

The Risk of Not Being Resilient

This presentation does not necessarily reflect the views of the United States Government, and is only the view of the author

Igor Linkov, PhD

Science Fellow, US OECD, Paris

Risk and Decision Sciences Team Lead

Environmental Laboratory/ERDC

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Igor.Linkov@usace.army.mil

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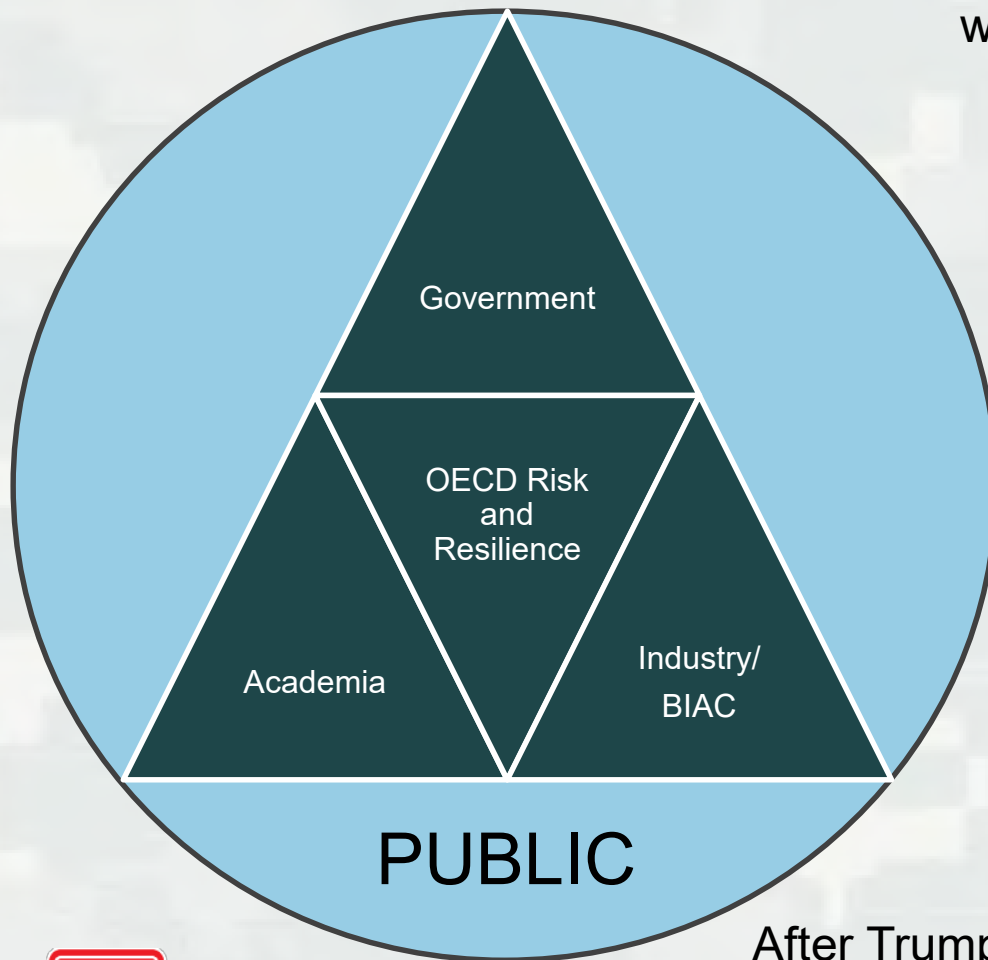
Resilience at OECD in 2017

Slides from my 2017 Presentation

Resilience at OECD: Current State and Future Directions

OECD's Role

Provide guidance for **unique** considerations within each governance jurisdiction:



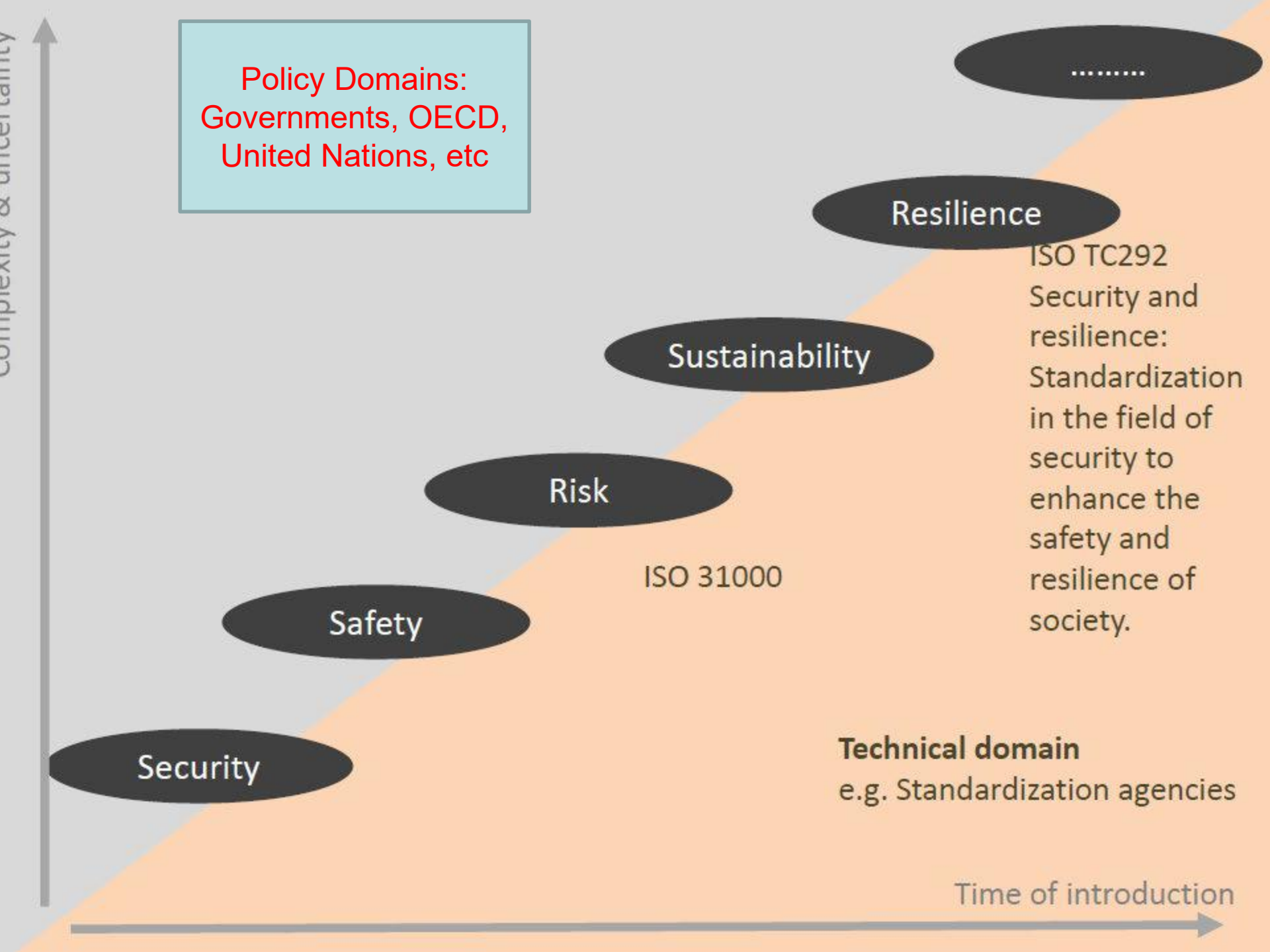
What rules/regulations exist, and how do they capture the **process** and **products** of emerging risks?

How do the **unique political and institutional frameworks** of a given jurisdiction affect emerging risk governance?

Do these regulatory differences influence the **perception** of risk by local experts and regulators?

After Trump,
Linkov et al 2016





Resilience Definitions - 2017

- Definition released by OECD Public Governance Committee:
 - ▶ *“...the ability to resist, absorb, recover from or successfully adapt to adversity or a change in conditions*”
- Consistent with the National Academies of Science (NAS) definition of resilience:
 - ▶ *“...the ability to plan and prepare for, absorb, recover from, and adapt to adverse events”*
- OECD directorates indicate that resilience needed to combat economic, social, and environmental risks on social systems



Publication on Resilience at OECD

OECD Directorate	Document	Plan	Absorb	Recover	Adapt
ITF	(Lofquist, 2017)	■	■	■	■
ED	ENV/EPOC/WPCID(2016)3	■	■	■	■
IEA	(OECD/IEA, 2015)	■	■	■	■
DCD-DAC	DCD/DAC/RD(2016)18/RD1	■	■	■	■
	OECD (2014b)	■	■	■	■
DSTI	OECD (2008)	■	■	■	■
	OECD (2015)	■	■	■	■
DELS	COM/ECO/CPE/WP1/DELSA/E LSA/WP5 (2017)1	■	■	■	■
DPGTD	OECD (2011)	■	■	■	■
	OECD (2014a)	■	■	■	■
	GOV/RDPC/URB(2016)4	■	■	■	■
	GOV/PGC/HLRF(2016)10	■	■	■	■
	GOV/RDPC/RD(2015)2	■	■	■	■
	OECD (2016c)	■	■	■	■
	GOV/PGC/HLRF(2016)9	■	■	■	■
	OECD (2013)	■	■	■	■

OECD Directorates Resiliency Involvement. OECD directorate publications denoted as they discuss the four stages of resilience “directly” vs. “indirectly,” or not at all.



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Discussion of Quantitative Approaches

OECD Directorate	OECD Directorate Publications	Quantitative Approaches
ITF	(Lofquist, 2017)	Maritime Safety Analysis
ED	ENV/EPOC/WPCID (2016) ³	Vulnerability Assessment Economic Analysis Cost Benefit Analysis Climate Risk Screening Tool
IEA	(OECD/IEA, 2015)	Climate risk auditing Risk Assessments Vulnerability Assessments Climate forecasts
DSTI	OECD (2008b)	Risk Assessment
	OECD (2015b)	Risk Assessment
DCD-DAC	DCD/DAC/RD (2016)18/RD1	Resiliency systems analysis framework
	OECD (2014b)	
DELS	COM/ECO/CPE/WP1/DELSA/ELSA/WP5 (2017)1	Econometric analysis
DPGTD	OECD (2011)	Risk Governance Framework/ National Strategy Foresight Analysis Global Risk Monitoring Systems Hazard and Risk Assessments (e.g., multi-hazard, multi-stakeholder) Early Warning Systems Needs Assessment Global Value Chain Modelling Cost Benefit Analysis Multi-Criteria Decision Analysis As Low As Reasonable Practice (ALARA)
	OECD (2014a)	
	OECD (2013)	
	GOV/RDPC/URB (2016) ⁴	
	GOV/PGC/HLRF (2016)10	
	GOV/RDPC/RD (2015)2	
	OECD (2016c)	
	GOV/PGC/HLRF (2016)9	
OECD (2013)		

OECD Resilience Quantitative Approaches. Examples of resilience-based quantitative analyses discussed among OECD directorate publications.



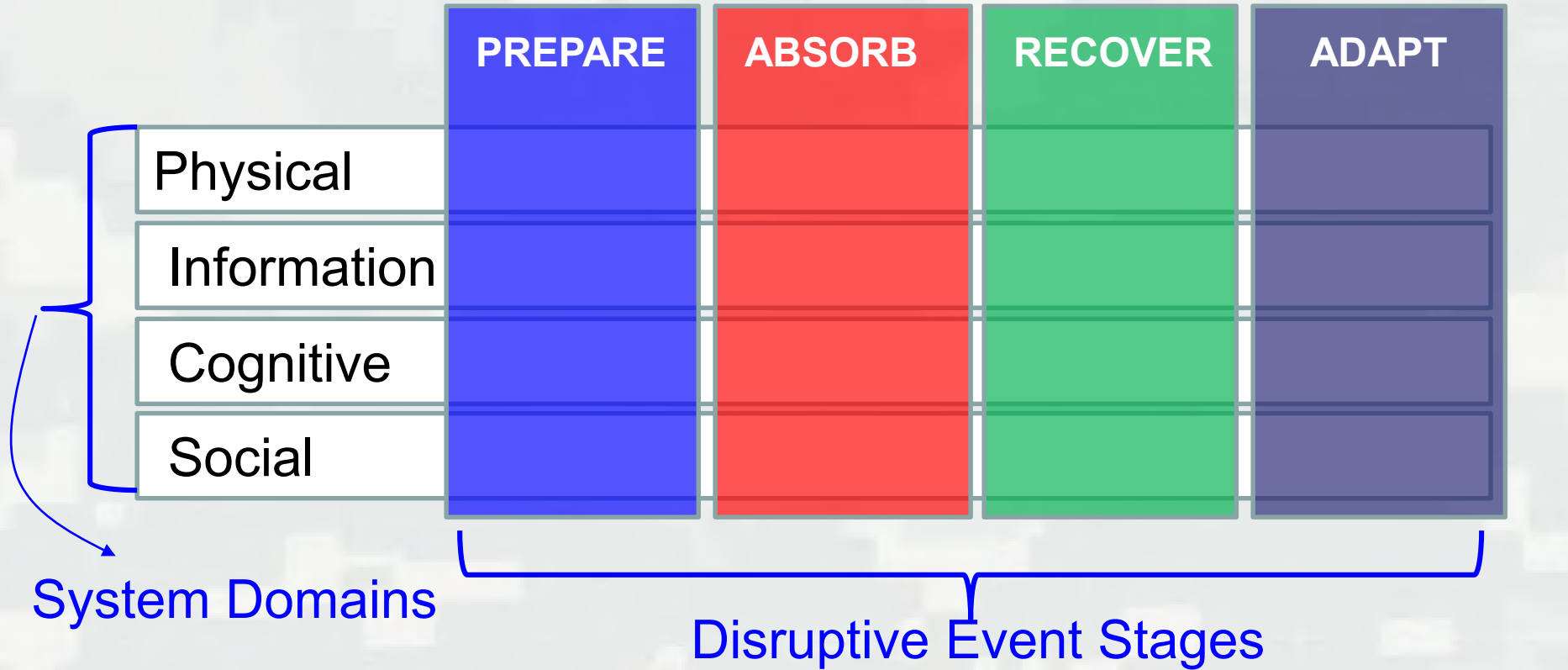
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Application of Resilience in OECD

- The emerging science of resilience has not been adequately featured in the body of work delivered by OECD
 - ▶ For many documents, a focus on Planning and Absorbing Risk, with less attention paid to system Recovery and Adaptation
- While the OECD directorates agree that resilience should be considered in systems development, OECD directorates focus heavily on resilience planning and preparation
 - ▶ Emphasis on other resilience features including system threat absorption, recovery, and adaptation are less prevalent



Quantifying Resilience - Resilience Matrix



Scale

← Home Neighborhood Town County Region State Country →



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Resilience Matrix: OECD Divisions vs. US Agencies

	Plan	Absorb	Recover	Adapt
DHS FEMA	DOJ	DHS cyber security	DHS FEMA	
		DHS climate	DHS S&T	
	NOAA	DOJ	DOJ	
	USACE	NIST	NIST	
	USAEC	NOAA	NOAA	
		USACE	USACE	NIST
DHS S&T	NIST			DHS cyber
		USACE		
			NOAA	

	Plan	Absorb	Recover	Adapt
Physical	ED		DPDTG	DPDTG
Information	DCD-DAC	DPDTG	DSTI	
Social	ITF	DPDTG	DSTI	ITF
		DELS	DELS	
		DPDTG	DPDTG	
		DSTI	DSTI	

OECD Directorate vs. US Agency resilience actions “directly” addressed (relative to NAS definition) in physical, information, and social domains. OECD publications discuss resilience within social domain while US agencies discuss resilience heavily within infrastructure domain.



Recommendations and Way Forward

- A normalized and operationalized definition of resilience within the OECD is useful to build adequate quantitative measures across directorates



Resilience at OECD in 2020



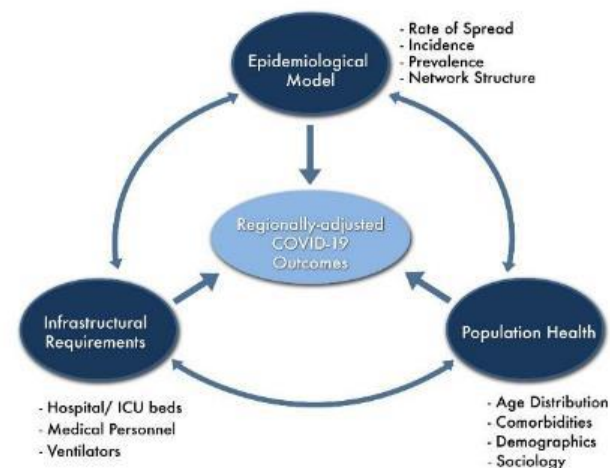
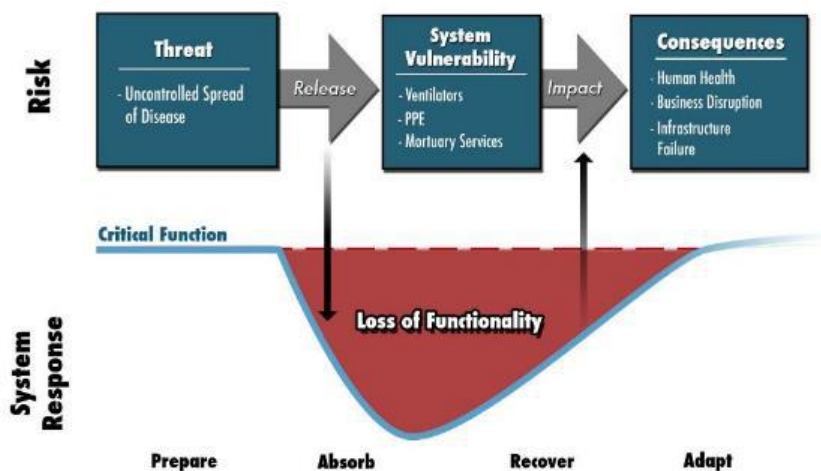
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COVID-19 and Resilience

- Goal: Translating region-specific COVID-19 and socio-political realities into an actionable plan
- Transition from risk- to resilience-based analytics



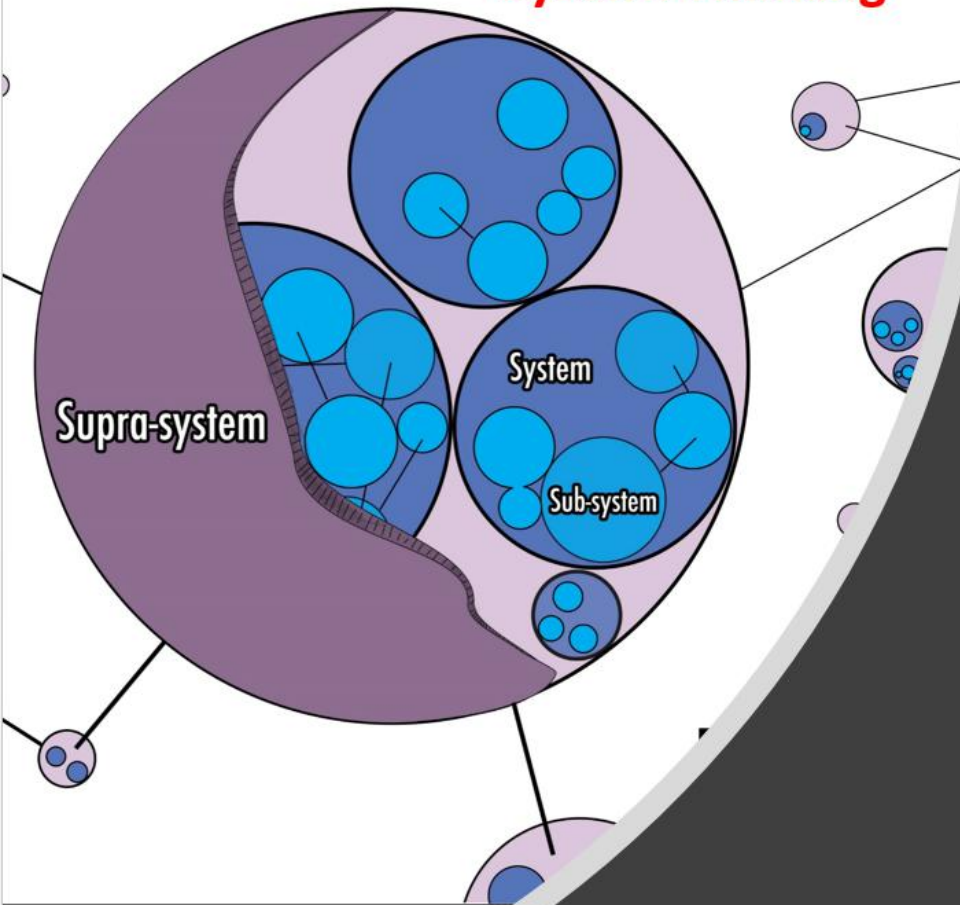
- Systems Approach to systemic risks combining epidemiological, infrastructure and public health models and evaluation
- Integration of socio-cultural specificity of state/territory

AN ANALYTICAL PERSPECTIVE ON PANDEMIC RECOVERY

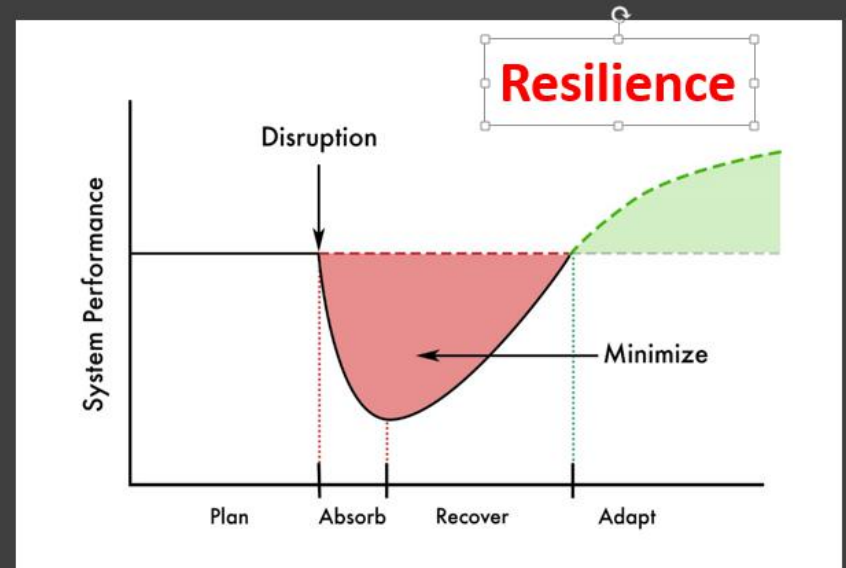
Health Security
Volume 18, Number 3, 2020
DOI: 10.1089/hs.2020.0057

Benjamin D. Trump, Todd S. Bridges, Jeffrey C. Cegan, Susan M. Cibulsky, Scott L. Greer, Holly Jarman, Brandon J. Lafferty, Melissa A. Surette, and Igor Linkov

System Thinking



What Makes Complex Systems (Communities) Susceptible to Threat?



After Linkov and Trump, 2019

Risk -- “a situation involving exposure to danger [threat].”

Security -- “the state of being free from danger or threat.”

Resilience -- “the capacity to recover quickly from difficulties.”

Definitions by Oxford Dictionary

Don't conflate risk and resilience

'Risk' and 'resilience' are fundamentally different concepts that are often conflated. Yet maintaining the distinction is a policy necessity. Applying a risk-based approach to a problem that requires a resilience-based solution, or vice versa, can lead to investment in systems that do not produce the changes that

Igor Linkov, Benjamin D. Trump
*US Army Corps of Engineers,
Concord, Massachusetts, USA.*
Jeffrey Keisler
*University of
Massachusetts Boston, USA.*
igor.linkov@usace.army.mil

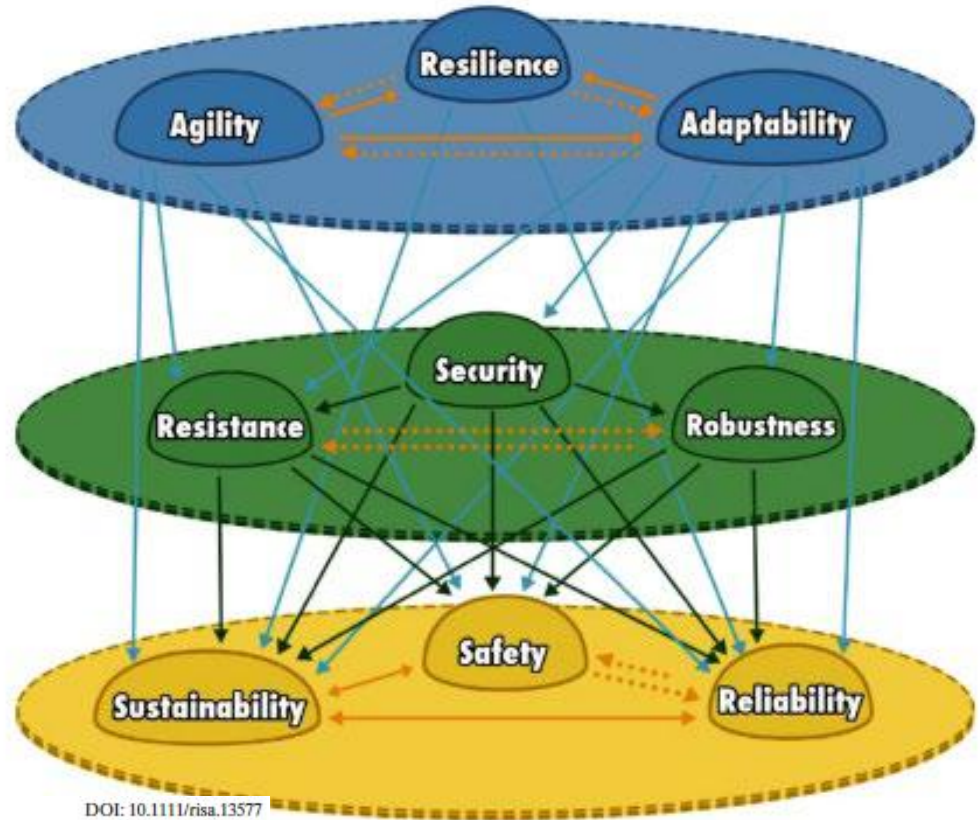
SYSTEM RISK/SECURITY AND RESILIENCE



System Affected by Threats: Taxonomy

The deliberate actions or choices taken

The short term consequences or abilities enabled by those actions

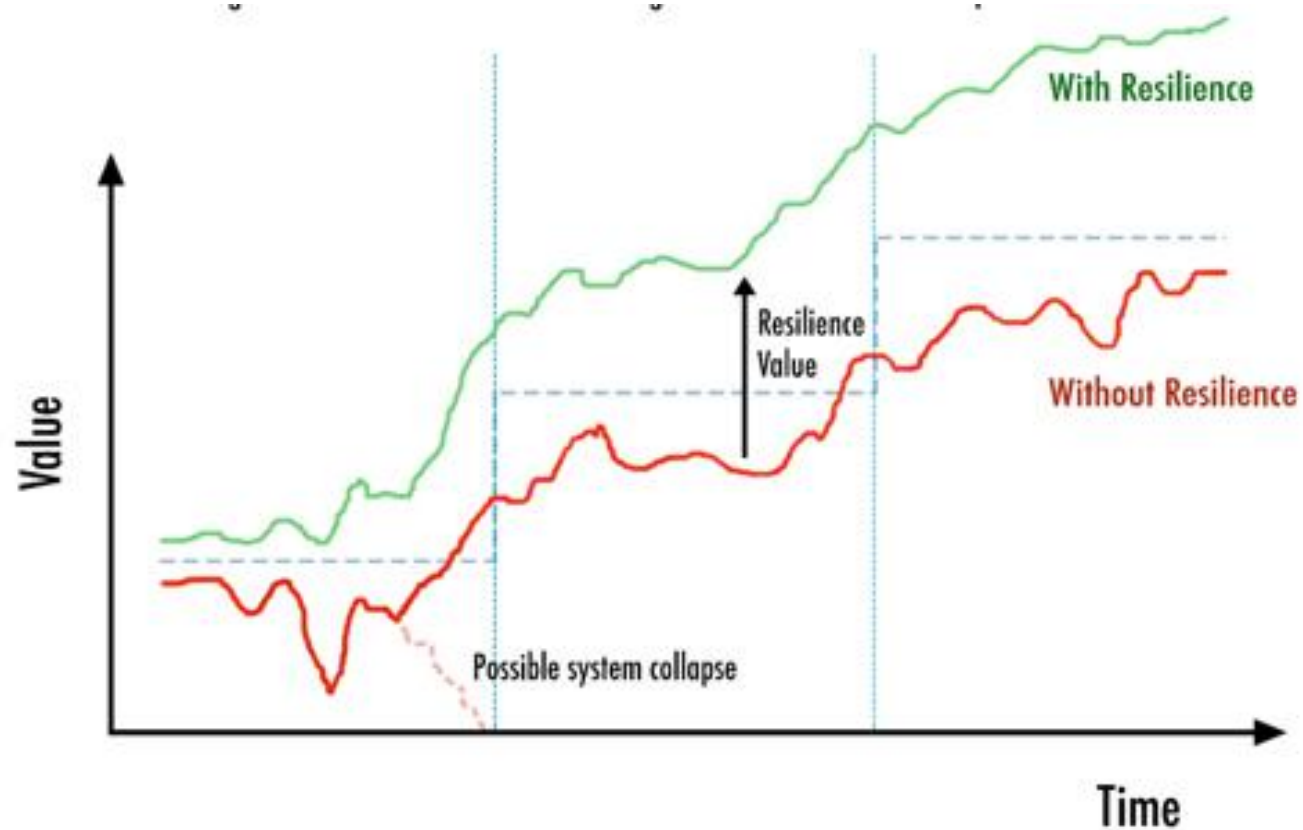


Risk Analysts, Vol. 0, No. 0, 2020

The Need to Reconcile Concepts that Characterize Systems Facing Threats

The long-term outcomes enabled by actions and abilities

Value of Resilience



2020

Management Research Review
© Emerald Publishing Limited
2040-8269
DOI 10.1108/MRR-08-2019-0353

The case for value chain resilience

Igor Linkov, Savina Carluccio, Oliver Pritchard, Áine Ní Bhreasail,
Stephanie Galaitsi, Joseph Sarkis and Jeffrey M. Keisler

Poor Efficiency:

System cannot not accommodate a large volume of commuters driving at the same time.

Traffic congestions are predictable and are typically of moderate level.

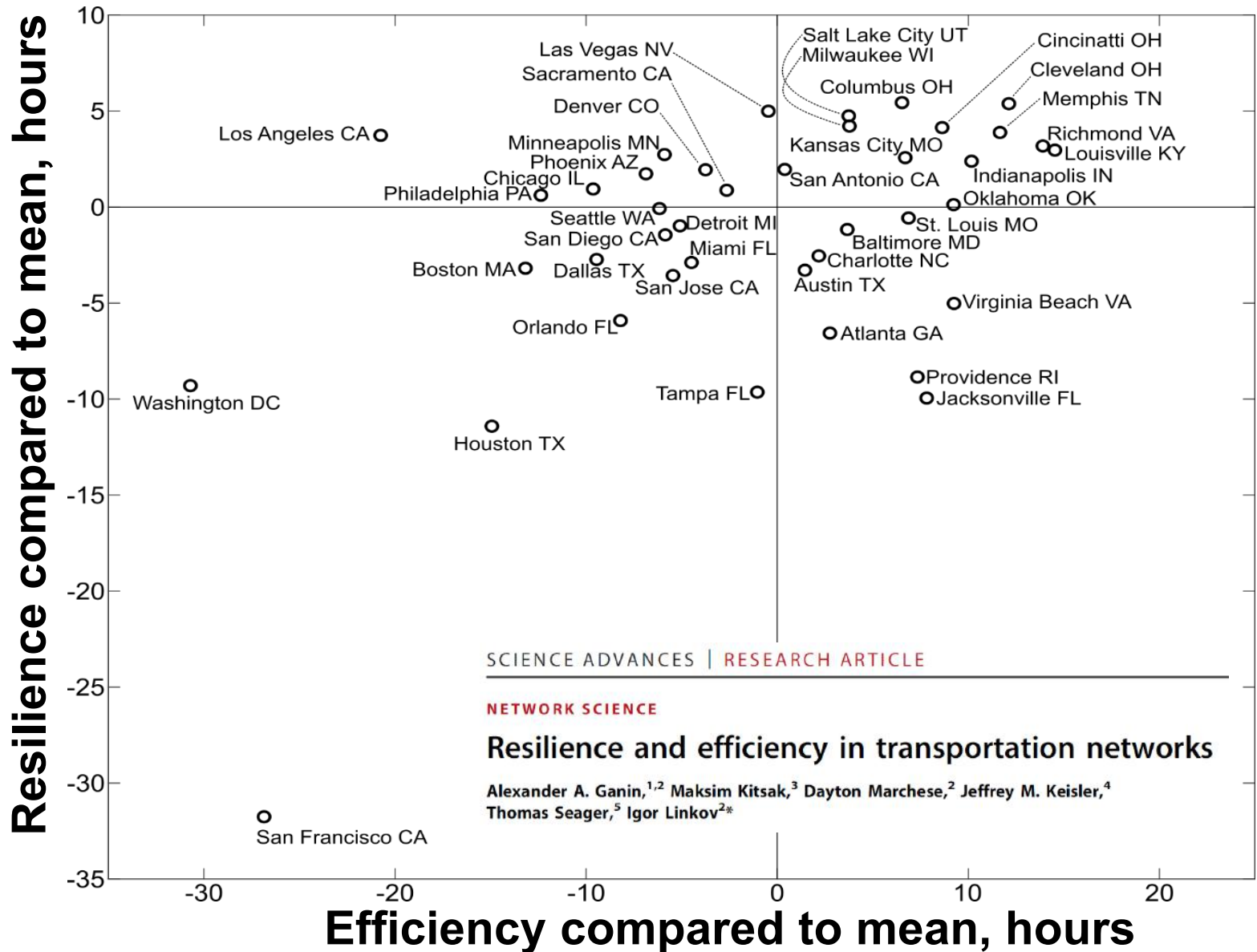


Lack of Resilience:

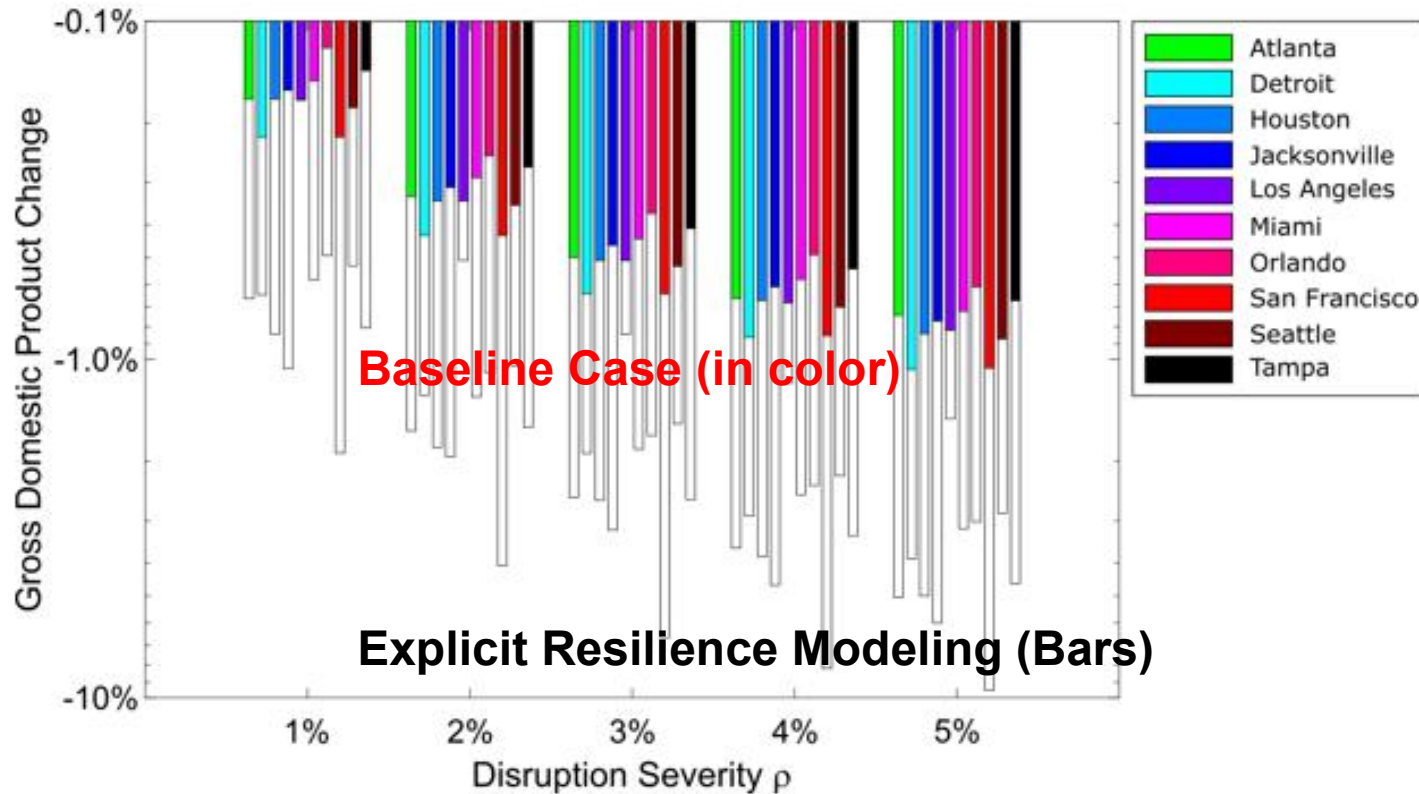
System cannot recover from adverse events
(car accidents, natural disasters)

Traffic disruptions are not predictable and of variable scale.

Resilience vs Efficiency



Lack of Resilience and Impact on GDP



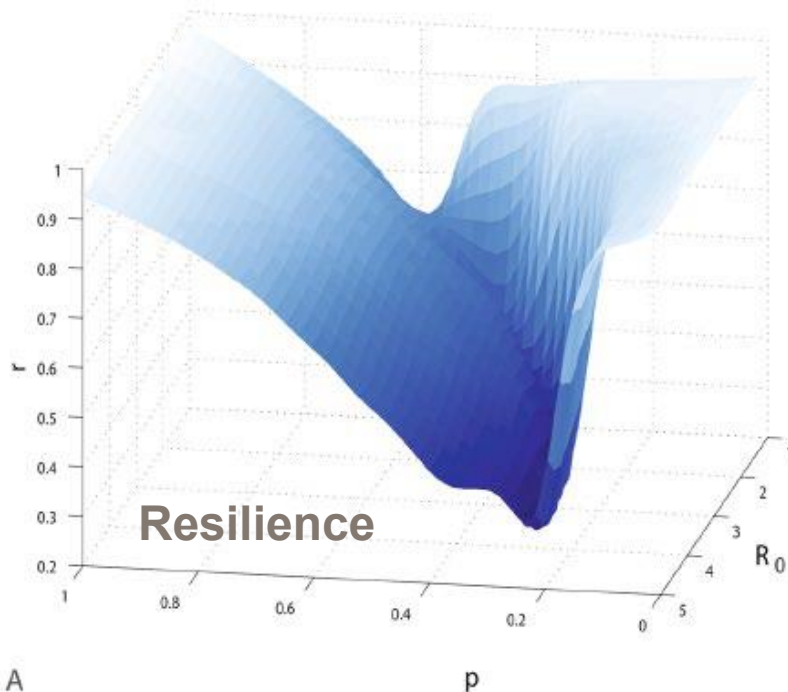
Contents lists available at ScienceDirect

Transportation Research Part D

journal homepage: www.elsevier.com/locate/trd

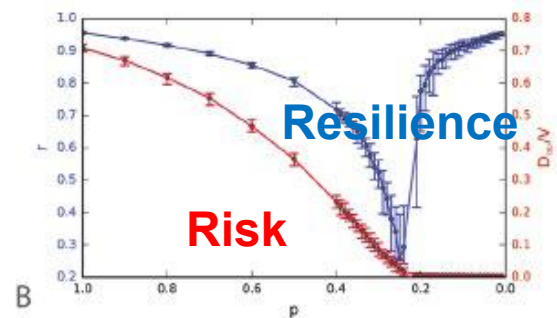


Resilience Analytics and Epidemics

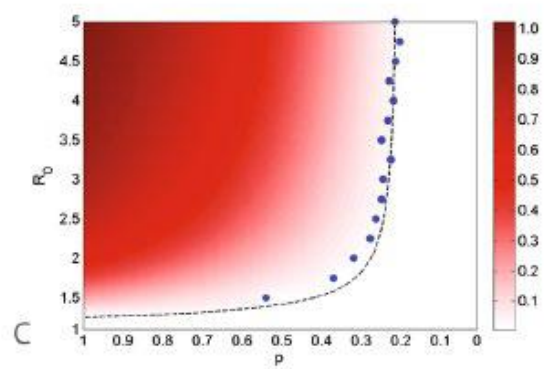


A
Free Travel

No Travel



B



C

Free Travel

No Travel

SCIENTIFIC REPORTS

OPEN Resilience management during large-scale epidemic outbreaks

Emanuele Massaro^{1,2,3}, Alexander Ganin^{1,4}, Nicola Perra^{5,6,7}, Igor Linkov¹ &

Moving From Inspiration to Operation

Social

Physical

1. Inspiration

4. Policy

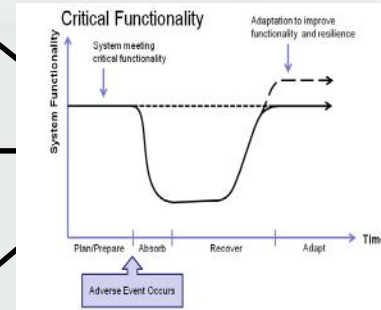
2. Framework (e.g.,
Resilience Matrix, Network
Science

3. Operation



Prepare Absorb Recover Adapt

Physical
Information
Cognitive
Social



Outcome



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