

# **Are Intellectual Property Rights Hindering Technological Advance? The Need for Technological Commons \***

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**Developments in the intellectual property rights regime & institutional environment threaten the creation & use fundamental technical knowledge, particularly when elements of that knowledge need to be accessed in bundles.**

**Not only the ethos of open science but also technological advance per se are at stake.**

**We call for action in securing technological commons (previously) provided via public research at universities & elsewhere.**

# Issues to be addressed

- **Silent revolution in IPR since 1980**
- **Technological trends**
- **The role of public research (especially universities)**

# Two modes of technological accumulation

- **Vertical accumulation**
  - Along developmental trajectories of artefacts
  - Social location: firms and industries
- **Horizontal accumulation**
  - Generic design spaces across trajectories and domains
  - Location is diffuse: technological systems, professions, , engineering disciplines, universities .....
- **The importance of horizontal accumulation is increasing**

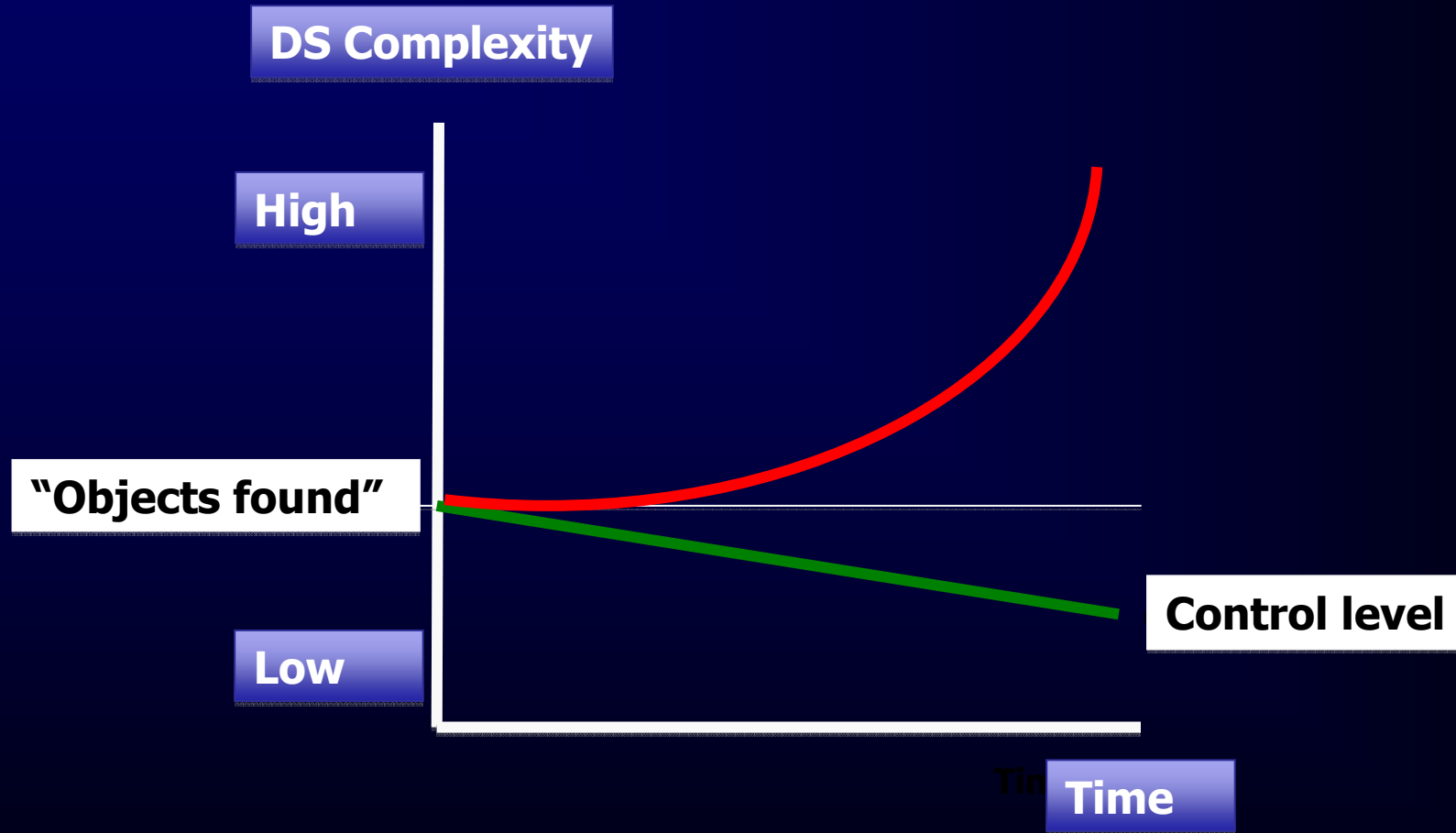
# From search to design spaces

- **Technological search sapce =**
  - The sum of all experiments and combination of experiments possible at a giventime
- **Inventive and problem-solving activities =**
  - Exploration of technological *search spaces*
- **“Raw” search spaces are transformed into progressively better ordered *design spaces***

# Design space defined

- **Design space = a combinatorial space generated by a set of operants (components, units of operation, tools, routines, etc.)**
- Operants = instrumental entities with defined structure-function relationships

# Evolution of design spaces



# **TRENDS: Design spaces tend to become more finely grained**

- **A shift towards simpler operants corresponding to the lower levels of organization of matter.**
- **The design spaces of virtually all high technologies today have molecular or sub-molecular dimensions - and the downward trend continues (quantum level technologies)**
- **Increasing 'science-dependence'**

## **TRENDS: The appearance of commonalties among previously unrelated regions of design space**

- Increasing frequency and pervasiveness of “technological fusions”.**
- Development towards a “universal design space” spanned by a variety of design languages corresponding to different application domains.**

# Private markets for design spaces or “professional toolboxes” may break down

- Coase’s theorem rarely holds in the real world
- Gridlocks in lighting, radio, automotive, aircraft
- Locking into sub-optimal standards
- **Biotech & software as recent examples**



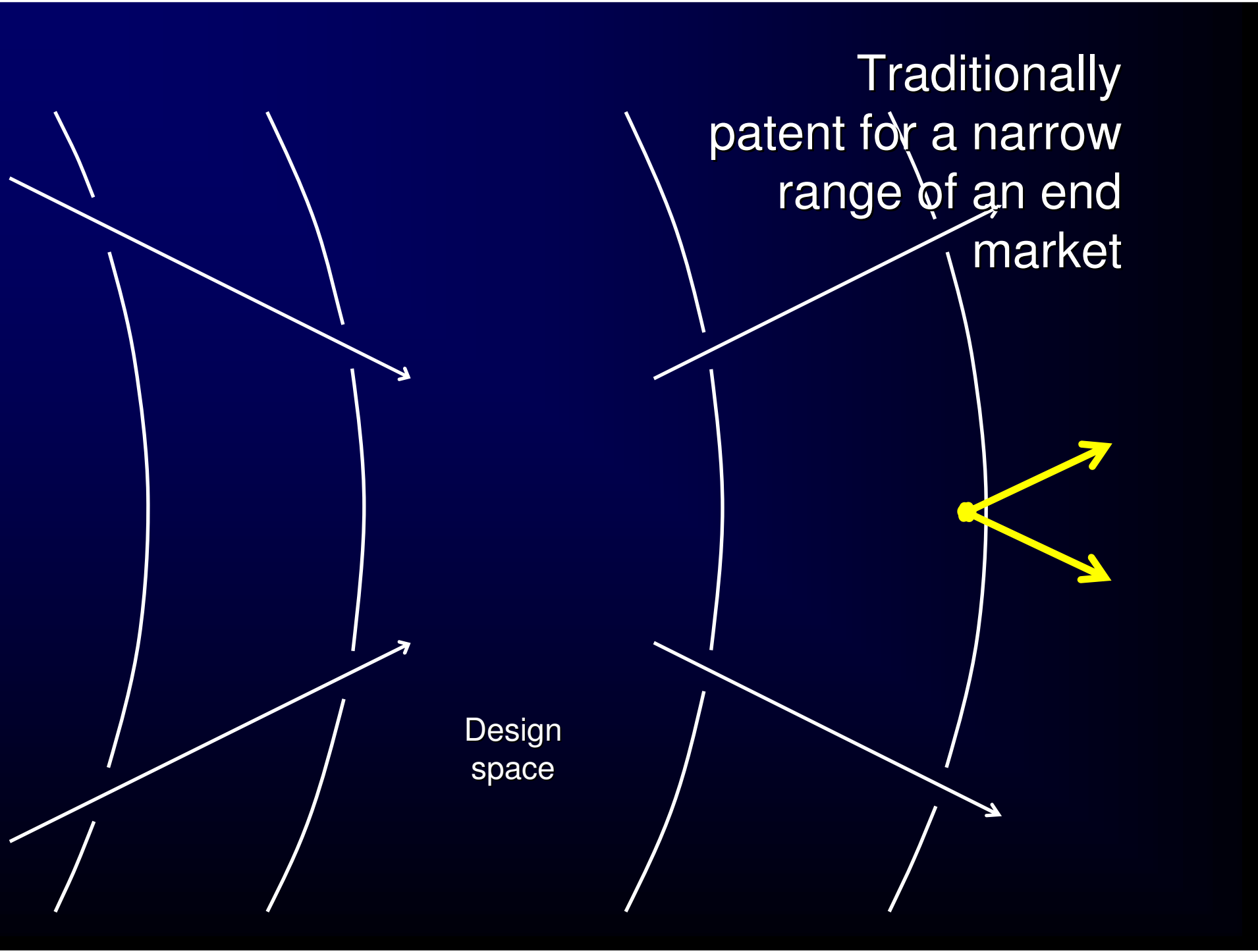
Universe  
of current  
and future  
possibilities

Feasible  
combinations  
of current  
knowledge

Design space:  
Elements and  
their relations

Domains of  
application  
the design  
space spans

The provision  
of goods and  
services in the  
market place

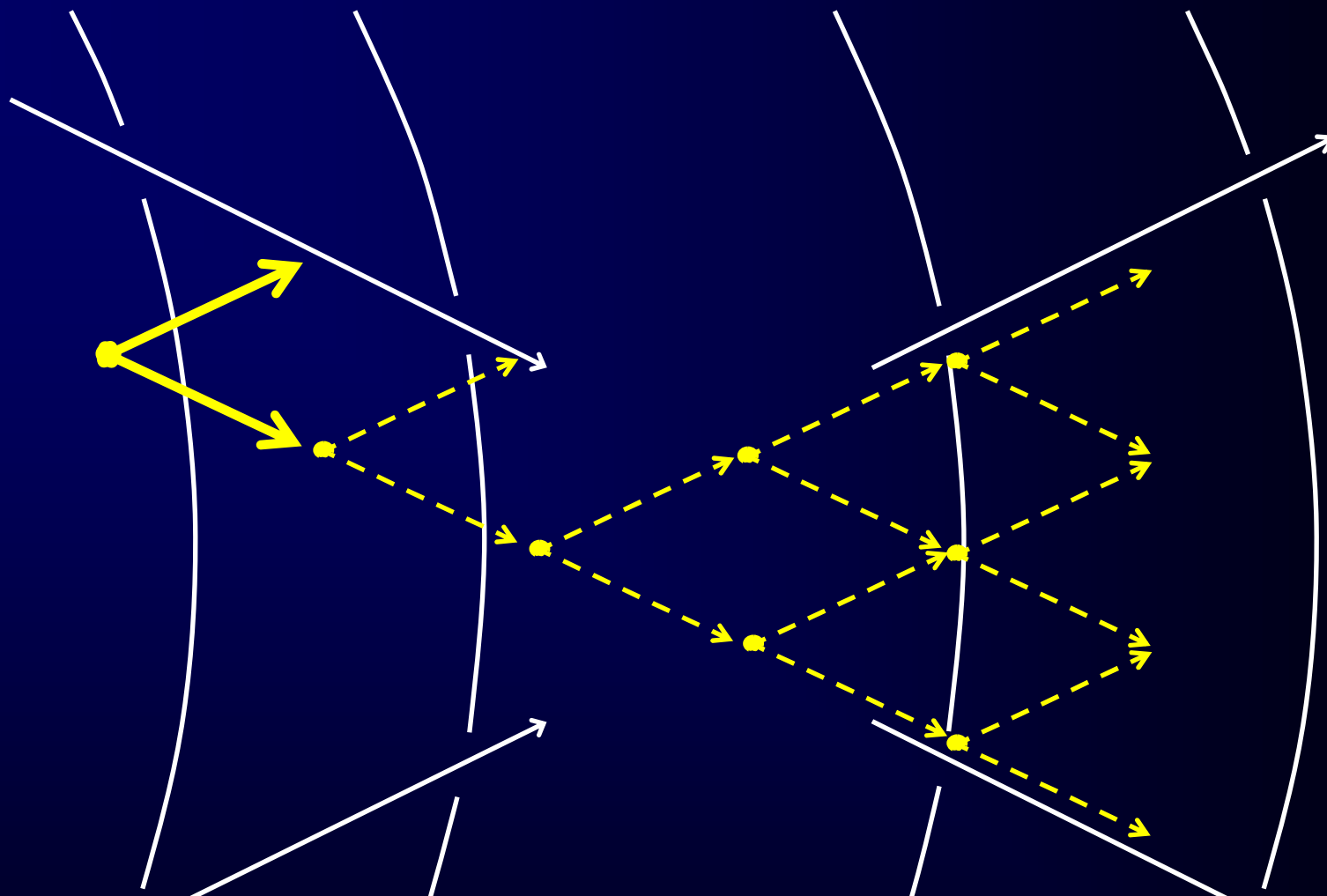


Traditionally  
patent for a narrow  
range of an end  
market

Design  
space

In the last  $\frac{1}{4}$  century patentable  
subject matter has gone upstream...

Design  
space



... as a consequence, a single patent has the potential to command a large range of applications

Specifically a problem in the context of a design space, as single/few elements can block the entire space

# Discussion

- **Tech commons have always existed & even today most knowledge is used for free**
- **While low quality IP per se constitutes a problem, it is particularly so in the context of a design space**
- **The IP problem in relation to design spaces is most prominent in emerging & fast-moving fields**
- **If the knowledge underlying or embedded in core operants is appropriated, a wide range of domains can be blocked or under-utilised**
  - **Industry gridlocks**
  - **Sub-optimal standards**
  - **Underutilization of knowledge**
- **→ Hindered technological advance**

# Speculative Intellectual Property

- **The combination of technological trends and changed IP regimes encourages speculative IP**
  - All IP is about future and therefore speculative
  - But elements of parasitic/pedatory behaviour can be observed
  - This leads to demands for more protection: vicious circle
- **IP speculation in immature design spaces**
  - Example: genomics
- **IP speculation in maturing design spaces**
  - Predatory patenting

# Heightened Role of Universities

- The co-evolving trends in technology & design spaces favour universities as the breeding ground
- Universities have a major role in planting the respective design spaces to the entering generations of professionals
- Yet the current IP regime is threatening both of these roles

# How to avoid balkanisation of Design Spaces ?

- Technological commons as an explicit goal of science & technology policy
- Pre-emptive investments in fundamental technologies
- Modification of patent law & praxis
- Rules & regulation on licensing
- Emerging new IP regimes