Increasing the success of strategic alliances in software ecosystems: design of a Software Ecosystem Alliance Management toolkit

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Preface

In agreement with the supervisors of this research, this thesis does not follow the traditional style of writing. Instead, the thesis is written in a form of a scientific journal paper, ready to be submitted to the journal of Information and Software Technology 2017. For these reasons, the written work is limited to 15,000 words and does not include any appendices. However, for clarity reasons, the appendices are included in the printed version. This should help the reader to better understand some of the aspects of this research, such as the validation protocol (appendix A), list of research questions (appendix B), activity (appendix C), and concept explanations (appendix D).

A special note must be made with regards to the scope of this research. Slinger Jansen's work on the first Software Ecosystem Management Maturity model had a lot of research influence on the design of this research and project itself. The model was applied at the case company at the start of the research to be able to position the degree of ecosystem management practices currently in place. Without such insight, the design of our management toolkit could have resulted in a very different definition, most likely exponentially increasing its scope. The model enabled us to define the scope of the toolkit, and define the abstraction level of practices to be included. It follows that a large part of the toolkit's ecosystem practices is based on Slinger's work, which given his expertise in the software ecosystem domain, only reinforces the validity of our toolkit. The maturity assessment is for clarity reasons included in the appendix, however there is no reference to it in the written paper for reasons mentioned above.

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Abstract

Context: So far, it remains unclear how can software-producing organizations deliberately increase the long-term success rate of strategic alliances while developing their software ecosystem. Many views exist on how individual ecosystem aspects should be managed, but however insofar there exists no complete management framework that software vendors are able to adopt to govern their ecosystem.

Objective: In this paper, we design a comprehensive management toolkit for software vendors. The toolkit is intended to support a holistic process improvement, by facilitating the diagnosis of the situation and the definition of concrete management actions and processes.

Method: Building upon theories and practices of the situational method engineering, we adapt the method-association approach and use it to underpin the management toolkit. We propose the adaptation to the method-association approach, through which it is possible to design management toolkit. We populate the toolkit with practices extracted from the literature on software ecosystem alliance management. In an case study research, we apply the toolkit in the context of a Dutch IT company to derive a partner selection method, and validate the results by means of expert interviews.

Results: Findings indicate that there are seven management areas that increase the success of alliance management within the software ecosystem. The results of the validation further suggest that the designed toolkit could potentially be adopted by software vendors, both to support process improvement and as a method generation tool. To our knowledge, the toolkit approach is the first attempt to provide software vendors with a holistic approach to ensure long-term alliance success.

Conclusions: We conclude that software ecosystem alliance management requires a deliberate and structured approach, through which a multitude of inter-connected incentives can be structurally adopted. Further validations are needed to evolve the toolkit and increase the generalisability of the results, but the case study has already yielded promising results.

Keywords: Software Ecosystem, Strategic Alliance, Alliance Capability, Knowledge Management, Method Engineering, Maturity Models

1. Introduction

Traditional software partnerships that do not expand beyond re-sellers and license agreements, no longer provide adequate returns and benefits in terms of financial revenue. In 2017, the software industry has been estimated to increase its market size by approximately 4.1% compared to 2016 [1], resulting in a market work over three trillion euros. It is further estimated that as much as 30% of the market revenue is to come from strategic business partnerships [2]. Despite this, the failure rates of strategic partnerships remain substantially high (40-60%) [3, 4, 5]. The IT sector is especially critical, since only about 30% of the Strategic Alliances (SA) last for more than three years [6]. The importance of higher-trust partnerships is not novel and has been a topic of significant discussion over the last 30 years in both in the strategic management and the software engineering domains.

Often the main reason for the low success rate is the inappropriate and measureless management process adopted within the Software Ecosystem (SECO) [3, 6, 4, 2, 7, 8, 5]. There exists a lack of insight into how SECO management can be used to influence and raise the success rate of firm's alliances in the international context. It thus remains unclear how successful alliance strategy within a SECO can be defined, and what are the supporting management processes that affect the alliance performance. We try to solve the problem

by adopting situation method engineering principles [9, 10], that enable the development of an information science based method, tailored to the specific situation at hand.

In this paper we propose an adaptation to the Method Association Approach (MAA), which was to our knowledge so far only used for the construction and design of situational methods for web content management systems [11, 12]. The established approach is expanded with the necessary concepts that allow for the construction of a management toolkit (i.e. strategic roadmap) [13]. We operationalize the adapted approach with the construction of industry-based holistic Software Ecosystem Alliance Management (SEAM) toolkit, that can be used by organizations in the IT industry. The toolkit is built across two dimensions: the management dimension (being, operational (<1 years), tactical (1-5 years), strategic (>5years) [14]), and the Ecosystem-Alliance (EA) dimensions. The EA dimensions (i.e. focus areas) (see section 4) are based on the conducted review of the literature (see section 3). The complete toolkit contains seven focus areas and 122 practices. The toolkit further serves as a method skeleton. The identified practices are modeled with the existing MAA through the validation matrices and the process-deliverable diagram approach. The biggest contribution of this paper is its definition of ecosystem-alliance management model, supported with the meta-model approach adaptation, that other studies can adopt.

The conducted research is presented in the following way. We begin the discussion with an overview of the research methods and approach in **section 2**. In here we define the meta-model for the management toolkit approach, which is adapted from the existing method-association approach. We continue with the investigation into the "state-of-the-art" in the area of ecosystem alliance management in **section 3**. The literature review is built from the identified findings and results from numerous Systematic Literature Reviews (SLRs). Next to this, we adopt a snowballing approach to further identify relevant literature concepts that are detrimental for ecosystem alliance success, and identify seven areas that are of relevance for this research. The discussion shifts towards the design structure of the management toolkit in **section 4**. In here, we outline the focus areas that are contained within the toolkit, and provide in-depth explanation of the ecosystem alliance practices that are of relevance for the respective management areas. The operationalization of the toolkit is discussed in **section 5**. In here, we discuss the conducted case study, how the management toolkit was adopted to create a situational method for partner selection, and explain the method. Further, in this section we validate the toolkit and the partner selection method, by means of expert interviews. The paper continues with critical in-depth discussion about the performed research and its limitations (**section 6**), where we further outline the research agenda relating to this study. We conclude the work in section 7, with the main result being the defined design of the management toolkit.

2. Research approach

This study adopts a mixed-method approach to information science research, based on design science principles of Hevner et al. [15], and thus follows the five process steps of this methodology as described by Vaishnavi and Kuechler [16]: (1)problem awareness, (2)suggestion, (3)development, (4)evaluation, and (5)conclusion. During the first step, existing Systematic Literature Reviews (SLRs) with a snowballing method are used to investigate the current state-of-the-art. During the second step, meta-model process approach is defined for the construction of *management toolkit* based on the adaptation from the Method-Association Approach (MAA) [11, 12]. During development, the outlined meta-model is instantiated to create Software Ecosystem Alliance Management (SEAM) toolkit. During evaluation, a case study is conducted through which evaluation and validation of two key artifacts is made; SEAM toolkit, and partner selection method. The validation is performed by conducting expert validation sessions. In the last step, findings and results are concluded. As a result, three main research questions are defined for this research:

RQ1 - What is the current state and process of strategic alliance management in software ecosystem?
RQ2 - How can software ecosystem management influence the performance of strategic alliances?
RQ3 - What is the long-term management path for alliance success in software ecosystems?

2.1. Literature review

The literature review used as part of this paper (section 3), is performed by identifying the existing SLRs, and applying a snowballing technique as described by Wohlin [17], in three areas, being software ecosystems, strategic alliances, and management. Examples are the works of Manikas et al. [18, 19, 20], Jansen et al. [21, 22, 23], Nevin [2], and many others.

In one of the earliest SECO research agendas, Jansen et al. [21] call for support from researchers in different areas, to provide an interdisciplinary perspective on the growing popularity of SECO. Almost five years later, the study of Barbosa et al. [24] revealed that the current field of SECO research is lacking industrial studies, which would strengthen the applicability of SECO in a natural setting. SECO in their novelty lack deeper linkage and connection with the domain of strategic management, and more specifically SA, which have been proven detrimental to the strategic advantage in the market.

The first SLR in the field of SECO has been conducted by Manikas & Hansen [18] where 90 papers were analyzed. In their later work, Manikas investigated the field of SECO from the views of (1) research output, (2) number of current empirical models, and (3) number of investigated SECOs. In both works, the authors identify the lack of consensus in regards to the definition of a software ecosystem, lack of analytical models, and missing research into the existing real-world ecosystems. On the other hand, it has been confirmed by numerous authors [24] that the domain of SECO is an increasingly emergent field, and although research output in this field has significantly increased in the last years [25, 26, 18] there exists a lack of cross domain research.

When it comes to the domain of strategic alliances, Christoffersen [27] investigated their performance on the international level. Shortly after, Gomes [28] investigated 22-years of literature on different alliance aspects, such as management, design, & other specialized areas. Lastly, Niesten [29] in their research into alliance management and performance identified the core concept of alliance management capabilities, which the authors have directly linked to alliance performance (i.e. alliance success rate).

2.2. Situational Method Engineering

Method engineering (ME) is in its basic form seen as a discipline, through the process of which the research is able to design, construct, and adapt existing tools, techniques, and methods for development of something novel [30]. Brinkkemper defines a method as **"an approach to perform a [...] project, based on a specific way of thinking, consisting of directions and rules, structured in a systematic way in development activities with corresponding development products"** [30, pp. 275]. One of the sub areas of ME discipline is Situational Method Engineering [9], which is also the focus of this research.

Different approaches exist within SME for construction of situational methods (see for example [10]). The creation of an "ad-hoc" method in a given problem situation was discussed by Weerd and Brinkkemper [31]. This research adopts a seven step approach, called method association approach (MAA). The seven steps of the MAA are; Identify project situations, feature grouping, candidate method selection, association of concept groups, situational method assembly, and method validation. The approach was initially defined by Luinenburg et al. [11], where the authors develop a situational method, for the design of a web content management system. Building on their work, Deneckere et al. [12] apply and generalize the MAA for any method implementation approaches. Based on this, we adapt their MAA approach in order to illustrate how the design of management toolkit can be made within SECO, and describe how it relates to the established method association approach.

2.3. Management toolkit meta-model

The constructed meta-model of the proposed management toolkit is shown in Figure 1. Part of the meta-model is adapted from [12] where the author's meta-model is used for the construction of a situational implementation method. For the sake of brevity, the existing parts of the meta-model (white concepts) are only explained in brief, whereas the newly expanded parts (blue concepts) of the meta-model are given more attention.

Method Association Approach

When describing individual projects the importance of situational factors should not be overlooked. Although every project can look similar to another, is always characterized by unique circumstances, also called project situations [11, 30]. Typically different projects or problems can be fitted to a specific project situation, but despite these, unique differentiating factors still exist. Project situations are almost always bound and influenced by the different characteristics that are specific to a way of working within that organization, and are sometimes referred to as situational factors, influencing the final outcome. Further, to satisfy the identified project **situations** and **characteristics**, individual **features** must be identified. These are extracted from the available methods and literature, and are later grouped into overarching clusters, called **feature**

groups [11]. Feature groups allow for the association between the candidate methods or fragments with the individual groups. If a given method fragment satisfies the defined feature group characteristics or requirements, it is selected (or associated) from the candidate method. Project characteristics play an important role in a form of association constraints, defining the scope of method fragments or other influencing factors that should not be overlooked. Once the feature groups have been appropriately associated to the **method fragments** that satisfy them, the individual method fragments can be modeled in a form of a PDD [30, 31]. This diagram serves the purpose of describing individual stages, steps, and activities, with the corresponding deliverables. The process part (**activity**) is specified using a UML activity diagram and the product part (**deliverable**) is specified using a class diagram.
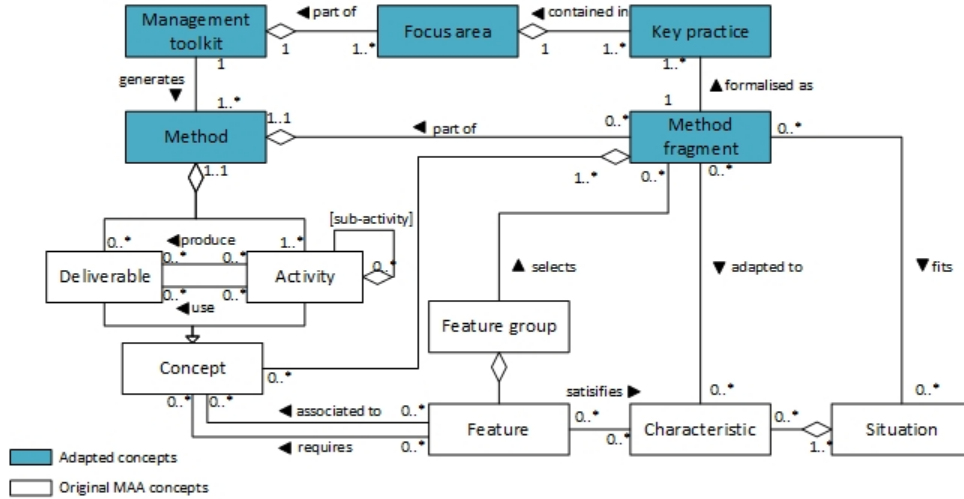

Figure 1: Management toolkit meta model

Management toolkit design

There are 4 concept additions and 1 concept adaptations made from the original MAA. For clarity purposes, the concept PDD is renamed to **method** for the simple reason that a PDD is a modeling technique used to model the method itself.

One of the ways to measure the current management state is through the focus area maturity models [32]. These can determine how well the organization is doing in different management and functional domains, and outline the incremental capability and practice development needed within the organization. Scope of such model is critical, as its application must be clear within the domain it applies to [33]. The concepts that define them are focus areas, capabilities, practices, and maturity levels. The management domain contains focus areas, which in turn contain sets of capabilities. These are positioned pragmatically in the maturity matrix. Each capability has specific practices associated, which serve as a guideline for incremental maturity improvement, and determine the current maturity level [34]. The notion of focus areas and capabilities is adapted to this research with the concepts **key practice** and **focus area** (Figure 1)

The adaptation from the existing MAA meta-model (see [12]) is the addition of **method fragment**. Relying on the domain of focus area maturity modeling, the meta-model associates the fragment with a key practice. The rationale is that the method fragment is always part of a method, but however proper formalization across multiple domains has to be ensured, in order to reach the same level of abstraction and granularity within the toolkit. As a result, each method fragment is formalized as a **key practice** and is contained in one corresponding **focus area**. This in turn creates a collection of practices (or capabilities). The integration of focus areas with the three management dimensions results in the concept of **management toolkit**. The ideas behind these concepts are not novel, and can be applied to different areas [32], such as ecosystem management [33], software product management [35], and other domains. Due to its pragmatic nature, such approach to management definition could be adopted in the research fields that deal with overlaps in multiple domains. In such cases, reaching same granularity and abstraction is difficult, not to mention the definition of process map across multiple domains.

3. Related work

3.1. Software Ecosystems and Strategic Alliances

The importance of international joint collaboration practices has been established and proven to be one of the essential parts of the firms success, especially when the main product is software related [36, 37]. Instead of positioning the leading software product as a standalone artifact, companies must instead integrate the product into other complementary software products [38]. This influences the growth of the firm across different organizational, regional and cultural borders [39], and in turn results in maximized revenue, brand image, and market positioning [22, 40]. Such deliberate behavior results in the natural development of what is a *software ecosystem* [41, 21, 19, 26]. SECO is defined as *"a set of businesses functioning as a unit and interacting with a shared market for software and services, together with the relationships among them. These relationships are frequently under- pinned by a common technological platform or market and operate through the exchange of information, resources and artifacts"* [21].

SECO can be defined from different perspectives; software product based [41], project based [42], community view [43, 44, 45] business-technology relationship [21], and actor influence view [25]. Despite the differences in SECO terminology, the elements of common software, the business, and relationships are always present [18]. Although in business spheres four role archetypes are typically present (creator, distributor, lessor, & broker) [46, 47], such nature of business network and relationships results in companies becoming hybrid (i.e. undertaking more than one role in SECO) [48, 49]. The reason for this is the aspect of mutual benefits [37] and goals [36, 50] that results from a plethora (clusters) of relationships amongst different entities [51]. The degree and focus of hybrid relationships can vary significantly, going from financial, customer, product, network-related, and market related [36]. A specific and common example where these goals can be achieved in greatest depth, are the strategic partnerships (alliances) [50]. Managing of these must be taken with great care, where the usage of associate models is extremely beneficial and detrimental to their success [37, 50]. It follows that SECO approach is the only viable option of software development, because collaboration with external market players is crucial for innovation [52].

The most natural taxonomy of alliances can be of either explorative (i.e. inter-firm collaboration for building new resources) or exploitative type (i.e. strategically pursuing inter-firm collaboration through the usage and refinement of existing resources) [53, 4, 54, 2, 7, 55] in which exploitative alliances experience higher overall performance and benefits [56]. Even deeper taxonomy can be depicted by non-equity alliance, equity alliance, and joint venture [7, 2, 5] where the key distinction is in the ownership structure of the alliance. Strategic alliances can be described as voluntary arrangements [7], in which tangible and intangible resources are exchanged for the mutual benefit and with a specific potential for competitive advantage. Their key principle is to increase the innovation levels of the participating entities [57].

Capturing value from SAs is defined as an **alliance capability** [58], and describes the effective management of different stages within the SA life-cycle [7]. By understanding the current state of organizational alliance capabilities, a much deeper understanding about organizational performance can be determined. The capabilities can be defined on three levels, namely individual alliance capabilities, alliance portfolio capabilities , and dyad-specific capabilities, which are aimed towards alliance establishment, portfolio management, and relational alliance capability, respectively [58]. Wang [58] built up on the concept of alliance management capabilities [29] and further distinguish between the pre- and post- formation stages of alliances and the role of value creation and capture. Their findings were later addressed in the work of Kilubi and Haasis [57], who were able to draw similar findings with regards to alliance capabilities and associated performance.

3.2. Management perspectives

The defined key practices for SECO management and coordination by Jansen et al. [33] serve as a solid foundation on which the complete SECO environment can be analyzed and subsequently managed more effectively. In their work, Jansen et al. developed the first focus area maturity models for SECOs. The maturity model has over 100 practices spread across seven management domains, and is to our knowledge the most complete attempt at SECO management. It has been suggested that the distinction between the SECO type and product position significantly affects the management processes and the corresponding strategy [59, 60]. Differentiation strategy for market leader, collaboration strategy when same to competitor, and cost reduction strategy when the product is lacking.
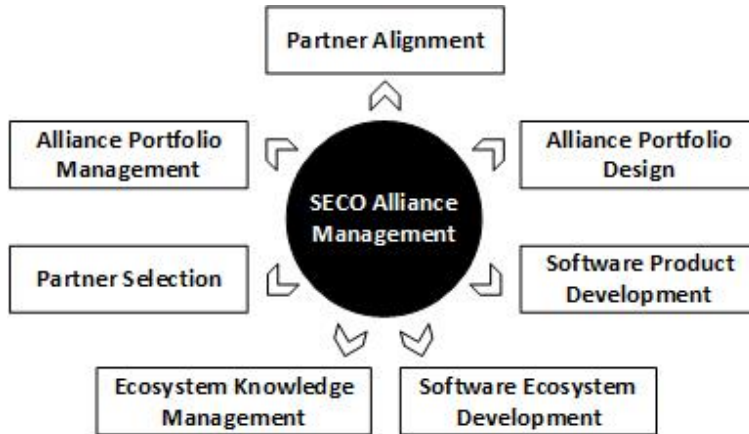
Figure 2: SECO alliance management process map

Similarly, the defined concept of SECO health [61, 62] are used as a performance measurement for productivity, robustness, and niche creation (PRN) which enable the identification of potential issues and areas of improvement. To capture complete SECO state, the analysis on three levels is crucial (i.e. actors, software, and governance) [19]. Still lacking however, are the quantifiable measurements of governance and health [63, 19, 64], which makes increasing SECO health a challenging task. Jansen [65] suggests employing specific tactics for increasing PRN within a SECO. These ensure increased overall quality and stability of the SECO [66]. First is the creation of explicit SECO strategy and vision (i.e. product, platform) [67]. The strategy must encompass the view of both SECO owner and niche players [21]. This increases innovation, reassures actor position, and is seen as healthy backbone of the SECO [65]. Despite the explicitness however, it is important to note that significant technical and management challenges exist [68, 67, 69, 70, 71].

Many complementary views exist about the life-cycle of alliances, however the most basic way is to illustrate them by means of stages [6]; in the pre- formation stage [58] the right strategy and resources should be selected [7], whereas in post- formation [58] management and coordination procedures must be defined [5]. Alliance cycle starts and finishes with the business strategy (i.e. internal alignment) [7], which thus belongs to both stages of the life-cycle [2].

Ecosystem owners should aim to ensure proper governance of external ties (i.e. partnering) within the SECO. Two principles of partnering governance are proposed by Albez [72]; adequately addressing all defined management levels, and making sure the balance between control and trust is appropriate and well-founded. Manikas and Hansen [18] argue that the aspect of decision making and SECO organization has not been defined adequately. Although addressed in the authors later work [20], organizational aspects in SECO are still seen as unanswered. They argue that SECO research is lacking insights into the business model organization, as well as SECO growth and development [18]. Recent findings of Serebrenik [73] revealed that still one of the key challenges in SECO research is be linked to two aspects; (1) connecting business goals with SECO strategy, and (2) governance approaches from the perspectives of the platform owner. The challenge of modeling SECO development and management thus remain lacking generalizable methods and approaches for software producing organizations [22, 26].

3.3. Software Ecosystem Alliance Management process

As illustrated in Figure 2, seven management areas are found at the backbone of SECO alliance management process. These are business strategy, knowledge management, software development, SECO development, alliance portfolio design, alliance portfolio management, and partner selection. First, the defined business goals determine the alliance portfolio strategy (i.e. type of alliance, strategic areas). Second, product development must ensure the sufficient degree of technical alliance capability [2, 58], to organically progress from product to platform [74]. Third, SECO governance processes must be defined [75] (i.e. alliance portfolio design, and SECO development) [2, 5], to ensure adequate level of control is enforced within the SECO. These must be implemented, and managed accordingly to the governance processes defined (i.e. alliance portfolio management) [2, 7, 58]. Next, value co-creation and capture must not be overlooked, where knowledge

creation and transfer plays a pivotal role (ecosystem knowledge management). Lastly, throughout the management life-cycle the process of selecting suitable partners is done. In here, potential business candidates are measured in terms of alliance portfolio fit [76], and overall business alignment. This is called partner selection process, which must ensure measurement across different critical alliance success factors [2] .

4. Software Ecosystem Alliance Management (SEAM) toolkit

This section discusses the defined SEAM toolkit (Table 1) by explaining the seven focus areas and 122 practices. The seven focus areas are selected as result of the outlined SECO alliance management process map. The practices in each of the areas have been identified and positioned from nine candidate methods, by means of the MAA matrix. Due to its size, the association matrix is split into two parts (Figure 3 and Figure 4).The practices have no dependencies, nor they are related to one another in terms of incremental progression. The only distinction however, is in their estimated time validity and importance. For clarity purposes, the toolkit contains specific practices that written in **_bold italics_**. These are the practices that were used for the method construction process (section 5). The seven focus areas are:

- **Partner Alignment -** As reported in the strategic management literature (see for example [7, 2, 77, 78]) the alignment of strategy and leadership can be seen as the main pillar for success (or failure). More specifically, the different strategies (e.g. product, business, alliance) must be defined in a complementary manner, and thus address their own respective domains. It follows that this focus area contains the key directives and incentives that should be adopted and integrated into the company culture. Generating business and successfully penetrating the market is positioned at the core of any organization, and thus the alignment of marketing & sales, roadmapping, and market research has to be done carefully and strategically in order to reach the set strategy and objectives.

- **Alliance Portfolio Design -** Moving from individual partnerships, the design of alliance portfolio ensures that the plethora of partnerships and alliances can be managed across the portfolio. Prerequisite for a successful design as reported in [2] are the alliance capability. With this in mind this focus area addresses the aspects of building skills, training people, developing smooth and efficient processes &procedures, and the development of an advanced partnership model, also reffed to as the associate model [37, 33].

- **Alliance Portfolio Management -** Described by Twombly [79] as the coordination and management of multiple strategic alliances as opposed to management of individual partnerships. It follows that this area contains practices with regards to effective management, tool support, portfolio performance, and portfolio innovation.

- **Software Product Development -** This focus area is concerned with software development of a scalable and open product, that is able to accommodate any potential niche player to start using the product as a platform. The first and foremost requirement is that the product is open [14], and order to do so, the community around the product has to be developed and systematically included in the entire development process, through requirements management practices, and shared collaboration.

- **Software Ecosystem Development -** . Moving from a software product to a SECO requires deliberate initiatives and practices [65] . This focus area contains practices with regards to the orchestration and governance of the ecosystem. This includes increasing ecosystem health, community engagement, and managing the product life cycle.

- **Ecosystem Knowledge Management -** Knowledge management is defined as "the deliberate and systematic coordination of an organizations people, technology, processes, and organizational structure in order to add value through reuse and innovation. This coordination is achieved through creating, sharing and applying knowledge ..." [80]. This focus area thus contains practices related to knowledge creation, transfer, and training.

- **Partner Selection -** The partner selection process is seen as a type of alliance capability [81, 2, 76], where the comprehensive selection process must contain specific steps, activities and outputs. This focus area therefore contains practices proven to have highest positive impact on effective selection process and long-term alliance success.

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Figure 3: Method association matrix - part 1

Figure 4: Method association matrix - part 2

Table 1: Software Ecosystem Alliance Management (SEAM) toolkit

	Operational	Tactical	Strategic
Partner Alignment	***Define explicit strategies (alliance, ecosystem, partner, market, etc.)*** ***Develop explicit market strategy*** ***Define available resources for alliance management capability*** Develop short- & long- term product, platform, and partner roadmap ***Perform detailed industry & technology trends analysis*** ***Identify strategic needs, gaps, & assets*** Develop explicit ecosystem value proposition	***Do collaborative marketing & sales*** Design sales support packages Implement sales verification process Involve all stakeholders in roadmapping Make product roadmap explicit Perform detailed competitor analysis Collect market, customer, & industry information	Establish joint alliance governance board ***Adopt best-practice alliance mentality*** Introduce new business models Share access to customer base Involve partners in niche markets discovery ***Define decision making*** Define innovative sales channels
Alliance Portfolio Design	***Develop advanced associate model*** ***Define explicit governance policies for complete ecosystem (alliance & software)*** ***Define ground rules for ecosystem portfolio*** ***Develop continuous scouting process*** ***Define ideal partner profile & explicit entry criteria*** ***Define explicit alliance portfolio scope***	***Identify & formalize possible exit strategies*** Create alliance clusters Systematically analyze partner performance Define transparent scoring model & due-diligence process ***Implement participant behavior regulations*** Implement formal partner appeals policy	***Design harmonized portfolio*** Train or employ alliance architect ***Create dynamic financial models*** Provide monetization & market extension opportunities ***Partner with same company on different level*** Investigate coopetition possibilities (i.e. partner with competitor)
Alliance Portfolio Management	***Define long-term partner development roadmap*** Incorporate innovation into company strategy ***Define innovation targets & objectives*** Showcase innovation success stories Develop & standardize partner selection process	Develop dedicated alliance department Organize partner award events Performance based partner promotion Implement partner relationship management & performance monitoring platform Research market regulations & industry initiatives	Develop relationship with universities & research institutes Establish incubator & provide research funds Actively attract niche players Increase diversity in the portfolio Monitor innovation progression

Table 1: Software Ecosystem Alliance Management (SEAM) toolkit (continued)

	Operational	Tactical	Strategic
Partner Selection	***Establish robust value analysis process*** Prioritize alliances based on portfolio spectrum position Train employees for partnership management ***Learn how & where to attract new partners*** ***Appoint senior leader as alliance champion***	***Implement specific relationship management plans*** Appoint dedicated alliance managers Implement partner development program ***Identify critical areas & relevant metrics*** Define explicit optimization targets	Establish competency base ***Establish explicit value creation process*** ***Adopt structured negotiation process*** ***Analise short-term commitment & long-term risk*** ***Plan continuous exit strategy***
Software Product Development	Adopt code re-usability principles Enforce standard development process Provide extension testing environment Involve main stakeholders in requirements management process Give partners explicit prioritisation voice Communicate accepted/rejected requirements Organize & connect similar requirements	Develop multichannel product Create stable and robust API Implement developer attraction channel Implement requirements management infrastructure Enforce software co-development Give partners testing responsibility Facilitate requirements management mechanisms	Develop common product delivery channel Develop extensions marketplace List platform extensions, use cases, & owner Copy innovative ideas from competitors Share access to requirements database Standardize requirement validation process Track requirement changes, market dependencies
Software Ecosystem Development	Validate product plans with business case Perform product life cycle analysis Define & share product release candidates Associate with domain specific experts Define intellectual property usage policy	Certify external components Verify release viability Validate product build Actively contribute to other ecosystems ***Keep ecosystem entry barriers low***	Start developing product lines Collect & share software operation knowledge Provide automated intellectual property checking mechanism Help partners resolve conflicts Form alliances with other ecosystems
Ecosystem Knowledge management	Collect feedback from ecosystem actors Automate data collection mechanisms Provide up-to-date product documentation Develop complete training program Establish knowledge management strategy Implement communication systems	Focus on knowledge codification Develop partner academy Implement alliance knowledge base Segment consultants & specialists Certify partners in different expertise areas Provide feedback channel for developers	Implement knowledge management compliance mechanisms Share customer service tickets Make consultants independent Assign implementation projects to partners Define different certification levels

4.1. Partner Alignment

Operational - On the operational level, the organization must ensure a well established leadership [2], through which complete business strategy [82] (i.e. product, alliance, market, ecosystem, etc.) [65] can be formalized. At the very least, detailed market strategy (i.e. what product, which partner, which specific market, what value proposition), especially in the niche market segments, is critical [35]. Strategy must be made explicit to ensure the entire ecosystem is aware of its general direction in in terms of products, partners, and activities. The initial aim should be to ensure senior management involvement throughout levels of operation, providing direct responsibilities and proper support mechanisms to facilitate the improvement process. Key strategic makers, who have the capability to request and provide the necessary assets for SECO and AMC development, need be put in charge of individual business units [83]. Both short-term (>1 product release) and long-term (2 years) road maps should consistently be evaluated and refined based on the identified changes in the market and industry [65, 35, 84]. This is not only the case for product road mapping, but also long-term partner road mapping [33]. Demonstrating strong vision with regards to its entire business network, increases the SECO health. Reaching new customer base and attracting diverse partners requires the definition of explicit ecosystem value proposition (i.e. internal, customer, partner) and make the benefits of potential collaboration specific and measurable [2]. To attract niche players, they must be convinced the expected partnership value outweighs the expected investments. Careful and objective gap analysis [83] can aid in this, to ensure strong market penetration and proper product placement. One of the ways to support the strategy definition is consistent market research, through the collection and sharing of customer, partner, market, and industry information [84, 14], thus utilizing the power potential of organization's business network to foster innovation and create business opportunities.

Tactical - For increased number of business opportunities the organization can collaborate with partners in shared marketing and sales [33]. This incentive needs to be supported with well-defined and beneficial support packages [84], and the establishment of sales verification process [33]. The key is to ensure adequate degrees of business alignment across entire partner network, in which involvement of key stakeholders is crucial [65, 35, 33]. This is the case for any type of of road mapping (i.e. product, partner). This must not be overlooked, as joint road mapping has been proven to have high positive impact on external relationships (i.e. providing another reassurance mechanism for niche players and their SECO position) [21, 33], and must be made explicit. Active discovery of new market domains where the product can be positioned [84, 65, 35] can support this. Organizations must know where it is under performing, and who is doing a better job. By knowing how the competition is doing better, the organization can decide the best course of action for its partner ecosystem, and guide partners in the process. The goal is to consistently identify relevant market competitors, try to identify their weak spots in the market, and determine how it can be transformed into own competitive advantage [65, 35].

Strategic - The organizational culture should adopt the joint decision making mentality [83, 85]. One of the ways is through the implementation of joint decision making governance board [83, 6]. The difficult aspect is to combine both trust and control mechanisms throughout the organization, that fosters balanced degree of the two. Enforcing control however should not be disregarded in favor of trust. To maximize revenue potential, organizations can define new innovative business models [84] and sales channels [33], through which unexploited market potential can be discovered. Another thing that the organization can benefit from significantly, is sharing access to its customer base [86], and continuously involve partners in niche markets discovery [84]. Giving access to untapped market to niche players is a sign of trust, and can yield substantial financial returns in the long run. At this point, increased market research focus should be given market trends to alter, adjust, and better position the placement of the product portfolio. The portfolio adjustments can reveal interesting collaboration opportunities, for which "make-buy-ally" decision making process [65, 35] can be formalized and implemented.

4.2. Partner Selection

Operational - Evaluating the partnering opportunities from short-term commitment and long-term risk, can be significantly improved with a well-defined value analysis process [87]. It should be made in a robust and cost effective manner, to avoid entering collaboration agreements that have a weak value potential from the start. Next, operational objectives definition needs to ensure the organization understands the expected outcome from attracting wide range of SECO complementors. Individual alliances should therefore be prioritized based on their position in the whole alliance portfolio spectrum [83, 87]. Gaps within the

spectrum need addressing through the learning process about the "how" and "where" new partners can be reached [84]. The consequent opportunities identification should thereafter be done in systematic and consistent manner, ideally through well-defined processes. One of the ways is by alliance terminology and process training program for employees [88], who are then able to start, manage, and end the relationships accordingly. Responsibility for the partner selection process should be given to the senior executive (e.g. alliance champion to manage specific portfolio [83]), who is also responsible for developing balanced partner selection criteria (i.e. entry barriers) with regards to the respective portfolio. By knowing the objectives, specific partnering characteristics and requirements, reducing overlap within the portfolio.

Tactical - Development of relationship-specific action plans [87] can help with the skills and competencies development on all sides of the relationship (i.e. increasing the alliance capability) [2], making the realization of the set strategy & objectives in line with the specified operational plans. Depending on the size and number of portfolios, organizations can appoint dedicated alliance managers [33, 2] responsible for the definition and implementation of partner development program. Alliance managers should monitor the employee learning and educate them where required. Their role must also facilitate the identification of critical areas & definition of relevant metrics for each partnership [2], to ensure the improvement areas have defined targets and mechanisms for portfolio optimization [87]. Consequent improvement needs to balance levels of partner investments, responsibilities, and benefits. Defined development plans need to be integrated into the operational planning of the organization. This means that the planning should not only take into account the required skills, capabilities and competencies needed to realize the set business targets, but also estimate the required effort and investments to make it a reality [2].

Strategic - Establishing competency base [87] can help in the partnership placement within the portfolio spectrum, as it outlines the existing competencies, skills, and knowledge already present in the portfolio. Joint value creation process can provide concrete plans on how individual sides are able to contribute to the realization of the set portfolio plans [87]. This should typically be done during the negotiation process, where the top priority should be win-win agreement. In other words, assessment of joint objectives for alignment and compatibility for the set scope of the relationship, should be formalized within a coherent exit strategy [2, 87, 77], containing potential triggers, rules of disengagement, or possible transition approaches. Similarly, future development plans can be formalized to ensure there is future vision present after the natural end of the relationship.

4.3. Alliance Portfolio Design

Operational - In terms of alliance portfolio implementation, two aspects (i.e. alliance capability [2] and associate models [33]) represent the necessary foundation for a successful portfolio design. In terms of governance, change management, issue escalation, and risk management procedures need to be clearly defined and made explicit [2, 33]. Another is the scouting process which is pivotal for the expansion of the alliance portfolio [33]. Once in place, the development of advanced associate models should be top priority [33], through which the diverse portfolios can be managed through partner clusters (i.e. different partner types, roles, and levels) [37, 50]. Each of the associate models should formally define its ideal partner profile, agreement scope, SLA agreements, and similar aspects [6].

Tactical - Given the increasing size of the portfolio over time, careful coordination of the portfolio needs to minimize the partner and alliance overlaps [72]. This can be achieved through associate model clustering and careful product-partner-market alignment [65, 35]. Dynamic exit strategies and agreements need to be formalized and implemented on both sides [6]. These should be put in place in case the systematic performance analysis [84] reveals specific alliance is not living up to its promise (or reaches it natural end). Coordination of partner selection should be complemented with transparent scoring model & due-diligence process [2], in which prospects must participate. Portfolio execution further needs participant behavior regulations, and formal appeals policy for partners [33].

Strategic - Portfolio design should aim to seek operational integration between the partner and organization (i.e. style of operations, management, etc.) fostering inter-cultural alignment on an international level. The portfolio should be harmonized with limited overlaps [35], fairly distributing operations, opportunities, risks, and rewards, to avoid creating competitions within the portfolio [2]. For such design, the organization should consider training or employing alliance architect [83]. The person responsible can further define portfolio dependent collaboration benefits (e.g. dynamic financial models, monetization & market extension

opportunities) [33]. Lastly, the organization should carefully consider partnering with same company on a different level [33], or partnering with competitor (coopetition) [2].

4.4. Alliance Portfolio Management

Operational - The management of the designed portfolio should focus on increasing Open Innovation (OI) [65] and tracking performance. Among others, establishment of a central partner directory [88] can help to facilitate the start of formal communication systems. The portfolio should be explicit in its definition of the desired partnership process, making it as standardized as possible, and ensuring that a systematic partner selection process is adopted [88]. At this stage, long-term partner development road map must be jointly developed with existing partners, to ensure consistent alignment for future business opportunities. The road map must define explicit OI targets & objectives [65, 35], and integrated into the organization-wide business strategy. Any new breakthroughs or innovative ideas should be showcased to raise OI awareness within the business network.

Tactical - Once the portfolio is mature enough and requires daily operational support, the shift from dedicated managers to department can be made [2, 72, 85]. This ensures the organization is able to provide the necessary support mechanisms, given the increasing size and complexity of the portfolio. Partners should be promoted based on their performance [83], for which dynamic incentives (e.g. larger resource allocation) and benefits can be formalized (e.g. partner award events) [33]. Partner relationship management platform with defined KPIs, can help objective and systematic measurement of the portfolio performance [33, 82]. By adopting such system, the portfolio can be managed in one single environment, which also facilitates the start of knowledge management information flow. An example can be sharing market regulations & industry initiatives with the partners through the dedicated platform [33]. It is desired that the implemented system is able to measure revenue generation, KPIs, and open innovation activities, making sure the progress within these areas is consistent and up to set expectations. Triggers should be put in place to alert any deviations from the set path and reduce the associated risk [82].

Strategic - Similarly to partner involvement, long-term relationship with research institutions (e.g. universities) can provide another dimension for innovation through the facilitation of incubators, contests, events, hackathons and similar activities [84]. These can provide valuable information about how the platform is perceived outside of the native business environment [33], and can result in diverse business relationships, increasing the organic growth and diversity of the alliance portfolio. OI progress should not be overlooked, for which monitoring mechanisms need to be ensured [88].

4.5. Software Product Development

Operational - Product development should aim to ensure product openness through the adoption of code re-usability principles and the development of software libraries [33]. Next to this standard for process development standard [14] should be adopted and enforced. Requirements management process must be done collaboratively with partners [65, 35], for example giving them a strong voice in the prioritization process [33, 72]. Similarly, any decisions made in the requirements management and product releasing (e.g. accepted or rejected requirements) should be communicated back to its owner to increase transparency and mutual cooperation [2, 33]. One of the ways is by establishing a central requirements database, thus ensuring requirements validation (i.e. correctness, completeness, ambiguity). This can be supported by external feedback mechanisms through which requirements identification and collection can be made easily [65, 35].

Tactical - Development of a multichannel product with easy integration, portability and scalability should be the highest priority [33, 72]. The first thing is a robust and stable product API [33, 84], through which the product is able to move towards an open platform, on top of which extensions can be developed. For these reasons, the partners should be fully engaged in the development process (co-development) [33, 72], and giving them responsibility for part of the release test-cycle [33]. Attracting new niche developers through attraction channels [84, 33] can aid in this, since the requirements collection, tracking, and organizing can be be directly linked to the market and product dependencies [65, 35]. This should however be done with care, making use of financial (cost and revenue) impact analysis for any new requirements and innovation ideas.

Strategic - The ultimate goal of software organization should thereafter be to move towards common product delivery channels [65, 35], making the organization more open in terms of attracting new business opportunities and making product releases easy and non-disruptive. Establishing a marketplace for extensions and modules [33] should be put high on the agenda, since this provides a beneficial monetization approach

for both the organization, as well as any partner trying to improve their financial and market position. With regards to product releasing, the organization should aim to involve internal and external stakeholders in the requirements management process as much as possible. Requirements history backlog should be made public [65], similar requirements automatically connected, and a standardized prioritization methodology adopted [35].

4.6. Software Ecosystem Development

Operational - Moving from a product towards platform is not a overnight action, but rather a continuous process, which should focus on establishing ecosystem governance [33] and managing product life-cycle. To ensure the product is aligned and facilitates the growing ecosystem, product life-cycle and roadmaps should be made explicit, product plans validated with concrete business cases [65], and the impact of new major product release carefully examined [35]. Organizations must as open as possible with regards to their future ecosystem plans. An example is sharing the acquisition strategy and product release candidates [33]. By doing so, the ecosystem participants are continuously involved in the decision making process. Lastly, the Intellectual Property (IP) rights of the product need to be clearly defined to avoid potential legal issues [14].

Tactical - Standard quality rules for making extensions need to be defined [14] through which external components can be validated before they are released to the market. Product builds should be validated both internally and externally [65, 35] to avoid excluding the smaller ecosystem players. Actively contributing to other ecosystems [84] can create significant value potential for the SECO. Entry barriers for the SECO should be kept low as much as possible [33, 84, 65], without sacrificing partner quality. An example is the development of a partner standard [33], and associating with domain specific experts that can determine realistic barriers [84].

Strategic - Next to releasing individual product, organizations should consider starting product lines [65, 35](if appropriate given the business context) and adopt re-usability principles as much as possible. To determine and monitor platform field performance, mechanisms for usage, quality and software operation knowledge measurement need to be defined [84]. These can identify the critical areas within the platform market placement. Lastly, automated compliance checking mechanisms for IP usage [84] need to be put in place to avoid any legal issues and to help partners resolve any potential IP conflicts [84]. At this stage, organizations should consider creating ties and alliances with owners of large ecosystems (e.g. SAP and Apple) [33], thus reaching new customer base with the potential of being a niche market.

4.7. Ecosystem Knowledge Management

Operational - Establishment of a complete KM strategy with the supporting infrastructure must be ensured, to foster knowledge creation and transfer (i.e. value creation). Feedback should be collected from customers and partners through different mechanisms (e.g. surveys, feedback forms) [33], and stored within a central KM database [2]. Specifically for the product side, the knowledge base should contain detailed documentation about the creation of platform extensions, first time usage instructions, and self-test procedures to get the new platform complementers started easily and quickly [33]. Further, communication strategy should be put in place addressing the possible communication paths and their usage frequency on operational and long-term basis [87, 2]. Knowledge creation and transfer should be supported with explicit collaboration focus, incentives, and the associated information flows. Careful on-boarding process should be defined through consultant, inter-cultural, and development training programs [33, 89]. Essential is the establishment of well-defined communication and support interfaces for every organizational unit, through which the collaboration culture can grow without jeopardizing the competitive advantage of trust and organizational integrity [72].

Tactical - Next to the collection of customer and partner feedback, codification of generated project knowledge and experience needs to become part of the organizational culture [85, 89, 33]. This aids in the establishment of best-practice approaches can be made within a dedicated alliance knowledge base [83]. Consultants should be segmented based on their domain expertise [33], and certification defined within different categories, areas and expertise. This can raise the levels of open innovation and can significantly increase ecosystem participation. For this reason, different certification levels should be defined (e.g. unknown, registered, preferred) [33], giving partners a sense of importance and appreciation through the assignment of different implementation project, depending on their certification status and level.

Strategic - It is not enough to simply rely on the trust when it comes to effective KM. Different levels of control should be put in place through compliance checking mechanisms (i.e. enough knowledge sharing, is every entity involved) to avoid the collaboration ties to become lurkers (i.e. using the knowledge without creating new [33, 65, 35]). Mechanisms for developer feedback [33] should complement the collected feedback from the collaborators, and the platform field performance. Value creation and transfer can also be achieved by sharing customer service tickets [33] and knowledge related to customer configurations [85]. Another way to transfer knowledge is by frequent partner academies [72], giving the consultants more independence [14] by making them fully capable of delivering the projects themselves [33].

5. Case study

This study examines a mature Dutch software vendor, that has been the market leader in the credit management IT industry for over 23 years. The recent capital investments and the merger with its biggest competitor in the European market directs an organizational shift where typical reseller partnerships are no longer sufficient for continued growth and increased revenues. The new strategic directive has been set to increase the level and maturity of the strategic alliances with external entities, both existing as well as yet unexplored opportunities. Illustrated by Director Channel Development: *"how to systematically attract new innovative partners to our ecosystem, remains our number one priority"*. Despite the fact the strategic directive could not be set any clearer, the path towards realizing this goal is still blurred; the trouble of identifying the correct steps, procedures, activities, and the needed capabilities within the organization remains.

Name	OnGuard
Country	The Netherlands
Size	>100 employees, >12000 daily users
	>850 businesses, >40 countries
Industry	Manufacturing, Professional Services,
	Construction & building materials,
	Business & Management Services,
	Logistics, Transportation, Automotive
Product / service	Credit Management, Cash Allocation,
	Order-to-cash, Consulting

Table 2: Company profile

5.1. Problem background

Numerous interviews conducted (see Table 3) revealed that at its core, OnGuard is struggling in two areas within their propriety ecosystem, being collaborative software development, and software ecosystem growth. In terms of collaborative development, besides outsourcing one third of their in-house software development to two partner companies, there exist almost no third-party development for their lead product, OnGuard Connext (total 2 extensions currently being supported by the product). The first problem is directly related to multichannel software platform, on which the the opportunities for extensions and independent development can be facilitated. In the words of its **CEO:** *"the architecture of our product is like spaghetti,[...], making the transition to a multi-tenancy platform extremely difficult due to many dependencies built over the last 23 years"*.

The second problem can best be depicted in terms of financial performance of the partner portfolio. Sales Director illustrates the financial implications of unbalanced and poorly designed partner portfolio:*"over the last 3 years, only 2 out of the 12 business partnerships yielded positive financial returns"*. This is supported in the words of OnGuard's Executive Director:*"to become best-of-breed credit management software provider, our partner portfolio must grow exponentially. Not only grow, we need to rethink our partnership approach"*. Although the recent incentive to implement extended associate model to support four clusters (referral, reseller, integrator, white-label) should increase the portfolio diversity, the interview with Partner Alliance Manager reveals this might not be enough: *"our partner selection process is mostly based on trust. There*

#	Job role	Years of experience
1	SVP Alliances & partners	15
2	Chief Executive Officer	20
3	Chief Technology Officer	10
4	Chief Operations Officer	7
5	Chief Sales Officer	15
6	Partner Alliance Manager	10
7	Partner Support Manager	10
8	Functional Product Manager	15
9	Technical Product Manager	25
10	Chief Architect	25

Table 3: List of interviews

is no step-by-step approach that we follow for every single prospect". Analysis of the four associate models further revealed the lack of balance in SECO entry criteria, and missing partnership value analysis. True importance for OnGuard in terms of operational goals therefore lies with systematic and objective partner selection process, that among others, encapsulates objective selection, analysis, and assessment processes.

5.2. Method generation

The partner selection method is shown in Figure 5. The method skeleton as derived from the selected key practices and method fragments contained in the management toolkit (in **bold italics**) (Table 1). Toolkit provides a holistic perspective about the short- and long- term importance of the key practices, and indicates a small degree of relationship amongst the practices. Next, by following the original method-association approach defined by Luinenburg et al. [11], the method association matrix (Table 3 and Table 4) is used to examine individual practices in detail with relevant literature and modeled according the suggested theories. In some cases the lack of method fragment rationale and literature support required additional a snowballing method to be applied through the consultation of related bibliographies and resources.

The method and its corresponding activities, decision points, and concepts is described in the next section. For brevity and clarity reasons the specific activity and concept definitions are committed from this paper, thus the method description is limited to relationship between method activities, concepts within the method (CAPITAL letters), and the design rationale.

5.3. Method description

The method consists of 4 main stages (awareness, selection, assessment, and negotiation) and two closing activities.

Awareness stage - The first concept that the method introduces is the idea of ALLIANCE STRATEGY, which is the process deliverable of one standard activity (Identify business needs and objectives), and two concurrent activities (consisting of five sequential activities). Firstly, the senior executive stakeholders of the organization should formalize the business objectives of the organization, resulting in the starting point for strategy definition. In order to capture the complete business environment, different analysis of internal processes, competition, and market trends have to be considered, resulting in INTERNAL, MARKET, AND COMPETITOR ANALYSIS, respectively. The association link is used to connect the 3 concepts to the ALLIANCE STRATEGY, since they directly influence the definition of organization-wide strategy through the identification of strengths and weaknesses. Similarly, during this step, VALUE ANALYSIS should be produced in a form of a well-define and standardized document, describing how partnering opportunities will be assessed objectively during the selection stage. Next to developing effective strategy, the pivotal focus should be given to critical definition and implementation of partner associate models, through which the software ecosystem owner is able to cluster and manage existing and future partnering opportunities. The organization can implement different associate models, but however each of them should have a respective owner in a form of an ALLIANCE CHAMPION. The champion is the senior executive responsible for the

management and consequent redefinition of associate model depending on market and business needs. Further, the champion is the operational team leader, who coordinates the operational activities that pertain to the partners of the specific associate model, and ensures that executive ownership is visible and is well structured. Entry criteria must be defined through PARTNER REQUIREMENTs, which are part of the associate model. How the requirements and entry barriers are be measured objectively is done in the last step of this stage, where the definition of SCORING MODEL ensures that the entire operational team is aware of the method used for assessing new partnering opportunities. The entire stage within the PSM should be seen as a continuous process rather than a one-time thing, given the ever-changing business and technology environment, and should therefore be continuously refined and adjusted.

Selection stage - Once the necessary mechanisms for partner attraction and management are defined, possible partnering opportunities should be identified and formalized in a form of a PARTNER CANDIDATE, consisting of basic information, and are integrated within the overall list of opportunities (i.e. LONG LIST). Given the previously defined VALUE ANALYSIS process, the LONG LIST of partner opportunities can be assessed for value potential, giving an objective opportunity assessment in terms of risks and investments expected. If these exceed the expectations or are not within the defined strategy borders, opportunity should be approached with great care, if not avoided completely. If however, the value potential is significant, inquiries for public and detailed information should be made. The collected information is compiled into an EVALUATION REPORT, which clearly shows where the highest value potential and initial organizational alignment can be expected, and in turn determines the priority score and SHORT LIST of the best opportunities. Then, the choice of best value potential PROSPECT PARTNER is discussed with the champion, and if agreed, the first formal meeting is organized. During the meeting, explicit value proposition and business case(s) are defined and kept in the MEETING REPORT. Next to this, the key stakeholder at the meeting captures their objective feeling about the organization and the general perception of the partnering opportunity.

Assessment stage - If the meeting with the prospect yielded valid business case and is accepted by the alliance champion, the assessment of previously defined PARTNER REQUIREMENTs through the SCORING MODEL is made to ensure objective assessment without personal bias in favor of the choice. The assessment of the opportunity should be done in a critical manner, trying to capture the five best-practice alliance dimensions. These are the commercial (What is the financial value?), technical (What resources exist?), strategic (What is the strategic advantage?), operational (How can success be ensured?), and cultural (What level of organizational alignment exists?). Although it is fairly difficult to find perfect alignment and meet set expectations in every alliance dimension, the essential thing is to determine which CSFs are the ones most necessary and are actually currently present in the way of working within the organization. One of the ways is to ensure good selection is made, is for the associate model owner to score itself on the same assessment model, and compare it with the ASSESSMENT REPORT of the PROSPECT PARTNER. This not only ensures good selection is made, but also gives the prospect the basic idea of what can be expected in terms of existing alliance, effort investments, and general alliance direction. Conversely, by giving an insight into the assessment approach adopted and the respective scores assigned, the PROSPECT PARTNER has the opportunity to suggest score adjustments, which facilitates the starting point for a win-win negotiation approach. In other words, if the prospect feels included in the entire assessment stage, process of trust development is rapidly increased. Lastly, if the assessment stage does not yield the necessary foundations and sufficient organizational alignment, the choice for a different PROSPECT PARTNER is made.

Negotiation stage - In case however both sides of the alliance are satisfied with the alignment and there is great value potential, they enter the negotiation stage of the PSM. Given the defined business case(s) and expected collaboration agreement, the extensive definition of appropriate governance mechanisms and structures is formalized within the GOVERNANCE PLAN. This concept is modeled as a closed concept due to its detailed and alliance-specific nature. The GOVERNANCE PLAN should at its core define explicit KM and communication strategy, collaborative marketing & sales activities, and other relevant operational plans within the set scope of the alliance. The scalable governance model should be built around three critical levels of key stakeholders (strategic, managerial and operational). The set plans and processes need to be detailed and include specific action plans to achieve the strategy (the how), supported with the development of suitable skills on within the relationship, thus agreeing how every entity will carry out their intentions.

Further, key performance indicators and the evaluation measurements used for the review meeting need to be defined. In line with the GOVERNANCE PLAN, the alliance itself has to be managed with balance

Figure 5: Process Deliverable Diagram - Partner selection method

of trust and control. One of the ways is to use the well defined approach of RACI matrix to assign roles and responsibilities, giving direct authority and accountability to the stakeholders involved. The addition to this step is the development of RELATIONSHIP MANAGEMENT PLAN, which is aimed to ensure alliance capabilities and skills are continuously improved and enhanced. Therefore, established mission and vision for the duration of the alliance has to formalized in terms of common goals and objectives. These targets are more focused on the side of alliance capability development and should aim to assess the current state of knowledge and expertise present from both sides. Once determined, based on the set targets, effort to progress from current state to desired goals can be estimated, giving concrete insight into the expected investments and involvement.

Often overlooked is the realistic definition of the appropriate EXIT STRATEGY for the specific alliance in question. The selection team should closely work with the prospect partner to understand their objectives and desired outcomes and evaluate them internally for alignment and compatibility. The formalization of the collaboration approach should be done in a way that resolves any potential conflict in a constructive and mutually beneficial manner, thus issue resolution and escalation procedures should be defined. It is imperative that participating entities of the alliance understand the lifespan of the agreement and understand that eventually the collaboration must come to an end. For this reason, potential disengagement with relevant triggers must be defined beforehand, to avoid significant disruptions to operational activities.

The three formal documents (i.e. GOVERNANCE PLAN, RMP, EXIT STRATEGY) are part of (aggregation link) the ECOSYSTEM ALLIANCE MEMORANDUM, which is formal document influenced by the associate model structure and can be seen as a type of legal contract. If the alliance memorandum is complete and both sides agree with the defined scope of the alliance, the signed contract results in a STRATEGIC PARTNERSHIP that adheres directly to the set boundaries of the agreement.

Another way to look at the ECOSYSTEM ALLIANCE MEMORANDUM is that of an associate model template. Each of the associate models can have respective memorandum templates, which ensures that the required planning, alignment, and agreements are done systematically over time, thus reducing any critical plan deviations, and provide the necessary mechanisms by which the STRATEGIC PARTNERSHIP can be managed as part of an alliance portfolio. Lastly, the key part of co-innovation and value creation is learning from experience. For this reason it is mission-critical that the entire selection process is systematically documented over time, and transferred into a dedicated alliance knowledge base for future reference in a form of PROCESS DESCRIPTION. Additional attention should be noted in terms of positive or negative experiences, or any other information of importance, to better prepare or avoid them completely next time the selection process is conducted.

5.4. Validation

With regards to this case study, three types validity threats exist, being; external and construct validity, and reliability threat [90]. In terms of addressing the needs of generalisability of the obtained results outside of the single case **external validity** this research builds upon the existing theories that have been identified in the outlined research domains. Despite such attempt, the actual degree of generalisability remains unknown. We argue that further case studies are required. To minimize the threat of **construct validity**, three different types of sources are used, namely scientific literature, industry best practices, and case study data. This way the derived concepts and results are supported in the established chain of evidence. Further, continuous involvement of key stakeholders of the research project is made, to continuously review the report and case study data. To address and reduce these threats the usage of explanation-building tactics is made, with the combination of critical evaluation of competing explanations of data results. Lastly, to increase the **reliability** of this study, the case study protocol and case study database are established which enables reuse, repeatability, and adoption in other studies.

In line with the method quality evaluation [12, 10] the usage of validation matrix ensures that the validation captures the changes needed in the derived method. By using the validation matrix, the interviewed experts have a great deal of flexibility in determining the overall state of the constructed toolkit and derived method. During each of the interviews, a corresponding matrix is filled out by the researcher, based on the received feedback from the expert, and later summarized. For brevity reasons, the motivation and rationale aspect is omitted from the validation tables. The SEAM toolkit validation results are presented first (Table 5), followed by method quality validation results (Table 5 and Table 6).

Change type	Remove	Change	Insert	Total
Complete	50	5	15	70
Partial	31	30	7	68
Total	81	35	22	**138**

Table 4: Software Ecosystem Alliance Management toolkit validation result

Software Ecosystem Alliance Toolkit - the validation of the toolkit is concerned with the four aspects of key practices: (1) position on EA area dimension, (2) position on management dimension, (3) scope, and (4) naming. The toolkit is evaluated in five iterations throughout its design cycle, resulting in a total of 138 significant changes. The majority of changes were identified by the method engineer who communicated these to the experts for validation.

In the first two iterations, the toolkit was significantly reduced in size (50 complete practices and 31 partial practices removed). In the third and fourth iteration, most changes were of type partial change (30). Such changes were concerned with the change in scope or name of the key practice. In the last iteration, 15 complete and seven partial practices were added to the toolkit, as a result of achieving same level of abstraction (e.g. define one key process as multiple practices). Overall, the experts were satisfied with the toolkit, its defined scope, and the nature of application. On the contrary however, some experts questioned the usability of the toolkit in a real business scenario. The main concern was the missing practice dependency, method of incremental progression, and increased levels of overlap amongst the practices.

Change type	Remove	Change	Insert	Total
Complete	0	2	2	4
Partial	4	8	3	15
Total	4	10	5	**19**

Table 5: Partner Selection Method validation result (Part 1)

Partner Selection Method - during each of the expert sessions a method snapshot in a form of a PDD [31] is shown to the expert. The method snapshot is evaluated in terms of method **completeness** (e.g. are the necessary steps and activities present?), **consistency** (e.g. are the steps and activities named correctly?), **reliability** (e.g. is the method logical and semantically correct?), **applicability** (e.g. is the method with the corresponding deliverables usable?), and **efficiency** (e.g. does the method ensure increase in the business objective?). This is performed in two phases. In the first phase, the expert specifies the type of change needed (i.e. activity to be removed, changed, or added) and the desired change scope, either affecting complete activity, or only a part of it (sub-activity). In the second phase, expert specifies if the change applies to a permanent activity, or only under specific conditions (situational activity).

Method change rationale (motivation) is captured throughout the evaluation process by engaging expert to briefly explain the choices made and provide reasoning about the design decisions [12].

Change type	Remove	Change	Insert	Total
Permanent	3	9	5	17
Situational	1	1	0	2
Total	4	10	5	**19**

Table 6: Partner Selection Method validation result (Part 2)

Overall, the method validation revealed positive results about the partner selection method. There was no complete activity removed, only four sub-activities. In terms of method consistency, the majority of naming changes was linked to sub-activities, and two name changes for main process stages. Method was confirmed as reliable by the experts, who agreed on its appropriate semantic definition. Experts at the case company further agreed that the systematic definition of the complete process could over time be implemented in their organization. The main reason being the simplicity and consistency during selection and assessment stages

of the method. Opposite however, the method adoption was identified as a critical aspect. The experts were skeptical about how would the methodological approach fit in day-to-day operations. The method requires deep understanding and knowledge training in areas of alliance terminology, to be adopted and usage enforced quickly. Lastly, the method efficiency could not be determined, as the method was not yet implemented.

6. Discussion

Strategic alliances are the cornerstone for successful international business, especially in the IT sector. The increased need for collaborative incentives and structured management within joint software development operations remains high. SECOs provide a perfect decomposition of how different actors within the ecosystem can share resources, technology, and knowledge, to increase the performance of both individual organizations, as well as the entire ecosystem. Despite the increasing SECO domain maturity, the lack of applicable governance approaches is negatively affecting structured management of the ecosystem. The proposed management approach through the SEAM toolkit can facilitate effective adoption of SECO incentives, that can increase the long-term success of external partnering ties the organizations tries to create and maintain.

The first research question was answered in section 3, through a focused literature review, which outlined the ecosystem-alliance management process map, consisting of seven process areas. Through the application of tailored method-association approach, the areas affecting strategic alliance performance were further defined by means of key practices. Strong literature evidence suggests that by adopting a healthy balance of SECO and alliance incentives, long-term success can be increased. This research attempts this, by defining a usable and practical means of directing the management path for alliances in SECOs.Obtained results suggest that such management approaches could potentially be useful in business context, given their holistic and pragmatic nature.

One of the attempts of this research is to build on the suggestions by Jansen et al. [21], thus providing one of the rare inter-disciplinary perspectives of SECO and their adoption. Our research findings suggests that cross-domain SECO applicability and definition is questionable. As stated in studies by Manikas [25, 26] and Christoffersen [27] the SEAM toolkit definition was significantly affected by the lack of studies that investigate SECOs from different domain perspective. In most cases, the literature findings were bound by the constraints of one research domain, almost never spanning beyond its boundaries. Further, our findings are in line with claims of Barbosa [91]. Similarly to their findings, we argue there is an enormous lack of research evidence of successful SECO management model application and definition. Despite this, we strongly feel that our work is a solid attempt that other studies could build upon, to define similar management approaches for other areas within SECO.

6.1. Limitations

Significant limitation of this study is the adaptation of the method-association approach. As this is the first attempt to design management toolkit through this specific approach, the validity of the meta-model could not be adequately determined.

Another limitation is consistent and appropriate formalization of key practices and method fragments, mainly due to significant differences encountered within the three overlapping research domains. In some cases, the practices are found on the process side, whereas others on deliverable side, making abstraction and granularity levels inconsistent. Further, due to contradictory findings found in different studies, positioning practices on the management dimension became challenging, creating practice overlap. In such cases the method engineer and with the expert made a decision with regards to most appropriate practice placement within the toolkit, changing others if necessary.

Lastly, significant limitation of this research is the number of case studies. Due to research time limitations, only one case study was conducted at the software vendor in the Netherlands, thus highly increasing the external validity threat. We conclude that the efficiency and applicability of the toolkit in the industry remains unanswered.

6.2. Future work

We call for additional research to be conducted in terms of three directions. The design of the SEAM toolkit must be validated by other studies in a similar setting. The researchers should aim to validate the proposed approach, by adopting the toolkit design within other management perspectives of SECOs.

This includes further definition of the practices not only in the toolkit, but in a form of a PDD. The aim should be to define explicitly how the 122 practices across seven EA areas are related in terms of activities, deliverables, and higher level processes. The aim is to support the definition of meta-process modeling of the defined management directives with proper tool support (e.g. Computer Aided Method Engineering (CAME) and Computer Aided Software Engineering (CASE) tools.

Second, the need for generalisability remains high. As such, more case studies are needed to validate two aspects of the SEAM toolkit: (1) validate the toolkit actually increases the success of managing alliances and the ecosystem, and (2) validation of the method generation.

In this research a single method was derived from the toolkit, which is seen as inadequate, for the aspect of generalisability of the defined method generation approach. One of the aims of the toolkit is the ability to derive situational methods, within the EA areas contained in the toolkit. For this reason, the process of method generation from collected practices and toolkit directly, must be extended beyond the scope of this research.

7. Conclusions

This paper presents a novel approach for the management of strategic alliances in SECOs. It is to our knowledge the first attempt to define a complete management roadmap, to be used for enhancing the performance of strategic alliances within the SECO. The design of the SEAM toolkit is based on the situational method engineering principles, where the method association approach was extended with the concepts typically found in focus area maturity models. In contrast to focus area maturity models, where the maturity stages have dependencies and incremental progression, the SEAM toolkit provides a holistic management direction within three inter-dependent domains; strategic alliances, software ecosystems, and knowledge management. At its core, the SEAM toolkit addresses the increasing need to grow the entire ecosystem organically in a structured manner. The realization of this goal is achieved by incorporating the established practices across three domains, which other established authors have determined to have positive long-term impact on the ecosystem. Conceptually, the toolkit develops ecosystem capabilities from different perspectives, where each of the seven focus areas contains a list of respective key practices. The practices are positioned pragmatically in the toolkit by the method engineer and by expert validation. The position of individual practice within the respective focus area is subject to their relative importance in terms of their timely adoption. SECO owners can use the toolkit to envision which best practices should be implemented and adopted on the operational, tactical, and strategic direction. Each of the directions is subject to practice validity, where the operational practices are valid for the first year, tactical practices for next 2-3 years and strategic practices for at least 5 years.

Although a complete management approach is presented, we recognize the increased validity threat of the defined model. The lack of case study validation and cross-domain evidence to support our findings suggest that the proposed model and its adoption must be incorporated into many other studies, that can ultimately reveal if such management approach is well-founded or not. We are encouraged by the positive results so far, and we are open to collaborate in future validation endeavors or facilitate independent applications of the toolkit.

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Appendices

A. Validation protocol

VALIDATION PROTOCOL

Researcher: Domen Smuc

Company: OnGuard B.V.

1. SCOPE

Thank you all for accepting my invitation for our meeting here today. The purpose of which is in the validation of the method that you are about to see modeled as a process deliverable diagram.

For the purpose of this session and more importantly to avoid too much detail, the method is segmented into three parts, all corresponding to the three main parts of the method. The validation of the method is done in 4 parts:

- Evaluate method completeness (e.g. are all the necessary steps and activities present?)
- Evaluate method consistency (e.g. are all the steps and activities named correctly?)
- Evaluate method reliability (e.g. is the method logical and semantically correct?)
- Evaluate method applicability (e.g. is the method with the corresponding deliverables usable?)

I would like to encourage you to provide rationale and motivation for each of the responses and to share ideas.

2. METHOD TOOLKIT

1. Can you interpret the toolkit?
2. Identify practices that are wrongly positioned.
3. Identify practices that are missing.
4. Identify practices that are incomplete.
5. Identify practices that are not applicable.

3. PARTNER SELECTION METHOD

1. Can you interpret the diagram?
    1.1.1. How do you understand the diagram shown?
    1.1.2. How do you interpret activity X with the corresponding deliverable Y?
2. Is the naming of activities, steps, and deliverables correct?
3. Are the diagram flows logical?
4. What do you miss in this diagram?
5. What in your opinion is too much, or not needed?
6. What would you change?
7. Do you think this method snapshot is usable and why?
8. Would you use this method and why?

Figure A.6: Validation protocol

B. Research questions

- RQ1. What is the current state and process of forming strategic alliances in a SECO?
  SQ1 - What are current practices of partner management and coordination in the software industry?
  SQ2 - How are partner management and coordination processes defined in SECO and SA?

- RQ2. How can we increase the success of strategic alliances in SECO?
  SQ1 - What is the role of strategic alliances in SECO?
  SQ2 - What factors influence the success of strategic alliances?

- RQ3. How can Method Engineering create detailed management path for the long-term alliance success in SECO?
  SQ1 - What are the existing SME approaches for method generation and process improvement?
  SQ2 - How can a comprehensive improvement method toolkit be designed within SECO?

C. Activity table

Activity	Sub-activity	Description & related concepts
Awareness	Identify business needs and objectives	Firstly, the senior executive stakeholders of the organisation should define the business objectives of the organisation. The pivotal importance thereafter should be given to the definition of an effective ALLIANCE STRATEGY. Clear vision and market trends should be taken into account when assessing the business objectives of the market, in order for the actual integration of practical approaches with the defined business needs and objectives is aligned with the organisational changes needed. The ALLIANCE STRATEGY in a broad concept is influenced by the INTERNAL, MARKET, and COMPETITOR ANALYSIS.
	Analyse internal processes	Organisation should perform internal analysis of the organisation in terms of organisation, people, and processes. Both influence the ALLIANCE STRATEGY with a more robust overview of the environment in which the collaboration will exist.
	Analyse competition	Competition plays a significant role in the entire alliance lifecycle, and thus careful examination of the competitors present in the specified markets with a COMPETITOR ANALYSIS. This should be performed to identify the ideal market placement and product portfolio that will help facilitate and realise the ALLIANCE STRATEGY.
	Identify industry trends / Identify technology trends	Due to the rapid and disruptive changes in the industry and technology in general, the performance of an organizations alliance portfolio is highly dependent on how these factors are systematically considered during the definition of an ALLIANCE STRATEGY. The defined strategy should always be complemented with the MARKET ANALYSIS within the scope of the organizations operational environment (e.g. SWOT analysis).
	Define value analysis process	Given the low success rate of strategic partnerships in general, cost-effective partnership selection is critical. One of the ways in assessing a given partnering opportunity from the start, is with a well-defined and robust VALUE ANALYSIS process, which can be systematically applied during the initial opportunity screening process. If a collaboration opportunity does not have enough value or is not cost-effective, the organization should avoid pursuing the opportunity, despite the potential high alignment across other assessment areas.

	Develop associate model	Collaborative approach must always show greater tangible benefits as opposed to the traditional business models, and thus the clustering of the different partnerships should be done with the ASSOCIATE MODEL approach. In this way, the alliance portfolio is structured, offers clear segmentation between different partnership types, and provides a well-define management structure for the alliance portfolio.
	Appoint alliance champion	Executive ownership is seen as one of the prerequisite for alliance success, and thus it is paramount that the internal roles are clearly defined and are in line with the overall policies and procedures. A typical way of achieving structured and well-coordinated leadership within the alliance portfolio is the appointment of the senior executive (i.e. alliance champion), who takes the responsibility of ASSOCIATE MODEL management. The champion ensures that the alignment of collaborative approaches meets the defined business objectives, and that there is sufficient operational governance established for any variations and risk management. The champion also selects the team that will take the responsibility of the partner selection process and operational support.
	Define entry criteria	The entry barriers should be kept as low as possible to allow niche players to enter the SECO without too many investments. Despite this, a well-defined and systematic assessment of potential partners is needed, through which the organization is able to be objective in its screening process, and apply the same assessment process throughout the partnering process. There is no ideal criteria, however basic requirements (e.g. company size, type, industry,) for the initial evaluation should be defined. These requirements can typically allow higher degrees of freedom during the evaluation and are the first entry barrier for niche players. Further, the benchmarking process should try to identify the minimum PARTNER REQUIREMENTs across the 5 alliance dimensions, being the operational, commercial, strategic, technical, and cultural (Nevin, 2014).
	Define scoring model	In line with the PARTNER REQUIREMENT, during the awareness stage, the organization should clearly define the SCORING MODEL that will be applied as part of the ASSOCIATE MODEL. The ASSOCIATE MODEL can have different SCORING MODELs depending on the type of partnership.
Selection	Identify partner opportunities	The dedicated alliance team investigates the available contacts network and performs analysis to identify the opportunities that exist in the market and other business networks. This step should be done in collaboration with the alliance champion to ensure there is clear organisational alignment from the start. The result of this activity are different PARTNER CANDIDATEs, which are compiled into a structured LONG LIST.
	Perform value analysis	VALUE ANALYSIS for the partnering opportunity in question should be done before obtaining the initial company information. The main purpose here is to measure the potential value of the opportunity against the risks and investments to ensure the added strategic benefit exists from the beginning of the investigation. If no sufficient value exist, the selection team should not continue with this opportunity, but select the next on the LONG-LIST.
	Collect public information	Next to the VALUE ANALYSIS, the selection team should aim to obtain the candidate PUBLIC INFORMATION for the initial screening. Publically available information is typically sufficient to assess the first two criteria dimensions, namely commercial and strategic fit. The combination of initial criteria scores with the VALUE ANALYSIS results determines if a request for detailed information should be made with the partner representative.

	Request detailed information	If sufficient alignment and potential has been determined, the alliance champion or the selection team should make further informal (or formal where needed) requests directly to the PARTNER CANDIDATE representative. This step has two objectives; initiate the first personal contact with the CANDIDATE PARTNERs' representative, and elicit the information required for the assessment of the remaining 3 criteria dimensions (operational, technical, and cultural). This is can ban be done quickly (e.g. over the phone) by asking questions that are of specific relevance to the criteria.	
	Objective assessment	Once all the needed assessment information and analysis has been performed, the criteria model and results are integrated into one central BENCHMARKING REPORT, which in turn determines the SHORT LIST of best PARTNER CANDIDATES based on individual scoring and importance assigned.	
	Select prospect partner	After the SHORT LIST has been defined, the selection team should prioritise the list based on type and value of the partnership, and select the candidate partner (i.e. PROSPECT PARTNER) in the given situation and environment.	
	Organize meeting	Once the selection of the most suitable partner is made, a formal meeting should be arranged with the candidate. The purpose of the meeting is to understand the vision and what drives the collaboration, during which concrete business objectives that exist in the given context should be identified. This should be supported with clear value proposition and draft business case for the partnership. Lastly, the alliance champion should closely observe the culture of the organization; provide an objective assessment based on personal feeling during the meeting, and during the visit to the organization. The newly acquired information should be captured in the structured MEETING REPORT, which in turn provides another dimension for candidate partner, and determines if the choice for collaboration is correct across all criteria.	
Assessment	Assess commercial fit Assess technical fit Assess operational fit Assess strategic fit Assess cultural fit	Despite the different views on how to do an objective partner assessment, the extensive research by the Alliance Best Practice Ltd. (Nevin, 2014) has determined that there are five different categories of CSFs that are consistently present in strategic alliances, being the commercial, technical, strategic, operational, and cultural CSFs. Although all CSFs are never present in a single alliance (or portfolio), the organization should aim to identify a reasonable number of CSFs that are of highest important by the organization. Once selected, the organization should perform objective assessment on the selected dimensions and factors, for both the PROSPECT PARTNER as well as the organization itself. This ensures that the alignment between the two parties can be determined. Once all the dimensions have been assessed, the results are stored in the ASSESSMENT REPORT.	
Negotiation	Define governance	The first part of the GOVERNANCE document should be knowledge management and communication strategy. strategy, Communication strategy, governance, stakeholders marketing and sales, Developing a scalable governance model to balance the degree of partner accountability with the size and scope of the alliance envisaged. The governance model should be built around three critical levels of key stakeholders (strategic, managerial and operational) levels, and include the specific action plans to achieve the strategy (the how), supported with developing suitable skills on both/all sides of the relationship and agreeing how both/all will carry out their intentions. Further, there should be clear definition of key performance indicators alliance managers choose to measure the strategic relationships by, and is used as a reference point during the review meetings.	
	Define roles and responsibilities	Despite trust-focused collaboration, clear ownership and accountability for all the sides of the collaboration is essential, and should be therefore implemented within the RELATIONSHIP MANAGEMENT PLAN in a form of a RACI matrix.	

	Define relationship management plan	A complete identification of individuals involved in the collaboration and their competencies should be made, in order to estimate the needed skill development and the associated resources (i.e. effort) in realising the set targets. Clear targets for co-innovation and value creation should be determined and supported by specific approaches and action plans.
	Define exit strategy	Often overlooked is the realistic definition of the appropriate EXIT STRATEGY for the specific alliance in question. The selection team should closely work with the prospect partner to understand their objectives and desired outcomes and evaluate them internally for alignment and compatibility. The formalisation of the collaboration approach should be done in a way that resolves any potential conflict in a constructive and mutually beneficial manner, thus clear issue resolution and escalation procedures should be defined. Further, it is important that all parts of the alliance understand the lifespan of the agreement and understand that eventually the collaboration will come to an end. For this reason, a clear path from periodic evaluation and potential disengagement with relevant triggers should be defined. Different exit strategies can be defined depending on the type, scope, and nature of the alliance in question, including the strategy for potential future collaboration opportunities.
Sign contract		Signing the contract is the last formal part of negotiation, from which the entire partner management process continues with the defined operational side including on boarding, training, and working together during the defined lifespan, and thus formally results in STRATEGIC PARTNER.
Capture partner selection process		Key part of co-innovation and value creation is learning from experience, thus the entire selection process should be systematically documented over time, and transferred into a dedicated alliance knowledge base for future reference in a form of PROCESS DESCRIPTION. Additional attention should be noted in terms of positive or negative experiences, or any other information of importance, to better prepare or avoid them completely next time the selection process is done.

Table C.7: Activity table

D. Concept table

Concept	Definition
ALLIANCE STRATEGY	ALLIANCE STRATEGY can be seen as a detailed picture of all the steps you plan to take in order to achieve the stated objectives. These need to be SMART in order for the business to know what progress it has made towards achieving the objective: specific - clear and easy to understand. According to [92] alliance strategy comprises of four pillars. First, it is the design and management of alliance portfolio as whole. Second, the strategy should focus on the design of alliance specific structures, such as goals, evaluation, partner selection, and governance processes. Third, is the alliance management of individual alliances on operational side, and fours is the internal alliance capabilities, i.e. infrastructure to support the process.
INTERNAL ANALYSIS	INTERNAL ANALYSIS is a continuous process that the organization performs to identify and evaluate its internal alliance capabilities, which typically include the infrastructure, resources, competencies, and the ability to create competitive advantage in the niche markets.
MARKET ANALYSIS	MARKET ANALYSIS is an investigation into the current and potential niche market and determines the overall market attractiveness in terms of threats and opportunities, that can be directly related to the internal position of the organization (i.e. strengths and weaknesses)

COMPETITOR ANALYSIS	COMPETITOR ANALYSIS is an objective assessment in terms of the strengths and weaknesses found when performing detailed competitor analysis. Typically, this assessment is able to give a broader strategic focus and context through which better product-market alignment can be made to ensure the company is able to outperform its competitors or avoid pursuing market opportunities with low success potential.
VALUE ANALYSIS	VALUE ANALYSIS is a systematic, objective, and critical assessment of the future in terms of the cost versus benefit potential. Derived from the product value analysis, the alliance value analysis defines how the alliance opportunities will be assessed and what is the minimum benefit and maximum cost that can be expected from the alliance, providing an objective assessment to ensure the cost of alliance does not outweigh the benefits that can be expected.
ASSOCIATE MODEL	ASSOCIATE MODEL is one of the established approaches towards managing all existing (and new) partnership through typological clustering, and imposing governance to these clusters within a SECO. Different associate models can exist, depending on the nature of the organization and its environment, however on the conceptual level, the associate model consists of rules about the owner, contracts, type of model, commitments, possible roles and layers, characteristics and requirements, costs, and benefits [33, 37]
PARTNER REQUIREMENT	PARTNER REQUIREMENT is the minimum entry barrier the software vendor defines within their ASSOCIATE MODEL, and is used for the evaluation of the PARTNER CANDIDATE. The vendor must decide how many criterions (CSFs) it will include in the partner criteria model. Typically, these include factors such as commercial resilience, strategic direction, technical quality, cultural alignment, operational structure and customer attitude. These can further range from hard (financial strength, market position) to soft (culture, personal chemistry) factors [81, 2] depending on the needs of the company.
SCORING MODEL	SCORING MODEL is a document or template, clearly defining what factors and other requirements the company will be measuring, and what respective weights they carry. Further, it should aim to define the organizational compatibility goals in terms and how much alignment should exist between the companies to continue the process with the PARTNER CANDIDATE.
PARTNER CANDIDATE	PARTNER CANDIDATE is a company or organisation that meets the defined scope of an ASSOCIATE MODEL. In other words, if the company fits within the overall set boundaries of the model (i.e. characteristics and requirements), it can be considered as a candidate to include in the LONG-LIST. In here the typical information about the company size, industry, alliance capabilities and references should be collected.
LONG LIST	LONG LIST is a document that includes all basic and easy to acquire information about possible partners, and is assembled from the identified partnering opportunities (i.e. PARTNER CANDIDATEs), which should be assembled as a result of a careful identification and scouting process.
SHORT LIST	SHORT LIST includes all interesting partners after evaluating the LONG LIST by means of the EVALUATION REPORT. This result in a structured list of partnering opportunities, giving each opportunity priority and importance based on the evaluation result. The opportunity with the highest scores should thereafter be selected for closer and detailed investigation and potentially organising the first meeting.
EVALUATION REPORT	EVALUATION REPORT is as a standard or point of reference for each of the identified opportunities. This is typically an objective assessment of the prospect partner with a simple yet complete questionnaire about leadership, resources, processes, metrics, and business impact, which are within scope of the alliance in question [81, 2]. Once collected the value potential of the opportunity can be determined, which in turn defined the priority and importance of the individual opportunity.

PROSPECT PARTNER	PROSPECT PARTNER is a possible partner, which appears to be the best suitable partner after obtaining all the required information, and performing the necessary objective screening based on the set criteria. Despite the objectiveness of the model, lots of other factors could play a role which can influence the decision for most suitable partner, and thus personal chemistry, feeling, and champion alliance experience play a critical role [81, 2].
MEETING RE-PORT	MEETING REPORT should be defined during the initial orientation meeting with the prospect partner and should aim to define the joint value proposition and the initial business case. This should be supported with the personal feeling the champion and the team obtained during the meeting. This enhances the chemistry between two possible partners since describes a mutual feeling whether the prospective partner company thinks that the partnering opportunity is able to fulfil their requirements, and the requirements of the organization itself.
ASSESSMENT REPORT	Numerous approaches to assessment exist [72, 93], however one of the approaches that is most commonly used and requires least effort is the balanced scorecard approach [76, 82, 94, 2, 7], where weights are assigned depending on the CSF importance, thus reaching a fairly objective result. Strong alignment across the 5 dimensions caries the biggest alliance success potential, and can prevent biased partner selection [2]. The results of the assessment stage are reported in the ASSESSMENT REPORT, which also takes into account the previously defined MEETING REPORT, and initial EVALUATION REPORT.
GOVERNANCE	GOVERNANCE PLAN is a detailed operational document, stating the expected investments, resources, and commitment from both sides to achieve the goals of the alliance. Joint product development and ecosystem participation needs to made clear with specific targets and operational objectives, to ensure the alliance is on the correct path of delivering value to all involved. The governance should also concern other parts such as communication, knowledge management, product strategy, and other parts that are specific to the alliance.
RELATIONSHIP MANAGEMENT PLAN (RMP)	RELATIONSHIP MANAGEMENT PLAN is a document detailing the how the alliance will be run in terms of reaching common objectives, identifying the skills and effort needed, and is generally focused on the human side of the collaboration agreement. In here clear responsibility and authority should be defined on four roles; Responsible, Accountable, Consulted and Informed (RACI matrix) i.e. the role a key stakeholder will play in either one of the operational processes defined. Based on the skill gaps and the defined objectives, a training programme can ensure the partner optimally reaches the previously defined goals and targets. The report should further detail the current relationship type, the strengths and weaknesses, and the desired future state and the degree of effort required to get. In other words, the report should not only identify the type of relationship desired, but also the effort required to make that a reality.
EXIT STRATEGY	Explicit definition of the disengagement from the alliance needs to be made clear from the start in form of EXIT STRATEGY a document formally capturing any deviances, triggers, and generally addressing how the (potential) end of the alliance will happen from both sides of the relationship. It is essential that this is put in place and is agreed from both sides.
STRATEGIC PARTNERSHIP	STRATEGIC PARTNERSHIP can be described as voluntary arrangements [7]in which tangible and intangible resources are exchanged for the mutual benefit and with a specific potential for competitive advantage, whose key principle is to increase the innovation levels of the participating entities [57].
PROCESS DE-SCRIPTION	Document containing a detailed description of the partner selection process that has been undertaken. It is crucial to document this, in order to be able to reflect on the positive and negative things that have occurred in the past.

ECOSYSTEM ALLIANCE MEMORANDUM	Adapted from the business management standards, BS1000 and ISO44001, the ECOSYSTEM ALLIANCE MEMORANDUM is document that contains all previously defined plans and actions plans, and directly corresponds to the associate model that it concerns. It further contains all the measurement models and the evaluation method used rewards and penalties within the alliance, all legal aspects, exit strategy, relationship planning and overall governance structures. It can be seen as a form of contract and should be signed by key stakeholders from all sides of the alliance.

Table D.8: Concept table

E. SECO Management maturity matrix

Associate Models	0	1	2	3	4	5	6	7
Partner promotion and		Scout strategic partners	Partner relationship model	Partner training and	Certification	Partner health analysis	Involve startps	Partner exclusion
Partnership management		informal agreements	Partner contracts	Associate model			Advanced associate model	
Consulting partner support			informal consultancy partner	Formal trainings		Consultant certification	Organizing consultant events	
Connect customers and		Direct customers to partners		Create partner index	Provide ticketing system	Provide customer contact data to		Share customer
Marketing and sales		Partner and customer focus			Cocquisition	Revenue sharing	Partner focus	
Training			Simple getting started guides	Prof. training organization	Certification based on training		Partner employee management	
Sales partner support		informal sales partner support		Certify sales partners	Marketspecific sales groups	Organizing local sales events		Partner awards
Sw. Devm. Governance	0	1	2	3	4	5	6	7
App testing		informal tests	Create app test procedure	Share app test procedure	Binary ext. test proc	Allow partners to selftest		Partners submit tests with App
Application quality		Support partners		Platform sandbox	Detect quality issues	Share issues with partners		Create SOK portals
Dev relationships		informal contacts	Dev. meetups are organized	Coordinated feedback channels	Dev. interaction is supported		Partners help partners	Devs contribute to other devs
Devm process automation			Quick install for SDK or streamlined		Automated testing	IDE extensions	Automated releasing	
Devm support		informal dev partner support	Dedicated engineers	Knowledge infrastructure	Ticketing systems	Collaborative roadmapping	Collaborative dev.	Facilitate ecosystem of
Requirements sharing		informal transparency	Formal communication policy	Requirements portal	Devs role in requirements portal	Partner supports prioritization		Partners pick up requirements
Roadmapping			Open roadmap			Partner extensions taken into	Partner extensions part of road	
Dev monitoring		informal monitoring	Monitor feedback channels for dev		Document dev wants and needs	Adjust docs according to demands	Study dev behavior through SOK	Use automatic data collection
Open Markets	0	1	2	3	4	5	6	7
AppStores, component markets		internal extensions list		List of extensions		AppStore	Microservice architecture	Dynamic app composition
Application format and delivery			Integrateable components, manual		Onelick install of integrations	Onemand applications	Extendable applications	
App approval process				informal	Establish app approval team	Process support and automation	Selfoderation by endsers	External partners approve
App curation				Opportunistic	Formal ruleset		Appeals policy	Community curation support
App marketing						Marketing of extensions in	Marketing of extensions outside of	
Community Engagement				Create dev forum		Organize devons and hackathons	Showcase devs and solutions	Showcase tools by devs
Business model innovation			Reseller model		AppStore model	Inpp purchases		Subscription
Intellectual Property	0	1	2	3	4	5	6	7
Licensing		Local products licensed					Sharing licenses with partners	Automated checking of license
Digital asset management		Reuse policy for internal products	Reuse policy for external products	Reuse policy for internal	Reuse policy for external products with partners			Contributions to other
Patent management					Third party patents licensed	Patents created for the platform	IP sharing with partners	Patent violations identified
Open Platforms	0	1	2	3	4	5	6	7
Platform hardening			First weaknesses identified	Guards built in	Structural hardening process	Architecture becomes first class		
Platform extensibility		SDK or API	Multilayered ext. framework		IDE Support			Fourth party extensions
Software operation knowledge			Platform SOK gathered		App SOK gathered	Sharing bugs and crashes	Sharing usage	Sharing customer
Platform doc.		Doc. with getting started	Doc. with examples	Doc. generated from code	Interactive documentation	Feedback gathered	Prioritization based on knowledge	
Security			Security scans	Security policies		Security policies shared with	Security certification of partner	Security alerts shared in
Platform evolution					Evolution policy established			Directed feedback to partners
Ecosystem Health	0	1	2	3	4	5	6	7
Competing ecosystem analysis		informal competition analysis		Reference competitors		Policy for contributing to other	Domain engineering and niche	Partners guided in
Market and customer analysis		Market analysis for platform		Market data shared		Customer surveys	Automated data collection	Customer data shared
Partner health assessment			Ask partners for performance data	Strategic partner analysis			Partner surveys	
Open Innovation	0	1	2	3	4	5	6	7
Standards participation			Standard adoption		Participation in standard bodies			Creation of new standards
Partnering with academia				Academic contacts		Collaboration in research projects		Shared R&D center
Dev inspiration			Stimulate incompany innovation	Promote partner solutions	Show partner innovations to partners		Reward new innovations	
Open technology road maps			informal sharing		Formal presentation			Collaborative road maps

Figure E.7: SECO Management maturity assessment