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Using Early Warning Signs to Prevent Global Software Development Failures

By focusing on early warning signs that complement conventional project management activities, project managers can more effectively identify potential risks earlier on in the software development process and raise the odds of delivering against project objectives.

Executive Summary

Every software project is a unique undertaking that requires project management based on its objective, team location, project setup, technology, environment, etc. Global software projects executed in emerging nearshore or offshore locations, such as Hungary or China, involve more risks than co-located or domestic ones. Identifying and proactively managing risks in the early project stages will set a solid foundation for the subsequent execution stages.

For many organizations, risk management measures employed in global projects may not be adequate to identify risks or issues early enough in a relatively new project environment. This white paper discusses early warning signs (EWSs) of failure that are more concrete and noticeable than risks. It discusses how to operationalize the project assessment in early stages, using EWSs to complete the project as originally planned.

There are several heuristics, such as type, clarity, context and cultural aspects, that aid the identification and analysis of EWSs in a project assessment. The assessment process should proceed through three main phases: elicitation, analysis and recommendation. After identifying the EWSs of failure, they need to be managed effectively based on the strategies and measures recommended in the project assessment.

Several challenges can hinder the project manager in detecting EWSs early enough in projects, especially in tightly-scheduled projects. For example, during execution, project managers need to understand the global work context and related cultural elements on which to base their decisions – as well as gut intuition – to manage warning signs. EWSs can help overcome project managers' predilection for not identifying issues early enough in the project. We suggest using an EWS tool to increase the odds of project delivery success, particularly if the project assessment is carried out by independent assessors that offer an objective viewpoint.

DETECTING EARLY WARNING SIGNS

In today's digital economy, companies worldwide are embarking on a greater number of IT projects with ever-increasing global scope. Team members in global projects often find themselves in a remote mode and collaborate with their counterparts using virtual communication channels. This has been the case with software projects executed in emerging nearshore or offshore countries such as Hungary or China. The intangible and invisible nature of code, as well as its inherent complexities, make software projects challenging to complete against plan even when co-located teams are used. The risk of project failure is higher in distributed, global projects than in domestic projects[1] and thus they require particular attention from global project managers.

Apart from the physical distance and time-zone differences involved, global projects are characterized by potential language and cultural barriers. Even though English has become the *lingua franca* in such projects, cultural differences at individual, national, organizational and professional levels persist and can affect project outcomes. Cultural research conducted by Hofstede,[2] Trompenaars[3] and others have revealed the different layers of cultural orientation in people. Nevertheless, the good news is that the success of projects depends more on work practices than cultural orientations,[4] and that such practices within a project can be managed effectively by project managers. This allows team members to feel part of the project by retaining most of their cultural identities.

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the project, especially if team members are new to global projects and do not possess a cultural understanding or intelligence regarding their peer behavior. Varying work practices among team members to provide a project deliverable could lead to problems with collaboration and thus result in the wrong deliverables that could eventually lead to project failures. Project issues need to be tracked and managed early within the project to steer the project back on track. If such failing issues can be identified and managed within the first 20% of the project timeline, the project can be completed according to the original plan. Picture a sailing boat on a time-restricted journey that has lost orientation and navigates back to the right direction if the mistake is found early enough.

EWS instruments are helpful in spotting potential project failures. An EWS can be defined as a project situation or indication that provides concrete information about potential issues in the first 20% of the project's collaboration period.[5] An example of an EWS is a missing written commitment from a vendor team member regarding a deliverable. The vendor team member might have agreed with the client about the need for a deliverable in a meeting. However, the lack of an explicit agreement promising prompt delivery, especially in the absence of a trustful relationship, should be considered a warning sign. The EWS of failure is a type of risk that could potentially be managed better in the project. In contrast to risks, which can also be concrete in nature, EWSs offer a more concrete assessment of perceptions regarding project setup, output, situation or behavior. The perception level will be higher when concrete EWSs are searched for instead of risks that can be abstract.

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Typically, risks are monitored for their probability and impact using the risk log or within a risks, assumptions, issues and dependencies (RAID) log. There are further extensions of RAID logs that include actions, decisions, constraints, etc., and they accompany the project throughout the lifecycle. While it is also possible to track EWSs of failures within the risk log, a project assessment, using EWSs within the first 20% of the project calendar, will provide the most value in terms of corrective actions that could put the project back on track. This analysis within the first 20% of the project is recommended particularly for projects that are managed by project managers who have less global project experience and do not have the cultural intelligence to manage people from different national and organizational backgrounds. Team members in global projects will have varying values and attitudes, and thus their behaviors can make project management challenging.

The visibility of the project manager within the project makes this person the best candidate for carrying out the project assessment. As noted, they can potentially integrate EWSs into the risk log or within the RAID log to manage the project signals. Nevertheless, the project assessment should ideally be carried out early in the project calendar by independent assessors to obtain independent and objective perspectives.

DIMENSIONS FOR IDENTIFYING EARLY WARNING SIGNS

When assessing potential failures in global software projects, several heuristic dimensions must be considered for proper identification and analysis of EWSs. The dimensions include type, clarity, context and cultural aspects (see Figure 1).

Dimensions for Identifying Early Warning Signs

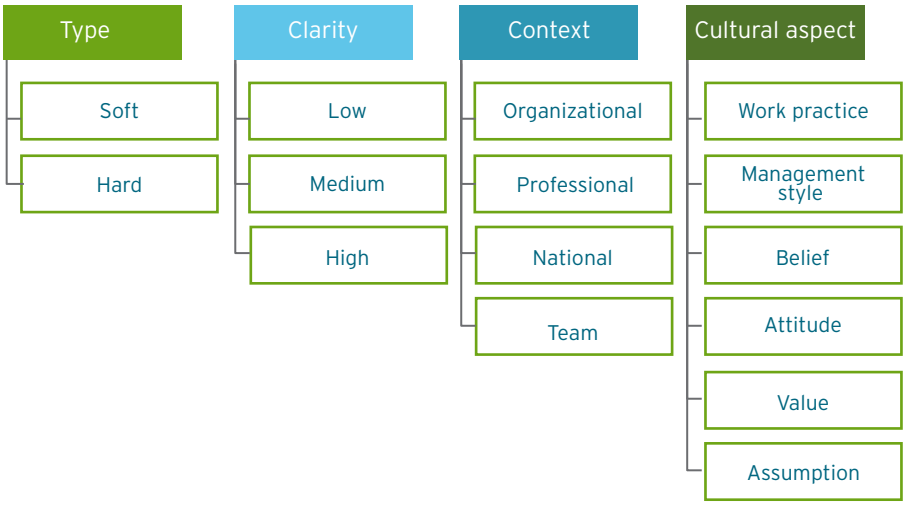

Figure 1

The type of EWS could be either soft or hard.[6] Hard EWSs involve technical deliverables that are easier to measure and detect (e.g., the deviation in project deliverables), whereas soft EWSs are human-related and typically involve behavioral complexities of team members (e.g., junior team members are silent in front of their seniors). Soft EWSs are more challenging to detect when there are multiple cultures involved; some national and team cultures are more dominant than others.

In order to establish EWS reliability, clarity needs to be assessed. Based on signal intensity, it can be high, medium or low to become a potential issue. Low clarity of an EWS means that the warning sign is not strong enough to provide clear indications and, as such, certain false positives could also appear in the assessment. High clarity means that the identified EWS can be clearly related to an impending issue. A high level of clarity corresponds to the high probability of a signal or risk becoming an issue, and one needs to take action based on signals.

Assessing context will help to understand and differentiate the signs that require checking. The main contexts span organizational, professional, national and team attributes. Among these contexts, the professional context requires special attention, as the software development profession is different from sales and marketing or human resources, and as a result the subtleties of professional behaviors need to be kept in mind during the analysis.

Further, based on the contexts, several cultural aspects provide hints regarding the way individuals work and behave. Characteristics that require deep analysis during the assessment include team work practices and management styles, as well as team members' underlying beliefs, attitudes, values and assumptions. These underlying aspects typically remain invisible and require more scrutiny to assess.

ASSESSMENT OF PROJECTS USING EARLY WARNING SIGNS

EWS assessment within a project involves three phases, as illustrated in Figure 2. In the elicitation phase, stakeholders closest to the project (e.g., the project manager, technical project manager and engagement manager) are interviewed to elicit project signs, situations or indications that could lead to potential issues. Focus groups and workshops involving multiple people working from the same area (e.g., business analysis or quality management) could provide further focused information regarding a project's warning signs. As software is intangible, there is a lack of intensity and subtlety in the early project stages. Only once the final or intermediate deliverables are provided can project managers usually detect issues.

In the analysis phase, based on the EWSs elicited, the project assessor needs to confirm their existence and check for associated potential project issues. The aforementioned EWS dimen-

EWS Assessment Phases

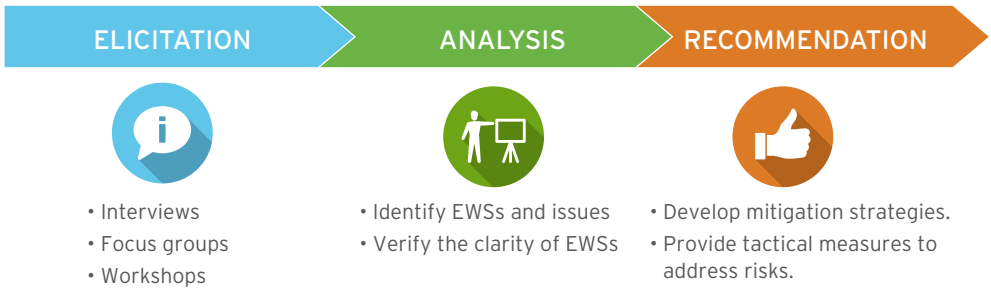

Figure 2

sions form a basis for analysis in this phase. With the warning signs in global software projects becoming clearer as the project progresses, it is important to note the clarity of the sign in order to assign it to an upcoming issue. If more EWSs point to a potential issue, clarity will improve and thus they may require particular attention. If the situation allows, the identified EWSs could be verified with vendor or client counterparts to gain even better clarity.

Based on the analysis of identified EWSs in the project to produce turnarounds, the recommendation phase then involves the development of corrective measures and mitigation strategies for each EWS. This step involves recommending quick corrective measures as well as medium- or long-term remedies. An example of an EWS assessment is depicted in Figure 3.

PROJECT MANAGEMENT FRAMEWORK AND WORK CULTURE IN GLOBAL PROJECTS

In global project execution, it is particularly important to look for EWSs in two domains: shared project management framework and shared work culture.[7] The shared project management framework comprises common structures required to execute the global project such as project management methodology, document management, change management, infrastructure management, etc. They are prerequisites for global teams to execute and move forward with the project, especially when the vendor and client have different organizational and professional cultures. Both vendor and client need to agree on a common project framework that will result in shared execution structures.

Shared work culture involves the common understanding of work practices and behaviors of team members based on work contexts and cultural orientations. Despite cultural differences among team members, an awareness of their cultural orientations, especially by project managers, will help to avoid misunderstandings, miscommunications and misjudgments within distributed teams. The resulting working and management styles of remote teams could be an amalgam of different styles that are either combined or adapted to fit the global team.

EWS Assessment: An Illustrative Example

Early Warning Sign	Originator	Type	Clarity	Potential Issue	Mitigation Strategy
Sporadic interactions between client and vendor teams.	Tim Smith	Hard	High	Lack of agreed communication structure.	Set up a communication plan.
Knowledge feedback mechanism shows missing business knowledge.	Catherine Clinton	Hard	Medium	Vendor offshore team lacks domain-specific knowledge.	Plan a comprehensive knowledge transfer.
Team members are silent.	Tim Smith	Soft	Low	Team members lack communication competency.	Brief team members about client expectations regarding communication.
Expectation gaps in technical deliverable.	Barbara Muller	Hard	Medium	Vendor team members lack required technical skills.	Assess technical skills required to deliver requirements.

Figure 3

Early Warning Signs in Global Projects

Category	Early Warning Sign	Potential Issue
Shared project management framework.	Missing definition or understanding regarding deliverables.	Deliverables or outputs do not conform to expectations.
	Vendor and client teams have no common data repository.	Lack of document version management.
	Lack of established change management processes.	Lack of project control regarding budget and timelines.
	Software and hardware versions at client and vendor sides are not identical.	Software could result in poor performance or even incompatibility.
	Nonfunctional requirements are not known.	Poor performance or security vulnerabilities could result in operational failure of system.
	Deadlines not met by vendor offshore team.	Cultural differences between vendors and clients regarding deadlines could lead to project delays.
Shared work culture.	Repeated expectation gaps in deliverables.	Quality of deliverables to affect project execution and thus team trust.
	Lack of regular meetings between vendor offshore and onsite teams.	Vendor onsite team could simply expect the offshore team to provide deliverables.
	Missing openness by vendor to communicate delays in advance.	Differing working styles could affect project execution.
	Vendor team members do not speak openly in front of superiors.	Team hierarchies in vendor teams could result in non-commitment for a task unless confirmed by managers.
	Vendor team members do not provide explicit or written commitment for a deliverable.	Courtesy in discussions between vendors and clients could be misunderstood as commitment.

Figure 4

Figure 4 lists some of the most prominent EWSs in global projects and their consequent issues. These EWSs could act as an initial checkpoint to begin the project assessment in global projects. The dominant context and their cultural aspects in the project provide hints regarding the identification of EWSs and the resolution of corresponding issues.

CHALLENGES TO DETECT EARLY WARNING SIGNS

While identifying EWSs, it is also important to eliminate false positives based on their clarity. This elimination involves checking the early warning situations or indications with emerging potential issues, and possibly verifying with peers and counterparts whether the identified EWSs could potentially become an issue. EWSs become more concrete as the project progresses.

To ensure that the detected EWS is valid, project managers need to check for other indications that could also point to the same potential issue, which will provide more clarity to the EWS. The potential issue should then become the focus of attention. Such a confirmation could also

involve a verification with the client or vendor to acknowledge the existence of an EWS and the potential issue.[8] This could especially be challenging in global software projects, in which vendors and clients face imperfect monitoring situations because of distributed project work. The IT industry is especially known for detecting issues very late because of the intangible nature of software.

The experience of project managers in global projects could help to detect EWSs in time. Novice project managers who lack the cultural intelligence of the work context will initially find themselves in a difficult position to manage global projects. With increasing experience and exposure to national and team cultures of the organizations involved, project managers will be better able to notice the management and working styles of team members. Knowledgeable or culturally intelligent managers could then notice the cultural differences and develop strategies accordingly to adapt, combine or enforce different working styles within the project.

The working and management styles of team members with more exposure to global projects involving different cultures will change since culture itself remains a dynamic construct. Detection of cultural subtleties involves intelligence regarding values, beliefs, attitudes, assumptions and resulting behaviors of team members. It will mostly require a gut feeling of project managers that will evolve with greater exposure to global projects. While detecting the patterns involved in cultural orientations, it is important not to use patterns (e.g., Indians always follow strict team hierarchies; Americans always behave like individualists) as stereotypes, but rather use their cultural learning as a basis to understand a team member originating from a different country. Team members who have worked on projects throughout various countries could exhibit different behavior as a result of their globalized work experiences. Working with people across countries needs to be considered as a positive and enriching asset rather than a liability in global projects.

LOOKING FORWARD

Identifying and managing EWSs could complement risk management measures in global projects. Although project managers can apply this instrument throughout the project, our recommendation is to use EWSs as a quick project assessment in early project stages to set the stage for further project execution. Detection and management of EWSs in early collaboration stages between global teams will allow the problems or risks to be resolved before they become real issues.

EWSs are more concrete and noticeable than risks as their existence can be perceived by the level of clarity, and therefore can be managed effectively. EWS detection in tightly scheduled projects remains a challenge as project managers need to employ their gut feelings to identify signals, as well as to eliminate false positives. Understanding the relevance of a common understanding of the project management framework and work culture in global software projects is also very important to avoid failure.

Depending on the outcome of the project assessment, several other EWSs related to the global team management, global team collaboration, team behaviors, etc., could be developed further for managing warning signs. Once EWSs are identified, project managers can manage them as they manage risks in global projects.

FOOTNOTES

[1] Iacovou, C. L. and Nakatsu, R. (2008). "A risk profile of offshore-outsourced development projects." *Communications of the ACM*, 51(6), 89-94.

[2] Hofstede, G. H. (1984). *Culture's Consequences: International Differences in Work-Related Values*. Sage Publications, Beverly Hills.

[3] Trompenaars, F. (1993). *Riding the Waves of Culture: Understanding Cultural Diversity in Business*. Nicole Brealey Publishing, London.

[4] Karahanna, E., Evaristo, J. R. and Srite, M. (2005). "Levels of culture and individual behavior: an integrative perspective." *Journal of Global Information Management*, 13(2), 1-20.

[5] Philip, T., Wende, E., and Schwabe, G. (2013). "Exploring early warning signs of failure in offshore-outsourced software development projects at the team level." In: *21st European Conference on Information Systems*, Utrecht, The Netherlands.

[6] Klakegg, O. J., Williams, T., Walker, D., Andersen, B. and Magnussen, O. (2010). *Early Warning Signs in Complex Projects*. Project Management Institute, Newtown Square.

[7] Philip, T., Wende, E., and Schwabe, G. (2013). "Exploring early warning signs of failure in offshore-outsourced software development projects at the team level." In: *21st European Conference on Information Systems*, Utrecht, The Netherlands.

[8] Philip, T., Wende, E. and Schwabe, G. (2013). "Why project managers fail to act upon early warning signs: evidence from failed offshore-outsourced software projects." In: *21st European Conference on Information Systems*, Utrecht, The Netherlands.

ABOUT THE AUTHOR

Tom Philip

Senior Consultant,
Digital Transformation Team

Dr. Tom Philip is a Senior Consultant within Cognizant Business Consulting's Digital Transformation Team. He has worked in the telecommunications, life sciences and aviation industries, and his works have appeared in leading publications. Tom's interest areas include global IT services, project management and project failures. He holds master's and Ph.D. degrees in information systems from the University of Zurich. Tom can be reached at Tom.Philip@cognizant.com.

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Cognizant

World Headquarters

500 Frank W. Burr Blvd.
Teaneck, NJ 07666 USA
Phone: +1 201 801 0233
Fax: +1 201 801 0243
Toll Free: +1 888 937 3277

European Headquarters

1 Kingdom Street
Paddington Central
London W2 6BD England
Phone: +44 (0) 20 7297 7600
Fax: +44 (0) 20 7121 0102

India Operations Headquarters

#5/535 Old Mahabalipuram Road
Okkiyam Pettai, Thoraipakkam
Chennai, 600 096 India
Phone: +91 (0) 44 4209 6000
Fax: +91 (0) 44 4209 6060

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