

CYBER FRONTIER AND INFRASTRUCTURE



Mikhail V. Chester, Ph.D.

Professor | Civil, Environmental, and Sustainable Engineering
Director | Metis Center for Infrastructure and Sustainable Engineering
School of Sustainable Engineering and the Built Environment
Arizona State University

Presentation to:

ECL USA

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20th CENTURY INFRASTRUCTURE at 2100+



Ellensburg Substation, BPA (1951)

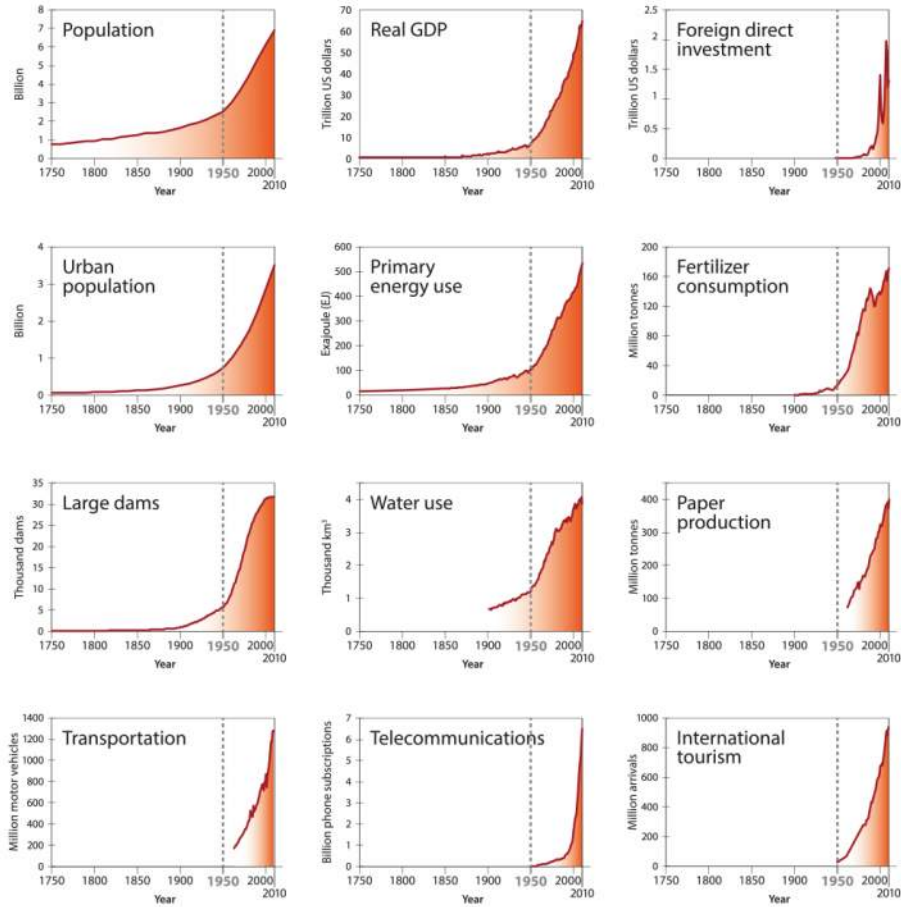


Seattle (1937)

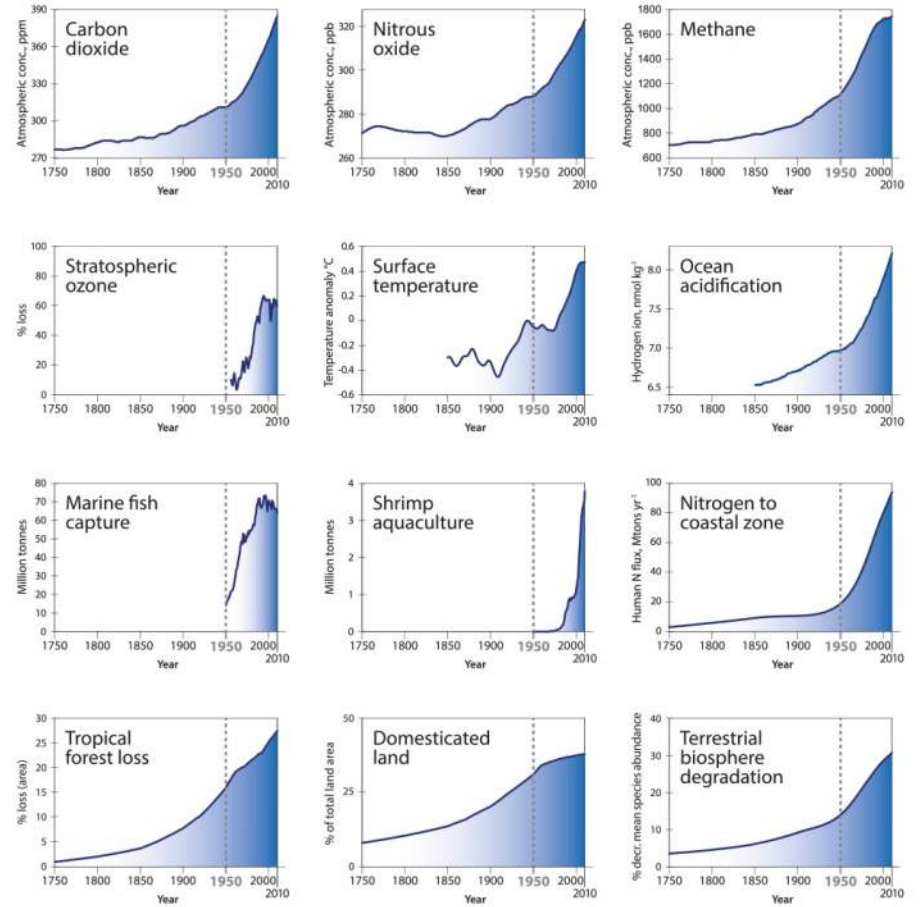


Bunker Hill & Los Angeles Drive (1940)

Socio-economic trends



Earth system trends



Steffen W, Broadgate W, Deutsch L, Gaffney O, and Ludwig C, The Trajectory of the Anthropocene: The Great Acceleration, 2015, *The Anthropocene Review*, doi: 10.1177/2053019614564785

ACCELERATING INTEGRATION

TECHNOLOGIES

IOT Devices

Cloud Computing

Sensing

Software Controls

Data Storage

AI

TRENDS

Hybrid Digital Infrastructure

Disaster Recovery

Future of Networking Solutions

Automation Strategy

Evolving Devops Ecosystem

Mobile Workforce

User Experience

Dispersed Infrastructure & Data

IOT & Cybersecurity

Distributed Infrastructure Challenges

Proliferation of IT-based Solutions

CAPABILITIES

AI/ML

AR/VR

3D Printing

Lidar

Metaverse

AVs & Drones

Digital Twins

Predictive Analytics

The Cyber Frontier and Infrastructure, Mikhail Chester, Braden Allenby, IEEE Access, 2020, 8(1), pp. 28301-28310, doi: 10.1109/ACCESS.2020.2971960.
<https://www.dincloud.com/blog/11-infrastructure-trends-and-how-to-align-Organization>, <https://wginc.com/10-strategic-tech-trends-infrastructure-industry-2023/>

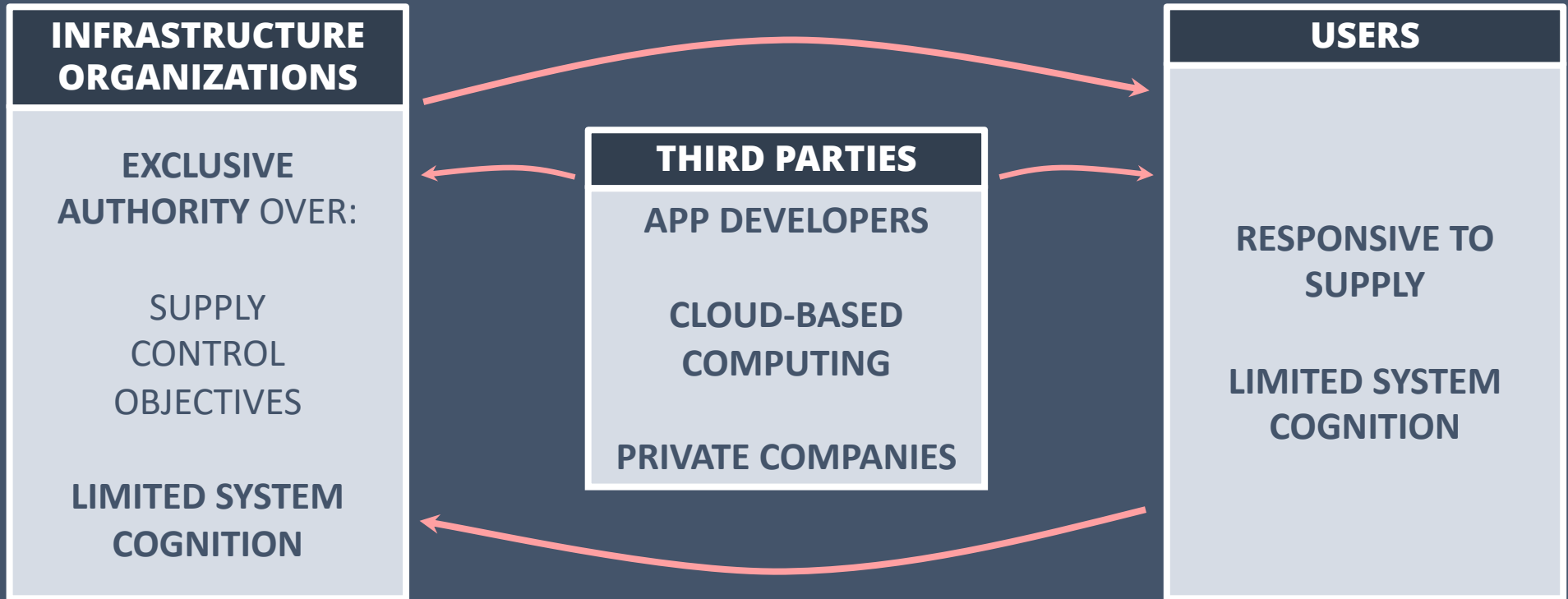
DIFFUSION OF CONTROL

In the past there were basically two players deciding how the system was used.



DIFFUSION OF CONTROL

Control of the system is increasingly steered by users and third parties, including software.

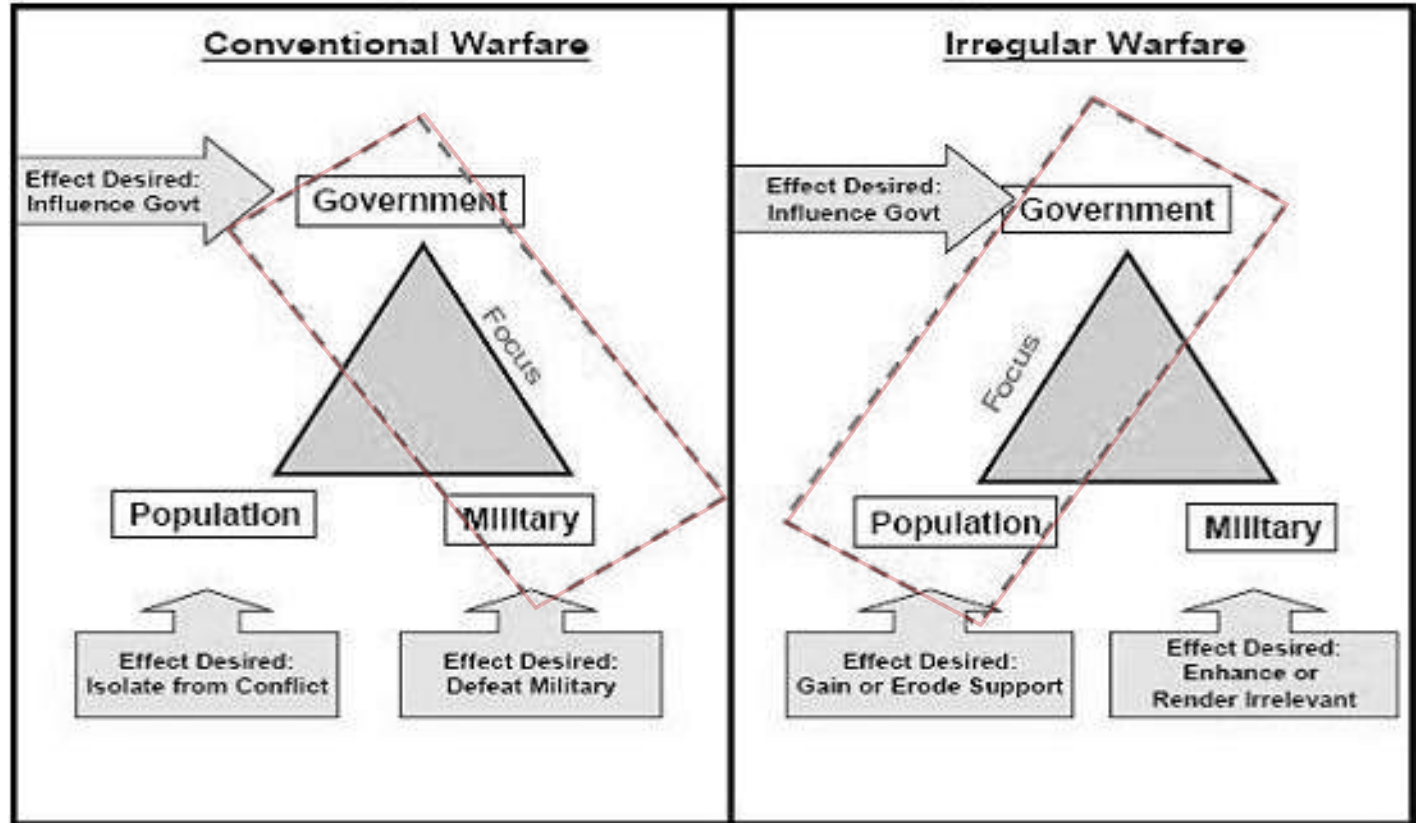


VULNERABILITIES

THREAT LANDSCAPE

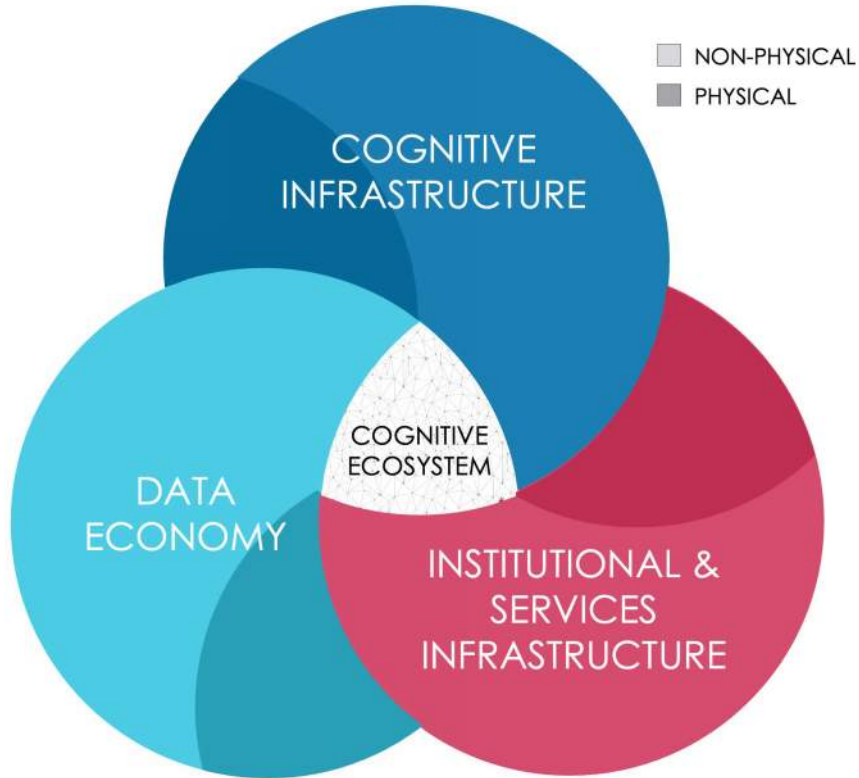
- Vandalism
- Incursion
- Breach
- Espionage
- Strategic Disruption

ASYMMETRIC WARFARE



The Cyber Frontier and Infrastructure, Mikhail Chester, Braden Allenby, IEEE Access, 2020, 8(1), pp. 28301-28310, doi: 10.1109/ACCESS.2020.2971960

COGNITIVE ECOSYSTEM



COGNITIVE ECOSYSTEM					
<p>ICT AND AI INTER-CONNECTIVITY</p> <p>The functional components of cognition linked together operationally by ever more powerful ICT and AI networks.</p>	<p>MULTI-SCALAR</p> <p>With functionality dispersed across the ecosystem, from chips and individual devices to AI-based arrays that rely on global inputs, it is multi-scale.</p>	<p>GLOBALLY DISTRIBUTED</p> <p>All functional elements - from information gathering to information processing to redistribution of information - are globally distributed.</p>	<p>EVOLVING ACCELERATING CAPABILITIES</p> <p>It is evolving emerging systemic and behavioral capabilities at a rapidly accelerating pace.</p>	<p>LIMITED HUMAN INPUT & MANAGEMENT</p> <p>It includes learning and information processing functionality at all levels that often has little if any human input or management.</p>	<p>STEERED BY GEOPOLITICAL & PRIVATE FORCES</p> <p>Geopolitical and private forces drive its component technologies and systems. Regulation is messy.</p>

Infrastructure and the Cognitive Ecosystem: An Irrevocable Transformation, Mikhail Chester, Braden Allenby, *Environmental Research Infrastructure and Sustainability*, 2023, 3(3), 033002, doi: 10.1088/2634-4505/aced1f



mchester@asu.edu



mikhailchester



mikhailchester.me



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