



CELEBRATING
OUR CENTENARY

Industry Responses in a Collapse of Global Governance

Workshop report for attendees

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Table of Contents

1.	Introduction.....	4
1.1	Background.....	4
1.2	Workshop scenario.....	4
1.3	Attendees	4
2.	Key insights	5
3.	Findings and critical vulnerabilities.....	5
3.1	Fuel security, power and transport	5
3.2	Electricity	6
3.3	Spare parts	6
3.4	Health.....	6
3.5	Family and community.....	6
3.6	Water.....	6
3.7	Telecommunications	7
3.8	Space.....	7
3.9	Economic decline	7
3.10	Civil infrastructure	7
3.11	Mining	7
3.12	Social order.....	8
4.	Timeline of effects.....	9
5.	Responses and preparedness	10
6.	What to do: thinking with head or heart	11
7.	Recommendations and Challenges	12

1. Introduction

1.1 Background

In 2018, the Department of Defence engaged Engineers Australia to convene a workshop for senior engineers with deep industry experience to discuss national mobilisation issues.

The workshop was held on 12 February 2019, at the Engineers Australia office in Melbourne. Seventeen expert engineers attended the workshop (plus Department of Defence project team members and Engineers Australia support staff). The engineers brought expertise from the following sectors:

- construction
- consulting
- electricity generation and transmission
- liquid fuel
- health care
- information telecommunications & media
- space
- manufacturing
- mining
- transport, postal and warehousing
- water and waste.

This report provides the findings of the workshop. It will inform further stages of work by the Preparedness and Mobilisation team at ADF Headquarters.

1.2 Workshop scenario

The workshop looked at the effects of a collapse in global governance, resulting in major disruption to the global supply chain. It sought to identify areas within each sector that would be affected, what those effects might be and how effects within one sector might affect others. They considered responses and preparatory methods of mitigation and resilience.

Detailed solutions to the issues identified were not developed.

The workshop focussed on three areas:

- Immediate effects from one to seven days
- Impacts if the situation lasts for three months, and
- Actions that could be taken prior to the event that would mitigate the effects identified.

1.3 Attendees

The workshop included 17 expert engineers. This number does not include the Department of Defence project team members and Engineers Australia support staff who assisted the workshop facilitation and discussion.

The workshop was conducted under the Chatham House Rule: *When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.*¹

¹ The Royal Institute of International Affairs, Chatham House Rule, Accessed 26 February, 2019. Available at: <https://www.chathamhouse.org/chatham-house-rule>.

2. Key insights

The workshop delivered the overarching advice that, in the scenario provided, Australia would suffer massive upheaval within one week due to job losses, social unease and hoarding.

Within a fortnight, due to stocks of imported supplies drawing down, major social infrastructure such as treated water would begin to fail and essential services such as health care would be degraded.

By the two-month mark liquid fuel would be almost exhausted, and by three months there would be wide-spread unemployment, no transport capability, and services that rely on imported spares (such as electricity and telecommunications) would begin degrading significantly.

To overcome these challenges, the nation would require transformation in terms of the degree of personal responsibility for preparedness, management of industrial and social supplies to survive extended periods without access to global supply chains, and a review of governance to ensure federal, state and local governments can take legitimate control of essential services.

Overlaying all these issues, the workshop identified social cohesion and social mobilisation as the essential ingredients to surviving the scenario crisis.

3. Findings and critical vulnerabilities

A range of critical vulnerabilities were identified for several sectors of industry.

3.1 Fuel security, power and transport

Limited fuel resources and an overarching power dependency will have a cascading effect on all sectors. There will be a clear and prompt effect on transport and freight which in turn affects the movement of goods and people. This is because most transport in Australia relies on liquid fuels, which is largely imported.

Without the ability to transport goods, there will be an effect on food security. The restricted ability to transport people will affect health care services and limit the ability to travel for work.

Emergency services will suffer, and rural and regional communities will be isolated. Some isolated networks are reliant on diesel fuel.

Of most concern is diesel as a fuel for generators that provide backup electricity systems. Random outages will have an influence on the edge of a network (suburbs) but, the greater the area affected, the greater the severity of the effects. For example, the effect of a mass power outage on a city the size of Melbourne would be catastrophic.

In the scenario with no international trade routes, liquid natural gas exports would stop, and the inability to export and import will have significant consequences. For example, most propane and butane is exported, so the excess that cannot be sold overseas would need to be stored within the gas storage and pipeline system, burned, or perhaps reinjected to the subsurface stores.

In addition, even though Australia has some domestic oil reserves, overseas-sourced crude is still required to enable Australian refineries to produce a wide spectrum of liquid fuels. Alternatively, the refineries could be re-calibrated to more effectively process the lighter Australian crude.

3.2 Electricity

Gas would continue to be available for gas-fired electricity generators. Coal, whilst still available, might not be able to be transported from mine to generator.

The workshop attendees were not too concerned with the electricity system in terms of supply but did note that system security would be at risk. This is because the ability to deal with normal maintenance issues will degrade over time as the necessary spare parts are exhausted.

3.3 Spare parts

Disruption to materials supply and specialist parts and equipment required for new projects and maintenance will affect all sectors. As stores diminish, projects would slow down and eventually halt. The cessation of operations would result in vast economic ramifications. There is the possibility of supply hoarding with subsequent negative influences on business-to-business collaboration.

'Just in time' logistics models will be unworkable in a situation whereby imports are halted, and if liquid fuel constraints affect domestic freight movements.

3.4 Health

The group noted that it estimated that 90-95% of specialist medical supplies are imported. Further work to verify that figure may be required.

A disruption to the supply of specialist pharmaceuticals will result in severe repercussions for public health. Specialised medicine supplies may be exhausted within days.

From an industry factors points of view, this could lead to lower productivity. Particularly affected will be the elderly and, if there is a disease outbreak, the unvaccinated.

Medical equipment and spare parts for maintenance form part of the critical health supply chain. Most are imported and the restriction of supply would create a steady degradation of medical support.

Health will also be greatly affected by disruptions to water and sewerage management, and waste disposal.

Waste collection services will be affected. Service standards may drop to ration fuel and electricity.

In terms of food supplies, they are expected to reduce within about 45 days.

3.5 Family and community

Clearly there would be an effect on non-essential travel and existing family arrangements such as education and other leisurely pursuits such as attendance at sporting events. The ability for intra-family care (such as adult children caring for elderly parents) would be disrupted.

3.6 Water

Water and wastewater are radio controlled standalone systems and therefore less vulnerable than other systems that rely on the internet and cloud data. It was noted that this is because water systems are often based on old infrastructure.

Mechanical supplies for workshops mean that the water sector could probably operate for more than 90 days.

However, the treatment of water relies on hundreds of tonnes of chemicals. Domestic supplies of the necessary chemicals would run out after about one week.

3.7 Telecommunications

Hardware, firmware, software and all spares come from overseas. Within 1-2 weeks, telecommunications outages (hardware, firmware and software) would occur with broad implications for data, particularly where not backed up and stored in the cloud.

At three months, software security will become an issue. It was also noted, however, that if the nation was targeted as part of a wider act of aggression (as opposed to the victim of a general global breakdown in supply chains), that the cyber security and telecommunications networks could be slowly infiltrated for months or years ahead of 'Day zero.' The infiltration could be so slow that it is either not identified, or the degree of threat builds imperceptibly.

The loss of international data, such as offshore commerce data facilities, will cause major social and economic disruptions.

Telecommunications are connected by international undersea cables and they regularly break. It was advised that it's not a matter of 'if' but 'when', and that ships are the essential tool in fixing lines that lie in international waters. If international shipping is stopped, satellites are relied on, but if they are also affected by the global political situation, there is a high risk that telecommunications will fail entirely.

Network stability may also be compromised, with the networked pushed beyond capacity.

3.8 Space

A space weather event that takes out power networks and GPS would have a significant effect. Loss of GPS affects the finance sector which relies on GPS-based timekeeping, and the transport and aviation sectors that rely on GPS navigation.

Examples of this occurring at a local level are the Montreal and Carrington space weather events. It was noted that space weather can have effects at a global scale, or very local scale.

3.9 Economic decline

The largest economic drivers are the export industries of mining and tourism, both of which will grind to a halt in the workshop scenario.

Job security will be diminished as projects slow down or stop. Major capital projects would see widespread layoffs after a week.

The result would be an economic downturn and price increases. It was expected that for many employers, especially those which operate on very small profit margins, layoffs of workers would begin within a week.

The financial system, including financial transactions, will be adversely affected by disruptions because they rely on GPS systems for things such as having an accurate time.

Shutting down the nation's export market would negatively affect export-oriented companies.

3.10 Civil infrastructure

The civil engineering sector has about 2-3 months of supplies. However, diesel and copper supplies will begin to be limited after about 2-3 weeks. Any repairs to infrastructure will be affected by limitations of stockpiles.

3.11 Mining

Mining exports will stop, so mines will quickly shut down operations—perhaps within two weeks. The benefit of this situation is that mine resources such as diesel would become unutilised and therefore free to fill gaps in supplies for other sectors.

Some domestic mining may continue, such as mineral sands and bauxite. Many mining systems utilise electricity rather than liquid fuels, which means that there is less chance for restriction to operations than in other sectors that rely on diesel and other liquid fuels.

The effect on the mining sector from low diesel fuel supplies was debated. Further research is required to determine the extent to which mine operations are dependent on diesel or electric energy sources.

3.12 Social order

With a decline in the availability and quality of goods, services and employment, a breakdown in social cohesion is likely. It was noted that 'Day 0', when global supply chains are cut, would likely be presaged by a long period of building tension and public awareness of the worsening situation. Hoarding of food, water and essential supplies by the public and industry is therefore expected.

It was noted that the governance structures of industry are not designed to cope with global disruptions. Instead, they are geared towards isolated and short-term events. Most industries are therefore unlikely to be well prepared for the workshop scenario, and their responses may be poor.

4. Timeline of effects

The timeline at Table 1 shows the major effects from before Day Zero to the three-month mark.

Table 1 Timeline of effects

Time	Event
Pre-Day 0	Cyber security and telecommunications infiltrated
Day 0	Public and industrial hoarding
	Specialised medicines shortage
Week 1	Water treatment systems begins to fail
	Export sectors affected
	Mass worker lay-offs begin
Week 2	Export mining operations cease
	Diesel shortages
	Copper shortages
	Standards for supply of goods & services declines
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Month 1	Liquid fuel shortages affect logistics
	Food supplies begin to run out
Month 2	Civil construction supplies start to run out
	Liquid fuel supplies exhausted
	Freight and passenger transport services cease
Month 3	Employment scarce
	Social unrest
	Software security degraded
	Undersea communications cables degrade
	Water supply networks degrade
	Electricity supply & transmissions degrade

5. Responses and preparedness

The Workshop participants were asked to identify potential responses to the likely effects of the scenario. Options to help prepare for those responses were also provided. These are shown in Table 2.

Table 2 Responses and Preparedness

Responses	Preparedness
Liquid fuel shortages treated with rationing and the triage of distribution. Priority allocation for critical services such as transport, health and waste.	Ensure fuel reserves for 90 days, which is in line with the International Energy Agency stockholding obligations.
Hoarding by the public of fuel, food and medicines, and industrial hoarding of spare parts and specialist supplies, may require civil authorities to take over distribution and begin rationing.	Encourage societal self-sufficiency while society is connected and cohesive. Create policies that require people to take individual responsibility. For example, all households to hold at least one week's worth of supplies. Ensure adequate stores of strategic medical and industrial supplies. Increase local manufacturing capability. This includes small scale onshore parts manufacturing that could be scaled to meet high demands if required.
Low liquid fuel supplies can be ameliorated by increasing use of alternative energy sources.	Consider electrification of a dedicated proportion of the transport fleet, and more investment in alternative fuel production. Develop an integrated energy policy. Increase liquid fuel refining capacity.
ADF supports the government in development of a coordinated response.	Seek legitimacy for an increase to federal government powers to coordinate a national response. Create multi-government framework to make contingency plans at all levels of government.
Provide alternative and coordinated communication channels such as radio and town hall meetings.	Create a large scale sophisticated and consistent national dashboard for communications and plan for swift implementation. Maintain an independent communications system. Introduce the relevant issues to the public at an early stage to make it part of a national dialogue rather than suddenly inducing panic when the crisis reaches breaking point. Conduct an analysis of communications best practices from other countries. Create public awareness of the crisis communications plans through unofficial and official channels.
Local government will become a key coordinator of service provision and goods distribution at the local level.	The private sector has a key role in preparing for crisis events. Note that industry typically prepares for short term and localised issues rather than global long-term crises.
ADF will provide civil support, in part to keep the public in a positive frame of mind regarding the role of the state to managing the crises.	Ensure that the ADF is well informed, in advance, of its civil support role.
Accept a decline in standards and cost responsibility.	Create a plan for the degradation of services.

6. What to do: thinking with head or heart

The final workshop exercise was to identify a range of options for how to respond, and how to prepare. Each is listed below and expressed as a 'hashtag handle'.

All workshop participants then voted for each option that they thought was most important to address, but from two different perspectives:

- Thinking with one's head, and
- Thinking with one's heart.

The results are at Tables 3 and 4.

Table 3 Responses - #votewithyourhead #votewithyourheart

Responses	Head	Heart
#NationalMobilisation	5	0
#AccurateInformation	4	3
#Rationing	8	1
#SOMO (social mobilisation)	2	10
#CommsAreDown	1	0
#PoliticalCooperation	0	6

Table 4 Preparedness - #votewithyourhead #votewithyourheart

Responses	Head	Heart
#SupplyDependency	4	0
#SOCO (social cohesion)	2	9
#MultiGovernmentCoordination	2	1
#CommsRedundancy	0	0
#HeirarchyOfPriorities	3	2
#PersonalResponsibility	0	2
#MadelnAustralia (minimum essentials)	2	3
#PlannedPerformanceDegradation	0	0
#BeAlertNotAlarmed	0	2
#Legislate	0	0
#PoliticalCooperation	0	0
#EnergyStrategy	6	1
#CorporateRiskAnalysis	0	0
#Biz+	0	1

7. Recommendations and Challenges

The workshop did not make recommendations *per se*. However, a range of challenges and questions were identified and these are recommended for further investigation by the Department of Defence Preparedness and Mobilisation project team:

- To what extent will the political parties cooperate?
- How well will the general public cooperate with each other and the authorities?
- The very elderly are likely the only people who will have experienced a government-enforced degradation of services and liberties in periods like WW2. How will the younger generations react if this occurs in the modern age?
- It will be hard to prioritise without knowing the exact scenario to be encountered.

Similarly, several factors were identified as having a large effect on the ability for society to act cooperatively. These should also inform future work:

- Size of Australia
- Role of government and regulatory agencies
- Lack of government authority over the private sector (legislation may be needed to define the authority of government)
- Lack of social cohesion and getting people to act in collaboration as a community and not as self-interested individuals.
- Cost of making the necessary preparations, in terms of efforts like fuel conversion, adaptation of logistics models and storage of supplies.
- Preparing for the extreme events in the absence of indications that they are likely to occur.
- The challenge of issuing a consistent public message without being alarmist and thus causing social unease and unrest.

