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Structural Balance and Creative Tensions in New Product Development Teams

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Abstract : New Product Development involves team members coming together and working in teams to come up with innovative solutions to problems, resulting in new products. Thus, a core attribute of a successful NPD team is their creativity and innovation. They need to be creative as a group, generating a breadth of ideas and innovative solutions that solve or address the problem they are targeting and meet the user's needs. They also need to be very efficient in their teamwork as they work through the various stages of the development of these ideas, resulting in a POC (proof-of-concept) implementation or a prototype of the product. There are two distinctive traits that the teams need to have, one is ideational creativity, and the other is effective and efficient teamworking. There are multiple types of tensions that each of these traits cause in the teams, and these tensions reflect in the team dynamics. Ideational conflicts arising out of debates and deliberations increase the collective knowledge and affect the team creativity positively. However, the same trait of challenging each other's viewpoints might lead the team members to be disruptive, resulting in interpersonal tensions, which in turn lead to less than efficient teamwork. Teams that foster and effectively manage these creative tensions are successful, and teams that are not able to manage these tensions show poor team performance. In this paper, it explore these tensions as they result in the team communication social network and propose a Creative Tension Balance index along the lines of Degree of Balance in social networks that has the potential to highlight the successful (and unsuccessful) NPD teams. Team communication reflects the team dynamics among team members and is the data set for analysis. The emails between the members of the NPD teams are processed through a semantic analysis algorithm (LSA) to analyze the content of communication and a semantic similarity analysis to arrive at a social network graph that depicts the communication amongst team members based on the content of communication. This social network is subjected to traditional social network analysis methods to arrive at some established metrics and structural balance analysis metrics. Traditional structural balance is extended to include team interaction pattern metrics to arrive at a creative tension balance metric that effectively captures the creative tensions and tension balance in teams. This CTB (Creative Tension Balance) metric truly captures the signatures of successful and unsuccessful (dissonant) NPD teams. The dataset for this research study includes 23 NPD teams spread out over multiple semesters and computes this CTB metric and uses it to identify the most successful and unsuccessful teams by classifying these teams into low, high and medium performing teams. The results are correlated to the team reflections (for team dynamics and interaction patterns), the team self-evaluation feedback surveys (for teamwork metrics) and team performance through a comprehensive team grade (for high and low performing team signatures).

Keywords : team dynamics, social network analysis, new product development teamwork, structural balance, NPD teams
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