

CIB W102 3RD INTERNATIONAL CONFERENCE, STUTTGART 2007 OCTOBER 17-18

"INFORMATION AND KNOWLEDGE MANAGEMENT — HELPING THE PRACTITIONER IN PLANNING AND BUILDING"

Organisational Partners

CIB-W102 is the CIB Working Commission on Information and Knowledge Management in Construction. It was instigated in 1999 in Montreal. Some of its objectives are to explore: the potential of information and knowledge management processes and technologies to improve performance of construction organizations in the construction supply chains; the challenges of global markets for professionals, firms and the construction industry in different countries; the challenges of innovation, information and knowledge transfer to Small and Medium Enterprises; and how the exploitation of information and knowledge management could benefit construction education.

Fraunhofer IRB, the Information Centre for Planning and Building of the Fraunhofer-Gesellschaft, being Germany's central facility for national and international knowledge transfer in planning and building, develops and distributes information services and products which are tailored for the special requirements of target groups from the fields of architecture, engineering, construction (A.E.C.).

Centre Scientifique et Technique du Bâtiment CSTB is a State-owned industrial and commercial corporative, placed under the administrative supervision of the French Ministry of Housing. It is one of Europe's leading research and evaluation centres. Its experts include specialists in construction materials and techniques, facilities, safety, thermal engineering, acoustics, aerodynamics, lighting, the environment, health, new information and communication technologies, not to mention economics and sociology. These complementary skills allow it to deal with the most complex construction problems from a multidisciplinary standpoint.

The conference is held in conjunction with the following events, also hosted by Fraunhofer IRB:

- the Annual Meeting of the CIB Working Commission on Information and Knowledge Management in Construction W102
- the Annual Meeting & Seminar 2007 of the International Union of Building Centres UICB
- the Annual Meeting of the ICONDA® Bibliographic Board, the supervisory committee for the bibliographic section of ICONDA® The International CONstruction DATabase

[Conference Information | Venue →](#)

[Schedule of Presentation Sessions →](#)

[Abstracts of Presentations →](#)

Conference Secretariat:

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Conference Website:

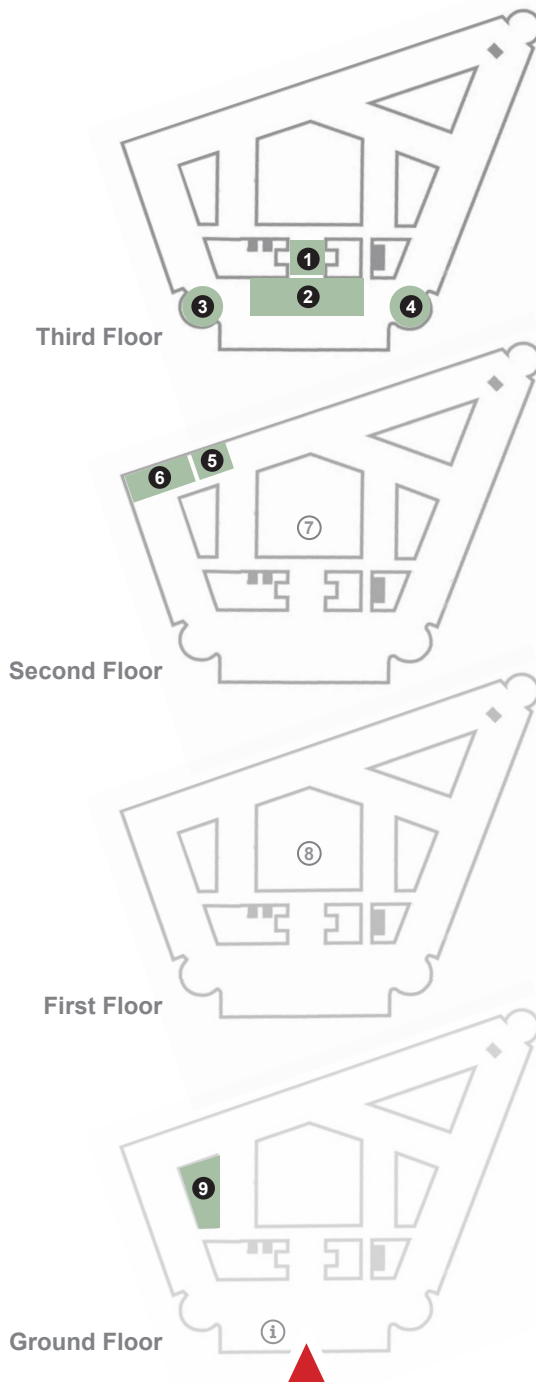
<http://cib-w102.iconda.org/conference2007stuttgart>

Conference Venue:

Haus der Wirtschaft Baden-Württemberg

Willi-Bleicher-Straße 19

70174 Stuttgart



- ❶ "Kepler" Hall Foyer
Registration, Service Desk
- ❷ "Kepler" Hall
Catering: Coffee Breaks, Lunch
- ❸ Conference Room "Studio A"
Conference Sessions 02 | 05 | 07 | 09 | 11
- ❹ Conference Room "Studio B"
Conference Sessions 03 | 06 | 08 | 10
- ❺ Conference Room "Ulm"
Conference Session 04 | W102 Meeting
- ❻ Conference Hall "Reutlingen"
Conference Opening Session 01
- ❼ "König-Karl-Halle"
- ❽ "Meidinger-Halle"
- ❾ "Logo" Restaurant Banquet
- ⓘ Main Reception/InformationDesk
& Meeting Point
- ▲ Main Entrance





from Airport STR g Stuttgart Main Station [30 min. travel]:
take urban rail **S** line S2 → Schorndorf or line S3 → Backnang
[departure h:08]:28]:38]:58]
exit stop „Hauptbahnhof“ platform 102, 2nd underground level

from Stuttgart Main Station [„Hauptbahnhof“]:
take metro **U** departing 1st underground level,
line U9 → Botnang or line U14 → Heschl Vogelrain
exit stop „Friedrichsbau“, walk in direction of metro travel

Day 1 | Oct 17

- Registration -		
09:00-12:30	01	OPENING SESSION
9:45	IRB CSTB CIB	Opening Address Director Fraunhofer IRB Opening Address Director R&D CSTB Opening Address General Secretary CIB
9:45	Keynote1	Capturing and Using Knowledge With Building Information Modelling
10:15	Keynote2	Smart and Open Building Information Modelling (BIM)
10:45-11:00 - Coffee Break -		
11:00	Keynote3	Value Knowledge Management
11:30	064 006	Announcement & Presentation of upcoming Conferences
12:30-13:30 - Lunch Break -		
13:30-16:00	02	Design & Knowledge
13:30	078pp1	DESIGN COLLABORATION AND TEAM WORKING
13:55	094pp3	ARCHITECTURAL SPATIAL INFORMATION: NEW CRITERIA FOR SPATIAL CONFIGURATION OF DESIGN
14:20	070pp1	BIOMETRIC FUTURES: GLOBAL BIOMETRICS AND THE ARCHITECTURAL PRODUCTION OF INTELLIGENT BUILDINGS.
14:45	098pp	MACE - METADATA FOR ARCHITECTURAL CONTENTS IN EUROPE
15:10	072pp2	USING INTEGRAL DESIGN FOR STARTING A CULTURAL CHANGE IN DUTCH DESIGN PRACTICE; 2000 - 2006
15:35		- Discussion -

DAY 1 | OCT 17

12:30-13:30		- Lunch Break -
13:30-15:30	03	Knowledge Management & Models (I)
13:30	026pp	KNOWLEDGE MANAGEMENT AND QUALITY MANAGEMENT SYSTEMS
13:55	051pp	HOW COULD CONSTRUCTION SUPPLY CHAIN BENEFIT FROM RFID/GPS INTEGRATION: A KNOWLEDGE MANAGEMENT PERSPECTIVE
14:20	110pp	KNOWLEDGE AND INFORMATION EVALUATION PRACTICE - AN EXPLORATORY STUDY IN A CONSTRUCTION FIRM"
14:45	080pp	KNOWLEDGE BASED INTEGRATION IN DESIGN AND CONSTRUCTION - "A CONCEPTUAL FRAMEWORK TO ANALYSE DESIGN INTEGRATION"
15:10	096pp	4D CONSTRUCTION PLANNING & HEALTH AND SAFETY MANAGEMENT
15:35		- Discussion -
13:30-17:30	04	e-Business [UICB Session]
13:30	126kp	SESSION KEYNOTE: E-business and Building Information
13:55	127pp	Building Information as e-business. Case Denmark
14:20	128pp	Building Information as e-business. Case Finland
14:45	129pp	Building Information as e-business. Case Turkey
15:10	107pp	METABASE ITeC
15:35		- Discussion -
16:00-16:15		- Coffee Break -
16:15-18:15	05	Project Management & Information Systems (I)
16:15	086pp	DEVELOPING PROJECT MANAGEMENT SYSTEM TO SUPPORT ACTIVE LEARNING AND COMMUNICATION IN A CONSTRUCTION PROJECT
16:40	111pp	INFORMATION MANAGEMENT FOR DESIGN OPTIMISATION IN THE PRELIMINARY STAGE OF AN EXCAVATION PROJECT: THE TAGUCHI APPROACH"
17:05	016pp3	INFORMATION TECHNOLOGY TOOL FOR THE ASSESSMENT OF KNOWLEDGE GAP IN REFURBISHMENT PROJECTS
17:30	055pp	THE ROLE OF MANAGING INFORMATION SYSTEMS TO IMPROVE COMPETITIVENESS OF SERBIAN BUILDING AND CONSTRUCTION INDUSTRY ORGANISATIONS
17:55		- Discussion -

16:15-18:15	06	Knowledge Management & Models (II)
16:15	083pp	AN ORGANISATIONAL MODEL FOR IMPROVED INFORMATION AND KNOWLEDGE IN INTEGRATED DESIGN TEAMS"
16:40	064pp	KNOWLEDGE MANAGEMENT CHALLENGE IN CONSTRUCTION INNOVATIONS
17:05	104pp	KNOWLEDGE SHARING AND MANAGEMENT IN ARCHITECTURAL DESIGN TEAMS USING A PROJECT WEBSITE
17:30	094pp1	APPLICATION OF KNOWLEDGE DISCOVERY TO CONSTRUCTION PROJECTS DATABASES
17:55		- Discussion -

16:15-18:15	W102	CIB W102 Annual Meeting 2007
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19:30	Conference Banquet (Conference Venue: Ground Floor, "Logo" Restaurant, open to all full participants and student extra payers, dress code: business/informal)	
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DAY 2 | OCT 18

9:30-11:30	07	Knowledge Management & Models (III)
9:30	065pp	MANAGING KNOWLEDGE WITHIN THE LEADING IRISH CONSTRUCTION ORGANISATIONS: CURRENT PRACTICES AND FUTURE DIRECTIONS
9:55	054pp	FRAMEWORK FOR KNOWLEDGE MANAGEMENT IN PRECONSTRUCTION PHASES OF CIVIL ENGINEERING PROJECTS - KOSOVO EXPERIENCES
10:20	125pp	THE CLIENT'S PROJECT MANAGER'S KNOWLEDGE NEEDS IN THE UK CONSTRUCTION SECTOR
10:45	087pp	SPECIAL INTEREST GROUPS - KNOWLEDGE MANAGEMENT MECHANISM ADOPTED BY A PUBLIC SECTOR CLIENT IN THE UK
11:10		- Discussion -
9:30-11:30	08	CoP & Knowledge Mapping
9:30	016pp1	THE KEY CHALLENGES ASSOCIATED WITH MAPPING SUSTAINABILITY-RELATED KNOWLEDGE FOR ORGANISATIONAL COMPETITIVENESS: AN EMPIRICAL STUDY
9:55	091pp	SUPPORTING THE EMERGENCE OF KNOWLEDGE COMMUNITIES IN INDUSTRIAL ASSOCIATION GROUPS IN THE CONSTRUCTION SECTOR
10:20	068pp	IDENTIFYING THE CRITICAL FACTORS THAT DETERMINE THE SUCCESS OF COMMUNITIES OF PRACTICE WITHIN AN ENGINEERING DESIGN CONSULTANCY
10:45	077pp	MAPPING CONTEXT-SPECIFIC VOCABULARY TO A LARGE-SCALE PRODUCT MODEL TO REALIZE A MORE USER-CENTRED INFORMATION SEEKING ENVIRONMENT
11:10		- Discussion -
11:30-11:45		- Coffee Break -
11:45-13:45	09	Knowledge Management & Models (IV)
11:45	016pp2	THE ROLE OF KNOWLEDGE CAPTURE FOR IMPROVED COMPETITIVENESS IN SMALL AND MEDIUM ENTERPRISES IN THE UK CONSTRUCTION INDUSTRY: AN EMPIRICAL STUDY
12:10	078pp2	PERMANENT EDUCATION FOR DESIGN COLLABORATION
12:35	069pp	DEVISING A FRAMEWORK FOR MANAGING SUBCONTRACTORS BY LEARNING FROM EXPERIENCE
13:00	059pp	STAKEHOLDER KNOWLEDGE MANAGEMENT PROCESSES
13:25		- Discussion -

DAY 2 | OCT 18

11:45-13:45	10	Project Management & Information Systems (II)
11:45	072pp1	INTEGRAL DESIGN METHODOLOGY FOR INDUSTRIAL COLLABORATION DESIGN OF SUSTAINABLE INDUSTRIAL FLEXIBLE DEMOUNTABLE BUILDINGS
12:10	089pp1	THE BASIS OF A DECISION MAKING TOOL FOR RISKS' EVALUATION BASED ON ONTOLOGIES
12:35	060pp	E-LEARNING IN DIDACTIC WORKSHOPS. THE VIRTUAL ATELIER SYSTEM 'T-LABS': STORAGE, CONCEPTUAL METATAGGING AND SHARING OF THE ARCHITECTURAL DESIGN KNOWLEDGE
13:00	073pp	EFFICIENCY GAINS TO BE WON THROUGH THE INTRODUCTION OF ELECTRONIC TENDERING IN THE CONSTRUCTION INDUSTRY
13:25		- Discussion -
13:45-14:45		- Lunch Break -
14:45-17:15	11	Ontologies & Management
14:45	076pp2	AN ONTOLOGY APPLIED TO THE MANAGEMENT OF THE CONSTRUCTION PROCESS REPRESENTING AN IDEFO METAMODEL INTEGRATED IN A PLANNING/DESIGN STRUCTURE MATRIX
15:10	021pp	AN ONTOLOGY DEVELOPMENT BASED ON FACETS CONCEPT: THE ONTOARQ PROJECT
15:35	106pp	AN ONTOLOGY-BASED INFORMATION RETRIEVAL AND EXTRACTION SYSTEM FOR THE EARTHEN ARCHITECTURAL HERITAGE (EAH) DOMAIN"
16:00	076pp1	DISTRIBUTED AND COOPERATIVE PLANNING. AN ONTOLOGICAL WEBBASED SYSTEM SUPPORTING THE KNOWLEDGE CAPTURING AND SHARING IN THE CONSTRUCTION FIELD
16:25	089pp2	IMPROVEMENT OF THE DOCUMENT MANAGEMENT SYSTEMS BY THE DEVELOPMENT OF AN ONTOLOGY
16:50		- Discussion -
17:15		- Coffee -

Jeffrey Wix

040kp

CAPTURING AND USING KNOWLEDGE WITH BUILDING INFORMATION MODELLING

Building Information Modelling, BIM, Industry Foundation Classes, IFC

This presentation will discuss how we can capture and use knowledge with building information modelling tools. It will consider areas where knowledge can be applied and where this can help to accelerate the growth of technology use. In particular, the separation of ideas into requirements and solutions will be discussed and solutions based on use of the IFC model proposed. The SMARTcode method for the capture of rules will be discussed to show how the tools for knowledge interpretation and capture can be given to users. The presentation will draw on real examples of knowledge capture and use including building codes development and housing design.

Michel Böhms

008kp

SMART AND OPEN BUILDING INFORMATION MODELLING (BIM) WITH A COMBINATION OF W3C SW (SEMANTIC WEB) AND IAI INDUSTRY FOUNDATION CLASSES (IFC)

This keynote will discuss the relevant aspects of Building Information Modelling (BIM): semantics, interoperability, information management versus handling etc. It will show the issues on both an ICT Solutions layer (management and design applications, schemas/ontologies) level and on the underlying ICT Platform layer (STEP technologies, Plain XML technologies, Semantic Web technologies like OWL, and implementing model servers). Theory will be complemented with implementations and demonstrations from various projects and initiatives (like EU SWOP, Manubuild, InPro, ECTP FA7 and NL COINS, ProClient).

Dr. Gerd Simsch - Beate Kögel, Bilfinger Berger AG

114kp

VALUE KNOWLEDGE MANAGEMENT

knowledge management, intranet applications, semantic networks

Advances in technology have done much to change the way we communicate, but no breakthrough has revolutionized our work as the development of the search engines.

In the information age having immediate access to data is fundamental to progress. The internet/intranet allows the documentation of essential information which are fundamental for the work progress and text messaging has made written communication more immediate as well. The ability to store tons of information in databases allows us to keep technologies portable. But finding quick answers and the development of durable high quality products is the real value behind knowledge management.

By measuring the value of knowledge people mean reviewing and comparing new measures, analysing their successes and failures of the implementation of systems. But it is also essential to look at all the questions where there are no direct access to answers and where the knowledge is only locally available - searching for “hidden knowledge” and for the ideas represented behind such scenes for

- making it easy for our people to identify and connect with subject matters of experts.
- communicating to provide ongoing conversations with the benefit of deeper thinking and finding solutions.
- promoting technical competence and innovation ability and helping to organize and cluster concepts.
- evaluating alternatives, potential difficulties and effects on other parts.
- helping our engineers to manage the content and organization of their daily work.
- helping our colleagues to identify and use the most appropriate information bases.
- making it easy for our experts/specialists to publish their knowledge and subscribe to the information they want.

The know-how of people over the projects, technical background, customers or the market is the crucial factor for the progress of each enterprise and its existence in the competition. It depends above all on the fact that the information research functions effectively. All the more because the construction industry has non-stationary business processes. The solution reads here: semantic technologies. With their assistance a general search can be converted into a firm specific. In addition goals and the background can be brought into the interaction with the information.

Knowledge Management is the process by which both the tacit and explicit information and intellectual assets, including organisational lessons learnt within the group of companies are captured, leveraged and managed.

tore, Bilfinger Berger’s technical operational research engine is the semantic network, which comprising knowledge assets, developed in-house and relationships as well as business disciplines around presentation and prequalification.

The aforementioned can all be summarized in the term Value Knowledge Management. Beside technical competences, innovation strength and risk management, time in particular is the most deciding factor that create value for a company.

Emile Quanjel; Wim Zeiler

078pp1

DESIGN COLLABORATION AND TEAM WORKING

Integral Approach, Collaborative Design, Practical Design Decision Tools, Workshops

One of the core problems within construction industry is knowledge exchange between the different participants during the design- and engineering process (Lechner 1991, Cross 1992, Reymen 2001, van Aken 2005). To link the parts of the knowledge-triangle practice, education and research forms the basis for possible solutions – in the context of the building design-engineering (Quanjel&Zeiler 2003). This context can be represented by the Product-Process-Organization model (Bax&Trum 2000). At the Technische Universiteit Eindhoven (TU/e) in collaboration with TNO Built Environment and Geosciences, first experiments to find a format for supporting Design Collaboration, started in 2000. Set up where training workshops for the members of BNA/ONRI (Royal Dutch Organization of Architects / Dutch Organization of Advisory Consultants), for design- teams including participants with the same educational background. More recent, a first set up was done for design teams with participants with different educational backgrounds. These quasi-experiments (Campbell&Stanley 1971) are coupled on the basis of a concrete task from the practice and the PhD-research EURACTIVE ROOFer by E. Quanjel at the TU/e-TNO. The objective of this project is to improve the knowledge exchange between design participants of active roofs in product development as part of the total building design and its comfort-systems. Salter and Gann (2002) found that face-to-face interaction and the use of sketching are still the most important elements for developing new ideas and solving problems. Given this aspect and the characteristics of the problem definition, a methodology to support the design team during the development of the building design is introduced. This method is based on the Methodical design methodology; a matrix orientated approach used in the mechanical engineering domain (van den Kroonenberg 1978). Within the setting of Methodical Design several design-support tools are used: the Morphological Overview and the Kesselring method (Zwicky 1969, Kesselring 1954). These practical tools from the theoretical method are connected with the design practice, as reflexive practice, through quasi-experiments for architects and roofer engineers (Schön 1983). The experiments will be done in a serial with feed-back; the Kesselring-method as well as the results of the quasi experiments itself. To distinguish the knowledge-exchange aspects, Bales' Interaction Process Analysis model is used (Bales 1950, Emmitt&Gorse, 2007). The result of these experiments is a design decision support tool for both architects and roofer-engineers in the setting of Collaborative Design.

Khaled Nassar

094pp3

ARCHITECTURAL SPATIAL INFORMATION: NEW CRITERIA FOR SPATIAL CONFIGURATION OF DESIGN

Information technology, knowledge management, distance, planning, building

Simple Euclidean distance has thus far been the dominating concept in analyzing architectural and urban spaces. This paper demonstrates that distances between spaces cannot be measured solely in terms of simple Euclidean Distance, but instead other kind of distances (e.g. City block, Chebyshev, Minkowski, Canberra distance or Angular separation) are shown to offer new meaningful insight into space and its denotation. Several issues are raised in light of these new measures such as how much are these measurement techniques influenced by what counts as "space"? In addition is there a difference between the physical distance and the human perception of distance? More importantly, how do these methods alter design or offer a new process of designing? Applications and analysis is applied to classical examples of architecture.

Dr. Peter Raisbeck

070pp1

BIOMETRIC FUTURES: GLOBAL BIOMETRICS AND THE ARCHITECTURAL PRODUCTION OF INTELLIGENT BUILDINGS.

Biometrics, building security, knowledge and data management and facilities management.

The technological revolution in information systems and telecommunications has had a profound effect on architecture. After 9/11 and with the ongoing conflict in Iraq governments have increasingly become interested in biometric technologies as a way to control access to urban buildings and facilities. Biometric technologies allow physical and biological information about the body to be scanned and recorded in databases. These techniques include fingerprint, facial, iris and voice recognition. Emerging research in the field also includes using biometrics to recognize a range of identity authentication methods including individual signatures, various body parts and gestures. Governments around the world are currently looking at a range of biometric technologies as a part of broader identity management strategies. The information gained from biometrics can be used in access control systems in buildings.

The Biometric industry itself is split industry itself competitive technology vendors and systems integrators, resellers, original equipment and device manufacturers Biometric application solutions providers, middleware providers, and algorithm creators. The outline structure, competitive drivers and current evolution of this of this market will be described.

The aim of this paper is to examine these technologies in relation to their possible impact on architecture, buildings and Facilities Management processes of the future. The paper will consider how the creation of biometric knowledge will shape the future of access control and building information systems. What new knowledge bases will be required and who will manage them? How will such technologies impact on both end users and building designers? One strategic approach to considering the way in which biometric technologies could be designed and integrated into buildings and facilities in the future is from the vantage point of the so-called intelligent building. This is because biometric systems suggest the possibility of achieving a symbiotic and inclusive, or as the case may be exclusive, relationship between users and various building systems.

Hans Martin Barth

098pp

MACE - METADATA FOR ARCHITECTURAL CONTENTS IN EUROPE

architecture, e-learning, metadata, content, enrichment, community

The schools of architecture all over the world have been reached by the digital era. Students prepare their projects and seminar papers already naturally with computers, teachers have been developing digital learning materials, tutorials, presentations etc. for online teaching. As a result, many schools today have a large number of digital learning contents, but the material is not shared across school boundaries with other schools of architecture. Unfortunately this valuable content is not exploited to its full extent. This is due to mainly technical problems: Currently, there exists no repository spanning access tool. No common methodology or standards are employed for knowledge structuring and exchange. At least the different content languages create one of the barriers that limit the potential impact of high quality architectural content on the huge user basis of stakeholders in the EU architecture heritage. The MACE project aims at achieving full integration of these large set of contents already in place and to emphasize its impact over the large communities of university students in architecture and civil engineering, as well as professionals and public administration. By enabling central access to large collections of architectural learning material, potential providers are encouraged to create and make available new learning resources, thereby gaining significant visibility and international recognition.

The MACE consortium consists of partners from academia and industry from five european countries. It builds on the experience gained in the WINDS project (Web based INtelligent Design tutoring System), an EU-funded e-learning platform containing 21 courses spread over Europe, and the experience from the ARIADNE Foundation. Architectural content is provided by Fraunhofer IRB through several databases, and by K.U.Leuven through DYNAMO (Dynamic Architectural Memory On-line), which contains project descriptions.

Wim Zeiler, Emile Quanjel, Perica Savanovic

072pp2

USING INTEGRAL DESIGN FOR STARTING A CULTURAL CHANGE IN DUTCH DESIGN PRACTICE; 2000 - 2006

Design methodology, industrial collaboration, planning, building.

Since 2000 an ‘integral approach’ to building design has been propagated within Dutch building design practice, through continuously developing ‘learning by doing’ workshops. The organization of workshops started during ‘Integral Design’ project in 2000 that was conducted by the Dutch Society for Building Services (TVVL), the Royal Institute of Dutch Architects (BNA) and Delft University of Technology (TUD).

The main focus of the project, which ended in 2003, was to raise the awareness of different disciplines about each others positions and problems in relation to building design, and to give an overview of issues influencing design integration and possible solution directions. The used workshops in which more than 180 professionals took part create a setting where the knowledge can be generated and regenerated in relationship to the knowledge developmenttriangle in a realistic setting; the Reflexive Practice. In a follow up research project in which Technische Universiteit Eindhoven (TU/e), BNA and the Dutch Association of Consulting Engineers (ONRI) participated the workshops became part of the permanent professional education program of BNA. All ready well over hundred professionals have participated in these “learning by doing workshops”. In this paper we will explain the results of workshops and reflect on preliminary results / conclusions.

Maria Aparecida Hippert Cintra, Francisco Loforte Ribeiro

026pp

KNOWLEDGE MANAGEMENT AND QUALITY MANAGEMENT SYSTEMS

knowledge management, quality, systems.

Knowledge Management (KM) is the formal management of knowledge for facilitating creation, access, and reuse of knowledge, using people, processes and technology. KM does not deal with structured information, but with “living” information and experience that circulate within the company’s everyday operations. KM takes advantage of an organization’s most valuable asset – the collective expertise of its employees and business partners – by putting it to good use. In short, KM can be defined as a systematic and organized application of the sum of knowledge used and shared everyday within the organization. KM, therefore, provides for continuous improvement of the performance of the organization the same way that a quality management system does. ISO 9000 series and ISO 10014, together, provide a robust framework for performance improvements in the construction. In addition, like quality management, KM is more of a systematic approach involving people, culture and tools. This paper looks at the correlation of KM and quality management systems. It stresses the significance of continuous improvement for construction organizations. Finally, it explores the ways that quality management systems can benefit from KM activities.

Milan Radosavljevic, Dauda Dan-Asabe

051pp

HOW COULD CONSTRUCTION SUPPLY CHAIN BENEFIT FROM RFID/GPS INTEGRATION: A KNOWLEDGE MANAGEMENT PERSPECTIVE

Supply chain, RFID, knowledge management, continuous improvements, automation.

Construction materials and equipment are essential building blocks of every construction project and may account for 50-60 per cent of the total cost of construction. The rate of their utilization, on the other hand, is the element that most directly relates to a project progress. A growing concern in the industry that inadequate efficiency hinders its success could thus be accommodated by turning construction into a logistic process. Although mostly limited, recent attempts and studies show that Radio Frequency Identification (RFID) applications have significant potentials in construction.

However, the aim of this research is to show that the technology itself should not only be used for automation and tracking to overcome the supply chain complexity but also as a tool to generate, record and exchange process-related knowledge among the supply chain stakeholders. This would enable all involved parties to identify and understand consequences of any forthcoming difficulties and react accordingly before they cause major disruptions in the construction process.

In order to achieve this aim the study focuses on a number of methods. First of all it develops a generic understanding of how RFID technology has been used in logistic processes in industrial supply chain management. Secondly, it investigates recent applications of RFID as an information and communication technology support facility in construction logistics for the management of construction supply chain. Based on these the study develops an improved concept of a construction logistics architecture that explicitly relies on integrating RFID with the Global Positioning System (GPS).

The developed conceptual model architecture shows that categorisation provided through RFID and traceability as a result of RFID/GPS integration could be used as a tool to identify, record and share potential problems and thus vastly improve knowledge management processes within the entire supply chain. The findings thus clearly show a need for future research in this area.

Llewellyn C.M. Tang, Yuyang Zhao, Simon A. Austin,
Mansur J. Darlington, Steve J. Culley

110pp

KNOWLEDGE AND INFORMATION EVALUATION PRACTICE - AN EXPLORATORY STUDY IN A CONSTRUCTION FIRM

construction, information evaluation, information management, knowledge management

There are a number of challenges associated with managing knowledge and information in construction organizations delivering major capital assets. These include the ever-increasing volumes of information, losing people because of retirement or competitors, the continuously changing nature of information, lack of methods on eliciting useful knowledge, development of new information technologies and changes in management and innovation practices. Existing tools and methodologies for valuing intangible assets in fields such as engineering, project management and financial, accounting, do not address fully the issues associated with the valuation of information and knowledge. Information is rarely recorded in a way that a document can be valued, when either produced or subsequently retrieved and re-used. In addition there is a wealth of tacit personal knowledge which, if codified into documentary information, may prove to be very valuable to operators of the finished asset or future designers. This paper addresses the problem of information overload and identifies the differences between data, information and knowledge. An exploratory study was conducted with a leading construction consultant examining three perspectives (business, project management and document management) by structured interviews and specifically how to value information in practical terms. Major challenges in information management are identified. An through-life Information Evaluation methodology (IEM) is presented to reduce information overload and to make the information more valuable in the future.

J.W.F. (Hans) Wamelink, John L. Heintz

080pp

KNOWLEDGE BASED INTEGRATION IN DESIGN AND CONSTRUCTION - "A CONCEPTUAL FRAMEWORK TO ANALYSE DESIGN INTEGRATION"

integrated design, knowledge management, collaboration

Integration is an essential feature of design activity and is traditionally regarded as one of the key tasks of the architect. This is particularly important now, as the spatial, functional, and technical aspects of the building design and construction become increasingly complex and the number of parties involved increases. Little is known about the actual course of the integration process during the design activity, though this is a source of many possible errors. Improved design integration may be expected to lead to a faster building process, fewer building errors and higher architectural quality.

This paper describes the conceptual framework for a study to determine whether the degree of integration differs in different types of building contracts by investigating the integration process in traditional and integrated forms of building procurement. The cases studied will be largely characterised by complex project engineering, as a result of which integration is one of the main keys to success. During the study, special attention will be paid to the way the various partners make knowledge available to each-other during the design process.

Angelo Ciribini

096pp

4D CONSTRUCTION PLANNING & HEALTH AND SAFETY MANAGEMENT

4D Construction Planning, Virtual Construction, H&S Management.

The paper aims to investigate how a 4D Construction Model could improve the effectiveness of the Health & Safety Management.

Indeed, the author deals with the meaning of a 4D Model to cope with the criticalities that could be found during the (Detail) Design Review Phase.

When the (Design) Health & Safety Plan has to be prepared on the behalf of the Client Organisation, the Health & Safety Co-ordinator should use a 4D Construction Model as a powerful tool to address a lot of specifications to Bidders about Space and Time.

The 4D Model, closely tied to a Time Chainage Chart or a Line of Balance Diagram, has to be performed in order to optimize Site Logistics and Management (including flows of the gangs, safety paths, etc.). Therefore, the awarded Contractor, after the closure of the Bidding Phase and prior to the signature of the contract, should improve and detail the original 4D Model to submit a lot of proposal to be agreed by Repeat Client Bodies.

Furthermore, the 4D Model must be regularly updated on site, according to the report findings coming from the Project Monitoring and Control System.

From such a point of view, Clients must debate the Construction Health & Safety Plan, including the revised 4D Model, with Health & Safety Managers from the Supply-Side during the weekly meetings.

An example (a reinforced-concrete leaning tower building 70 meters high) has been considered in order to explain the main leading principles involving 4D Construction Planning from the viewpoint of Health & Safety Co-ordinators.

Gert Birnbacher

127kp

SESSION KEYNOTE

Gert Birnbacher has a background as Cofounder and Chairman for many years of the Danish E-business Association and has worked as manager and consultant in complex public and private e-business enterprises in Scandinavia. Mr. Birnbacher has worked especially with information intensive projects and has in the later years specialised in open source projects with an international perspective. This key note will discuss how building information can be seen in an e-business and customer orientated perspective.

Jörn Vibe Andreasen

127pp

BUILDING INFORMATION AS E-BUSINESS. CASE DENMARK

Markku Salmi

128pp

BUILDING INFORMATION AS E-BUSINESS. CASE FINLAND

building information model, building information centre, e-business

This paper comments and submits the key-note titled “Building Information as e-business” presented by Mr. Gert Birnbacher. The paper describes the actual situation of building information services in Finland and its future trends and challenges.

The Finnish Building Information Group has more than 60 years experience of producing and selling building information services for professionals in building and real estate markets.

The business environment is facing big changes when adapting BIM (Building Information Model) or product model based working methods into practice. The biggest building owners in Finland have already started to demand architects plans and drawings in the format of Architects Product Model and they do not accept any more 2D cad-drawings. The Finnish Building Information Group has been committed more than 20 years to develop both IFC/IAI product model -based planning methods and practices for construction branch and new building information services for its own clients. The content of this paper is based on experiences and lessons learned in the Finnish Building Information Group.

Baris Onay

129pp

BUILDING INFORMATION AS E-BUSINESS. CASE TURKEY

Xavier Casademont Torrents

107pp

METABASE ITEC

information technology, construction databases, project definition knowledge, prices of constructive elements, commercial products information, environmental information.

The Catalonia Institute of Construction Technology - ITeC is an independent, non-profitmaking organisation that carries out its work in the area of operations intended to further the progress of construction.

Since 1985, it has owned both the generic Bedec DB and the Materials register DB that includes the reference prices, commercial products and legal specifications of constructive elements for edification, civil engineering, urbanisation, rehabilitation, preventive and corrective maintenance, security and health, tests of quality control, etc. It allows designers to consult, and helps them assemble project budgets and technical specifications. Since 2004, it has been expanded with environmental information (construction and packaging waste, energy costs and CO2 emissions).

In parallel, ITeC has contributed to creating and maintaining other DBs on construction in two directions: DBs of Enterprises, containing their commercial information (list of products with their characteristics, reference prices, certificates and images, prices of constructive elements that use the products, contact, branches, links to their web, etc.), and DBs of official and private Entities in Catalonia (Gisa, Incasol, Port de Barcelona, etc.).

Since 2001, all this information has been 100% available online in metaBaseITeC at www.itec.cat

Päivi Jävänä; Marja Naaranoja

086pp

DEVELOPING PROJECT MANAGEMENT SYSTEM TO SUPPORT ACTIVE LEARNING AND COMMUNICATION IN A CONSTRUCTION PROJECT

knowledge management, requirement engineering, learning, communication

Stakeholders of construction projects are numerous and multidisciplinary, and it is of paramount importance that all the information is coordinated and communicated effectively. Participation in knowledge-intensive work requires that individual professionals and their communities continuously transform their practices and create new knowledge. One effective means of ensuring the success of information flow between various partners is the use of an electronic project management system. The main target of this article is to study what kind of learning is needed in a construction project and how ICT tools could be developed based on such understanding. The material is based on project interviews and literature review on construction IT and Requirement Engineering (RE). RE plays a fundamental role within the systems development process by identifying stakeholders, applying elicitation techniques, validating and prioritizing requirements and managing changing requirements. This paper gives an analysis of the requirements for the system. Among the user's requirements were guidance for the novices, FAQ, possibilities to use Building Information Model (BIM) services, video sharing sites, instant messaging, text and voice chat, Wikis, blogs etc. All the tools leave a digital trace and permit conversations to be saved.

Eleftherios-Stamatios Telis, George Besseris, Constantinos Stergiou

111pp

INFORMATION MANAGEMENT FOR DESIGN OPTIMISATION IN THE PRELIMINARY STAGE OF AN EXCAVATION PROJECT: THE TAGUCHI APPROACH"

Designing Phase, Quality Optimisation, Construction Project, Displacements, Finite Elements, Taguchi Method, Design Of Experiments

The accurate prediction of a design characteristic during the preliminary phase of an excavation project was until now blocked, because no particular method existed. Currently used methods and software packages, do not predict the design characteristics optimum values by taking into account the combination of design variables. The only procedure followed up to now is the calculation of the design characteristic, such as the safety factor or displacements, via civil engineering standard equations for only one set of design variables.

Total displacement (horizontal and vertical) is one of the most important key design characteristics, the optimisation of which is an innovation procedure during the design (preliminary) phase.

The purpose of this project is to optimise all possible design variables in order to minimize the total displacements following a methodology based on Taguchi method, where they are supplemented also by factorial analysis. For this reason, a 2-level, L16 orthogonal array has been employed. The design variables, which were taken into account, are the reinforcement, the pile's length, the anchor height, the distance between the piles, the angle of the excavation, the anchor stretch and length. These are to name the most engaging in the design. Along these control factors there are their 7 associated 2nd order interactions, which were also considered.

To explain the methodology, a case study from a real-life excavation project of Geostirixis – S. Asproudas Co. is presented, by using the finite-elements software package.

Via this method the civil engineers can use proven quality methods such as DOE to compute the optimum value for total displacements for a bracing project and they were able to propose control levels for the total displacement minimization.

Cynthia ChinTian Lee, Charles Egbu

016pp3

INFORMATION TECHNOLOGY TOOL FOR THE ASSESSMENT OF KNOWLEDGE GAP IN REFURBISHMENT PROJECTS

Client's project Requirements, Information Technology Tool, Knowledge Gap, Knowledge Management, Refurbishment

Refurbishment projects are generally considered to be of higher risk, more complex and in need of greater co-ordination than new build projects. Meeting client requirements and managing refurbishment projects can pose a difficult task for construction organisations. In project-based professional or technical service organisations, an organisation's competences are reflected not only in the quality and number of its individual experts, but also in the integration of the organisation's knowledge resources through its deployment of people in project teams. It is argued that a knowledgeable project team that is able to understand and interpret the client's requirements and rely on their knowledge and experience to meet the client's requirements is likely to increase the chance of delivering a project on time and within budget. From a knowledge-based strategic management perspective, the creation of an optimal mix of a project team (i.e. having expertise in its membership drawn from across organisations) that has requisite skills and competences matched unto the client's project requirements, will lead to client satisfaction of the project. The aim of this paper is to explicate the operation of a developed information technology tool to assess the knowledge gap between the knowledge of the project team and the requisite knowledge for meeting client's project requirements in refurbishment projects.

Svetlana Vukotic; Sonja Petrovic-Lazarevic

055pp

THE ROLE OF MANAGING INFORMATION SYSTEMS TO IMPROVE COMPETITIVENESS OF SERBIAN BUILDING AND CONSTRUCTION INDUSTRY ORGANISATIONS

management information systems, human resource management, expatriates, competitive advantage.

The aim of the paper is to point to the importance of introducing human resource management in Serbian Building and Construction Industry organizations which operate internationally.

Serbian Building and Construction Industry organizations have a long standing reputation of doing business successfully offshore. Building and Construction Industry in former Yugoslavia of which Serbia was a part, has significantly contributed to the growth of gross domestic product for several decades (Petrovic-Lazarevic, 2002). After the political and economic turbulence in the last decade of the twentieth century, Serbian Building and Construction Industry organizations face new challenges of how to return successfully to the world market (Petrovic-Lazarevic, 2005).

Former Yugoslavian Building and Construction Industry organizations had distinctive competence conducting business globally based both on the quality of their work and competitive prices (Petrovic-Lazarevic, 1989). Because of the collapse of Yugoslavia followed by the commencement of the transitional period towards a market economy, many Building and Construction Industry organizations ceased to exist while some new organizations have been established.

At present the Serbian Building and Construction Industry faces the challenge to come back to the world market and continue the tradition of successful business. In this respect, the organizations are reorganizing their business by introducing different styles of management of which human resource management is one. For Building and Construction Industry organizations in Serbia this means establishing of international human resource management (Vukotic, 2007).

The role of international human resource management is to deal with expatriates. A research project of the behavior of international managers from Serbian Building and Construction Industry companies has been conducted. The findings supported by the in depth literature review contributed to the formation of a theoretical model of human resource management in the Building and Construction Industry. This model adds value to the existing knowledge of ways to succeed in global business.

Conclusions: The presented human resource management model if applied in the Serbian Building and Construction Industry can help organizations to improve their competitive advantage both at home and internationally

Timuçin Harputlugil

083pp

AN ORGANISATIONAL MODEL FOR IMPROVED INFORMATION AND KNOWLEDGE IN INTEGRATED DESIGN TEAMS

design management, design quality, integrated design, knowledge management, organization

This paper explains main outline of a recently-started PhD research project on design management in the development and construction of complex buildings. In traditional design approaches and design organizations for complex buildings -such as hospitals-, the development of solutions for space necessities is far more difficult than straightforward architectural design. As the novel technological developments need to be considered at the every level of design of complex buildings, the designs project team should consist of a group of experts.

The paper proposes an initial, hypothetical organisation(al) model for the integrated design of complex buildings. The model is hoped to allow for improved information and knowledge transfer among members of the integrated design team, leading to better and well co-ordinated communication. The proposed model can be easily applied at each face of design from preliminary to final. It aims to collect the data about the outcomes of different stages of design and from each of the design participants to manage the design in order to increase design quality. The initial model as presented in this paper will be used to test alternative design management strategies for complex buildings for which information and knowledge management plays an essential role.

Marja Naaranoja

064pp

KNOWLEDGE MANAGEMENT CHALLENGE IN CONSTRUCTION INNOVATIONS

Innovation, data, information, knowledge, construction

This paper focuses on the knowledge management in construction innovation. It is explored what kind of issues are critical in innovation processes. The possibilities of knowledge management tools are also studied. The research is qualitative aiming at exploring the challenges of knowledge management in innovations.

In today's society, innovation and knowledge management are no longer luxury items. Instead, they are necessities and a means of economic development and competitiveness. Knowledge and innovation are inseparable. Knowledge management competencies and capacities are essential to any organisation that aspires to be innovative. Innovation and knowledge management are closely related. This paper discusses the importance of knowledge management in innovation for construction companies. It describes how innovations can be achieved through the role of knowledge management. In the paper a framework for innovation process is also proposed.

Ad den Otter

104pp

KNOWLEDGE SHARING AND MANAGEMENT IN ARCHITECTURAL DESIGN TEAMS USING A PROJECT WEBSITE

Knowledge sharing, knowledge management, integral design, technological frames, planning of change, team workshops.

In this paper the sharing of knowledge in architectural design teams using a Project Website is discussed. The results of multiple case studies, being part of a recently finished PhD research project to communication and performance of design teams using a Project Website, show that systems for sharing of knowledge in such teams are hard to change and better systems are difficult to implement for various reasons. Sharing of knowledge in such teams is important for collective understanding of a design during its development, to derive insight and overview on progress of design and to prevent misunderstanding and failures. Knowledge about a design is usually, implicitly stored in the participating designers heads, and explicitly as paper and (nowadays) electronic information on drawings, images, and documents. To improve knowledge sharing collectively during the design process, team communication and collaboration is essential. The best well known means for collective communication are faceto-face meetings and dialogues because of their possibilities for interaction and reaching consensus.

The use of a Project Website as a new means for collective communication and information sharing is advocated by its Vendors for greatly increasing collective communication and stimulating the sharing of design knowledge. The expectations of vendors are directly related to the characteristics of the means being an information vault that contains all the latest designs produced with the registration of owners and updaters and preventing failures by double and outdated information. The information exchange flows and the frequency of the use of means and tools in these teams were observed before, during and after the introduction of the Project Website. The outcomes of the multiple case studies show that full adoption of the Project Web did not happen and team members still used old, trusted systems despite various management interventions to stimulate use of the Project Web. Architects and structural designers showed to be slowest in adoption or did not adopt the new means, easily developing incongruent technological frames for use.

Basically it was concluded that the most stimulating management intervention during the adoption of the Project Website, were collective workshops, organized per team in which knowledge sharing could be optimized to show the benefits of the new means to the participants in daily work. The workshops resulted in substantial increase of adoption of the Project Website but not full adoption. Finally the development of incongruent technological frames in groups and levels in the organization and rivalry of tools will be discussed because of their importance for adoption of a new means for sharing knowledge by such groups with a high number of creative, visionary, abstract thinking, practitioners.

Khaled Nassar

094pp1

APPLICATION OF KNOWLEDGE DISCOVERY TO CONSTRUCTION PROJECTS DATABASES

Information technology, knowledge management Data mining, Construction Databases, State Transportation Agencies Databases, knowledge discovery

Data mining is widely used in business applications including market segmentation, fraud detection, credit risk analysis as well as many other applications. In the construction domain however, the use of data mining has been extremely limited. Data mining usually requires the availability of a large database of previous cases to be analyzed. Therefore applications in the construction industry must be geared to those situations where such databases are readily available. This paper describes a research effort to explore a potential use of data mining in the construction industry. Real data about asphalt paving projects was collected from various IDOT (Illinois Department of Transportation) sources and analyzed using data mining techniques. The results indicate that data mining can provide information beyond the use of general statistical analysis. Various rules and patterns were derived from the original database, which could be applied to support decision-making. The limitations of data mining are also noted including the need to verify and test the discovered patterns.

Juhani Kiiras, Can Ersen Firat, Wafa Alsakini, Pekka Huovinen

063pp

MODEL BASED INFORMATION SYSTEM FOR A VIRTUAL CONSTRUCTION MANAGEMENT SERVICES COMPANY

Networking is the organizational form of the information age. Networked organizations signify a form of collaboration planned to facilitate economic exchange among stakeholders. Virtual companies resemble dynamic networks that facilitate a configuration of core competences in value chains that, in theory, result in optimal value creation processes. A virtual construction management services company (VCMSC) is defined as a dynamic network of collaborating companies that reconfigure virtually around a management core whenever a construction project opportunity arises. At the core, the leading member manages and nurtures the virtual network. Each member specializes itself in those parts of the value chain with which it achieves the maximum added value. The key members involve special system contractors (SSCs). An ideal VCMSC has a flat and virtual organization and a competitive network of SSCs, designers, and a project staff pool. The traditional middle management level of construction companies is removed and the basic functions of these companies are outsourced.

The purpose of the suggested paper is to introduce an information system for enabling the effective management of the ideal VCMSC, based on a building information model. It consists of three parts as follows. (i) A building product model targets a finished building as building elements, and their receipts of building products. (ii) A building project resource and cost model targets a building project as resource objects, the amounts of building products retrieved from a building product model, and the installation resource receipts, with current prices. (iii) A building construction process model targets a building project as activity objects, that are coupled with resources retrieved from a resource and cost model, dependencies between activities and their durations calculated by resources.

All generic model data are stored, updated, and reused via the project libraries of a VCMSC. In particular, all models of a VCMSC involve the systemspecific submodels that are interchangeable among internally competing SSCs. The IS strategy of a VCMSC involves the use of Internet as the base for networked communication, the integration of compatible software by all members of the competitive network, and the training of project stakeholders to utilize such software.

Brian Graham; Ken Thomas

065pp

MANAGING KNOWLEDGE WITHIN THE LEADING IRISH CONSTRUCTION ORGANISATIONS: CURRENT PRACTICES AND FUTURE DIRECTIONS

Continuing professional development (CPD), human resource management (HRM), knowledge management (KM), Irish construction industry, strategic framework

Despite the benefits which knowledge management (KM) can bring to construction organisations there appears to be a lack of understanding in relation to both knowledge and its management in practice. In the context of Irish construction, both Engineers Ireland (EI), and the Construction Information Technology Alliance (CITA) have identified KM as important to the future competitiveness of the industry.

The findings of interviews with senior management from ten of the leading Irish construction organisations are presented, having been selected as they are perceived to possess the most advanced organisational processes. Three ontological dimensions were explored; individual, project and organisational, with a view to identifying current approaches to managing knowledge. The findings confirm that these organisations lack a proper understanding of KM, yet recognise the need for a more structured, coherent approach.

The paper proposes the establishment of a strategic framework to improve the understanding of KM within the leading organisations, through a collaborative approach between academia, industry, EI and CITA. A central feature of this framework will be the development of a KM model which will be evaluated by participating organisations for its practicality.

Ilir Rodiqi

054pp

FRAMEWORK FOR KNOWLEDGE MANAGEMENT IN PRECONSTRUCTION PHASES OF CIVIL ENGINEERING PROJECTS - KOSOVO EXPERIENCES

Preconstruction phase, knowledge management, Soft System Methodology, system analysis, developing countries.

Construction projects are complex systems where knowledge is extensively used. Particularly, in reconstruction, innovative knowledge is critical success factor. In traditional construction contracts, preparation overlaps with bidding and continues with definition of: performance, methodology, quality, supply, site preparation and works introduction. Integrated contracts are more complicated due to economic, social and design issues that must be taken in account. Above all, this issue is more critical in the developing countries like Kosovo, where basic management principles are not applied as needed. This paper presents a study that designs a Knowledge Management Framework (KMF) that supports knowledge utilization in the preconstruction phases. The models of the KMF are made with Soft Systems Methodology (SSM) based on the cases of “Hidroterm” Construction Company. The proposed Framework shows that knowledge is not managed purposefully if the overall system of the supportive activities related to knowledge use is missing. The study contributes for the development of construction projects in the developing countries by creating opportunities to better use knowledge assets and thus increase overall performance of the construction industry.

Zhaomin Ren

125pp

THE CLIENT'S PROJECT MANAGER'S KNOWLEDGE NEEDS IN THE UK CONSTRUCTION SECTOR

The client, knowledge management, project manager, UK, construction

Project managers who work for the client play an important and unique role in the construction industry. Their involvement in project and tasks to perform are significantly different from their counterpart in the contractor. Therefore, they have knowledge requirements and personal traits. This study explores the client project managers' knowledge needs and personal traits, and the approaches to accumulating such knowledge in the UK construction sector. The client's and contractor's project managers' knowledge needs are also compared.

