The structure network (authors Julian Häußer and Martin Werdich / FMEAplus Academy)

For decades, the structure tree has been taught in FMEA methodology for structural analysis. With this article we would like to introduce the structure net. This would be, in our opinion, a useful evolution for realistic FMEA models.

State of the art is a structure tree, whose root element is the highest structure level. However, since functions and defects are modeled in nets, structural inconsistencies arise in some cases. These in turn often lead to inconsistencies, long discussions and compromises, which are not in the sense of a complete, conscientious and goal-oriented analysis. After all, the more realistic a model is, the more likely it is to be accepted by those involved, provided it does not appear too complicated.

Example effects:

One of the problems a moderator has when modeling consequences is that several consequence levels have to be considered in one root element.

Law	User	Vehicle	Parent system	Customer	Parent assembly	Production	Focus element

However, this would be confusing in the modeling, not representable in the form and not representable in many softwares. Therefore, each presenter has developed their own approach to how they implement this problem. The most commonly used solution to this problem is to combine the sequence elements in the root element.
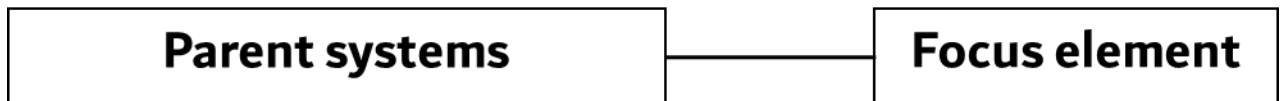

In a structure network we can clearly and practicably represent the system elements of higher hierarchy with their functions individually.
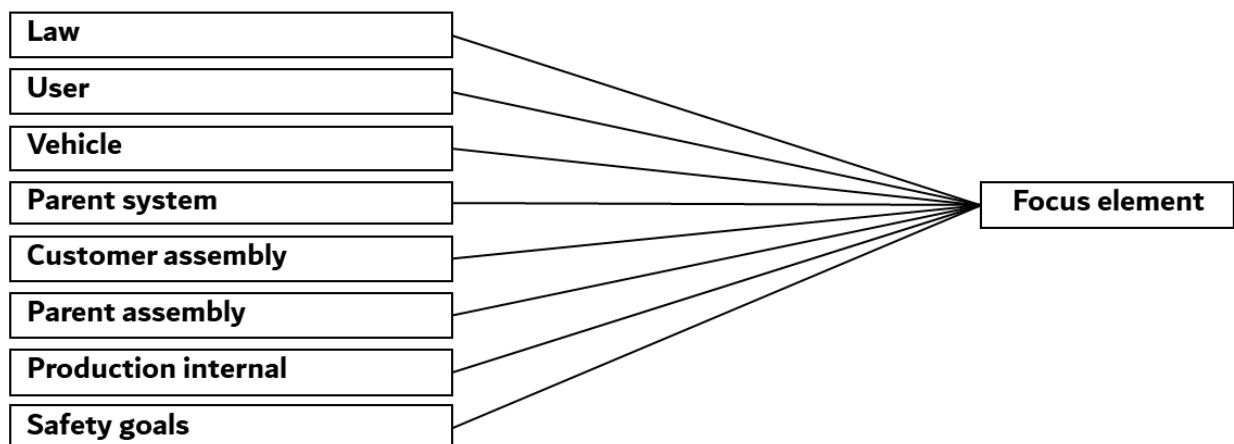

Example of cause levels:

When modeling function, and consequently fault, networks with multiple levels, the moderator has the problem that a cause function can be linked to functions of several higher level system elements. Although this can usually be represented in the software, it inevitably leads to the violation of structural integrity in the case of structural trees and, in addition to error proneness, also leads to unnecessary discussions.
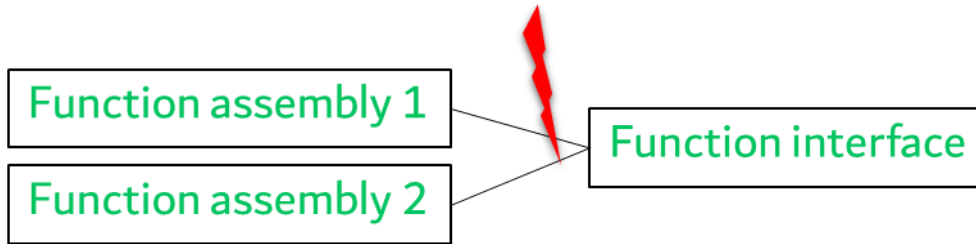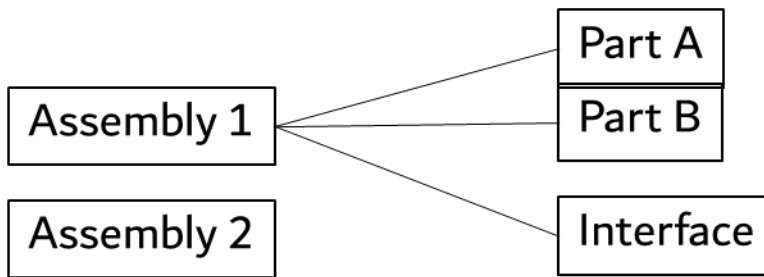
Here, too, moderators apply various fallback solutions in practice. The worst one is that the rule "A system element may be noted only once in the structure tree" is ignored and one and the same cause element is present several times.

A structure mesh would completely eliminate this problem due to the more realistic modeling.
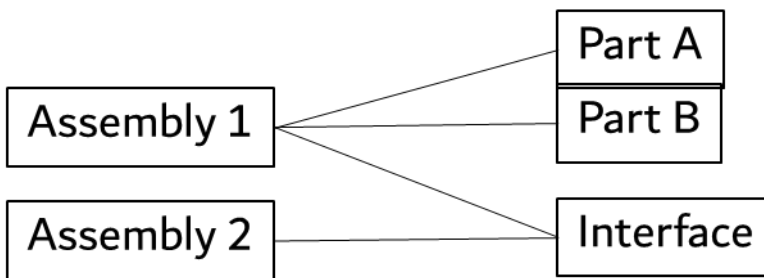
A counter-argument could be: "Such a structure net becomes completely unclear". But, as in the function and error meshes, it is possible to focus on one element. The clarity of complicated models is thus achieved by "intelligent hiding" and corresponding focus as before.
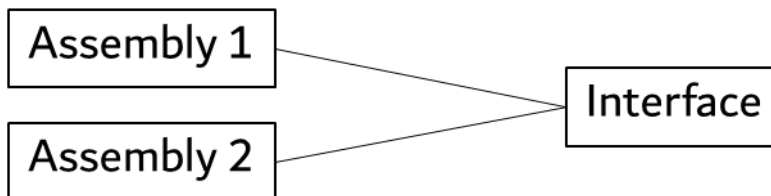
We believe a structure network is necessary to maintain structural integrity and avoid unnecessary extra work. In addition, it would only be consistent to use a structure network if error and function networks are already established.

What is your opinion? Write in our blog on Blog: FMEAplus Akademie

A detailed article with further arguments and discussion feedback will be published by us in the next magazine "FMEA-konkret" in summer 2021.