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Sustaining Open Data as a Digital Common

Design principles for Common Pool Resources applied to Open Data Ecosystems

Digital commons

- *Information and knowledge resources that are collectively **created and owned or shared** between or among a **community** and that tend to be **non-exclusive**, that is, be (generally freely) available to third parties.*

- *...*

- *Additionally, the **community** of people building them **can intervene in the governing** of their interaction processes and of their shared resources.*

- (Foster Morell, 2010)

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Contrasting digital commons

- Commons is generally a broad term, often left undefined (Hess, 2008)

- Can be contrasted in many ways

  - Traditional vs. Knowledge commons (Hess, 2008)

  - Bounded vs. Open commons (Benkler, 2014)

  - Environmental vs. Open source-based commons (Schweik and English, 2012)

  - Commons-based peer-production (Benkler, 2005)

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Open Data Ecosystems

- *A networked community of actors (organizations and individuals), which base their relations to each other on a common interest.*

- *This interest is underpinned by a technological platform that enables actors to process data (e.g., find, archive, publish, consume, or reuse) as well as to foster innovation, create value, or support new businesses.*

- *Actors collaborate on the data and boundary resources (e.g., software and standards), through the exchange of information, resources, and artifacts.*

- (Linåker & Runeson, 2021)

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The Tragedy of the commons

- Commonly exemplified through Hardin's open pastures (Hardin, 1968)

- May be considered as a Common Pool Resource (CPR)

- A resource system that is non-exclusive, and subtractable (Ostrom, 1990)

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How can a CPR be sustained?

- Central regulation or privatization…

- Or self-organized governance by the users of the common, provided (e.g.,)
    – Possibilities for sanctions
    – Some level of common interest, and
    – Efficient means of communication

- Condensed into 8 design principles for CPRs (Ostrom, 1990)

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Research questions

- **RQ 1**: How may Ostrom's design principles be applied in the context of ODEs to help sustain the shared data?

  RQ 2: What are the fundamental differences between natural and digital commons?

Application to digital commons

- Limited application to digital commons

- CPRs more aligned with traditional commons rather than digital commons (Hess, 2007)

- However, still useful as input to governance of digital commons (Benkler, 2014)

- Applications include

  - Wikipedia: Viegas et al. (2007), Forte et al. (2009)

  - Drupal: Rozas (2017)

  - Open data: Coyle et al. (2020), Ruhaak et al. (2021)

pine watt | https://unsplash.com/photos/3_Xwxya43hE

Research design

- For each principle, we
  - Contextualize how the principle has been applied in related work
  - Based on our interpretation, contextualize the principle in terms of governance in Open Data ecosystems as identified in three earlier reported cases (Runeson et al., 2021)
  - Analyze and compare the our interpretations from related work, and the ODE context
  - Derive a recommendation for ODE practitioners

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Principle 1

Analysis

- **Clearly defined boundaries**

- *Individuals or households who have rights to withdraw resource units from the CPR must be clearly defined, as must the boundaries of the CPR itself (Ostrom, 1990)*

- Wikipedia and Drupal cases focus on boundaries in terms of who is allowed to contribute

- Open Data-cases also highlight who has the right to access and use the data

- In the ODE context, boundaries follows the domain and common interest and are commonly set by platform provider and keystones

- Important that these boundaries are set inclusively, and all voices are heard

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Principle 2

- **Congruence between appropriation and provision rules and local conditions**

- *Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions and to provision rules requiring labor, material, and/or money (Ostrom, 1990)*

Analysis

- Wikipedia and Drupal cases focus on the need to adapt rules to local needs as they have large communities

- Adaptation not an issue for ODEs which are considerably smaller in size

- Important that licenses and processes reg. use and contribution address perceived risks while persisting potential for value creation

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Principle 3

- **Collective-choice arrangements**

- *Most individuals affected by the operational rules can participate in modifying the operational rules (Ostrom, 1990)*

Analysis

- Wikipedia and Drupal cases are consensus-driven, all affected should be able to influence a decision

- In ODEs, decisions are usually made by the platform provider, although considering the ecosystem at large, especially keystones

- Structrue and ownership of the platform provider further affects this the decision process

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Principle 4

- **Monitoring**

- *Monitors, who actively audit CPR conditions and appropriator behaviour, are accountable to the appropriators or are the appropriators (Ostrom, 1990)*

Analysis

- Wikipedia and Drupal cases highlight that the community monitors itself through transparent and consensus-based governance and collaboration

- In the ODEs, conditions are not necessarily equal, but both platform provider and actors have possibilities to monitor one another.

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Principle 5

- **Graduated sanctions**

- *Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and context of the offence) by other appropriators, by officials accountable to these appropriators, or both (Ostrom, 1990)*

Analysis

- In the Wikipedia and Drupal cases, definition, and provisioning of sanctions are done collectively by the communities

- In ODEs, platform provider and actors can apply different types of sanctions mutually

- Common discussion and understanding of rules and sanction must however exist

- Rukaak et al. highlight that rules and sanctions should apply both to consumption, provisioning, and collaboration

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Principle 6

- **Conflict-resolution mechanisms**

- *Appropriators and their officials have rapid access to low cost local arenas to resolve conflicts among appropriators or between appropriators and officials (Ostrom, 1990)*

Analysis

- In the Wikipedia and Drupal cases, most conflicts are managed in local settings due to the communities' size and decentralized organization

- In ODEs, conflicts are usually resolved or facilitated by the platform provider

- Ruhaak et al. emphasizes that clarity is needed on which conflicts are resolved internally, and externally (e.g., in court)

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Principle 7

- **Minimal Recognition of rights to organize**

- *The rights of appropriators to devise their own institutions are not challenged by external governmental authorities (Ostrom, 1990)*

Analysis

- In the Wikipedia and Drupal cases, the principle is contextualized internally due to size of communities, creating need for local recognition of subcommunties

- For ODEs, recognition follows the platform provider, keystones and characteristics of the ecosystem

- Ruhaak et al. highlight need to also consider concerned regulations and abide accordingly

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Principle 8

- **Nested enterprises (for CPRs that are part of larger systems)**

- *Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises (Ostrom, 1990)*

Analysis

- In the Wikipedia and Drupal cases, this is again contextualized inside the communities in different layers given their size

- For ODEs, this refers rather to how different ecosystems may be nested horizontally or on different abstractions (e.g., in terms of public transport)

- Ruhaak et al. highlight the importance of interoperability, and that an ecosystem may break up as they evolve.

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Differences between digital and natural commons

- Digital commons are primarily non-substractable

- Higher utilization (ideally) lead to more contributions and increased value

- Maintenance labour, however, is substractable

- Demand may increase with appropriation, e.g., in terms of questions

- Governance practices focus more on the peer-production process, rather than limiting the appropriation

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Differences between digital and natural commons

- **P1:** As appropriation of a digital common grows, so does the demand for labor required to contribute to and manage the contributions to the collective action, underpinning the common.

- **P2:** To enable sustainability of a digital common, governance must consider both how to promote and manage contributions, within the available frame of maintenance labor of a community.

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Impact on definitions of design principles

- Artificial vs. physical boundaries

- Different mediums for communication, dialogue still as important

- Local (physical) vs. global (virtual) context, e.g., affecting applicable jurisdictions

- Over- vs. under-utilization

- Mutual dependencies between those contributing to the collective action, and those appropriating its output

Photo by Nadir sYzYgY | https://unsplash.com/photos/wc3jFFQxo8k
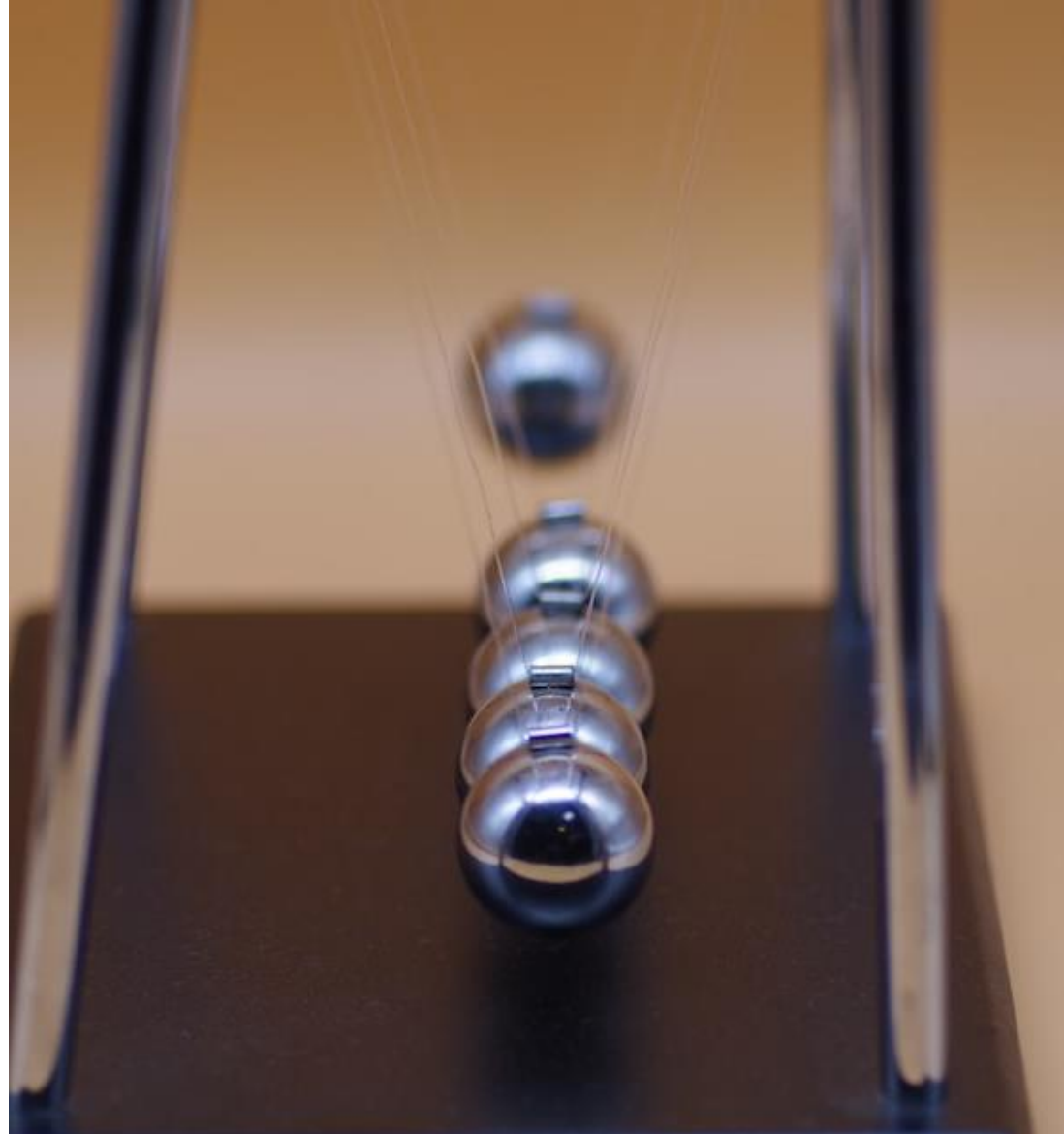
Limitations and threats to validity

- Applicability of Ostrom's principles to digital commons may be questioned
  - Related work points to the opposite, although highlighting need to be tailored

- Open data may not always be considered a digital common
  - Collaboration and co-ownership (e.g.,) a central aspect
  - Implied explicitly by the definition of an ODE.

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