

## The Value of Long Term System Support

In the mid-1970s when microprocessor-based control systems were first introduced in the marketplace, early adopters did not give any thought to what would happen when that equipment neared the end of its useful life. At that time end of life was 25 to 30 years away; well after the year 2000 millennium rollover and well beyond the time frame that management was thinking about. But now it is 2013, the millennium rollover was 13 years ago, and the first microprocessor systems are two generations old. Users and especially the early adopters are now being forced into making a decision on what to do -- migrate to a new product or continue using their legacy systems.

For many the choice is not an easy one. Do they migrate to a new system and get the benefit of the latest technology but at a substantial cost of implementation and disruption? Or do they keep with the existing, proven technology but with on-going concerns about unexpected outages, availability of spare parts and lack of knowledgeable support personnel?

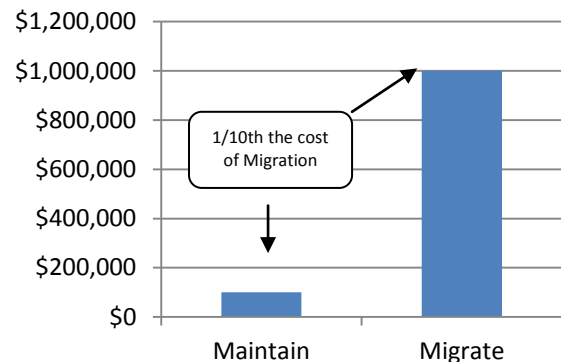
### Maintaining the Status Quo

Obviously, maintaining the status quo is the more expedient and much easier solution as it postpones the complexity, difficulty and cost of migration hopefully for many, many years. It also preserves the existing high value intellectual property (IP) investments while avoiding the high cost and especially the process disruptions associated with system replacements.

The decision often becomes a tradeoff between a guaranteed parts and support contract which will reduce near term risk versus a complete migration that yields little economic benefit.

It is not unusual for a typical system migration to cost upwards of \$1M while the cost to

maintain the same system (depending on condition) may be 1/10 the cost of migration.



On the down side, there is always the question if or when will the system suffer a major failure which could have a severe impact on process operations or in the worst case result in an unplanned plant outage. Trying to predict when a failure might occur and what that failure would be is an inexact science at best and a wild guess at worst.

In most cases even the increasing probability of an unplanned shutdown is not sufficient justification for a migration especially if the consequences of such a shutdown are not severe. It is extremely difficult to forecast the probability of the event occurring and its associated financial impact. If there have been few unplanned shutdowns in the recent past. Typically this justification only occurs after an unplanned shutdown that resulted in a substantial financial loss.

### Moving to New Technology

If a migration to a newer control system could provide a sufficiently large incremental value over maintaining the status quo, then migration would make both financial sense and provide a platform for automation expansion. The key question is do the benefits obtained with the new control technology outweigh the cost and inconvenience of the migration process?

## Time to Break Even

Migrations may, in the long term, be inevitable but a migration must always achieve a financial target established by management. There are many approaches to calculating the necessary return such as Internal Rate of Return (IRR), Net Present Value (NPV) or a simple breakeven analysis.

For the purpose of creating a generic breakeven analysis, let us make the following assumptions:

- \$1M invested at a nominal 5% rate of return of the stock market (Do nothing) versus
- Investing the \$1M in a system migration with six months required to create and implement the migration solution (Note: support labor costs will not be considered due to the fact that the site either has to continue to train its personnel on the old equipment to maintain it or it must train its personnel on the new equipment when installed)

The following charts graphically depict the required returns to achieve breakeven at 5 years (Figure A) and 2 years (Figure B):

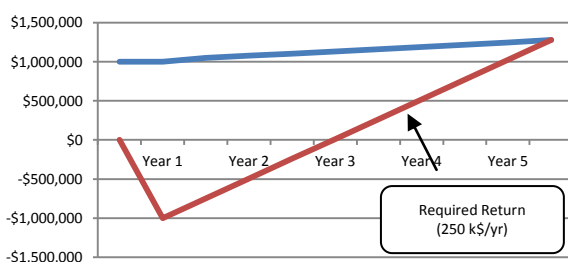


Figure A

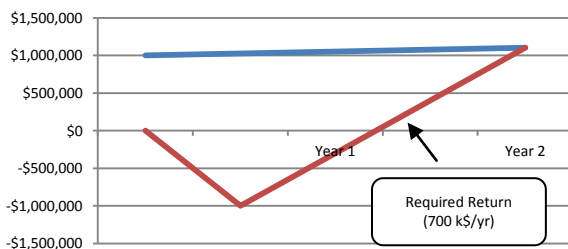


Figure B

To generate the required financial return, it becomes obvious that the justification for migration to new technology must go beyond simply moving a PID loop in an old controller to a PID loop in a new controller or copying existing graphics directly to a new HMI. As one very experienced control engineer is heard to say “A PID is a PID is a PID”.

This “copy and paste” approach may be viewed as a way to reduce the initial cost and perceived project risk, but it typically does not provide incremental value sufficient to justify a migration.

Many users have calculated the expected value of advanced process control techniques such as Multivariable Control (MVC) and/or Real Time Optimization (RTO) to justify a migration. Advanced control applications have been implemented on many legacy DCS systems with significant benefit. However due to the well-known difficulties in maintaining these advanced applications over the long term, it may be difficult to use the expected benefit over the planned payback period to justify migration.

Additionally, with legacy control systems it may be difficult to find incremental advanced control credits beyond what already exists. If the existing advanced applications with minor modifications could produce an incremental return, the obvious choice would be to modify/update the existing applications and restart them on the existing system even if that only captures a portion of the return.

## Finding Incremental Value

Incremental value sufficient to justify the high cost and difficulty of migration can typically be found in (1) work process changes such as consolidation of control rooms and automation of manual procedures, (2) the addition of asset management applications, and (3) the elimination of higher level application software

packages (and their support fees) by moving the application lower in the control system hierarchy.

Current control systems provide many tools and capabilities not found in earlier systems. However, to fully utilize these tools in the pursuit of incremental payback the following tasks should be performed at a minimum:

- A detailed analysis to fully understand and document the existing control schemes, capture operator knowledge and implement automated startup and shutdown procedures. The performance and loading effect of subsystem interface integration, smart field instrumentation for asset management applications and the migration of higher level control applications to the controller should be thoroughly understood.
- An analysis of the effectiveness of existing graphics and alarm management tools and how the utilization of current high performance HMIs, graphics tools and advanced alarm handling capabilities may facilitate the consolidation of control rooms and change work processes
- System network size and server cluster loading based on controller load, network configuration and operator interface analysis. A complete system loading calculation and optimization plan to effectively utilize new control capabilities, networks, servers and system database.

To maximize the use of new system functionality requires a thorough understanding of the new system capabilities and the creativity and time to apply these capabilities in the search for financial justification. The best time to implement this change in control capability is during a major upgrade of the automation system. The best time to start work on developing incremental value is well before the major upgrade is performed.

The time and resources required to develop and analyze work process and system capabilities may be significant. Unfortunately, the typical bid/buy and migration FEED process is focused on insuring “like for like” functionality which does not provide the opportunity to uncover added value opportunities.

### **A Typical Situation**

Several years ago one of the world’s largest users of the original TDC 2000 Data Hiway based Distributed Control System had reached a decision point. Much of the installed control equipment has been in use for 30+ years and is nearing the end of its projected lifecycle. A decision needed to be made as to what to do. Ultimately this user decided to extend the life of this equipment due to the high return on investment required to justify migration and the length of time and associated unit downtime required to perform the migrations.

### **The Decision to Request Long Term Support**

During the development of a multiyear automation roadmap, it became clear that the need for long term system support while migrations occur would become a key component of the overall risk reduction strategy necessary to justify the migration schedule.

The roadmap development process included: (1) documenting existing system architecture differences, (2) determining the availability of skilled resources and anticipated capital budgets, (3) estimating the time to develop new automation and workflow processes and standards and (4) anticipating process downtime schedules necessary to perform the migration.

Critical factors identified were:

- The very large installed base of systems with thousands of controllers, I/O interfaces and other connected devices

would require significant detailed engineering effort

- Experience has shown that new technologies have not provided a sufficient ROI to justify a rapid migration schedule therefore the overall migration schedule should be extended
- It has proven problematic to schedule long term migrations to new technology based on scheduled process downtime and available skilled resources, both of which are subject to change without adequate advanced notice - significant schedule flexibility is required
- The need to manage annual capital budgets in volatile financial markets with constantly changing investment hurdle rates requires ongoing detailed financial analysis and process improvement plans to meet these changing requirements
- New functionality to be provided in future control system releases may provide significant incremental ROI but may also require changes in the migration roadmap

A key part of the roadmap development process is an analysis of the current automation suppliers to determine their acceptance and support of an extended migration timeframe. A history of significant increases in the cost of spare parts along with extended delivery schedules and a reduction of skilled resources all signify the vendor has a lack of interest in supporting the existing users.

There is high value in “doing nothing” and avoiding migration in the near term if your support vendor views the legacy products as strategic rather than simply obsolete.

With the ever increasing cost of support and lack of skilled resources provided by the existing controls and support vendors, the situation was deemed unacceptable to meet the needs of this and a decision was made to search for alternate support providers.

## Requirements for Long Term Support

Numerous support alternatives were reviewed and prioritized. Input from various worldwide sites and engineering organizations led to a comprehensive list of support requirements summarized as follows:

- A commitment to support the installed base of systems with both parts and expertise through the year 2025 to meet the expected time required to complete all migrations
- The willingness to redesign parts as needed and to recertify used parts using a high quality factory refurbishment process that not only repairs the spare part but whenever possible makes the changes required to bring the part up to the latest revision.
- The availability of highly skilled engineers with in depth knowledge of the system and its operation
- The ability to perform a detailed analysis of parts failures to determine if a failure was atypical or simply due to aging
- The ability to proactively analyze system performance and robustness and provide recommendations for improvement
- The ability to train and maintain the detailed system knowledge from both a supplier and site perspective
- The availability of 24/7 access to knowledgeable resources
- A cost effective total solution with limited annual price escalation
- The willingness to work as a team with all sites worldwide
- The provisioning of regional spare parts inventories and in-depth system expertise
- A willingness for the supplier support team to be an integral part of the ongoing migration planning and new system functionality reviews

These requirements led to the decision to select Azbil (formerly Yamatake-Honeywell) to provide the required long-term parts and support

services. Azbil was a co-developer and is a co-owner of the existing technology and intellectual property and can therefore meet all requirements outlined above.

Azbil's new support offering called the Data Hiway Life Extension program provides not only spare parts and system expertise but also new technology that can refresh an existing Data Hiway based system. The goal of the program is to increase system reliability and performance in a cost effective manner. The Data Hiway Life Extension program provides for minimal process disruptions, while preserving the existing investment in hardware enclosures, field wiring, software, and the high value intellectual property.

By protecting existing investments, avoiding obsolescence, increasing system reliability, and removing the time pressure of having to make decisions relative to DCS platform migration, Azbil provides a high value service and support offering.

### **Migrate Now or Later**

To manage the various facets of the support agreement, a highly skilled support team was created and is comprised of both user and supplier resources. This joint team is responsible for managing the business relationship and the overall success of the long term support plan. In addition to meeting the specific requirements of an individual plant, the team is also involved with long-range system migration planning from a corporate perspective. In-depth system knowledge is critical for a successful and financially justified migration plan.

### **Time is of the Essence**

Significant time and effort is required to capture process and control system knowledge, create new work processes, redesign advanced application architectures, develop asset models

and predictive tools, and create a migration schedule to match process shut down schedules or by hot cutover.

With automation technology progressing at a rapid pace, Azbil's long term support program provides Data Hiway users an opportunity to observe these developments from the "sidelines," without the need to commit to any particular platform or approach until fully prepared and ready to do so.

Selecting the correct long term support provider can give a site the time to develop the justification, obtain management approval and perform migrations without concern for unplanned downtime, poor system/process performance or unreasonable annual cost increases.

### **Author Bio:**



Richard L. White is an independent automation consultant with more than 40 years of experience in the hydrocarbon processing industry. He has been involved in the implementation of multiple automation projects and assisting vendors in the design and development of new control systems. He was instrumental in the development of worldwide standards for a major hydrocarbon processing company concerning the application and implementation of distributed control systems and associated advanced applications.