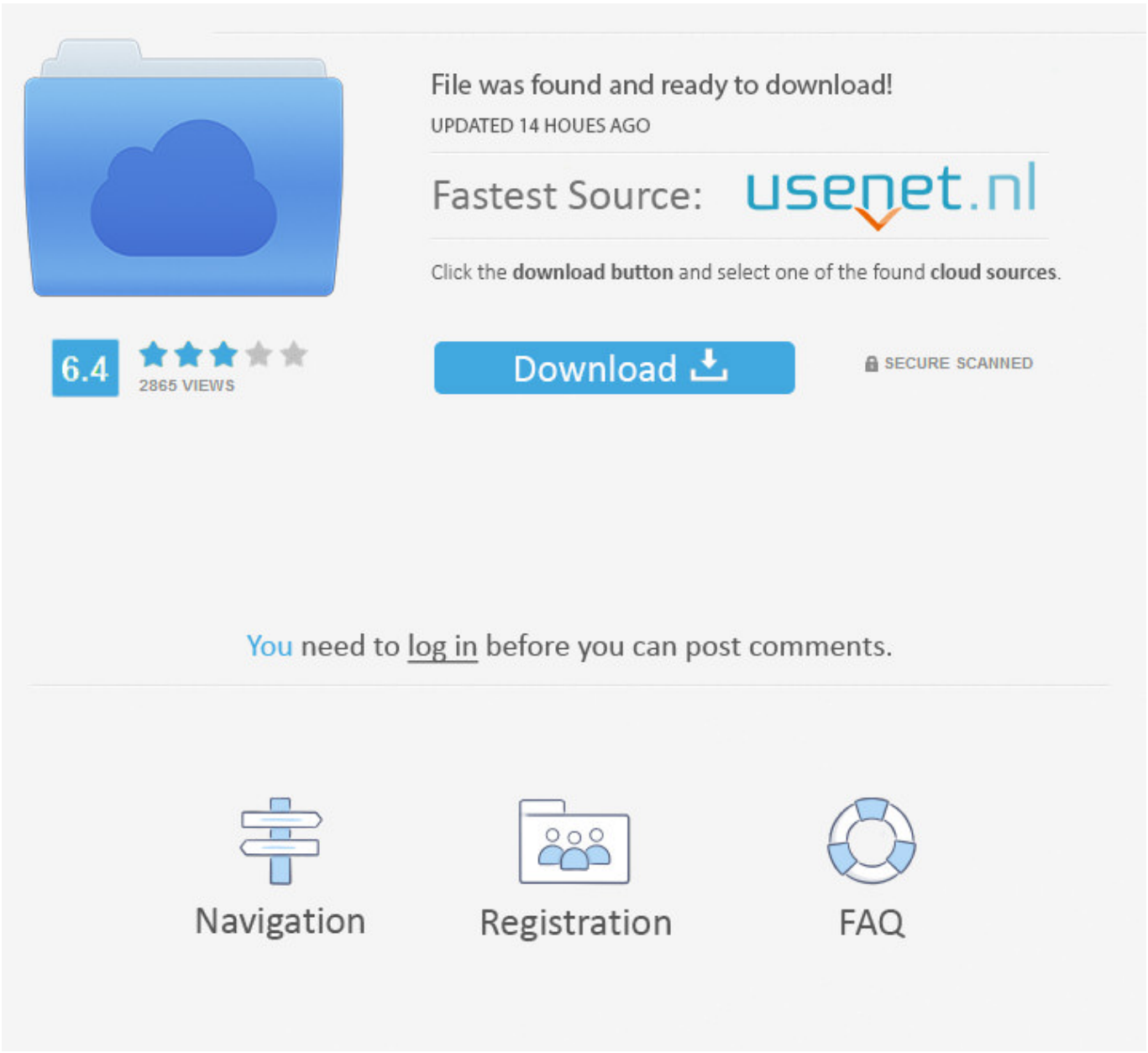

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Implementation of ANSI/ISA-84.00.01-2004 (IEC 61511 Mod)" specifically addresses the FSM by defining a Roles & Responsibilities Matrix including the experiences and skills required for the disciplines represented in the R&RM. In spite of importance of a full and efficient FSM implementation, this process is made difficult due to criminal and civil liabilities associable to accidents potentially having a direct association to the approval responsibility defined in the FSM R&RM for SIS safety lifecycle activity.

4. Trends

4.1 Current trends

The current trend of IEC 61508 and IEC 61511 application is absolutely satisfactory in the process industry with the exception of only a few sectors reluctant to any change of the approach to process safety. The same successful trend applies to machinery sector where the compliance with IEC 62061 starting from 2011 is full.

4.2 Favourable trends

- EN 61508 and EN 61511 Norms harmonization to Seveso Directive;
- IEC 61508 Certification Bodies notified by EU Authorities;
- IEC 61508 Certification Plan and Activities covered by IEC 61508;
- SIS active components all covered by IEC 61508 Certification;
- IEC 61508 application guidelines issue;
- IEC 61508 derived standards for non-process industry and road tunnels;
- SIS full compliance with IEC 61508 cyber-security requirements
- Safety Manuals and Restrictions to Use to cover the 100% of SIS active and passive components;
- HazOp team and leader competent and expert in functional safety;
- HazOp to fully determine initiating causes and consequences of hazardous events;
- HazOp to fully determine the occurrence of hazardous events in abnormal conditions;
- QRA application to be set up as HazOp action whenever consequences lead to SIL 3;
- Mitigation Risk Targets for Safety and Environment to be set per industry sector;
- Introduction of SIL, EIL, AIL respectively for Safety, Environment and Assets risk mitigation;
- SIL Assignment methodologies (CRG and LOPA) to be fully defined on IEC 61508 and/or IEC 61511-3;
- Independency criteria of DCS alarms, DCS interlocks, DCS permissives to be fully defined on IEC 61511;
- SRS to be fully defined on IEC 61511-1 including I/O channels segregation criteria;
- FSA activities to be fully defined on IEC 61511-2;
- Management of Functional Safety (FSM) to be fully defined on IEC 61511-2;
- Full Variability Language software currently to be executed under IEC 61508-3 requirements to be defined under EC-61511-1 to avoid misinterpretations and double standard compliance inconsistencies;
- Minimum hardware fault tolerance to be uniquely defined for IEC 61508 and IEC 61511;
- SIL verification methodologies (simplified equations, RBD, FTA) to be fully reported on IEC-61511-3;
- Qualified FMEDA mandatory for the definition of failure rates and SFF for each SIS device;
- Mission time definition mandatory for each SIS device;
- Expert systems risk reduction capability recognition.

In spite of the efforts of four generations of engineers the goal of an accident-free process industry has still to be reached, but we glimpse a light at the end of tunnel.

References

EN 61508, 2010, Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems
IEC, CH

EN 61511, 2003, Functional Safety: Safety Instrumented Systems for the Process Industry
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EN 62061, 2005, Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems
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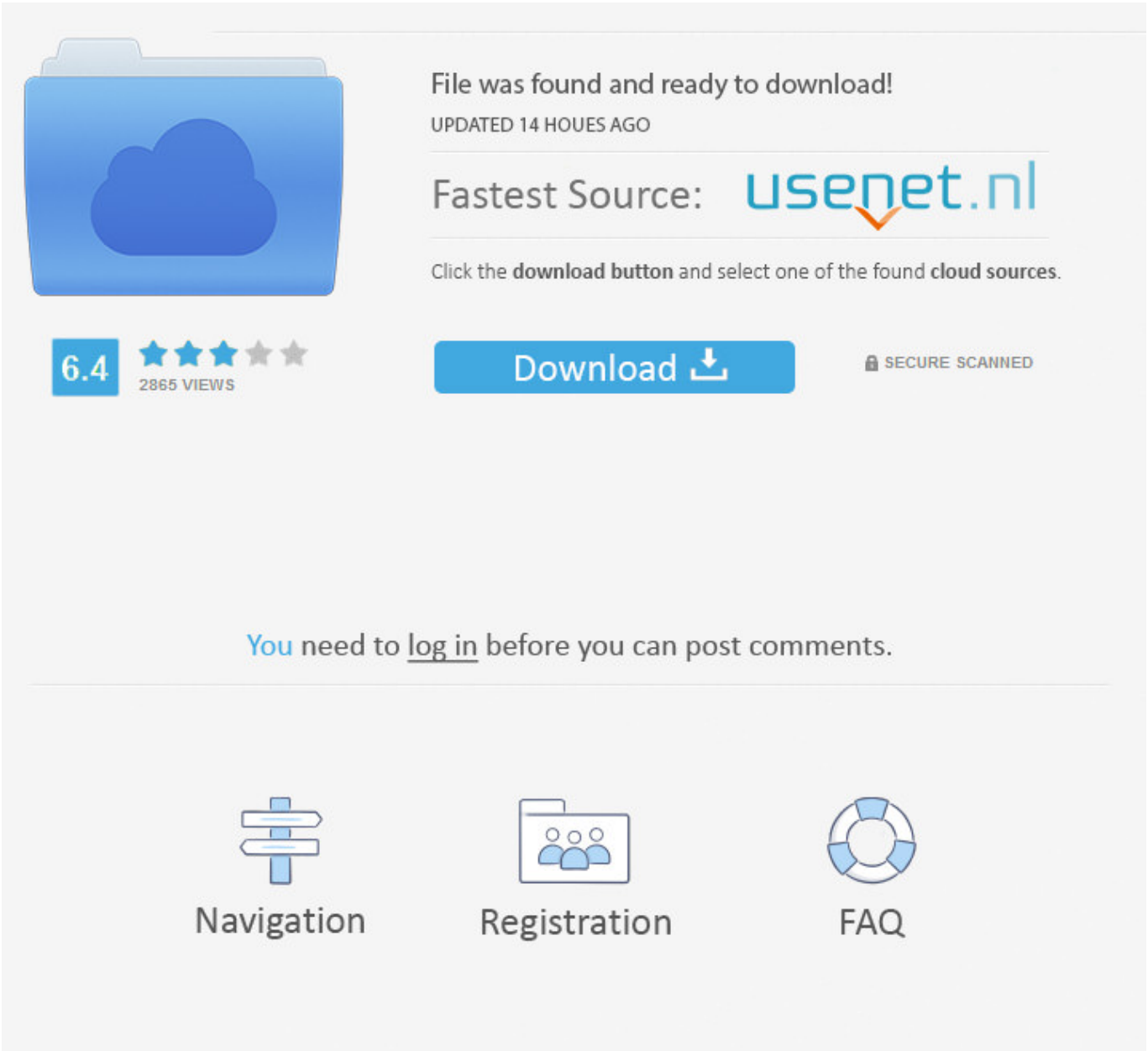

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