Australian Government
Department of Defence
Defence Science and
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Trusting Technology in a Complex World

EDTAS Conference

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Overview

- Background – Forward 2035 follow-on
  - *Mastering Technology & Trust in Technology* megatrends
- Underlying premise & assumptions
  - Human- Autonomous Ecosystem
- Trends & Drivers
  - Implications and complications
- Key threads
  - Some Food for thought

Forward 2035 Megatrends

- **Mastering Technology**
  - Convoluted and congested supply chains at risk from natural disasters
  - Increasingly complex critical infrastructure powered by complex computer control systems networked through ubiquitous communications systems
  - Risk through interconnected and interdependent civilian and military infrastructure - key components are beyond the control of government
  - Mastering this complexity will deliver distinct (relative) technology advantage
- **Trusting Technology**
  - Automation / virtual environments will fundamentally change the nature of work
  - Prevalence of and dependence upon automation assumes willingness to trust and/or capacity to control
  - Operative autonomy needs confidentiality, integrity and availability of info
  - Critical information is not necessarily held by those dependent on it
- **Also *Smart Power & Innovation Enterprise***

Forward 2035 – 'so what'

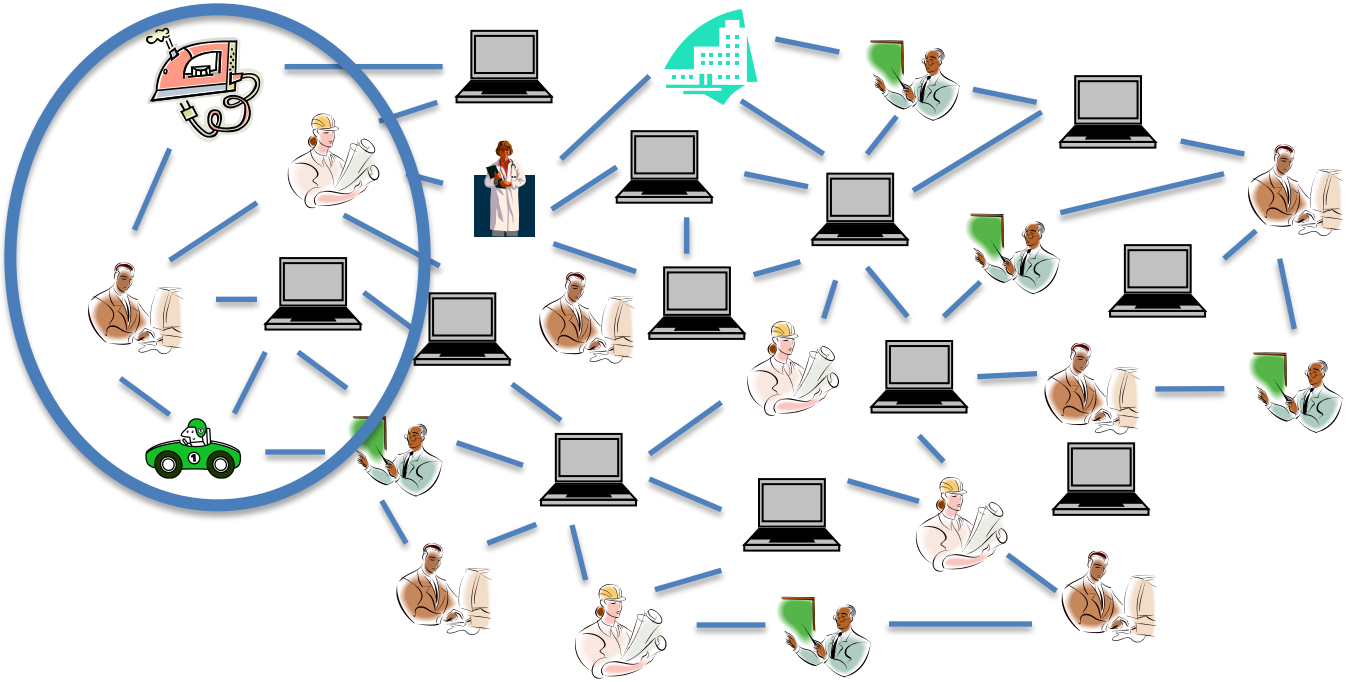
- **Working title: *"Trusting technology in a Complex world: Balancing the human and the autonomous"***
  - Building on momentum of Forward 2035 to look more deeply at outcomes
  - Bringing together *Mastering Technology* & *Trust in T nology Themes*
  - *Autonomy* focus chosen to coincide with other tives
  - Focused on implications/impacts, rather th al aspects
- **Aspirational outcomes**
  - To shape and influence future by capturing and situating the essential trends associated n autonomy
  - To enhance the capaci t the trend by putting in place additional R&D into certain ar esting or partnering with other countries
  - To establish strategic policy positions that can shape and influence development paths and timelines

Human-Automated Ecosystem

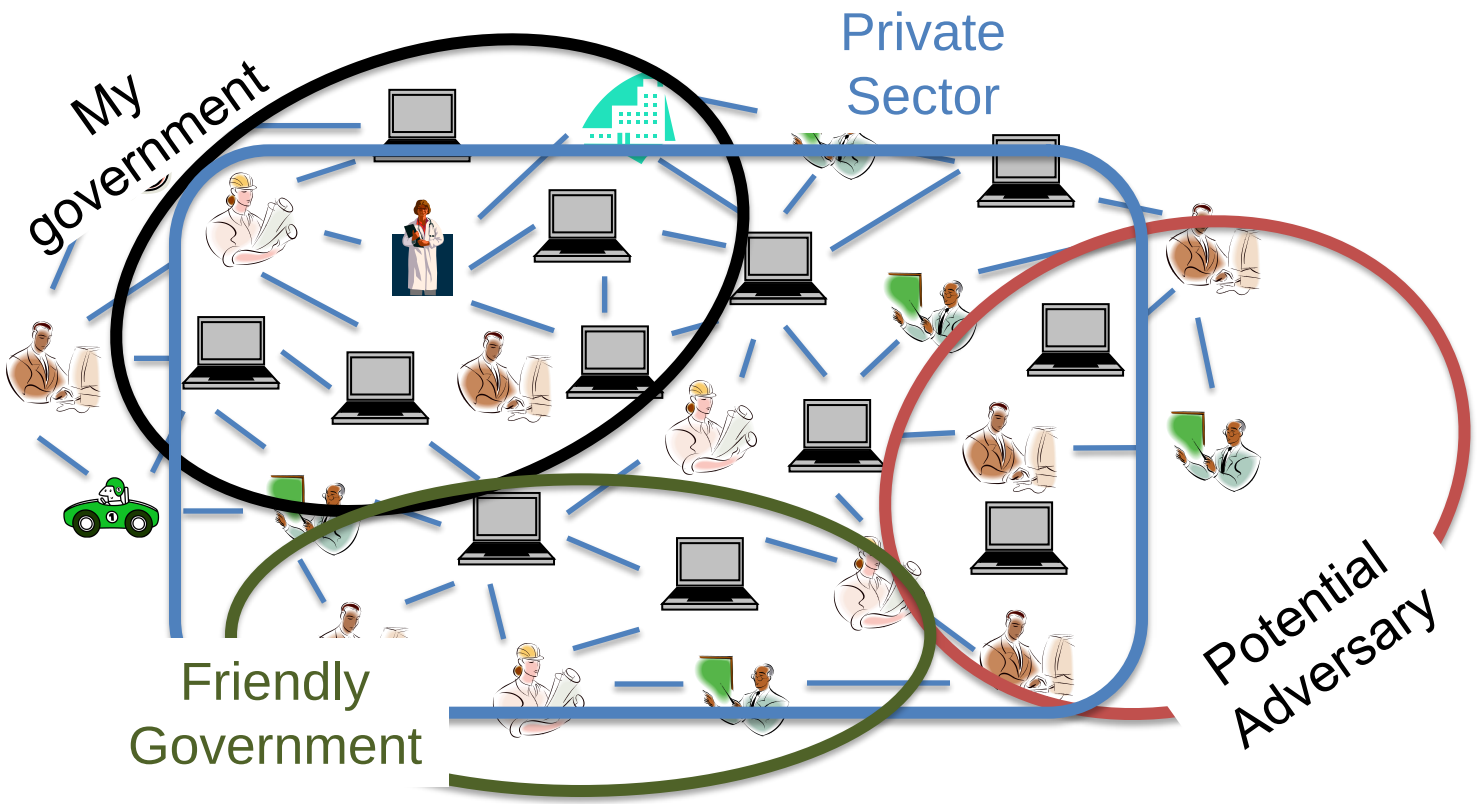
- Emergence and localised maturing of a human-autonomous 'social' ecosystem
  - Complex networks of interactions are established
  - 'Trusting' (preferential) relationships are built and broken
  - Information sought and provided (not always coherently or accurately)
  - Introspection and learning evolve individual behaviours
  - Emergent collective behaviours – Human-Machine; Machine - Machine
- Explore how a complex human-autonomous system might evolve, adapt and manifest itself from a societal and security perspective
  - Need to shape and influence design to avoid maladaptive evolution
  - Cannot control but … acceptable behaviour boundaries need to be established
  - Constrain outcomes (behaviours) rather than processes (controls)

Human-Automated Ecosystem

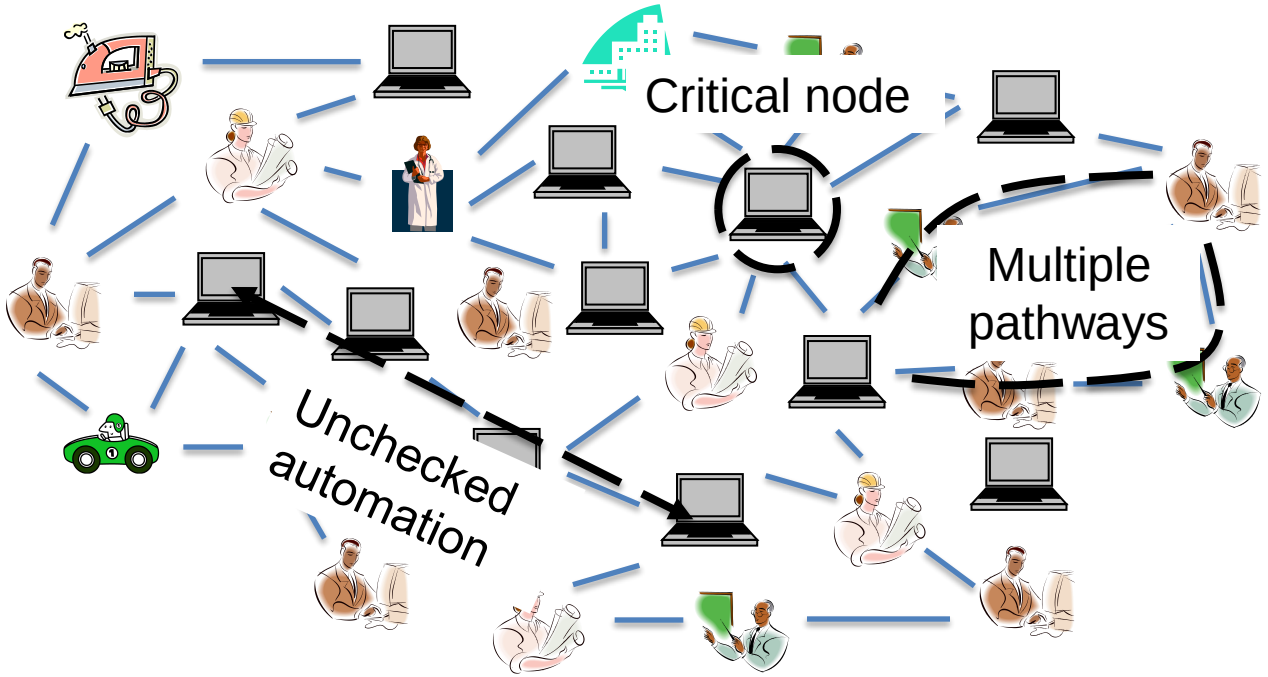
Mine to ‘control’



Human-Automated Ecosystem



Human-Automated Ecosystem

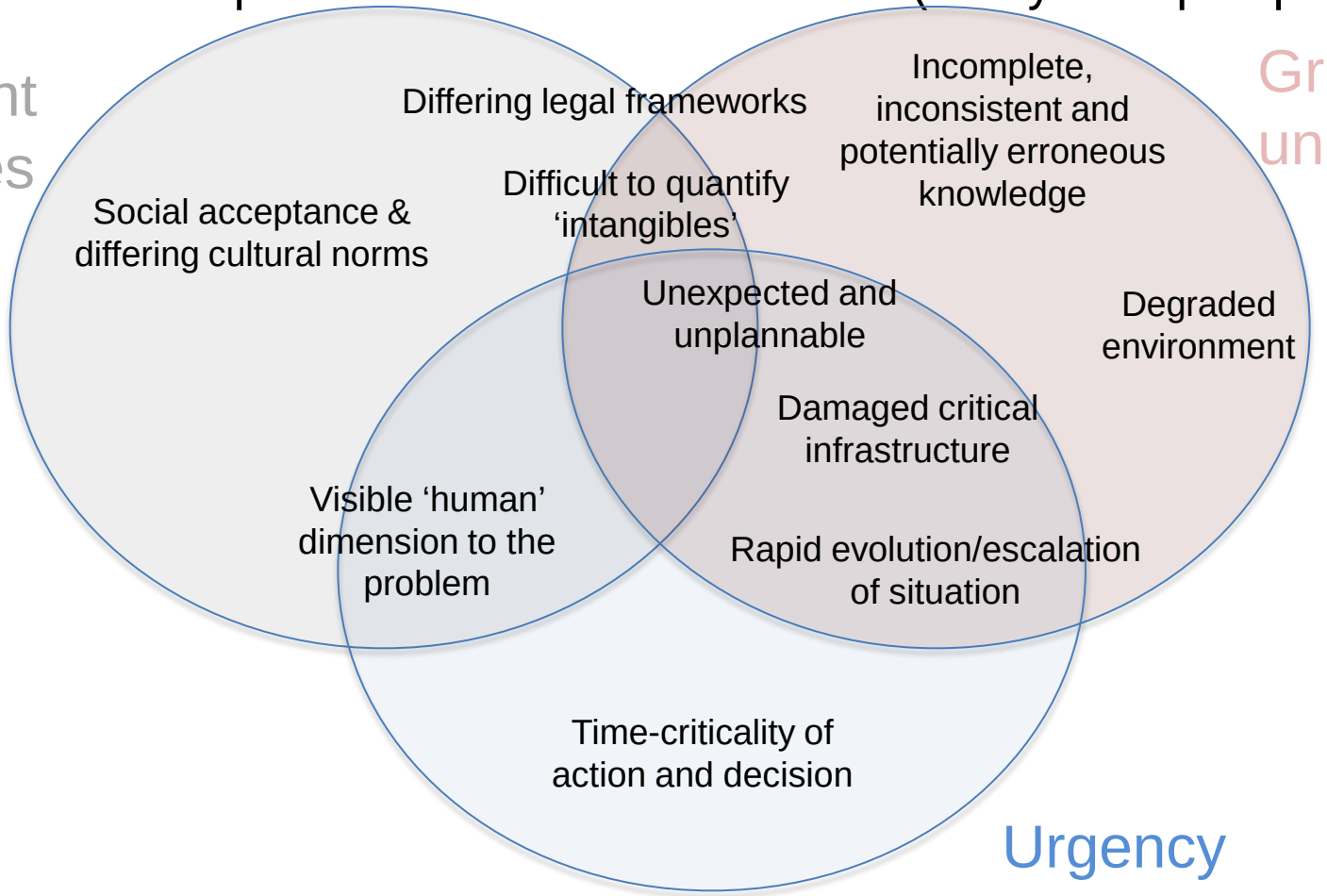


Some Trends & Drivers

- Internet of Everything & Big Data
  - Ubiquitous sensors and computing capabilities in everyday environments
  - Understanding of patterns of complex emergent behaviour
- Resilience & the balance between human and automated system
  - Continuously absorbing significantly different and often unanticipated changes
  - Reskilling of people leading to deskilling and the loss of redundancy
- Social attitudes and ‘trustability’
  - Managing increasing cognitive demands by entrusting decisions to ‘intelligent’ automation
  - People/consumer/cultural power across different strata will create disconnects
- Risk tolerance vs Competitive advantage
  - Disproportionate impact of marginal improvements within decision cycle
  - People more likely to make mistakes, but Autonomous Systems not accountable

Humanitarian Assistance & Disaster Relief

§ What set it apart from "Business as Usual" (ecosystem perspective)?



Food for thought – some open questions

- What is the 'natural' redundancy that the Ecosystem requires to effectively function in its 'natural' environment?
  - Redundancy, de/upskilling – resilience, robustness
- How does this 'Ecosystem' challenge the current HADR practice?
  - Opportunities to enhance preparation for HADR events
- How do we embed 'cultural values' in the Ecosystem?
  - Explicitly programming respect for seniority; value of one human over another
- What is 'tacit' knowledge in such an ecosystem?
  - Learning machine vs machine learning in a HADR environment
- What are the vulnerabilities given differing perspectives?
  - Potential threats – adversaries, criminal entities; alternative viewpoints
- What can we do to shape the evolution of this Ecosystem?
  - Managing the outcomes over controlling the processes

Discussion