



## CLIPS: Enriching interorganizational R&D project management by a project culture focus

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### **Abstract:**

Project managers still face management problems in interorganizational Research and Development (R&D) projects due to their limited authority. Addressing a project culture which is conducive to cooperation and innovation in interorganizational R&D project management demands commitment of individual project members and thus balances this limited authority. However, the relational collaboration level at which project culture manifests itself is not addressed by current project management approaches, or it is addressed only at a late stage. Consequently, project culture develops within a predefined framework of project organization and organized contents and thus is not actively targeted. Therefore, a focus shift towards project culture becomes necessary. This can be done by a project-culture-aware management. The method CLIPS actively supports interorganizational project members in this kind of management. It should be integrable in the common project management approaches, that with its application all collaboration levels are addressed in interorganizational R&D project management. The goal of this paper is to demonstrate the integrability of the method CLIPS and show how it can be integrated in common project management approaches. This enriches interorganizational R&D project management by a project culture focus.

### **Keywords:**

interorganizational R&D projects; project culture; project-culture-aware management.

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## 1. Introduction

An increasing technology and product complexity leads to organizations networking with different partners for their Research and Development (R&D) activities [1, 2]. For solving complex problems, firms form nonequity partnerships with complementary partners [3]. When these partnerships have a temporary character and are formed to jointly accomplish a unique task in R&D, the result are interorganizational R&D projects [4–6]. Sydow and Braun [7] point out, that the interorganizational dimension for projects is still under-researched. There is a missing theoretical dimension for interorganizational projects, especially in terms of governance, routines and behavior [7]. According to vom Brocke and Lippe [4], there are two well-researched research streams for interorganizational R&D projects. While the first stream focuses on the understanding of management tasks and underlying processes, the second stream deals with extending and adapting existing project management knowledge. Here, focus is on a support provided by guidelines, techniques, and tools [4]. So far, culture is very little considered in the context of interorganizational R&D projects. The studies that consider culture focus on cultural differences, especially regarding university-industry collaborations [8, 9]. The focus lies here on a gap between organizational cultures. This gap results, for example, from differences in timescales or priorities and problems related to intellectual property rights and confidentiality [8]. Furthermore, interorganizational R&D projects are mainly managed by using common project management standards, such as PMBOK [10], ICB [11] or PRINCE2 [12] and different agile approaches [13]. These approaches can all be applied to manage interorganizational R&D projects either as a single approach or in combination [13]. The use of these standards is beneficial, as their standardized characters promote a common understanding of project management [14]. However, these approaches do not focus on particularities of interorganizational R&D projects.

Interorganizational project team members belong to their permanent institution during the entire time of the temporary organization [15]. Thus, project managers only have a limited authority [4]. Furthermore, interorganizational project team members represent interests of their “home” institutions and are shaped by their cultures. Therefore, there is a high partner heterogeneity in cultures and interests [4]. Moreover, as non-equity partnerships are contractual agreements without equity investments, there are high transaction costs and opportunism risks in interorganizational R&D projects [3, 16]. These particularities often lead to different problems in practice such as protecting intellectual property, cultural differences, communication issues or a lack of trust [17]. As a result, a project culture evolves which is rather not conducive to innovation and cooperation. This hinders a successful project completion [18]. In this context, a project culture can be defined as the dynamic and complex system of shared artifacts, chosen beliefs and values and basic assumptions, which evolve as project rules over time [19, 20]. However, a project culture which is conducive to cooperation and innovation promotes team cohesion for jointly accomplishing a given task and thus is essential for interorganizational R&D projects [20]. In this way, commitment of individual project members is demanded and thus limited authority of interorganizational project managers can be balanced [18]. Therefore, this kind of project culture becomes essential in interorganizational R&D projects and thus should be addressed by interorganizational R&D project management.

In interorganizational R&D projects, networks form at both the firm and project levels. However, these are structured differently in terms of their nodes and ties. At firm level, nodes are the individual organizations and ties are the non-equity partnerships among these organizations [19]. At project-level, nodes are the employees of the involved organizations and ties are their collaboration within the framework of the non-equity partnerships [19]. For interorganizational R&D project management the focus lies on the project level. Here, collaboration of interorganizational project members takes place on an operational level, more precisely on the three collaboration levels organization, relation and content [14, 19]. While the organizational level comprises for example project organization, structures and processes, the content-related level includes for example productive work, scope, time and cost [14]. The focus of the relational collaboration level lies on shaping relationships. On this level, a project culture manifests itself [14]. Project management operates on the strategic level above these three collaboration levels and needs to address them in order to ensure a productive collaboration and thus a successful project completion [19]. As already shown above, interorganizational R&D project management is mainly carried out using common agile-based approaches and/or project management standards [13] such as PMBOK [10], ICB [11] and PRINCE2 [12]. Dieterich [18] assigns the individual practices of these approaches to the three collaboration levels of Kuster et al. [14] described above. By this assignment, it becomes clear which levels

are addressed or not addressed by the approaches. In addition, the inclusion of the individual process groups allows a phase-oriented view [18]. The analysis of Dieterich [18] reveals that the organizational and content-related level are strongly addressed by the project management practices. However, the relational collaboration level is addressed only little [18]. PMBOK addresses the relational level only in the execution project management process group by the practices “Manage project knowledge”, “Develop Team” and “Manage Team” [10, 18]. For ICB, the relational level is addressed in the monitoring and controlling project management process group by “Personal communication”, “Relationships and engagement”, “Teamwork” and “Conflict and crisis” [11, 18]. PRINCE2 focuses on the relational collaboration level even less. It can only be assumed, that in some activities the relational level is addressed [18]. For example, it can be assumed that the activity “capture previous lessons” in the “Starting up a project” phase [12] also includes lessons learned regarding relational issues [18]. Thus, if the relational level is addressed by these standards in project management process, it is addressed late in the process [18]. Agile-based approaches still take the relational level into account the most. This is because of the underlying twelve principles and four values of the agile manifesto, where individuals, their interactions and teamwork are actively targeted [18, 21]. Thus, in agile-based approaches, relationships, activities or roles are not guided by predefined rules, but by these four values and twelve principles [22]. However, these values and principles are rather tailored to software industry for whose support these have been defined. Thus, they are not specified for each individual project and context. They rather serve as a guideline for agile methods [22]. Hence, in an interorganizational project that is managed agilely, its individual project culture is not actively targeted either [18].

To sum up, these common project management standards and agile approaches do not address the relational level in their project management practices or address it only late [18]. Thus, interorganizational R&D projects are treated like intraorganizational projects in project management: To fulfil the given task project organization and content-related aspects are designed first. Then, in the second place, details on team collaboration are specified. This means, that the organizational and content-related level are addressed first and then the relational level [18]. By this approach, project culture evolves within a predefined framework of project organization and organized contents and thus is not actively targeted. Therefore, a focus shift towards project culture becomes necessary in interorganizational R&D project management [18]. This can be done by a project-culture-aware management [18–20]. In this management, project managers and team first determine collaboration details for accomplishing a given task. They set a common value basis and derive suitable norms [18, 19]. Then, based on these values and norms, they design content-related aspects and project organization [18–20]. By this approach, the targeted project culture sets the framework for the development of contents and project organization. This means, that the relational level is addressed first and then the content-related and organizational level. In the context of her dissertation project, Dieterich [18] developed the project-culture-aware management method CLIPS. CLIPS is an acronym that stands for “Cultural Links for Interorganizational Project Success” [18]. By applying this method, the focus in interorganizational R&D project management is placed on the relational collaboration level. In this way, interorganizational project members are actively supported in a project-culture-aware management of their project. One requirement of this method is to be integrable into the common project management approaches [18]. This is essential, because the organizational and content-related collaboration level are already fully addressed by these approaches. It seems that only the relational level is underestimated so far and consequently not actively addressed. Therefore, the method CLIPS should be integrable in these approaches, that with its application all collaboration levels are addressed in interorganizational R&D project management [18]. The goal of this paper is to demonstrate the integrability of the method CLIPS and show how it can be integrated in common project management approaches. This enriches interorganizational R&D project management by a project culture focus.

The structure of this paper is as follows. The following section provides a brief literature overview of different culture approaches and shows the research gap, that is filled by the project-culture-aware management method CLIPS. Then, in section three, the project-culture-aware method CLIPS is shortly presented. Section four shows how the method CLIPS can be included in common project management approaches. Section five shows a conclusion and avenues for further research.

## 2. Background

According to Sackmann [23], there are three different perspectives of culture: “culture as a variable”, “culture as a metaphor” and “culture as a dynamic construct”. In the “culture as a metaphor” perspective culture cannot be shaped but evolves from social interaction of organizational members. Thus, according to this perspective “an organization *is* a culture” ([23], p.21). According to the other two perspectives culture can be shaped. However, while underlying assumptions are deterministic/mechanistic in the “culture as a variable” perspective, they are probabilistic in the “culture as a dynamic construct” perspective [23]. Thus, even when representatives use same wordings such as “culture-aware management” there is a difference regarding a mechanistic or probabilistic execution [23].

In culture literature all different perspectives of culture are considered. However, for culture development the focus lies on the perspectives “culture as a variable” and “culture as a dynamic construct”. For these perspectives Dieterich [18] shows the following three-part area of tension:

- **Organizational vs. project culture:** Main cultural frameworks, process models and methods focus rather on organizational than project culture.
- **Frameworks vs. process models vs. methods:** Extant literature on (organizational) culture focuses on frameworks and process models.
- **Mechanistic/deterministic vs. probabilistic:** Most process models have rather a mechanistic/deterministic than probabilistic understanding [18, 23].

This area of tension can be clarified by the following. For organizational culture, there are frameworks which show which levels or dimensions a culture has [23–26], what types of cultures there are [27–29] and which factors are important to consider [30–32]. For project culture and project management culture respectively, there are only a few frameworks. Vaidyanathan [25] shows a framework with five key dimensions for project culture in organizations. This framework aims to support project initiation, planning or implementation in organizations to increase their strategic initiatives [25]. For project management culture, which is a broader construct than project culture, there are frameworks that include behaviors of stakeholders who are involved with the project in an organizational setting [26]. Furthermore, Seelhofer et al. [32] show a framework with relevant dimensions for a project management culture in the context of higher education. For a culture-aware management, Sackmann [33] describes concrete actions which address its structure in a conceptional way. These actions are based on cultural sensitivity and on an awareness process that could either be evolutionary or revolutionary. They refer to culture carriers, context, and leadership [33]. Dieterich et al. [19] show a two-part framework for a project-culture-aware management in interorganizational R&D projects. In the first part, they concentrate on project culture development. Here, they illustrate how project culture develops within different levels. In the second part, they show which factors are relevant to consider and designable to support a cooperative and innovative behavior in interorganizational R&D projects. In this context, they show a design chain of values, norms, operational and organizational structure [19].

Culture development as a demanding change process typically runs in the process phases analysis/diagnosis, design, implementation, and reflection [34]. In this context process models can be found above all. These models show “what to do”, i.e., which steps are to be carried out [35]. Thus, when it comes to change, develop or shape organizational culture, process models mainly show what managers and/or their change agents systematically have to do in the single steps of different-stage models [23, 36–38]. Moreover, these models give recommendations, such as to include the people who are addressed by cultural change [36]. Some process models also show how change affects organizational members [39, 40]. In this context, Sackmann [23] points out, that publications for culture change mostly show systematic approaches which rather have a deterministic understanding. However, humans, projects and teams are non-trivial systems that do not operate in a mechanistic manner [14, 23]. Here, managers should rather be enabled to create conditions that increase the probability of a desired behavior [23]. For a culture-aware management, Voigt [41, 42] shows a three-step process model with a deterministic/mechanistic understanding [18]. In the context of interorganizational R&D projects, Dieterich and Ohlhausen [20] show for a project-culture-aware management a closed-loop control for living values of a

cooperative innovation culture. This closed-loop control describes the system “cooperative innovation culture” and illustrates relevant activities for designing and controlling project culture in interorganizational R&D-projects [20]. In contrast to process models, a method describes “how to do” something. Thus, it goes deeper than process models and describes in what way and with what results the steps need to be carried out [35]. So far, there are only a few methods that focus on the “how to do”-perspective in culture literature. These can be found in the diagnosis step of a cultural change process above all. For example, Cameron and Quinn [27] consider the “how to do” perspective for diagnosing organizational culture with the OCAI as a diagnosing instrument.

To sum up, project culture is very little considered in interorganizational R&D projects. Furthermore, there is an underrepresentation of the relational level in common project-management approaches and cultural frameworks, process models and methods do neither focus on project-level nor on a probabilistic understanding. Thus, there are extensive research needs on how to carry out a culture-aware management in a probabilistic way in interorganizational R&D projects. This research gap is closed by the project-culture-aware management method CLIPS [18] as it guides managers and project team through an entire culture development process and supports them in how to manage these projects project-culturally-aware in a probabilistic way.

### 3. CLIPS - A project-culture-aware management method

The overview of how to carry out a project-culture-aware management with the method CLIPS is divided into two parts. In the first part, the project-culture-aware process model of the method CLIPS is presented. It shows what steps interorganizational project members need to carry out for a project-culture-aware management [18]. In the second part, these steps, as the individual components of the method CLIPS, are described in more detail. Hence, focus is in this part on how these steps need to be carried out by interorganizational project members [18]. The method CLIPS is presented in this paper only as a summary, for details see [18].

#### 3.1 *What to do - Project-culture-aware process model*

The project-culture-aware process model of the method CLIPS is a further development based on the models illustrated in Dieterich et al. [19] and Dieterich and Ohlhausen [20]. It comprises seven components (see Fig. 1) of which six can actively be designed. One component is a passive one that is influenced by the actively designable components. This highlights a probabilistic understanding of the method [18]. As there is a high heterogeneity in interests, project sponsors should identify in the first step a transparent project scope that represents a win-win situation for all involved organizations. Then, in the next step, all interorganizational project members jointly define values following a consensus principle. These values should be conducive to achieve this transparent project scope in cost and time. Based on these values, in the third step, project manager(s) and team derive norms following a consent principle [18]. Norms show specific rules of conduct in an interorganizational R&D project. In the fourth step, based on these derived norms, project manager(s) and team define the operational structure followed by the organizational structure of a project. Based on values, norms, operational and organizational structure a behavior of interorganizational project members results. This is the passive component of the process model. In the fifth step, the active component observation follows in which the resulting group behavior of interorganizational project members is observed. Then, in the sixth step, observations are jointly reflected by observers, project manager(s) and team [18]. Reflections take place after two different periods. A “small” reflection takes place every four weeks, since this is the period, in which consent decision need to be reviewed [43]. After this reflection follows a review and, if necessary, an adjustment of norms and/or organization to minimize discrepancies between actual and target condition of project culture. An “extended” reflection takes place every three months, since this is the approximate period within which humans form habits [44]. The consideration of habits is beneficial here because habits describe beliefs that are no longer aware to the respective persons due to their repeated use [23]. Hence, they are an automatic response to environment in thoughts and actions and thus belong to the basic assumptions of a culture [23, 44, 45]. After this “extended” reflection follows an actuality check, review and, if necessary, an adjustment of transparent scope, values, norms and/or organization. In this step, it is especially important to consider the reciprocal relationship between values and transparent project scope. As values need to be conducive to achieve transparent project scope in time and cost throughout the project, changes in project scope need to be checked

regularly so that values can be adjusted accordingly [18]. The described project-culture-aware process model is illustrated in Fig. 1.

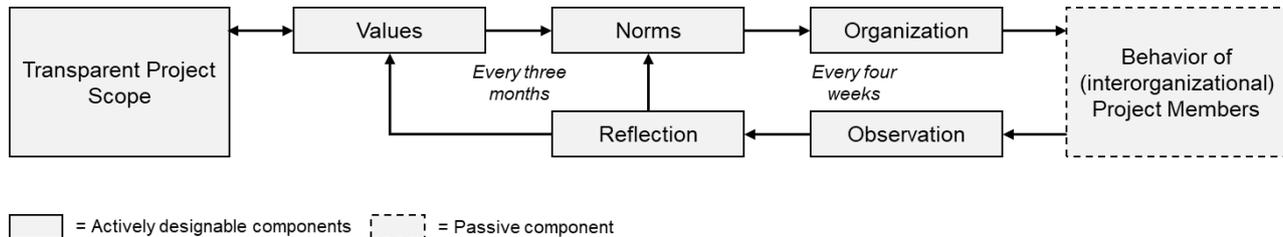


Fig 1. Project-culture-aware process model, following Dieterich [18]

### 3.2 How to do - Individual components

**Transparent project scope:** To pursue a collaborative strategy, interorganizational project outcome needs to be beneficial for all involved organizations (see Lewicki and Hiam [46]). Therefore, individual organizations should align their individual interests in a transparent process right from the beginning. Dieterich et al. [47] show a conceptual approach of a partner-finding process with a supporting tool, the Collaborative Iron Triangle. According to this approach, an initiating organization can start choosing either an effectuation or causation approach. Then, the initiating organization and their possible partner organizations document their individual scopes, the resources which they can/want to contribute and their desired time horizons for achieving their individual scopes. Afterwards, they search for suitable solutions. With an effectuation approach, organizations extend project scope and cost and level project time. With a causation approach, organizations separate project scope, extend project cost and level project time. These processes result in a win-win project outcome, complementary work effort, costs and resources and coherent time horizons [47]. The identification of a transparent project scope takes place on project governance level. On this level, sponsor-organizations and project sponsors are involved [48]. The use of the Collaborative Iron Triangle results in a collaboration agreement which considers the interests of all involved organizations. Furthermore, the tool ensures transparency for project scope. Thus, at the end of this component a commonly defined win-win project scope results, which includes the interests of the organizations involved. Furthermore, it is shown which organization is pursuing which interests and contributing which resources [18].

**Values:** As a defined values consensus forms the underlying form of culture [49, 50], values definition is the most essential step. Therefore, each interorganizational project member is involved. Hence, at the beginning, all interorganizational project members define values following a consensus principle [18]. The definition of values is done in three steps. In the first step, each project member should prioritize three to five values from a “values pool” by a pairwise comparison [51]. This number of values is beneficial, since humans can only remember a number of four in short-term memory [52]. The “values pool” shows 18 values of a project culture, that are conducive to cooperation and innovation, with their definitions [17, 18]. In this way, each project member has the same understanding of the values to be defined [18]. Then, in the second step, project members carry out a dialogue conference. For this conference, the rules of a democratic dialogue [53] are valid. Thus, at the beginning of the conference, these rules should be communicated to all interorganizational project members [18]. In accordance with these rules, interorganizational project members define valid values for collaboration in their interorganizational R&D project following a consensus principle. This can be done in heterogeneous and homogeneous teams in three rounds [54]. In the first round, they form heterogeneous teams, i.e., teams with persons of different hierarchical levels. Here, each project member contributes his/her individual prioritized values to the discussion. Based on these values, each heterogeneous team defines three to five values following a consensus principle [18]. To prepare a consensus decision, project members can communicate their tendencies with a template, that shows five variants for voting [43]. Then, in the second round, they form homogeneous teams, i.e., teams with persons of the same hierarchical level. Based on the defined three to five values from round one, they define again three to five values following a consensus principle. These values form the basis for

the final round three. In this round, all project members define three to five values based on the resulting values from round two following a consensus principle. This results in the final values. In the third step “manifestation of values”, these final values are documented in a values-charter [18]. This values-charter needs to be agreed by each project member, for example, by signature. Furthermore, to link project culture with project success, values are documented in the “Collaborative Project Scorecard” [55]. This project control tool is beneficial because it takes both hard and soft factors of interorganizational projects into account. Hence, at the end of this component a values consensus results, which is agreed by all project members and forms the basis of their daily work. Furthermore, culture is considered in a strategic element for interorganizational project control [18].

**Norms:** Based on the values-charter, project manager, subproject managers and project team derive valid norms for collaboration following a consent principle. This derivation is done in two steps. In the first step, they derive norms according to the three rounds of a consent principle [56]. In the first round of a consent principle, project managers inform project team. Here, it is important to promote a common understanding of the term “norm” in the group. For this, a template with examples can be used. When a project team does not need more information for the derivation of norms, project manager asks project team for suggestions on derived norms. Within this process, project team can agree or disagree to what was previously said, add to it or come up with new ideas. Then, in the second round, project team can give their opinions on the resulting derived norms from the previous round. During these two rounds, no side talks are allowed and project manager documents new contributions [43, 56]. Based on the suggested norms, project manager is preparing a proposal for valid project norms in the third round and presents it to the team. If slight and/or heavy objections to the proposal arise, these are discussed and resolved. When there are no more objections, in the second step, the final derived norms are documented in a code of conduct. This code of conduct needs to be agreed from all members involved in the decision process, for example by signature. Thus, at the end of this component, derived norms result which guide project team and manager(s) in their daily work [18].

**Organization:** Based on the derived norms, project manager, subproject managers and project team design their operational and organizational structure. This design process comprises three steps. In the first step, based on the code of conduct, they shape operational structure [18]. Here, they can follow again the three rounds of a consent principle (see step “Norms” and Strauch and Reijmer [56]). Since the method CLIPS is supposed to be integrated in both classic and agile project management approaches, they should focus on “must-have” project management practices [57] to design the operational structure in interorganizational R&D projects. In this step, it also becomes important to design and implement a system for tracing intellectual property. Since an interorganizational R&D project is a temporary organization, according to Dieterich and Ohlhausen [58], this can be done with a private blockchain system. Since project members need to agree here, the origin of a contributed idea is acknowledged [58]. In this way, there is a transparency on who contributed when an idea that potentially can become intellectual property (IP). Thus, output separation is simplified, and IP issues are minimized. Hence, it is likely that more information than just the necessary ones are contributed [18]. In the second step, based on the operational structure, the organizational structure is shaped. Here, they can follow again the three rounds of a consent principle (see step “Norms” and Strauch and Reijmer [56]). Also in this step, focus lies on “must-have” project management practices [57]. For organizational structure, a “must-have” practice is a RACI-matrix. In this matrix, also the position “observers” should be included for the next four weeks [18]. One observer should observe around seven people [59] and each subproject must be represented. A project member can voluntarily enroll for the “observer” position in the RACI-matrix but must be observer at least once during an interorganizational project [18]. In the third step, defined elements of operational and organizational structure are documented in the target area of the reflection document. Hence, at the end of this component, an operational and organizational structure results which is based on the defined code of conduct and includes “must-have” project management practices for interorganizational R&D projects. Furthermore, observers are defined for the next four weeks [18].

**Observation:** The defined transparent scope, values, norms, and organization set the framework within project members work on accomplishing the given task. The observers defined in the previously step “organization” evaluate the collaborative behavior of project manager, subproject managers and project team. In addition, each project team member observes himself/herself during the entire project duration [18]. For observation, observers can follow the diagnosis-intervention-cycle [60]. Thus, they first observe the collaborative behavior of project team and managers. For

this, they can use the PLA-CHECK approach (see, for example Doke and Risley [59]) as a guide. To observe the collaborative behavior, they make notes in an observation template of how many people present adhere in which situation to the code of conduct. This results in subjective perceived engagement rates. Furthermore, they document their perceived operational and organizational structure. By this process, each observer documents the actual state per week. In addition, each project member observes himself/herself during the entire project duration by tracking his/her behavior by means of the code of conduct. For this, they can use a self-observation template [18]. In the second step, each observer infers meaning of the observed collaborative behavior. After four weeks, observers meet once before the reflection meeting and combine their weekly observation templates. This can be done, for example, with a spreadsheet software to calculate combined subjective engagement rates. By this software, these rates also can be represented graphically. Thus, a development in collaborative behavior can be read [18]. In the third step, observers prepare an intervention. For this, they transfer the summarized notes and combined subjective engagement rates in the actual area of the reflection template. Then, they invite project members to the reflection meeting. Hence, at the end of this component an actual condition results which can be contrasted with the target one [18].

**“Small” Reflection:** Every four weeks project manager, subproject managers, project team and observers jointly reflect observed collaborative behavior. This is done in two processes. In the first step, each project member assesses the actual condition in terms of the degree of norms lived. For this, they use a ten-point scale which runs from “not lived” to “fully lived”. The calculated average is then included to the actual area of the reflection template [18]. Afterwards, observers present the observed actual condition and its development over the last four weeks to the others. Then, they ask for other opinions (see diagnosis-intervention-cycle [60]). Here, project members can voluntarily complement the actual state with their self-observations. In the second step, when there are no more additions, they jointly analyze the resulting actual condition. Then, they identify discrepancies between actual and target condition and determine the reasons for them. Hence, at the end of this component, needs for action result or not [18].

**Norms | Organization | Observation:** Based on identified discrepancies, project manager, subproject managers and project team adapt norms and/or organization, if necessary. In any case, observers for the next four weeks are defined and documented in the RACI-matrix of the project. Afterwards, project members proceed with their daily work which is then observed again (see step “Observation”) [18].

**“Extended” Reflection:** Every three months, reflection is extended. This means that, beside living of norms, also living of values is jointly reflected by project manager, subproject managers, project team and observers. The extended reflection is done in three steps. However, the first and second step are almost the same as in “small” reflection. There is only an adaptation in the first step. Here, beside the degree of norms lived, also the degree of values lived is assessed by project members using the ten-point scale described above. The calculated average for values is then also included to the actual area of the reflection template [18]. Then, step two is carried out as in “small” reflection. Afterwards, in step three, they prepare actual conditions and their developments of the last three months, also after adaptations. Hence, at the end of this component, in addition to needs for action, there is an overview of the actual conditions of the last three months [18].

**Values | Project Scope:** After three months, project manager reports developments of actual conditions and potential adaptations in norms and/or organization to all interorganizational project members. Then, all members check whether there are changes in interests of the individual organizations that could influence project scope. For this, they can use the Collaborative Iron Triangle [47]. If project scope has changed, interorganizational project members need to check whether the defined values are still up to date and conducive to achieve it in time and cost. Moreover, they should check whether other values became more important in the last three months [18]. Furthermore, if some values are already fully lived by project members, i.e., values became basic assumptions, interorganizational project members can start prioritizing further values. For this, they can carry out again a dialogue conference (see step “Values”). Hence, at the end of this component, a project scope results that is reviewed for possible changes in interests of the involved individual organizations. Furthermore, values are checked and, if necessary, values basis and the Collaborative Project Scorecard are updated [18].

#### 4. Integration of the method CLIPS in common project management approaches

In order to demonstrate the integrability of the components of the method CLIPS [18] in common project management approaches and to show how they can be integrated there, the six actively designable components are analyzed in more detail. Here, for common project management approaches, focus is on PMBOK [10], PRINCE2 [12] and ICB [11] as well as on the underlying construct of agile project management approaches. For the analysis, the assignment of Dieterich [18] to identify the underrepresentation of the relational collaboration level, explained in section 1, can serve as a basis. This results in two analysis criteria. The first criterion is collaboration level [14]. In terms of this criterion, it is evaluated whether the individual components of the method CLIPS focus on organizational, relational, or content-related issues. Organizational issues involve for example project organization, structures or processes [14]. Relational issues deal with the relationships of interorganizational project team members and content-related issues focus on scope, time and cost as well as on productive work [14]. The second criterion is process group. In terms of this criterion, it is evaluated in which process group processes and actions of the individual components of the method CLIPS take place. Here, focus is on the process group frameworks of PMBOK [10] and PRINCE2 [12]. This is because the elements of the competence-based project management approach ICB can be assigned to the process groups of PMBOK (see for more information Dieterich [18]). The process group framework of PMBOK shows the five process groups “initiating process group”, “planning process group”, “executing process group”, “monitoring and controlling process group” and “closing process group” [10]. The process group framework of PRINCE2 shows the seven process groups “Starting Up a Project”, “Directing a Project”, “Initiating a Project”, “Controlling a Stage”, “Managing Product Delivery”, “Managing a Stage Boundary” and “Closing a Project” [12]. In terms of agile project management approaches, there are many different agile methods with different processes. However, agile methods have the two key elements “agile manifesto” [21] and “iteration cycles” as an underlying construct in common [22]. Therefore, focus is laid on these two key elements. Here, the inclusion of the components of the method CLIPS is shown in a conceptual way.

The analysis shows that the method CLIPS does not conflict with established project management approaches. Rather, it addresses the relational collaboration level where current project management approaches do not. Thus, the method CLIPS can be integrated in PMBOK [10], PRINCE2 [12] and ICB [11] as well as in agile project management approaches. In the following it is shown how the components of the method CLIPS can be included in the process group framework of PMBOK (for ICB [11] and PMBOK [10]) and of PRINCE2 [12]. Furthermore, it is described how they can be integrated in agile approaches.

As Table 1 shows, for PMBOK and ICB, single components of the method CLIPS can be included in the “initiating”, “planning”, “execution” and “monitoring and controlling” project management process groups. As the project starts, partner-finding can be carried out with the Collaborative Iron Triangle [47] to determine a win-win project scope, complementary resources, and a coherent time horizon. Furthermore, a collaboration agreement can be formed with it. For PMBOK, this agreement can be included in the project charter which is developed in the “initiating” process group [10]. For ICB, this agreement can be considered in the competences “project design” and “requirements and objectives” [11]. By this integration, the component “transparent project scope” addresses the organizational and content-related level and thus defines the task to be accomplished. This sets a framework within which interorganizational R&D project management operates for a successful project completion. Once the task is set, collaboration details need to be specified in order to ensure a focus shift in project management towards project culture [18]. Therefore, the component “values” is also included in the “initiating” process group. This component serves as a starting point for interorganizational R&D project management. In the “planning” process group, norms are derived from the defined values. In this way, the previously unaddressed relational collaboration level is addressed in this process group. Furthermore, in this process group, according to PMBOK [10] and ICB [11], operational and organizational structure is defined. This takes place on the organizational and content-related collaboration level. Thus, the focus shift becomes evident here, as the operational and organizational structure is now designed based on the defined code of conduct [18]. Furthermore, as focus is for the component “organization” on the “must-have” project management practices (see for “must-have” practices Fernandes et al. [57]), operational and organizational structure is adapted to interorganizational R&D projects. As working on the task is done in the “execution” process group [10], observational actions of the method CLIPS are carried out there. Thus, for PMBOK, beside manage and develop team and manage project knowledge [10], the relational level is

addressed by the component observation. As reviews are carried out in the “monitoring and controlling” process group [10], the component “reflection” addresses the relational collaboration level there. For ICB, the component “reflection” complements the competences “Personal communication”, “Relationships and engagement”, “Teamwork”, “Conflict and crisis” [11].

Table 1: Integration of actively designable components of the method CLIPS to PMBOK and ICB

		PM Process Groups**				
		Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
Collaboration Levels*	Organization	Organizational PM practices <b>Transparent Project-Scope</b>	Organizational PM practices <b>Organization</b>	Organizational PM practices	Organizational PM practices	Organizational PM practices
	Relation	<b>Values</b>	<b>Norms</b>	PMBOK**: Relational PM practices <b>Observation</b>	ICB***: Relational PM practices <b>Reflection</b>	-
	Content	<b>Transparent Project-Scope</b> Content-related PM practices	<b>Organization</b> Content-related PM practices	Content-related PM practices	Content-related PM practices	Content-related PM practices

**Actively designable components of the method CLIPS:** \*see Kuster et al. [14]; \*\*see PMI [10]; \*\*\*see IPMA [11]; PM = Project Management

For PRINCE2, as Table 2 shows, components of the method CLIPS can be integrated in the processes “Starting up a Project”, “Initiating a project” and “Controlling a stage”. In the process “Starting up a project”, an outline of a Business Case is prepared, and a project brief is assembled [12]. Thus, the component “transparent project scope” can be integrated here. In this way, the Business Case outline and project brief is adapted to interorganizational R&D projects, and the content-related and organizational collaboration level are addressed to define the task to be accomplished. In the process “Initiating a project”, the operational and organizational structure is defined [12]. Thus, in order to ensure a focus shift, values and norms need to be defined in this step. In this way, organization can be designed based on a code of conduct. Hence, the relational collaboration level is addressed firstly by values and norms. Afterwards, the content-related and organizational level is addressed by the component “organization”. By focusing on the “must-have” project management practices [57] here, operational and organizational structure is adapted to interorganizational R&D projects. In the process “Controlling a stage”, defined activities such as work packages, Business Case or risks are tracked [12]. So far, the focus of this process lies on the content-related and organizational collaboration level. By integrating the components “observation” and “reflection”, also the relational level is addressed. Therefore, there is an add-on of observation activities and joint reflections in the monitoring process. So far, project managers are responsible for this stage [12]. However, by integration of observation and reflection activities, also observers and project team should be involved here.

For agile project management approaches, the integration of the method CLIPS is shown in a conceptual way focusing on the two key elements “agile manifesto” [21] and “iteration cycles” [22]. Here, for the definition of a transparent project scope an effectuation approach should be chosen. This is beneficial to agile approaches, as means are set and scope is flexible [14, 47]. Then, the Collaborative Iron Triangle can be used to form a collaboration agreement [47]. Afterwards, values need to be defined. From the defined values norms are derived. Then, the resulting code of conduct serves as the basis for designing operational and organizational project structure. Since many agile project management methods include iterations, the components “observation” and “reflection” should be integrated to them. However, since iteration lengths are mainly shorter than four weeks/three months (see for an overview Flora and Chande [22]), reflection period should be aligned with agile iteration cycles. Thus, by integrating the method CLIPS in agile project

management approaches, the four values and twelve principles from the agile manifesto are complemented by project individual values and norms. Furthermore, agile approaches are adapted to interorganizational R&D projects.

Table 2: Integration of actively designable components of the method CLIPS to PRINCE2

		PRINCE2 Processes**						
		Starting Up a Project	Directing a Project	Initiating a Project	Controlling a Stage	Managing Product Delivery	Managing a Stage Boundary	Closing a Project
Collaboration Levels*	Organization	Organizational PM practices <b>Transparent Project-Scope</b>	Organizational PM practices	Organizational PM practices <b>Organization</b>	Organizational PM practices	Organizational PM practices	Organizational PM practices	Organizational PM practices
	Relation	-	-	<b>Values Norms</b>	<b>Observation Reflection</b>	-	-	-
	Content	<b>Transparent Project-Scope</b> Content-related PM practices	Content-related PM practices	<b>Organization</b> Content-related PM practices	Content-related PM practices	Content-related PM practices	Content-related PM practices	Content-related PM practices

Actively designable components of the method CLIPS:

\*see Kuster et al. [14]; \*\*see OGC [12];

PM = Project Management

## 5. Conclusion and future research in the context of interorganizational R&D projects

Since there are still problems in managing interorganizational R&D projects, a promising management approach is to address project culture there. However, in interorganizational R&D project management, the relational collaboration level at which project culture manifests itself [14] is still underrepresented. Common project management standards and agile approaches do not address this level in their project management practices or address it only late [18]. Thus, project culture evolves within a predefined framework of project organization and organized contents and is not actively targeted. Therefore, a focus shift towards project culture becomes necessary in interorganizational R&D project management [18]. This can be done by a project-culture-aware management [18–20]. The method CLIPS actively supports interorganizational project members in this kind of management. It should be integrable in the common project management approaches, that with its application all collaboration levels are addressed in interorganizational R&D project management [18]. Thus, the goal of this paper is to demonstrate the integrability of the method CLIPS and show how it can be integrated in common project management approaches.

The method CLIPS empowers project sponsors, managers, and team to manage interorganizational R&D projects project-culturally-aware on a probabilistic basis. It guides them through a closed-loop control of seven components. While six components are actively designable, one is a passive component highlighting the probabilistic understanding of the method CLIPS [18]. The analysis shows that the actively designable components can be integrated into common project management approaches. For ICB [11] and PMBOK [10], they can be integrated into initiating, planning, executing, monitoring and controlling process groups. For PRINCE2 [12], these components can be integrated in the three processes “Starting up a project”, “Initiating a project” and “Controlling a stage”. By this integration, interorganizational R&D project management is enriched by a project culture focus. First evaluations with organizations from different industries and of different sizes show that there is interest from practice in the method CLIPS. However, processes of the method CLIPS should be further simplified [18]. In addition, further empirical studies should be carried out focusing on an integration of the method CLIPS in classic and agile project management approaches. In general, a project-culture-aware management is a promising research direction where researchers should further elaborate on. As the importance of project work increases – in Germany, Norway and Iceland project work is about nearly one third of all economic activities [61] – a project-culture-aware management could also be beneficial in large firms with different organizational units. Since the analyzed project management approaches are generally valid for project management, the method CLIPS is also applicable for intraorganizational projects. Here, the interorganizational focus of the method

CLIPS is an advantage as this method was developed for project members whose trust basis is little and interests in individual output maximization is high. However, if project context is different from R&D, the “values pool” should be adapted accordingly.

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## Biographical notes



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Since the beginning of 2019 Katharina Dieterich is doing her PhD as a scholarship holder of the Graduate School of Excellence advanced Manufacturing Engineering (GSaME) at the University of Stuttgart in cooperation with the Fraunhofer Institute for Industrial Engineering IAO. In the context of her PhD project, she researches on project culture of interorganizational R&D projects. Until 2018 she studied technically oriented business administration at the University of Stuttgart and completed a semester abroad at the University of Exeter, UK. Main topics of her studies were, among others, innovation, controlling, and production technology.



### Peter Ohlhausen

Peter Ohlhausen has been working at Fraunhofer IAO since 1993. There he is head of the Research Coordination department. At the Reutlingen University ESB he is responsible for technology and innovation management. The key fields of his research are innovation management, R&D management, knowledge management, diversity in innovation management. He led numerous projects dealing with project management implementation, knowledge management and the reorganisation of R&D departments in industry like Bosch, EADS, BAe, Casa, Siemens Medical, Daimler and several SMEs. Furthermore, he worked on several projects dealing with diversity in innovation management and in research institutions. He had a great interest in the topic of science fiction as an impetus for innovation.