Infrastructure Lifecycle Management

An Executive White Paper: Aligning Real Estate and Facility Portfolios with Corporate Business Strategy

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Executive Summary
Several of today’s global 2000 organizations drive their success from traditional ‘brick and mortar’—type of industries that are dependent on physical infrastructure assets to deliver core products and services to market. For these firms, planning, building and maintaining physical infrastructure assets are critical to achieving corporate growth initiatives as well as remaining competitive in the marketplace. According to IDC¹, industry estimates put this level of activity at more than $3.5 trillion in infrastructure projects under way globally.

For organizations where physical infrastructure is required to deliver on the company’s mission—whether that infrastructure is office buildings, retail stores, manufacturing plants, transportation systems, etc.—executive management must ensure that its corporate business goals align with its real estate, construction and facilities programs.

Typically, these enterprises go through the familiar corporate business planning process to map out a three-to-five year strategic direction. The annual operating plans that result from this process take care to establish specific revenue and other business objectives for the fiscal year and then map out execution points which internal IT, real estate, construction and facilities management teams must support.

According to the Aberdeen Group², “owners and operators of properties lose millions in top-line revenue and bottom-line profits because they cannot get critical facilities operational or renovated in a timely manner. Companies have responded with a mix of makeshift systems (often no more than spreadsheets, as prior Aberdeen Group research has found), the formation of capital expenditure committees, and political might (in the absence of real hard data) to reduce the risk of project failure.”

This whitepaper reviews the strategic value of an organization’s real estate asset portfolio and introduces the Proliance® solution, an Infrastructure Lifecycle Management (ILM) solution for optimizing global real estate and facilities assets. The Proliance solution was introduced by Meridian Systems® in 2003 to help organizations impact top- and bottom-line performance by optimizing the entire plan, build and operate lifecycle for global real estate and facilities assets. By bringing multiple departments together on one, comprehensive enterprise system and technology platform, an organization can improve collaboration across its entire real estate supply chain, from a complete project and facility lifecycle perspective.

Proliance innovatively combines project and portfolio management (PPM) applications to manage the plan and build phases of new real estate projects, with facilities management (FM) applications for maintaining an existing portfolio of buildings and assets. These business capabilities are combined with business process management (BPM) technology to establish best practices and streamline routine processes across the organization. Proliance Analytics adds a business intelligence (BI) layer, enabling executive-level dashboards, metrics and trend analysis across the entire portfolio of new and existing facilities.

Built from the ground up on a modern Service Oriented Architecture using Web Services and XML technology, Proliance meets the technical requirements of large organizations for integration, scalability and extensibility.
Organizations adopting the Proliance solution receive tremendous value from the corporate, line of business and IT perspectives. Proliance brings the following key value propositions to large organization:

- Improved alignment between corporate objectives and real estate/facilities
- Increased visibility into an organization’s entire real estate and facility portfolio
- Increased revenues by reducing cycle times for new facilities
- Decreased operating costs to manage existing facilities and assets
- Elimination of multiple point-solutions that require training and support and are ineffective in lifecycle management
- Increased competitiveness by improving time to market and organizational efficiencies
- Generation of new business opportunities by offering leading-edge collaboration and real estate management technology

The following sections of this whitepaper delve further into how Proliance provides lifecycle management around the plan, build and operate phases of a real estate asset.
Strategic Value of Your Real Estate and Facilities

On an organization’s income statement and balance sheet, corporate real estate and facilities usually rank among the top three or four line items in terms of most valuable assets and highest cost centers. The balance sheet captures new capital infrastructure costs for new facilities that a business requires to operate. Once new projects are completed, they are commissioned and turned over to maintain, showing up on the income statement as large facility maintenance and operating expenses. From a lifecycle perspective, the eventual remodel and refurbishment of existing facilities are reborn as new capital projects.

Despite their strategic significance and material costs to an organization, these physical infrastructure assets have been managed from an IT perspective across several non-integrated ‘single purpose’ software applications. Data is kept in separate systems with no single point-of-entry or a common technology platform. This approach fails to give senior management real-time visibility into how quickly new assets are being brought online, and how effectively they are being maintained throughout the asset’s lifecycle.

The Aberdeen Group also observes that “several industries…want to track the design, construction, and operation of their facilities seamlessly and see faster deployments of these properties. New benefit opportunities are possible when builders, owners and operators can seamlessly communicate, transfer knowledge, reduce errors, and so forth.”

Aberdeen further notes that companies have responded with a mix of makeshift or patchwork solutions, which can force firms to fall into the following traps:

- They make inappropriate decisions, such as the deployment of scarce capital.
- They compound these mistakes by altering or failing to prevent further capital project failures.
- They fail to transfer critical knowledge to others within their own organizations.
- They experience difficult transitions from one stage of development to another.
**Infrastructure Lifecycle Management (ILM) – The Proliance Solution**

The Proliance solution introduces enterprise ILM software that manages new capital expansion programs and existing facilities maintenance and operations. Proliance manages the entire plan, build and operate lifecycle in one, single enterprise application.

The history of enterprise software shows that business needs can drive consolidation of point applications through a lifecycle enterprise solution replacement. Past examples include a major consolidation of financials and enterprise resource management software, as well as the rise of enterprise solutions for human resources designed to manage employees from a lifecycle perspective. Eventually, a consolidation of multiple point solutions that concentrated on customers took place with the advent of CRM systems to manage the customer relationship lifecycle.

Proliance represents a consolidation of multiple point solutions in the PPM and FM space in order to manage physical infrastructure from a lifecycle perspective, including the ability to manage the planning and building of new facilities, and the efficient operations of existing facilities.

In its whitepaper, “Assessing Infrastructure Lifecycle Management Market Opportunities” published in September 2004, IDC validated the opportunity for ILM solutions observing that “today’s businesses rely on physical infrastructure assets—whether plants, retail storefronts, transportation systems, or health care facilities—to deliver their core products and services to market. Like a symphony, complex buildings projects and other physical infrastructure initiatives can be executed flawlessly only when everyone is playing off the same sheet of music and aligned behind the strategic objectives of the company. An integrated infrastructure lifecycle management (ILM) system can help companies achieve this goal.”

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**Project Portfolio Management**—primarily for use during the planning and building phase of the lifecycle—enables you to manage all critical aspects of projects, including scope, schedules, budgets, contracts and resources.

**Facilities Management** helps you operate and manage physical assets, maintenance management and service request items.

**Business Intelligence** provides senior executives and mid-level managers visibility into the entire portfolio of projects, programs and facilities through key performance indicators, dashboards and roll-up reporting.

**Business Process Management** tightly integrates with all Proliance applications via a technology platform that enables organizations to create, enforce and automate best practices and processes enterprise wide.
Aligning Real Estate to Corporate Strategy
The case for using infrastructure lifecycle management as a strategic technology solution for managing real estate and facilities becomes even stronger as companies navigate today’s complex business environment. In order to effectively align real estate programs behind the highest level of corporate objectives, organizations must evaluate projects and programs from multiple business perspectives:

1. What it takes to run the existing business
2. What it takes to grow the existing business
3. What it takes to transform the business to a new model

Current Business
When organizations look at running their existing business, it means that hundreds and thousands of facilities filled with millions of assets must be properly maintained and operated. If these facilities are operating inefficiently and assets are constantly malfunctioning, the existing lines of business are not generating maximum revenues. Ongoing facilities maintenance expenses are rising because it always costs more to repair an asset once it breaks, than to prevent it from breaking down in the first place.

Transformation and Growth
If an organization wants to grow or transform their existing business, it requires large capital expenditures to plan and build the new infrastructure that will generate new revenue sources. These new facilities are treated as critical projects and are managed for the duration of the planning and building phase. Once these projects are completed, they are added to the existing pool of facilities as assets that must be maintained and operated.

Additionally, as organizations mature with hundreds and thousands of facilities, business strategy often requires major refurbishment on a large scale to support re-branding or new service model initiatives. These large scale refurbishments are treated as a capital program or project.

The diagram below illustrates how Proliance can combine both PPM and FM capabilities to support these multiple business dimensions (run, grow and transform the business), giving organizations the ability to align corporate business strategy with their real estate projects and programs.
A simple examination of the operational needs of an organization’s real estate and facilities teams, further illustrates this alignment dynamic. The Proliance solution manages all of the following examples in one enterprise solution. Below are some specific examples.

<table>
<thead>
<tr>
<th>Need</th>
<th>Cost Impact</th>
<th>Business Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Change the filter on an existing air conditioning unit: a</td>
<td>Usually an operating expense</td>
<td>Run the business</td>
</tr>
<tr>
<td>preventative work order is issued and linked to an existing asset.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Fix an air conditioning unit that is not working properly: a</td>
<td>Usually an operating expense</td>
<td>Run the business</td>
</tr>
<tr>
<td>demand work order linked to an existing asset.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Replace an existing air conditioning unit that has completely</td>
<td>Could be an operating expense or a</td>
<td>Run the business</td>
</tr>
<tr>
<td>failed: a work order package that requires multiple scopes of work</td>
<td>capital expenditure</td>
<td></td>
</tr>
<tr>
<td>to be performed as a small project.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Replace 200 air conditioning units at 100 different facilities</td>
<td>Usually a capital expenditure program</td>
<td>Run the business</td>
</tr>
<tr>
<td>along with the existing roofs: a refurbishment program that</td>
<td></td>
<td></td>
</tr>
<tr>
<td>requires up front planning and re-construction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Build a brand new facility: a new project that goes through</td>
<td>Capital expenditure program</td>
<td>Grow the business</td>
</tr>
<tr>
<td>rigorous planning and building processes before completion, and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>then is turned over to maintenance and operations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Build 100 new facilities in a fiscal year to support a new</td>
<td>Significant capital program</td>
<td>Transform the business</td>
</tr>
<tr>
<td>service offering: a large scale capital program with many smaller</td>
<td></td>
<td></td>
</tr>
<tr>
<td>projects that require significant oversight and management.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Value of Implementing an Infrastructure Lifecycle Management Solution

Implementing an ILM solution can generate enormous economic benefits to stakeholders across the entire plan, build and operate ecosystem, including building owners, contractors, engineers, architects and subcontractors.

Building owner/operator organizations in particular can be significantly impacted because they have multiple departments or business units that are responsible for the plan, build and operate lifecycle.

One department will be responsible for real estate and construction of new projects, while a completely different group is responsible for maintaining the existing facilities and assets. This division of responsibility has created an environment of disconnected silos of project and facility data stored in disparate software solutions that do not integrate with one another.

In addition to this collaboration issue, the lack of coordination and integration between both IT systems and people has created huge inefficiencies and cost impacts for owners/operators, construction firms, architects, engineers, etc. In August 2004, a study commissioned by the U.S. Department of Commerce, and conducted by the National Institute of Standards and Technology (NIST) reported that this interoperability problem costs $15.8 billion annually in the U.S. alone, with two-thirds of this cost borne by the owners/operators.

The study noted that owners bore the most significant portion of the interoperability costs in the maintenance phase of their assets, due largely to their inability to capture information during the planning and building phase of new projects.

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Planning, Engineering, and Design Phase</th>
<th>Construction Phase</th>
<th>Operations and Maintenance Phase</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architects and Engineers</td>
<td>1,007.2</td>
<td>147.0</td>
<td>15.7</td>
<td>1,169.8</td>
</tr>
<tr>
<td>General Contractors</td>
<td>485.9</td>
<td>1,285.3</td>
<td>50.4</td>
<td>1,801.6</td>
</tr>
<tr>
<td>Specialty Fabricators and Suppliers</td>
<td>442.4</td>
<td>1,762.2</td>
<td>—</td>
<td>2,204.6</td>
</tr>
<tr>
<td>Owners and Operators</td>
<td>722.8</td>
<td>896.0</td>
<td>9,027.2</td>
<td>10,648.0</td>
</tr>
<tr>
<td>Total</td>
<td>2,658.3</td>
<td>4,072.4</td>
<td>9,093.3</td>
<td>15,824.0</td>
</tr>
</tbody>
</table>

Source: RTI estimates.

By implementing Proliance, a capital-intensive organization can begin to eliminate many of these inefficiencies in interoperability. For example:

- When initial planning and construction decisions are made based on low up-front costs to build these assets, yet the lifetime costs to maintain them are high because of the poor quality.

- Throughout the plan, build and operate lifecycle, organizations must collaborate with a large and complex supply chain. The real estate and facilities departments must maintain relationships with hundreds and thousands of outsourced designers, contractors, subcontractors and maintenance contractors.

- A new project is completed, yet 30 to 60 days after the facility has been turned over, sensitive assets begin to fail because of the lack of preventative maintenance, therefore increasing expense costs, and ultimately decreasing the lifespan of the asset.
The Proliance solution allows you to improve upon your original planning and construction decisions by analyzing the total lifecycle cost for new projects, taking into account up-front costs plus ongoing maintenance costs.

Proliance leverages a modern technology platform, so that collaboration with trading partners can be conducted in near real time using the internet as a backbone. Ultimately organizations can reduce the cycle times required to deliver new facilities, and to fix and repair critical assets—keeping existing facilities running at peak efficiency levels.

Proliance uniquely integrates project and portfolio management for new projects with facilities management for existing assets in operation. Owners and operators can stay on top of preventive maintenance requirements before problems occur.

The value of infrastructure lifecycle management on the maintenance or ‘operate’ phase of a facility, can be reinforced by data from the NIST Study which cited that as a facility ages during the many decades it is in service, periodic renewal or revitalization activities are needed. Over time, a building’s performance will decline due to age and the use it receives; however, this decline will occur at an optimal rate with proper maintenance. Without preventative maintenance, or required maintenance, the building’s usefulness will decrease at an accelerated rate.

![Maintenance Effect on Facility Performance](based on the NIST Study).

The total cost of ownership is the total of all expenditures an owner will make over a building’s service lifetime. Failure to recognize these costs and to provide adequate maintenance, repair and renewal results in a shorter service life, more rapid deterioration, higher operating costs and possible missions degradation over the lifecycle of a building. The IT systems employed during the operate phase of the facility lifecycle should interoperate with the planning and design systems to provide the most efficient data and information.
Key Elements of PPM and FM

Project Portfolio Management (PPM)
Effective project management requires a solution that manages many critical elements in one holistic perspective. Proliance manages actual projects as well as a pipeline of potential projects, where tracking real estate, legal and entitlement processes are important in the up-front planning stages. The Proliance PPM application suite combines 10 key elements into one, enterprise system:

1. **Project Scope**: A series of features to manage the review and approval of conceptual and detailed drawings and specifications, land development, entitlements and government approvals.

2. **Project Budget**: Documents that establish order of magnitude and final budgets as well as funding sources for particular budgets. In addition, Budgets work in conjunction with Project Costs to manage project savings and overruns based on the company’s chart of accounts. This system is based on “committed costs” project accounting with a focus on comparing budgets to committed costs, as opposed to actual payments that have been made.

3. **Project Costs**: Contracts, Purchase Orders, Change Orders, Invoices and payments are managed to account for committed costs on projects and to compare against budgets.

4. **Project Changes**: Manage the process for potential project changes as they are identified and forecast them into the Project Budget. Change management processes encompass managing instructions to official price changes. Track incoming quotes for change work and turn into official change orders.

5. **Project Schedules**: Breakdown a project into a series of tasks and milestones with durations and a sequence of logical relationships; generate critical paths to track and manage finish dates.

6. **Project Resources**: Assignment of resources to tasks in order to determine specific responsibility of who must perform each task.

7. **Project Quality**: Document all defects and deficiencies on a project; manage in a tracking system to ensure these items are completed at the end of a project.

8. **Project Journal**: Document the day-to-day activities, meetings and correspondence that occur during the course of a project.

9. **Project Process**: Use a definable and enforceable process management system to ensure that all scopes, budgets, costs, changes, schedules, resources, journals, etc. follow your organization’s best practices. Repeatable processes expedite cycle times and reduce project risks.

10. **Project Collaboration**: Work collaboratively on projects with multiple companies to expedite the communication process.
Facilities Management
Optimizing a large portfolio of real estate facilities and assets requires the management of several critical elements within one system. The Proliance infrastructure lifecycle management solution brings these key elements together on a modern technology platform.

1. **Location Assets**: The ability to assign a geographical location to all your enterprise buildings, plants, infrastructure, etc.
2. **Equipment Assets**: Using a hierarchical structure including locations, create all your equipment assets within each one of your facilities.
3. **Service Request**: Provide your entire user community the ability to request service via the web, and get status updates on their maintenance requests.
4. **Demand Maintenance**: Generate work orders to fix assets that have been broken, or reported as issues by an end user.
5. **Preventative Maintenance**: Automatically perform routine work orders on key assets based on a maintenance plan that extends the lives of the assets.
6. **Predictive Maintenance**: Based on a series of procedures and readings that are created for key assets, conduct predictive work orders based on threshold readings of key assets.
7. **Facility Budgets and Costs**: Track all labor and materials to keep your existing assets and facilities in good condition. Understand all costs at various levels within your enterprise assets hierarchy, including at a high level for all facilities, down to detailed equipment assets.
8. **Facility Contracts**: Manage contracts and invoices for the outsourced portion of your overall facilities costs.
9. **Facility Process**: Establish a definable and enforceable process management system to ensure that all facilities, assets, work orders, etc., follow your organization’s best practices.
10. **Facility Collaboration**: Work collaboratively on facilities and assets with multiple vendors and staff using an enterprise facility management system to expedite the communication process.
**Industry Momentum**

The concept of integrated infrastructure lifecycle management is gaining momentum within the corporate real estate and facilities industry. This is evidenced by other leading organizations that understand the vision of ILM and are driving the development of lifecycle processes and technology standards within the capital facilities markets. Some of these organizations are discussed below.

**FIATECH** (www.fiatech.org) is a non-profit consortium focused on fast-track development and deployment of technologies to substantially improve how capital projects and facilities are designed, engineered, built and maintained. FIATECH has a Capital Projects Technology Roadmap (http://www.fiatech.org/projects/roadmap/cptri.htm) that creates a vision for the future and consists of nine elements. One of these elements is “Real Time Project and Facility Management, Coordination, and Control.”

The following is an excerpt from this element in the roadmap, “While Project and Facility Management are classically treated as separate and distinct sets of processes with a discrete handoff point, this element treats them as a single set of processes covering the continuum from initial planning to the end of life of the facility.”

**OSCRE** (www.oscre.org) is an association dedicated to Open Standards for Corporate Real Estate. The goal of OSCRE is to facilitate a greater level of coordination, standardization and collaboration across the key stakeholders in the corporate real estate industry—corporate owners, public agencies, service providers, management consulting organizations, software vendors and material suppliers. OSCRE sees the role of web-based technology as an enabler paramount to their efforts. The need for a standard methodology and language is fundamental for the corporate real estate supply chain to operate and communicate within today’s e-business environment.

Using technology to strategically manage real estate portfolios is also being recognized by corporate owners, according to Mark Golan, VP of Worldwide Real Estate and Workplace Resources at Cisco, who presented at the 2004 Realcomm conference, “IT and corporate real estate departments are working closer than ever to manage the assets of the corporation; real estate departments that use information systems strategically are having bigger business impacts.”

Even Gartner has their own vision of ILM, which they refer to as IWMS or “integrated workplace management systems.” IWMS describes the market for enterprise solutions that support the management of facilities, real estate and physical assets.

According to Gartner, “through 2009, 60% of global customers with real-estate portfolios greater than 2 million sq. ft. will demand integrated workplace management systems (IWMS) over best-of-breed point solutions.” These solutions merge together traditional point applications for project management, real estate/portfolio management, facilities (space) management and maintenance management into one integrated solution that “shares a common database, uses advanced Web services technology and has an architecture that enables user-defined workflow processes and customized portal interfaces.”
**How Proliance Benefits the Organization**

The Proliance solution provides organizational value from several vantage points, including delivering complete infrastructure lifecycle management at the corporate level, as well as robust PPM and FM benefits at the operational level. The following tables describe these benefits in detail.

<table>
<thead>
<tr>
<th>Overall ILM Benefits</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage new projects and existing facilities in one, enterprise system.</td>
<td>Improve alignment of business strategy in regards to running, growing and transforming the business and the needs of new and existing physical infrastructure assets.</td>
</tr>
<tr>
<td>Understand real estate and facilities from a lifecycle perspective.</td>
<td>Capture and understand the total lifecycle costs of new projects and the maintenance costs of existing assets in a holistic way, thereby optimizing the value of these assets to the line of business units that requires them.</td>
</tr>
<tr>
<td>Eliminate downstream maintenance costs by capturing information about new projects during the planning and building phases.</td>
<td>Eliminate costly breakdowns of new projects that are commissioned and turned over into maintenance.</td>
</tr>
<tr>
<td>Gain organizational synergies across the organization by bringing together the separate real estate, construction and facilities teams onto one system.</td>
<td>Transform how key departments perform by helping them to better understand the strategic value of your infrastructure assets to the overall business.</td>
</tr>
<tr>
<td>Eliminate multiple point solutions that IT must maintain and support, and minimize the number of integration touch points.</td>
<td>Integrate multiple applications including program and project management, scheduling and facility management applications on one enterprise platform.</td>
</tr>
<tr>
<td>Increase efficiency, productivity and audit ability by allowing real estate, construction and facilities teams to communicate in real time with outsourced trading partners.</td>
<td>Manage the entire supply chain of trading partners throughout the entire lifecycle process on one collaborative platform.</td>
</tr>
</tbody>
</table>
### Overall PPM Benefits

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streamline the pipeline for new projects by tracking potential and possible projects in the system.</td>
<td>Identify new projects in the real estate pipeline early on in order to meet targets for new projects delivered to the business in a fiscal year.</td>
</tr>
<tr>
<td>Streamline the real estate pipeline and increase organizational revenues.</td>
<td>Reduce the cycle time from project identification to project completion and deliver more new projects to market.</td>
</tr>
<tr>
<td>Reduce risk of unsuccessful projects through increased visibility.</td>
<td>Take appropriate action to get projects back on track by having real-time visibility into the status of projects that are over budget or behind schedule.</td>
</tr>
<tr>
<td>Improve time to market for major refurbishment on existing facilities.</td>
<td>Easily manage large-scale remodel projects at one facility, or similar scopes of work across hundreds of facilities using Program Management functionality.</td>
</tr>
</tbody>
</table>

### Overall FM Benefits

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain a high degree of operating efficiency of your existing facilities.</td>
<td>Ensure that your ongoing revenue streams dependant on smoothly running facilities are protected on a daily basis.</td>
</tr>
<tr>
<td>Extend the lifespan of your existing facilities and assets.</td>
<td>Through preventative and predictive maintenance, ensure the longevity of your facilities and key assets.</td>
</tr>
<tr>
<td>Minimize ongoing facility management costs.</td>
<td>Shift your work orders on assets from demand work orders to preventative maintenance work orders, thereby reducing maintenance expenses.</td>
</tr>
</tbody>
</table>

The Proliance solution allows organizations to impact corporate financial results by optimizing the entire plan, build and operate lifecycle for global real estate and facilities assets. By taking an integrated approach to Infrastructure Lifecycle Management, Proliance provides an IT solution that allows organizations to manage their real estate and facilities portfolios as a strategic asset, and to ensure these assets are in alignment with corporate strategies and goals.

With over $3.5 trillion in infrastructure projects under way globally, the pressure is mounting for organizations and their real estate and facilities teams to drive efficiency, reduce schedules, mitigate risks and deliver results to the bottom line. Built on a modern Service Oriented Architecture using Web Services and XML technology, Proliance meets the technical requirements of large organizations that will need integration, scalability and extensibility to effect the above changes in their organization. By bringing multiple departments together on one, comprehensive enterprise system and technology platform, an organization can improve collaboration across its entire real estate supply chain, from a complete project or facility lifecycle perspective.

For more information on Proliance and how ILM technology can impact your organization, please visit the Meridian website at: www.meridiansystems.com, or call us at (800) 850 2660.
Bibliography

3. Ibid.
4. Ibid.