



Future challenges for Strategic Trade control: New & emerging technologies

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Future challenges

What are the future challenges?

How can we address them in the context of strategic trade controls?

Dual-use, technology, innovation?

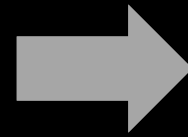
Knowledge as part of technology and the limits thereof?

The role of knowledge and the social life of lists

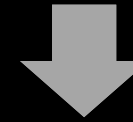
Scientific and technological developments

The Biosciences Case

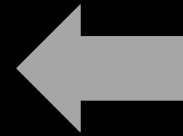
Availability and power of enabling technologies rapidly progressing



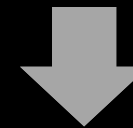
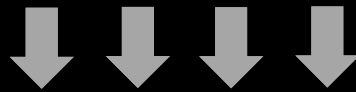
Rapid diffusion of knowledge, materials, and technologies:



to actors outside of traditional research settings (vertical diffusion)

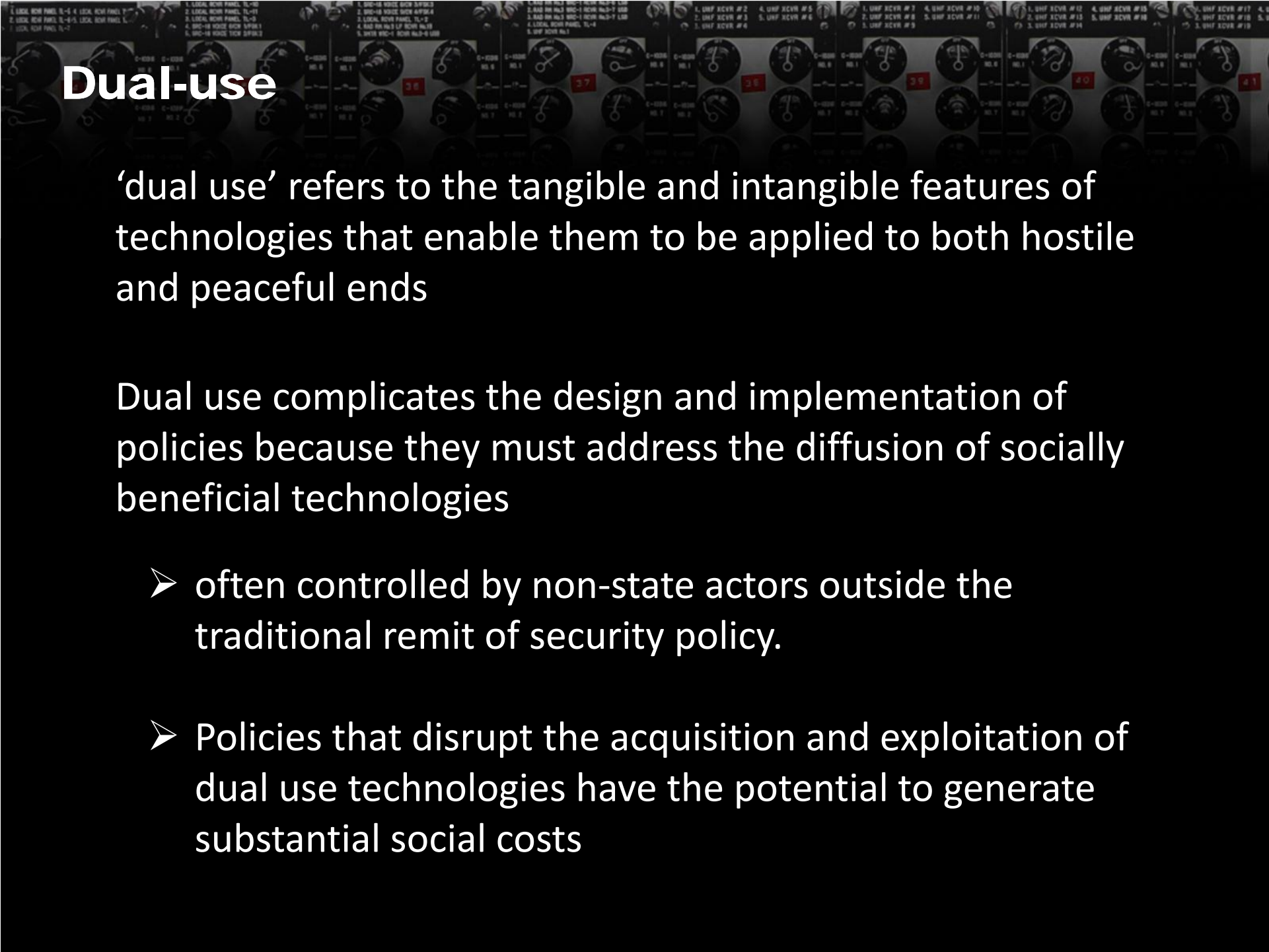


integration of multiple disciplines, incl. chemistry, biology, information technology, mathematics, and engineering sciences



geographically across the globe (horizontal diffusion)



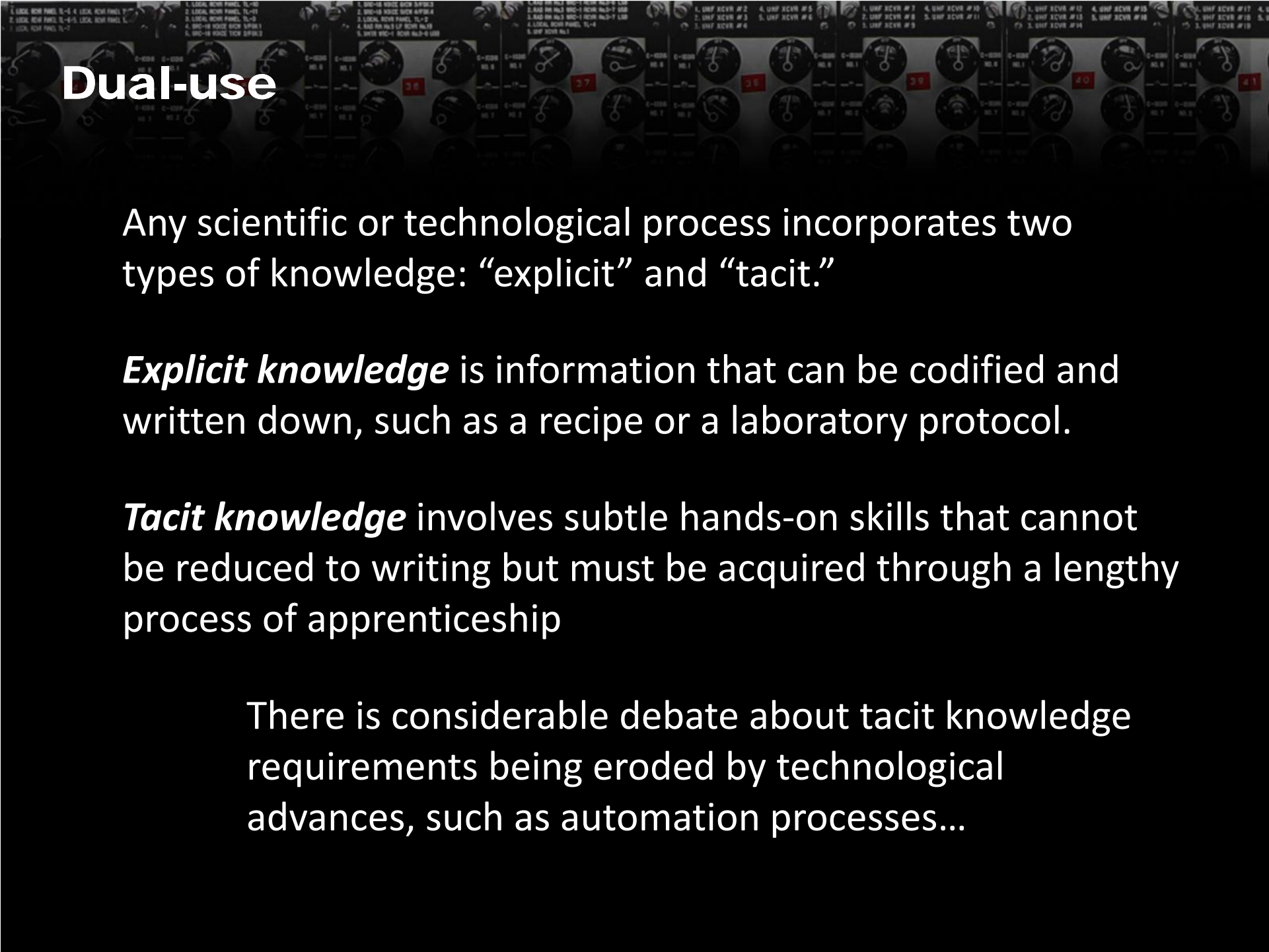


Dual-use

‘dual use’ refers to the tangible and intangible features of technologies that enable them to be applied to both hostile and peaceful ends

Dual use complicates the design and implementation of policies because they must address the diffusion of socially beneficial technologies

- often controlled by non-state actors outside the traditional remit of security policy.
- Policies that disrupt the acquisition and exploitation of dual use technologies have the potential to generate substantial social costs



Dual-use

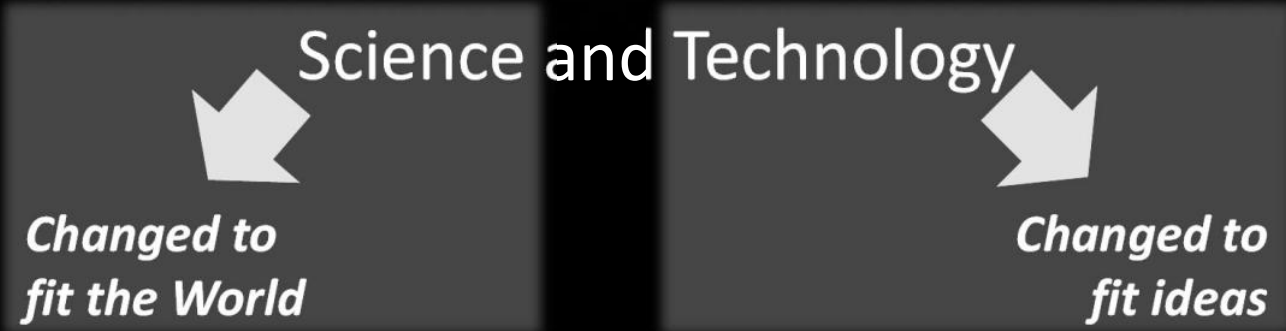
Any scientific or technological process incorporates two types of knowledge: “explicit” and “tacit.”

Explicit knowledge is information that can be codified and written down, such as a recipe or a laboratory protocol.

Tacit knowledge involves subtle hands-on skills that cannot be reduced to writing but must be acquired through a lengthy process of apprenticeship

There is considerable debate about tacit knowledge requirements being eroded by technological advances, such as automation processes...

Technology



Technologies' (imposed) functions depend on people's understanding, while...

...how well technologies perform those functions depends on the intrinsic properties of the technology

Technologies' (imposed) functions depend on interactions with wider environment

For more on technology:

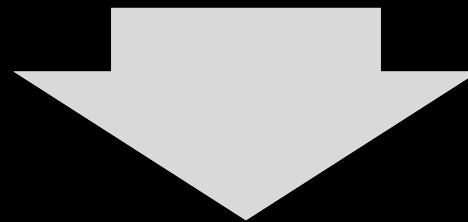
MacKenzie, D., & Wajcman, J. (Eds.) (1985). *The Social Shaping of Technology: How the Refrigerator got its Hum*, Milton Keynes: Open University Press.

Bijker, W. E., Hughes, T. P., & Pinch, T. (1987). *The Social Construction of Technological Systems*. Cambridge, MA: MIT Press

Technology

Innovation cannot be an *event* where the artefact/function is discovered.

Innovation is a *process* of changing features until they produce a desired behaviour.



tends to be a **difficult, time consuming, inherently uncertain, knowledge intensive and costly** process involving a number of steps and a range of technologies

Technology

Disentangling complex and dynamic inter-dependencies

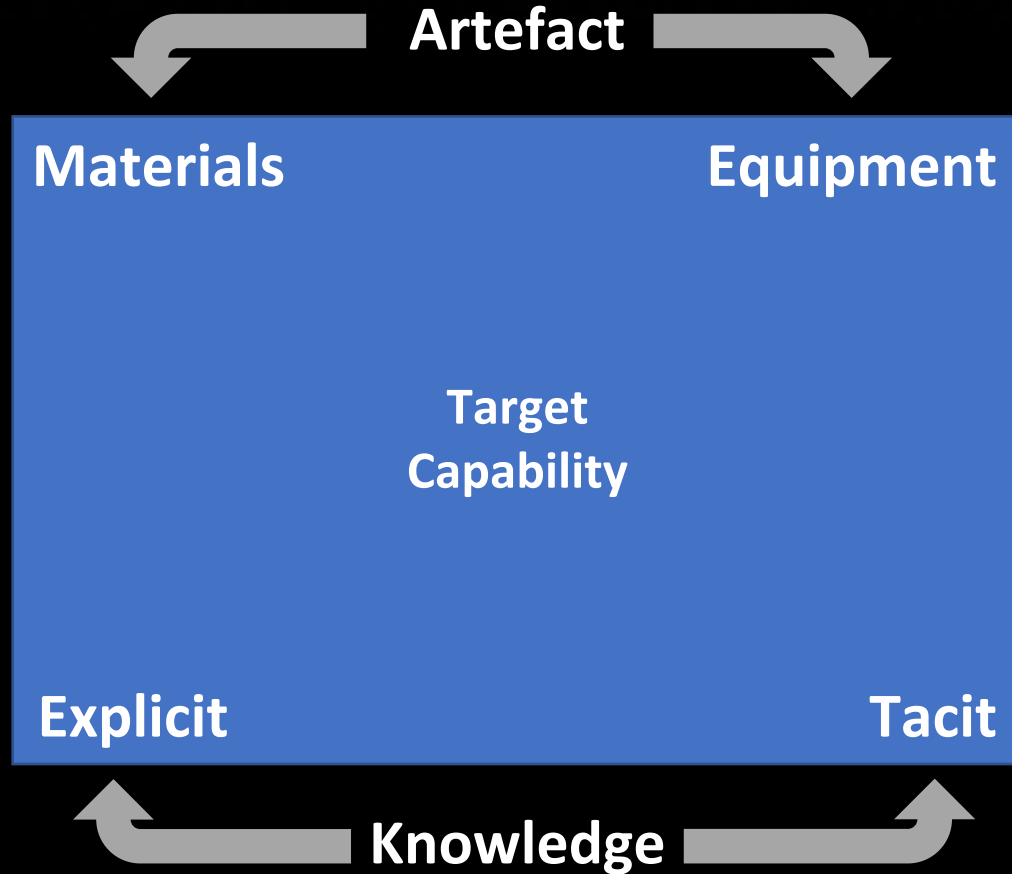
Allows conceptualisation of points to interdict and **identify barriers to acquisition** and or **proliferation**

more complex characterisations of technology possible - STS & innovation

is ostensibly **about controlling the knowledge** component of technology

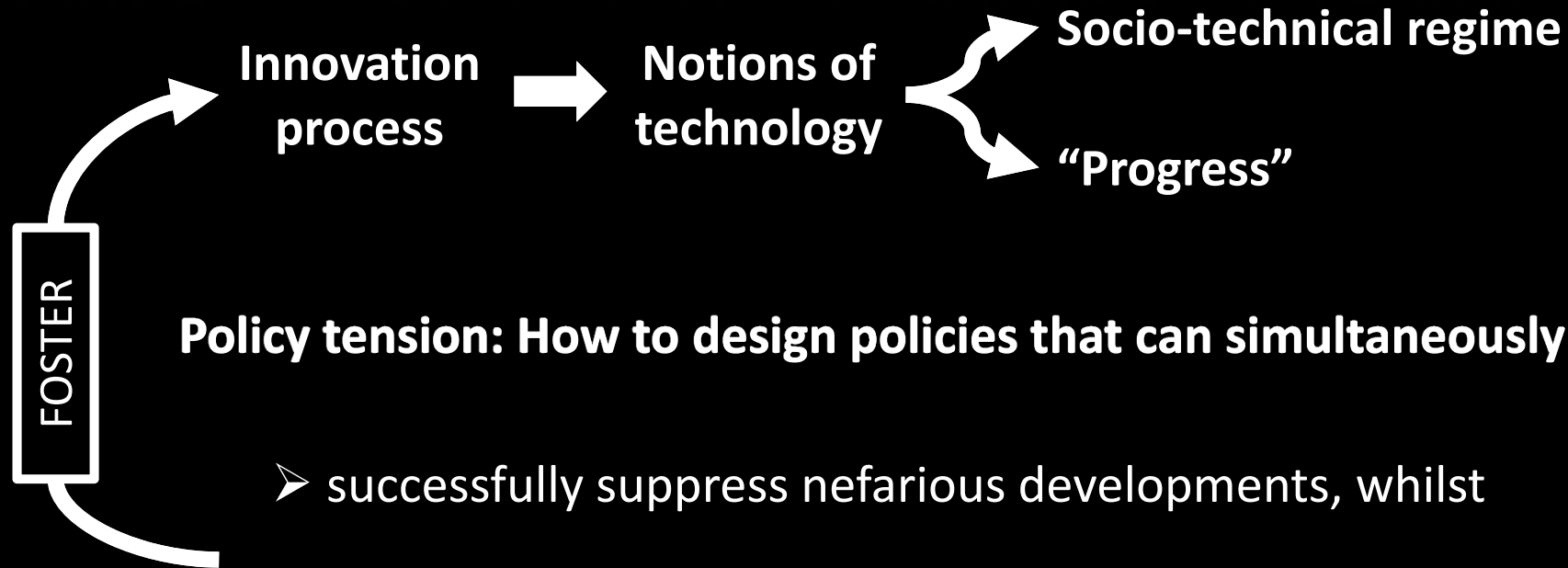
and is an **essential and integral** part of an export control regime

Capability Acquisition Model



“Technology Readiness Level”

Dual-use dilemma



Policy tension: How to design policies that can simultaneously...

- successfully suppress nefarious developments, whilst
- accommodating and encouraging the spread of dual use technologies for legitimate technical and scientific reasons

For more on dual use, see:

Molas-Gallard, J. (1998) Dual use technologies and the different transfer mechanisms. CoPS Publication No55

Conference Paper, at: <http://www.cops.ac.uk/pdf/cpn55.pdf>

McLeish, C. (2007). 'The problem of dual use knowledge' in McLeish, C. & Rappert, B. (eds.) A Web of Prevention: Biological Weapons, Life Sciences, and the Governance of Research (London: Earthscan Publications Ltd.)

Export controls and (lack of) knowledge

Knowledge of tech change

Four states

Spaces for exchanges

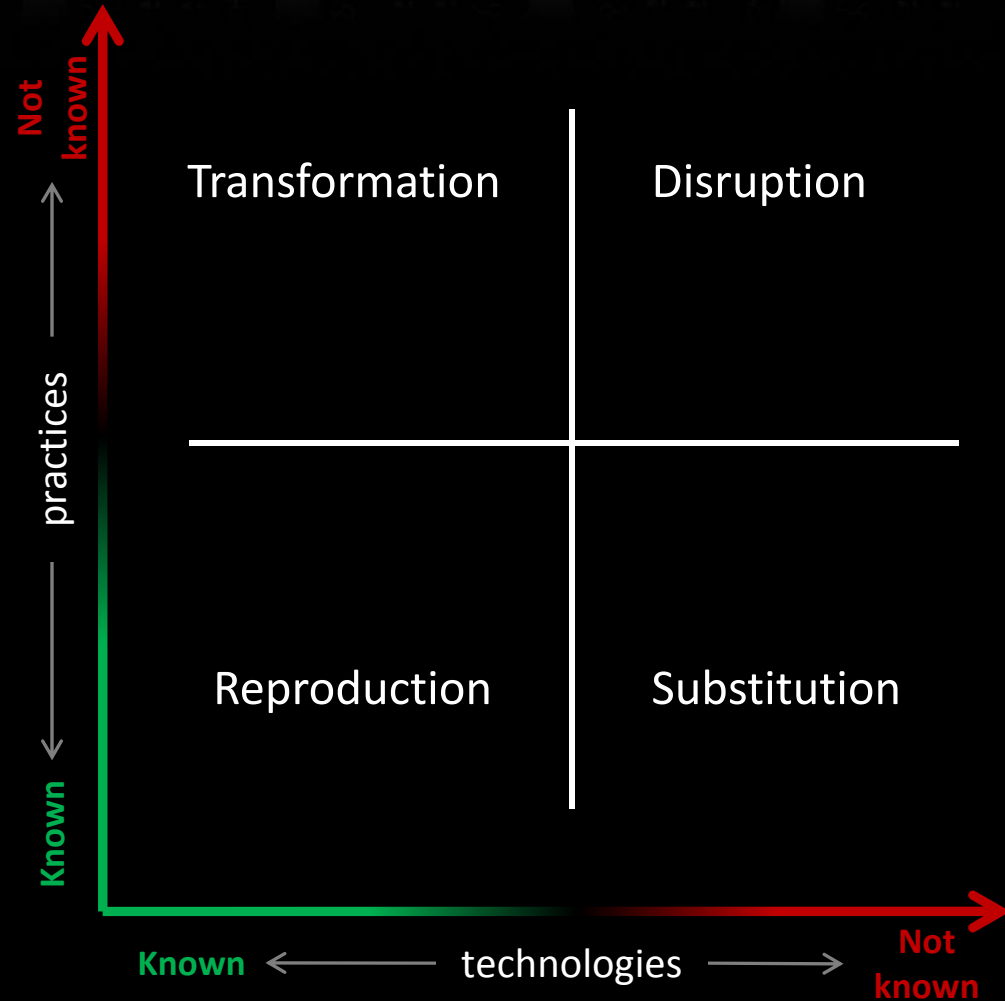
Intra institutionally, inter institutionally

National, regional, international

... with wide variety of **actors and stakeholders, enablers and facilitators**

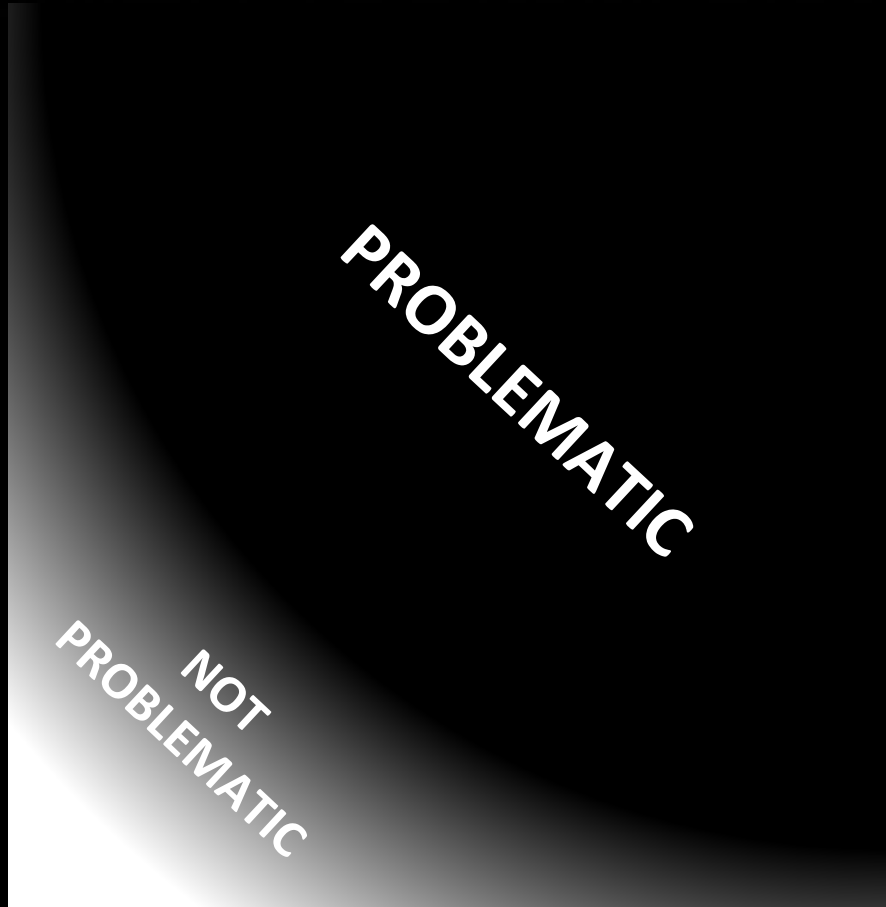
In academia, industry, government, civil society, financial sector, law enforcement, customs

Requires space, dedication, resources, collaboration, time, and active engagement...

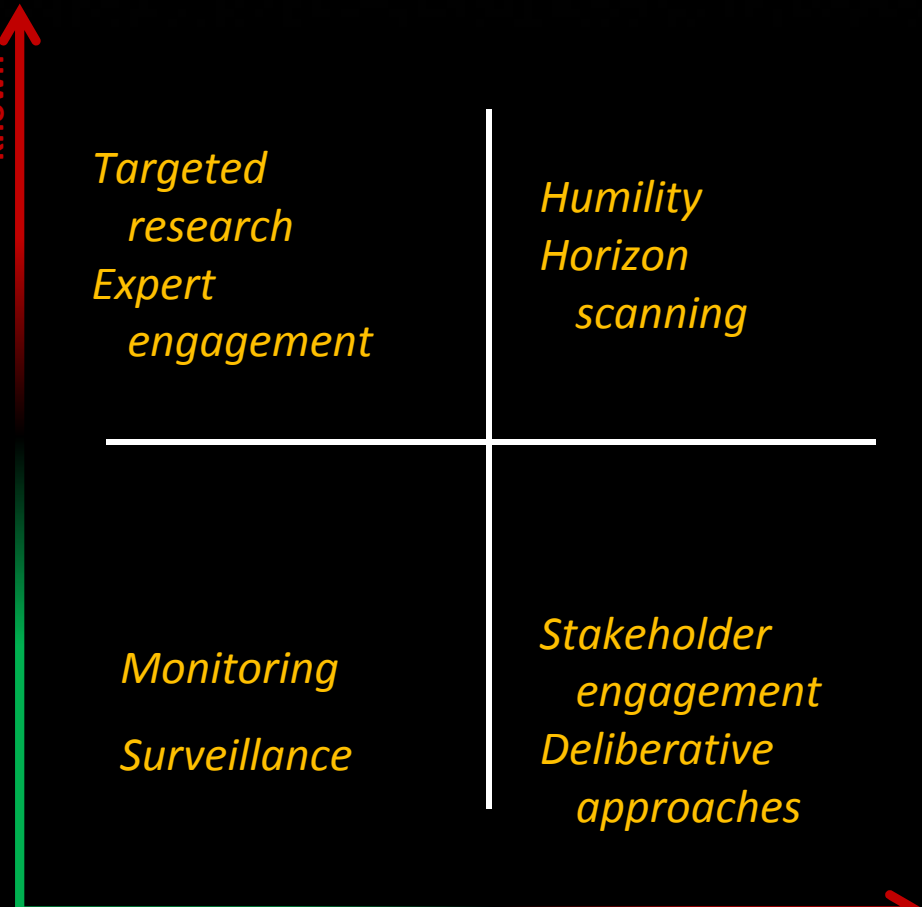


Export controls and (lack of) knowledge

Second Graphic



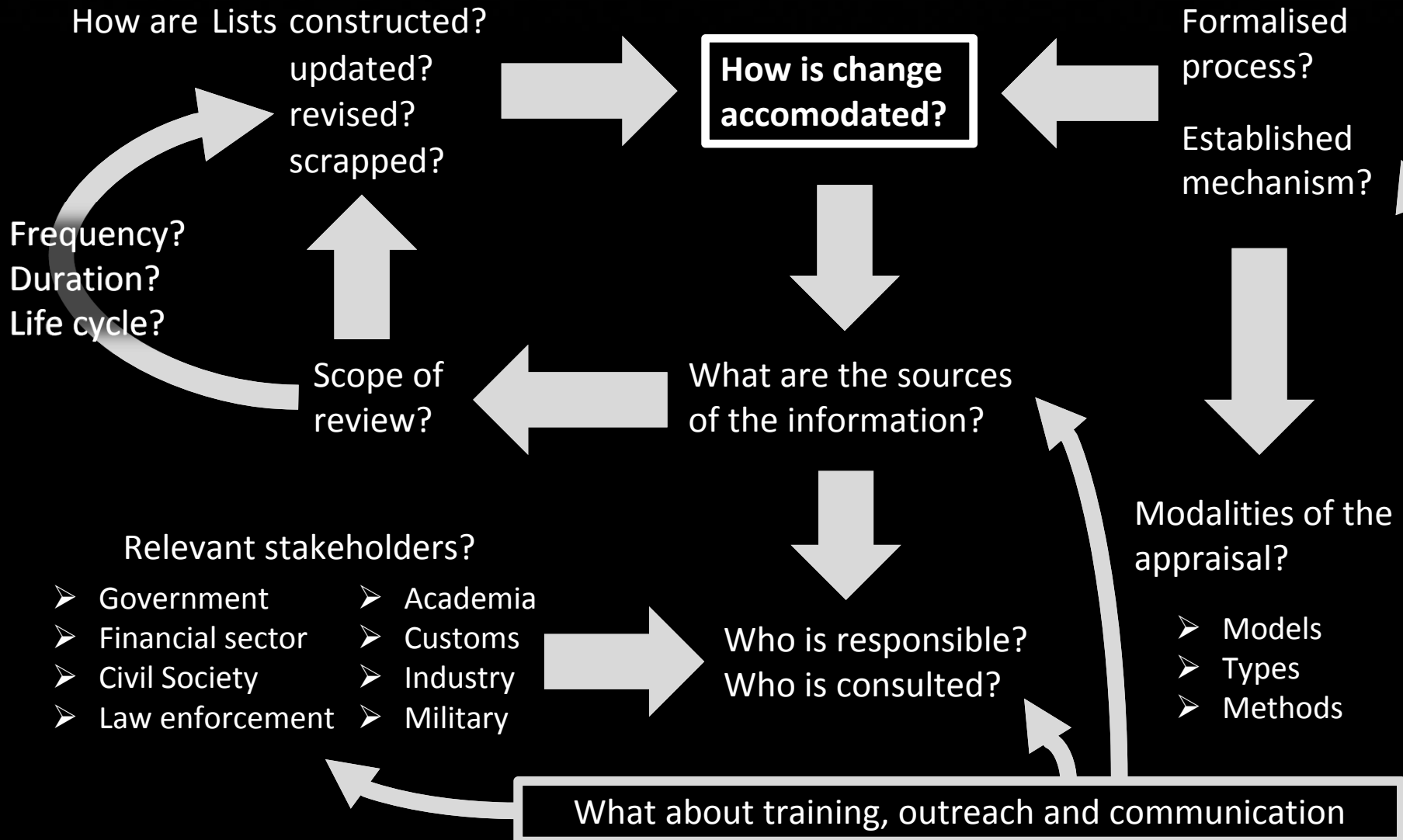
Third Graphic



Known ← technologies → Not known

Known ← technologies → Not known

Technology evolution and Export controls



Technology evolution and Export controls (ordered...)

**How is change
accomodated?**

*Scope of
review?*

*Frequency?
Duration?
Life cycle?*

**What are the sources
of the information?**

Who is responsible?

Who is consulted?

*Relevant
stakeholders?*

- *Financial sector*
 - *Government*
 - *Customs*
 - *Academia*
 - *Law enforcement*
 - *Civil Society*
 - *Military*
 - *Industry*
-

**Modalities of the
appraisal?**

*Established
mechanism?*

*Formalised
process?*

- *Models*
 - *Types*
 - *Methods*
-

How is change communicated?

updated? revised? scrapped?

Several significant challenges to implementation

“basic scientific research”



Changing goal posts

publically available information



*Exemption, definition,
and tacit knowledge*

**What is proliferation relevant
knowledge?**



Context dependence

**What needs to be export
controlled?**



*Fuzzier criteria
Less certain
Constant change*

**Rapidly changing S&T
landscape**

The Walkshop



Information

Dress Code – Casual, decent shoes, rain probable!!

Logistics – where, what, how, what if

What we are doing

- You have three questions, following
- Answer each question
- Get an answer from a member of each group

Duration

**NEEDS TO BE FINISHED
and logistic information**