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Development of Smart Grids in Brazil: a multi-level perspective analysis

Guilherme Dantas
Caetano C.R. Penna* (caetano.penna@pped.ie.ufrj.br)
Pedro Vardiero
Rubens Rosental
Maria Alice Espinola

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Overview

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3. Theoretical framework: the multilevel perspective
4. Smart grids in Brazil
   - Landscape
   - Regime
   - Niche
5. Concluding remarks

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Introduction

Smart grids as a central element in the dynamics of transformation of the electricity sector

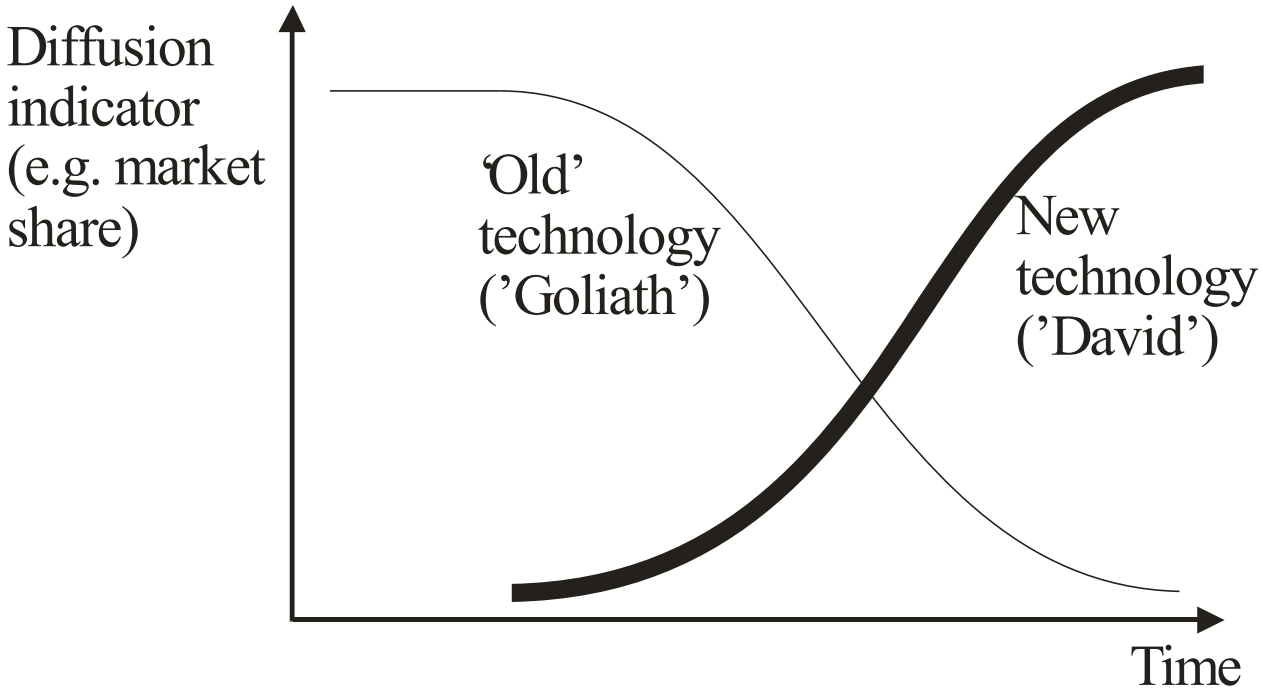
Techno-economic characteristics of the electricity sector vs. investments in innovation

Need for public policies to promote the roll out of smart grids

Diffusion of smart grids as a technological transition process

What is the status of smart grid development in Brazil?

Socio-technical transitions and the Multi-Level Perspective (MLP)

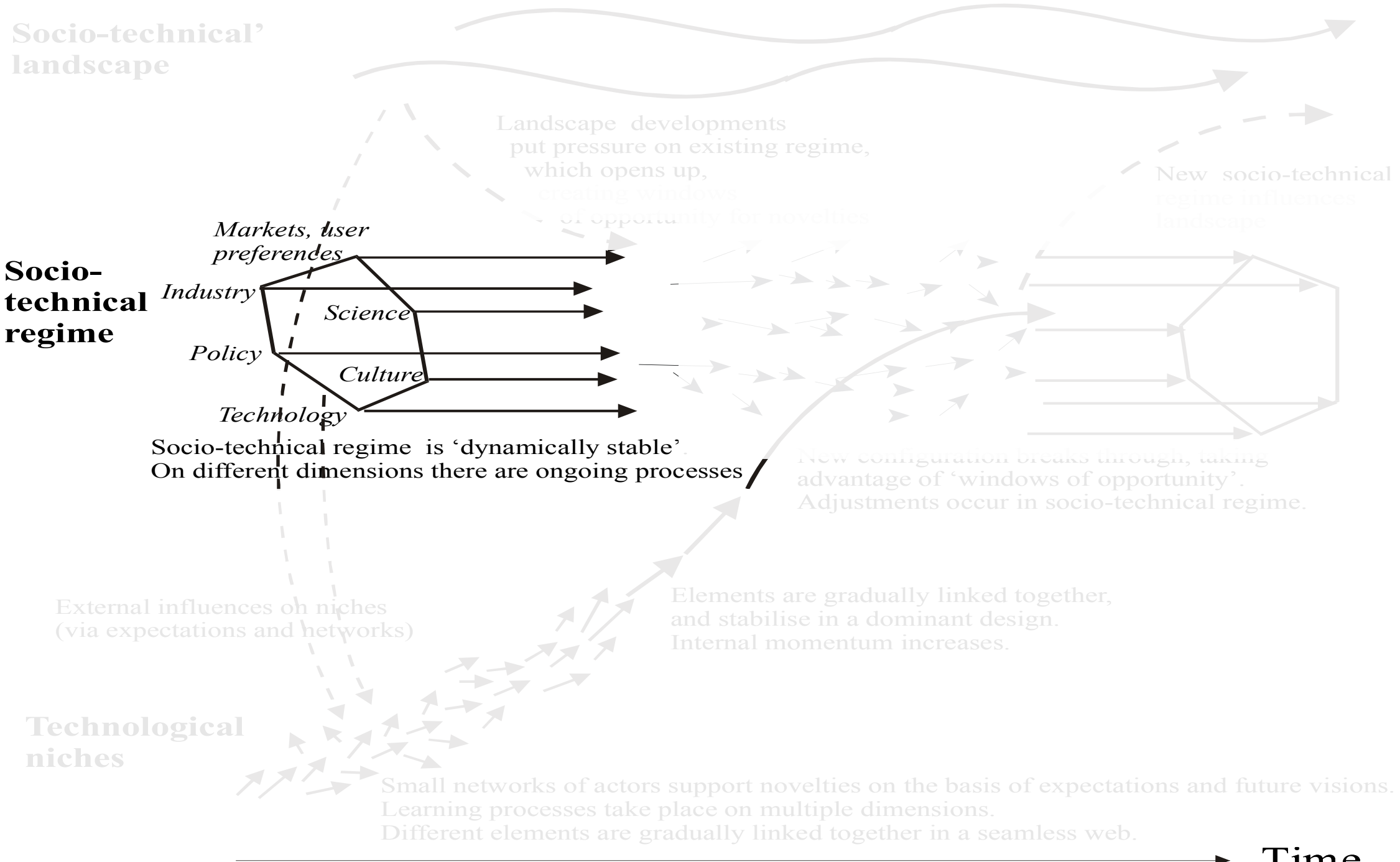


Long-term transformations (30-70 years)

Characteristics

- Multi-actor, co-evolutionary processes
- Long-term, multi-level change, systemic nature
- 'Niche' protection / broad socio-cultural change matter
- Systemic properties

Heuristic model: the Multi-Level Perspective/MLP (Rip and Kemp, 1998; Geels, 2002, 2005)…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Landscape developments put pressure on existing regime, which opens up, creating windows of opportunity for novelties
New socio-technical regime influences landscape
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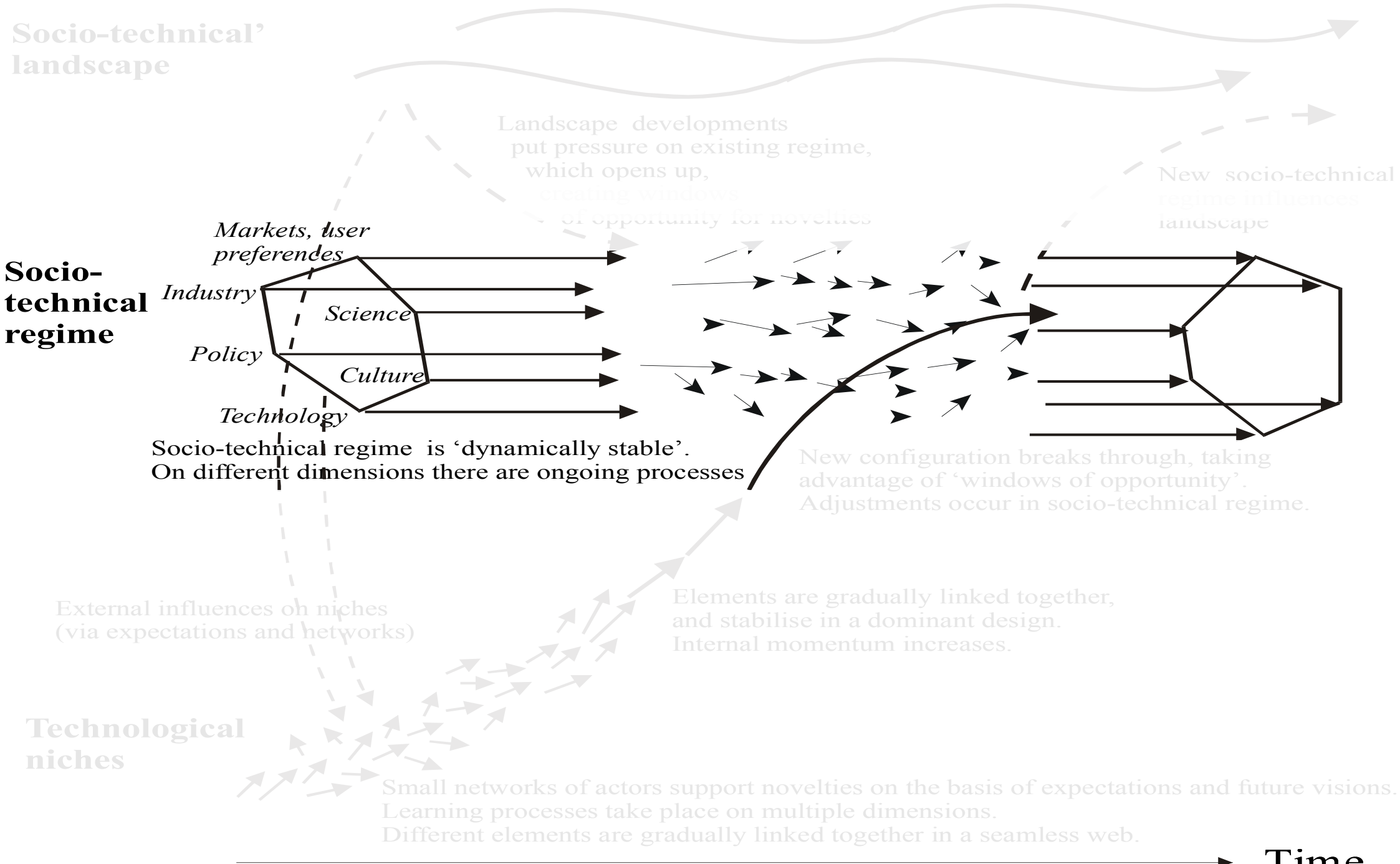
Markets, user preferences
Industry
Science
Policy
Culture
Technology
Socio-technical regime is 'dynamically stable'.
On different dimensions there are ongoing processes
New configuration breaks through, taking advantage of 'windows of opportunity'.
Adjustments occur in socio-technical regime.
External influences on niches (via expectations and networks)
Elements are gradually linked together, and stabilise in a dominant design.
Internal momentum increases.
Technological niches
Small networks of actors support novelties on the basis of expectations and future visions.
Learning processes take place on multiple dimensions.
Different elements are gradually linked together in a seamless web.
Time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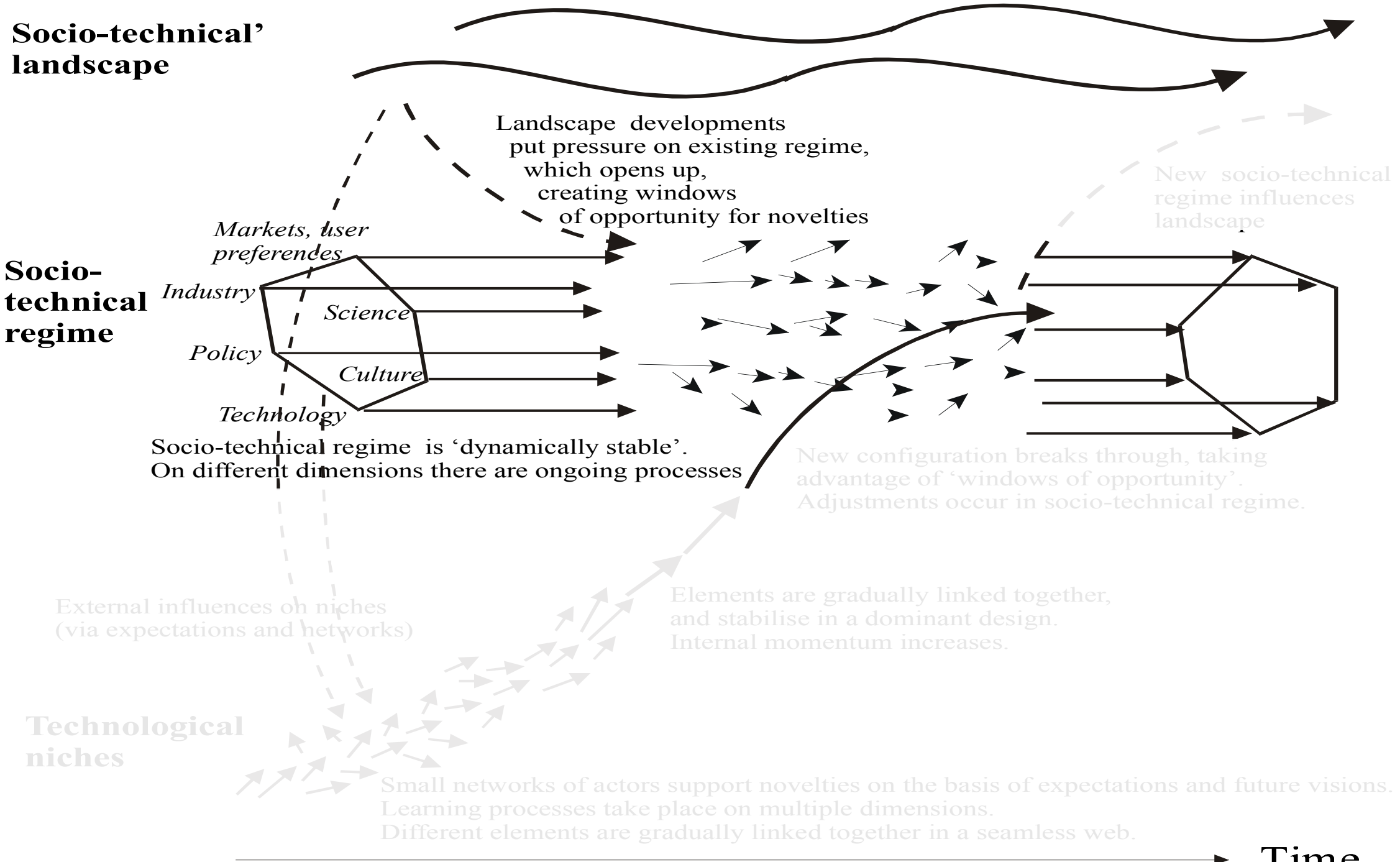
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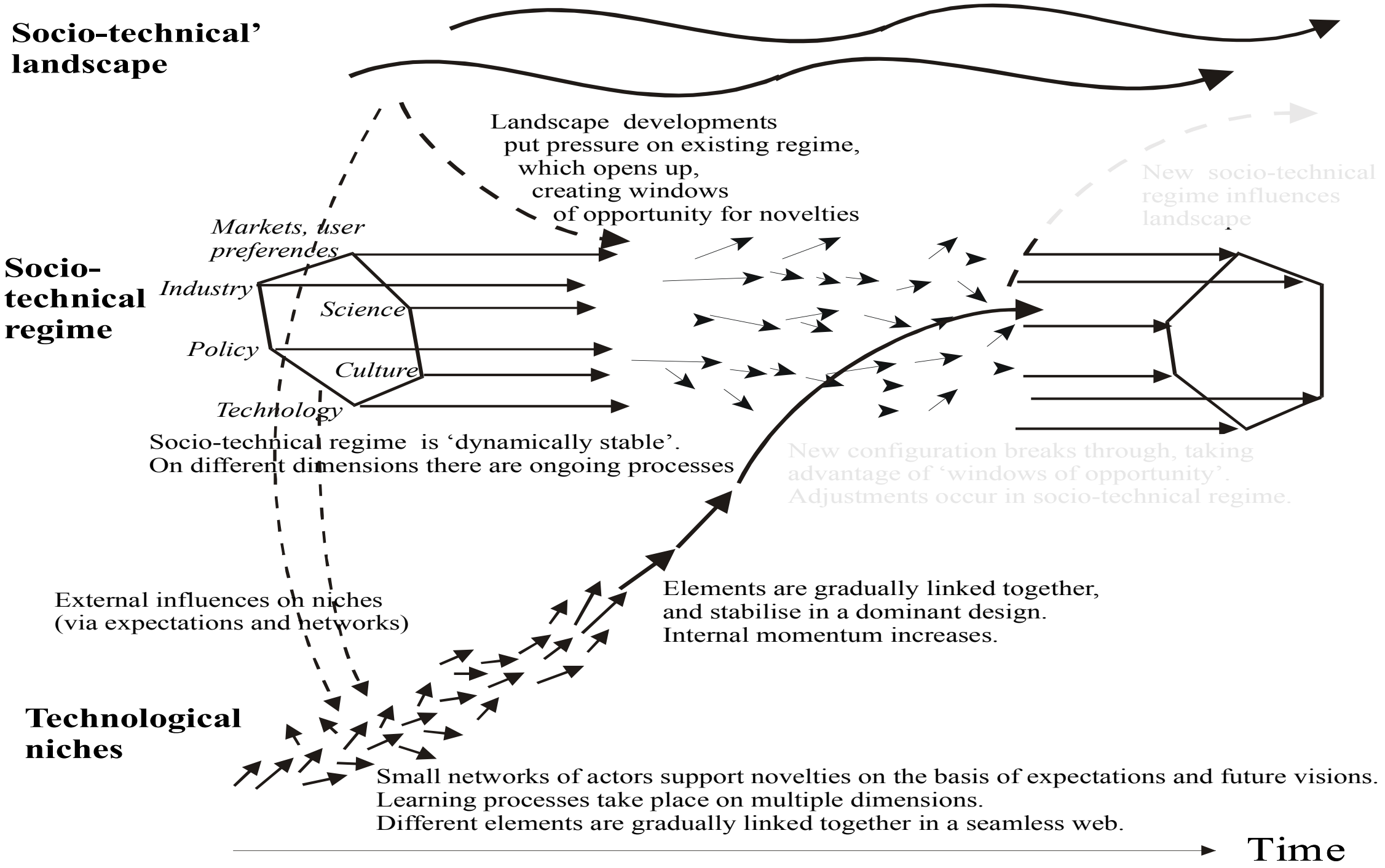
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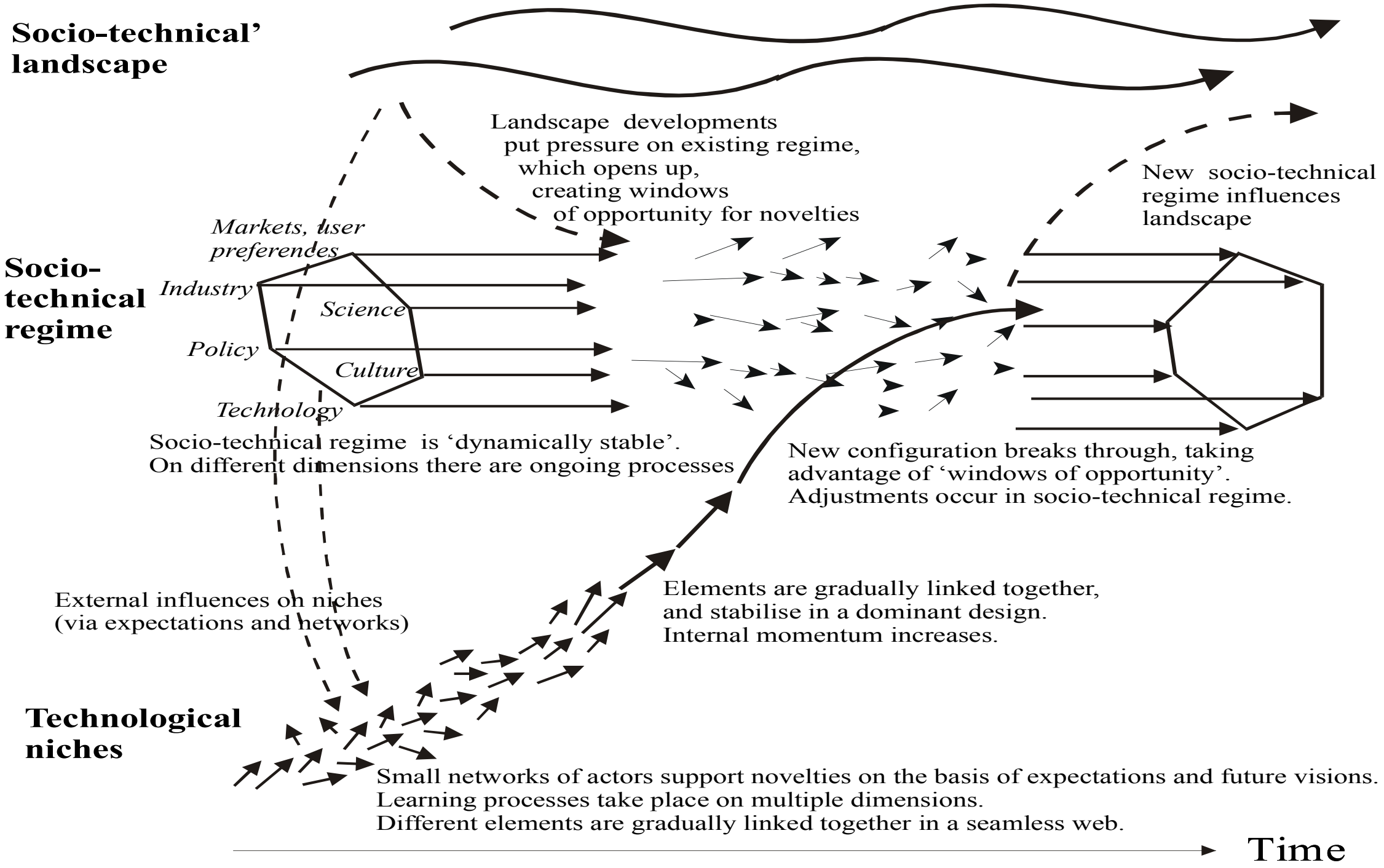
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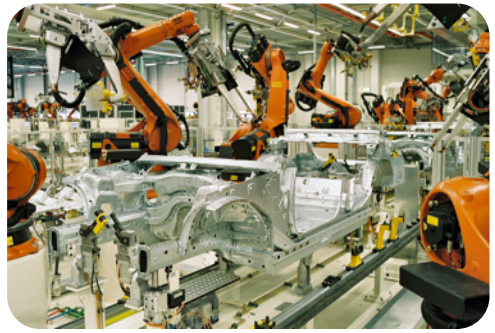
Smart grids in Brazil: the landscape



Low income per capita and inequality: low capacity to pay for utility services

High energy intensity of the Brazilian economy: need for competitive prices of energy

Industrial policy: promotion of technology-intensive sectors

Environmental sustainability: political and societal demands

Smart grids in Brazil: the regime

Electricity consumption levels: increase in energy demand (absolute and per capita)

Electricity generation matrix: diversification away from big hydroelectric plants

Non-technical losses and quality of supply: high level of fraud in certain geographical areas; high number & long interruptions

Regulatory framework and tariff system: time-of-use type tariff for large consumers

Complem. assets: importance of comms. infrastructure

Smart grids in Brazil: the niches

New policies & initiatives: roll out of smart-meters to large consumers; inter-ministerial group to identify the entire production chain of smart grids and propose new policies

Pilot projects: EDP/Bandeirantes (*InnovCity*, in Aparecida, SP); AES/Eletropaulo (in Barueri, SP); Ampla (Buzios, RJ); Cemig (Sete Lagoas, MG); COPEL (Curitiba, PA); Light (400,000 smart-meters rolled out in Rio de Janeiro, RJ)

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Concluding remarks

Different rationales for rolling out smart meters than in developed countries: poor quality of supply and non-technical losses vs. environmental and security drivers

Landscape creating opportunities, but:

Regime locked into standard metering system due to existing policies and industry dynamics

Niches so far not exerting 'enough' pressures

Regulatory changes are required in order to encourage the smart grid innovation and its diffusion

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