Supporting Experiential Learning through Exploring Central Topics in ICT Project Team Leadership - The *rhea.framework* Knowledge Base

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ABSTRACT

This article describes central topics of team leadership in ICT projects within a socio-technical system supporting experiential learning in team leadership: the *rhea.framework*. These were iteratively elaborated in a hermeneutic, machine-learning supported process based on a literature survey and the collection of interrelated experience descriptions – including organizational patterns - concerning team leadership. The four central topics – or core flows – distinguished within the *rhea.framework* knowledge base are abstractions of clusters of connected experience descriptions. They are anchors in personal reflection and experiential team learning processes.

1 INTRODUCTION

The *rhea.framework* (Haselberger 2019) offers conceptual guidelines for personal and interpersonal reflection of daily practice in Information and Communication Technology (ICT) project team leadership. At its base is a reflection process model consisting of two modules: personal written reflection (*flow elaboration*) and case-based peer learning (*flow sessions*). The first module includes a writing template inspired by the structure of organizational patterns (Coplien & Harrison 2005) and Christopher Alexander's architectural patterns (Alexander 1977), e.g. in suggesting an outline of the interpersonal context of a significant moment and potential consequences. A reflection guideline may support filling out template areas. The second module portrays a moderated case-based peer learning process (Haselberger & Motschnig 2018).

Written reflections (called *flows*[1] in the framework) can be compared to a collection of peer-reviewed and published case studies and organizational patterns (summarized as *reference flows* in the framework) within a team leadership knowledge base. These reference flows are interlinked with each other semantically through keyword relationships generated through machine-learning procedures. They were further categorized according to a team leadership taxonomy, a project risk

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[1] See Appendix A for the discussion: *Is a Flow a Pattern?*

taxonomy (Haselberger 2016) and to four typical ICT project life-cycle phases - inception, elaboration, construction and transition - by crowd sourcing.

Finally, they were clustered and attributed to one of four central team leadership topics (called *core flows* in the framework). Core flows are abstracted central topics of team leadership. Main concepts of the *rhea.framework* are presented in figure 1.

The framework and the contents of its knowledge base are primarily targeted towards leaders of ICT project teams.

In the next section of this paper, the process to arrive at core flows is presented. Subsequently, these core topics in team leadership are described in detail. Finally, a web-based support tool to navigate the *rhea.framework* knowledge base is presented.
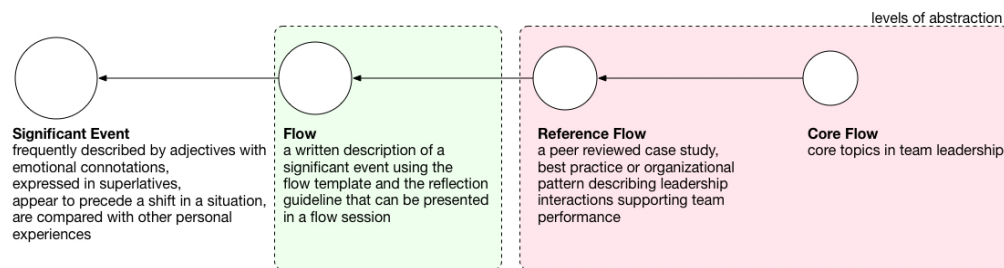

levels of abstraction

Significant Event
frequently described by adjectives with emotional connotations, expressed in superlatives, appear to precede a shift in a situation, are compared with other personal experiences

Flow
a written description of a significant event using the flow template and the reflection guideline that can be presented in a flow session

Reference Flow
a peer reviewed case study, best practice or organizational pattern describing leadership interactions supporting team performance

Core Flow
core topics in team leadership

Figure 1: *rhea.framework* Concepts, from: (Haselberger 2019, p. 227)

2 MINING PROCESS

Machine learning algorithms such as topic modeling and concept mapping appear supportive to conceptualize domain knowledge. This article presents four central topics, or core flows, of team leadership that emerged in a hermeneutic *"blended reading"* design process of the ICT team leadership domain. "Blended reading" is the combination of automatic text-mining procedures (*"distant reading"*) with qualitative data analysis ("*close reading*") (Snodgrass & Coyne 1997), (Stulpe & Lempke 2016), (Wiedemann 2013). Text mining is hereby used to cluster, structure and semantically analyse text data, while the extraction of latent meaning is out of the scope of automatic text analysis. Single case close reading is blended with algorithmic analysis to complement and possibly correct each other. Finding underlying topics was a recursive process, similar to the KJ method (Iba & Isaku 2012), involving automated text-mining.

First, a concept map was formed based on a selective literature review (Haslam et al. 2011), (Kriz 2006), (Rogers 1983), (Senge 2006), (Surowiecki 2005), (Yalom 2007). Next, keywords in *reference flow* titles were automatically extracted. Topics were inferred from the synthesis of keywords from the selective literature review (that were chosen) with keywords from reference flows. Preliminary topics were:

- Meeting Cultivation

- Iterative Development

- Ritual

- Trust

- Pair Programming

- Apprenticeship

- Vision

- Water cooler and Team Space

- Team Building

- Task Delegation and Assignment

- Coaching

- Role Modeling

- Interfacing (Firewall)

- Team Learning and Retrospective

- Communication Channels

- Group Validation

Thereafter, an ontology of team leadership practice was formed by connecting 78 experience descriptions, primarily organizational patterns, that were compiled in a systematic literature review (Haselberger 2016). Experience descriptions were linked to each other through semantic keyword

relationships (Rose et al. 2010), (Iacob & Fogli 2011). Semantic connections were inferred from ConceptNet (Speer et al. 2017).

A community detection algorithm (Blondel et al. 2008), (Lambiotte et al. 2009) was used to discern connected groups in the resulting dense weighted semantic graph. After the first community-detection, four groups of related reference flows emerged. Most frequent keywords in each group were noted. Further, most central reference flows were sought for each group. The community detection was repeated three times. Groups were labelled based on attributions in the first round. Reference flows were then ascribed to the group where they most frequently belonged to. The grouping was contrasted and enriched through findings in a k-medoids clustering (Weiss et al. 2015) based on semantic document similarity. Lastly, groupings were compared to the initial concept map.

After groupings were formed and labelled, abstract descriptions were formulated from them. These *core flow* descriptions were compiled based on findings in literature, reference flow contents and extended by case vignettes from interviews on significant events with project team leaders in medium and large ICT enterprises.

In this elaboration process, text mining procedures offered an additional perspective on possible semantic relationships between texts. Clustering and community detection, though not providing objectively distinguished groupings, appeared supportive in arriving at and reasoning on the meaning of document groupings and labelling these within the knowledge base. Core flow descriptions were finally intersubjectively validated in a peer debriefing and two expert audits (Haselberger 2019). The quality of core flow groupings may best be determined by team leaders using the knowledge base as a learning resource.

3 CORE FLOWS

Central topics in team leadership, or core flows (table 1)

- constitute a dynamic core of team leadership in complex work environments, such as ICT projects, supporting team performance,

- are highly related and interlinked to each other,

- can be used as anchors for reflecting day-to-day practice,

- are linkable to other team leadership experience descriptions, and thus may be further differentiated, completed or re-organized.

Core Flow	Key Question	Focus
Prototype Team Identity	Who are "we" and what is "our purpose"?	Team Identity
Organize for Complexity	What capabilities help us achieve our goals in our current environment?	Specialization, Diversity and Decentralization
Facilitate Team Cohesion	How are we going about this with each other?	Collaboration and Team Learning
Arrange for Task Completion	What technical tools and engineering strategies help us achieve our goals?	Domain-specific Task Framing

Table 1: Core Flows, from: (Haselberger 2019)

The structure of the core flows adheres to a *flow template*, which is heavily inspired by the text-based pattern structure suggested by Alexander (1977) or Coplien and Harrison (2005). This template (or *domain entity model*) holds the following facets:

A *title*, a *description* referring to the *intent* (summarizing the essence of a flow), the *context* (circumstances in which an interpersonal situation emerges in a team including e.g. the perception of the team atmosphere in that situation – including perceived tensions -, the team history, but also team size, company core values, organizational process structures, and so on), an (intended) *treatment* (or interpersonal intervention) and (imagined) *consequences* risen through that treatment. Keywords, pictures, and references to related resources can be added.

In the following sections, the *rhea.framework* core flows are presented[2].

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[2] Most parts of the core flow descriptions are based on and/or literally cited from: (Haselberger 2019)

3.1 PROTOTYPE TEAM IDENTITY (or: Participate in the Team)

Keywords: Vision, Norms, Responsibilities, Trust
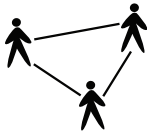
Intent:

This core flow describes how leadership shapes team atmosphere.

Context:

In work teams, people of different backgrounds, with various occupations and expertise, with distinct values and aspirations are joining together to support organizations' longevity in generating value. A team needs to form that is sufficiently **differentiated** from other teams or work streams of an organization it is situated in. Yet effective **contact with its environment**, including stakeholders from within and outside the organization, is pivotal. This includes that team members need to find a "proper" or satisfying **place within the team**, and **get support in achieving their personal aspirations** in the context of their work setting.

The word team is frequently defined as a work group striving towards goals. In fact, it is necessary to **share a vision** of the services or products - a desired future - that team members work on together, and also, of how they want to or can work together. *"Vision is only useful if it allows us to see* and then create *a better future (Haslam et al. 2011, p. 72)."* Successful decision-making demands not just a view of the world as it is, but of the world as it will or could be (Surowiecki 2005, p. 11).

Treatment:

Leadership can be seen as a group process in which persons that **prototype** the team are influential to team and work processes. *"To be a leader, one must be seen to speak not of 'me' (nor of 'them'), but for the very essence of 'us' (Haslam et al. 2011, p. 108)".* People with a leadership function (even if not formally given) do not merely engage in role modeling: Effective leaders transform by *embodying the group* they influence. Because they embody their group *par excellence*, they are influential in it.

They turn to the group and its social context rather than relying on decontextualized knowledge and principles. This means: They truly **participate** in their team, get to know their team members and their organizational surrounding, get to know the needs and wishes, objectives and qualities of the people they work with.

They *authentically* **represent** their team's vision, values and interests (Haslam et al. 2011, p. 209). Independent of behavior or process, leaders' *actions and vision may promote group interests* as suggested by the group's norms and values (Haslam et al. 2011, p. 132/133). The vision a leader proposes in a team is effective, if it aligns with the aspirations of team members who are working in that specific organizational setting. Goals and team values are proposed by team leaders as expressions of shared values, beliefs and priorities (Haslam et al. 2011, p. 163).

Social identity determines how participants collaborate and on what they collaborate on (Haslam et al. 2011, p. 143). Team norms and communication channels appropriate to the organizational environment are set up and payed close attention to. Concurrently, boundaries are established to differentiate team membership and allow for effective work processes. Team leaders **realize** team norms and values. As such, they are able to shape the team's future.

Consequences:

Team cohesion and cooperation are emergent results of **social identity**[3].

Trust and reciprocal respect are associated with social identity. The more meaningful a team is to a person, the more personal attraction to working with others within the team is expressed (Haslam et al. 2011, p. 58).

Being perceived as trustworthy, fair and charismatic is a consequence of in-group prototypicality.

Leaders perceived as prototypical of the team can mobilize team members in new directions in line with shared goals (Haslam et al. 2011, p. 107).

Case Vignettes:

- In an interview on significant events in a successful project, a project manager explains that he believes that it was very important for team performance to hold up a - as he dubbed it - "Captain Kirk" attitude. This attitude means "whatever may come along our way, we will get through it".

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[3] Social identity refers to a persons' knowledge of belonging to a specific group together with an emotional and value significance related to this group membership (Tajfel 1972) in: (Haslam et al. 2011, p. 250). It is researched in the social identity approach in social psychology, subsuming social identity theory, self-categorization theory and other theories on motivation and social influence with a focus on the relationship between collective self-conception and (inter)group processes (Hogg & Vaughan 2005, p. 127).

- Another interviewee says that he created a logo and t-shirts with the logo on it for his team members.

- One project manager highlights that fun was esteemed in her team. In one report to higher management they included an "easter egg" on one slide - a joke in very small font, barely readable, that only people from the team could understand, because it was written in a particular language which team members developed while working together.

References to Leadership Models:

This core flow is related to leadership practices "Model the way" and "Inspire a shared vision" as described by Kouzes & Posner (2012). It is associated with the following enabling team conditions described by Hackman (2002): "A Real Team", "Compelling Direction".

Experience Description Catalogue: https://rheafmwk.io/pti, (Haselberger 2019, p. 256)

3.2 ORGANIZE FOR COMPLEXITY (or: Take Action)

Keywords: Change, User, Distractions, Diversity, Requirements
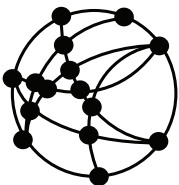
Intent:

The main intent of this core flow is to point towards ways to handle - or rather welcome and deploy - complexity in business or work requirements, (technological) resources, stakeholder involvement and interpersonal team processes.

Context:

Explicit or tacit organizational values and norms, organizational **culture**, that influence the team as well as values developed within the team add up to team process complexity. In the ICT

industry, **fast-paced technology advancement** is regular. The **constraints of business cases** affect team leadership complexity.

Work teams are regularly urged to **reorganize and rebalance** - or actualize - e. g. work processes, interpersonal work settings (such as distributed collaboration), tool use, communication channels with clients and stakeholders, interfaces with other parts of the organization, or team norms and personal values to encounter yet unfamiliar work circumstances. Therefor, team structuring provides stability, but needs to be kept sufficiently flexible.

Treatment:

Professional development of individuals within the team is appreciated and supported. Individuals are **encouraged to take responsibility** for their work environment. Team members are **supported in finding creative, efficient ways to get tasks done** (Marquet 2012).

Effective teamwork processes may be refined (exploitation). Team member location (e.g. co-location or distributed) and team rituals, such as establishing a "how" in communication (e.g. reporting by starting with the personal intent), are attended to.

Promoting diversity is highly important to support team decision-making. *"Collective decisions are most likely to be good ones when they`re made by people with diverse opinions reaching independent conclusions, relying primarily on their private information (Surowiecki 2005, p. 57)."*

Self-organization of (parts of) a team goes along **decentralization** in decision-making. *"If small groups are included in the decision-making process, then they should be allowed to make decisions (Surowiecki 2005, p. 190)."*

Stakeholders are involved in decision-making processes, e. g. through participatory design methods (Simonsen & Robertson 2012).

Emergent, creative processes within a team (exploration) can unfold in **dialog** between team members (Olsson & Backström 2012). **"Practice fields"** (Senge 2006, p. 240), **"play spaces"** (Kriz 2006) or **"significant learning communities"** (Motschnig-Pitrik 2008) can provide for an atmosphere where it is safe to risk exploring new ideas. People can draw on **local knowledge** and are able to **specialize**.

Consequences:

Balancing exploitation with exploration processes may support team longevity through organizational **ambidexterity** (Raisch & Birkinshaw 2008).

If team members are in charge of their working conditions, this can increase team performance (Surowiecki 2005, p. 213).

In practice fields, participants hold a tendency of **learning from mistakes**. Speculative ideas can be followed even if they have slim possibilities of success (Surowiecki 2005, p. 28).

Case Vignettes:

- A project manager describes in an interview that he didn´t like the long distances for his team members that worked together on a project to get from point A to point B in a very large company building. He mentioned having to "visit many islands". So in a follow-up project, he was committed to co-locating people working together in a software development team.

- Another manager states that for him it is necessary to develop a basic rhythm during a project. Projects have a chaotic touch, because unexpected things can happen. So it is necessary to follow a basic rhythm that can be trusted. Meetings can be beats of such a rhythm.

- A professor at University, and director of a large organization, notes that for him it is necessary to keep being aware of different team directions and to value contributions of team members.

- One project manager highlights that in decentralized teams he finds it tremendously valuable to have shared moments with each other - to go for a coffee once in a while or to have dinner together.

- A manager of a large project expresses gratitude for having a colleague to co-lead the project team with her. For her it is very satisfying that they can discuss tough decisions and complement each others' skills.

References to Leadership Models:

This core flow is linked to leadership practice "Challenge the process" in Kouzes & Posner (2012). It can be related to subsequent enabling team condition described by Hackman (2002): "Enabling Structure".

Experience Description Catalogue: https://rheafmwk.io/ofc, (Haselberger 2019, p. 264)

3.3 FACILITATE TEAM COHESION (or: Dwell and Give Feedback)

Keywords: Decisions, Interrupt, Potential, Resource, Knowledge
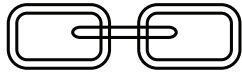
Intent:

In a cohesive team, participants work jointly towards shared goals. The team satisfies the emotional needs of its members. Team members work together complementarily - collaboratively rather than individually.

Cohesion is a function of team members' feeling of belonging to a team (Yalom 2007, p. 82). It is important from early on in a team effort, so that participants can manage and master difficult tasks and conflicts along the way (Yalom 2007, p. 82/83). Cohesion can foster team members' relative independence in opinion from each other.

Context:

Team performance is alternating or faltering.

People may consider themselves part of the team, but are **not communicating** with other participants (sufficiently). They may go their own directions **presuming it is the team direction**, not championing a team vision. Some person(s) block(s) team processes (Haselberger 2015). Members may be **excluded from communication** for they challenge the status quo.

Perhaps team wisdom, **a diversity in perspectives** and relationships that supports decision-making to bring the team forward in their tasks, **cannot unfold**.

Formal and informal leaders may **compete** against each other - tearing the team apart instead of, for example, pursuing co-leadership.

Team **polarization** may **hinder collecting necessary information** to get to grips with a difficult situation.

Treatment:

Facilitative team leaders **focus on the interpersonal dynamics** within the team. Based on experience and **reflection**, they intervene in crucial situations in the team process.

Detailed domain knowledge is elaborated by rather independently working and **decentral** organized individuals **participating** in the team. A cohesive team needs ways to aggregate all sorts of sharing of involved participants to be able to learn from each other's experience. It needs mechanisms to turn private information and judgements into collective decisions.

Team members have to **invest time and effort to reflect their activities** and interactions in order to arrive at promotive decisions for their working together and their approaching of tasks.

Supporting team cohesion may include to establish and **facilitate communication** (Rogers 1978) and to **manage meaning** to **increase security and trust** within the team (Yalom 2007).

An atmosphere of authentic reflection and team learning may be fostered, if team leaders **acknowledge and accept criticism**.

Case Vignettes:

- One project manager explains in an interview that for him the most important thing about working together effectively is to give priority to interpersonal conflicts within the team. He explains that if he senses conflicts among co-workers, he tries to immediately address them.

- A counsellor working with organizational staff mentions in an interview concerning complex problems that involving people is crucial. More people have more perspectives on the problem. From there it can go to the next level. Each challenge is unique.

- A project manager that was interviewed really enjoyed working in a team where conflicts could be openly and professionally discussed. He liked that they could have confrontations in the team and afterwards go for a coffee together.

References to Leadership Models:

This core flow is in line with leadership practices "Enable others to act" and "Encourage the heart" as elaborated by Kouzes & Posner (2012). It is associated with the following enabling team conditions described by Hackman (2002): "A Real Team", "Supportive Context".

Experience Description Catalogue: https://rheafmwk.io/ftc, (Haselberger 2019, p. 272)

3.4 ARRANGE FOR TASK COMPLETION (or: Work Towards Team Goals)

Keywords: Practice, Coach, Information, Process, Discussions
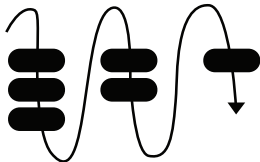
Intent:

This core flow spans approaches and tools to complete team goals in time, budget and scope satisfying stakeholders and, succeeding, team members. So, it is most specific to the business domain the team operates in.

Context:

Artifacts need to be developed and tested. They should fulfil stakeholder requirements and operate as expected.

In a software development project, with frequent changes in requirements, an **overview of necessary steps to task completion** needs to be kept.

Difficulties in technology or tool use have to be **recognized and handled efficiently**. People in the team need to be informed of project changes or updates. Technical pitfalls have to be documented. Errors should be kept to a minimum - especially in release products.

Team members need to be up-to-date with the **status** on problems their co-workers are tackling.

Work processes, development approaches and product architecture need to **fit the system use-case or feature set**.

Treatment:

Stakeholder or customer interview and **observation** techniques can support framing requirements **according to stakeholder needs** and **realistic test scenarios** (Alvarez 2014).

Incremental, iterative design and development methodologies, such as the Unified Process, Scrum or Kanban may provide effective means to arrive at viable, functional products and get a hold of problems quickly.

Use-cases integrate stakeholder requirements in a structured, often visualized form. They promote a **shared understanding of the system and development directions** for software engineers, managers, customers and stakeholders.

User stories pack system requirements in easily understandable work packages.

A **project handbook** (DIN 69901-5:2009), **project management plan** or **project initiation documentation** may contain valuable information on conventions, standards and rules of the work endeavor. Frequently this document is based on team member and stakeholder inputs and approved by responsible stakeholders.

Versioning systems can support transparent development. **Channel-based instant messaging** systems can facilitate team communication. **Ticketing systems** present customer-relevant requests.

Case Vignettes:

- In an interview on significant moments during a project, a project manager mentions that in a project he led team members were asked to form "tandems" with external stakeholders in order to facilitate collaboration.

- One project manager explains the setup of the project team work space: desks with laptops, a partition, behind it a large meeting table and a beamer. The walls can be fully used to share project plans. Besides the large room, there is a smaller room with a telephone. Team members usually work in the larger room next to each other.

References to Leadership Models:

This core flow is related to the following enabling team conditions described by Hackman (2002): "Enabling structure", "Expert Coaching".

Experience Description Catalogue: https://rheafmwk.io/ste, (Haselberger 2019, p. 280)

4. WEB-BASED SUPPORT TOOL

The initial viable *rhea.framework* knowledge base is supplemented with a web-based support tool.

This tool may be seen as a model representation of the *rhea.framework* according to the model-view-controller software architectural pattern.

Written reflections can be compared to reference flows based on semantic document similarity. For natural language processing, the python framework spaCy (https://spacy.io), targeted towards industy-application, was used. Comparisons may offer entry points for exploring related reference flows. This knowledge-based recommender system adheres to confidentiality and privacy needs of potential users as no user data is stored permanently and contributions are sent using secure connections. Moreover, the recommender-system is open source and can be instantiated on a private server.
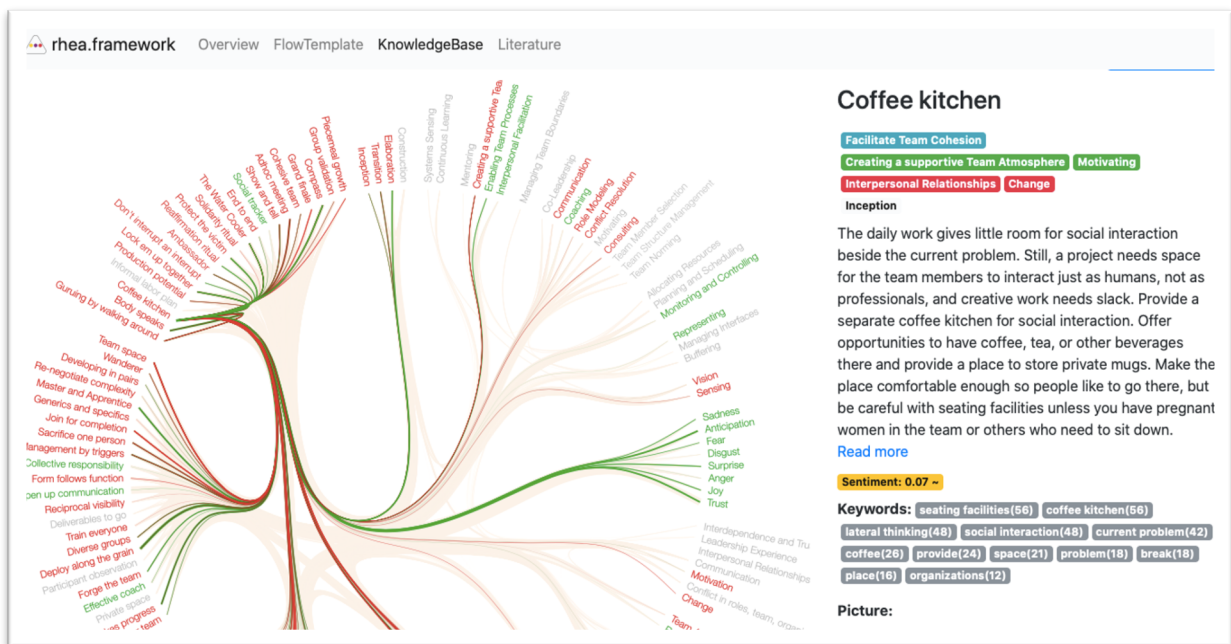

Figure 3: *rhea.framework* Web-based Support Tool

Relationships between reference experience descriptions can be followed in a knowledge base visualization (figure 3). Besides keyword relationships – a primary source for core flow elaboration – experience descriptions may be traced based on taxonomical affiliation, such as leadership behavior and project risk categories (Haselberger 2016), or Unified Process project phases (Jacobson et al. 1990).

The leadership support tool is released as open educational resource (https://rheafmwk.io).

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APPENDIX A: *IS A FLOW A PATTERN?*

The design of the *rhea.framework* is based on the following guiding principles:

- The personal idea of human beings *("Menschenbild")* suggests the paradigmatic perspective on team leadership: This "anthropological regulative" influences how we get in contact and, also, what behavior we perceive to be effective.

- Leadership is a team function: Only in a group of people with similar aspirations, there is leadership.

- Leadership influences team performance.

- Learning from personal experience informs decision making in interpersonal situations.

Leadership practice is embedded in an ever-unique interpersonal context. What appears appropriate is related to situational contingencies and past experience.

Flows are experience descriptions of significant events in interpersonal relationships – e. g. within a team. The denomination can be associated with flow as in work flow, flow as psychological process of optimal challenge, but foremost it relates to Heraclitus' process philosophy. Flow structure is inspired by Pattern structure, and reference flows and core flows are strikingly similar to or can be organizational Patterns (if read as reflective anchors).

Why adhere to a Pattern structure?

1, Reflective writing can be facilitated through structuring. Pattern writing includes considering intents, the context of a situation and imagining or differentiating consequences of an intervention, including changes in perspective. This distinction of reflection areas can be highly supportive in reflective writing processes.

2, Organizational patterns are interesting reference points for personal reflection because they often refer to actual experience in organizational contexts, though generalized. Moreover, they went through peer review processes, which means that presented insights are advocated by a group of experts. Sharing a similar structure may ease the critical comparison to a personally written flow.

3, Several large organizational pattern languages and collections exist.

What is the difference?

1, Patterns tend to adopt a mechanical language. And in the context of engineering, be it architecture or software, this can be considered fairly appropriate. For example, talking of forces fits well for the

construction of buildings, where there literally are natural forces to consider in the design process, or even for software, where some premises logically exclude others. It probably fits for explaining and promoting normative models of effective teaching strategies or organizational structures – at least at a meta-level. Yet, regarding interpersonal relationships, subtleties of unique encounters can probably not be expressed thoroughly. If we consider introspection and empathy as our pathways to interpersonal understanding, a phenomenology-oriented language appears favorable. "Tensions" in flows appear to be bridge terms to a more phenomenological description of experience in interpersonal situations.

2, Patterns are often written and supposed to be implemented fairly deterministically. Pattern design is oriented towards a wholeness that is ideally empirically verifiable. This entails a search for *all* so-called forces involved and conflicting in a particular situation – frequently termed "problem" in a pattern. A pattern is a blueprint of a problem-solution: If this problem is present, and these forces are involved, you can do that to yield those consequences. It is hard, or not feasible, to describe systemic, open-ended, non-deterministic processes in patterns.

How can Patterns be included in the rhea.framework as reference flows?

With a focus on personal reflection and the contextual embeddedness of personal practice, organizational Patterns can be read as highly valuable contributions for comparison and critical inquiry in how far they promote a more differentiated understanding of the personal work environment.

Flows adhere to the Pattern structure, yet acknowledge fallibility. They are not blue-prints for action taking, but reference points for personal reflection on interpersonal relationships (in various degrees of abstraction). They are (learning) process-oriented rather than prescriptive.