LoCo CoCo: Automatically Constructing Coordination and Communication Networks from Model-Based Systems Engineering Data

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1 Extended Abstract

Communication and coordination are essential activities in software and systems engineering [KS95]. In particular, communicating requirements [He07], and sharing the product and contextual knowledge required to understand requirements during analysis and development [Li16] are challenging.

The structure of all interacting individuals and groups in an organisation can be described and analysed as a social network. Social network analysis (SNA) and has successfully been used in software engineering to facilitate collaboration and relationships among individuals in software teams [Wo09].

Existing automated approaches for SNA, such as Codebook [BKZ10], focus on software development artefacts on a low level of abstraction, such as source code or bug requests. However, in large systems engineering projects, communication between different disciplines is required [Li16], taking place on a domain level independent of the source code.

We present LoCo CoCo, the Low-Cost Communication and Coordination approach, the result of a one-year design science research project at a large automotive original equipment manufacturer (OEM). LoCo CoCo automatically creates social networks from model-based systems engineering data by leveraging a structural meta model similar to standards like EAST-ADL [EA].

We identify people and their relations by extracting ownership and trace information from systems engineering data. The resulting networks are used as a supporting tool for enabling or improving communication and coordination. We evaluated LoCo CoCo analytically, by constructing social networks from real-life systems engineering data at the industrial

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partner. Additionally, we collected empirical data from 15 interviews and 12 surveys with practitioners.

Our results indicate that LoCo CoCo helps addressing existing communication challenges by identifying important contacts across the organisation structure, thus facilitating communication of requirements in systems engineering. While we observed that the quality of social data in existing systems engineering tools, such as ownership data or information about who changed elements, is sometimes low, practitioners rated it as sufficient. Furthermore, visualising erroneous connections due to outdated social data can trigger practitioners to update the data. Finally, we elicited several ethical implications arising from the use of social data. These will have to be considered when using LoCo CoCo or similar approaches in industry.

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