Risk Assessment for Deliberate Biothreat Events (DEs)

Systemic DE risk

Effective preparedness

Response considerations

Resilience building strategies

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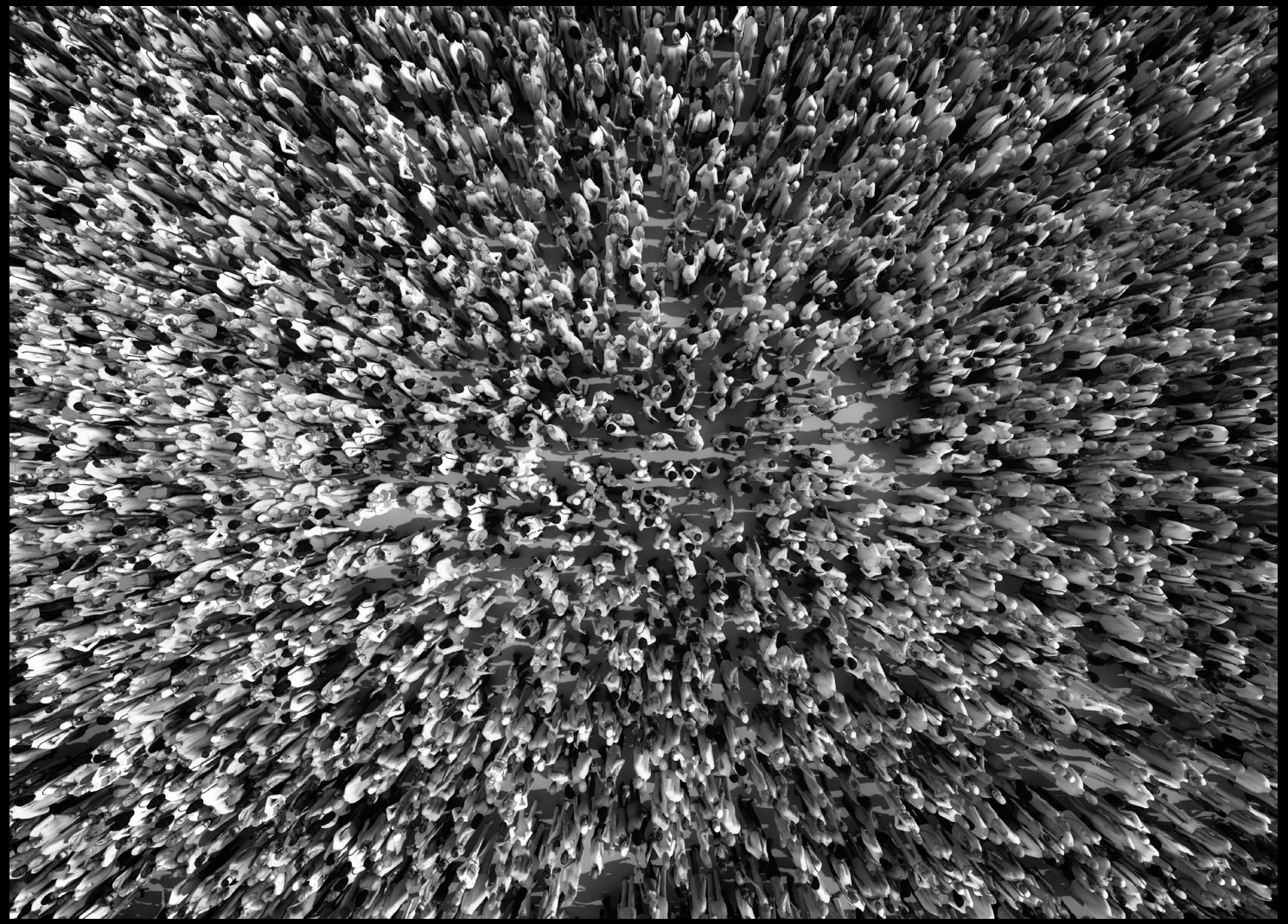
Matthew Flinders Distinguished Professor

Complex Systems Risk

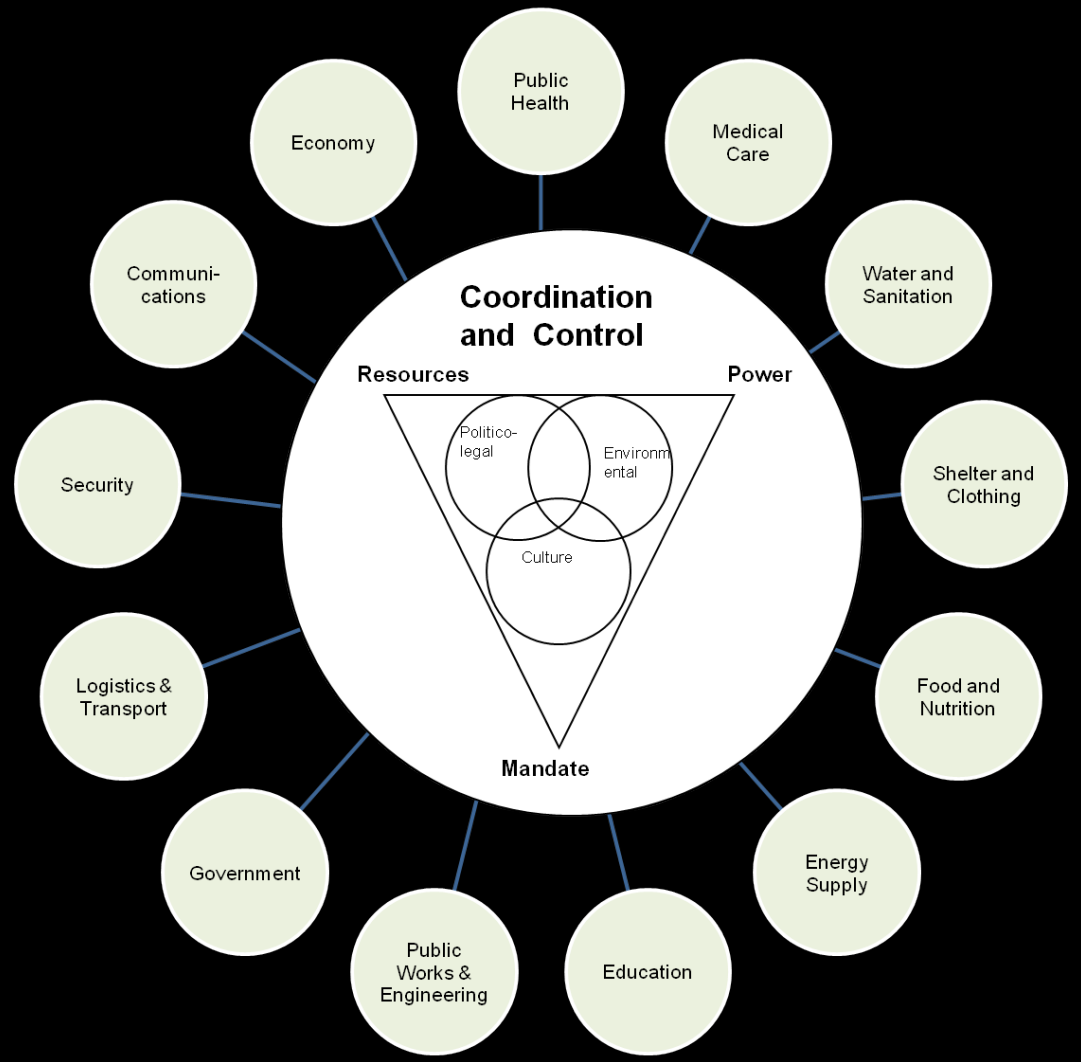
Global events demonstrate greater complexity and interconnectedness that is now understood to be a characteristic of public health emergencies related to biological events. These events not only challenge health system preparedness and response(s) but also have profound impacts on economic, political, informational and social systems.



Complex Systems Risk – challenges to public health and medical care

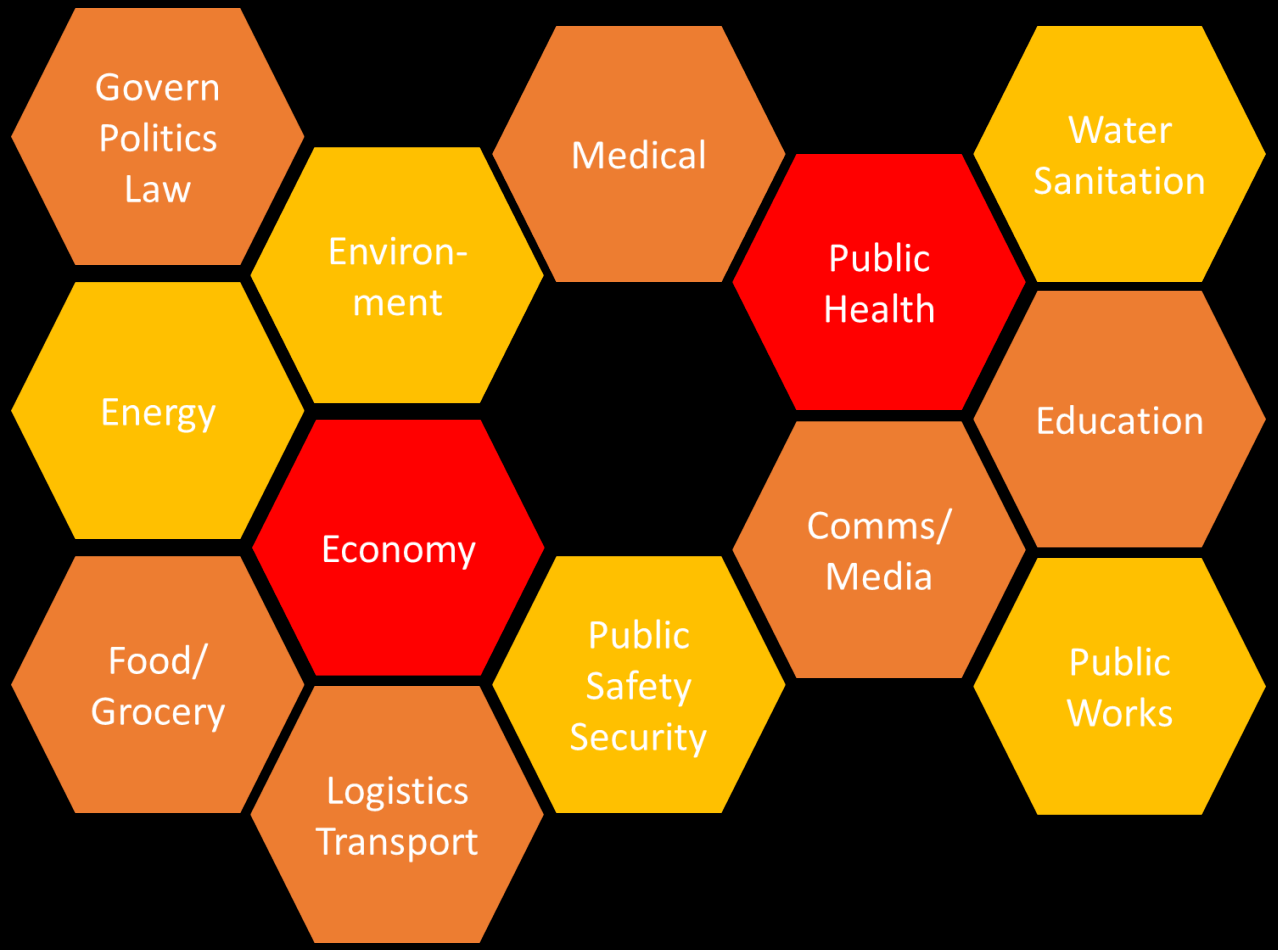
Essential Societal Systems

Societal systems are impacted by the bio-threat event
AND
this impact changes health systems capacity and capability



Cascading consequences across societal systems

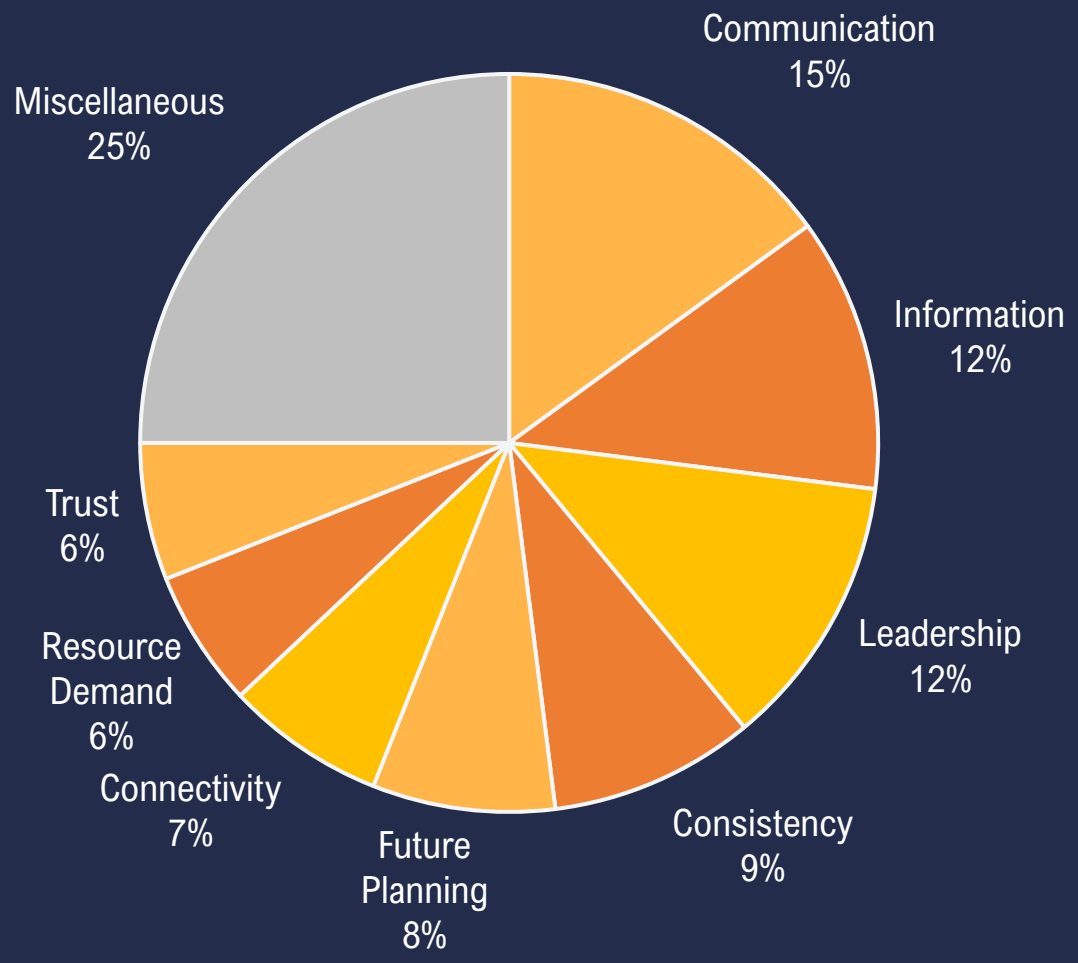
Impacts on one or several *Essential Societal Systems*



Societal Resilience, including organisation and psychosocial: Lessons from COVID-19

Arbon, P., Fidock, J., Filinkov, A., Hall, A., and Scott, N. Pandemic REDI Report. Defence Science and Technology Group, Department of Defence. Pages 1-274, 2022

Lessons for Coordination



Key themes: Opportunities for improvement/adaptation: Pandemic REDI

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Australian Government
Defence

Societal Resilience, including organisation and psychosocial: Lessons from COVID-19

Flinders University
Torrens Resilience Initiative

Justin Fidock [1], Nadia Scott [1], Paul Arbon[2], Anna Hall[1] and Alexei Filinkov[1]

The COVID-19 Pandemic tested Australia's bio-threat resilience. Since the onset of the pandemic, significant effects have been observed at the psychosocial, organisational and societal levels. Although, this isn't the first pandemic, the current pandemic has several distinct aspects. It is occurring in an extraordinarily connected and interdependent world [see Figure 1]. We are benefitting from vaccines and medicines that substantially mitigate the impact of COVID-19. We have information and communication technologies that facilitate intelligence about transmission, and support planning and responding to challenged. We also have pervasive access to information, especially through social media, which both facilitates and undermines efforts by governments and health authorities to mobilise citizens to reduce the impact of the pandemic.

Figure 1. Systems and effects framework

Through engagement with a range of stakeholders from across whole of government involving workshop and sponsored research, we have surfaced the following:

- The implications for Defence efforts to strength resilience to Cyber and CBRN [Chemical, Biological, Radiological and Nuclear] threats.
- Responses to online information, including public health messaging, misinformation and disinformation. Particularly, trust in science and fact-based crisis communication [1], and ethical considerations of influence/counter-influence measures [2]
- Potential of fusing government captured [e.g. contract tracing interview data; QR codes] and publically available digital data (e.g., Bluetooth mobility data) to enhance intelligence. [3]
- Opportunities for improvement and adaptations [see Figure 2] identified in collaboration with participants from Health, Academia, and other jurisdictions [e.g., Home Affairs, Department of Foreign Affairs and Trade, Australian Federal Police, etc.]. Based on the data from the workshop, recommendations are made and are shown in Figure 3 [4].

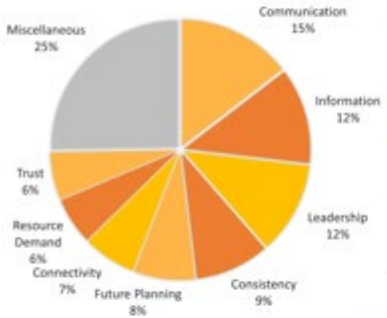


Figure 2. Key themes identified from participants' input at the Pandemic REDI Workshop

Figure 3. Recommendations based on input from the Pandemic REDI Workshop

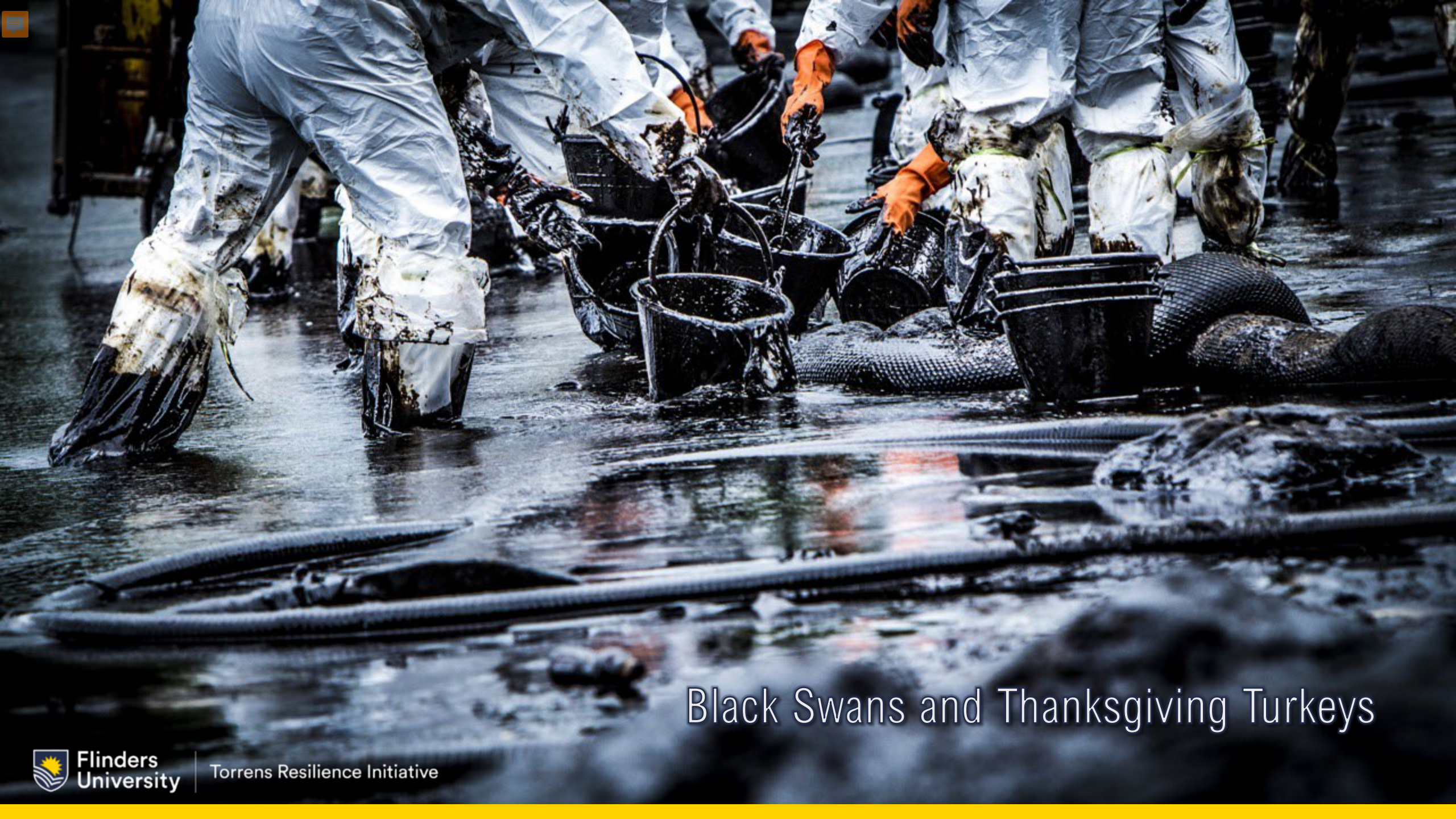
Australia has demonstrated resilience throughout this pandemic, as shown by vaccination rates and support for other public health restrictions – nonetheless, there were severe and at times unexpected consequences for society, organisations and individuals. It is therefore essential to increase preparedness, fill gaps in knowledge about the experiences of COVID-19 and whole of government coordination, and, in particular, understand the role of the information ecosystem. CBRN threats can cause substantial physical harm to our citizens and war fighters and require effort to identify how best to strengthen our future resilience to such events.

[1]Department of Defence, Defence Science and Technology,
[2]Flinders University, Torrens Resilience Initiative

References
[1] Arbon, P., & Talbot, S.(2022) Information Disorder and Existential Threats: Understanding the cross-scale effects of information disorder on societal resilience and social cohesion. Report in Preparation. DSTG.
[2] Fidock, J., & Scott, N. (2022) The Ethics of Influence: thoughts to guide reflection and discussion. DSTG.
[3] Parsons, K., Wood, M., Fidock, J., Donnelly, B., & Resnyansky, L. (2021). Recommendations for Contact Tracing at Scale: An Organisational Design Approach. DSTG.
[4] Fidock, J., Arbon, J., Filinov, A., Hall, A., &Scott, N., (2022) Pandemic REDI Workshop DSTG report draft (for public release)

TBD Contact and Contact Details
Sponsor - Operating in CBRN Environments STaRShot, Department of Defence

Arbon, P., Fidock, J., Filinkov, A., Hall, A., and Scott, N. Pandemic REDI Report. Defence Science and Technology Group, Department of Defence. Pages 1-274, 2022



Black Swans and Thanksgiving Turkeys

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HIC SVNT DRACONES
HERE BE DRAGONS
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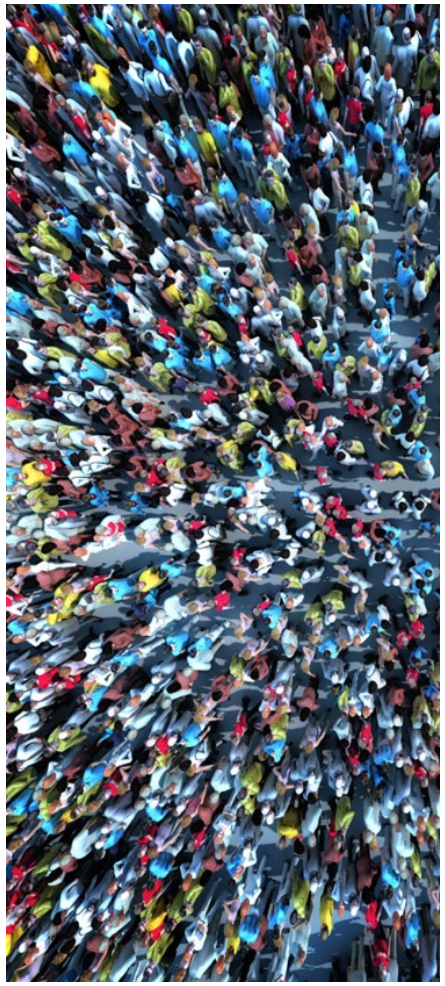
Defining DEs in the biothreat context



A DE is defined as a malicious act involving the intentional release or use of biological agents or toxins.* A DE may be announced or occur covertly, with uncertainty (ambiguity) regarding what has caused it or whether the cause was “deliberate.” The public health consequences may vary in terms of scale, scope, intensity, duration, and focus (target). These events vary widely – they could be aimed at individuals or small groups of people with minor or major impacts, or cause mass casualties and cascading consequences that are not possible to contain – scenarios that have been termed existential or complex disasters.

Advances in science and the associated technological tools have increased the potential consequences for harm to public health arising from a Bio-threat DE.

*World Health Organisation, (2024b), Deliberate events, accessed 21 May 2024, https://www.who.int/news-room/fact-sheets/detail/deliberate-events

DE: Are there unique characteristics?

- may lead to a widespread outbreak, depending on the biological agent used.
- may be difficult to distinguish from a "normal" event
- the response may differ from the normal health emergency response - what are the unique response considerations?
- what are the signals or indicators that would help us to determine that an event is deliberate?
- when a DE is suspected, response efforts will have to balance medical, public health, epidemiological, and public safety response, with security, criminal and forensic investigations involving national and/or international authorities across multiple agencies (national and international).
- the nature of the event may not be clarified until further investigated, and medical and public health responses need to be timely, flexible, safe and pro-active.
- cross-sectoral cooperation and understanding of the unique considerations is required to ensure that health systems are better able to effectively manage through and recover faster

Differences in detection, response and diagnosis

International involvement

- A DE is more likely to have international treaty repercussions and involve agencies beyond national health agencies; complicated by political considerations, including in some cases United Nations Security Council, Secretary-General's Mechanism for Investigation of Alleged Use of Chemical and Biological Weapons (UNSGM).

Multi-agency

- The local or national response to a DE is likely to be led by non-health agencies - organised via a different chain of command. Depending on national security considerations health agencies may be marginalised or not engaged in a timely or effective fashion
- The multi-agency response to a DE will be cross-sectoral and involve multiple ministries and require a lead agency for coordination; ideally identified in emergency plans prior to an event.
- Trusted relationships across the health and security interface prior to an incident are important.
- Notably, the police investigation, with requirements for forensic evidence collection and protection of the chain of evidence, will commence immediately, seizing materials, securing the ‘crime scene’ and restricting access health investigations

Differences in detection, response and diagnosis

Media and public awareness

- DEs are likely to be accompanied by intense media attention complicated by misinformation, and, potentially, deliberate dis-information. Handling media interest is a major response consideration - events will be accompanied by a higher level of public concern and fear, because of the (perceived or actual) presence of perpetrators who may remain at large.

Political involvement

- DEs will be subject to much greater scrutiny and, potentially, political interference in decision making.

Utilization of National Stockpiles and Medical Countermeasures

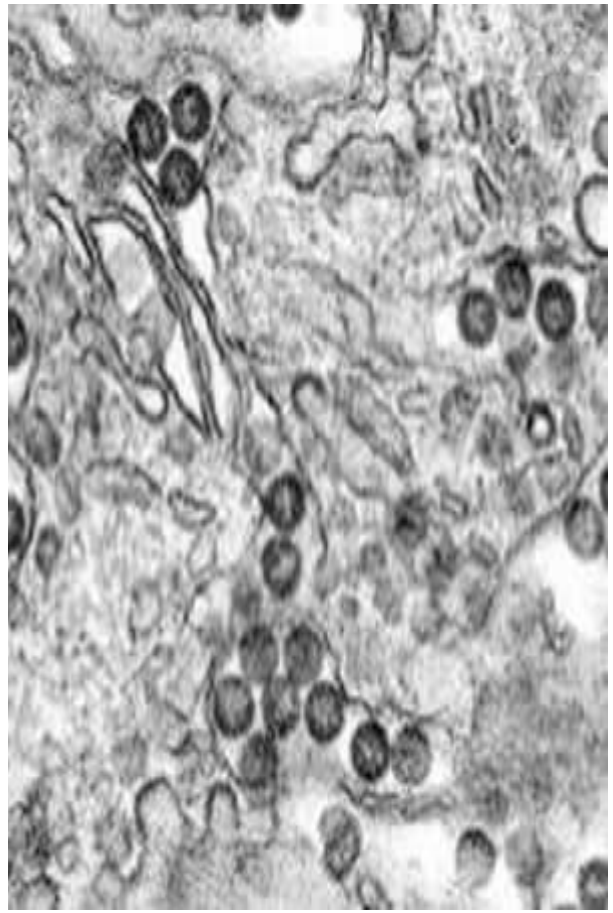
- The strategic allocation of medical countermeasures must balance the urgency of each site's needs with the imperative to maintain a sufficient reserve for subsequent attacks.
- Precision in the selection and administration of countermeasures becomes critical, in an effort to ensure effective containment and mitigation strategies are implemented across all affected areas.

Differences in detection, response and diagnosis (Pathogen behaviour)

- DE biological agent may behave differently - in unexpected ways
- An unusual clinical course - more virulent than natural disease (a different and more fulminant disease process than that experienced by natural exposure)
- Pathogen and the presenting illness might be quite rare or not naturally found in the affected community
- Diagnosis may be challenging - lack familiarity with the disease.
- National laboratories may not have specialized diagnostic capabilities.
- The pathogen may be genetically modified or engineered for increased antibiotic resistance or to be more virulent.
- For high consequence pathogens, special equipment and facilities will be required for sample collection, and diagnostic or laboratory work. Vaccines may provide only limited or no protection.
- Differences in presentations and mapping of the disease may arise because the organism is not native to the environment or introduction of the organism to the population is different.

Differences in detection, response and diagnosis (Pathogen behaviour)

- The mode of infection or transmission may be less predictable, and the outbreak may progress at a greater speed, with very large numbers of people exposed simultaneously.
- Normal health sector surveillance may be insufficient to assess a possible deliberate outbreak, and security, community, and social information sources may also be required to be assessed.
- The outbreak may arise in multiple locations simultaneously or progress rapidly across an affected region with novel or unexpected means of dispersal.
- The possibility of repeated deliberate releases of pathogens in different locations could change the risk of exposure.
- Even if very effective public health containment measures are put in place, the disease may appear elsewhere following a new deliberate release.
- Health authorities will need to be prepared to respond to unexpected and continuing instances of exposure.



Differences in preparedness requirements

- Intersectoral collaboration, including in scenario-based simulation exercises, and the development of emergency plans, is critical
- Need to account for a mass exposure and mass casualty response
- Require a realistic assessment of health system surge capacity
- A biological DE may result in patient presentations across a wide geographic area
- May be required to manage large numbers of the so-called “worried well”
- Health services must be well prepared for surge and have adequate security (a secure boundary) and triage for entry
- Problems can be exacerbated by rumour and dis-information about the nature or geographic spread of the outbreak.
- Consequently, the psychological effects of a DE will require special attention and need to be planned for in advance. This includes pre-prepared community health information and infodemic management plans. The release of information may need to be coordinated with the response objectives of security agencies.

Differences in preparedness requirements

- Planning should address management of competing requirements of public health, in understanding the nature of the outbreak and responding appropriately, and security, in forensically investigating, identifying, and responding to the perpetrators.
- These plans need to consider how sites will be quarantined, what samples may be collected and how, and which laboratories will receive samples. In addition, protocols for effective sharing of information should be agreed upon.
- A DE will be a complex emergency requiring intersectoral collaboration, and the command and coordination of the response will be critical to its success.
- In the preparedness phase clear lines of command and communication must be established including the identification of a lead agency for this type of event.
- These plans should be approved by political leaders and delegate responsibility to suitably experienced agencies and commanders. This reduces the impact of political interference during a DE response

Bio-threat DE Resilience

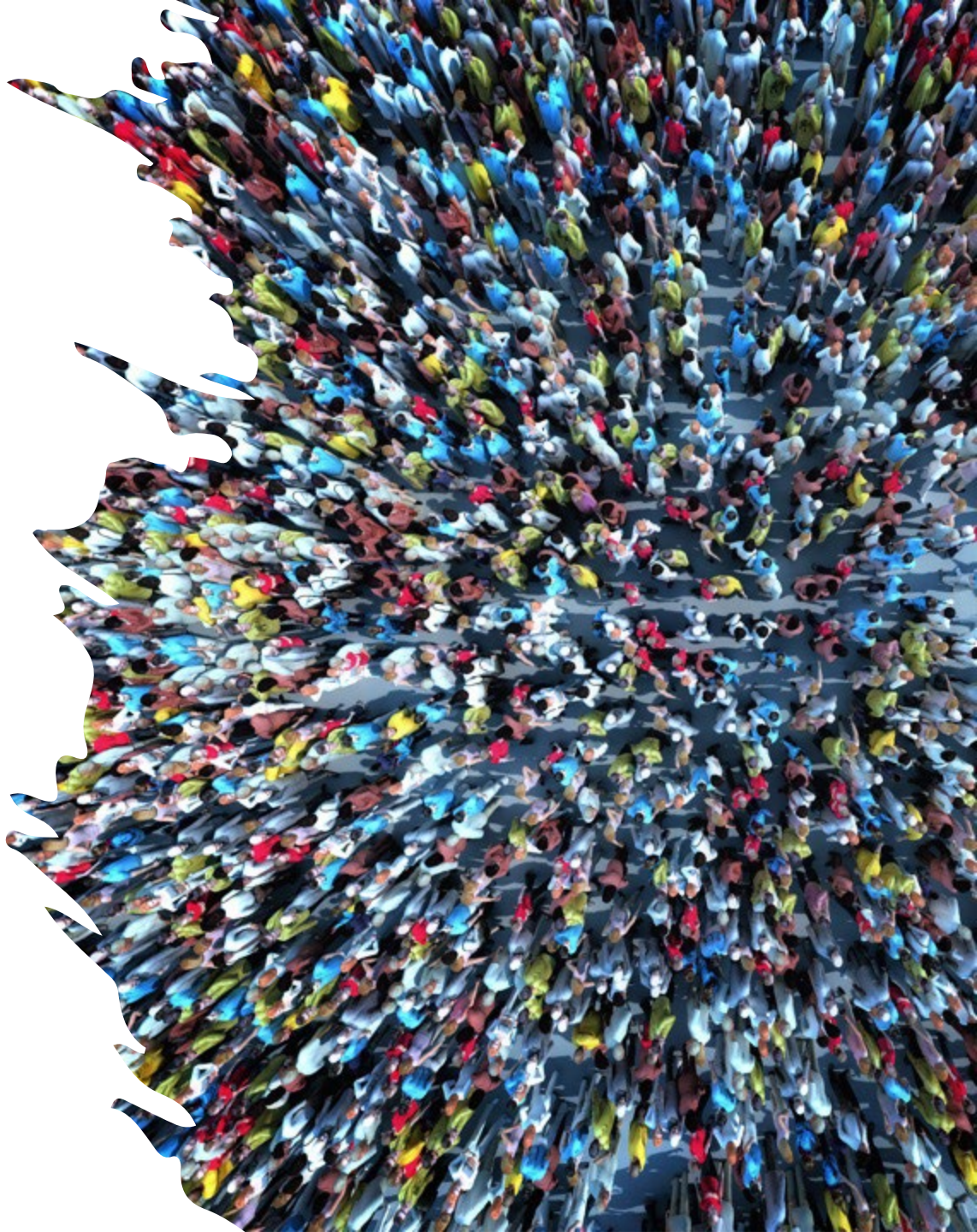
The resilience of systems and effects

Complex systems resilience: the ability of the system to react to perturbations – including internal failures, and from external events - by absorbing the disturbance and reorganizing to maintain function(s).

Ability of the system to withstand a major disruption within acceptable degradation parameters and to recover within an acceptable time.

Resilience plays out in three ways, as resilience of the state (including government, business, and civil society), resilience of entities (e.g. services or infrastructure providers), and resilience of important effects (e.g. trust, confidence, knowledge).

Focus on Vulnerability, Value, Responsibility, Partnerships, Awareness and Skills



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CONNECT

Questions and discussion

Flinders University acknowledges the Traditional Owners and Custodians of the lands and waters on which its campuses are located, these are the Traditional Lands of the Arrernte, Dagoman, First Nations of the South East, First Peoples of the River Murray & Mallee region, Jawoyn, Kaurna, Larrakia, Ngadjuri, Ngarrindjeri, Ramindjeri, Warumungu, Wardaman and Yolngu people. We honour their Elders past, present and emerging.