

I&C System Upgrades for Long-term Operations (LTO)

Optimized I&C upgrade packages for LTO designed to secure safety, increase plant reliability, and mitigate outage duration



Challenge

There are limits to economically extending the life of an instrumentation and control (I&C) system through spare parts management or retro-engineering of obsolete cards. Incorporating the latest safety requirements can also be challenging with an aging system. For customers planning LTO, oftentimes the most economical approach is to consider a refurbishment or replacement of the upper layers of the I&C chain. Based on the specific needs of the plant, it can be difficult to determine the best upgrade options. Should they choose a complete digital system, an analog system, or an optimized combination of both?

Solution

Based on its Nuclear Power Plant (NPP) manufacturer experience in safety and as a developer/integrator of I&C systems, Framatome provides full system packages that include:

- designing the most suitable solution in accordance with customers' and safety authorities' latest requirements
- supplying and integrating the adequate architecture and equipment that will meet the customer's expectations and constraints
- installing and commissioning

Customer benefits

- Effective integration of the overall project; from design to commissioning including interface management
- Reduced maintenance costs and plant unavailability with the latest upgrade solutions
- Increased project reliability through Framatome's unmatched multi-disciplinary expertise in nuclear and I&C solutions
- Highest level of safety during and after migration to the new system
- Easier and improved interaction with safety authorities with support from Framatome
- A customized solution that fits customers' specific needs
- Project confidence from Framatome's knowledge of the most up-to-date technologies and advanced architectures from new build projects around the world

Your performance
is **our** everyday **commitment**



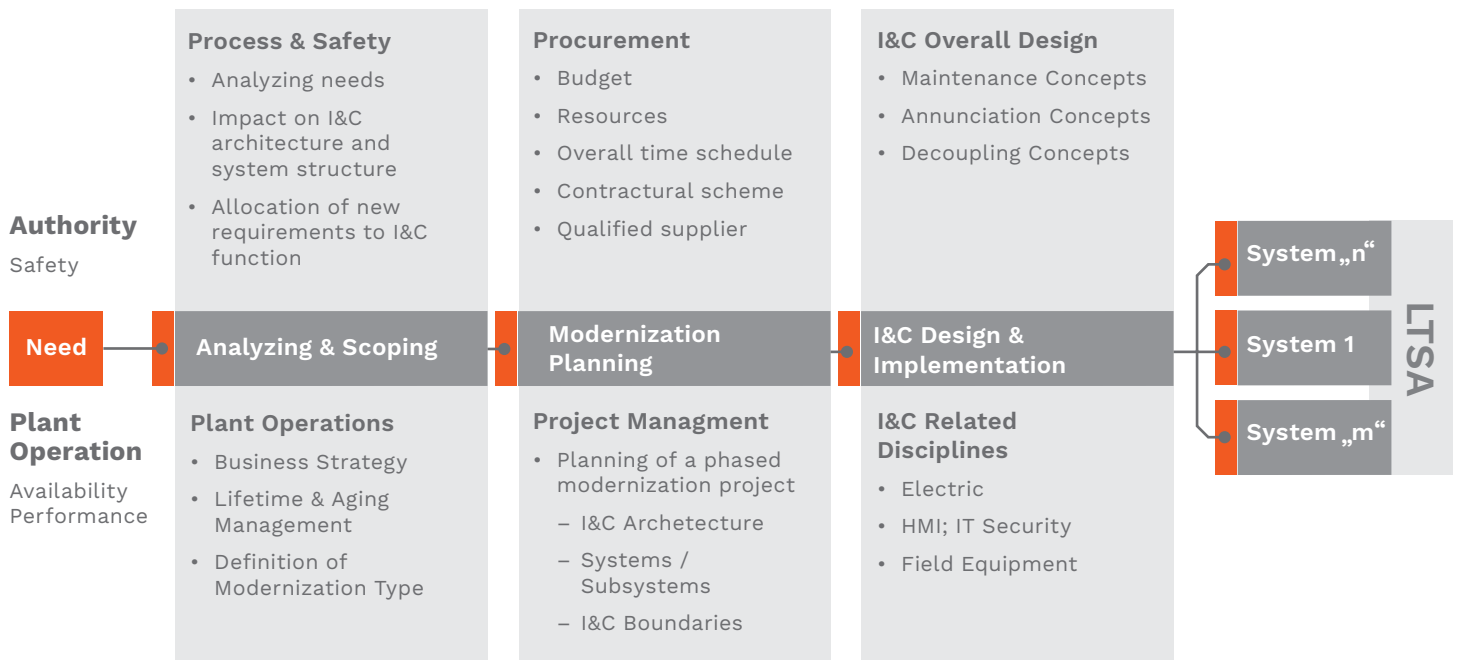
The right solution to fit your plant's specific needs

Regardless of the customer's upgrade approach — a completely new digital system or analog system, or an optimized combination of both — the selected I&C upgrade must guarantee the safety of the plant during and after the migration to the new system. Framatome solutions and experts are fully dedicated to ensuring the highest level of safety at all stages of the project — from start to finish — until the new system is fully operational and in line with every specification. In addition, the work must be completed in the timeframe allocated to the I&C upgrade project during the outage, all the while successfully interfacing with existing systems. Framatome upgrade solutions offer all of this and more.

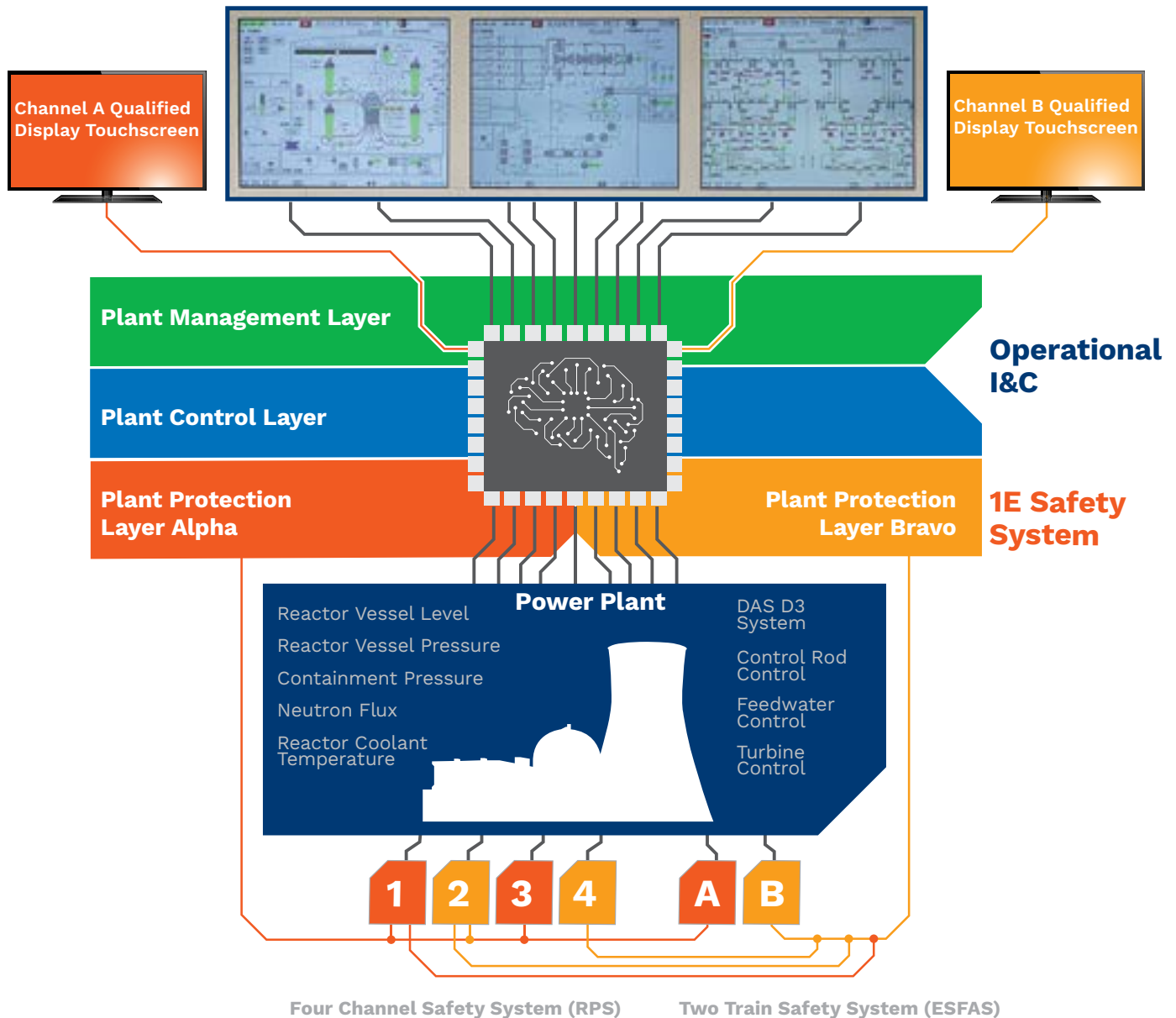
Additionally, Framatome solutions include precision analysis and scoping through elaboration of I&C requirements based on the plant's processes and safety needs. This is achieved through close collaboration between Framatome I&C architects and plant personnel to define the modernization scope through detailed analysis of existing I&C architecture, safety and security needs. Customers select only the most suitable products and technologies based on their existing design and specific safety requirements. That all adds up to a solution that fits and brings greater I&C performance for the future while reducing maintenance costs and avoiding potential plant unavailability that may result from an out-of-date system.

1E Tricon System shown in the I&C test lab at Framatome's Lynchburg, Virginia, Operational Center of Excellence

I&C Modernization Process



I&C Intelligent Architecture



Technical Description

Custom solution design:

- Existing I&C assessment
- NPP safety requirements assessment
- Definition of the most suitable solution
- Process and architecture definition (digital, non-digital, back-up systems)
- Regulatory and licensing files
- Integration in existing NPP

Supply:

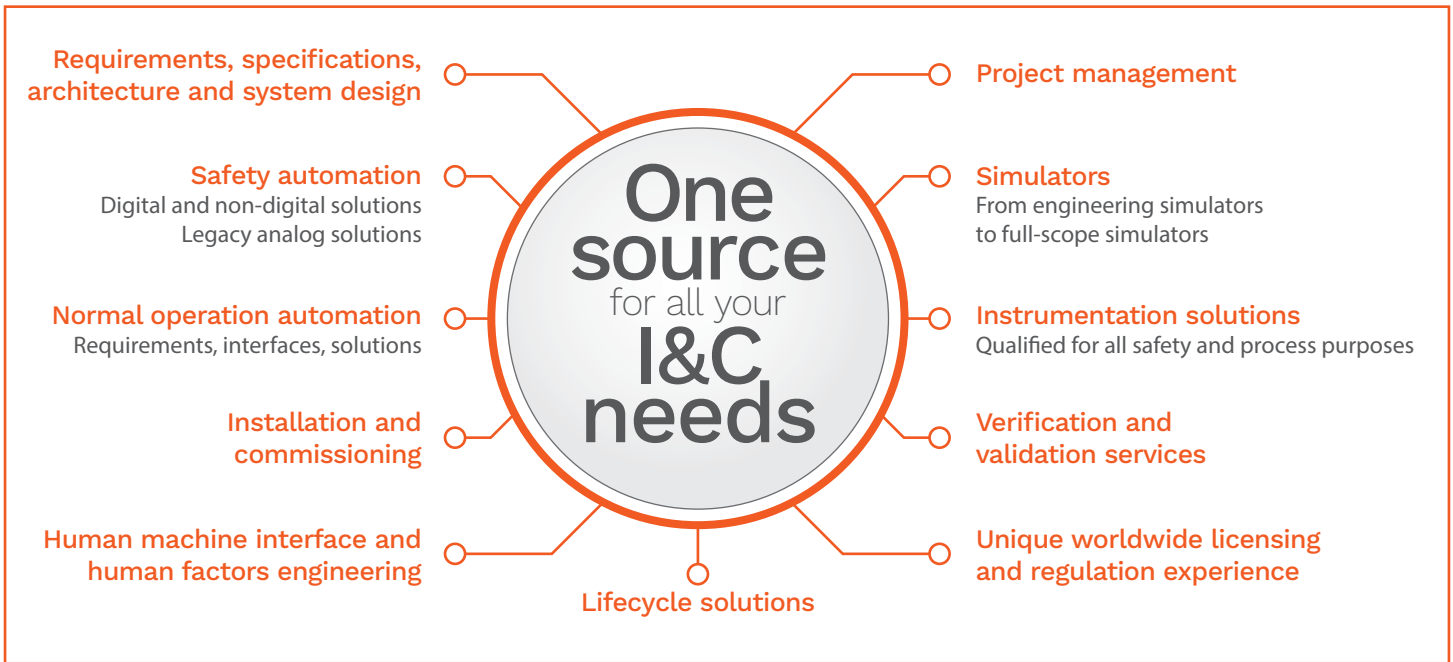
- Equipment supply
- Secure outage schedule through extensive factory acceptance tests

Installation and commissioning:

- Optimized installation aligned with outage teams to secure outage duration
- Commissioning
- Optimization of radiation protection

Optional long-term services:

- Availability management
- Obsolescence surveillance
- Long-term maintenance program



Framatome I&C modernization project installations

Europe

- Belgium
- Czech Republic
- Finland
- France
- Germany
- Hungary
- Netherlands
- Russia
- Slovakia
- Spain
- Sweden
- Switzerland

North America

- Canada
- United States

South America

- Argentina
- Brazil

Africa

- South Africa

Asia

- China



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