PREFACE
Throughout history people from all walks of life have marvelled at the beauty of iconic buildings and spent time wiling away the hours drinking coffee in the streets and squares of places where they live or visit. These buildings and places, and all of the man-made infrastructure around us, are created by those in the design, project delivery and construction professions: and we at ICPMA are proud to play our part.

ICPMA is involved right now with several initiatives that it believes will help to provide a better understanding of the life cycle of projects from inception to delivery and management thereafter. ICPMA believes that new forms of cooperation will improve quality of the final product, and that innovation and modern methods are crucial to drive success.

Specifically, the current immediate aims of ICPMA are to:

- Recognise excellence through our two annual Award programmes
- Ensure that we attract students and early career professionals to our association to capture their fresh ideas and enthusiasm
- Embark on a programme of research sponsorship to guide new thought processes
- Continue to encourage participation at our annual conference to exchange ideas and experience and to foster new friendships
- Enter into direct liaisons with like-minded organisations to maximise effectiveness

This Yearbook contains some examples of our recent award winners - you will see that projects both large and small have been honoured. How ICPMA defines excellence, and some detail of our awards programme, forms the introduction to this Yearbook. Other contributions consider opportunities and challenges for our professions.

We at ICPMA hope you enjoy our Yearbook and invite you apply to become a member or to follow us on www.icpma.net; on our Facebook site ICPMA; and via LinkedIn at International Construction Project Management Association.

We also hope to see you at our next conference in Lausanne, Switzerland on June 13th and 14th 2019.

Author: Nick Smith
President ICPMA 2017-9
EXCELLENCE
IN ARCHITECTURE, ENGINEERING AND CONSTRUCTION PROJECT MANAGEMENT
ICPMA promotes excellence in all aspects of the planning, design and delivery of buildings and real estate mixed-use projects. We believe that all participants are important in this process, working together to benefit the world we live in and to create the returns needed to survive.

Building projects have a long life cycle and this means that all of us, collectively, have a responsibility to undertake our work professionally and with thought for future generations.

This 2018 Yearbook is an update of our first and comprehensive 2016 Yearbook launched at our conference in Doha, Qatar. Many of the messages and exemplar projects contained in the 2016 version are even more relevant today.

Since 2016, ICPMA has moved forward with various practical and academic initiatives and has recognised, through our Awards programme, excellent projects from many different geographies. Some of them are included in this 2018 update.

Two categories of Awards are honoured by ICPMA

1 - The Alliance Award - recognising cooperation and mutual respect in Construction Project Management. Projects that demonstrate excellence in delivery are rewarded, with the evaluation taking account of the seven principles of “the better way”. These are:
   • People who believe that working together makes all of us more effective
   • Processes fostering cooperation instead of confrontation
   • The use of fair, clean and simple contracts: contract management in mutual respect
   • Transparent and competitive costs with reasonable profit for all
   • Quality as our primary goal, at a price that is acceptable to all
   • Life cycle, sustainable projects, designed with all phases in mind
   • Challenges identified and solved with joint responsibility

2 - The IQ Award - recognising innovation and quality in the process and final product. This Award is given to those projects that have used innovation and new techniques or platforms to drive better quality in the delivery of projects to help future generations. It is given to projects, clients, the professional team, and other participants who have shown outstanding innovation and quality of process used, with a final product to match. The size and type of project are immaterial: both large and small are eligible.

Awards procedure - ICPMA posts details of the yearly Awards on www.icpma.net and dates for submissions and judging criteria are listed.

The Awards are announced and presented at our ceremony held in conjunction with our Annual Conference, which in 2019 will be in Lausanne, Switzerland on June 13th and 14th. The Awards process is open to both members and non-members of ICPMA. For any other information please email icpma members@gmail.com.

“These prestigious awards promote your successful projects and are free to enter. We honour both large-scale and smaller projects, tools and inventions. Please consider your project for the upcoming 2019 Awards. They are easy to participate in with information and deadlines on www.icpma.net.”
The Union Street development in Southwark was a personal passion, as well as a business endeavour, for the client. The project was driven by quality, sustainability and unique modern design, with a view to creating a stunning place and stimulating working environment in this lively and ever-improving area of London.

100 Union Street is a new build office for a small, hands-on development company. This Design and Build development has an area of 25,000 sq ft GIA. There is a significant emphasis on design and quality. The design is an honest, raw, industrial feel, with bare concrete, crittall-style glazing and exposed services.

Located on a brownfield site adjacent to a Network Rail viaduct, the 4-storey building consists of piled foundations, a concrete frame and brickwork, along with aluminium industrial style glazing.

The commercial office space displays exposed services, raised timber access floors and acoustic slatted timber internal cladding. The third floor has a spectacular board-marked concrete soffit and there is a roof terrace, with views of The Shard, for communal use on the top of the building.
Collaboration drove the process. The whole team maintained an excellent working relationship throughout the project and genuinely enjoyed the build. Openness and transparency ensured that problem-solving occurred early throughout the process and solutions were able to be implemented quickly. Any disagreements were discussed and worked through in face to face conversations. Fairness and morality were upheld as key principles throughout the project and decisions and resolutions were concluded with this in mind. This meant that an outstanding building was delivered to the expected budget. In summary, the project was a success on both quality and process and surpassed all client expectations. Much of this was due to the hands on approach of Buro Four project manager Emily Slupek. She was passionate about delivery and the ethos of collaboration.

The project achieved a BREEAM excellent rating. Sustainable materials were used as much as possible, including the recycling of the board-marking planks for the third floor soffit for use as the final decking for the roof terrace. The project used photo-voltaics and an Uponor heating and cooling system within the concrete frame. The main staircase is designed to encourage the use of the stairs over the lift, to promote health and well-being.

Sustainability
100 Union Street won the ICPMA Full Award for Alliance in 2018. The Award was presented at the ICPMA Conference in London in June 2018.
PMK CONSULT

THE 3D PRINTED OFFICE OF THE FUTURE
The construction industry in the UAE is a $44 billion industry that employs approximately 34% of the population and the Dubai Government is continually looking for ways to innovate and improve the efficiencies of the industry. By 2030, the Dubai Future Agenda aims to have 25% of Dubai’s construction made by 3D printed technology. Globally, 3D printed technology is estimated to add $300 billion to the world economy by 2025.

The Office of the Future is the world’s first 3D printed office building. 3D printing is an innovative method that has been adapted for construction and used here for the first time in a commercial project.

The project consists of approximately 350sqm of office space, printed layer by layer, using a 20-foot-tall 3D printer, located in Shanghai, China. Each structural component was built using innovative 3D printing technology, combining a mixture of Special Reinforced Concrete (SRC) and recycled construction material.

Now complete, the building serves as the management office for the ‘Museum of the Future’ project and provides a headquarters for the Dubai Future Foundation, an organization that will help to deliver smart technologies to the Emirates, including driverless cars and other cutting edge technologies.
A huge benefit of utilising 3D printing methodology was the speed at which the building was completed. After the design model had been completed, it took only seventeen days to print the entire structure and the speed of installation on site took two days. The speed of installation significantly reduced the number of personnel involved in the site installation phase. Specifically, the labour involved in the printing process included just one staff member to monitor the function of the printer and only seven operatives to install the building components on site. As a result, the labour cost was cut significantly compared to conventional buildings of similar size, which has clear advantages for the future of construction.

The interior of the building follows a minimalistic design that encourages collaborative working and creative thinking. Features include; interactive idea walls, open plan communal areas with natural foliage and large glass windows to allow natural light. In addition to fully automated building management systems to regulate temperature, lighting, solar shading and audio-visual equipment.
Fundamentally, the project has demonstrated that it is possible to design, create and build a 3D printed office building. This has generated valuable data and a realistic benchmark for time frames for future 3D printed building projects. The project represents one of the most relevant and exciting research and development construction projects anywhere in the world.

The 3D Printed office of the Future won the ICPMA Full Award for IQ in 2018. The Award was presented at the ICPMA Conference in London in June 2018.
DIGITAL SKILLS

AND SOFT COMPETENCIES FOR MANAGING CONSTRUCTION PROJECTS
The digital revolution currently taking place in other sectors through the Internet of Things, Artificial Intelligence (AI), distributed ledger technologies and blockchain has been touted as a solution for the inefficiencies in the construction industry. Construction has been always looking to other sectors such as manufacturing for improving its performance by importing technological innovations.

The emerging construction digitisation of assets and digitalisation processes promise to extinguish the persistent problems of inefficiency and ineffectiveness. Given its high product and demand variability and temporary character, construction is notorious for traditionally importing innovations from other sectors and adopting them in an ad-hoc manner.

Amidst this appetite for innovation and construction digitalisation, Digital Construction and Building Information Modelling (BIM) both promise to modernise construction and create new challenges, particularly around leadership, communication and collaboration.

To this end, the ‘Digital’ methods generate new needs for individual, intra-organisational and inter-organisational capabilities.

The Digital and BIM are not quick-fix and off-the-shelf solutions but require additional coordination within projects and across firms and teams. Whereas various specialised roles and positions emerge to cope with this new complexity, the Digital way requires the updating and adjustment of digital-enhanced existing roles.
Surprisingly, the leaders of digital innovation not only need to develop digital skills but also master their existing project management and engineering skills. To align this demand for digital skills with the existing modes of talent supply we need to:

- Strengthen digital literacy before entering the market;
- Provide accredited programmes and strengthening the role of professional organisations;
- Leverage skills/culture/generation gaps through reverse mentoring;
- Adopt life-long learning and a culture of project-based learning;
- Utilise international networks of firms to learn from other countries.

The changes that the ‘Digital’ methodologies bring to Construction Project Management (CPM) extend beyond the individual and relate to intra-organisational level, inter-organisational and institutional levels.

To this end, Digital ways require both stronger technical and managerial skills and also:

- Awareness of the Digital ways are needed across all hierarchical levels in firms;
- Adaptation of business models for digital, e.g. outsourcing, mergers and acquisitions;
- Cooperation of firms through a ‘relationship approach’ for inter-firm learning;
- Balanced engagement and responsibility of both public and private sector.

The construction industry is under intense digitalisation beyond BIM. After all, in the UK BIM Level 3 Digital Built Britain the BIM and ‘Smart Cities’ agendas will be eventually merged. These developments are accompanied by an effort towards a ‘digital shift’ and construction modernisation. However, performing a ‘digital shift’ very much requires a ‘cultural shift’ by adjusting leadership, communication and collaboration models. The digital future is here and CPM is already changing!
This project involved the renovation of three main structures designated as National Cultural Assets. It was recognised that the works would be long-term, and since the funds were to come directly from worshippers, a method of proceeding with transparency and fairness was required. Accurate process and delivery planning over the period 2004-15 ensured the buildings fulfilled the specific and detailed renovation objectives, using a combination of both modern and traditional techniques.
This mantra guided the management of this project from inception. Occupying a site of 90,000m², with an original build budget of around 200m USD, this major renovation was pushing the boundaries in terms of the ways in which the buildings could be brought up-to-date whilst respecting their unique history.

The Founder’s Hall, measuring 3,300m², is the largest wooden structure in the world. Multiple individual contractors were tasked with construction, and diverse ordering methods were used to supply information and materials on time.

The absolute requirement for quality meant that specialists needed to be selected who could preserve the ways the buildings had been originally built and then previously renovated in 1895 (following a fire in 1864). Ultimately 48 construction contracts were let throughout the build process.

The knowledge obtained throughout this project has been recognised as being applicable to both large-scale wooden buildings and also traditional Japanese housing - providing improved seismic resistance and a longer life-span.
The Higashi-Honganji Temple achieved an ICPMA Alliance Distinction Award in 2017

Why Construction Project Management was the vital component

Collaborative CPM was the key to the successful delivery of this complex project. A “Technique Specialist Committee” was formed to manage the delicate works needed for the wooden buildings, and structural specialists were used to ensure all the works would be safe in the event of earthquakes. In order to repair the structural wooden members, and to replace the roof tiles, it was necessary to build a temporary roof structure to completely contain the buildings.

This temporary roof structure could slide, enabling it to be used across several buildings. “Soft steel” was used to reinforce the worn framing members. Through up-to-date CPM methods, environmental initiatives were introduced to use natural lighting, rainwater collection, solar power, and recycling of tiles. CPM demonstrably fulfilled its role in coordinating the design, detailing, procurement and construction necessary to ensure that the buildings retained their status as National Cultural Assets.
The Qatar Facility of Islamic Studies (QFIS) is a profoundly spiritual building that communicates and imparts Islamic values and education in a setting that is modern and progressive.

QFIS draws attention to the comparative forms of 'knowledge and light' which are used in the detailing of the building, with the pathways binding the faculty and teaching space (knowledge) to the ambience of the mosque (light).

The design incorporates the achievements of Islam, Islamic art, architecture and science. Calligraphy runs from the mihrab (the point closest to Makkah, toward which the congregation faces to pray) throughout the entire building, representing the knowledge derived from Islam. QFIS challenges the prejudices that consider Islamic architecture to be only of the past - this new building embodies the value systems of Islam appropriate for the modern age.

Built on a three hectare site, QFIS comprises two basement levels and five floors of classrooms, offices, exhibition space and an auditorium. The mosque can accommodate 2000 people. Two large non-vertical minarets extend out of one side of the structure, rising to 90m in the direction of Makkah. 2000 tons of steel were used to construct the minarets. Five mushroom-shaped pillars support the mosque structure, symbolising the five pillars of Islam. Water is used as a key element throughout the building, with four streams flowing around the exterior and within the interior, inspired by the rivers of paradise described in the Holy Qur'an.
Some of the key challenges

The mosque roof design was extremely complex with multiple skin levels and openings which had not been attempted before. A cantilevered scaffold grid system was designed to provide an access platform for workers and materials to reach all the curved areas of the mosque dome. The roof itself was created in 400 sections and cast in gypsum.

The calligraphy in the main courtyard required a technical solution to eliminate shadows from the Qur’anic verse falling inside the building from being walked over. A screening system was devised on the inner side of the glass to diffuse the shadows and avoid this potential issue.

The minarets required a 85m high self-supporting scaffold (the third largest in the world) and strict health and safety guidelines were enforced in order to work at such heights. Each minaret is connected to the base by a huge viscous damper to absorb the wind load. These were tested in Germany and allow the building to have a longer life span.

How teamwork was the most vital element

The construction was divided into four main parts: zones 1,2 and 3 and the mosque and external works. Each zone had an area manager and a team of multi-disciplined engineers to plan, coordinate and deliver all construction elements on a daily basis. The client owner representative and the construction management company participated in all daily meetings to resolve design difficulties. Performing all the activities strictly in the correct sequence was essential particularly for the complex roof structure. BIM and 3D tools were used extensively to minimise design and implementation issues and to aid programming.
QFIS achieved an ICPMA Alliance Distinction Award in 2017
LIMA, PERU

LIMA AIRPORT DEVELOPMENT PROGRAMME
The Lima Airport Development Programme started in 2017, with the completion of the field studies and the preparation of the Request for Proposals and Project Agreement for the main construction works, to be managed as a megaproject. The preparation of the finance plan was a key event, as the total cost of this megaproject is to be financed 100% with private funds, without state co-financing. The construction of the New Jorge Chávez International Airport requires from Lima Airport Partners (LAP) an investment of approximately US$ 1,500 million, which will benefit more than 30 million passengers annually, the airlines and the overall airport community. But more importantly, it contributes to the positioning of Peru as an Aviation Hub, thus supporting the economy and improving the international perception of Peru in the world. The project video can be found on YouTube.
The traditional contracting approach for project owners to transfer as much of the risk as possible to the contractor (e.g. Lump Sum Turnkey) generally does not apply for megaprojects. To establish a collaborative working environment the Fixed-Price-Incentive-Fee (FPIF) delivery model (NEC or FIDIC contracts) will be applied and therefore risk management will play an important role for a successful project delivery.

In Lima, as in every other megaproject, it is essential that all participants from different fields (project team, internal departments, internal/external experts, external stakeholders, etc.) are involved in the process. Before the initial risk management process starts, project fundamentals, constraints and problem areas are identified and discussed, giving each participant the chance to align and deepen their understanding of the project.

While common risk management operates with a standard cost estimate and a deterministic schedule, the applied risk process in Lima considers not only the cost impact of risks, but also the time impact, which is linked to the project schedule and the time-dependent cost and therefore could also result in delay cost. This method captures a significant amount in the overall risk cost which if undiscovered has the potential to add significantly to the project cost.
The integration of cost and time schedule is highly relevant as schedule delays are very often the root cause for severe cost overruns – therefore, integrated systematic processes and tools are needed for the effective management of these complex projects.

The Lima Airport Development Program uses the professional software application RIAAT. It integrates and links information from cost management, risk management and schedule planning inside a hierarchical project structure.

The fully integrated probabilistic cost and schedule model provides a basis for further analysis on a management level. The probabilistic results provide also the data to enable the client to negotiate a reasonable target cost with the contractor and to equitably balance the pain/gain share ratio.
Lima Airport Development Programme achieved an ICPMA IQ Distinction Award in 2018
ICIS

INTERNATIONAL CONSTRUCTION INFORMATION SOCIETY
ICIS is an association of organisations that provides national master specification systems, cost information systems, and/or building product information for the construction industry. We believe that using and maintaining high-quality knowledge and information improves both our national and the global construction industries.

The mission of the society is to advance the globalisation, standardisation, harmonisation, and interoperability of construction information. It comprises a group of like-minded organisations that are willing to share their thoughts and ideas, and promote the best practices in their home nations and around the world.

A key way of sharing ideas is through global networking, and ICIS organises an annual conference where current issues and technologies are discussed and debated. ICIS was where the building SMART Data Dictionary was founded.

ICIS creates projects that use the collective skills and experience of the members to produce technical reports and solutions about topical issues. These are available to all members, with some available to the general public, latest projects include: “BIM Education Global Update”, “Classification, Identification, and BIM”.

ICIS member organisations provide technical services to hundreds of thousands of construction professionals, worldwide, who use their products and services to prepare construction documents. For the changing needs of their members’ clients, ICIS aims to anticipate and confront trends occurring in the construction industry internationally, including:

- The strong trend towards international harmonisation of standards and procedures.
- The increasing expectation of functionality and user-friendliness of information used in construction processes.
- The need to integrate a wide variety of related project data, particularly drawings, specifications, costs, and product information.

In order to facilitate industry, research and academic cooperation, and to promote mutual understanding, ICPMA and ICIS have agreed to collaborate and work together where possible towards worldwide dissemination of knowledge, experience and best practice in construction project management, construction information and associated fields.

Richard Choy, President ICIS
DOHA, QATAR
NATIONAL MUSEUM OF QATAR
The National Museum of Qatar is one of the Middle East’s most iconic landmarks. The design reflects the desert rose, commonly found beneath the sands of the Gulf region, and comprises an organically propagating series of interlocking disks that surround the main structure, creating a ring of gallery spaces circling a central court.

The interlocking disks that compose the building are representative of rose petals, each positioned at different angles. These disks are made of steel truss structures assembled in a hub-and-spoke arrangement, clad in glass fibre reinforced concrete panels.

Three major aspects played critical parts during the inception and delivery of this building in order for it to fulfil the objectives set by the client: design, cutting-edge technology, and sustainability.
Design

Conceptually, the National Museum of Qatar follows an undulating loop that gently rises and falls, replicating the natural contours of the desert. At the end of the loop, visitors can explore Fariq Al Salatah Palace, a historic building which forms an integral part of the museum. Large windows reveal glimpses of the caravanserai, the museum’s gardens and Doha Bay. Thirteen permanent galleries occupy the interior like nomad camps, telling the story of Qatar’s natural, cultural and political history from ancient times to the present. Columns concealed within the vertical disks carry the weight of the structure’s petals to the ground. Deep disk-shaped sun-breaker elements filter incoming sunlight and provide shade.

The building provides 8000m2 of permanent gallery space, 2000m2 of temporary gallery space, a 220-seat auditorium, a food forum and TV studio, two cafés, a restaurant and a museum shop. It is surrounded by a 115,000m2 park with an artificial lagoon and parking space for 400 vehicles.
The National Museum of Qatar achieved an ICPMA IQ Distinction Award in 2018

**Technology**

BIM played a major role in shaping the project management methodology, providing state-of-the-art solutions to ensure the smooth transition of the project throughout its entire life-cycle. Importantly, BIM facilitated greater coherence for all stakeholders, and ultimately reduced the length of the development process. Due to the complex design of the museum, the major challenge was to be able to accurately visualise the design from all angles. BIM allowed this to happen. ASTAD also used its flagship technology SINAN to connect the client, project teams, contractors, suppliers, architects, consultants and all other relevant stakeholders, optimising the collaborative experience throughout.

**Sustainability**

The building is designed for USGBC LEED 2.2 Silver rating. It provides passive shading to the facades from the sun, reducing solar gain to both solid and glazed areas as well as providing comfort to people moving around the perimeter. Deep overhangs provide shading; a target cut-off angle of 30 degrees was set based on an analysis of solar data for Doha. The facade panels are double glazed low E with air gaps filled with Argon gas to reduce the air conditioning energy consumption.

Fresh air usage is adjusted to match occupancy rates using CO2 sensing, with air recirculated wherever possible and full recirculation used when the galleries are unoccupied.

The project is designed to achieve 21% energy savings, with indoor water consumption 26% lower than the industry standards. Selecting native and adaptive landscape species has reduced landscape water consumption by 55% by using indigenous grasses and plants, such as pomegranate trees, date palms, herbs and the Sidra, the national tree of Qatar.
OSLO, NORWAY

INFRASTRUCTURE PROJECTS IN NORWAY
**Introduction**

Norway, the western part of the Scandinavian Peninsula, has an even bigger area than Germany but at the same time just 5.21 million inhabitants. This thinly populated country is divided by its well-known fjords and mountains. Norway developed massively after oil was discovered in the North Sea in the early 1960s and the production from the fields started in 1971. Thanks to the oil industry Norway is now a highly developed country, also it has the world’s largest sovereign wealth fund, with a value of USD 1 trillion. In order to provide their inhabitants and visitors good connections all over the country, the Norwegian state is now investing a significant amount into upgrading the infrastructure. A variety of road, bridge, and tunnel projects are being planned and built and make the country very interesting for foreign construction companies, suppliers and consultants.

**Loftesnes-bridge, Songdal, Norway**

In September 2015, the Norwegian Road Authority, Statens Vegvesen, awarded the Joint Venture PORR – KA AURSTAD to build the new Loftesnes-bridge in Sogndal, at the Sognefjord in Western Norway. The new bridge replaces the old one from 1958, which no longer complied with today’s traffic and safety requirements. The contract included the construction of a new 194 metre long steel arch bridge over the Sognefjord, with a steel volume of around 1,250 tonnes and a width of 17m. The bridge has two deep foundations in the sea with a total of 28 piles up to 47m in length and it was to be built with a concrete deck.
The construction works started in early 2016 and the new bridge was opened for the traffic on November 30, 2017. This was followed by the demolishing of the old bridge and finalising of the rest of the contract scope, such as road improvement works and a new roundabout with a special design due to challenging ground conditions. The project was handed over to the contracting authorities on July 19, 2018.

The Loftesnes-bridge has recently been nominated for the “European Steel Bridge Awards” organised by the European Convention for Constructional Steelwork (ECCS) and provides now a safe crossing of the fjord for cars in two lanes, as well as pedestrians and cyclists. According to the project participants, the biggest challenge was the compliance with the outstandingly high safety and quality requirements and also the weather-related difficulties. The collaboration of different cultures on the project worked well and smoothly throughout all stages.

Future of infrastructure projects in Norway
The above mentioned project was, like most in Norway, awarded based on the lowest price principle and the conditions were based on the Simplified Norwegian Building and civil engineering contract (NS 8406). However the Norwegian authorities published recently more tenders based on a different and new best value tender processes and a design and build contract model. The model, which also contains the design aspect, is normally chosen in order to save time and optimise the project, but can increase the risk potential for the contractor. A new phenomenon is also that construction projects based on offshore standard contracts such as NTK 15 are being published. These factors are more demanding for both foreign and local companies, and thus require a closer cooperation and need for mutual learning.
Plaza Mayor, Madrid
WHAT IS THE FAC-1?

FRAMEWORK ALLIANCE CONTRACT
FAC-1 is a standard form designed to help plan and integrate any number of related two-party contracts and/or related projects for works and/or services and/or supplies. It is endorsed by the Construction Industry Council and by Constructing Excellence.

King’s College London Centre of Construction Law has created this standard form based on successful prototypes and trials, developing FAC-1 in consultation with 120 organisations. The list of Consultation Group members and details of FAC-1 users, news and useful links are available at www.allianceforms.co.uk.

Good frameworks have used alliancing and related systems to enable major cost savings and other improved economic and social value, but nearly all the best framework contracts have been developed for individual clients and/or projects, and are bespoke and confidential. In 2012 a cross-industry Contract Form Working Party reported that “the general lack of standard-form framework arrangements makes it difficult for clients to procure frameworks on a consistent basis”.

FAC-1 sets out:
- The “Alliance Members” including the “Client”, an in-house or external “Alliance Manager” and any combination of selected consultants/contractors/suppliers/providers, with the facility to add “Additional Alliance Members”
- Why the framework alliance is being created, stating agreed “Objectives, Success Measures, Targets and Incentives”
- How work will be awarded to Alliance Members, under a “Direct Award Procedure” and/or “Competitive Award Procedure” and under early standard form “Orders” (clauses 4, 5 and 7, Schedule 4 and Appendix 3)
- Flexibility to use FAC-1 with agreed “Template Project Documents” that include any one or more forms of Project Contract
- How the Alliance Members agree to seek “Improved Value”, working together through “Supply Chain Collaboration” and other agreed “Alliance Activities” in accordance with an agreed “Timetable”
- How the Alliance Members will manage risks and avoid disputes using a shared “Risk Register”, “Core Group” governance, “Early Warning” and options for an “Independent Adviser” and alternative dispute resolution
- Flexibility to include particular “Legal Requirements” and “Special Terms” required for any sector and in any jurisdiction.

Successful use of Building Information Modelling (BIM) is closely linked to the interfaces and systems established in the procurement model and contract terms, and some leading BIM trial projects have used a multi-party framework alliance. These are described in the King’s College London research report “Enabling BIM Through Procurement and Contracts”, which can be downloaded at https://www.kcl.ac.uk/law/research/centres/construction/enabling-bim/ebimtpac-form.aspx

FAC-1 provides the option for BIM to underpin the agreed approaches to design, supply chain engagement, costing, Risk Management and programming. Provision for BIM is set out in FAC-1:
- in relation to the Framework Programme in the Framework Documents
- in relation to each Project in the Template Project Documents.
BREXIT

The Effects of Brexit on the Construction Industry
In 2018 we surveyed a large group of organisations in the Western Region of the UK to find out what they thought about Brexit. The group comprised Chief Executives and other Senior Officers of NHS Trusts, Local Authorities, Local Enterprise Partnerships and Companies in most of the key industries in the region.

The questions we posed were:

1. How will Brexit affect your organization short-term?
   - 56% of people thought that the economy would be worse in the short-term.

2. How will Brexit affect your organization long-term?
   - There was considerably more optimism with only 21% of people thinking that the economy would be worse.

3. How confident are you that a deal will be struck?
   - 45% of people had no confidence in our ability to strike a deal.

4. How will Brexit affect the wider economy short-term?
   - As a result, 50% of people thought that the economy would be weakened in the short term.

5. Has your organisation received funding from the EU in the last 5 years?
   - 43% of our respondents had received EU funding.

6. How likely is it that the Govt will provide the funding?
   - Only 30% of people had no confidence in the Govt intention to replace funding, with 25% thinking that it was likely. The “Don’t knows” were 45%.

7. What do you think will happen to free movement of people?
   - 82% of people thought that free movement would be modified.

8. What do you think will happen to the single market?
   - 70% of people thought that the single market would be modified.

9. What do you think will happen to the customs union?
   - 74% of people thought that the customs union would be modified.

The four main effects on construction:

1. **Labour** - Construction relies heavily on EU and other foreign nationals.
2. **Cost of material** – 64% of building materials used in the UK are imported, whilst 63% of those produced in the UK are exported.
3. **Project funding** – A new source of project funding will be required.
4. **OJEU** – 160,000 adverts are placed in the Journal per annum, of which 14,000 are from the UK.

The four main remedies:

1. If labour is a problem companies will have to apply for visas as is common with other non-EU nationals working in the country. We do not see this as a “cliff edge”.
2. We cannot see how tariffs can be avoided unless the mutual benefits between the EU and the UK are in balance. Construction is likely to become more expensive.
3. The Govt will have to set up a commission to deal with funding of projects which would otherwise have gone to the EU.
4. OJEU will have to be amended to reflect the relationship that the UK has negotiated with the EU. For example, Switzerland and Norway have access to the single market through its negotiated relationship.

**Summary**

The UK still has an opportunity to negotiate with the EU and avoid adverse impacts on the construction industry. We do not believe that it will be before we leave the market and much of the negotiation will be in the transition period.
4D MODELLING

AND VIRTUAL REALITY
4D models are visual representations of construction schedules. By using 3D geometry, assigned to Gantt charts, detailed sequences and logistics can be quickly reviewed and developed by project teams. Planning review workshops are more collaborative, decisions are supported by the 4D model and options explored quickly, with greater confidence.

Design information models (such as Revit and MicroStation) are re-structured and imported into packages such as Synchro PRO 4D, and the 3D geometry is then ‘assigned’ to activities within imported schedule information such as Primavera P6 and Asta Powerproject.

Further information such as surveys, logistics and models and commercials can be imported to add insight to the base 4D model. Outputs in animation, sequence images and the 4D model itself are easily distributed to the wider team for feedback and schedule development.

Various benefits are realised, both soft and hard. Soft benefits include an increased understanding of the construction sequence and method by all parties across the project.
The 4D model can be used in various forums, including client-contractor reviews, public consultation, operative safety reviews, contractor procurement, co-ordination and scope agreement. Hard benefits include spatial planning and clash detection, realising opportunities, and discovering and managing construction risks.

For an even deeper simulation, using Virtual Reality systems, the 4D model can be explored in an immersive 1:1 scale where the user is able to walk around the construction site at any point in the future. This allows both improved safety and logistics planning, and greater project / task training and rehearsal.
GRENFELL TOWER

HAVE ANY LESSONS BEEN LEARNED?
West London on the 14th June 2017 was thick with smoke, as emergency services rushed to the scene of one of the most tragic fires seen in the UK. 72 people are known to have died, a similar number injured, with 223 escaping from the 24-storey tower block. Grenfell Tower was designed in a brutalist style, and construction was completed in 1974. The flats were to Parker Morris space standards - higher than comparable private sector dwellings. A few of these public sector flats were subsequently sold to residents.

Many tower blocks in UK cities have lost whatever architectural appeal that they may have once had. Some have been demolished, others renovated. Grenfell Tower had GBP 8.7m spent on it between 2014-6, including new cladding, windows and heating systems. The fire is thought to have started from a faulty fridge-freezer on the 4th floor, rising quickly through the exterior cladding, engulfing the building in flames. The single central stair design didn't help residents to escape as it filled with smoke.

The UK press and social media continue to be full of the story. Political mileage is being made by all the national and local parties. There has been too much finger-pointing, without justification. And there has been mismanagement. There are several inquiries being undertaken but, sadly, the UK continues to take far too long to deal with the need to address urgently the immediate safety of residents of similar tower blocks, and how now to design new ones. Accidents happen: but appropriate sprinkler systems, top-rated fire-resistant cladding, insulation and compartmentalisation reduce the spread of fire. New designs must have alternative means of escape. We have to accept that some older buildings must be demolished as they have passed their “sell-by” dates and are no longer fit for purpose. And the issue is not just with public housing - residents of a luxury 121-unit tower block have had their management charges doubled, to pay for around-the-clock fire marshals, and are being asked by the landlord for around £18,000 each to replace the risky cladding.

There is a real need for the UK to increase housing supply, particularly in London and the other major cities. The Mayor of London has called for urban and estate regeneration rather than just renovating old stock as a way of improving quality of life. New methods of design, specification, project management and information sharing can help all those involved with the delivery of these new homes to actually successfully create places where the people want to live. This is the biggest objective for us all to work towards in the wake of the Grenfell Tower disaster.
CMAK

The Construction Management Association of Korea
CMAK was established in 1997 under the umbrella of the Ministry of Land, Infrastructure and Transport. Its aims are to develop suitable Construction Management (CM) for the Korean construction market by introducing advanced CM systems to enhance the competitiveness and efficiency of the construction industry that has a key role in the national economy. CMAK members consist of those who are engaged in CM business such as construction companies; CM, supervisory and claim specialists; real estate consulting companies; and IT companies.

Other members are generalists such as technicians, public officials, professors and researchers. The main activities of CMAK are the following:

- **International CM Day**
  In association with the Construction Management Association of America (CMAA) in 2001, CMAK expanded activities with the first CM Seoul Forum in 2005. Other forums followed and in 2009 at the CMAA National Conference, CMAK proposed the establishment of the ‘International CM Day’. CMAK, CMAA and the Chartered Institute of Building (CIOB) agreed to designate the second Monday of March each year as ‘International CM Day’ and in 2010 at CM Seoul Forum and Global CM Contest

the Construction Management Association of Japan (CMAJ) and the International Project Management Association (IPMA) also joined, with all parties signing “The Declaration of International CM Day”. On the first ‘International CM Day’ in 2011, President Barack Obama sent a congratulatory letter and events were held around the world to celebrate the occasion. By 2018, 7 organisations participate in the ‘International CM Day’ - the five already named plus the Asia Pacific Federation of Project Managers (apfpm) and Ikatan Ahli Manajemen Proyek Indonesia (IAMPI).
• CM Supply to Overseas Construction Markets
Since 2013, the overseas CM supply project has promoted the development of the construction industry by supplying Korea’s CM system with the government’s budget support to establish Korean construction companies’ overseas advancement.

This supply project is to provide:
1) a CM operation manual,
2) manpower and technology development programme, education and training, and
3) a related system (or legal) framework to define the contents of 1) and 2). The CM system makes the formation of the CM market possible with the implementation of the relevant system (or statute) needed in each location.

Starting with the successful completion of projects in Cambodia in 2013, Myanmar followed in 2015 and Vietnam in 2016. In 2018, CMAK is carrying out a CM supply project in Indonesia and is also currently doing post-management in Cambodia, Myanmar, and Vietnam.

• CM Professional Training and Construction Project Manager Qualification
In December 1997, CMAK was designated by the Government to carry out continuous education and CM specialised training to foster CM professional manpower. Educational training courses last 35 hours over 5 days and consist of basic to advanced level teaching.

The curriculum focuses on the core theory of construction project management and uses case-centered techniques to provide practical training. Since 2004, qualification tests for the CM have been used to cultivate outstanding specialists.

The tests target those who have completed the relevant education in areas such as construction, design, CM, finance, contract, accounting, and anyone with experience in construction-related projects.

In September 2018, ICPMA and CMAK signed a MOU to work together in respect of construction project management initiatives and international liaison of best practice
What we focus on

That’s what our Yearbook is all about.

- Innovative ideas and quality which make our projects successful.
- Award Winning Projects.
- Success factors and lessons learnt.
- Partnership and cooperation create profit for all.
WHAT

CLIENTS REALLY WANT?
A research project is currently underway in the Dublin Institute of Technology to examine the potential for this change in approach. The objective of the project is the development and testing of a working model radically changing the means by which the client’s actual needs are accurately captured at the outset of a development project. Adam Goff is the Principal Researcher and is working under the guidance of Dr Louis Gunnigan. Both are ICPMA members.

Too often, the conversation arises during the design process that what the team delivered was not what the client actually wanted. Feedback from clients will normally revolve around the design team not having listened to the client or the team not understanding what the client wants. The design team, on the other hand, usually believe that the client has changed their minds, thereby creating a scope change not covered in the project budget.

Problems start to surface in this process when we do not adequately acknowledge the language gap that sometimes exists between the client and the design team.

Blyth and Worthington (2001), state: “Design and briefing are integral parts of the same process with much of the briefing carried through the process of design. During this process the language used by the organisation is converted into the language of building. The strategic brief is articulated through words and diagrams, while the project brief is articulated through conceptual drawings and workflow diagrams.”

Historically design teams will be in the habit of communicating with visual aids, drawings and photographs, whereas the user may be more used to written reports and not familiar with the process of interpreting a designer’s drawing.

A similar problem occurs when non-technical clients attempt to define their requirements in terms of technical outputs. In this instance as the client is not wholly familiar with the language being used such that they may not be fully able to articulate what they are trying to achieve.

This is nicely summed up by the former Chairman of The Federal Reserve of the USA, Alan Greenspan, who stated: “I know you think you understand what you thought I said but I’m not sure you realise that what you heard is not what I meant.”

So how can we attempt to bridge the language barrier? Maybe we should be looking at outcomes vs outputs - namely a goal to be achieved versus a direct instruction. When a design team is issued with a direct instruction for a required output (e.g build a staircase) it will be easy for the design team to translate this into a real structure. What if a design team was given the outcome required, “I need a way to get from point A to Point B?” What impact do you think this would have on the amount of design options being put forward for consideration? How much easier would it then be for the client to assess the most suitable design option in terms of the function required of the space?

Dym, C.L., et al (2013) gives an excellent example of how the design process can be managed. The first step being “Identifying the client’s needs” which normally results in creating a list of project objectives, requirements, constraints and functions.

The progress of this project will be reported to ICPMA so that the new methods developed can be shared for the benefit of clients and construction project management professionals.

References
MAPUA

THA MAPUA STUDENT CHAPTER
Author: Alben Bagabaldo, Programme Chair, Construction Engineering and Management, School of Civil, Environmental and Geological Engineering, Mapua University

Mapua University (formerly Mapua Institute of Technology) is known to be the largest engineering school in the Philippines with more than 8,000 engineering students. It has effectively proven to the world that it can also compete globally as it was awarded by ABET Inc. its very first accreditation seal in the southwest Asia region. The school has continuously proven its excellence by producing about 300 board top-notchers in the national licensure examinations. Mapua continues to achieve highly in the fields of engineering, architecture and design, and in technology-based programmes.

One of the relatively new programme offerings of the university is the Bachelor of Science in construction Engineering and Management (BSCEM) which started in 2010. Students in this programme should be knowledgeable in the fundamentals of structural analysis, construction engineering design and analysis, material testing and quality assurance, building systems, and in construction technologies.

The programme continues to produce a number of graduates every single year that are likely to bring future construction engineers and managers into the profession enabling successful, safe, economical, and high-quality structures to be constructed.

Having this kind of programme allows partnering with an international organisation like the International Construction Project Management Association (ICPMA), which gave birth to Mapua Student Chapter (MSC) in the year 2012.

The ICPMA-MSC link, being one of the accredited student organisations of Mapua, has been involving its officers, members, and its faculty in activities that are not only enjoyable but also educationally beneficial.

Some of the following activities are:

**General Assembly:**
This activity marks the first term of the whole tenure for the given academic year where the aspiring members will be introduced to the officers and the organisation itself.
ICPMA Yearbook
Year 2018
HIGHLIGHTS FROM HAMBURG:

THE ICPMA 2017 CONFERENCE
A packed conference discussed and debated two topical subject areas: how to add value to modern city centres; and is digitalisation the way forward?

Attendees again came from across the globe - Austria, Australia, Finland, Hungary, Iran, Ireland, Japan, U.K., USA, Switzerland and Germany. With the focus on Hamburg, the Waterfront, Elbphilharmonie, HafenCity and Art Invest projects were showcased: with the National Theatre London, and projects from Oslo, Kyoto and Ireland concluding the international look.

All of these showcased projects have combined new uses for our cities that respect the historic fabric, but add something special and create places popular with people.
Further use of digitalisation was acknowledged by all delegates to be the route to create more effective, successful and efficient buildings. Whilst the talent of designers and other professionals will always be needed, achievements can be maximised by fully embracing these new ways.

HafenCity is a mega redevelopment of a major run down part of Hamburg, close to the city centre, using new flood protection techniques and combining new buildings with old historic warehouses, creating a vibrant new neighbourhood of mixed uses.

The Hamburg Port Authority presentation showed delegates how modern advances in digital methods are helping to plan and deliver major new infrastructure in the city.

A site visit was held to the iconic Elbphilharmonie Concert Hall, one of the most impressive new buildings seen by ICPMA and set to be a catalyst for the future growth of this city.
These sub-processes were digitalized and combined to HR-Management Digital

- **Project acquisition**
  - Focus on the initiation of projects

- **Resource planning**
  - Focus on current year

- **Resource Forecast**
  - Focus on future personnel requirements

- **Skill management**
  - Focus on current resources

- **Budget allocation**
  - Focus on profitability

- **Personnel budget controlling**
  - Focus on management demands
LONDON:

LEARNINGS FROM LONDON 2018
The National Theatre on the south bank of the River Thames provided an inspiring venue and setting for the 2018 conference. The theme of “Building Futures” explored recent practice, modern technologies, current research and celebrated successes: providing a positive out-take and actions for all to follow.

The audience comprised delegates from Europe, North America, Asia and the Middle East. The way that human skills can add to and enhance technological advances was a common theme: when all work together, world class projects can be created. This is a secret for success. Some of the speakers and award winners have contributed to this Yearbook and made the event more than memorable.

The major advance this year for our conference was the fact that we were able to attract, sponsor or part sponsor a significant number of young professionals and students in the early stages of their careers. This balance of guests, with those further on in their careers, helped to create a dynamic and interactive forum. ICPMA plans to do the same for future events. Many of the young professionals have now registered with us and we hope they will help to drive excellence in all they do in the years to come.
ICPMA calls the young professional side of the association (Young) YICPMA and we are progressing discussions with Zukunft Bauen (ZB) in Austria and Construction Management Association of America (CMAA) in the USA, in addition to MAPUA from the Philippines, to help those joining our professions. ICPMA also intends to engage in practical academic research in the near future.

Please visit our website www.icpma.net. Follow us on Facebook at ICPMA and LinkedIn at International Construction Project Management Association. We welcome new members and those interested in registering with us.

Quote from Anna Heigl “I was delighted when ICPMA helped Aida and myself to participate in London: the winners of the awards were all represented and to see their projects and to meet them was truly inspiring.”

Quote from Aida Mulahasanovic “Anna and I were asked to be on panels to discuss some of the themes at the conference. This was a wonderful opportunity for both of us and we loved our time at the conference.”
ACKNOWLEDGEMENTS:

ICPMA thanks all who contributed to this Yearbook. Copyright of the articles, graphics and photos is held strictly by ICPMA and the authors, nothing must be copied or used elsewhere without direct permission of these owners. In the first instance please email icpmamembers@gmail.com for any matters relating to copyright.

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