Process industries rely on process control and safety instrumented systems (SIS) to minimize the potential and consequence of hazardous incidents. As the computer-based systems become more complex, there is the potential for inaccuracies and errors in program logic to introduce new causes of process deviations (abnormal situations) to the process plant. Finding these errors requires extensive review of the software utilizing traditional document tools. The novel chain-of-events analysis provides an effective aid in this process by extracting the linkage information from the system and creating an interaction table from which displays and reports may be generated to illustrate the influencing relationships among process control and SIS entities (points and their parameters). This method is also useful for routine maintenance and operation of a facility. It also provides assistance in analyzing alarms for abnormal situation management.