





*Risk analysis of complex technological systems, using the methods listed below:*

## **Risk Identification**

- *Hazard and Operability Studies (HAZOP, using conventional methods, such as guide-words, and advanced techniques, such as Recursive Operability Analysis)*
- *Failure Modes, Effects and Criticality Analysis (FMECA)*
- *Safety Audits*
- *Preliminary Hazard Analysis (PHA)*
- *Hazard Identification Analysis (HazId)*



## **Quantification of the probability of the unwanted events**

- *Fault Tree Analysis (FTA)*
- *Event Tree Analysis (ETA)*
- *Safety Integrity Levels (SIL)*
- *Integrated Dynamic Decision Analysis (IDDA)*

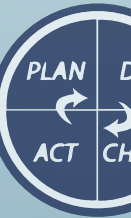


## **Simulation of accidents consequences**

- *Fire, explosion and toxic release modelling*

## **Risk representation and decision making**

- *Layer of Protection Analysis (LOPA)*
- *Bow-tie analysis*
- *Integrated Dynamic Decision Analysis (IDDA)*
- *Land Use Planning (LUP)*



## **Analysis of the operational experience**

- *Analysis of accidents, near misses and anomalies occurred in the plant, to support Risk assessment*
- *Analysis of the unsafe acts and unsafe conditions for preventive purposes*



*ARIA assists companies in identifying and implementing occupational health and safety regulations, in compliance with D.Lgs. 81/08. In particular:*

*Assessment of general and specific risks (chemical hazards - REACH, CLP -, ATEX, noise, vibrations, electrical hazards, biological hazards, manual handling of loads, exposure to carcinogenic agents, etc.)*

*Fire hazards analysis*

*Emergency planning: Internal Emergency Plan (IEP) and emergency procedures*

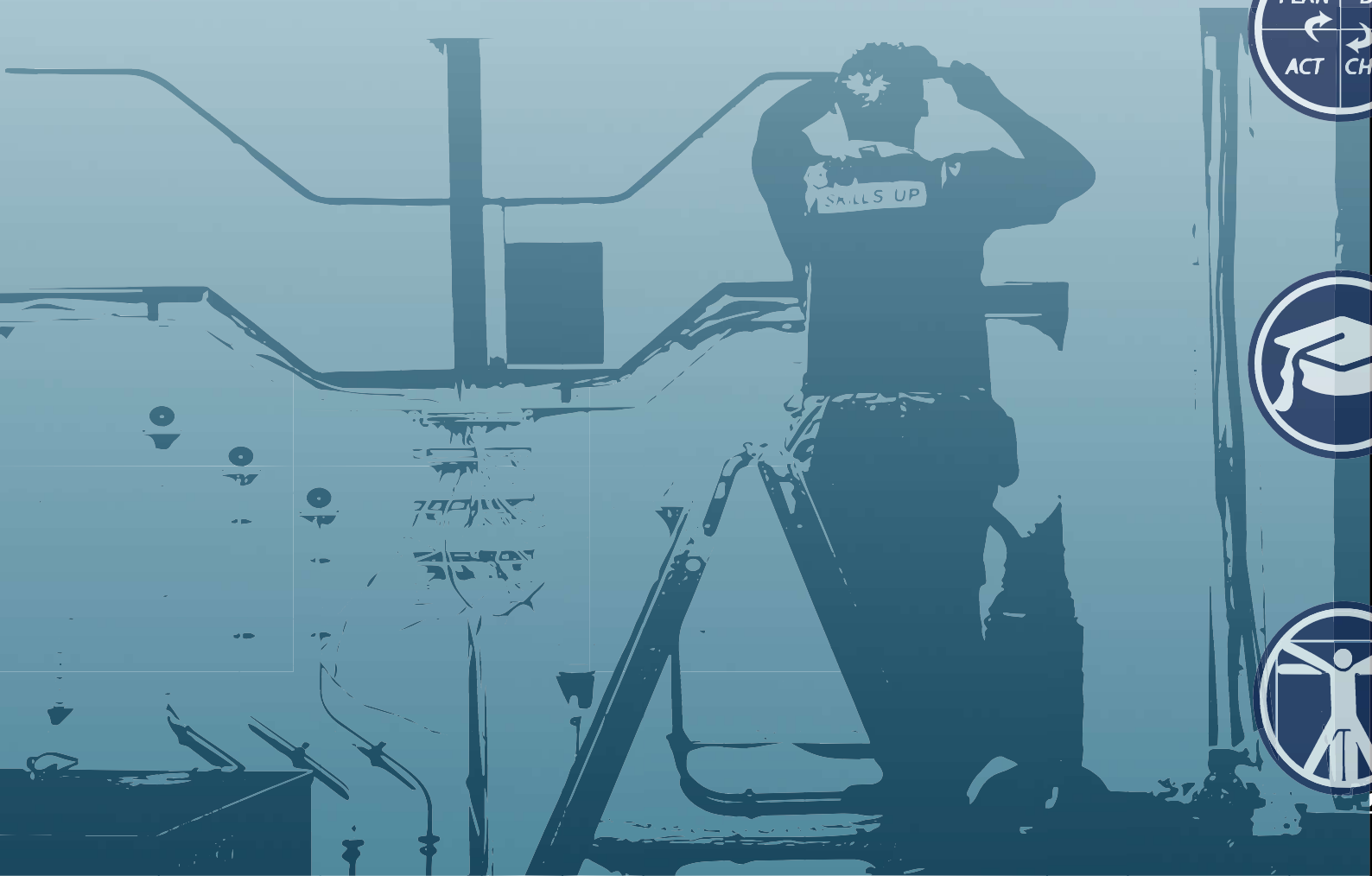
*Accident, near-miss and occupational accident analysis, using innovative analysis techniques (Fuzzy Logic Approach). Collection and analysis of unsafe acts and unsafe conditions for preventive purposes*

*Development and integration of Occupational Health and Safety Management Systems (ISO 45001)*

*Information, education and training for the employees*

*Machinery Directive: risk assessment and support for CE/ATEX certifications*

*Construction Site Directive*



## *RAMS analysis*

*Assessment of the reliability and availability of process plants and complex technological systems using conventional methods (FMECA, FTA, etc.), and innovative techniques (Markov chains, Integrated Dynamic Decision Analysis and Fuzzy Logic)*

*Maintenance planning optimisation (Reliability Centred Maintenance - RCM). Condition Based Maintenance - CBM*

*Assessment of the Safety Integrity Level for process plants (ISO 61511), machines (ISO 62061) and automotive (ISO 26262)*

*Development of Reliability Databanks based on company-specific information (e.g. maintenance data) or on data from commercial databanks (ESReDA, OREDA, AIChE et al.)*

## *Integrated Dynamic Decision Analysis (IDDA)*

*Logical-probabilistic modelling of complex systems. Development of a "dynamic" event tree, representing all the sequences of events compatible with the description received from the perspective of both the "logical" construction and the "probabilistic" coherence*

*Phenomenological modelling of systems, to be integrated with the logical-probabilistic model to represent the physical behaviour of the system in case of deviations*

*Decision-making support. Starting from the model of the analyzed system, an analytical representation of the possible alternatives and of the risk (in terms of probability and consequence) is obtained*



*Occupational Health and Safety management systems (ISO 45001), environmental management systems (ISO 14001), quality management systems (ISO 9001).*

*In the field of management systems (Quality, Environment, Health and Safety), ARIA offers the following services:*

*Initial Assessment of the safety and enviromental achievement. In this phase, the status quo is defined, to be used as a starting point for the development or upgrade of management systems*

*Analysis of the operational experience. Analysis of the accidents, near-misses and occupational accidents, to support risks assessment and to optimize the productive processes and the maintenance. Analysis of the unsafe acts and unsafe conditions for preventive purposes*

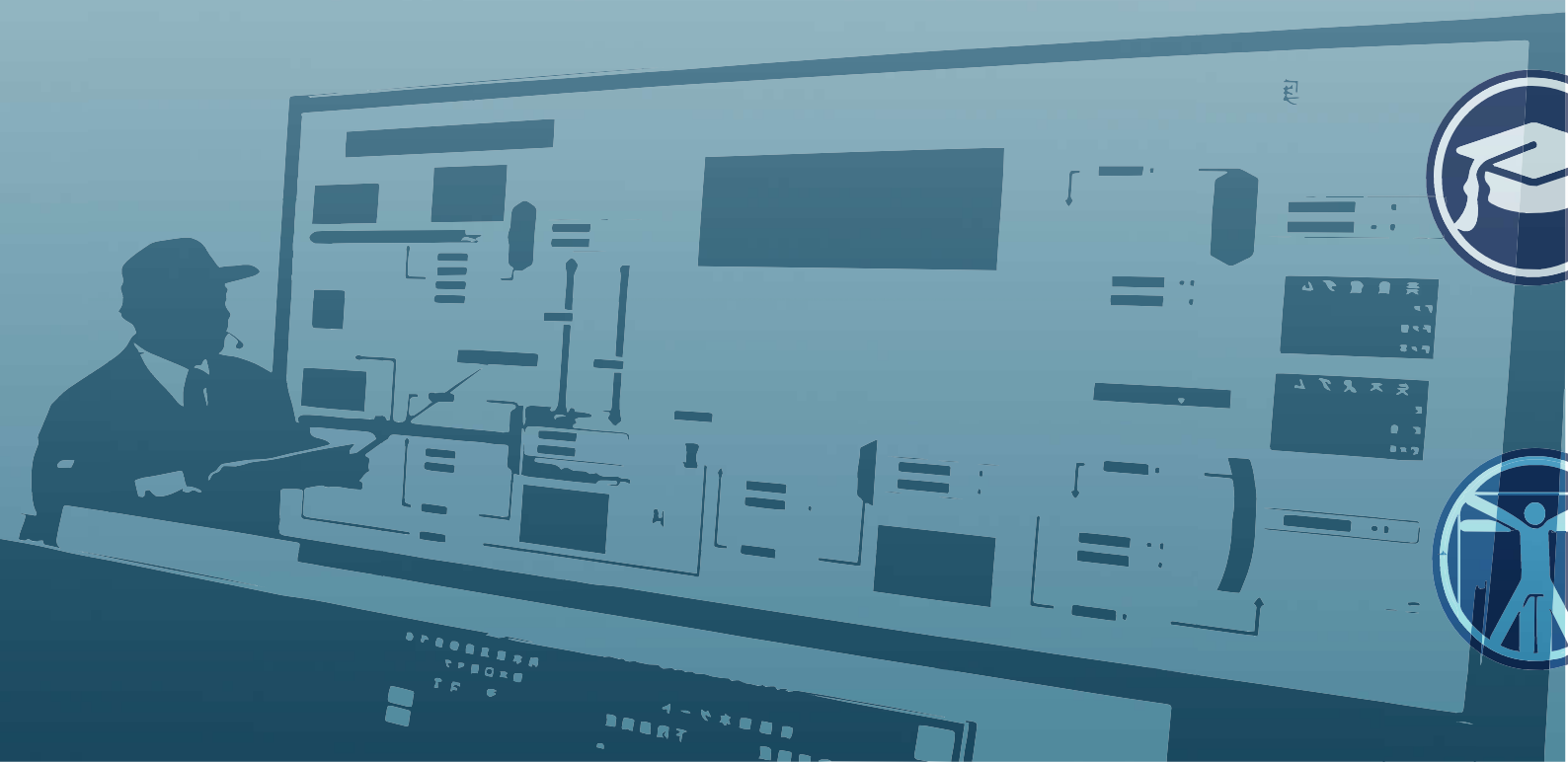
*Development of the MS. In this phase, the documents that contitute the framework for the whole MS (manual, procedures, operational instructions) are drafted, in close cooperation with the company*

*Audit. Necessary for the MS implementation, the audit activities foreseen are: intermediate audit, to assess the implementation completeness, pre-audit for certification purposes, support during certification audit*

*Education and training. Specific training for the executive team, the operational staff, the internal auditors and the personnel*

*Support to the risk based approach switch for ISO 9001 and ISO 14001 (Life Cycle Perspective - LCP and Life Cycle Analysis - LCA)*

*Management Systems integration, for the optimisation of company resources*





*Information, education and training of employees and working personnel*

*Design and supply of courses for all the levels of the organization*

*Design and supply of in-depth courses on specific subject, like i.e. chemical risk, fire risk, ATEX, Machinery Directive, product certification, Risk analysis techniques and SIL (Safety Integrity Level)*

*Design and supply of courses on environmental subjects, like i.e. Management of wastes and emissions in atmosphere, and dangerous goods transportation (ADR)*

*From the point of view of the participatory safety, development of training routes for homogenous groups of workers, aimed at the integration in the risk assessment of the workers' perceptions*

*Support in the design of customized training projects, including the analysis of the possible financing*

*The courses can be supplied in ARIA operational office in Turin, or at the Customers' premises.*

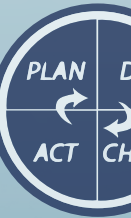


Technological risk evaluation integrated with human factors. Analysis and optimization of operational procedures for safety purposes

*Analysis and optimization of operational procedures for safety purposes. Identification and development of conditions and procedures which can actively increase the industrial safety of individuals and groups*

*Analysis of the technological risks, integrated with Human factors. Process and workplace risk assessment integrated with Human and organizational factors*

*Development of tools for the collection, analysis and use of the plant operational experience: i.e. unsafe acts and conditions; transfer of the information during the shifts (shift handovers)*



# ARIA SRL

## *Analysis of Industrial and Environmental Risks*

*Industrial safety*

*Workplace safety*

*Reliability and maintainability*

*Management systems*

*Education and training*

*Human Factors*

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