

## Tensions in the original premises of the IAD framework compared to contemporary spatial applications: Revisiting Elinor Ostrom

Neef, Robin<sup>1,2</sup>; Leendertse, Wim<sup>1,3</sup>; De Koning, Stijn<sup>1</sup>; Gerritsen, Jildou<sup>1</sup> and; De Witte, Rebekka<sup>1</sup>

1 University of Groningen, Faculty of Spatial Sciences, Department of Planning and Environment

2 Orcid ID 0000-0002-5624-3402

3 Orcid ID 0000-0001-7706-1272

Email: robin.neef@rug.nl

### Abstract

The IAD framework was developed in circumstances different from contemporary spatial and governance issues. This article systematically compares Elinor Ostrom's work (1965–2017) and contemporary applications in spatial and governance research using the IAD framework. Findings include firstly that action situations and action arenas are applied inconsistently in contemporary research due to evolution of the concepts throughout Ostrom's own work; secondly, that the IAD is in many researches incoherently used where rules are studied in isolation of their configuration or rule configurations in isolation of the community attributes; and thirdly, that the application of IAD is mostly incomplete, specifically as explicit commons dilemmas, common pool resources and community are frequently undefined. A more consistent, coherent, and complete application better allows reproducible research and is fundamental for a better understanding of the relationship between institutions and communities.

### Keywords

Institutional Analysis and Development framework; Commons dilemma; Spatial Planning; Action situation; Rule configuration

### Introduction

Elinor Ostrom's Institutional Analysis and Development framework (IAD) is frequently used to study an institutional setting for governance practices in spatial planning. Our impression is that this often happens without awareness of or structural incorporation of conditions under which this frame was developed. We believe that these conditions are essential for the applicability of the framework and therefore the reliability of the institutional analysis. For example, the IAD framework emerged out of a particular set of cases, being small communities dealing with a scarce common. This particular setting is not always identical to contemporary spatial and governance issues (Ostrom, 2005). Moreover, applications of the IAD in contemporary research often focus on one of its working components instead of the complete framework. This raises questions on the extent to which the application of Ostrom's IAD framework has departed from its original premises, and consequently the implications for contemporary analysis of spatial and governance issues.

In this paper, we explore the premises of the IAD framework to the institutional setting of spatial and governance issues as described by Elinor Ostrom herself, to identify the differences in contemporary applications of this framework. To that end, we intertwined three research steps. First, key principles of the IAD framework were derived by analysing 15 key publications, including early empirical research, (e.g. Ostrom, 1965), late studies (e.g. Polski & Ostrom, 2017; Schlager & Villamayor-Tomas, 2023) and comprehensive work (e.g. Ostrom, 2005). Secondly, from these principles, we established an analysis scheme which we, thirdly applied to compare a selection of contemporary research based on institutional analysis in or

related to the field of spatial planning. These include ten years of applied IAD research of the Spatial Planning department of the University of Groningen, who have a longstanding tradition of institutional analyses and the IAD in governance practices and spatial planning, other Dutch universities who have a research tradition in spatial and governance-institutional research, and other contemporary applications of the IAD at other research institutes worldwide.

The IAD framework is an instrument to systematically study institutional arrangements to demarcate established governance practices regarding a commons dilemma or the use of a common pool resource (CPR). Here, institutional arrangements or institutions are understood as the rules, norms, and strategies that prescribe how actors must, must not, or may act in an action situation (Polski & Ostrom, 2017).

Our analysis revealed three main findings. First, the framework is frequently applied in cases that do not resemble the criteria identified by Ostrom herself, i.e. the requirement for an action situation to concern a focused commons dilemma or particular common pool resource. From Ostrom's perspective, this is however vital, because the commons dilemma or common pool resource drives the formation and application of the respective institutional arrangement. Secondly, most institutional analyses using the IAD framework only analyse specific variables or rule types and do not use the complete framework. This may result in a lack of coherence between the rules and/or other elements of the framework, which is a premise of the framework. Lastly, Ostrom herself is inconsistent in definitions of the key concepts including action arena, action situation and institutions. As a result, subsequent studies employ different definitions which make the institutional analyses only limitedly comparable and can produce different outcomes.

#### **Ostrom's (sociological) perspective on institutions**

Societies are made up of large numbers of actors, who are constrained or enabled in their actions by structures or institutions. Structure refers to the frameworks within which these actors operate. These frameworks include culture, laws, agreements, material and technical possibilities (Kooiman et al., 2008). The definition of institutions is currently still far from a settled issue, with considerable literature addressing how to define institutions (Alvesson & Spicer, 2019).

Sociologically, institutions can be defined as the *rules* (Ostrom, 2005) that guide human interaction or the *constraints* (North, 1990; 1991) that shape human interaction. The most commonly accepted definition in planning practice is that institutions are the rules of the game in a society, together with their enforcement arrangements and include both formal rules such as laws and constitutions, and informal constraints such as conventions and norms.

Individuals interacting within rule-structured situations face choices, regarding the actions and strategies they take (Ostrom, 2005). Ostrom emphasises that institutions not only delineate constraints, but also those which are permitted. Her construction of the concept 'rules-in-use' allows rule takers to exercise a degree of agency in putting rules into practice.

The principal function of institutions is to create order and reduce uncertainty by providing a structure that guides human interaction and leads to a ‘stable, valued and recurrent pattern of behaviour’ or ‘patterned interaction that is predictable’ (Lowndes & Roberts, 2013). According to Ostrom, institutions are the prescriptions that humans use to organise all forms of repetitive and structured interaction (Ostrom, 2005).

### Ostrom’s IAD Framework

One reason for Ostrom to develop the IAD framework was to coherently analyse a wide diversity of problems through a common and coherent set of elements and their relationships (Ostrom, 2007). Central in the IAD framework is the action situation and the action arena. In an action arena, participants (inter)act given an action situation and this interaction leads to outcomes (Ostrom, 1983a; Ostrom, 2005; Ostrom, 2011). Action situations refer to the social space where individuals interact, exchange goods and services, engage in appropriation and provision activities, solve problems, or fight, among the many things that individuals do in action situations (Ostrom et al., 2006). In the action arena participants actually interact given an action situation which results in outcomes (see Figure 1). Most of social reality is composed of multiple arenas linked sequentially or simultaneously.

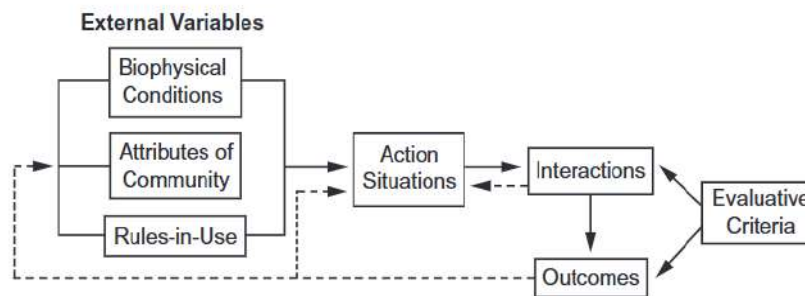


Figure 1: The IAD framework for institutional analysis (adapted from Schlager & Villamayor-Tomas, 2023 and Ostrom, 2005)

An action situation itself can be characterised using (internal) variables (see Ostrom, 2005) such as *actors*, who can be thought of as a single individual or as a group functioning as a corporate actor; *positions*, which associate actors with an authorised set of actions in a process and the *set of (potential) actions* that participants in particular positions can take at different stages of a process; the *information* available to a participant in a position at a stage in a process; the *set of payoffs* that assign benefits and costs to actions and outcomes; the *number of repetitions* of the situation (Ostrom, 1985). According to Ostrom, a particular combination of values for these variables yields an action situation if there is a situation such as ‘commons dilemma situation’, a ‘prisoner’s dilemma situation’, or a ‘free rider situation’ (Ostrom, 1985).

A myriad of specific *rules-in-use* (hereafter called ‘rules’) and *attributes* structure an action situation (see Figure 1). Rules are shared understandings among those involved that refer to

enforced prescriptions about what actions (or states of the world) are required, prohibited, or permitted. All rules are the result of implicit or explicit efforts to achieve order and predictability among participants. Ostrom (2005) discerns seven types of rules that can affect the structure of an action situation. *Position rules* establish the specific positions that actors can fulfil. *Boundary rules* outline the conditions under which actors can access or leave a position. *Choice rules* specify what a participant occupying a position must, must not, or may do. *Information rules* regulate what information is sent and received. *Aggregation rules* influence how actors jointly affect collective decision-making by clarifying the influence of each actor when multiple positions have partial control over the same decision. *Scope rules* define the solution space, the outcomes which may, must, or must not occur. *Payoff rules* affect the benefits and costs that will be assigned to particular combinations of actions and outcomes, and they establish the incentives and deterrents for action. The set of rules is an interdependent configuration (Ostrom, 1983b; 1999; 2005; 2011): changes of one rule can affect other rules.

*Attributes of the physical and material world* influence what actions are physically possible, what outcomes can be produced, how actions are linked to outcomes, and what is contained in the actors' information sets. Important *attributes of a community* include the norms of behaviour generally accepted in the community, the level of common understanding that potential participants share about the structure of particular types of action arenas, the extent of homogeneity in the preferences of those living in a community, and the distribution of resources among those affected. The term "culture" is frequently applied to this bundle of variables (Ostrom, 2005).

#### **Assumptions underlying the IAD framework**

In studying literature about the development of the IAD framework through time we distinguished several assumptions for applying the framework.

A first assumption is that the IAD framework can be used to analyse *institutional arrangements on different 'tiers' or 'levels'* (Ostrom, 2005). A tier or level is not strictly defined by Ostrom. The action situation can be located on an operational tier, consisting of, for example, a free-rider problem, the distribution of a CPR, or a commons dilemma. Alternatively, the problem can be located on a policy tier concerning a collective-choice level. At this tier, policy decisions are made within the constraints of a set of collective-choice rules. These policy decisions affect the structure of the action situation on an operational level, where individuals act. On the institutional tier, decisions concern who is eligible to partake in the policy making process and concern the rules that will be used to undertake policy making (Ostrom, 1999). Actions on the institutional tier influence the action situation on the policy tier. The assumption of tiers poses two premises for institutional analysis. First, the analysed tier must be defined so as to direct the analysis to the appropriate problem and related rules. Secondly, the embeddedness of tiers must be defined, so as to understand the influence of to-be-identified institutions. For example, the nestedness of the operational tier (through the policy tier) in the institutional tier means that institutions of the institutional tier are more inert than those at the operational tier. Without clear tier distinction, such relative inertia may be overlooked.

A second assumption concerns how *the definition of action situations and action arenas* developed over time. Before 2005, the IAD framework was conceptualised as analysing both action arenas and action situations. The action arena consisted of an action situation and the actors acting in that situation. The action situation was defined as an analytical concept to enable the isolation of the direct structure impacting an action arena. However, the definition of action arena and action situation changed between 2005 and 2011 because Ostrom indicated that the difference between the terms generated confusion over the years as it was implicitly understood that action situation include actors. Ostrom started defining action situations identical to action arenas. An action situation is then defined as “the social space where participants with diverse preferences interact, exchange goods and services, solve problems, dominate one another, or fight (among the many things that individuals do in action arenas)” (Ostrom, 2005, p. 13). In her earlier publication this was in fact the definition of an action arena. Her 2005 definition of the action arena is limited to: “in which [...] participants and an action situation interact as they are affected by exogenous variables (at least at the time of analysis at this level) and produce outcomes that in turn affect the participants and the action situation” (Ostrom, 2005, p. 13). Figure 1 represents the latest definition (this evolution is illustrated in subsequently Ostrom, 2005; Ostrom & Schlager, 2014; Schager & Cox, 2018; Schager & Villamayor-Tomas, 2023) showing that interactions structured by an action situation result in outcomes. Despite the turn in definitions, much literature still refers to action arenas as key element in the IAD framework using older definitions. This lack of consistency in definitions may be a cause of inconsequent application of the IAD framework in academic research.

Ostrom refers to the *concept of commons or common pool resources (CPR)* as attractor for community building and enhancer for the creation, development and multi-tier nesting of rules. The term "commons" was popularised by Garrett Hardin in an influential 1968 article called "The Tragedy of the Commons", addressing the problem of humans overusing and depleting a common-pool resource (CPR) even though it is not in their best interest to do so. This trend of over-exploitation particularly plagues commons because the lack of individual ownership and inability to restrict usage incentivises actors to consume as much as possible of the shared resource before others do. The commons can be understood as natural resources that groups of people (communities, user groups) manage for individual and collective benefit (Ostrom, 1990; 2005). Ostrom debunked the inevitability of the tragedy of the commons by the presentation of case after case of resource users effectively self-organising and sustainably managing a common themselves. Successful cases of commons self-governance had in common principles (Ostrom, 1990; 2005) such as clearly-defined boundaries, congruence between the resource environment and its governance structure or rules, the availability of collective-choice arrangements, effective monitoring and rules enforcement and conflict resolution mechanisms. Higher-level authorities recognise the right of the resource appropriators to self-govern the common resource in nested tiers from the lowest level up to the entire interconnected system. These principles imply that a starting point for applying the IAD framework should be a collective action problem (a prisoner's dilemma, a free rider situation or a commons dilemma) positioned in an interconnected nested governance system (Ostrom, 1990; 2005).

Ostrom presents the IAD framework in her publications as *an all-encompassing coherent and interrelated configuration of components*. This implies that one can study a subset only in consideration of the relationship to the other components. Although Ostrom always presented the framework as an integrated set, later studies use components as analytical tools for systematically examining institutional arrangements separate from the framework (see for example Schlager & Villamayor-Tomas, 2023).

A last assumption concerns *the dynamic nature of the IAD framework*. Ostrom's (1990; , e.g. ) work emphasises the need for what she refers to as "adaptive governance." Adaptive governance concerns the way in which the structure of rules, norms, strategies and enforcement mechanisms adapt and evolve over time as information about the commons environment expand or change (Ostrom & Jansen, 2004). The term connotes that an institutional arrangement is able to evolve in order to fit current conditions and needs best. As Ostrom puts it: "a set of rules crafted to fit one set of socio-ecological conditions can erode (...) successful commons governance requires that rules evolve" (Dietz et al., 2003). As mentioned above, in her article "A Method of Institutional Analysis" (1985), Ostrom added as variable to characterise the dynamics of an action situation, the number of repetitions of the situation itself. Consequently, to study institutional evolution, one has to apply and compare the IAD framework sequentially.

### **Methodology**

This research aimed to study the use of the IAD framework in planning studies by analysing contemporary (recent 10 years) research articles using this framework. First, we looked into research performed by the Faculty of Spatial Sciences of the University of Groningen (UoG) and research performed by spatial planning departments of other Dutch universities. To make a broader comparison possible we also used a selection of articles based on the diverse application of the IAD framework from different scientific backgrounds.

The book 'Understanding Institutional Diversity' (2005) by Ostrom has served as the start of our study. From this book, key definitions such as action arena, action situation, and rules were derived as discussed above. Based on these definitions, we constructed an analysis scheme<sup>1</sup> (see Table 1) to characterise each article by discipline of the article, compliance to the IAD's original premises and the application of the action arena, action situation, and rules.

We used Google Search and Scopus to retrieve relevant articles from Dutch universities using the search terms "IAD framework" and "Institutional Analysis and Development Framework". This resulted in seven articles from UoG and six articles from the planning departments of other Dutch universities (see reference list). To expand our search to other disciplines we also used Scopus. Again, using the search terms "IAD framework" and "Institutional Analysis and Development Framework", and sorting the results on "Cited" and "Date" we found the following relevant articles: "Stronger together, but how? Lessons from the Walloon dairy

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<sup>1</sup> In earlier iterations of the analysis of this paper, the ADICO syntax (Crawford & Ostrom, 1999) was included as criterion. However, the studied empirical material indicated that applying all elements of the ADICO statement often not reflected the studied empirical practice. To avoid verbose theoretical, methodological, and results description of the ADICO statement, ADICO is not further discussed in this paper.

history on the strategic relevance of cooperative models” (De Herde, 2023), “Collective Action within the Household: Insights from Natural Resource Management” (Doss & Meinzen-Dick, 2015), “Governing large-scale marine commons: Contextual challenges in the Coral Triangle” (Fidelman et al., 2012), “A modified diagnostic social-ecological system framework for lobster fisheries: Case implementation and sustainability assessment in Southern California” (Partelow & Boda, 2015). For practical reasons we limited ourselves to four articles outside of spatial planning.

An overview of the studied articles is given in the reference list.

*Table 1: Analysis scheme as used in our study to characterise publications*

<b>Components</b>		<b>Application</b>
<b>1) Research background</b>		From what background is the article written and what is the nature of the similarity with Ostrom's background? For what purpose is the article written, and is the IAD framework (as Ostrom described it, i.e. a CPR) appropriate for this purpose?
<b>2) Research aim</b>		What is the aim of the article?
<b>3) Action arena</b>		Does the article use the concept of action arena?
<b>4) Action situation</b>		Does the use of action situation match Ostrom's premises? How (clearly) is the action situation demarcated in the article?
<b>5) Tier of IAD framework</b>		Is the IAD framework approached from the operational, policy, or institutional tier? How is tier embeddedness addressed?
<b>6) Rules</b>	<i>General</i>	How are the rules generally elaborated within the articles, based on the workable definition of Ostrom (2005). Are the definitions corresponding or are there similarities?
	<i>Position rules</i>	How are the rules generally elaborated within the articles, based on the workable definition of Ostrom (2005). Are the definitions corresponding or are there similarities?
	<i>Boundary rules</i>	How are the rules generally elaborated within the articles, based on the workable definition of Ostrom (2005). Are the definitions corresponding or are there similarities?
	<i>Choice rules</i>	How are the rules generally elaborated within the articles, based on the workable definition of Ostrom (2005). Are the definitions corresponding or are there similarities?
	<i>Aggregation rules</i>	How are the rules generally elaborated within the articles, based on the workable definition of Ostrom (2005). Are the definitions corresponding or are there similarities?
	<i>Information rules</i>	How are the rules generally elaborated within the articles, based on the workable definition of Ostrom (2005). Are the definitions corresponding or are there similarities?
	<i>Payoff rules</i>	How are the rules generally elaborated within the articles, based on the workable definition of Ostrom (2005). Are the definitions corresponding or are there similarities?
	<i>Scope rules</i>	How are the rules generally elaborated within the articles, based on the workable definition of Ostrom (2005). Are the definitions corresponding or are there similarities?
<b>7) Focus on rules or action situation</b>		Is the action situation more highlighted or the rules?
<b>8) Function of the rules</b>		What is the function of the <i>rules</i> within the article (contextualise, demonstrate, describe)?
<b>9) Correspondence to IAD framework</b>		Does the use of the IAD framework, to achieve the purpose of the article, align with Ostrom's premises? Is there a clear dilemma outlined?

### **Findings**

To identify how Ostrom designed the application of the IAD, we evaluated Ostrom's own applications. However, our desk research indicated that only a limited number of usable case studies exist in which Ostrom clearly applies the IAD framework. Pivotal is her case study analysing the use and governance of the West Basin aquifer in California (Ostrom, 1965). In this (doctorate) study, she approached the action situation from an *operational tier*, and the components as identified in table 1 are applied. Later, Ostrom published three other case studies that were smaller in size (Ostrom, 1988). In all these studies Ostrom applied the framework on an *operational tier*, specifically to a CPR in which a commons dilemma was present. Ostrom described and demarcated the action situations clearly in all her articles where she applied the IAD framework herself. To illustrate, in the case of Ostrom's 1965-study, it is the aquifer of the West Basin in California and the stakeholders that made use of the aquifer for various uses, such as agriculture and drinking water. However, it is important to note that the rule types are mentioned implicitly in this study, potentially because the IAD concepts and their definitions have not been introduced yet. Ostrom approached the rules as a configuration and they are therefore not handled individually. Consequently, the causation between the rules and their effect on the action arena is clearly visualised. Ostrom uses the different parts of the IAD framework to explain the operation of the institutional structures within the action arena, and to explain the relation between the different parts.

### ***Research by the Faculty of Spatial Sciences of the University of Groningen***

Each analysed study of the Faculty of Spatial Sciences of the UoG employs the concept of action situations as multiple linked situations, i.e., governance systems. This complicates the demarcation of single action situations. To illustrate, Van Geet et al. (2019) applies the IAD framework to the action situation of "land use and transport integration", which is constructed of linked action situations on different tiers, namely the policy and the institutional tier. Similarly, Neef et al. (2023) apply the IAD framework on multiple Dutch infrastructure networks, specifically aimed at identifying how rule directions influence actors to achieve collective actions on both a policy and institutional tier. Spijkerboer et al. (2019) apply the IAD framework solely on the institutional tier. The study's focus on spatial integration of renewable energy and other land use functions indicates interlinking different action situations at a single tier. Neither of these study's explicitly empirically distinguish the different linked action situations. While this lacking distinction is thus methodologically different from the IAD's premise, it is unclear whether or how problematic this is. However, focussing on the action situation on the operational tier, misses the consequences of the relationships to the policy and institutional tier.

Further, some studied articles employ the term action arena, despite Ostrom's shift in focus to action situation. More so, the concepts action arena and action situation are used interchangeably, and refer to articles before the amalgamation of the definitions by Ostrom. To be clear, the last definition of Ostrom for the action situation was "a social space where individuals interact, exchange goods and services, solve problems, dominate one another, or fight..." (Ostrom, 2011), and no longer "the immediate structure affecting a process of interest

for the purpose of explaining regularities in human actions and results, and potentially to reform them” (Ostrom, 1999, p. 43). The interchangeable use by Leani et al. (2021) start by introducing and focusing on the action situation as “The core analytical concept of the IAD framework is the action situation...” (p. 13). However, later they employ the concept of action arena when introducing the rules. Alternatively, Hijdra et al. (2015) use the concept of action arena, and do not mention the concept of action situation, e.g. “The IAD framework defines the action arena as the relevant unit of analysis ...” (Hijdra et al., 2015, p. 66). Other articles do only apply the concept of action situation, such as Van Geet et al. (2019) and Wu et al. (2022). This raises the question on mutual comparability between the articles.

Lastly, the studied material has a strong focus on separate rules, and excludes the influence of attributes of the physical and material world and attributes of a community, and have less emphasis on the configuration of rules. For example, Hijdra et al. (2015), Wu et al. (2022), and Lee et al. (2022) apply the rules of the IAD to describe the action situation. This differs from the IAD’s premises, where the *configuration* of rules and *attributes* co-determine the action situation, and indirectly shape the interactions and outcomes of an action situation. Additionally, Neef et al. (2023) applied the IAD framework to identify how rules affect actors to achieve collective actions. Van Geet et al. (2019) stay closer to the original premise of the IAD framework by using rules to contextualise the action situation. The situatedness of the outcomes in particular communities raises the question what communities are actually presented or analysed in the papers, and to what extent the findings can be extrapolated.

#### ***Research by Spatial Planning Departments of other universities in the Netherlands***

A similar application of the IAD application occurs in the studied articles of Spatial Planning disciplines at other Dutch universities as compared to the UoG. To illustrate, multiple articles apply the IAD framework on two tiers, the policy and institutional tier. For example, Lammers & Hoppe (2019) apply the IAD framework on institutional conditions that enable or disable decision-making processes and the impact of the selection of smart energy systems, applying the IAD framework on both the policy and institutional tier. Alternatively, Vitale & Meijerink (2023) and Van den Hurk et al. (2024) apply the IAD framework on only the institutional tier. They apply the IAD framework to study an action situation of the management of (national) policies. Warbroek et al. (2023) do explicitly mention the tier of focus in their research, being the operational tier defined as concerning “individual actor day-to-day decision-making” (Warbroek et al., 2023, p. 100). Such a clear demarcation did however not withstand an explicit description of the CPR that demarcates the action situation. Rather, the focus is on the decision-making process or the management of policies. Hence, a clear tier demarcation and a clear CPR definition may go hand-in-hand.

Next, also similar to the UoG, the studied articles portray a mixed use regarding action arenas and action situations. To illustrate, Klok & Denters (2018) initially state that the action arena is the central unit of analysis in the IAD framework, but later refer to an action situation. Thereafter, they continue to focus on the action arena. Moreover, whereas Van Karnenbeek & Janssen-Jansen (2018), Lammers & Hoppe (2019), and Warbroek et al. (2023) only use the action situation when applying the IAD framework by referring to Ostrom (2011), Van den

Hurk et al. (2024) and Vitale & Meijerink (2023) use an action arena by referring to Ostrom (2005). To add to the mixed image, while Warbroek et al. 2023 do focus on action situations, action arenas are mentioned in an undefined manner. Hence, contemporary applications of the IAD in the Netherlands do appear to raise a mixed use of action arenas and action situations.

The reason to conduct institutional analysis differs per article, but two main differences may be distinguished. On the one hand, Vitale & Meijerink (2021), and Klok & Denters (2018) apply the IAD framework in order to contextualise the action situation, which corresponds with the defined use as determined by Ostrom. Alternatively, and similar to the UoG, the other studied articles aim to reveal institutional rules, conditions, barriers, and/or opportunities with a focus on the institutional design of the action situation or action arena (Van den Hurk et al., 2024; Lammers & Hoppe, 2019; Van Karnenbeek & Janssen-Jansen, 2018; Warbroek et al., 2023). This subtly, but crucially, departs from the premise of the IAD. Whereas, originally, the institutional rules *reflect* the institutional situation as is, here, the institutional rules are to be redesigned so as to *change* the institutional situation. This is different from Ostrom's understanding of rules contextualising an action situation: other rules presuppose other action situations. This different use of the AID raises questions on the appropriate use of the IAD (further discussed below).

Furthermore, the rule configuration is assessed in most articles, such as Warbroek et al. (2023), Lammers & Hoppe (2019), and Klok & Denters (2018). Van Karnenbeek & Janssen-Jansen (2018) apply the rules in an individual manner in which the rules are analysed individually, however they do not consolidate the rules as a configuration afterwards. They argue that this application of the framework "reveals a hierarchy in the rules" (Van Karnenbeek & Janssen-Jansen, 2018, p. 408). Vitale & Meijerink (2021) and Van den Hurk et al. (2024) study the rules individually, but recognise the configuration, and put the rules together in their discussion.

Lastly, the analysis highlighted a factor not explicitly incorporated in the analysis scheme. Lammers & Hoppe (2019) acknowledge the static nature of the IAD framework, whereas decision-making commonly comprises a (dynamic) process. They address this nature by applying the framework with causal process tracking. In a follow-up study, Neef & Verweij et al. (2023) also address this dynamic nature by applying a decision-making rounds model. Both approaches introduce a temporal dynamic in the IAD, which merits from further scrutiny into how the IAD addresses this dynamic.

#### ***Research outside of Spatial Planning***

In comparison to the application of the IAD framework within spatial sciences, the IAD framework is approached differently outside of spatial sciences.

First, it is observed that the IAD framework in the articles outside spatial planning is applied on a single tier. In general, the selected tier is the operational tier, which is directed at a common action problem. For example, Fidelman et al. (2012) applies the IAD framework on the operational tier in order to "examine the contextual complexity facing organisations attempting

to coordinate regional-level action” (p. 43). Also, Partelow & Boda (2015) apply the IAD framework on the operational tier, as they aim to improve the management of the natural resource system. Additionally, the IAD framework is applied on rather static, not consisting of sequentially or simultaneously linked action situations. The demarcation of the action situation is in most articles clearly defined, however varying from an area demarcation to a governance system. To illustrate, in Fidelman et al. (2012) the action situation is demarcated as the Coral Triangle, which allows for a geographic boundary. An exception is De Herde (2023), who applies the IAD framework on the policy affecting the dairy industry in Wallonia. Consequently, this action arena consists of sequentially or simultaneously linked action arenas, resulting in a less concrete demarcation of the action situation.

Moreover, it is found that the articles focus only on the action situation, such as Partelow & Boda (2015). On the other hand, Fidelman et al. (2012) only use the action arena in their application of the IAD framework. The publication date of this article is close to the change in focus initiated by Ostrom, which can explain this focus.

Additionally, most articles outside spatial planning aim at contextualising the action situation by means of the IAD framework. To illustrate, Fidelman et al. (2012), De Herde et al. (2023), and Dos & Meinzen-Dick (2015) applied the IAD framework in order to contextualise the situation at hand. On the other hand, Partelow & Boda (2015) aim at analysing and describing the maintenance of natural resources. Last, there are differences in the application of the rules in the action arena or action situation. In the articles outside spatial sciences, the focus is directed at the action arenas. Therefore, in these articles, the rules are studied in a configuration, and therefore contribute to the contextualisation of the action arena. This is in accordance with the described application of Ostrom. Consequently, by doing so, the aim of the framework of contextualising the action arena, is reached.

### **Discussion and Conclusion**

In this paper we explored the premises of the IAD framework to the institutional setting of spatial and governance issues as described by Elinor Ostrom, to identify the differences in contemporary applications of this framework. To this end we explored literature describing and elaborating the IAD framework to signify key elements as meant by Ostrom when applying the framework. We further explored contemporary articles describing research using the IAD framework both inside and outside spatial planning.

We discovered that Ostrom changed definitions of elements of the frame through time especially concerning her definitions of action arena and action situation. In her most recent description of the framework, she considers the action situation in the centre of the IAD framework. This includes actors, but not the interaction itself. Consequently, the action situation seems static, a photo. Interaction as a separate component in the framework leads to outcomes. However, by adding an extra variable to characterise to the action situation, being the number of repetitions of the situation itself, she defined institutional evolution as a sequence of changing action situations, a film consisting of photos. Rules she positions as variables,

besides physical and community attributes, influencing the action situation and not as part of the action situation itself.

The researches we studied do not use these definitions consistently. Especially, the action arena and the position of the rules, which Ostrom in her earlier publications positioned in the centre of the IAD framework, is regularly used following older definitions. Further, the demarcation of the action situation differs per research, be it a spatial area, a governance system or a cooperative setting. As a consequence, it becomes hard to compare the different studies. Our advice for future studies using the IAD framework is to use the latest description and definitions as given by Ostrom.

In most researches only one action situation is analysed. However, Ostrom explicitly mentions in her publications, the nested nature of an action situation, being different linked tiers and parallel linked action situations. Because these actions situations are linked, they influence each other. Not taking this in account limits the strength of the institutional analysis.

Ostrom presents her IAD framework as a coherent, interrelated and interdependent configuration of components. This means that an analysis using this frame should describe all elements in mutual coherence. Recent publications, for example Schlager and Villamayor-Tomas (2023) even propose to use components of the IAD framework as analytical tools for systematically examining institutional arrangements separate from the framework. However, many of the studies we examined only described and employed a part of the framework, in spatial planning especially focusing on the rules or just some rules. This raises the question on how problematic analysing rules in isolation of the IAD really is.

To feed that particular debate, we suggest to further scrutinize the concept of rules (institutions) and community. One interpretation, found in many of the scrutinized articles, is that rules are mechanisms that structure behaviour. Such an approach allows researchers to propose changes of rules so that behaviour changes, i.e., they propose institutional (re)design. Another interpretation, closer to Ostrom her original work (1965), is that rules *are* communities. This finding is based on the large number of cases where Ostrom herself found that if there is a community, they can be caught in a coherent set of rules, not the other way around. Hence, this metaphysical or philosophical understanding of rules vis-a-vis communities would deter such mechanistic institutional (re)design. Hence, this finding begs the question if, and if so how, the IAD may be applied to inform how to initiate or navigate institutional change. Suggestions may be found in Lammers & Hoppe (2019) and Neef, Verweij et al. (2023) as they provide suggestion on dealing with the temporally static instrument that the original IAD is. A more fundamental answer to how rules (institutions) and community relate does merit further discussion and research.

Ostrom explicitly mentions the necessity of a collective action problem to motivate resource users in effectively self-organising and sustainably managing a common themselves i.e. community forming. Interestingly, in most of the research we studied there was no or hardly

any description of the collective action problem. The question is then what ‘drives’ the self-organisation of the community and in this the development of rules.

To conclude, our study left us with some questions, which are in our opinion worthwhile to further discuss:

1. Does the framework provide a coherent language for identifying universal elements to analyse and explain how self-organisation in action situations develops or is the framework just limited to specified action situations?
2. Is the framework conceptually ‘open’ enough to stimulate new theoretical developments, for example in the field of spatial planning?
3. Since we live in an increasingly dynamic world and studying dynamic social and institutional development becomes more important, is the institutional evolution as presented by Ostrom consistent with contemporary theories of system evolution?
4. Does the framework sufficiently support the analysis of multi-tier or multi-level interaction or governance, a field of theoretical research currently strongly in discussion?

Ostrom herself identified these questions as relevant as early as 1999. “I would answer these questions positively, but the real assessment will be made by other scholars over the next several decades” (Ostrom, 1999, p. 63-64).

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