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Ecology to the Rescue!

Unravelling the complexities of the digital economy

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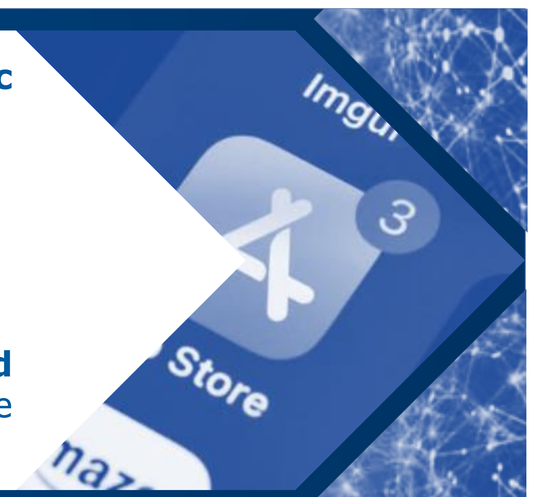
Digital Platform Ecosystems

Digital platform ecosystems (DPE) **provide crucial digital infrastructures for social and economic interactions between several users.** The success of DPEs have resulted in:

- Reduced transactional and search costs for consumers,
- New technologies, income streams, and greater connectivity,
- Restructuring value creation into a network of agents exchanging value continuously,

Only a handful of DPEs capture enormous value from multiple sectors across the world which has **concentrated digital market power.** Meanwhile**, fragmented regulatory jurisdictions** rely on sanctions, fines, or reactive policies which **do not curtail market concentration in the long-run.**



Natural Ecosystems

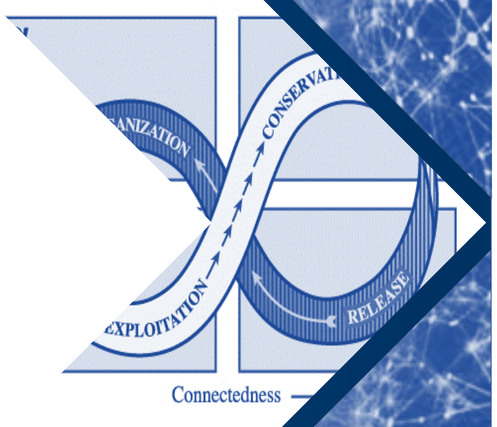
Business and economic literature has often drawn parallels between economic systems and natural systems. The **term 'ecosystem' was introduced from ecology to describe networked businesses by Moore (1993)[5]** such as Apple, Walmart, and IBM, which operated worldwide with multiple products. Since then, various ecological phenomena have been repurposed as metaphors to provide insight for digitalisation and platform models. However:

- The **use of ecological metaphors is fragmented and lacks a foundational framework,**
- Such metaphors have been **applied in the context of platform strategy and hence lacks policy insights for regulators of digital markets.**

Complex Adaptive Systems

DPEs have been comparable to natural ecosystems because they **both share common, fundamental attributes of complex adaptive systems (CAS).** Based on their nexus of CAS theory, we can apply the hierarchical organisations of natural ecosystems, that is, **micro, meso, macro, and mega, and meta** levels **to organise the elements, agents, and processes found in DPEs.**

Our **framework enables for a systematic approach in transferring concepts, analogies, and methods** from ecology into the domain of the digital economy. Such that it aims to **inform regulators on the complexities inherent to DPEs**, and thereby substantiate long-term policies which revive digital competitiveness and sustain the welfare gains from them.



5M-Level Natural-Digital Ecosystem Model

	Natural Ecosystems	DPEs
Micro Level	**Genomes** **Agents:** genes **Phenomena:** mutation, recombination, genetic interactions (epistasis, additivity, synergy, suppression)	**Human and knowledge capital** **Agents:** individual technologies, elements of business strategy, behavioral drivers, motivations, objectives **Phenomena:** innovation, replication, spillover effects
Meso Level	**Species** **Agents:** species **Phenomena:** adaptation, niche theories (occupation, separation, construction), foraging, species roles (keystones, engineers)	**Products** **Agents:** services, technology platforms **Phenomena:** adaptation, niche product markets, gatekeepers, free-riding, online marketplaces
Macro Level	**Natural Ecosystem** **Agents:** ecosystems structures **Phenomena:** food webs, stability, resilience, diversity/species richness, adaptive cycle, interaction networks, ecosystem services	**Digital Platform Ecosystem** **Agents:** digital platform ecosystems **Phenomena:** financial flows, data metabolism, (platform) value creation and value extraction, network effects
Mega Level	**Biosphere** **Agents:** biomes **Phenomena:** environment, climate conditions, ecosystem boundaries, in- and outflows, nutrient cycles	**Industry and whole economy** **Agents:** Analogous and digital institutions and citizens **Phenomena:** ecosystem boundaries, regulatory background, cultural background, investments
Meta Level	**Interconnections** **Agents:** pairwise and community interactions **Phenomena:** competition, cooperation, symbiosis, antagonism, syntropy, guilds, (intraguild) predation	**Interconnections** **Agents:** pairwise and community interactions **Phenomena:** complementarity, value co-creation (synergisms), killer acquisition

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5) Moore, J. F. (1993). Predators and prey: A new ecology of competition. Harvard Business Review, 71(3), 75–86.
Panarchy diagram source: Figure 2: The panarchy adaptive cycle model (Source: Gunderson and Holling 2002)
Stock images source: Canva.com