UNIVERSITY OF CAMBRIDGE

Transforming construction: impact case study

Benefits to industry: enables organisations to work across geographical and time boundaries; improves responsiveness to projects and clients; strengthens project management skills to enhance productivity

Virtual teams: what are the effective leadership attributes for project managers?

Virtual teams are becoming more widely adopted as a strategy to deliver major infrastructure design projects globally. The construction industry has shown increasing interest in the use of virtual teams in the last decade driven by the digitalisation of the sector and requirements to deliver services globally. Globalisation and virtual teams are identified by the Association for Project Management (APM) as a key driver to be addressed and understood for the future of project management within the construction sector up to 2040. The COVID-19 pandemic has resulted in many industries adapting quickly to work differently – operating virtually has become the 'new normal' for many organisations.

The virtual landscape

The implementation of a virtual teaming strategy enables organisations to work across geographical and time boundaries, improve responsiveness, and be more adaptive to their projects and clients. A virtual teaming strategy increases the diversity of the teams, which can bring innovation and a range of talent to a project that improves the effective nature of virtual teams to significantly boost productivity. However, the impact of this strategy on how teams effectively work together is not necessarily acknowledged in the operational culture of the organisations involved or addressed through the leadership of project managers.

Benefits and challenges

Advantages for implementing a virtual team include:

- The ability to maintain project productivity 24/7 across global time zones
- Access to a greater resource pool of experts to deliver projects
- Lower costs resulting from outsourcing and shared knowledge across an organisation.

Challenges and difficulties (which differ to those faced when working within a co-located team) include:

- Developing trust in the team due to the lack of face-to-face interaction
- Monitoring and managing team activities
- Problems collaborating across geographic distances and without personal interaction
- Communication difficulties and cultural differences.

Literature review as context

Currently there is limited guidance for the construction sector on effective mechanisms and leadership styles for managing virtual teams to deliver major infrastructure design projects. The shift to adopting virtual teams has occurred mainly without considering the impacts on the team, putting at risk the benefits of adopting a virtual teaming strategy in the first place.

This research brings focus to the current state of practice of virtual teams in the United Kingdom and aims to investigate the effective leadership attributes required for project managers to lead virtual teams in delivering major infrastructure design projects.

Leadership is a key factor for ensuring effective project delivery using a virtual team and the leadership attributes are different to those required for co-located project teams. Critically, there are few studies and frameworks that have investigated the 'real-life' complexities of the project environment of virtual teams and compared them to those of co-located teams.

This research features a comprehensive literature review to understand the context of current leadership and management theories as they relate to virtual teams and co-located teams within the construction sector. The research identifies the effective leadership attributes and action mechanisms for a project manager in relation to virtual teams, which is further explored through the main research workshops.

The framework

The literature review informed the development of the proposed effective leadership framework for the study with the key components of the Project Environment, People, Processes and Technology (PePPT) Framework. Effective leadership attributes require 'elements of roles', 'behaviours' and 'awareness in virtual teams' and a project manager is required to understand these holistically in order to effectively lead a virtual team.

The framework allowed the core components and project complexities to be studied through the research.

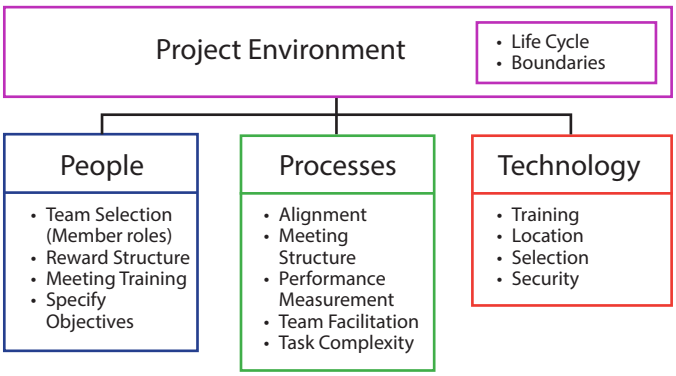

Figure 1: Proposed research design PePPT Framework (proposed by author)

Approach and methodology

The methodology used a qualitative research approach to elicit the views of engineering professionals with project experience of virtual teams. The research featured nine workshops designed to establish the knowledge and experience of the existing participants and identify key leadership attributes for the virtual teams. Six of these workshops were conducted within one organisation (an international engineering design consultancy) and three workshops were undertaken at similar organisations within the industry. The adopted approach was to ensure organisational culture was not providing bias to the data in the single-organisation workshops.

The workshops discussed a range of multi-disciplinary engineering projects, completed during the first six months of 2018, to secure a broad spectrum of data and participants' views. The projects covered various sectors including rail, buildings, defence and education. The 35 participants represented a wide range of roles including Project Managers, Directors and Discipline Engineering Leads, and each had direct experience of working as part of virtual teams. The workshop structure and exercises are detailed in Figure 2.

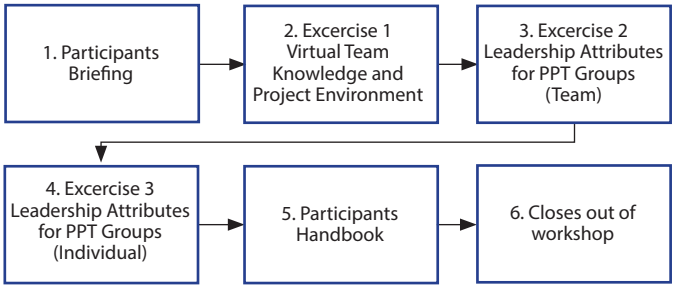

Figure 2: Simplified workshop flow diagram

Results and discussion

The results and discussion from the workshop findings and analysis identified primary themes for each of the framework groups. The results and analysis identified the associated leadership attributes and associated action mechanisms from the workshop participants for each framework group.

Project environment

Organisational leadership networks: The theme identified within the project environment related to the ability of the project manager to develop and utilise organisational leadership networks to enhance virtual team cohesion and team effectiveness. This relates to the development of dynamic relationships between the project manager and team leaders in other areas of the organisation and immediate project team. The workshop participants all experienced challenges related to understanding the resources of the team, developing trust and building relationships within the team. This ultimately had an overall effect on the virtual team effectiveness for achieving deliverables and objectives.

To develop dynamic relationships, six out of nine of the project managers chose to travel to the other teams to implement face to-face time at some point on the project to help foster these relationships. The action mechanism to support this is that throughout the project the Project Manager should facilitate to travel at agreed project stages to develop these networks and understanding with wider teams.

Leadership Attributes	Action Mechanism
• Communication • Knowledge sharing • Cultural awareness • Organisational networking • Proactive and flexible nature	• Project manager to travel to teams to develop face-to-face time at agreed project stage

People

Communication of project goals and objectives

The theme identified related to the ability of the project manager to communicate directive, clear and objective information within the virtual team environment. The workshop participants all experienced problems associated with communication clarity on projects shared across geographical boundaries. Formal briefings were identified as key for alignment of the team participants. Interestingly, the project manager's ability to foresee and direct the conversation between teams at design meetings was also considered to be important. This ability for a project manager to read a situation via virtual communication is a soft skill that can be improved with experience. The action mechanism to support the communication relates to collaborative and briefing workshops, along with the formality and regular team meetings with all team members.

Leadership Attributes	Action Mechanism
• Ability to be clear and concise • Understand cultural and team boundaries	• Collaboration and briefing workshop • Formal and regular team meetings

Processes

Virtual team delivery strategy

The theme identified was the virtual team delivery strategy. This relates to the ability of the project manager to develop and outline delivery strategies for the production of deliverables and team setups specific to that of virtual teams in the construction sector. The primary challenge faced by all project managers was the lack of documented knowledge of how to go about the delivery of strategy for utilising virtual teams. The project managers had different strategies depending on the task complexity and the stage of the project.

Processes invariably have an effect on the team effectivenes and will become a structural support once embedded in the team environment. The research proposes a number of delivery strategies to the delivery of projects (see Figure 3). The leadership role of the project manager is to be the facilitator to ensure the virtual team receives the correct information and processes on a project are defined through adopting the correct delivery strategy. The action mechanism proposes a set of three delivery models to support teams that consider task/project complexity and the team cohesion.

Leadership Attributes	Action Mechanism
• Facilitator to support the team • Strong ability to develop clear processes and clear communication	• Defined virtual team delivery strategy selection

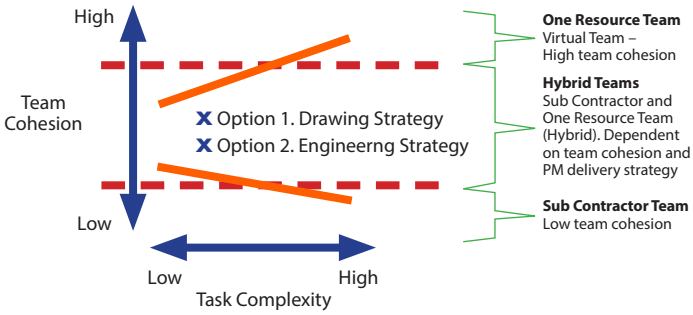

Figure 3: Virtual team delivery strategy selection

Technology

Correct technology, tools and selection
The ability of the project manager to select the appropriate technology for the project and support the team was the leading theme. The role of the project manager is to integrate the information of the team together to enable team effectiveness. The findings suggest that the project manager must have some baseline technology knowledge as to not inhibit the team's operations by being unable to resolve problems. Through the Project Manager empowering the team this would allow the most appropriate individual to take on the technology front role. The action mechanism of incorporating strategic decision points allows for strategic selection and review of technology throughout the project life cycle to support the ongoing virtual team delivery.

Leadership Attributes	Action Mechanism
• Understand technology and its application • Understanding the organisation's strategy for digitalisation	• Ensure strategic decision points for technology selection are undertaken

Summary and next steps

Virtual teams are becoming more widely adopted as a strategy to deliver infrastructure design projects globally. The implementation of virtual teams enables organisations to work across geographical and time boundaries and to also improve responsiveness to their projects and clients.

The primary findings within the project environment group was the project manager travelling at key points in the project to facilitate the development of organisational leadership networks and organisational ties to enhance virtual team cohesion and team effectiveness. Development of these components at key points alleviated the key challenges faced by the virtual team members including developing relationships, building trust and understanding team resources. The findings of this study suggest that a combination of virtual teams and co-located teams may be the most effective strategy for projects. Co-located leadership attributes form a foundation in the actions for a project manager, but there is a requirement to understand the nuances and complexities of virtual teams. Once established this would enable the full advantages of adopting virtual teams to be recognised and begin to address the requirement in the construction sector for improving project management skills and increasing productivity.

This study presents effective leadership attributes and action mechanisms for virtual teams and identifies the requirements for developing the virtual team delivery strategy. Organisations should review their delivery strategy and train individuals to be aware of the associated challenges and opportunities of adopting virtual teams. The processes within an organisation need to be updated to support virtual teams and ensure productivity over the project life cycle.

Further research could consider involvement of stakeholders who are not currently integrated within the virtual team within the construction sector. Constant changes in a project can result in significant communication challenges making the inclusion of stakeholders within a virtual team environment worth investigating.

The research recommends that project managers are trained to be virtually aware, understand the virtual team complexities, network widely and be collaborative. These effective leadership attributes will ensure future project managers are prepared to effectively lead virtual teams to deliver major infrastructure design projects globally.

LAING O'ROURKE CENTRE
for CONSTRUCTION ENGINEERING
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The Laing O'Rourke Centre for Construction Engineering and Technology, at the University of Cambridge Department of Engineering, was launched in 2011 with industry partner Laing O'Rourke to fulfil a shared vision of transforming the construction industry through innovation, education and technology. The Construction Engineering Master's (CEM) degree programme is designed to shape the next generation of industry leaders and undertake innovative research projects that deliver value to industry.

Case study

This case study is based upon a Laing O'Rourke Centre for Construction Engineering and Technology, Construction Engineering Master's dissertation titled: *Virtual Teams: effective leadership attributes for project managers* (2018). The research is by James Walker, Senior Manager, Atkins Acuity.

Further details

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