John Walkington and Stuart Nunns
ABB Technology Group
Functional Safety Management
contact: john.walkington@gb.abb.com

Functional Safety Management
Assuring your Safety Instrumented Systems Requirements

1. Introduction
The focus for delivery of your SIS will be via the company’s safety management systems. Such systems will need to address corporate responsibility, development of a safe culture of work, implementation of a basis of safe operation and competency for staff at all levels within the organisation. In developing a basis of safe operation, the operator’s need to have systems and procedures in place that can address the needs of Process Safety, Functional Safety, Product Safety and Competency Assurance. All four parameters are required to come together in the desire to reduce the operating risk to a minimum, or ‘As Low as Reasonably Practicable’ (ALARP).

Fundamentally, this commitment should ensure that an adequate basis of safety is derived for all operating facilities. This basis of safety should cover the requirements for process safety management, hazard and risk assessment, the development of protective and mitigation measures, and the standards and systems to design, engineer, install, operate and maintain to world-class standards.

2. Impact on the Supply-Chain
In most end user organisations today, the capacity to engineer large scale safety projects and have resident functional safety expertise is no longer the norm. Right sizing and downsizing is common place, mergers and acquisitions frequently result in a core expertise becoming fragmented or lost. For these lean organisations and management structures there is an ever increasing requirement for the provision of products and services from competent third parties.

Equally many large safety projects involve complex supplychain models with complex interactions, responsibilities and deliverables. This can typically involve a consortium of end users, regulatory bodies, EPCs, third party auditors and functional safety assessors, engineering and design organisations, accredited certification bodies, independent consultants, etc. In some cases, many end users have difficulty in fully understanding the requirements of the functional safety standards themselves and experience difficulties in understanding just who has overall responsibility for managing the achievement of functional safety throughout the lifecycle of the project.

3. So what are the issues in the delivery of assured layers of protection?
Experience suggests that this usually manifests itself in a lack of clarification of safety requirements, a too conservative or inadequate development of the basis of safety, overspend in unnecessary equipment, lack of definition and cost effective proof testing regimes, inadequate assessment of supplier’s capabilities and competencies, etc.

To assist in achieving these requirements, Industry today is utilising the safety lifecycle models as found within EC61508 & 61511 functional safety standards (diagrams opposite), to align the above requirements in terms of processes, structure and deliverables as a means of demonstrating overall improvement.

4. Managing the required change?
In considering a seamless approach the following are core to supporting both Process and Functional Safety Management requirements:

- hazard & risk management
- safety instrumented system delivery (ESD, alarms and fire & gas)
- operators and maintenance
- operational management and management of change

4. continued
Critical to managing the work scope is the visibility of who is responsible for ensuring functional safety is delivered throughout the safety lifecycle activities. The core activities require dedicated, competent resources in full alignment throughout the supply chain to truly deliver the necessary risk reduction requirements and this is by no means a straightforward task. This is where a FSMS which has been assessed as being compliant with the standards by a reputable accredited third party can assist the visibility and traceability of functional safety scope requirements and verified deliverables.

5. Where are we now?
Invariably the basis of safety will identify the need for SIS. The application of modern programmable technology offers significant economic and safety benefits to end users and operators of hazardous processes. However, to exploit this potential the technology must be applied in a compliant and competent manner and this means the adoption of Industry best practice and the corresponding relevant standards such as IEC 61508 and IEC 61511. In any case, the requirements of these standards cannot be ignored, especially as Industry across all sectors is specifying them as a functional safety benchmark and a contractual requirement.

So what are the perceived benefits from an increased safety assured solution? By harnessing the use of a supply chain that can provide a seamless safety assured solution and in doing so provide all the necessary deliverables as outlined previously, an operator is better able to demonstrate that their Process Safety Management and Functional Safety deliverables do indeed match the whole of the safety lifecycle requirements. See example FS lifecycle plan below for design and engineering of an SIS.

6. Conclusions?
Whether embarking on delivering a new (Greenfield) project, or for managing your existing (Brownfield) asset, for increased safety assurance, the requirement to ever improve process and functional safety management techniques and competencies should be paramount within any responsible organisation.

To do this requires senior management commitment and a willingness to persevere whilst under pressure to possibly compromise. In a competitive manufacturing environment, we should not forget that in addition to minimising risks to as low as reasonably practical, profit and safety are inextricably linked. Achieving this balance is an ever present dilemma which continues to challenge all stakeholders at all levels of the business.

Figure 1: Linkage of the Key Safety Assurance Parameters

IEC 61508
IEC 61511

Assuring your Safety Instrumented Systems Requirements

Linkage of the Key Safety Assurance Parameters

IEC 61508
IEC 61511