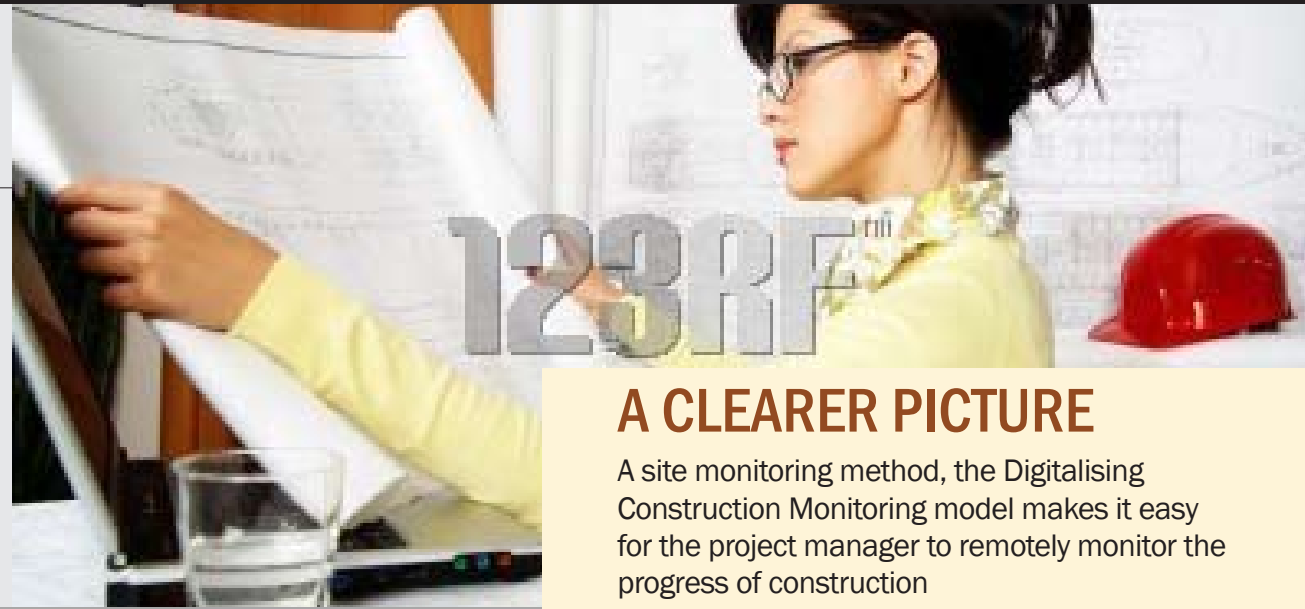


THE THREE OS

Efficient planning and organised project management are critical in helping a project stay on-time, on-cost and on-specification



A CLEARER PICTURE

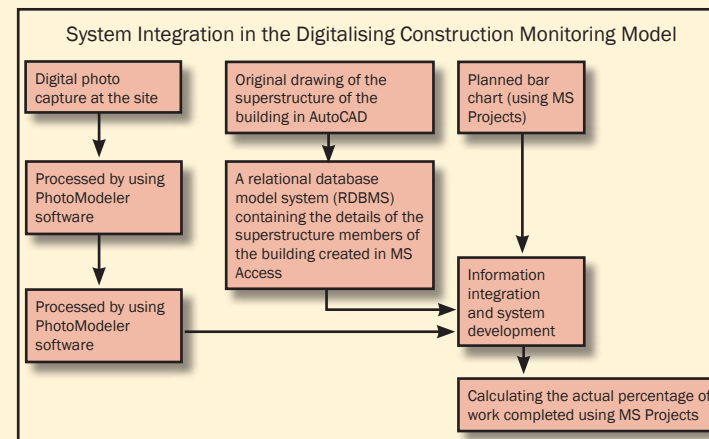
A site monitoring method, the Digitalising Construction Monitoring model makes it easy for the project manager to remotely monitor the progress of construction

Construction project management, especially for on-site activities, usually entails part of the project management team camping out at the site, monitoring the progress and reporting back. Similarly, teams from the architect's office, from the consultants and other stakeholders, have to all make trips to the site independently from time to time. To cut through that clutter and still get a clear idea of the progress, several methods have been tried over time.

One of the most recent methods to come out has been the Digitalised Construction Monitoring (DCM) model. The model was proposed by Zubair Ahmed Memon, Muhd Zaimi Abd Majid and Mushairry Mustaffar, all senior faculty in the civil engineering department at the Universiti Teknologi Malaysia's Construction Technology and Management Centre (CTMC) in a research project. The team tested the method on a pilot project of the Larkin Mosque Car Parking Project at Johor, Malaysia.

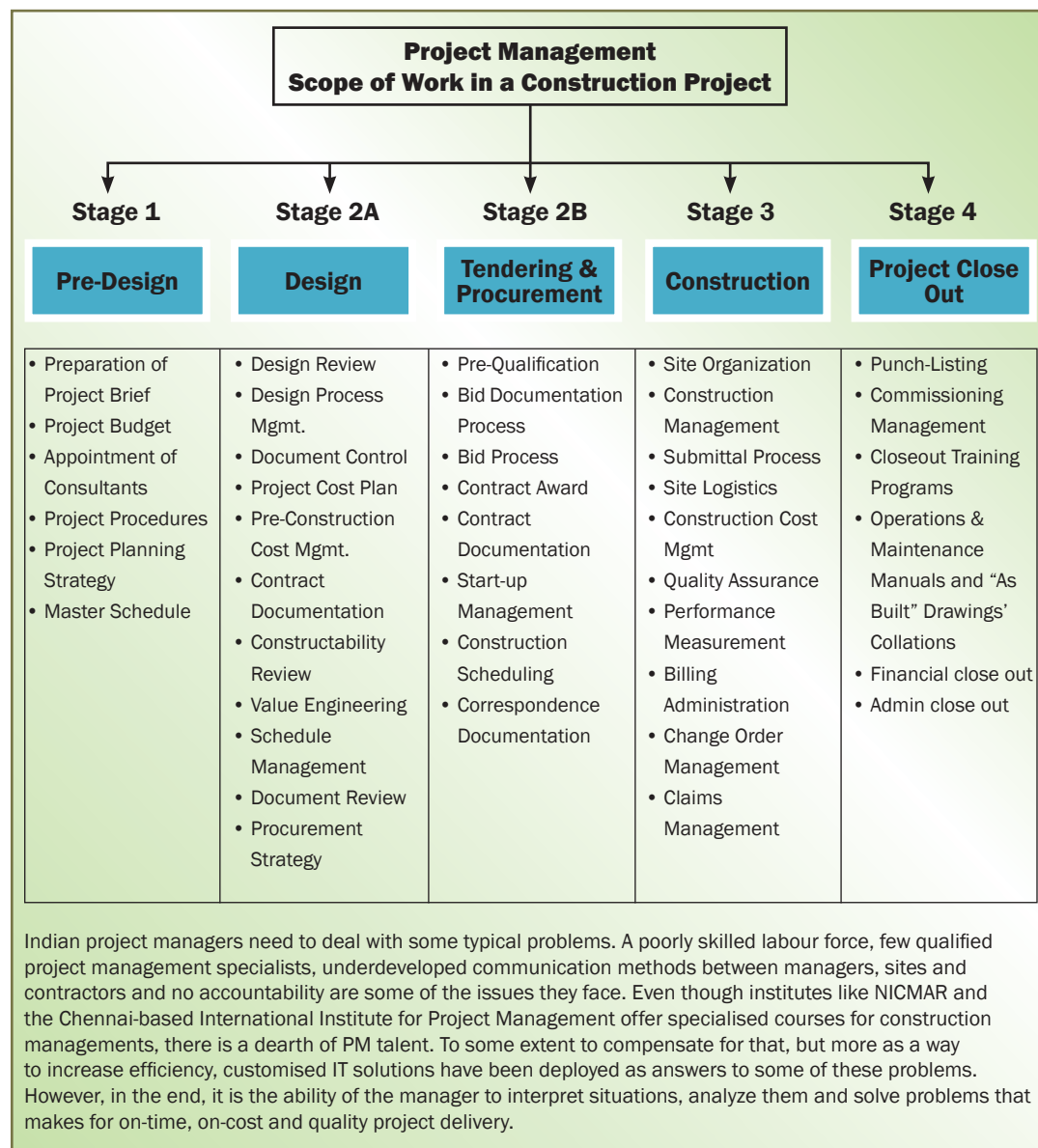
In simple terms, DCM takes photogrammetric inputs (2D images converted to 3D drawings using software like PhotoModeler), compares them with the original drawings in AutoCAD, runs it by a project management software like MS Projects, analyses the information and presents the actual progress of work in percentage terms (see figure). The images can be taken with regular point-and-shoot cameras by anyone.

Besides making it easier on the project management team, the DCM model also makes it easier for the rest of the stakeholders to monitor progress. Images as well as data can be shared easily with the design team as well as the others. It also makes it easier for the design team to do mid-course correction. ■



It was more than a year and things were not looking good at the Tarapur Atomic Power Project, Units 3 and 4, in Maharashtra. First the project was delayed because the handing over of the site was late, followed by major changes in the draft design and then delays in design approvals and clearances. After which, heavy rains came down on the project, with the level going up to 48 mm on a single day, delaying it by another three months. And when the work did start, steel prices shot up by more than 30 per cent. It was a challenging time for both, the Nuclear Power Corporation of India Limited (NPCIL), the owners, as well as Larsen&Toubro (L&T), in charge of the actual construction. The Rs 1,252 crore project was in danger of being derailed.

Or so it would have been, had L&T not had sound project management (PM) in place. Responding with corrective measures like delay analysis, adding resources, improvement in the construction methodology, better utilisation of resources, negotiations on raw material prices with manufacturers and replacing road transport with rail. With several years



in the business, L&T had an accumulated wealth of learning in the area of project management, putting it to work, the project was finished in 2005.

Defining PM

Project management, defined variously by several institutes and academicians, is essentially about ensuring that a specific objective gets fulfilled in a stipulated time frame, following specific guidelines and meeting defined parameters (especially financial ones). The Project Management Institute, a leading association for project management professionals, defines project management as "the application of knowledge, skills, tools and techniques to a broad range of activities in order to meet the requirements of a particular project."

While in software a project could mean the development of a software product, in construction, a project could be the construction of a road, building a small home, delivering a gigantic plant, for instance. Says Prof. Goutam Dutta, Chairperson, Research and Publications, Indian Institute of Management, Ahmedabad, "Traditionally, project management has been seen as an operations function, giving an organisation competitive advantage. While most people think project management helps save costs on the overall project, one often-overlooked aspect is the saving achieved by risk management, which happens because risks are apparent more easily and on time when project management is in place."

Project management as a discipline was born out of experiences in construction

and defense. Now, however, it is used as a broad management tool and is especially important to the software industry. The definition of project may differ, but many of the tools used are similar. Moreover, software tools have become an integral aspect of implementing project management techniques in construction. The petrochemicals sector also employs project management. "One area that desperately needs project management is the public sector in the country. It is critical to train public servants in project management so that those projects are better managed," says Prof. Dutta.

The basic approach

The traditional phased approach to project management identifies a 5-step sequence of steps—initiation, planning and design, execution or production, monitoring and controlling, and completion.

To understand this, let us take the example of a software product that needs to be created. The initiation stage outlines the nature and scope of the project. In this case, it means preparing the product brief, putting down the procedures to be followed, putting down the project strategy and schedule. In a way, conceptual design also happens at this stage. Then the system is designed, often along with a prototype.

During execution, the coordination of people and resource assumes importance along with integrating and performing project activities according to the project management plan. Keeping release schedule in mind, the

execution process includes monitoring and controlling to identify and solve problems. Variances from the plan are noted as learning for the future. The closing stage includes formal acceptance of the project, including finalising all activities of the process groups as well as the contracted professionals and vendors involved in the project.

Tools

Project management was formally developed into a management tool by Henry Gantt way back in the 1890s and the Gantt chart was widely used till

its modern variants, the critical path method (CPM) and the Program Evaluation and Review Technique (PERT) were designed in the 1950s. Essentially, Gantt charts, CPM and PERT use a graphic schedule of tasks in order of completion, to plan and control work and record progress.

A Gantt chart allows you to see, at a glance, what should be achieved at a point in time. It also permits the user to assess how long a project should take, lay out the order of tasks, manage dependencies, and assess the impact of remedial action on the project. (See Chart)



STREAMLINING A BEHEMOTH

Using Primavera's project management solution, Essar Construction (India) Limited managed to save 20 per cent of its administrative costs and 30 per cent of its scheduling time

For a construction company, monitoring the progress of its various projects across several locations is extremely critical and very difficult. Translating the vision of the senior management for each project and ensuring the follow-through of that makes it essential for the company to employ a project management system.

A large contractor for engineering, procurement and construction projects, Essar Construction Limited is a subsidiary of the Essar Group. It has experience in civil and irrigation projects, laying of pipelines, construction of industrial plants and highways and expressways. The company has a workforce of more than a 1000, engineering design centres in Hazira (Gujarat), Mumbai, Chennai and Kolkata and global sourcing offices in India, the Middle East, Europe and China. At any given time, the company handles 20-30 large projects (of more than Rs 100 crore in value).

A solution was needed to give top management an overview of all the projects of various strategic business units (SBU) such as steel, oil and gas, power, infrastructure, pipelines and marine. "There was a need to bring uniformity and standardisation in the planning approach for diverse projects in various SBUs," states Mohan Phatak, the company's GM and Head of Planning in an interview to Express Computers.

The company contracted KLG Systel, a Gurgaon-based software solutions and services company, to deploy an enterprise-wide project management solution from Primavera. Using the solution, information on the progress of their projects underway all over India and abroad was to be collected to provide centralised project data to their controlling facilities at Mumbai (the head office), Hazira and Jamnagar (in Gujarat,

where senior management is based). Like most major companies, Essar construction uses a combination of ready solutions like Primavera and customised software. Using SAP ECC 6.0 PS module, a budget monitoring and management information system (MIS) was also developed.

Finished in about two months, the implementation "helped create standard methodologies for various business processes. The data is being made available to individual users hierarchy-wise. There has been constant web-based updating of projects and customisation of web-based views for executives and top management," adds Phatak. Data such as resource codes, activity codes, work breakdown structure (WBS), calendars, numbering systems, and reports for the typical projects for each of the SBUs was standardised.

Using the solution, a baseline schedule is prepared and periodic reports on quality and schedule compliance are sent to the central planning team. Daily, weekly and monthly analysis of data is done to keep an eye on critical activities. The planners able to get resource loading and in turn is able to get cash flow in advance, which was earlier very tedious. This is close to what the company is supposed to spend and they know this information in advance. Previously this was being done manually without a user-friendly interface. Also, centralised reporting is something that was not being done earlier.

Essar purchased 15 licenses of Primavera at Rs 180,000 per license. The total cost of ownership, which included the purchase of Oracle 9i as the database server and Windows 2003 server edition, came to about Rs 7.5 crore. Against this, Essar reported a return on investment of around 10-15 per cent.

Using project management, Essar Construction has managed to better utilise resources, cut administrative costs by 20 per cent and, by sharing best practices across projects, 30 per cent on scheduling time. For its implementation, Essar Construction (India) Limited became the first Indian company to receive the Primavera Excellence Award 2006 for engineering and construction in the contractor category. ■

SCRUMPTIOUSLY MANAGED

A simple, yet no-nonsense method for project management, SCRUM breaks the project down into smaller chunks finished iteratively

In the context of product development, time-to-market is a critical criterion for success. You may have the most competitive products in place, but your competition may have already beaten you to it. Also, long drawn-out product cycles usually don't cater for rapidly changing market scenarios. In spite of all good intentions and hard work, if the product fails to hit the market on time and with all the features the customer expects, time and effort are wasted—affecting not just ROI, but also employee morale.

Enter SCRUM, an iterative method of creating a product. An idea made popular by Ken Schwaber and Jeff Sutherland, SCRUM is not an acronym. It takes its name from rugby, where the team works together to achieve something. In the case of product development, that something is a shippable finished product.

SCRUM is most actively used in the area of software product development. Some of the top names in software—Google, Microsoft, Infosys, Wipro and Yahoo!—all use SCRUM to improve their development process. Other big SCRUM implementers include Siemens, Motorola, Nokia, Philips and Accenture. SCRUM is now being used to develop any kind of product or even as a general project management tool.

SCRUM uses a cross-functional team of usually 5-9 and clears them of hierarchical limitations—everyone does everything. This team then goes about developing the product in an iterative process. SCRUM involves working in short, snappy sessions (see figure). The three main roles in SCRUM are the project owner, the SCRUM team and the SCRUM Master. While the project owner communicates the expectations from the SCRUM—a master list of features, with priorities sorted—the SCRUM Master is the person actually ensuring the SCRUM process by protecting the team from outside disturbances as well as helping out with problems.

While SCRUM works on a simple framework, usually once a company or unit decides to implement SCRUM, they get in touch with a SCRUM evangelist or expert, who takes them through the process the first few times. There are about 50 certified SCRUM trainers (CSTs) trained by Ken Schwaber himself. In India, Pete Deemer, a CST, has set up GoodAgile to provide SCRUM training and certification.

According to a survey done by GoodAgile in Yahoo!, 68% of the teams thought productivity was higher using SCRUM, while 85% thought they would continue to use SCRUM. ■

CPM is a mathematically based algorithm that allows the user to view the list of activities, the time taken to complete them and the interdependencies. Essentially, CPM calculates the longest path of activities to complete a project, and helps the project manager find the shortest time possible to complete the project. It follows the activities that are on the critical path, that is, those that are on the longest path in the chart. A delay on the critical path means an increase in the overall project completion time. A CPM helps the manager determine the amount of float in each activity, which is the amount of time that specific activity can be delayed without delaying the entire project. Activities on the critical path have zero float.

PERT, a similar technique, was specifically developed by a contractual vendor under the United States Department of Defence to simplify the planning and scheduling of large, complex projects and is able to incorporate uncertainties.

Says Dr AV Patwardhan, Dean at the National Institute of

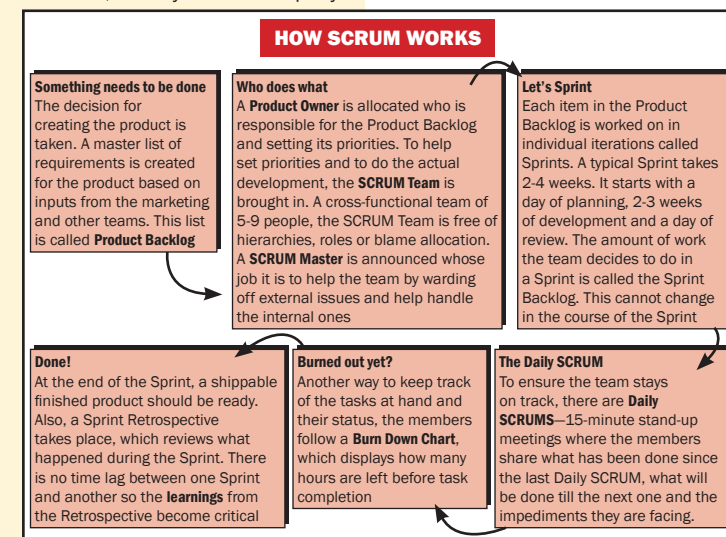
Construction Management and Research (NICMAR), "While Gantt is just a comprehensive, visual, at-a-glance method, PERT and CPM are more extensive in their scope. PERT is better applied to scientific and defense projects where there is a possibility of new discoveries and unpredictability along the way, while for CPM, you need to have clarity on the project path."

Beyond the traditional methods, advanced variations like critical chain project management, extreme project management, event chain methodology and Prince2 are being used, among others. These analytical tools help managers allocate resources, prioritise activities and cut down the time and cost on a project by fast tracking activities or adding resources.

Project management in construction

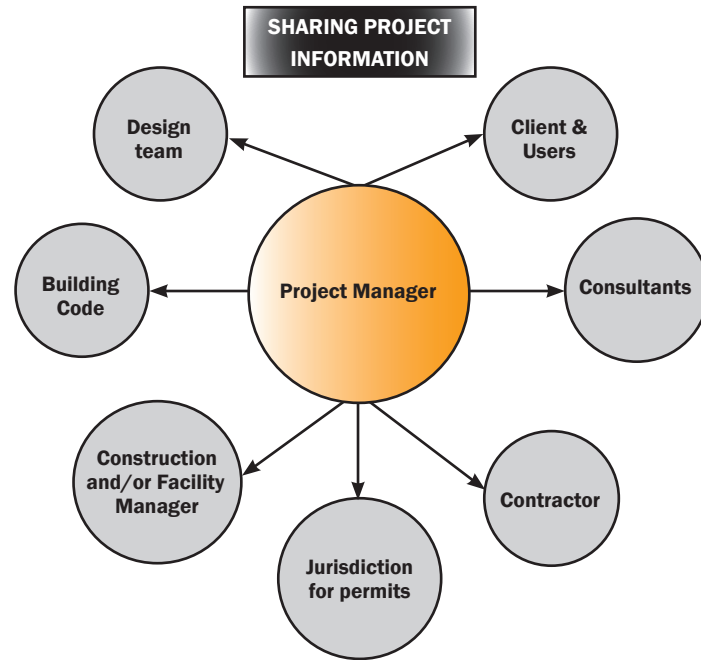
In the context of construction, project management plays an extremely critical role. Construction projects in India have come a long way from the days of ad-hoc planning and poor management, when delays and cost overruns were rife. The government-run projects were particularly poor in project management running up huge losses. However, in the last years, the government has cleaned up its act and tightened its hold on the projects, consequently bringing the cost overruns down from 62 per cent in 1991 to just 22 per cent in 2003.

Today, medium- and large-sized projects have professional teams for engineering, construction and project management. Within



the industry, though, there are variations. Says Dr Patwardhan, "While the Indian infrastructure companies are at par with those in the rest of the world in terms of project management, the real estate sector still has to catch up. The bigger players in it are more organised, but in the small and medium sized companies, there are very few who employ project management in a formal manner."

Where project management is in place, the whole construction process is detailed, the major stages and their tasks, with the project management team at the centre. See chart for a breakdown of the five stages in a construction project.



Software for project management

Though project management techniques were developed before computers became widespread, today the implementation of PM is entirely through a wide array of general and specialised software available for the purpose. There are a number of open source, proprietary desktop-based as well as web-based project management software available today. Whereas QuickGantt can help manage small projects and essentially helps managers generate basic charts, complex projects need software like Primavera SureTrak and Microsoft Project. Microsoft Project 2003 (with Project Server). Primavera Project Planner, Enterprise PM and Micro Planner X-Pert are suitable for multi-project situations. In India Primavera and Microsoft Project is used in most cases. Most companies use a combination of off-the-shelf

and web based or customised products. Choosing one over the other is usually dependent on the price and the available support. In India, customers want the full solution, and are willing to pay for it. Costs usually depend on the size and scope of the implementation. Ultimately, as Dr Patwardhan says, "these programs are just tools, and need the vision and planning to be clear in order to be effective."

Project management in software development

Software development is a complex process that often needs to respect draconian release schedules. Accordingly, software development firms have been quite savvy in deploying project management. In fact, software development companies usually tend to use more complex project management methods like Capability Maturity Model Integration (CMMI) and Rational Unified Process (RUP). There

are, however, some inherent critical differences in how project management is practised in software development versus how it is practised in construction. "In software, you have the option of simultaneous development at several locations. In construction, the scope for that is very limited because of the cost and availability of raw material as well as transportation costs. Also, in software, it is simpler to have people on the benches, who you can quickly deploy when you need to and pull and when you don't," explains Prof. Dutta.

Traditionally software development companies have followed the 'waterfall' method of development, in which the process is more sequential. The process starts with stating the requirements, design, implementation, verification and finally maintenance in a linear path. The management of this process is also linear, with

a hierarchical and fixed team structure.

In the mid-90s, a new way of thinking evolved, which emphasised iterative processes, teamwork, self-organisation and accountability. This grew to include a group of methodologies known as agile software development models. Some of the popular methods in this include SCRUM (see box), Extreme Programming (XP) and Agile Modeling.

A number of software development companies that traditionally followed waterfall methods have shifted to agile methods. Project management software Primavera, for instance, chose SCRUM.

Ahead of the game

The quality of project management can make or break a project today, where the costs as well as risks are high. With new technology and approaches coming into the market rapidly, managers need to stay informed about the latest trends.

At present, the biggest concern for project managers is controlling processes. The second task that managers are emphasising is the management of project information during the various phases. A migration from written reports to online and computerised documenting systems is on the cards at most major project management setups in India. Risk management is another area that is hotly discussed at this time, largely because risks are often underestimated in construction. ■

NEXT ISSUE:
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