

Computational Team Dynamics in Student New Product Development Teams

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Abstract : Teamwork is an extremely effective pedagogical tool in engineering education. New Product Development (NPD) has been an effective strategy of companies to streamline and bring innovative products and solutions to customers. Thus, Engineering curriculum in many schools, some collaboratively with business schools, have brought NPD into the curriculum at the graduate level. Teamwork is invariably used during instruction, where students work in teams to come up with new products and solutions. There is a significant emphasis of grade on the semester long teamwork for it to be taken seriously by students. As the students work in teams and go through this process to develop the new product prototypes, their effectiveness and learning to a great extent depends on how they function as a team and go through the creative process, come together, and work towards the common goal. A core attribute of a successful NPD team is their creativity and innovation. The team needs 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. The simultaneous requirement of teams to be creative and at the same time also converge and work together imposes different types of tensions in their team interactions. These ideational tensions / conflicts and sometimes relational tensions / conflicts are inevitable. Effective teams will have to deal with the Team dynamics and manage it to be resilient enough and yet be creative. This research paper provides a computational analysis of the teams' communication that is reflective of the team dynamics, and through a superimposition of latent semantic analysis with social network analysis, provides a computational methodology of arriving at patterns of visual interaction. These team interaction patterns have clear correlations to the team dynamics and provide insights into the functioning and thus the effectiveness of the teams. 23 student NPD teams over 2 years of a course on Managing NPD that has a blend of engineering and business school students is considered, and the results are presented. It is also correlated with the teams' detailed and tailored individual and group feedback and self-reflection and evaluation questionnaire.

Keywords : team dynamics, social network analysis, team interaction patterns, new product development teamwork, NPD teams

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