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An Evaluation Method for Team Competencies to Enhance Nuclear Safety Culture

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Synopsis

Safety culture has received attention in safety-critical industries, including nuclear power plants (NPPs), due to various prominent accidents such as concealment of a Station Blackout (SBO) of Kori NPP unit 1 in 2012, the Sewol ferry accident in 2014, and the Chernobyl accident in 1986. Analysis reports have pointed out that one of the major contributors to the cause of the accidents is 'the lack of safety culture'. The term, nuclear safety culture, was firstly defined after Chernobyl accident, by the International Atomic Energy Agency (IAEA) in International Nuclear Safety Advisory Group (INSAG) report no.4, as follows: Safety culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted their significance. [1]

Afterwards, a wide consensus grew among researchers and nuclear-related organizations, that safety culture should be evaluated and managed in a certain manner. Consequently, each nuclear-related organization defined and developed their own safety culture definitions and assessment methods.

However, none of these methods provides a way for an individual or a team to enhance the safety culture of an organization. Especially for a team, which is the smallest working unit in NPPs, team members easily overlook their required practices to improve nuclear safety culture. Therefore in this study, we suggested a method to estimate nuclear safety culture of a team, by approaching with the 'competency'point of view.

The competency is commonly focused on individuals, and defined as, "underlying characteristics of an individual that are causally related to effective or superior performance in a job"[2]

Similar to safety culture, the definition of competency focuses on characteristics and attitudes of individuals. Thus, we defined 'safety culture competency'as 'underlying characteristics and outward attitudes of individuals that are causally related to a healthy and strong nuclear safety culture'. Based on individual safety culture competency, team safety culture competency was defined similarly, but more focused on shared values among team members. The definition of team safety culture competency is defined as follows; underlying and sharing characteristics, outward attitudes, and pattern of behavior of team members that are causally related to a healthy and strong nuclear safety culture.

In the first step of this study, we derived team safety culture competencies. To this end, the strategic success modeling (SSM) method was used to satisfy the criteria of existing international and domestic safety culture assessment methods. Through SSM, we derived a total 52 competencies for a general team in NPP.

In order to evaluate the competencies of a team, Social Network Analysis (SNA) was chosen, which a strategy for investigating the relationship through the use of network and graphical elements. [3] SNA has a strength, that the pre-modeling of composing elements is not required. The result of SNA itself shows the relationship among elements of team safety culture competencies.

Observation data of a team is gathered from a qualified observer, within a given observation criteria. Data are arranged in rows for each team member and in columns for the numbers of observed inappropriate team safety culture competencies. Then the matrix is operated to derive the density of team members, and the de-

gree centrality of team safety culture competencies, which could represent the degree of deficient team safety culture competencies among team members, in numerical and graphical ways.

It is expected the proposed evaluation method of team safety culture competencies not only provides concrete practices to enhance safety culture, but also enables to analyze the shared values and the underlying characteristics of team safety culture.

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