserve part time personnel. This provides the opportunity to use mobile devices to train, and coordinate part time recruits. Traditional war planning assumes that reserve personnel will be mobilized, when required. However, the fast tempo of modern warfare may not permit reserves to be called up in time to be of use. Also there are likely to be months, or years, of "grey-zone" operations, which do not meet the criteria for all out war. In these situations, it would be useful to be able to call on reserves, for a few minutes or hours work, much like the gig-economy. These personnel need not leave their usual workplace, but instead work via a secure mobile device.

The military tend to use advertising promoting an outdoors active dynamic lifestyle to attract recruits. However, something more like Open Universities Australia's  marketing of online university courses may be more appropriate for technical reserve recruits. In the television advertisement, the student is shown leaping from place to place, but then ends with them sitting studying on a smartphone. The message is that this is something which can fit into everyday life.

# Hackerthons for Recruitment and Training


Shockproof, defence sponsored hackerthon run by the Australian Computer Society, 2020



In addition to the Navy Warfare Innovation Workshop, there were two defence sponsored hackerthons run by the Australian Computer Society ran in 2020. These used Slack, Zoom, and the usual collaboration tools. These had hundreds of participants and about 80 mentors. The Shock-proof hackerthon on Secure Supply Chains for the Australian and New Zealand Defence Forces was unusual as it was aimed at defence force personnel, but open to anyone.

# Role for Universities:

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The need to recruit and train an expanded Australian Defence Force in new technical areas will challenge the capacity of current trainers and techniques. This provides an opportunity for Australian university academics to assist, particularly using the skills and knowledge gained over the last two years of the COVID-19 pandemic. Australian universities have been forced to rapidly evolve from places which offered classroom teaching, to ones where most learning is now done online. In particular, the use of Virtual Reality for training rescue (Pedram, 2018), and emergency medical personnel (Aiello, Sevigny, & Cochrane, 2021), can be directly applied to the Australian Defence Force..

An example of a Defence/university collaboration is the Australian Signals Directorate, Australian National University Co-Lab, located in the university's Maths & Computer Science Building.

# Some Ways to Scale

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**Some Ways to Scale**

**Mobile Recruiting**

Recruiting, training, and managing more than ten thousand extra defence personnel is a daunting task. The technology can be used to help manage this. One way is to use mobile devices to provide potential recruits with information, and guide them through the application process. Ideally, an applicant should be able to do this online with their phone in a couple of sessions, without needing to speak to anyone.

**Mobile Trainers**

The military traditionally provide quality training for personnel. However, this can be at a high cost to the organisation, and also in terms of time for reservists. Mobile and online learning can allow personnel to train and be trained with the minimum of standing around waiting usual in the military.

**Industry Standard Training**

A major incentive for personnel to join and remain in the military is free training. For this to be an effective inducement, the training needs to be well delivered, relevant and recognized outside the Australian Defence Force. The military should adopt Australian civilian standards for qualifications of their trainers, and courses. Personnel should be formally trained in how to teach, particularly online, as part of leadership training. The students can also be trained in how to provide feedback online, and assess fellow students, to reduce the need for specialist instructors. Students can be shown how to prepare an e-portfolio to showcase their skills. Obviously all of this will need to be done mindful of security requirements, as individuals skills are a valuable source of information for potential enemies.

**Uber War**

Members of a militia traditionally keep their rifle at hand to be ready to fight at any time. Members of Australia's reserve should treat their government security approved smart phone the same way. Rather than having to muster at a military base, they should be able to train and fight, from wherever they are. This may be for only a few minutes at a time, in between a regular civilian job, over days, months, or years, of a conflict.

Earlier I showed a photo of someone from Australian Defence media, sending reports from Exercise Kangaroo 95. There is a companion photo, of me receiving the reports. But I was not at my desk in Headquarters Australian Defence Force. I happened to be on holiday, so I was receiving the reports via a pocket modem (this was last century), and adding them to the Department of Defence website, using a laptop computer. That could now all be done on a pocket size smart device. Some personnel would require devices with higher levels of security, and which do not depend on public data networks.

# Questions?

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