

# TECHNOLOGY TRENDS AND ANTICIPATED ETHICAL DILEMMAS

ESCWA Technology Centre  
Amman, Jordan  
July 2017

Economic and Social Commission for Western Asia



UNITED NATIONS

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YEARS

# In 20 Minutes: I will Not Discuss Innovation and Ethics related to:

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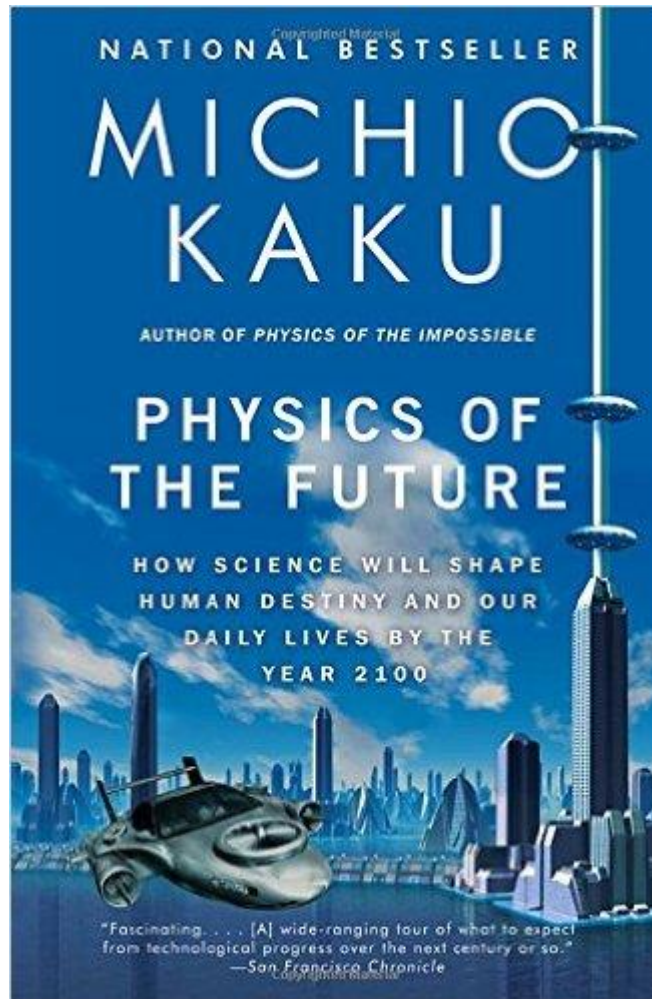
## IMPORTANT TOPICS:

- IP Claims and Patenting
- IPR and IPP
- Reverse Engineering
- Prototyping
- Procurement

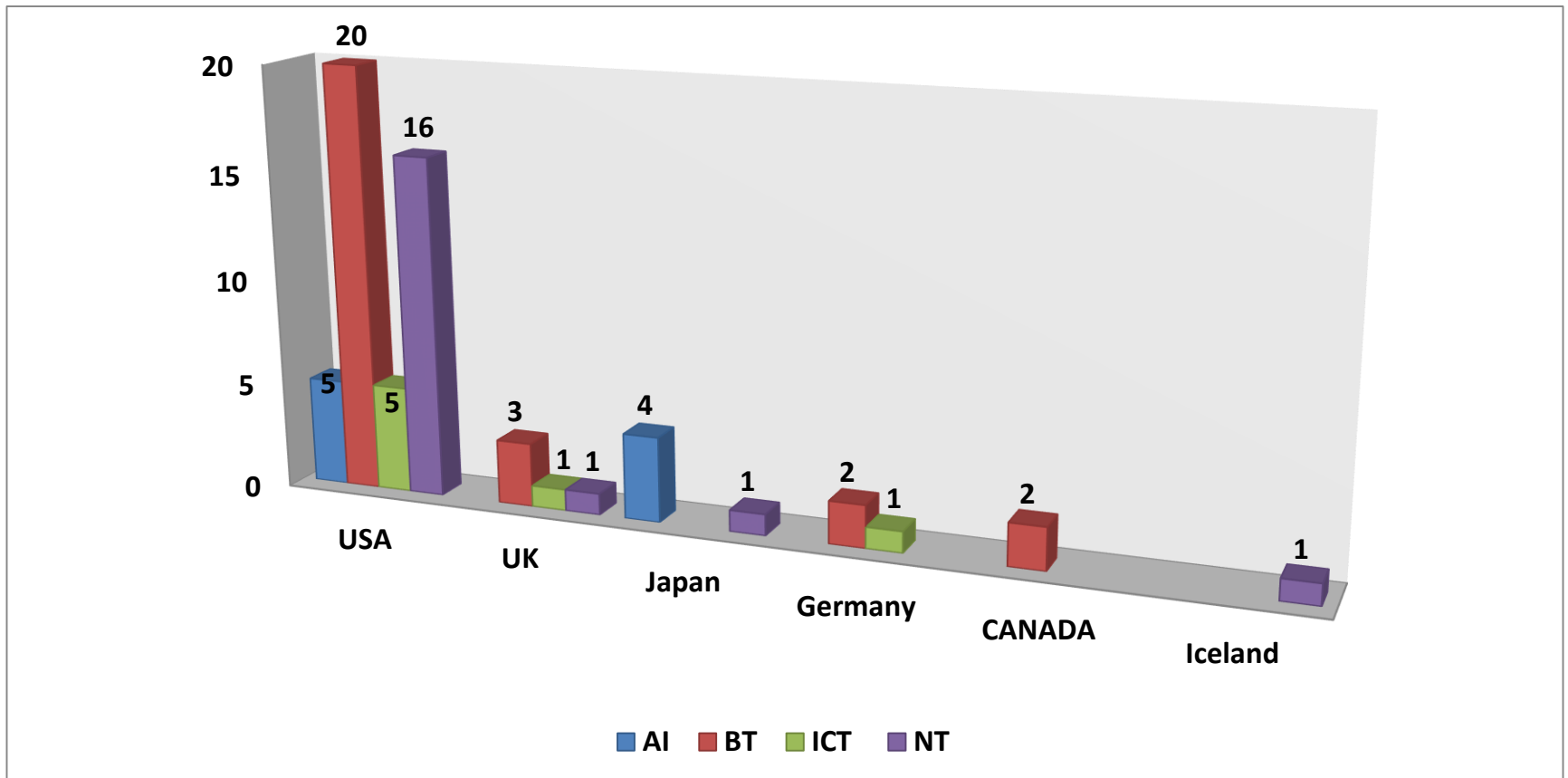
# This 20 minutes session: On The.....

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1. Emerging Technology trends: Forecast 100 years !
2. Arab countries: CASE Nanotech
3. Ethical Dilemmas of Technological Innovation
4. Challenges in assessing Emerging Technologies
5. Guidelines: Responsible Innovation



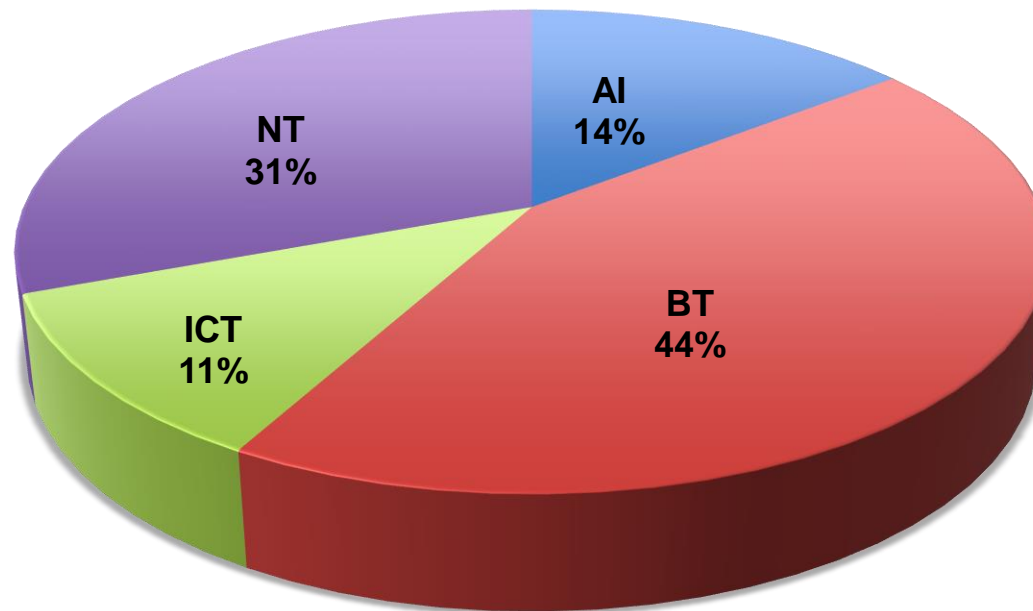
# Michio Kaku, "Physics of the Future: how science will shape human destiny and our daily lives by the year 2100," 2012



# Michio Kaku: Tech for next 100 years

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**Total Identified Projects: 62**



# Artificial Intelligence

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## Projects

Artificial Reasoning

Augmented reality

Driverless car

Emotional robot

Robot chef

Robot flutist

Robot nurse

Robot remote sensing


Universal translator



ZDNet

# BIOTECH

## Projects

Aging single gene	Gene sequencing	Reconstructing from genes
Artificial retina	Gene therapy	Regrown finger
Bacteria propelling nanocars	Genetic happiness setpoint	Reverse eng brain
Biochip	Longer life breeding	Smart mice biotech
Brain machine control	Mammoth genes	Stem cell
Caloric restriction	Mighty genes	Stem cell heart
Cloning	Monogamous gene	Tissue engineering
Designer children	Neanderthal genome	
DNA chips	Nurotransmitter mice	
DNA molecules Computer	Printer of living Heart	
	tissues	

threeding



# ICT

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## Projects

F-MRI

Fusion energy

Modeling brain dawn super comp

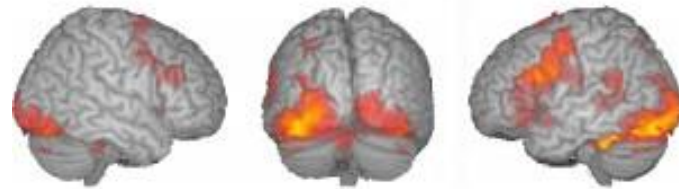
MRI mouse

Quantum Computer

Space colony

Virtual haptic

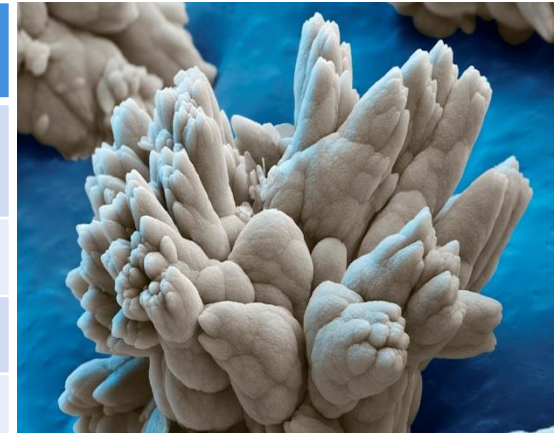
fMRI group results to word reading in 10 subjects



NYU Cognitive Neurophysiology Laboratory

# NANOTECH

Projects	
Analyzing ice 1000s years old	Nano cars in blood
Antimatter	Nano particles against cancer
Atomic Guitar	Nano particles pills zapping cancers
Carbon nanotubes	Nano self assembly
Flexible e-paper	Programmable Matter
Glasses lens Display	Smart pill
Graphine Transistor	Space Solar Power
Microchip blood tester	Speedy nano cars
Mini helicopters swarm bots	STM for atom scope
Modular robots	



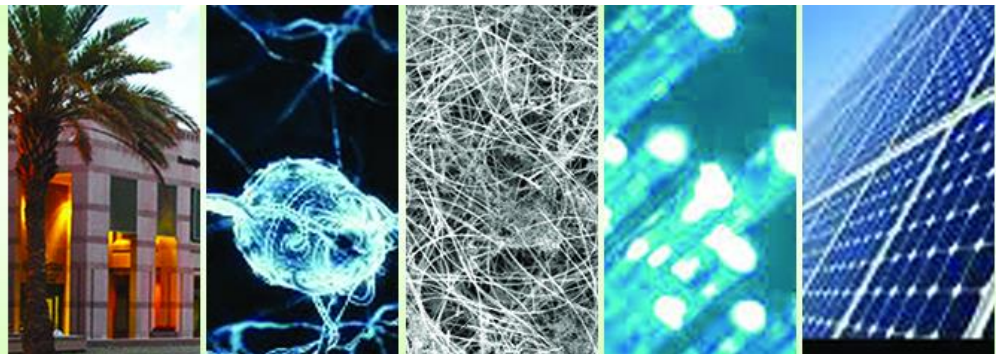
A microscopic view of a nanoparticle carrying a drug payload inside

NOVA NEXT

# Case of Arab Nanotech Portfolio: ALECSO 2017

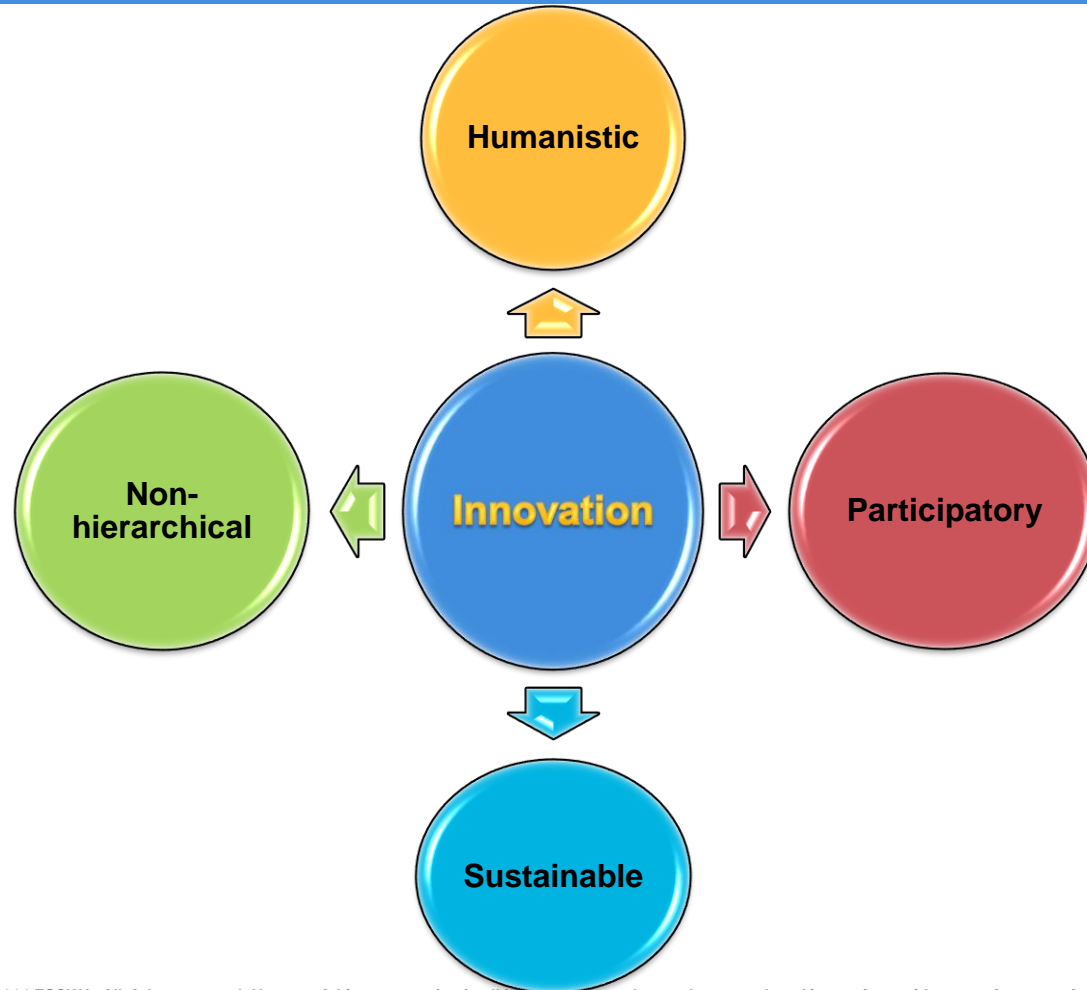
Many Arab countries adopted serious national programs to develop nanoscience and technology:

Nanotechnology companies	Nano patents USPTO 2011-2016	World ranking to publish Nano-2016	Total publications nanotechnology ISI	The number of centers and departments of nanotechnology	State
3	158	16	9425	6	Saudi Arabia
2	12	25	6915	11	Egypt
	--	41	2281	2	Tunisia



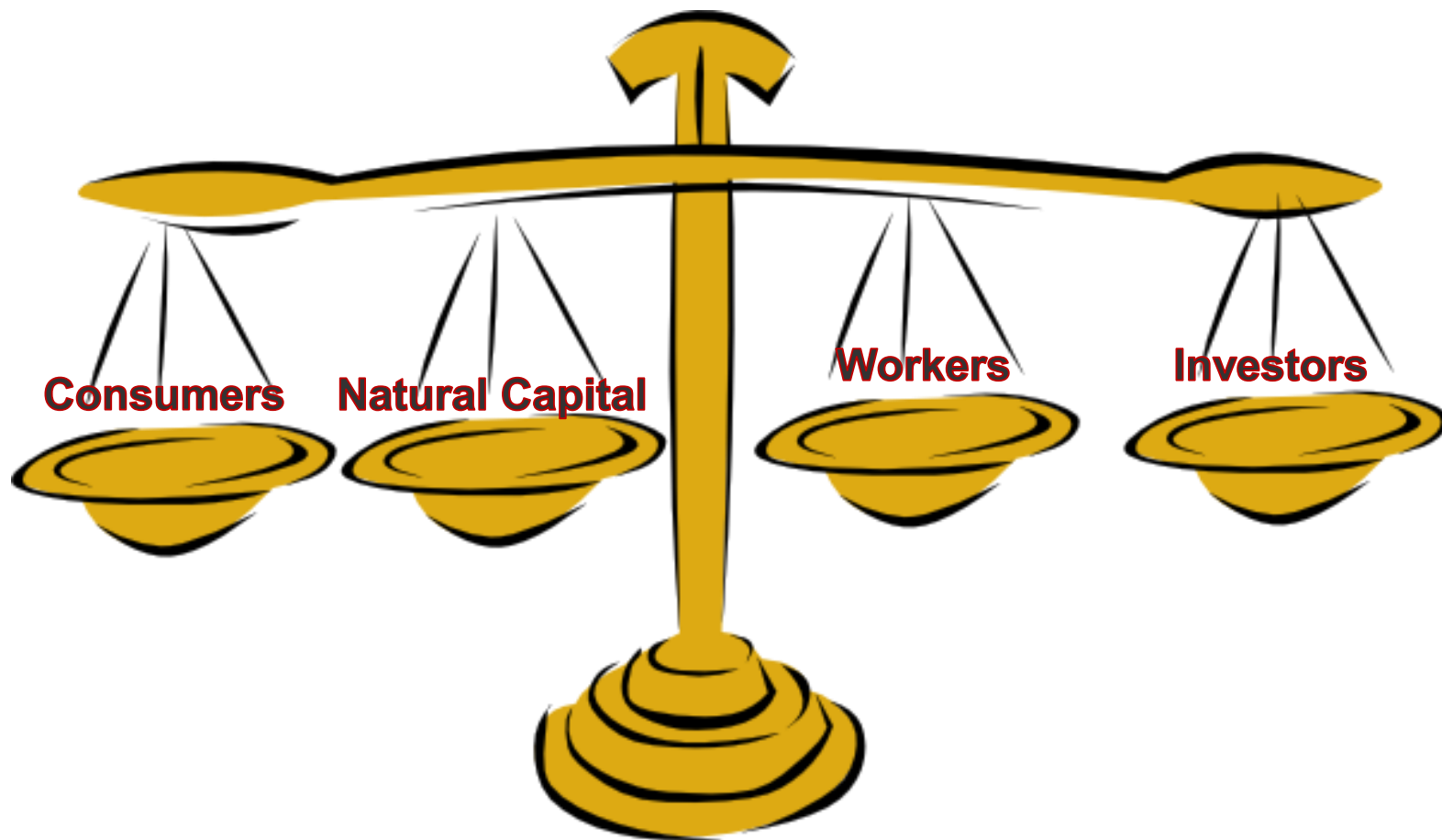
# Innovation Characteristics

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# Fair assessment of the role of technologies

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# Responsible Innovation Dilemma

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- Responsible without shutting down risk-taking
- Unpredictability of potential harmful uses, not originally intended
- Difficult to make a full technological assessment
- Challenges of assessing emerging technologies
- EU defines responsible innovation (RI):

***“approach that anticipates and assesses potential implications and societal expectations”***





Nauman Sabir

# SmartCity



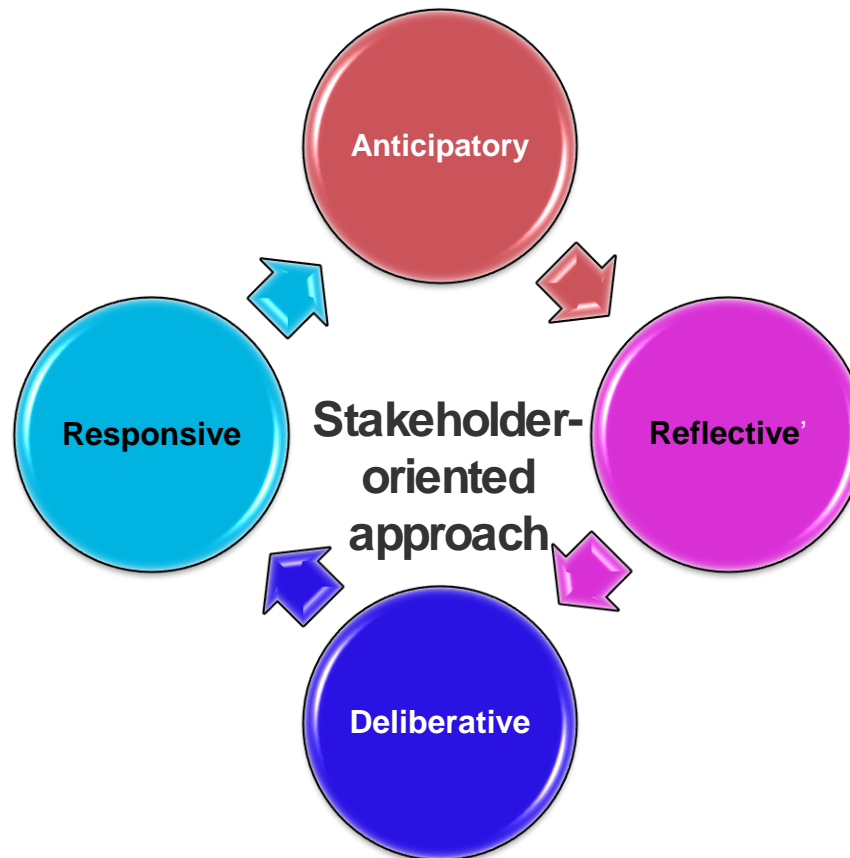
EUREKA



# Guidelines: Responsible Innovation

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Circular RI process not linear:



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## Guide innovation with the greatest potential benefits:

**Network effects :**



**Goods :**



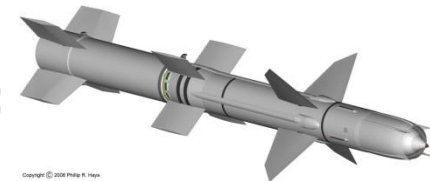
**Commodities:**



**Positional goods:**



**Goods negative externalities:**



## References:

1. G. Nathan, Innovation process and ethics in technology: an approach to ethical (responsible) innovation governance, Journal on Chain and Network Science 2015
2. G. Mulgan, Good and bad innovation: what kind of theory and practice do we need to distinguish them? [www.nesta.org.uk](http://www.nesta.org.uk); July 2016
3. [C. Fabian, R. Fabricant](#), “The Ethics of Innovation;” Stanford social innovation review, 2014

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THANK YOU

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