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de Groot, Bert; Leendertse, Wim; Arts, Jos

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Learning across teams in project-oriented organisations: the role of programme management

Bert de Groot and Wim Leendertse
Department of Planning, Faculty of Spatial Sciences, University of Groningen, Groningen, The Netherlands and Rijkswaterstaat, Ministry of Infrastructure and Water Management, Utrecht, The Netherlands, and

Jos Arts
Department of Planning, Faculty of Spatial Sciences, University of Groningen, Groningen, The Netherlands and Unit for Environmental Sciences and Management, North-West University, Potchefstroom, South Africa

Abstract

Purpose – Learning across teams and organisational levels enables organisations to deal with challenges that arise from changing contexts. Project-oriented organisations increasingly use programme management to cope with such challenges and improve performance. This paper aims to find out how different programme configurations affect learning across project teams and between project teams and their parent organisation in project-oriented organisations.

Design/methodology/approach – A case study of a project-oriented organisation involved in five infrastructure programmes was performed.

Findings – The studied programmes linked learning processes at group and organisational levels by creating relationships across project teams and their parent organisation and acting as a knowledge centre. Team learning benefits from the learning culture and stable environment that programmes create for project teams. This study indicates that a programme's features and focus strongly determines whether a programme predominantly enhances learning across project teams or learning between project teams and their parent organisation.

Originality/value – Although programme management is increasingly used by project-oriented organisations, there are few studies relating to learning in programmes. This study provides new insights into learning across teams through programmes.

Keywords Team learning, Collective learning, Programme management, Project-oriented organisation, Infrastructure planning

Paper type Research paper

Introduction

Organisational learning comprises learning processes at individual, group and organisational levels and the interaction between these levels (Crossan *et al.*, 1999). Learning in teams – group

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level – is considered a vital component of a learning organisation (Barker and Neailey, 1999; Senge, 1990). Accordingly, project teams contribute significantly to learning in project-oriented organisations (Brady and Davies, 2004; Chronéer and Backlund, 2015). However, team learning – "the process of aligning and developing the capability of the team to create the results its members truly desire" (Senge, 1990, p. 236) – in projects is strongly affected by the focus on project results. De Groot *et al.* (2020) argued that the predominantly problem-oriented and internal focus of project teams hinders learning to other project teams and their parent organisation. Projects are temporary constructs for delivering predefined results within set conditions of time, scope and budget (Gemünden *et al.*, 2018; Pellegrinelli, 1997). Consequently, team learning in projects is often limited to achieving project goals (intra-project). Learning beyond a single project, requires knowledge transfer to other project teams (inter-project) and to the parent organisation (meta-project). Programme management may help to overcome the impediments of single-project management to inter- and meta-project learning (De Groot *et al.*, 2020). A programme is defined as a framework for grouping projects to achieve benefits that would not be realised if they were managed independently (Lycett *et al.*, 2004; Pellegrinelli, 1997). This study combines the strands of literature on organisational learning and programme management to find out whether and how programmes facilitate learning across teams and organisational levels.

Currently, the management of transport infrastructure networks in many countries, for example The Netherlands, the UK, Germany and the USA, faces challenges, e.g. the incorporation of new mobility technologies, ageing infrastructure and a growing call for sustainable solutions (Brown *et al.*, 2017; Willems, 2018). The prime responsibility of transport infrastructure agencies is to provide and maintain adequate infrastructure facilities. In order to do so, such agencies often use projects, thereby organising themselves as project-oriented organisations (Leendertse and Arts, 2020). Learning across teams and organisational levels increases the diversity of response options and enables organisations to deal with challenges that arise from changing contexts (Folke *et al.*, 2005). From the studied literature, we found that this learning between teams and from teams to the organisational level is addressed, but hardly studied (Lycett *et al.*, 2004; Rebelo *et al.*, 2020). Moreover, the configuration of a programme may affect intra-, inter- and meta-project learning, but this remains unclear. Therefore, the aim of this paper is to find out how different programme configurations affect learning across project teams and between project teams and their parent organisation in project-oriented organisations. For this purpose, we conducted a case study of a project-oriented organisation involved in five infrastructure programmes.

Theoretical framework: programme management and learning

Potential of programmes for learning in project-oriented organisations

Leendertse and Arts (2020) characterised a project-oriented organisation as a system with strong relationships at project-team level and weaker relationships between project teams and their parent organisation. In other words, a project-oriented organisation can be considered a loosely-coupled system (Orton and Weick, 1990). Strong relationships suggest stronger learning capacity than weaker relationships. Boyer and Roth (2005) found that different groups can join to form "a group of groups" (Boyer and Roth, 2005, p. 349), thereby expanding learning through relatively weak relationships between separate groups. De Groot *et al.* (2020) described that project-oriented organisations deliberately group projects into programmes to improve overall performance. Although most programmes are not intended to improve learning, they can provide the link for inter- and meta-project learning organisation (Buijs, 2010; De Groot *et al.*, 2020). Group-level learning in a programme context is multifaceted and can comprise a single project team, multiple separate project teams or an interdependent set of project teams as part of a programme. Because of this multifaceted nature and the scope that goes beyond a single team, we will use the term

collective learning – i.e. "the ability of the collective to learn from experiences drawn by members of the collective while working" (Backström, 2004, p. 471).

From the literature, we found four themes concerning the influence of programmes on learning. These themes provide the theoretical framework and will be used as the structure for the findings and discussion sections: programme features and the impact on learning (Martinsuo and Hoverfält, 2018; Pellegrinelli, 1997); learning levels and interaction between the levels (Dutton *et al.*, 2014); the role of a Programme Management Office (PMO; Dutton *et al.*, 2014; Rijke *et al.*, 2014); and the influence of openness on learning (Buijs, 2010).

Programme features and the impact on learning

Pellegrinelli (1997, p. 143) identified "three primary reasons for the creation of a programme" and accompanying archetypal configurations. The "heartbeat" configuration aims to "enhance existing functionality or service delivery" (Pellegrinelli, 1997, p. 143). From a need for adaptation and improvement while maintaining stability in ongoing operations, learning is focussed on the implementation of change by experimentation and incremental steps. The "portfolio" configuration aims to "coordinate distinct projects using a common resource or skill base" (Pellegrinelli, 1997, p. 143; Thiry, 2002). Learning is focussed on optimising the use of resources, particularly knowledge and skills, across projects. The "goal-oriented" configuration aims to "develop completely new systems, infrastructure or services" (Martinsuo and Hoverfält, 2018; Pellegrinelli, 1997, p. 143). Learning is focussed on coping with uncertainty and ambiguity to enable progress (Thiry, 2002). Van Buuren *et al.* (2010) identified three levels of intensity of programme management which can respectively be related to the aforementioned configurations: a shared service centre for projects, a light coordination mechanism for multiple projects and an integrated development strategy.

Learning levels and interaction between the levels

Although collective learning occurs in and between project teams and their parent organisation, learning is experienced at individual, group and organisational level (Dutton *et al.*, 2014). In project-oriented organisations, information flows from individuals to the project or programme level and to the parent organisation and vice versa. Dutton *et al.* (2014) elaborated on the idea of learning at various interacting levels by mapping learning in a programme context using the "4I" organisational learning framework of Crossan *et al.* (1999). The 4Is stand for "intuiting" and "interpreting" at individual level, interpreting and "integrating" at group level and integrating and "institutionalising" at organisational level. Intra- and inter-project learning typically involve individual and collective interpreting in project teams or groups of projects, while meta-project learning additionally involves integrating and institutionalising at organisational level (Figure 1).

Crossan *et al.* (1999, p. 525) argued that "interpreting bridges the individual and group levels, while integrating links the group and organisational levels". Every level in turn provides the opportunities and constraints for learning at a particular lower level (Argote, 2013). Although programmes can support knowledge interpretation and integration across projects – feedforward – and affect learning in the embedded projects – feedback – this does not yet affect an entire project-oriented organisation. In our view, programmes concern group level, whereas institutionalisation involves organisational level and requires meta-project learning.

Role of a programme management office in learning

Rijke *et al.* (2014) and Van Buuren *et al.* (2010) consider a PMO as key in coordinating, controlling, monitoring and supporting projects and the overall programme performance. A PMO is considered responsible for developing, capturing and transferring knowledge throughout a programme (Owen, 2008). According to Dutton *et al.* (2014), a PMO can have a

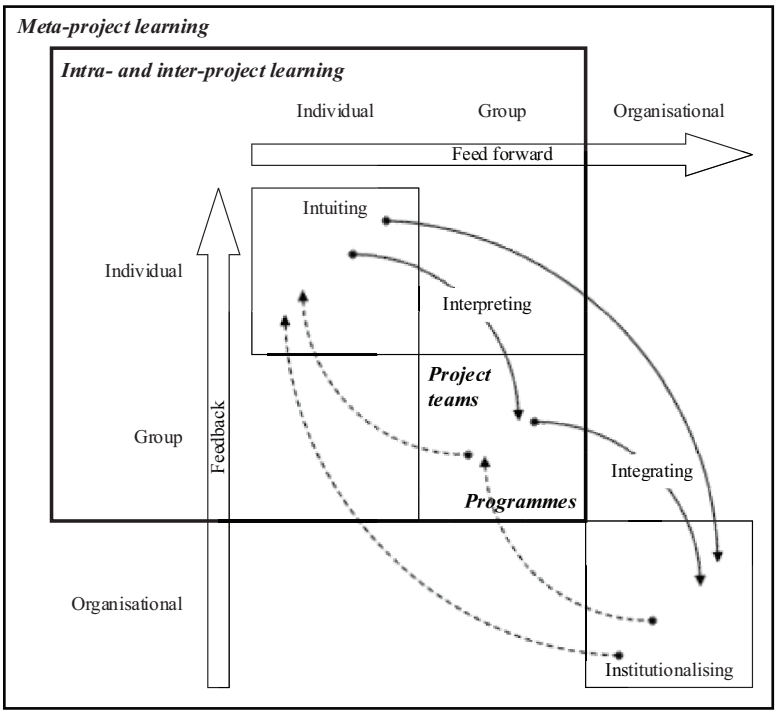

Figure 1.
Learning levels and interaction (based on Crossan *et al.*, 1999)

facilitating role in inter-project learning, for example by programme meetings facilitating information transfer between projects, by developing standard procedures for projects or by switching employees between projects. A PMO can also provide a reporting function between projects and the parent organisation (Dutton *et al.*, 2014; Rijke *et al.*, 2014).

Influence of openness on learning

While considering programmes as action systems where programme management, projects, parent organisation and environment interact, Buijs (2010) argued that programmes can create frames and a stable structure (conservative self-organisation) or can develop and change internal structures adaptively in relation to the environment (dissipative self-organisation). Programmes can allow change in programme goals, change in the set of embedded projects and involvement of the environment in the development of the programme. As such, the openness of programmes affects the flow and interpretation of information and the context in which knowledge is applied, thus the ability to learn. According to Buijs (2010), programmes should be allowed to change their openness over time to fit the circumstances, for example to temporarily improve the exploitation of existing knowledge or the exploration of new knowledge (March and Olsen, 2006).

Overview

The literature shows that heartbeat, portfolio and goal-oriented programmes have different aims, intensities and learning foci. The literature also shows how programmes may affect intra-, inter- and meta-project learning in general (Table 1). However, it remains unclear how

	Learning levels		Role of a PMO	Openness	
	Learning process	*Levels linked*		*Closed*	*Open*
Intra-project learning	Interpreting and integrating within project	Individual-group	Providing enabling context for team learning within projects	Stable context allows for exploitation of existing knowledge within a single project	Changing context allows for exploitation of existing knowledge and exploration of new knowledge within a single project
Inter-project learning	Interpreting and integrating across projects	Group-group Individual-group	Facilitating and organising learning activities	Stable context allows for efficient exploitation of existing knowledge across projects	Changing context allows for exploitation of existing knowledge and exploration of new knowledge across projects
Meta-project learning	Integrating from projects/ programme to parent organisation and institutionalising	Group-organisation Individual-organisation	Formal reporting function, Institutionalisation of knowledge	Limited, because of limited interaction with parent organisation and stakeholders	Changing contexts, more relationships and knowledge sources increase possibilities for learning

Table 1.
Overview of intra-, inter- and meta-project learning in a programme context

the configuration of a programme affects intra-, inter- and meta-project learning and how learning actually occurs in different programme contexts (see e.g. Busscher, 2014; Dutton *et al.*, 2014; Martinsuo and Hoverfält, 2018).

Methods

To find out whether programmes enhance learning in practice, we conducted a case study (Yin, 2003) of a project-oriented organisation involved in infrastructure programmes in The Netherlands. Infrastructure planning is interesting because of the current challenges that necessitate learning and the potential for learning across the many project teams in this field. The Netherlands is interesting because of the increasing use of programmes in infrastructure planning (Busscher, 2014). Rijkswaterstaat, the executive agency of the Ministry of Infrastructure and Water Management in The Netherlands, uses programmes to improve the coordination and performance of its projects. By selecting five different programmes, we could analyse differences in learning across programmes. These programmes were as follows:

- Schiphol-Amsterdam-Almere (SAA): A programme of five road projects on the Amsterdam motorway network that aims to improve financial control and optimise accessibility and liveability during construction.
- Sluices Programme (SP): A programme of six sequentially planned sluices projects that enables projects to learn from each other, to increase efficiency and to allow contractors to optimise their tenders.

- High Water Protection Programme (HWPP): A programme of almost 300 projects that aims to adapt 1,100 kilometres of dykes, including sluices and pumping stations, to new water safety regulations.
- Replacement and Renovation (R&R): A programme of over 80 projects ensuring safe and reliable road and waterway networks for the future through replacement or renovation of key network objects.
- SmartwayZ.NL (SNL): A programme of eight coherent traffic challenges on two corridors in the south of the Netherlands that aims to improve accessibility and traffic flow, including smart mobility solutions.

We conducted 19 semi-structured interviews (Bryman, 2012) between February 2019 and March 2020 with Rijkswaterstaat employees involved in the aforementioned programmes: project managers and stakeholder managers (project level), programme managers (programme level), directors (organisational level) and advisors and portfolio managers (bridging the levels). In these interviews, we asked about relationships across projects, programmes and their parent organisation, which learning activities were organised and how knowledge was transferred. All interviews were transcribed and analysed based on codes retrieved from the theoretical framework using ATLAS.ti 8.4. Additionally, we analysed documents from all programmes, such as programme-management plans and progress reports. Furthermore, we organised a focus group (Bryman, 2012) in April 2020 for corroboration and enrichment of our preliminary findings. The focus group consisted of five professionals: two project managers, a knowledge manager, an advisor "Sustainability, Living environment, and Knowledge" and the head of department for "Project Management Knowledge". They discussed our preliminary findings through statements for each of the four themes from our theoretical framework. We incorporated the results of this discussion in the findings section in this paper.

Findings

Programme features and the impact on learning

The SAA programme aimed to improve financial control and optimise accessibility and liveability during construction and implemented a focus on "predictability, efficiency, and teamwork" (Interviewee 7). To optimise programme performance, "the project managers were made jointly responsible for the performance of the entire programme" (Interviewee 2). Furthermore, the projects were supported by a shared service centre for control, procurement and knowledge management at programme level. The partly sequential execution of the projects allowed for continuous improvement and efficient use of resources through learning. SAA showed features of both goal-oriented and portfolio programmes.

The SP programme was based on: "learning from each other, increasing efficiency, and early involvement of the infrastructure asset manager" (Document 5). The projects were essentially autonomous and had their own clients and reporting lines to the parent organisation (Interviewees 10, 15). Interviewee 15 characterised SP as "a knowledge programme, a learning organisation, not responsible for budget, distribution of resources, not having a team at programme level". The SP programme facilitated learning across projects and showed features of a portfolio programme.

The HWPP programme aimed to achieve "controlled realisation of the assigned operation while remaining sufficiently flexible and offering space to cope with developments and needs in the environment" (Document8). Within the integrated development strategy, the water boards were responsible for the projects, while the programme controlled subsidies and prioritised projects. Interviewee 11 stated that "we want projects to work smarter, faster, better, more efficiently, and to incorporate new techniques". HWPP focussed on formal education to

ensure sufficient quality and facilitated informal knowledge communities (Document 8). HWPP showed features of a goal-oriented programme.

The R&R programme started in 2012 and after an evaluation in 2017, a temporary support construction was added with the aim to assist the parent organisation to "signal dilemmas, remove obstacles, and speed-up decision-making" (Document 12). The programme organisation provided four main tasks: "monitoring whether the parent organisation fulfils its responsibilities; assist, signal, connect and advise the parent organisation based on results of monitoring; escalate issues to the board; and propose interventions" (Document 11). To structure their tasks, the programme organisation developed 11 tracks including "learning and development". This track focussed on:

> [. . .] increasing the learning capacity of actors [. . .] to speed up and renew the approach of the assignment in a stepwise manner through experiments where learning is monitored at individual level, at team level and at organisational level (Document 12).

The R&R programme showed features of a heartbeat programme.

The SNL programme was initiated to strengthen the economy and international connectivity of the region and to realise a smarter mobility system in the south of The Netherlands (document16). This integrated development programme consisted of seven infrastructure projects and a smart mobility project. The programme board was responsible for the content, planning and budget and was supported by a programme team for decision-making, coordination of projects and overall monitoring (Document 15). Learning focussed on early implementation of innovations and collectively monitoring the effects to enable improvement (Document 17). SNL showed features of a goal-oriented programme. Table 2 at the end of this section gives a summary of the findings.

Learning levels and interaction between the levels

Individual learning predominantly occurred through informal learning on the job. To this end, SAA used the "master-apprentice" concept. SP, HWPP and R&R also used more formal education programmes. For instance, HWPP and R&R developed individual learning programmes focussing on development of competences together with the Corporate Learning Centre of Rijkswaterstaat (Interviewees11, 12). Although professional development of employees was considered a prime responsibility of the parent organisation, focus group discussants and interviewees argued that programmes invest in individuals to keep them committed and motivated. Additionally, these programmes used the potential of available learning platforms, such as the discipline-oriented learning platforms of Rijkswaterstaat where employees from across the country exchanged experiences, for interpreting from individual to group level. All studied programmes organised meetings, such as programme-wide events, discipline-oriented meetings and project team meetings. This enabled individuals to interpret their knowledge in relation to the context in which they operated and enabled integration at group and organisational levels.

At group level, a distinction between intra- and inter-project learning was noticed. In Rijkswaterstaat, projects are managed by a project management team consisting of five discipline managers: a project manager, contract manager, stakeholder manager, technical manager and a manager project control. Each manager represented a sub-team of specialists. This project management team interprets and integrates knowledge from the different disciplines in the context of the project. Other than "providing a stable and comfortable environment" (Interviewee 3) and improving team collaboration and team learning within the context of a specific programme (focus group), the studied programmes did not appear to specifically improve intra-project learning. However, the process of

		SAA	SP	HWPP	R&R	SNL
Programme features	**Configuration**	Goal-oriented / portfolio	Portfolio	Goal-oriented	Heartbeat	Goal-oriented
	Aim	Improve financial control, Optimise accessibility and liveability.	Learn from each other, increase efficiency, and early involvement of infrastructure asset manager.	Controlled realisation while remaining sufficiently flexible.	Signal dilemmas, remove obstacles, and speed-up decision-making.	Strengthen regional economy and international connectivity, Realise a smarter mobility system.
	Intensity	Shared service centre.	Knowledge management.	Integrated development.	Monitor, signal, escalate, intervene.	Integrated development.
	Learning focus	Efficient use of resources, Securing programme culture.	Efficient use of resources, Optimising infrastructure asset management.	Incorporating innovations, Ensuring quality through formal education and knowledge communities.	Increasing actors' learning capacity, Experimenting, Monitoring learning (individual, team, organisational).	Early implementation of innovations to learn from the effects and enable improvement.
Learning levels and interaction between the levels	**Intra-project**	All programmes: team meetings, discipline-oriented sub-teams.				
	Inter-project Individual ⇔ group	Storytelling, Sense of unity.	Sense of unity, Education programme.	Education programme.	Education programme.	
		All programmes: discipline-oriented meetings, communities-of-practice, moving people.				
	Inter-project Group ⇔ group	Core values, Joint office.	Temporary collaborations.	Learning groups.		Core values.
		All programmes: programme-wide events, thematic sessions, sharing documents.				
	Meta-project Individual ⇔ organisation			Creating learning awareness, Relations officers.	Creating learning awareness.	
		All programmes: learning on the job, learning platforms.				
	Meta-project Group ⇔ organisation	Sharing good practices.	Intranet, Presentations to departments.	Innovation projects.	Innovation projects.	Innovation projects, Sharing good practices.
		All programmes: communities-of-practice, professional events.				
Role of a PMO	**Responsible for**	Budget, progress, scope.	No PMO.	Improve main programme processes.	Signal cross-project trends and impediments in organisation.	Budget, progress, scope, Coordinate coherence.
	Learning	Stable project environment, Temporary extra capacity and knowledge for projects, Gather and transfer lessons.	Learning between projects, specifically regarding procurement, and project control, Knowledge transfer to parent organisation.	Guide project transcending explorations and implementation of innovations, Knowledge broker between projects, Facilitate communities-of-practice.	Monitoring and facilitating learning on individual, group, and organisational level.	Simulate implementation of smart mobility innovations in infrastructure projects, Knowledge centre.
Openness	**Embedded projects**	Fixed.	Adaptive.	Adaptive.	Adaptive.	Adaptive.
	Objectives	Fixed.	Fixed.	Adaptive.	Fixed.	Fixed.
	Environment	Not involved.	Involved.	Involved.	Involved.	Involved.
	In general	Closed.	Open.	Open.	Open.	Open.

Table 2.
Overview of findings

interpreting benefited from core values, storytelling, joint offices and activities that were organised at programme level as it resulted in a shared understanding of the context. For example, the core values of SNL and SAA provided a similar base for different project teams, thereby enhancing inter-project learning. SAA and SP regularly transferred employees and documents from one project to another to transfer knowledge. This way of integrating knowledge into a group seemed effective for the implementation of good practices in subsequent projects. SP also organised temporary collaborations across projects to transfer knowledge. All studied programmes organised "communities-of-practice for certain themes, disciplines, or subjects" (Interviewee 11). Within HWPP, SNL and R&R, "innovation projects have a knowledge dissolution assignment" (Interviewee 11), which supports the integration of knowledge from group to organisational level and subsequently back to other Rijkswaterstaat projects.

Regarding learning at organisational level of Rijkswaterstaat, the interviewees stated that "the parent organisation tends to make learning instrumental" (Interviewee 18). Interviewees argued that translating knowledge to procedures and guidelines on the intranet takes time and once it is done, it might be outdated (Interviewee 17). Furthermore, some programmes seemed to hinder institutionalisation because of the perceived distance between projects and the parent organisation. Interviewee 7 mentioned that their programme team "deliberately created a "we-feeling" to be different than the rest of Rijkswaterstaat", which strengthened the sense of unity. The parent organisation sometimes increased the perceived distance by not being receptive to lessons from the projects and programmes (Interviewee 15, focus group). Contrastingly, several interviewees argued that learning at organisational level happened automatically by various actions undertaken by the programmes, e.g. organising a community-of-practice for contract managers or professional events, to support the flow of knowledge from projects to the parent organisation. SAA and SNL shared good practices, SP visited departments to present their experiences and HWPP and R&R created awareness of the value of individual lessons or appointed employees as relations officers to enhance knowledge transfer between the programme and the parent organisation. This demonstrates that programmes may support interpreting and integrating from individual level to group and organisational level.

Role of a programme management office in learning

Interviewee 2 stated that "projects barely have buffers; but the programme has extra capacity, power, people and knowledge through the PMO". Next to support for control and procurement and creating "a stable environment for the projects by managing the upper side and creating predictability" (Interviewee 7), the PMO of SAA gathered lessons from the SAA-projects and helped to transfer these lessons to other projects, programmes and the parent organisation.

SP did not have a PMO. Although initially learning focussed on improving contracts and procurement processes, later the SP-projects started to look for other opportunities to collectively improve processes, especially regarding project control (Document 3).

HWPP introduced "guiding teams" that took on the PMO role to intensify cooperation between projects and programme and between infrastructure network asset managers and the programme board (Document 9). These guiding teams consisted of a project manager, a project controller and a knowledge advisor and aimed to improve the main programme processes. Furthermore, the guiding teams supported the implementation of innovations and acted as "knowledge brokers" between the different projects (Document 9). Interviewee 11 added that "the programme office HWPP, also facilitated communities-of-practice".

R&R initiated a team "to signal trends across projects and to pinpoint directions and dilemmas" (Interviewee 17). Regarding the aforementioned track "learning and development", Interviewee 12 argued that:

> [. . .] team R&R monitors the assignment on three levels: the 'I', do I know what my job is?; the 'we', do we know what we have to do?; and 'the organisation', do we all know who does what and what we need from each other?

According to this interviewee, "it's about facilitating, coaching, validating and creating the right conditions" to integrate "I", "we" and the parent organisation.

SNL used a programme team to prepare decision-making for the programme board and to coordinate the coherence between the projects (Document 15). This programme team stimulated innovations, advised the programme board on planning, budget and opportunities for the application of smart mobility solutions in the infrastructure projects and organised supporting facilities (Document 15). The smart mobility project acted as a knowledge centre that developed building blocks for the other projects, thereby ensuring cross-connections and enhancing inter-project learning (Interviewee 16).

Influence of openness on learning

The embedded set of projects of SAA was fixed. It was "just a big project cut into five pieces, but because of the partly sequential execution of the projects, it has characteristics of a programme approach" as Interviewee 7 stated. Since predictability was one of the guiding values, the objectives were fixed. Although much attention was paid to the environment in terms of accessibility and liveability during and after construction, SAA may be considered a generally closed programme.

SP had an adaptive set of projects. "Two projects are ready now, but also two projects are added" (Interviewee 15). The programme deliberately considered to be open "to have a good connection with the parent organisation while ensuring an own identity" (Interviewee 15). Based on an evaluation, knowledge transfer towards the parent organisation was added as a new goal for SP, whereas the initial goals were continued (Document 3). Focus group discussants argued that adding new goals and projects causes a programme to open up. New relationships across projects emerged and teams interpreted the consequences of the changes for their own project. Based on the openness towards the parent organisation and the environment as well as adaptations in the embedded set of projects, SP may be considered an open programme.

The embedded set of projects of HWPP had to be adaptive given the size and lead time (2050) of the assignment, because "new technical insights and policy will be developed during the programme and new evaluation results will affect the character and size of the assignment" (Document 8). "Knowledge, experience and resources are shared to the benefit of the alliance as a whole" (Document8). HWPP developed a knowledge and innovation agenda in interaction with both internal and external stakeholders (Interviewee 11). Overall, HWPP can be considered an open programme.

"Typical for R&R was that everything is adaptive" as Interviewee 12 characterised the openness. Interviewee 13 added that "R&R organises all kinds of linking sessions with engineering agencies, contractors; sessions to devise an approach together with companies" and "relationships with other governments through learning platforms". After an evaluation, the aim of the programme remained to support the parent organisation. "I even think that the relationship with the parent organisation is stronger than with the projects" (Interviewee 13). R&R can be considered an open programme.

SNL was described as a programme that tried to incorporate the opportunities that arose from the collaboration between parties (Document 15, Interviewee 16). The programme

created space for innovations and used social design to actively involve stakeholders (Document15). Although the set of seven projects in SNL remained fixed, the scope of the projects was allowed to change in accordance with the programme objectives. SNL can be generally considered an open programme. Table 2 gives a summary of the findings.

Discussion: Collective learning through programme management

Programme features and the impact on learning

Pellegrinelli *et al.* (2015) argued that, while facilitating ambidexterity, exploration occurs at programme level and exploitation occurs at project level. Learning at programme level then focusses on gathering new knowledge to develop innovations, whereas team learning at project level focusses on using existing knowledge to efficiently deliver projects. However, we also found that innovation cannot completely be developed at programme level. Actual innovation occurs in the projects. The level of innovation is determined by the "development space" allowed by the programme and the project focus. Programmes serve as a "firewall" for contextual developments, confirming Busscher (2014), thereby providing a stable environment in which project teams felt safe to implement innovations and develop new knowledge. Newly developed knowledge is transferred across projects within the programme and is used to improve the programme. In our study, the goal-oriented and portfolio programmes predominantly focussed on team learning within projects (intra-project) and collective learning across projects (inter-project) whereas the heartbeat programme (R&R) focussed on learning in the parent organisation (meta-project). So, a programme's features and focus strongly determines what kind of learning is stimulated.

Learning levels and interaction between the levels

At individual level, various programmes paid attention to professional development of individuals through formal and informal learning on the job to keep employees committed to the programme and to ensure that they possessed the knowledge necessary to fulfil their tasks.

At group level, the studied programmes clearly showed activities for interpretation and integration of knowledge from individual to group and between different groups, such as regular cross-programme meetings, storytelling and employee exchange. This supported team learning as new knowledge flowed in and between teams through various relationships. Interestingly, some programmes used "core values" to emphasise their identity and to influence interpretation at individual and group level, thereby trying to direct team learning. Hence, programmes support both feedforward from individuals to project teams and feedback from programmes to project teams and individuals within projects. Our study underlines that learning at group level is multifaceted. Apart from project teams, groups can be discipline-oriented teams, learning platforms, departments and communities-of-practice. In this network of groups within project-oriented organisations, programmes and PMOs are extra groups that enhance inter- and meta-project learning by creating relationships across projects and between projects and their parent organisation that would not have been created with single-project management.

Programmes contributed to knowledge integration and institutionalisation at organisational level through activities, such as creating awareness of the value of individual lessons, thereby altering individual-level learning from intuiting (preconscious) into interpreting (conscious) and enabling learning from individual to group and organisational levels. Programmes linked group and organisational levels through collective development and implementation of innovative ways of working and innovation projects with knowledge dissolution assignments. These knowledge dissolution assignments enabled the reuse of knowledge developed during innovation projects across the organisation. Whereas Dutton *et al.* (2014) argued that knowledge feedback focussed on programme improvement and benefits, our study shows that programmes also support the institutionalisation of knowledge in the parent organisation to

improve other programmes and projects. For the parent organisation, programmes provide a single point of contact towards multiple projects. Directions from the parent organisation, for example to follow a new procedure, are interpreted at programme level and then distributed across the embedded projects. Hence, programmes can provide focal points in the network of groups in project-oriented organisations through which knowledge flows from the parent organisation to the projects and vice versa.

Role of a programme management office in learning

PMOs stimulate team learning by creating learning structures, serving as a knowledge centre and adding a project-transcending learning assignment to project objectives. Together with the aforementioned safe environment that programmes provide for projects, PMOs seem to allow team members' "psychological availability" (Rebelo *et al.*, 2020, p. 49) and facilitate team learning. Interviewees and focus group discussants generally agreed that PMOs can encourage but cannot force learning. In the absence of a PMO, the projects themselves joined to form a group of groups (Boyer and Roth, 2005) where inter-project learning was initiated from the bottom-up. Here, the learning culture was not created, but it emerged.

PMOs may act as knowledge brokers in social networks within project-oriented organisations. They are not only responsible for retaining and transferring knowledge themselves, as Owen (2008) argued, but they also build relationships between projects and departments, thereby enabling knowledge to flow and facilitating team learning as a microcosm for organisational learning (Senge, 1990).

Influence of openness on learning

Most of the studied programmes were generally open, thereby increasing the possibility for knowledge to flow in and out. The only closed programme (the goal-oriented programme SAA) created a distinct identity to which the projects could connect. However, this increased the perceived distance to the parent organisation. This distance was strengthened by the level of autonomy of the programme within its hosting organisation. Rijke *et al.* (2014) considered autonomy to positively affect the ability to manage the programme and in this case it did, but it affected meta-project learning adversely. Hence, the limited openness of this goal-oriented programme towards its parent organisation resulted in relatively weak relationships between the programme and parent organisation. In fact, the findings indicate that goal-oriented and portfolio programmes generally maintained stronger relationships with the projects than relationships with the parent organisation, which makes sense given their effectivity and efficiency focus, and thus enhanced team learning.

The findings also indicate that the openness of programmes varies during their life cycle. For instance, changes in the goals and embedded set of projects of the SP programme introduced dynamics and caused the programme to "defreeze" and open up. A process of sensemaking occurred to understand the impact of the delivered and newly added projects in the context of the whole programme. This rendered new insights and relationships which revitalised team learning within the existing projects and collective learning throughout the programme.

Conclusions

Our study shows that programmes build stronger relationships with either the embedded projects or the parent organisation. In the "heartbeat" configuration, learning is focussed on the implementation of change by experimentation and incremental steps. Learning in the "portfolio" configuration concerns optimising the use of resources, particularly knowledge and skills, across projects. In the "goal-oriented" configuration, learning is focussed on coping with uncertainty and ambiguity to enable progress in the development of entirely

new systems. The effectivity focus of goal-oriented programmes and efficiency focus of portfolio programmes results in stronger relationships between projects and the programme, thereby enhancing inter-project – or inter-team – learning. The incremental change and improvement focus of heartbeat programmes results in stronger relationships between the programme and the parent organisation, thereby enhancing meta-project – or team to organisation – learning. Programmes and their PMOs may support interpretation, integration and institutionalisation of knowledge at group and organisational level by creating learning structures and acting as a knowledge centre.

Our study contributes to the existing literature on learning in a programme context (Dutton *et al.*, 2014; Lycett *et al.*, 2004) by showing how programmes actually facilitate learning and how different programme configurations affect learning across teams and organisational levels. Team learning benefits from programmes that support a learning culture and provide a stable environment for project teams, thereby allowing team members' "psychological availability" (Rebelo *et al.*, 2020, p. 49). Programmes especially support organisational learning processes that link learning levels (Crossan *et al.*, 1999). Furthermore, stronger relationships seem to be key for collective learning, but too many strong relationships could result in a rigid organisation. As programmes build stronger relationships with either the embedded projects or the parent organisation, they preserve the adaptability of project-oriented organisations as loosely-coupled systems (Leendertse and Arts, 2020).

The understanding of "group level" in programmes is multifaceted. Each collective, e.g. a project team, programme team, or discipline-oriented team, has its own context and objectives that influence learning. The insights from our study can be interesting for studies into polycentric governance as project-oriented organisations can be considered a proxy for polycentric governance systems. The insights about how different programme configurations affect organisational learning processes can be interesting for project-oriented organisations and other types of organisations that implement programme management. Practitioners should manage programmes without putting too much focus on either projects or parent organisation by dynamically balancing inter- and meta-project learning over their life cycle. This balancing is a learning process in itself.

As our study is based on a single case of a project-oriented organisation involved in five infrastructure programmes, further research to enrich the insights in the influence of programme management on learning is recommended. Furthermore, programme management is still quite often interpreted as a scaled-up version of project management due to the extensive use of projects in infrastructure planning. Therefore, it would also be interesting to study how programmes influence learning within and across teams in organisations in other sectors. Moreover, group level learning is not only supported by programmes, but also by communities-of-practice and other learning platforms. It would be interesting to study the influence of such learning platforms on learning across teams and organisational levels in project-oriented organisations.

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About the authors

Bert de Groot is PhD researcher at the Department of Planning, Faculty of Spatial Science, University of Groningen, The Netherlands. His research focuses on the relationship between collective learning and adaptive capacity in project-oriented organisations in infrastructure planning. Furthermore, he works as Project Management Consultant at Rijkswaterstaat, part of the Ministry of Infrastructure and Water Management in The Netherlands. Bert de Groot is the corresponding author and can be contacted at: e.a.j.de.groot@rug.nl

Wim Leendertse is University Professor Management in Infrastructure Planning at the Department of Planning, Faculty of Spatial Sciences, University of Groningen, The Netherlands and Senior Advisor for Rijkswaterstaat in the field of project management, innovation management and market involvement.

Jos Arts is Full-Professor Environment and Infrastructure Planning and Head of the Department of Spatial Planning and Environment, Faculty of Spatial Sciences, University of Groningen, The Netherlands and extraordinary professor at the Unit for Environmental Sciences and Management, North-West University, Potchefstroom, South Africa. He has organised many international workshops, conferences and published widely about impact assessment, evaluation and environmental, spatial and infrastructure planning. His research focuses on institutional analysis and design for integrated planning approaches for sustainable infrastructure networks.