Abstract

Trust is widely considered to be essential for the smooth functioning of digital ecosystems. However, trust by its very nature, and due to the virtual connection between entities, is extremely fragile. Trust has a life cycle which is composed of building, maintaining, and declining. Given the fragility of trust in virtual environments, it is challenging to work out how to maintain the level of trust (specifically positive trust) between two interacting parties. Once positive trust has been established in the trust building phase, a methodological framework is needed to maintain the existing trust level, so that the relationship may be sustained in the future. In this paper, we present amethodology for maintaining trust in industrial digital ecosystems. The methodology proposes the use of a third party agent, an iterative negotiation process, proactive performance monitoring, and intelligence metrics recalibration of the trust level. In a trust-based relationship, trust can be regarded as having been maintained if the final trust isgreater than or equal to initial trust. We demonstrate the validity of the methodology by engineering a prototype setup and running simulations under various operational conditions.

Index Terms—Cyber engineering, digital ecosystems, final trust, initial trust, trust maintenance.