

# Evolving automation systems

Automation systems discover the meaning of life

Denis Harding

According to the leading research and advisory firm, ARC, a staggering \$65 billion worth of installed automation systems in the process and utility sectors have reached the end of their life cycle. Unfortunately many companies have failed to put any form of automation system migration plan in place, and could face an expensive upgrade bill that is further compounded by the need to close plants and processes for long periods to carry out the necessary upgrade. In the few cases where a migration plan exists, extensive and expensive rework, automation application redevelopment and disruptive “rip and replace” of existing equipment is often required just to return functionality to current levels of performance.

It is against this backdrop that ABB has developed its Six-Stage Automation System Management Program. The program is aptly called Evolution for Life, and aims at avoiding the last minute panic and excessive costs of a failing automation system by providing a clear roadmap to maintain, repair, upgrade or replace the existing system and its component parts over an agreed time frame; usually the lifetime of the system.



## Operational excellence

For numerous chemical and pharmaceutical companies – especially in the developing world – where the threat of lower cost operations is ever-present, staying in business can be a daily challenge. However, sooner or later automation plant equipment and systems need to be changed or modified. Unfortunately, for many companies there may be limited scope for investment in new systems, and for those companies that can afford the capital expenditure involved, the disruption, retraining and snagging that comes with it is undesirable.

To help companies avoid reaching a point where major investment in their automation plant is the only way of ensuring their survival, ABB has developed a Six-Stage Automation System Management Program called Evolution for Life. This program provides a cost-effective path to enable a company's automation systems to evolve through a series of small, manageable and affordable steps on an ongoing basis to meet their changing business, legislative and operational needs within agreed financial and operational restraints. By extending the life cycle of existing systems and adding new functionality at the right point in the life cycle, significant savings in operational and capital costs, as well as optimized production, can be attained <sup>1</sup>. Evolution for Life goes beyond traditional maintenance and migration programs to include techniques that optimize the performance of the control system and extend its operating life and benefits beyond the norm <sup>2</sup>.

The program initially targets ABB's own installed base, with a commit-

ment to support its previous generation of control and automation systems until at least 2025.

### ABB's Six-Stage Evolution for Life

The Evolution for Life program comprises the following stages:

- **Stage 1:** Identify customers business goals
- **Stage 2:** Analysis of installed systems and how they are affected by business goals
- **Stage 3:** Assess ABB's system and services offering
- **Stage 4:** Develop long- and short-term technical and commercial plans
- **Stage 5:** Develop and implement an agreed Evolution schedule
- **Stage 6:** Continuous re-evaluation of business needs and solutions

#### Stage 1: Identifying business goals

ABB has put together an Evolution core team whose role is to work with customers to identify the key business drivers that are likely to impact on the automation system. This team, together with the customer's business and operational/technical management, carries out an all-encompassing business review that considers activities such as:

- Environmental effects including carbon footprint analysis.
- Energy saving and energy measuring opportunities.
- Legislation, regulations and directives. In other words, a review of what is currently in force, what is changing, and how these may effect the automation system.
- Productivity programs such as overall equipment effectiveness (OEE).

- Asset, production and information management issues such as plant life and usage changes.
- Plant and system maintenance schedules.

This review provides the customer with a firm commercial rationale for engaging the Evolution for Life plan.

**Stage 2: Analysis of installed systems**  
ABB audits the installed automation systems using tools and techniques to ascertain:

- Current configuration and status of the systems
- How well the systems are currently performing
- The current and future life cycle of the installed base

This information, together with the findings of Stage 1, provide a roadmap that identifies the impact of the business goals on the existing automation system functionality.

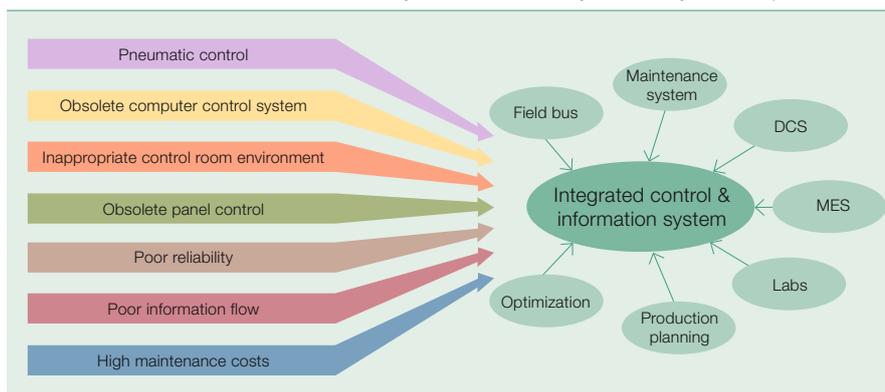
The findings of Stage 2 provide the customer with a firm technical rationale for engaging the Evolution for Life plan.

#### Stage 3: Assess ABB's offering

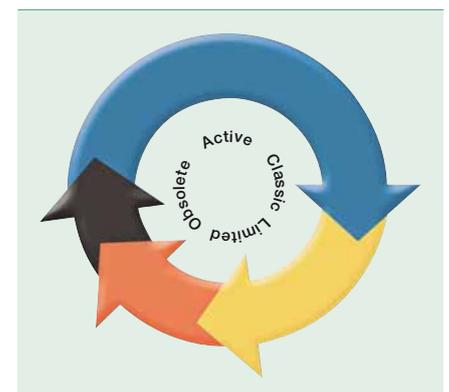
A review of ABB's existing technology is undertaken to identify products, systems or services which could provide immediate and long-term benefits to the existing installation. The customer receives an initial plan plus an audit report detailing the technical steps recommended and a summary of the commercial consequences.

This assessment drills down to the sub-system module level and identifies areas where the final Evolution

<sup>1</sup> ABB's Evolution for Life addresses the key issues in control system life cycle and operation.



<sup>2</sup> The "cradle-to-cradle" life-cycle concept





for Life plan can be implemented in small or large increments. This ensures that an informed plan-of-action is agreed.

#### Stage 4: Develop long- and short-term technical and commercial plans

Armed with the findings of Stages 1 to 3, ABB produces a recommended Evolution for Life plan for the existing system to meet the agreed business goals over an appropriate time frame. This plan is typically based on the “risks and consequences” to the customer’s business if any part of the system or the business goals change status during its life cycle. Facilities at greatest risk that need be considered in the short-term are identified and targeted.

The steps within the plan are carefully scheduled to maintain the integrity and minimize interruption to production during the various stages. The plan contains details such as:

- Scope of supply
- A program of maintenance solutions targeting:
  - System life cycle in terms of functionality, hardware and software
  - Software revisions
  - Operational enhancements
  - Obsolescence
- A breakdown of the above into stages with:
  - Planned timings
  - Commercial effects
  - Responsibilities

The customer now has a mutually developed, business and technical risk/

consequence plan that meets current and future needs. With it, a schedule with small or large steps is drawn up to meet production and financial strategies.

#### Stage 5: Develop and implement an agreed Evolution schedule

Every plant is different. As such, the collaborative evolution team agrees a detailed implementation plan for each stage.

**ABB’s Evolution for Life program provides a cost effective path that allows a company’s automation systems to evolve through a series of small, manageable and affordable steps on an ongoing basis.**

#### Stage 6: Continuous re-evaluation of business needs and solutions

Stage 6 is the crux of the evolution plan. It aims to support the production process throughout its life-cycle whatever the status of the commercial, legislative and technical environment, and as such the plan is regularly updated by the customer and ABB. Thus the plan is adapted as the business or technical environment changes to ensure that the system remains current, with the required functionality. This ensures a plan based on commercial, production and technical requirements that are centralized around the cus-

tomers’ business priorities, and avoids the issues highlighted by ARC<sup>1)</sup>. Evolution for Life, therefore, eliminates Automation System surprises – a fundamental benefit in the current business environment.

#### Evolution for Life in practice

During 2007, 43 customers in the UK made a financial commitment to ABB for an Evolution for Life program. One of the early adopters of the program has been British Gas (BG) and its North Sea Armada platform, which produces 300 million cubic feet of gas per day.

Together with the customer, ABB has developed a comprehensive five-year evolution plan that will upgrade and extend BG’s ICSS (Integrated Control and Safety Systems) to monitor and control every aspect of the Armada platform’s process and safety systems. This will deliver increased reliability, improved asset integrity and enhanced performance. Furthermore, the scope of the ICSS will be extended to incorporate additional sub-sea tiebacks. Modernizing and extending the system will be carried out without disrupting production. The plan is reviewed every six months by BG and ABB as business and production priorities change and the implementation is fine-tuned.

#### Footnote

<sup>1)</sup> Companies have made a massive investment in automation systems. It is not just financial but extends into intellectual property and the general experience gained by their workforce.

## Operational excellence



In the oil and gas sector, the priority is to ensure safe, reliable production with no disruptions. Therefore plant integrity is essential. While repair and maintenance may be covered by conventional service plans, the Evolution for Life program goes further to provide for the planned modernization of equipment and base control software. In this way companies like BG can be sure they are operating at the same high level of productivity as they would if they invested in the wholesale installation of new plant equipment.

A second North Sea operator investigated the option of replacing their existing control system. They were told by another supplier that nine weeks of production downtime would be required to install and commission a new system. As the value of oil production is about £500,000 (\$985,200) per day, the economics showed that evolution rather than “rip and replace” is the way to go.

#### Chemical and pharmaceutical sector

For chemical and pharmaceutical companies, the Evolution for Life approach not only assists with the long-term challenge of staying in business, but it also ensures that the customer’s organization has confidence in ABB’s long-term support of all facets of its automation plant. This support even extends to older components in a system, such as the core components belonging to a previous generation of systems, that are performing well.

In addition to supporting these core components, ABB has committed to provide a minimum of 10 years continuing support to any such product that is removed from active sale.

To illustrate this, a chemical plant in the north of England installed an ABB distributed process control system in its main plant in the early 1990s. Due to the low investment capacity of this manufacturer, the system has had minimal modernization and is therefore no longer suitable to provide all of the functions required for a modern world-class manufacturing facility.

Some parts of the system are reaching the end of their life cycle, and legislative changes mean that new features are necessary over the next several years. The capital investment needed for a new control system is simply not available.

The Evolution for Life program differentiates itself from others by focusing on preserving the production process stability.

ABB and the customer have agreed a six-year evolution program to support and modernize the existing system in small stages, thereby keeping the investment within the customer’s budget. As part of the program, automation functions that are currently in third-party systems will be moved into the ABB system, thus significantly improv-

ing plant operation and support needs. In addition, this will also provide improved and consistent functionality, as well as a reduction in support costs and production disruption.

For this customer, the advantage of implementing the evolution program is that he now knows his technical and commercial solution for many years to come. This will be reviewed each year to ensure continued stability and suitability of the plan for a similar period of time ahead.

#### Keep on going

In high performance process and utility industries, the need to keep abreast of industry-leading performance is vital. Falling behind can reduce margins, reduce throughput and build a gap which ultimately becomes economically unbridgeable.

ABB’s Evolution for Life program differentiates itself from others by focusing on preserving the production process stability. The integrity of the customer’s existing installed base is preserved by providing a “hot cutover.” This results in the seamless implementation of modern, robust and supportable equipment and eliminates the need for costly interruptions to production.

#### Denis Harding

ABB Process Automation  
UK  
denis.harding@gb.abb.com