Industry as a partner for sustainable development

Consulting Engineering

International Federation of Consulting Engineers (FIDIC)

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Disclaimer

In a multi-stakeholder consultation facilitated by the United Nations Environment Programme, a number of groups (including representatives from non-governmental organisations, labour unions, research institutes and national governments) provided comments on a preliminary draft of this report prepared by the International Federation of Consulting Engineers (FIDIC). The report was then revised, benefiting from stakeholder perspectives and input. The views expressed in the report remain those of the authors, and do not necessarily reflect the views of the United Nations Environment Programme or the individuals and organisations that participated in the consultation.

Contents

Foreword

Some 178 governments adopted Agenda 21 at the United Nations Conference on Environment and Development (UNCED) – the so-called Earth Summit – held in Rio de Janiero in June 1992. They also agreed on the Rio Declaration on Environment and Development, a set of principles defining the rights and obligations of nations as they pursue human development and well-being, and a statement of principles to guide the management, conservation and sustainable development of forests. Two major international conventions (on climate change and on biological diversity) were negotiated separately.

A programme for the further implementation of Agenda 21 was adopted by the 19th Special Session of the General Assembly in 1997 as part of a review and appraisal of the implementation of Agenda 21. This 'Rio+5' conference demonstrated that the response to Agenda 21 has been varied, and, many believe, inadequate: key recommendations for structural, institutional and policy shifts had received little attention; many national efforts had been thwarted by the complexity of integrated planning required to realise sustainable development. The Rio+5 conference left a sense of failure as many milestones set in Agenda 21 were missed.

Agenda 21 contained over 2,500 wide-ranging recommendations for action. It represented a landmark achievement in integrating environmental, economic and social concerns into a single policy framework. Seen as a long-term blueprint for sustainable development in the 21st century, it offered an unprecedented, ambitious and comprehensive strategy and plan of action for a global transition to sustainable development via a global partnership, to be formally taken up by United Nnations organisations, governments, and so-called major groups at the global, national and local levels.

In effect, the various actors in society in every area in which human activity impacts significantly on the environment would be involved. Consequently, Agenda 21's 40-chapter statement of goals and potential programmes covering over 100 potential programme areas, reflected very comprehensively the views of a broad group of stakeholders on:

- key sectors such as agriculture, industry and urban management;
- key cross-cutting issues such as technology transfer, poverty, population and trade;
- main environmental priorities such as biodiversity conservation, protection of oceans and seas, climate change, hazardous waste, toxic chemicals and water.

United Nations General Assembly decided in December 2000 to organise the World Summit on Sustainable Development (the Rio+10 summit) in order to 'reinvigorate at the highest possible level the global commitments to sustainable development and to north/south partnership in accelerating the implementation of Agenda 21'. This will be a ministerial-level, ten-year review of the progress achieved in the implementation of the outcome of the UNCED and the Programme for the Further Implementation. The Assembly reconfirmed that:

- the roadmap for sustainability provided by the Rio Declaration and Agenda 21 should not be renegotiated. The review should ensure a balance between economic development, social development and environmental protection;
- The importance of a comprehensive assessment by governments and the United Nations system, at the local, national, regional and international levels, of progress achieved.

The review should focus on:

- accomplishments and measures for further implementation, including sources of funding;
- areas where further efforts and action-oriented decisions are needed to implement Agenda 21;
- new challenges and opportunities in the light of emerging trends;
- a renewed political commitment, and support for sustainable development.

In evaluating the obstacles to progress and the results achieved since Rio, the Summit presents an opportunity to build on the knowledge gained over the past decade, and provides a new impetus for committing resources and specific action to global sustainability.
The implementation of environmental policies is generally recognised as being insufficient, and the policies as such are therefore perceived as being ineffective. So there is a growing consensus that the Summit must agree on definitive actions that can comprehensively address the economic, social and environmental issues confronting the global community.

The Summit thus presents an important opportunity for today's leaders to adopt concrete steps, and to identify quantifiable targets for an improved implementation of Agenda 21. Indeed, ministers meeting in Geneva in September 2001 have already agreed to work towards the launch of a 'concrete mechanism' to advance sustainable development.

Rio+10 submissions by business-based initiatives such as the World Business Council for Sustainable Development (WBCSD) and the joint International Chamber of Commerce (ICC) – WBCSD *Business Action for Sustainable Development* intend to focus on shared learning, progress and values, and to recommend policy framework changes that will enable business to optimise its contribution to sustainable development.

As part of wider review of progress, under the framework of the Rio +10 Summit, in implementing Agenda 21, the Division of Technology, Industry and Economics of the United Nations Environment Programme (UNEP) is providing, in conjunction with the United Nations Commission on Sustainable Development, a platform for a multi-stakeholder process to prepare industry sector reports. By engaging in this process, international sectorial industry organisations commit themselves to taking stock of progress towards sustainable development, and to outlining future challenges. This undertaking should aim to be global in scope and subject to scrutiny by all relevant stakeholders.

The present report for the consulting engineering industry builds on the Agenda 21 structure and the general format being used by the CSD in preparing Agenda 21 thematic reports for the intergovernmental meetings prior to the Rio+10 Summit. Specifically, it was proposed by UNEP that there should be four sections:

- executive summary and foreword;
- implementation of the three dimensions of sustainable development. A review of Agenda 21 Sections I and II, 'social and economic dimensions' and 'conservation and management of resources' – the environmental dimension – under headings that consolidate key cross-cutting issues and key environmental priorities;
- means of implementation corresponding to Agenda 21 section 4;
- futures challenges, goals and plan of action.

Executive summary

The consulting engineering industry is uniquely positioned to provide leadership in implementing sustainable development because it plays a central role in society throughout the world.

With an annual turnover of some USD180 billion worldwide, the industry is made up of over 20,000 firms supplying technology-based intellectual services for the built and natural environment. These firms range from large, multinational, multi-disciplinary suppliers of a comprehensive range of planning, design and project delivery services, to many small- to medium-sized firms that tend to specialise in selected areas of the project delivery process. So the industry witnesses, from a privileged vantage point, how trends affect clients' operations, plans and attitudes across many technological sectors.

The industry remains largely responsible for designing and planning the construction, operation and maintenance of the infrastructure needed to meet the world's ever-increasing demand for food, water, shelter, sanitation, energy, health services and economic security. It tackles, on a daily basis, the problem of how to improve people's lives, while conserving natural resources in a world that is growing in population.

Clients come from all sectors and all levels of society, from multinational government institutions, through to national and local government; and in the private sector, from multinational corporations through to local business, and even individuals.

Construction remains the most important market, with areas such as industrial and process engineering design enjoying higher returns, but unable to significantly affect the way physical infrastructure is delivered by facilitating the adoption of assembly line techniques.

Implementing sustainability implies a changing role

Intense competition in the construction sector and clients seeking a greater range of services to address emerging sustainability issues are encouraging firms to provide multidisciplinary capabilities. Larger firms have responded by extending established technological skills into new areas, and by successfully expanding their resource base by integrating increasingly more specialised staff into multidisciplinary teams.

Viable business strategies for smaller firms that address opportunities in sustainable development, especially in less-developed countries, are not as clear-cut. The consensus is that even small firms will have to be more active in all phases of the project cycle, from inception through to operation and maintenance if they are to respond to client needs. However, to ensure global quality at the local level, the firms will have to expand their skills and experience in a generally difficult business environment.

Meeting the challenge will be risky, but hopefully rewarding. Governments are urged to recognise the challenge, and the value of helping to maintain a viable local consulting industry that is able to anchor local knowledge in the context of global standards to provide significant job opportunities, wealth creation and appropriate projects.

Considerable progress in the means of implementations

Unlike firms in many sectors employing professionals, especially technical staff, consulting engineering firms, both large and small, are generally united in most countries through membership of national associations. These associations often belong to (FIDIC), the International Federation of Consulting Engineers to enhance international representation of their member firms' business interests.

The industry, through FIDIC, repeatedly reaffirms its commitment to sustainable development, and has challenged members with a pragmatic Call for Action. The industry has also undertaken a strategic review of its business practices and operations in what was effectively an Agenda 21 process conforming to the Rio principles of sustainable development.

An assessment of the outcome of this process indicated that the industry has made considerable progress in mainstreaming the principles of sustainable development into business practice, notably in project delivery which is the prime vehicle used by the industry to provide infrastructure. Special mention should be made of recent initiatives to develop and apply business management tools that integrate the social and environmental dimensions of sustainable development.

The industry believes that by using these new skills it will be able to make significant contributions to the priority programme areas and sectors that have been identified by the United Nations Secretary-General. The programme areas are poverty alleviation, health and housing, and production and consumption patterns. The sectors are energy supply, ecosystem protection, freshwater supply, and agriculture and rural development.

Significant challenges

The assessment of the industry's Agenda 21 outcome also indicated that the main challenge for further developing the means to implement sustainablity involves stakeholder participation and consensus building. Generally lacking, especially in the area of project delivery, are measures to ensure a significant participation by stakeholders in all phases of project delivery. Such measures will need to ensure increased transparency and accountability, improved communication, and greater public awareness within a shared long-term vision for development.

Meeting this challenge comes under the general heading of targeting, resourcing and monitoring. Initiatives must ensure that communities have a good understanding of the targets that must be achieved, that local firms have the capacity to provide the required high level of services, and that there is adequate monitoring and feedback to ensure continued support for the targets.

FIDIC is formulating specific initiatives and actions that can be carried out in collaboration with national associations to help address some of the requirements. A vigorous initiative to build the capacity and general business environment of local firms is being backed up by capacity benchmarking, resource identification and new forms of quality management, notably those that tackle supply-side corruption and demand-side transparency.

It is also hoped that performance indicators for sustainable development will be established to the point that they can be used not only in an international context, to monitor compliance with international commitments, but also in the local context to encourage firms to build capacity, and to generate confidence and trust with local communities and partners.

These initiatives stemmed from a survey of capacity building needs. The survey identified obstacles to participation by local firms, which mirror the priority areas of globalisation, technology transfer and governance that have been highlighted by the United Nations Secretary-General as requiring enabling initiatives to mitigate harmful effects and serious shortcomings.

New modes of project delivery

Aside from these specific actions, it is felt there is an urgent need for a more global approach to implementing sustainability which makes use of new modes of project delivery, especially for smaller, community-based projects that encompass a range of requirements.

Furthermore, it is argued that modes based on multi-sectorial partnerships are needed to help solve the general problem of poor quality construction. Raising this quality will also help achieve sustainability gaols. These new modes will not be based on existing innovative modes which focus on relatively large-scale projects in developed countries, where the primary goal is to deliver more using less resources.

Experience has shown that attempts to secure sustainability goals by imposing constraints and requirements on a particular element of the project cycle such as procurement guidelines, regulations, bidding procedures or contractual terms, are ineffective and generally resisted.

Moreover, lessons learnt from the generally large and relatively little used private-public partnership approaches to infrastructure supply highlight the importance of these elements for success. So developing new modes will require a careful evaluation of all phases of the project delivery cycle in partnership with other actors in the cycle.

Part 1: Introduction

The Rio Declaration, in stating that economic progress is linked with environmental protection, defines the rights of people to development, and their responsibilities to safeguard the environment, by establishing global partnerships that build upon international agreements.

The consulting engineering industry reaffirms its support of:

- The Rio principles, notably;
    - poverty and sustainable livelihoods: eradicating poverty is essential to achieve sustainable development;
    - health: people are entitled to good health and a productive life;
    - production and consumption patterns: nations shall reduce and eliminate unsustainable patterns of production and consumption.
- The need for sectoral commitments, as articulated in reports by the United Nations Secretary-General (28 February 2002) and by regional preparatory meetings for the 2002 World Summit on Sustainable Development;
    - energy: improved access to clean energy services and increased energy efficiency;
    - ecosystems: protect the integrity of life-supporting ecosystems;
    - freshwater: increase the sustainable use and management of freshwater resources;
    - agriculture: increase significantly sustainable agriculture and rural development.
- The need for enabling initiatives that;
    - globalisation: mitigate the non-beneficial effects of globalisation;
    - technology transfer: enhance the availability of technology transfer and financial resources for sustainable development;
    - governance: strengthen international governance for sustainable development.

These ten aspects, singled out as priorities by both the United Nations Secretary-General and by regional preparatory meetings, are the main issues that will be addressed in this assessment of the consulting engineer industry's contribution to sustainable development.

Meanwhile, the industry reiterates its commitment to the general principles of sustainable development, in particular:

- common, but differentiated responsibilties: nations shall co-operate to conserve, protect and restore the health and integrity of the Earth's ecosystem. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command;
- Future needs: development today must not undermine the developmental and environmental needs of present and future generations;
- Polluter pay principle: the polluter should, in principle, bear the cost of pollution;
- Precautionary principle: nations should use the precautionary approach to protect the environment;
- Integrated development: to achieve sustainable development, environmental protection shall constitute an integral part of the development process, and cannot be considered in isolation from it.

Responding to the Summit priorities

The consulting engineering industry's response to the priorities of the 2002 World Summit on Sustainable Development involves three related areas, namely participation in programmes, implementation of the three dimensions of sustainability and enabling initiatives.

Participation in programmes:

- poverty and sustainable livelihoods,
- health and housing,
- production and consumption patterns.

Poverty and sustainable livelihoods

A significant stride towards sustainable development can be accomplished by addressing poverty, including such aspects as desertification, soil erosion, water pollution, air quality and human health. The consulting engineering industry will be called upon to play a major role in planning, designing and executing appropriate management systems and infrastructure development.

The recent international economic downturn has placed great emphasis in developing economies on job creation. Once again, the role of the consulting engineering industry in developing sustainable and creative projects in infrastructure development, has the concomitant benefit in many cases of creating many jobs.

Health and housing

Many developing countries are located in arid or semi-arid regions. Key issues include water supply on demand, water quantity and quality management, the impact of development on the water sector and aspects regarding risk, vulnerability and sustainability in the water sector. A continued emphasis is the impact of water quality on human health and child mortality, and the re-examination of DDT for the prevention of malaria, (and other more conventional methods), somewhat out of fashion in the first world, but nevertheless affordable and appropriate in the third world for the purification of water and the control of waterborne diseases.

The ravages of war, political turmoil, poverty and competition for scarce resources have resulted in housing becoming a major issue in developing countries. The provision of infrastructure, especially in water supply and sanitation, roads, housing and large projects is often the preserve of the consulting engineering industry. By ensuring that consulting engineering takes due cognisance of these issues, one is able to ensure that sustainable development occurs in addressing the needs of humankind.

Production and consumption patterns

Consumption patterns will need to focus much more directly on the quality of life rather than on the standard of living. Over the last decade, quality of life for many, if not most, people in the developed world has been static or declining despite widespread economic growth, with the upper 10% to 20% in socio-economic terms becoming much better off in every sense. Sustainable consumption will need to respect environmental, social and ethical norms, while meeting real needs for food, housing, transport, education, entertainment and fulfilment. Firms address these issues through their policies in areas such as infrastructure needs (company cars, canteens, office buildings and industrial plants), the purchasing of supplies and the marketing of products.

Consulting engineers are skilled at redefining a problem so that the answer becomes self-evidently far more straightforward. Their role is to focus public debate on the real issues of production and consumption, and to explore win-win opportunities instead of ideological conflict. Engineers encourage people to think 'Isn't there a better way of doing this?' so that all parties benefit. 'Does a project need to cost more to be more environmentally sustainable?'

This indeed is a true win-win for all parties concerned.

Implementation of the three dimensions of sustainability in project delivery and business practice in priority sectors:

- energy,
- ecosystems,
- freshwater,
- agriculture and rural development.

Upgrading the scope and efficiency of the methods of project delivery and business practice is vital because project delivery represents the main vehicle for delivering infrastructure that will meet the need for energy, ecosystems, freshwater, and agriculture.

Enabling initiatives to improve the business environment with respect to:

- globalisation,
- technology transfer and governance.

Globalisation

The globalisation of the trade in services and supplies is both a reality and a controversial aspect of many major projects. Firms may need to provide clients with information regarding the impact of their projects on trade, including impacts on labour practices, as well as on the near- and far-field natural environment. Again, appropriate internal accounting and the use of industry guidelines will address questions regarding environmental and human resource impacts which the public and the media often use to confront project development interests.

Technology transfer and governance

A focus on sustainable development forces the engineer's attention toward human resources, toward the way in which they are organised to build, operate and maintain facilities, and toward the cultural and socio-economic environment in which people work. The implementation and long-term survival of facilities depend on trained and motivated staff able to relate global standards to local conditions, organised in institutions that can endure and survive, and which are nourished by a well-governed political environment. These features are ensured by sustainable design, a viable private-sector consulting industry, institutional strengthening, capacity enhancement and good governance.

Call for Action

The consulting engineering industry is uniquely positioned to provide leadership. Consulting engineers possess not only the predictive methods to analyse the impending problems, but also the technological tools and creativity to provide solutions. It seems we have two choices.

The first is to do what we have always done: tinker with the current production-consumption model hoping to make incremental changes, while navigating from crisis to crisis. This choice may lead to short-term profits, but has the risk of being cast as part of the problem, not the solution.

The second and far wiser choice is to use our vision and tools to provide leadership out of this impending crisis and into a new industrial age of sustainable development. To lead, the consulting engineering industry must take on five tasks.

1. Communicate the business case for sustainable development

Sustainable development is often portrayed as a noble cause without much practical application. Corporate executives, faced with increasing competition, cost pressures and a rapidly changing business environment, need solid proof that becoming sustainable will help their companies survive and be profitable. There is a strong business case for sustainable development; it needs to be communicated.

2. Develop technologies that foster sustainable growth while maintaining and enhancing quality of life
Sustainable development represents a series of design problems: how do you produce products and services that use fewer critical resources, release fewer contaminants, contain less toxic substances, and can be recycled, but offer the same quality at an equal or lower cost?

Clearly these are complex and difficult problems. At the same time, these are invigorating problems that stretch our thinking and create whole new markets and technical disciplines. They are also the kind of problems that excite and attract our young engineers.

3. Become leaders as well as doers
Our vision and tools place us in an unique position to lead the way into a new industrial age. To do so we must become part of the policy making process. Unfortunately, most engineers are not comfortable working in this arena.

4. Teach others about the problems with our current production-consumption model, and about the concepts of sustainable development
To reset our course toward sustainability, we need to develop simple messages that explain sustainable development and the need for action. On a global scale this problem is daunting. How do you teach a world composed of myriad of political boundaries, religions, value systems and levels of economic development about to work together to manage the global commons?

5. Learn more about the impending problems of non-sustainable behaviour, and the technologies needed to solve them
Although the negative effects of the current model are becoming more evident, we still have a lot to learn about the current state of our resources and ecological systems. At the same time, we need to learn how to gauge our progress towards sustainability, and begin to develop the technologies needed to move forward.

A unique role

The consulting engineering industry has responded vigorously to the call to implement the three dimensions of sustainable development in its everyday business practice because it plays a central role in society throughout the world. It witnesses from an unique vantage point how trends – global, regional and local – affect clients' operations, plans and attitudes.

As detailed in annexe 1, the industry is truly global in scale and, unlike other technology-based sectors which tend to focus on a single industry or activity, sees issues from the perspective of a vast array of clients in both the public and private sectors. Clients operate in their own business environment and circumstances, and they vary greatly in terms of size, interest, geographic coverage, and needs, and they have very different goals, strategies, beliefs, cultures, stakeholders, strengths, and weaknesses.

Demanding requirements

The industry's reaffirmation of the Rio principles and its Call for Action highlight the extent to which it has become aware that concerns such as global climate change, corporate responsibility, sustainable growth, and biodiversity will have significant impacts on clients as well as on the industry. These and related issues and trends, can be aggregated under the general concept of sustainable development – the concept that through the actions of our industrial society, we are using up scarce resources and depleting the ecological carrying capacity faster than it can be replenished or replaced by renewable substitutes.

Although there is still some controversy over the magnitude, or even the existence, of the

effects of these trends, there are many people, not least important stakeholders of the industry's clients, who believe that these problems are real, and that something needs to be done about them. Over the last decade, stakeholders have taken companies, both large and small, to task for perceived bad behaviour which has affected negatively and significantly a company's reputation, market share and profitability.

With stakeholder concerns and actions becoming a strong and effective force in the marketplace, companies are changing the way they handle environmental management and social responsibility. These considerations go beyond current regulations and the conventional boundaries of business responsibility

Challenging tasks

Engineers have as their mission to serve clients in a way that meets and hopefully exceeds the client's needs and perceptions of quality service. They have also long understood that sound project design incorporates financial, environmental, and social factors, together with technical feasibility.

So engineers have a challenging task. In the first instance, they must make their clients aware of these emerging trends and market drivers, and give appropriate advice on how to respond. But they cannot preach sustainability to clients: they can only advise them on how the trends and market drivers associated with sustainability may affect their business, and provide them with alternatives on how to respond in ways that are appropriate to their situation.

The result so far has been that engineers may have had to compromise on the delivered project since clients, in search of the most cost-efficient solution, were not as prepared as they are today to incorporate non-technical factors.

Fortunately the situation is changing. A growing number of clients are committed to making their operations, products and services sustainable, thus creating new requirements for sustainability capabilities on projects, and a general widening of scope.
While it is becoming increasingly important to factor sustainability issues into the way the industry delivers advice and services to clients, one must recognise that the trends and issues affect, and are perceived to affect, clients differently. For example, large multinational clients are generally well aware of the issues surrounding sustainability. In many cases, they have made a public commitment to sustainable development. Conversely, many smaller clients do not presently attach the same importance to sustainable development.

A widening of scope

The consulting engineering industry took as the starting point for responding to Agenda 21, its historically significant involvement in the environmental impact of its services in several key areas, notably construction services that account for more than 50% of the industry's turnover.

Legal action of any form against design professionals in the area on construction was rare until after World War II, but by the mid-1980s environmental liability litigation had become quite common in the United States, and was starting elsewhere. It was felt that polluters and their designers should be held financially accountable for adverse environmental impacts. By the late-1980s there existed many checklists, guidance documents and reference works describing procedures that could be used to identify, screen and evaluate the potential impact of a construction project on the environment. For example, the World Bank published in 1989 guidelines titled *Operational Directive Environmental Impact Assessment* to help staff to identify projects requiring impact assessment. The other multinational development banks and agencies published similar documents soon after.

In the course of time, the construction sector came to be subject to many different aspects of domestic environmental regulation. These include controls on land use, building regulations and technical requirements, building permits and inspection, registration of proprietors, contractors and professionals, regulation of fees, environmental regulations, etc. Such measures are applied not only at the national level, but also at the sub-national or local government level; standards may be fixed by government, standard-setting bodies or private-sector associations.

A large part of such measures is intended to maintain the safety of the objects constructed and the construction work involved, to implement urban and land use planning, or to protect the health and safety of workers and users, as well as environmental quality, all in the interest of the public.

So the consulting engineering industry had recognised long before the late-1980s that it had a definite role to play in moulding the thinking of clients and the public in a proper appreciation of the environmental consequences of activities in which the industry is called upon to play a part. This mandate was clearly present in the statutes of FIDIC, that represents worldwide the business interests of suppliers of technology-based intellectual services for the built and natural environment.

For example, revisions to FIDIC's statutes in the late-1970s refer to the enhancement of professional environmental services, the dissemination of environmental information and the development of proper roles of professional conduct in environmental matters.

This awareness arose from the fact that many firms had been providing services in areas such as water supply, sewage and waste treatment that have an important environmental component from the engineering and technical perspectives. Such services extend today to cover complex, multidisciplinary environmental issues involving, for example, wetlands management, brownfield and ecosystem rehabilitation, and flood control (see FIDIC *White Book Guide* for a comprehensive list of environmental services).
The widening of scope stemming from regulation has continued to the point that consulting engineers are nowadays able to assist legislators, politicians, the public and officials in interpreting the implications of many forms of proposed legislation policy and guidelines that affect the built and natural environment. Without this practical definition and implementation of legislative and policy decision making, public debate has tended to focus on ideology, with problems of definition.

The engineer's role especially in the formulation of detailed guidelines, action plans and implementation, translates concepts into meaningful results and action. It also enables the planner, policy-maker and decision-maker to identify and assess the implications of unsustainable environmental policies or practices, and provides a fertile breeding ground for the development of appropriate, new and cleaner technology which streamlines policy development onto a more sustainable footing.

Because its skills cover a wide range of technical areas and scientific disciplines, the consulting engineering industry can also help influence the way people approach a problem by providing new technologies and factual information which highlight the implications of unsustainable practices, such as the proliferation of single-passenger motor cars and the increasing demand for air travel in preference to say video conferencing.

The industry's unique role in facilitating a dialogue between stakeholders is being increasingly reinforced by the regulatory framework that controls the market for engineering and design activities. This framework, and the accompanying national

strategies and action plans, (notably national and local Agenda 21 processes), are being adjusted in many countries to address the wider public's desire for sustainable development.

Many of the initiatives stem from international undertakings such as ratified international conventions (including the conventions on climate change and on biological diversity). Generally speaking, national priorities and the overall legal rules and guidance for both public and private clients already require the integration of sustainable development when clients formulate a demand for services from consulting engineers.

For example, energy utilisation in existing buildings is an area that will attract much more attention. Environmental impact assessments are being carried out in connection with a wider variety of new investment projects - not only those involving large plants. Environmental codes now place a greater responsibility on property and plant owners. For some Nordic countries, this means that in connection with a sale, if not before, existing buildings must be surveyed with regard to the environmental load that they represent, a process that is usually referred to as environmental due diligence.

A vigorous response

The United Nations has estimated that most of the USD630 billion needed each year by developing countries to finance their move towards sustainable development, as outlined in Agenda 21, should be spent on infrastructure. This amount corresponds to about 20% of the total amount spent today worldwide on construction. Assuming that 6% of the requirement will be spent on technology-based intellectual services (owing to increased complexity, the percentage will most likely be more than the 1.4% of construction spending that is spent on design services), in purely business terms, sustainable development currently represents a potential annual market for the industry of some USD40 billion, or close to 20% of today's industry turnover.

Aside from this potential market, the existing market for specialised skills arising from sustainable development and Agenda 21 is being driven by:

- clients seeking new project delivery systems, where the supplier is accountable for total project delivery and better protects the clients' interests. Those seeking sustainable solutions will give preference to suppliers who exemplify sustainability in their outputs and methods;
- suppliers seeking to provide higher value-added services with superior returns by persuading clients, especially those for whom public approval of their efforts is essential for success, to specify generally more complex and technically demanding sustainable requirements.

Meanwhile, other industry sectors, notably those involving management and accounting firms, scientific and environmental management firms, equipment suppliers and contractors, are attracted by higher returns and seek greater involvement in project delivery. So the market for technology-based intellectual services remains extremely competitive.

Aside from responding to vigorous competition, firms must develop a close interaction with external resources such as universities and public sector research institutes on issues related to sustainable development.

A global market shift

There is solid evidence that the shift in market requirements is taking place on a global scale. For instance, in most developed countries, there is a significant and growing revenue generated by project delivery methods that are based not on traditional procurement by competitive tendering. In Canada in 2000, the

percentages of revenue by delivery method were: traditional, 84%; design-build (a single contract for design and construction), 13%; and build-operate-transfer, 3%. Secondly, firms with more than 150 employees had a higher proportion of revenue coming from non-traditional contracts than smaller firms, because larger firms are needed to handle the non-traditional methods of project delivery. Design-build projects are much larger than traditional projects. For example, design-build projects in the United States in 2000 were worth on average USD5 million, as opposed to an average traditional project size of about USD100,000 in Canada in 1999.

It is clear that the market challenges can only be met if firms expand their scope and extend their business and technical skills and management capacity into a broad range of areas. Many firms addressing sustainable development as an integral part of projects in order to secure more comprehensive solutions for clients, with more diversified targets and objectives, still take traditional engineering skills as the point of departure by developing multidisciplinary approaches to complex challenges (see box: 'An urban environmental management system for Kuching').

Some firms are now adopting a more aggressive strategy by adding and strengthening aspects of their resource base in areas such as environmental assessment and socio-economics and institutional development. Firms everywhere will need to adopt this more comprehensive approach of harnessing specialised skills in multi-disciplinary teams, in order to provide state-of-the-art consulting services integrating sustainable development at all stages of project delivery, from concept to operation and maintenance.

Serving the needs of traditional clients, notably local authorities remains a strong focus (see box on page 20: Innovative consulting services for local authorities). But there are also new opportunities emerging where a detailed understanding of the private and public sectors is required (see box on page 21: Implementing the Kyoto mechanisms).

An urban environmental management system for Kuching

As in most developing countries, environmental issues related to the rapid urban growth and industrialisation in Kuching on the island of Sarawak (Malaysia) were initially dealt with on a case-by-case basis. Each issue was perceived as an isolated area of conflict, so goal-setting was issue-oriented, whereas there was a growing demand for coherency and clarity in order to deal with environmental management in a systematic and integrated manner.

An incoherent approach and the lack of overall direction brought with it the risk that conflicting or overlapping initiatives may be launched at the same time, while overlooking problem areas. Moreover, management functions related to enforcement, monitoring, and reporting were carried out as activities in their own right rather than as a means to feed information back into the decision-making process.

The consulting engineering industry was called upon to undertake a thorough analysis of the institutional, legal and organisational issues related to the environmental management of Kuching, with a particular emphasis of urban environmental management and the two areas of major concern, namely river quality and solid waste management.

By focusing on coherent management of the urban environment through a systems approach involving several state and local agencies, the state government has taken a proactive step towards dealing with institutional and organisational capacity constraints, the underlying reasons for the hitherto inadequate response.

Fragmentation and incoherency in the legal framework implies a risk of inefficient use of resources and conflicting action, while wide-ranging and overlapping mandates mean uncertainty and poor transparency for those who are subject to regulations.

Analysis has also shown that further streamlining of the system is required in order to provide the proper legal and institutional framework for coherent environmental management. More specifically, environmental management of the two areas of concern is marked by an unclear division of skills and tasks. This means that several agencies have the mandate to carry out the same management functions. At the same time, the present legal framework contains few duties to act, so many tasks are optional and left to the discretion of the agencies involved. This implies a risk of inactivity in administration and management in situations where action is crucial for proper environmental management.

Innovative consulting services for local authorities

Many local authorities are developing strategies for sustainable development, and there is often a legal requirement to do so. However, many are uncertain as to how to manage their obligations. Sustainable development, Agenda 21 processes and public participation involve a huge array of local interests that must be reconciled with a host of international and national action plans. In this dynamic environment, it is hardly surprising that there is a great need for innovative tools, management systems and guidance.

The consulting engineering industry is providing separately or in combination an extensive catalogue of services in the environmental, social and economic fields to local authorities. Sustainability impact assessment encapsulates one form of service. Checklists covering the environmental, social and economic issues of project management have been developed. At the strategic level, sustainability impact assessment is now offered as an integral part of strategic planning, where the starting point is ideally the political process of setting goals for sustainable development. Firms also implement the assessments in regional and local action plans, and in plans covering entire industry or infrastructure sectors.

Stakeholder analysis and participation, especially public participation, are important issues for local authorities. Consulting engineering firms manage these processes by organising hearings, workshops, meetings and the like. Firms also help formulate environmental and social plans for municipalities, and strategies for sustainable urban development.

Many local authorities are also challenged by the new interdisciplinary and cross-sectorial ways of working that are required to handle sustainability. Organisational reviews, organisational development and ways to facilitate employee involvement are therefore becoming major business areas for the industry, alongside traditional training and capacity building activities.

Implementing the Kyoto mechanisms

The flexible mechanisms introduced in the Kyoto Protocol of 1997 represent a new generation of tools for achieving sustainable development. They reflect a new business environment, where not only technical and economic aspects matter, but also environmental performance.

The mechanisms embrace, among others, joint implementation (JI) for reducing greenhouse gas emissions in central and eastern Europe, and the clean development mechanism (CDM) for developing countries. Both involve direct investment in equipment, with a transfer of the resulting emission reductions by way of credits to the investor.

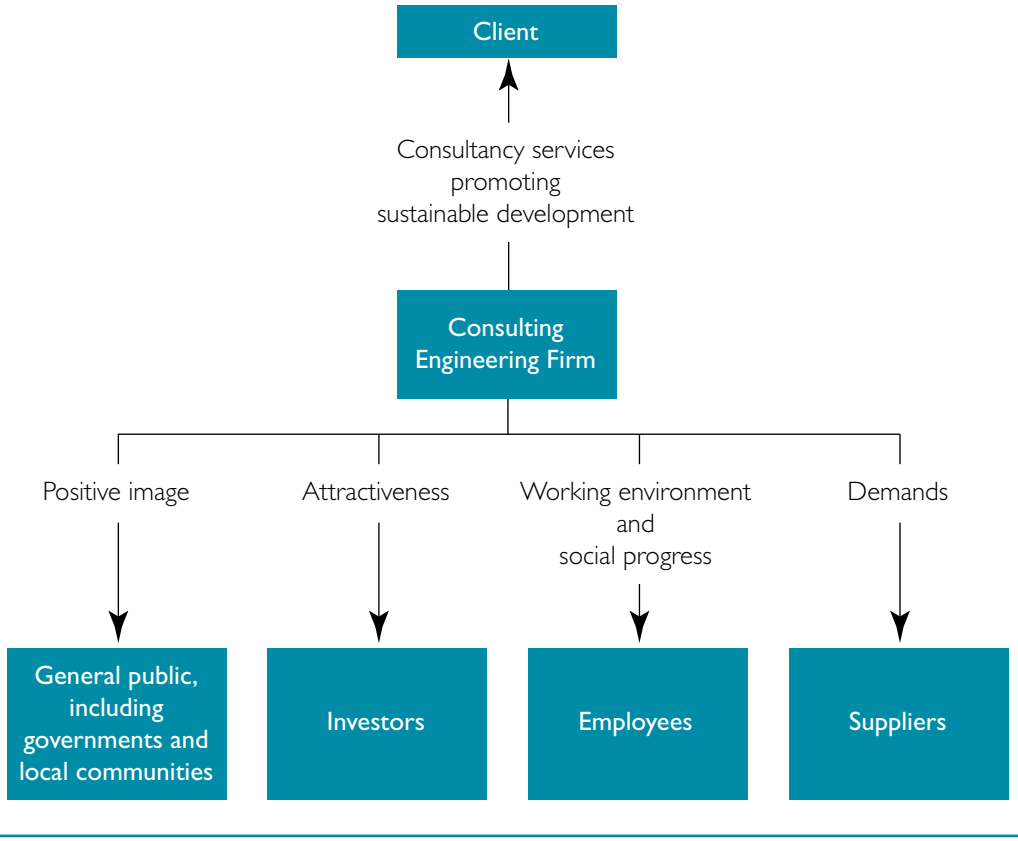
By integrating the limitations and potential of the latest technology with economic and socio-economic considerations, the consulting engineering industry has already done much of the preparatory analysis for JI in the Baltic Sea Area – a designated, large-scale testing ground. In the process, the industry has developed management tools for investors to optimise the benefits from JI.

As the framework approaches maturity, consulting engineers have been charged with identifying and developing other suitable JI and CDM projects, which have sufficient potential in terms of emission reductions, efficiency and economies of scale to satisfy investors. The industry's contributions thus form an integral part of JI and CDM.

Technical insight and multi-disciplinary skills have proven to be of crucial importance. Faced with the need to optimise the technical, economic and environmental outcomes, the industry has successfully increased the use of specialised skills relative to traditional infrastructure projects.

According to the specifications of the United Nations Framework Convention on Climate Change (UNFCCC), claimed emission reductions corresponding to transferable assets must be certified by an independent audit. Certification would be costly without reliable and highly efficient monitoring systems. The consulting engineering industry has also been able to supply the required control through monitoring and quality assurance, and by developing the necessary instrumentation. It is envisaged that in the near future, company quality assurance programmes may be adapted to cater for the needs of the new mechanisms.

Figure 1: Sustainable development impact on interest groups



The role of a consulting engineering firm is to act as the interface between the client and stakeholders

The role of the consulting engineer

Integrating sustainable development as a fundamental part of the services of a consulting engineering firm involves the relationship with a client and the relationships with the general public – including local communities and government – investors, suppliers, and the firms employees.

Integration of sustainable development strengthens the firm's attractiveness to investors, influences its business image, creates a positive impression with the general public, affects the employees through a direct focus on the working environment and social progress, and gives firms the opportunity to influence suppliers by allowing them to offer higher priced services.

It is important that firms seek a spirit of co-operation and mutual respect between their clients and the interest groups. Listening to expectations expressed by clients and other stakeholders is essential for preventing conflicts on the approach to be followed in projects.

Part 2: Implementing the three dimensions of sustainable development

The consulting engineering industry's Agenda 21 process (annexe 2) concluded that the social and environmental dimensions of sustainable development must be integrated into the well-developed classical methods of business practice to provide a coherent set of integrated management tools.

Secondly, suppliers of intellectual services that relate to the WSSD priority sectors (energy, freshwater, health, urban environment, agriculture) highlighted by the United Nations Secretary-General's and PrepCom reports typically supply services on a project basis. Project delivery is therefore a core element of their business model. Implementing the three dimensions of sustainable development into the industry necessarily implies the development of methods for integrated project delivery supported by integrated management practices.

Integrated project delivery

The traditional method of project delivery is a staged process involving discussion with the client, and definition of the project structure and project management approach. Then follows: project planning, possible delivery methods, and the formulation of a design brief, design, cost plan and programme; contract preparation, tender documentation and the calling of tenders; activities for a price and time in accordance with the contract.

Procurement is the process that an entity initiating a project uses to achieve delivery of the project by obtaining services, in conformance with applicable laws and regulations. In the case of infrastructure, for the built environment, the entity is often a government body (construction contracts account for more than 50% of local authority spending). The key feature of project delivery is the selected procurement procedure, where suppliers are invited to submit a tender offer or a proposal (occasionally qualification information, or a response to a request for information). Procurement includes the ways in which these tenders or proposals (or information submissions) are treated.

Since the marketplace varies for different services and construction, it is recommended to use a variety of source selection techniques designed to provide the best competition for all types of procurements. Typically, there will be either competitive sealed tender bids and proposals, or less-competitive, special procurement procedures.

A request for proposals is used when the purchaser is looking for the best-value solution to resolve a problem, but is not sure how to achieve it. It is not an offer, and only contemplates an offer. Similarly, the receipt of a proposal is not an acceptance, so it does not result in a contract. Proposals are generally submitted as the result of an invitation to propose a solution to a problem. The choice of which solution is the best is based not only on price and delivery, but also upon technical aspects. Technical evaluation criteria are therefore important.

A call for tenders is used when purchasers know exactly what services they want, and are looking for what is now called the 'most economically advantageous' offer, and not simply the lowest price. Tendering is the formal and detailed exercise of using a particular source selection to ensure delivery of a project which generally has a relatively high value and/or the specification is detailed or complex, and/or special terms and conditions may apply.

Source selection for tendering procedures includes open competitive tendering (any eligible supplier can submit a bid), selective competitive tendering (some or all of the bidders on a list are invited to submit a bid), and weakly competitive, special single sourcing/direct contracting or limited tendering (allows contracting a sole supplier or a number of suppliers individually).

Governments will continue to produce new infrastructure using traditional procurement or design-build followed by long-term operation and maintenance by public employees. The percentage of design-build is growing (in 2000, two-thirds of United States ACEC member firms' design-build projects were for government). Moreover, many internationally tendered construction projects are now executed on a design-build basis or turnkey basis, where the client is guaranteed a defect-free finished works. This frees the client from having to provide technical skills, and on the other hand, the greater involvement of the contractor in the economic cycle of the project leads to larger returns.

In both design-build and turnkey procurement, the contractor takes full responsibility for the design, and the consulting engineering industry has published model conditions of contract for both types of project. FIDIC recently reviewed and updated its conditions of contact in line with international business practice. It focused on the two main types of design-build projects. These are projects for electrical, mechanical, and process-plant; and fixed, lump sum projects of the engineer-procure-construct type that seek greater certainty of final price and time where one, or both, parties is unwilling to accept the risk distribution advocated by traditional contracts.

The engineer's role in this two-party context will be to work for and report to the client, and not to act as a traditional third-party to ensure efficient management of the contract, and to maintain proper relations between the two contracting parties in accordance with the contract terms.

FIDIC turnkey conditions should normally only be used as a starting point for negotiations in the relatively few, complicated, build-operate-transfer (BOT)-type projects, where private investors, both domestic and foreign, build an infrastructure facility, operate it on a commercial basis for a certain period and then turn it over to the government on pre-agreed terms.

Competitive tendering remains, however, the main procedure for procuring infrastructure. It generally involves the preparation of tender documents, including terms and conditions for submission, the criteria for selecting tenders, requests for tenders, the submission of offers for a call for tenders, the receipt of tenders, the opening of tenders, and tender evaluation involving the exclusion and selection of tenderers, evaluation of offers, and award of contract.

FIDIC has published guidelines for procurement by competitive tendering. Specifically, the federation publishes *Standard Prequalification Forms* for contracts, and the *FIDIC Contracts Guide* reviews project procurement strategies to help in the identification of the most appropriate type of contract. The guide also describes a systematic approach for tendering and the award of contracts for international construction projects using FIDIC's main conditions of contract.

Mandatory separation of design and execution

The private sector finances 15% of infrastructure worldwide (World Bank, 1995), and 10% in developing countries (UNECE, 2000). Much involves relatively large BOT projects where the numerous actors and aspects involved, and the Web of financial and contractual arrangements, make BOT procurement a complex task. Several United

Nations agencies have prepared general guidance (UNCTAD *Guidelines for Infrastructure Development through BOT Projects,* UNCITRAL *Legislative Guide on Privately Financed Infrastructure Projects,* UNECE *Private-Public Partnerships for Infrastructure Development,* UNDP *Public-Private Partnerships for the Urban Environment).*

An invitation to tender usually outlines only in very broad terms the criteria the project should fulfil. In such cases, it is indispensable to allow the tenderer to provide his own design work in order to draw on each bidder's expertise and innovative ability in proposing the best solutions to meet the prescribed need. Separating design and physical construction along the lines proposed recently – albeit without success – by the European Parliamen to safeguard 'cultural' and other values of intellectual services is certainly not the optimum approach.

Criteria linked to social or environmental objectives

The purpose of regulations governing public procurement is to secure fair and transparent competition in order to obtain the best quality-price ratio to secure the optimum use of public funds. Award criteria must be directly and objectively connected to the object of the contract concerned. Considerations of general policy, important as they may be, should not be a factor in decisions concerning the awarding of procurement contracts.

For tenders, the choice of the winning bid is in principle simple: the most economically advantageous offer that is responsive is awarded the contract. Factors other than price to be used in the award criteria should to the extent practicable be expressed in monetary terms. Award criteria include costs, quality and performance, time, ingenuity and environmental effects, and it may be necessary to apply weightings to each criterion when evaluating tenders.

Tenderers will have carried out detailed environmental investigations as part of studies of feasibility during the early stages of the project. When a design and construct responsibility is contracted out against a client and design specification that defines 'fitness for purpose', there are some measurable parameters. However, many parameters that respond to quality (for example, durability and maintenance), and to function and environment remain subjective, difficult to measure and thus difficult to award profit against. The industry appreciates that these issues require continuous discussion to set standard and specifications that are actionable.

In the case of the European Union (EU) (similar discussions are at are similar stage in other regions), the European Commission adopted in May 2000 two proposals for EU-wide directives on public procurement that would simplify and restructure public procurement for contracts whose financial value exceed a threshold.

Awards below the threshold are subject to national regulation, and the threshold is subject to various trade agreements including the 1996 World Trade Organization (WTO) Agreement on Government Procurement to facilitate the cross-border movement services (foreign firms in signatory countries can bid for contracts which exceed the threshold).

It is envisaged that thresholds for developing countries will be not modified in such a way that the architecture of the WTO General Agreement on Trade in Services is modified. Instead, as articulated by the WTO, 'specific commitments' to strengthen aspects such local capacity and overseas marketing will be negotiated in exchange for restricted competition (or 'unsymmetrical opening' of markets).

If adopted, EU procurement directives will, for the first time, contain an explicit reference to the environment in the contract award criteria. The proposals are presently being commented on by the European Parliament.

The directives are not as revolutionary as some may believe, since European courts have ruled that when the award of the contract is made to the most economically advantageous offer, environment can be mentioned as an award criterion in the contract, and it can be used as such provided there is an economic advantage. This allows aspects such as the cost of maintenance or the cost of treatment of waste to be considered as award criteria.

Some would hope that the directives will go much further than this by allowing the contracting authority to use as criteria aspects linked to a general social or environmental objectives (such as, a campaign against unemployment), provided that that condition is consistent with all the fundamental principles of European Union law, notably non-discrimination.

As has been discussed above, it is not the role of a contract between two parties that is enforced by each party to incorporate the environmental obligations of the two parties with respect to a third party, namely society at large.

Firstly, the parties are bound by law to respect environmental obligations independent of the contract. Secondly, the authority can opt for environmentally sound requirements by specifying what is required in the call for tenders. This is the so-called 'greening' of public tenders. The European Parliament in fact encourages authorities to adopt many of the business practices which the consulting engineering industry is developing in strengthening its role in sustainable development. These include:

- to specify the use of best-practice environmental management practices during construction, perhaps through the specification of project environmental management systems based on ISO 14001;
- to request the inclusion of the environmental performance record of the bidding contracting organisations in the tender selection criteria, particularly for longer-term partners;
- to encourage contracting organisations to offer sustainable construction techniques, for example innovative ways to reuse and recycle;
- to include a checklist in all bid assessments designed to allow an evaluation of the economic, social and environmental impacts of the submitted bid.

Continuous monitoring

FIDIC's conditions of contract for construction and similar activities assert that the '... contractor shall take all reasonable steps to protect the environment (both on and off the site) ... as a result of his operations', and that emissions and the like 'shall not exceed specified values and values prescribed by law'.

It has been argued that commercial tendering covered by contract fundamentally cannot handle environmental contingencies unrelated to the contractor's activities that are discovered during the construction phase. The parties would need to respond by updating the design, a possibility that is not covered by forms of contract currently in widespread use.

A further, related, criticism of the traditional method of project delivery covered by standard forms of commercial contract, is that procurement on the basis of the contract itself does provide for implementation and monitoring of the results of the environmental impact assessment.

For traditional project delivery by competitive tender, the contractor's environmental obligations can be detailed in the project specifications or in the client's requirements in such a way that they are enforced by a so-

called quality management clause. For FIDIC conditions of contract, this is clause 4.9: 'The contractor shall institute a quality assurance scheme to demonstrate compliance with the requirements of the contract. The system shall be in accordance with the details stated in the contract. The employer shall be entitled to audit any aspect of the system...'.

Adding a special clause to enforce environmental obligations is unworkable because standard conditions of contract must cover projects of very different sizes. It is difficult to see how a clause covering complex environmental considerations could be used for small contracts. Clients would simply delete the clause. It is preferable to exploit the provisions of existing, generally accepted clauses such as clause 4.9 to enforce environmental compliance.

However, it is essential to continuously assess whether other project delivery methods are more effective in safeguarding environmental aspects as there is a range of alternatives to competitive tendering based on best value. These include two-stage tender processes where an initial selection is made on the basis of the quality of a proposal, and a price for that proposal is then developed which is tested either through benchmarking or through a restricted competitive process.

Innovative methods of project delivery

The construction industry is moving away from the simple and confined goals of cost and time for construction to focus on the macro issues of overall project outcomes in project delivery, where the outcomes should be used as goals for all project participants.

This shift comes, maybe surprisingly to some, not simply from pressure for sustainable development, but for strictly commercial reasons (elimination of disputes and cost and time overruns; increased client satisfaction), and the understanding that as management techniques advance it should be possible to take a more global view.

The awareness is that today's 'off the shelf' methods of project delivery by competitive tendering are not necessarily either the most efficient or the most appropriate for a given project. Take, for example, contracts – the principal means used today for sustaining and bringing discipline to the relationship between clients, project teams and their suppliers. It is claimed, from a strictly commercial perspective, that a narrow, formal contractual relationship focuses parties on their own goals and adversarial positions, leading to conflict, inefficiency, and duplication of work. Other bases for the relationship are sought. According to the 1994 United Kingdom report *Rethinking Construction,* these should be more-rewarding (to enhance motivation), more demanding (to maximise value), 'soundly based' and reflect 'mutual interdependence'.

It was initially felt that contractual relationships could be replaced by long-term relationships based on the outcome, determined by clear measurement of performance, of a process involving sustained improvements in quality and efficiency.

Such arrangements were not sufficiently rigorous, so other methods based on outcome-based delivery are being tried. One such method is the partnering of project teams, which started to be used significantly in the United States in the early-1990s. Here the project delivery system focuses on what is sometimes called an Enterprise Project Business Plan, and comparing this with the project outcome, apportions profit to the delivering parties according to their ability to produce, replicate or exceed the plan's requirements.

Partnering aims for all team members to share in success in line with the value that they add for the client. Clients should not take all the benefits: there should be proper incentives to enable cost savings to be shared so that all members of the team to make fair and reasonable returns.

Partnering and similar forms of project delivery are based on what one now calls aligning incentives, and the techniques of outcome-based project delivery involves their management. For instance, an outcome-based contract may require the construction team to produce one, two, or a matrix of deliverables that can be either fixed or benchmarked for improvement.

It has been argued that partnering will have a limited success because it merely relies on best endeavours and acts of faith: partners simply tell each other that they will act reasonably and fairly while expressly disavowing any legal obligation to do so.

Results reported to date are more encouraging, at least in the commercially favourable United States construction market of the late-1990s. For instance, the United States Construction Industry Round Table surveyed in 2000 a total of 50 member firms with an average annual revenue of USD2 billion that mainly supplied either design services, or construction services, or both. Almost all (94%) had had significant or greater experience with partnering, which gave 'significant' benefit based on subjective responses to assessment criteria covering litigation, working conditions, innovation, management efficiency and project costs.

It is perhaps too early to judge whether partnering will significantly improve client values. However, partnering has clearly opened the way forward to the consideration of more efficient project delivery methods for complex projects based on aligning incentives. These methods are ultimately not about lowest price, but about best overall value for money.

Among the most widely used is alliance contracting, where Australia has been taking the lead. In Australia by mid-2000, alliance contracts (or project alliancing) had been used successfully by both the public and private sectors on projects worth USD350 million.

Another is engineer-procure-construct-manage (EPCM) that can also be seen as a form of producer-controlled turnkey undertaking, with greater competition over costs at the physical construction stage by having the client work in close co-operation with a project management team.

Alliance contracting and EPCM, instead of reducing the scope of contractual obligations in fact extends it. This is because these project delivery methods require the parties to integrate the management of work and key aspects, notably risk, in a much broader way than by simply transferring work and risk via separate contracts, as in the traditional project delivery process.

According to the United Kingdom's 1994 *Rethininking Construction* report, it is believed, but unproven at this very early stage, that alliancing and similar types of contracts, 'should facilitate proper recognition of environmental performance in the selection process'. They are also probably able to handle unforeseen environmental contingencies and the management of environmental monitoring during physical construction. Only time, and a considerably body of experience, will tell.

The issue for the industry is not so much 'will it work?', but 'it should be tried'. It is perhaps more important that the industry is prepared to evolve with, and contribute to, changing business practices that address sustainability than it is to come up with the correct answers right away.

Qualifications-based selection in design-build

Professional associations representing consultants have sponsored the 'two-envelope' appointment system for qualifications-based selection (QBS) on the basis that it is the only method that can generate fairness and equity in appointment together with a level of income necessary to produce a quality of design compatible with the client's interest.

The two-envelope system has one envelope containing a firm's commercial and technical appreciation of the project, methodologies, innovations, project team, value adding, techniques, etc. This envelope is opened first and the assessment panel grades the tenderers on the quality of their commercial and technical appreciation. The second envelope containing the price is then opened. If the lead company's price is less than the project budget, it will be awarded the project, or if the lead and second company are close on commercial and technical appreciation the decision between them may be made on price.

Tender assessment on a competency-based system using the two-envelope system has been known for several years but rarely used. Many clients argue that their entitlement to minimise cost is theirs, and theirs alone and it is up to the industry itself to invest in its long-term future. To date, where the two-envelope system has been used in tendering, the commitment to the commercial and technical issues has been an act of faith rather than a contractual deliverable.

Should industry decide to promote appointments though a qualifications-based, two-envelope system the offers, commitments and perceived benefits contained in the first envelope must be made contractual with a margin of profit allocated to ensure implementation. For as always, where margin is allocated to a defined deliverable which can be partly or fully implemented, a risk reward formula must apply, and an independent person nominated in the contract to manage it.

The trend, however, is give greater attention to the use of QBS in design-build as opposed to traditional competitive tendering, largely because this method of project delivery is being used more and more around the world. In integrated design-build project delivery, a client can focus design and construction responsibility through a single contract. The design-builder may be one of several entities, including a design firm, a construction company, or an integrated design-build firm. Work is typically contracted through one of three ways: with a design-build entity operating under one roof, with a designer or contractor contracting directly with the other to create a design-build team, or a designer and contractor team created as a joint venture for a specific contract. Selection of the design-build team can be accomplished through QBS, advertising the work to a selected list of bidders, negotiated contracts, or through a design competition.

Many industry associations in the United States strongly support the use of the two-phase competitive source-selection process required by the Federal Acquisition Reform Act of 1996 for design-build contracts awarded by government agencies, where the design-build team must be selected using modified qualifications-based selection criteria. Many United States states are considering the corresponding legislation.

It is claimed that QBS allows life cycle costs such as construction, operations, and maintenance to be factored more efficiently into project design. Also the client is more likely to obtain a qualified service provider through QBS than through competitive bidding because the QBS procedure requires proposers to submit information that outlines the applicability of their qualifications to the particular project at hand.

It is further claimed that properly designed procurement based on design-build with QBS selection to procure the design function from a single entity should give public clients the opportunity to competitively test the quality and price of all design-build proposals before selection, and before undertaking an open choice among different project delivery methods.

There are challenges that must be addressed if quality is to be maintained in design-build with QBS-base selection, namely:

- the client must provide sufficient design services to prepare the design-build request for proposal, otherwise the design will be insufficiently developed to allow the identification of the disciplines needed in the design-build team and the fixed price to be set as one of the selection criteria, a feature that is generally sought by all clients;
- the client has virtually no control over the design process after the designer-build team has been awarded the contract, so the contract expressing the client's requirements in the proposal and enabling the design-build team to fulfil its professional and ethical obligations to the client must be carefully thought out.

It is largely in response to these weaknesses in the delivery method that the consulting engineering industry in the United States recommends design-build with QBS mainly when innovation or unique technology from the design-build team will yield enhanced results or greater economy. Generally, however, the so-called value-based delivery method should be used for most design-build delivery schemes. Value-based delivery also supports qualifications-based selection as the preferred selection criteria, but, in addition promotes the use of the most appropriate system of delivery. Value-based delivery systems encourage the design professional's role as a trusted advisor in the simultaneous use of a variety of integrated project delivery and finance methods.

As is the case for project delivery methods based on incentive alignment, the issue for the industry is not so much 'will it work?', but a commitment to develop QBS-based and value-based design-build to achieve sustainability goals.

Integrated management tools

Project activities can produce several types of impacts: positive or negative; on-site or off-site; environmental, socio-economic, physical, psychological; short-term or long-term; financially internal or external. When properly evaluated, any one of these impacts can be large enough to change the final decision about whether to proceed with a project.

The table opposite outlines the scope of knowledge-based intellectual services over the three sustainability dimensions. FIDIC's *Business Guidelines for Sustainable Development in Consultancy Services* specifies that firms should use the best available business practices to integrate the scope into project planning, evaluation and implementation. Secondly, a firm should obtain the expertise through appropriate channels if it does not have the required expertise to carry out the necessary assessments.

Each of the dimensions is addressed by management tools, the classic example being environmental impact assessment. However, the drive for sustainability has focused attention on equivalents in other dimensions. Indeed, a tool in any single dimension is now seen as having equivalents in all dimensions. One therefore speaks nowadays of:

- environmental impact assessment and social impact assessment,
- environmental due diligence and social due diligence,
- environmental management and social management,
- environmental reporting and social reporting,
- environmental life cycle analysis (LCA) and social LCA.

Likewise, environmental concepts such as clean technology and best-available technology have social versions.

Table 1: The scope of knowledge-based intellectual services over the three sustainability dimensions		
Environmental dimension	**Economic dimension**	**Social dimension**
Increase material efficiency by reducing the material demand of non-renewable goods	Consider life cycle costs	Enhance a participatory approach by involving stakeholders
Reduce the material intensity via substitution technologies	Internalise external costs	Promote public participation
Enhance material recyclability	Consider alternative financing mechanisms	Promote the development of appropriate institutional frameworks
Reduce and control the use and dispersion of toxic materials	Develop appropriate economic instruments to promote sustainable consumption	Consider the influence on the existing social frameworks
Reduce the energy required for transforming goods and supplying services	Consider the economic impact on local structures	Assess the impact on health and the quality of life
Support the instruments of international conventions and agreements		
Maximise the sustainable use of biological and renewable resources		
Consider the impact of planned projects on air, soil, water, flora and fauna		

Traditional, essentially economics-based, management systems also need to be combined with systems for environmental and social management in order to integrate sustainability into management practice. Consequently, several firms are working to integrate management systems for quality, environment, health and safety, social management, production, maintenance, development and economics. The core principle is to develop a sustainability management system that identifies all relevant environment, health and safety, social and economic aspects at the start of a project, and to enter into dialogue with the client on how to handle these issues during project delivery.

Several sustainability management systems have been proposed both in Europe and North America. The most viable and effective will be those which represent logical extensions of quality management systems, because firms will need to lever synergies with the various forms of quality management (environmental, integrity, quality, etc.) in order to absorb implementation costs.

Running in parallel with the development of tools and systems for the integrating new dimensions of business practice, are efforts to improve not only the classic tools of environmental, social and economic analysis and assessment but also multidimensional tools that combine two or more dimensions of sustainable development.

It is unnecessary to undertake a comprehensive review of the various types of tools and management systems in order to appreciate how integrated management

practices now being developed by the industry are able to further sustainability goals. A few examples spanning the three dimensions of sustainability development will be sufficient.

Impact assessment

a) Environmental

Major construction projects acquired by traditional phased procurement are generally subjected to an environmental impact assessment that takes place during a pre-contract evaluation phase to examine feasibility and alternatives, and not during the main phase involving detailed design and physical construction. FIDIC offers model agreements for intellectual services, where the scope of services for typical agreements can cover all phases of a construction project, from inception through to inspection, including environmental assessment during the pre-contract phase.

A working and functioning contract for construction such as a FIDIC form of contract requires disclosure of data. For instance, the general conditions of the latest versions of FIDIC forms for construction require that tenderers assert that that they have supplied, in tender documentation, all of the 'relevant data' that is generated in accordance with clause 4.10 of the general conditions.

Under Clause 4.10, the 'relevant data' is data that influences the feasibility, planning or cost of the project. It has been argued that there exist data that affects none of these, but is relevant for the environmental impact of the project. Withholding this data would not be in breach of contact, but it would be against the interests of society. Extending the argument, when sustainablity impact assessment becomes mandatory, withholding information on social aspects would have similar implications.

It is not the role of a contract between two parties that is enforced by each party to incorporate the environmental obligations of the two parties with respect to a third party, namely society at large. These third-party obligations are covered by law or other instruments such as the loan agreement for the project.

While convinced that the contract is not the proper place to secure sustainability goals, the consulting engineering industry recognises that every effort should be made to ensure that environmental impact assessments carried out for the tenderer during studies of project feasibility are of the highest quality. The industry therefore continually develops, promotes and reviews business practices that maintain and enhance the quality of its services, especially the quality of environmental impact assessment.

Initiatives (summarised in annexe 3) involve environmental management systems, urban environmental management, guidelines for sustainable development, codes of ethics, client-consultant agreements, quality management, quality-based selection, and reviews of procurement procedures.

b) Social

Social impact assessment is emerging as an important tool in parallel with environmental impact assessment for planning new projects and evaluating company activities. A core component is stakeholder analysis and active participation of the stakeholders. Their management calls for new analytical skills, and new skills in communication and information activities.

With the client's agreement, the following step-by-step procedure is recommended by FIDIC's *Business Guidelines for Sustainable Development in Consultancy Services* for a social impact assessment:

- categorising and stakeholder analysis: a preliminary project evaluation where the project is categorised according to various sustainable development requirements. Some projects may not proceed beyond this stage;

- project screening; an assessment is made using the checklist in the early phase of the project to identify all the essential environmental, social, and economic aspects and to giving a preliminary description of their relationships;
- project planning; incorporation of the objective into the quality plan and specification of the services needed for the project. The selection of a sustainable development co-ordinator and relevant specialists for the project team are recommended;
- development of a communication strategy framework;
- partnership development: the strategic development of partnerships is recommended because it represents a systematic approach to manage relationship building based on key shared values;
- specification of services and further stakeholder analysis: discussion with the client and stakeholders to define the sustainable development objectives of the project;
- performance of services and follow up; a review of the status and possible revisions of each of the phases should be carried out, at least at the end of every phase of the project, and whenever major modifications are made to the project;
- preventive measures; take action if adverse effects are to be expected, and recommend mitigative measures to the client.

Several of these aspects are explored in greater detail in annexe 4.

Due diligence

a) Environmental

As mentioned earlier, in some Nordic countries, environmental due diligence is now required by law in connection with a sale, if not before. The process involves surveying existing buildings with regard to the environmental load that they represent. The industry envisages that measures to control all aspects of the efficiency of built infrastructure will become more important, and that they will be linked to international, national and sectoral performance goals and benchmarking to verify conformance with international undertakings.

b) Social

Companies focusing on social issues is also seen in the processes of mergers or acquisitions, or in companies' auditing of existing operations or sub-contractor and supplier activities. Several firms have developed tools for social due diligence covering a broad spectrum of elements such as company commitments, employee evaluations (qualifications, turnover, satisfaction, organisation, cultural fit, etc.), social ethics, legal compliance, critical stakeholder relations, macro-economics of surrounding society, political, cultural and social climate, etc.

Environmental financing strategies for sectoral sustainability

Environmental financing strategies (EFS) are multidisciplinary analyses that serve as environmental investment management tools for the recipient country, and as planning tools for environmental co-operation with relevant donors. They are developed by teams comprising both technical experts and economists, working in close co-operation with experts and administrators from the recipient country.

Several EFS have been carried out in the wastewater sector in eastern Europe and in Russia by consulting engineering industry in collaboration with the OECD.

EFS identify the future operation and maintenance costs of, for example, wastewater treatment plants in a region or country according to a status quo scenario (present level of treatment sustained). It also identifies additional capital needs for new environmental investments and related operation and maintenance costs in accordance with national or regional environmental investment plans, and the funds allocated for this purpose in government spending.

In eastern Europe and Russia, significant financial gaps (shortage of funds available in the future) have been identified in many of the EFSs being developed in the wastewater sector, even for status quo scenarios. Based on identified financial gaps, solutions are suggested and scenarios are developed for closing the financial gaps (both in 'status quo' and 'environmental upgrading of utilities' scenarios).

Such an exercise includes: socio-economic surveys such as the capacity and willingness to pay; analysis to assess the sustainable level of user payment for the provision of a sustainable public utility service; identification of the technical cost of reducing intervention (for example energy saving interventions); the screening of possibilities for attracting additional funds.

Based on these EFSs and other relevant sector and socio-economic analysis, consulting engineering firms are helping donors and recipient countries to develop environmental co-operation programmes that addresses the institutional, economic, social and technical issues needed to secure the sustainable development of a public utility.

Multi-dimensional tools

FIDIC's *Business Guidelines for Sustainable Development in Consultancy Services* highlights the tools and management systems that are being developed by reinforcing the links between aspects focusing on two or more dimensions of sustainability.

For instance, techno-economic instruments that link technical and economic considerations include:

- financial instruments coupled to global environmental agreements;
- instruments involving the replacement of detailed regulation by cost-motivated innovations, tax reduction and subsidies for environmentally friendly goods and services;
- preventive, restorative or compensatory measures (cleaner technologies, environmental management systems) and new methods that have to be developed (such as sustainable construction) that internalise environmental costs into the accounting for and pricing of investments;
- eco-efficiency aimed at reducing the material and energy intensity of goods and services, reducing toxic dispersion, enhancing material recyclability, maximising the sustainable use of renewable resources, and extending product durability;
- closed-loop, life cycle approaches for analysing the processing, transport and consumption of resources.

Sectorial multi-disciplinary analysis

Multi-dimensional tools of the types described above have historically focused on a project-by-project analysis. Traditional engineering design skills are combined with environmental, economic and social analyses and strategic planning, with sustainable development as the overall objective.

A typical assignment comprises recommendations on technical solutions to mitigate negative environmental impacts related to, for example, the lack of efficient wastewater treatment and inadequate handling of solid waste. They also nowadays include a multi-disciplinary analysis leading to recommendations regarding strategic planning, environmental financing such as sustainable 'user pays' schemes, as well as institutional development.

However, there is a move away from a traditional feasibility study of a single project to macroeconomic analyses that address the long-term sustainability of environmental investments in a sector. The development of environmental financing strategies is a good example of the trend (see box opposite: Environmental financing strategies for sectoral sustainability).

Part 3: Means of implementation

Meeting the priority needs in the area of the business environment that were identified by the United Nations Secretary-General's report requires enabling initiatives to:

- mitigate the harmful effects of globalisation,
- enhance technology transfer,
- ensure good governance.

Making globalisation work

The consulting engineering industry's reaffirmation of the Rio principles and its Call for Action highlight the extent to which it has become aware of a number of trends which could have a significant impact on clients as well as on the industry. However, initiatives are being increasingly put at risk by the notion that the globalisation implications in the Rio Declaration is not beneficial for sustainable development.

This notion, explored in depth in the United Nations Secretary-General's report *Implementing Agenda 21*, is proposed as one of the important priorities – perhaps the most important – for the 2002 World Summit on Sustainable Development.

The Secretary-General points out that globalisation has demonstrated both benefits and limitations. Countries and industries that have adapted have prospered; those that that were unable to do so owing to a lack of technical capabilities, infrastructure and institutional capacity saw a widening gap between themselves and the rest of the world.

Design services in general, and technology-based design services, in particular, being rooted in intellectual, scientific and technological rigour are global-scale industries operating to uncompromising global standards, without scope for reinterpretation and misrepresentation.

The industry realises that its clients, the owners of the future projects, both public and private, will always seek quality, comparable at a global level. The industry's mission is to deliver this global quality via independent, for-profit, firms supplying technology-based intellectual services on a fee-for-service basis.

It is believed that the competitive supply on an open a free market ensures the highest quality because it is the client that decides, subject to overall governmental regulation and policies.

Moreover, the supply of high-quality services inevitably requires an understanding of the local conditions. This understanding will only be available if there exist local organisations capable of pooling and building upon their staffs' knowledge and skills. Such organisations will, for the most part, be private sector firms, which hopefully enjoy sufficient returns to be able to survive in the long-term, and to reinvest for the future.

Making globalisation work for sustainable development is thus central to the consulting engineering industry's mission and strategy.

The Secretary-General's report, and the reports of the summit's regional review meetings, propose measures to manage globalisation so as to advance economic growth and sustainable development everywhere. Most are government-level initiatives (for instance, coordinated macroeconomic policies, removal of trade distorting policies and effective participation in multilateral trade negotiations). A significant number relate to what could be industry-level initiatives that can be implemented nationally through established sectoral organisations. They include initiatives that have been taken up by the industry, notably:

a) increased technical assistance,
b) enhancing the role of information and communication,
c) supportive investment policies,
d) increased access to global markets.

Local obstacles

While there is an increasing amount of evidence indicating that an overall widening of scope to meet clients' needs has led to a profound readjustment of the role of the consulting engineer, an industry-level survey conducted by FIDIC in 1999 indicated that a number of obstacles prevent industries in some countries, and their clients, from profiting from globalisation. These obstacles invariably, and without exception, encompassed the four areas highlighted by the Secretary-General's and PrepCon reports.

a) Increased technical assistance:
   at the project level;
      poor transfer of know-how on projects.
b) Enhancing the role of information and communication:
   at the general level;
      lack of acknowledgement of the importance of a 'knowledge industry'.
c) Supportive investment policies:
   at the general level;
      inadequate sources of finance for establishment of private firms.
      Unacceptable tax-and business operating environment,
      lack of legal instruments, insurance cover and contract infrastructure.
   at the project level;
      unacceptable contract conditions, liability and insurance;
      cash flow difficulties, cumbersome and slow payment methods,
      bureaucracy in implementation.
d) Increased access to markets:
   at the general level;
      local preference for employment of individuals, NGOs or university institutions;
      too much work is carried out by in house, often less effective, units;
   at the project level;
      discrimination of LDC firms in favour of DC firms,
      unclear shortlisting procedures,
      lack of transparency,
      lack of meaningful roles in joint-ventures.

In addition, the survey singled out corruption at both the general and project levels as a major obstacle to capacity building.

Supportive investment policies and facilitating market access are largely determined by government and international lending agencies. In *Building the Capacity Building of Consulting Firms* (2001), FIDIC has proposed legislative action, policy initiatives and financial initiatives, and revised procurement guidelines. Increased technical assistance and the role of information, on the other hand, can be addressed directly by the industry.

Increased technical assistance

As pointed out in the EU report *Quality in the Constructions Sector: The European Way to Excellence in Construction* (1999), poor quality of construction is of general concern. It is also a vital consideration for sustainable construction, for without high quality it will be difficult to ensure the required high performance standards.

A 2001 survey by the FIDIC showed that 25% of industry professionals distributed uniformly between North America, Europe and Asia (30%, 35%, 30%) say that construction quality continues to deteriorate. So the quality of construction remains a problem. Moreover, it is a worldwide problem involving both developed and developing countries.

Good project management clearly helps. The EU report mentions that a major Spanish contractor achieved a 50% reduction – albeit from an abnormally high level owing to reporting practices – in major on-site accidents by introducing a conventional quality management system.

However, the FIDIC survey showed that upgrading project management will not provide all of the needed improvement because poor quality arose owing to fundamental characteristics of project delivery by competitive tender (tight budgets; stake sharing). These led to poor project practice in virtually all areas (poor designer and contractor selection, poor project supervision, poor materials, poor workmanship).

Solutions therefore call for a multi-sectoral strategic partnership involving both clients and suppliers similar to that required to promote sustainable development. This partnership will need to address several different aspects of project delivery using many of the tools and business practices discussed earlier. Such partnerships will be global in the sense that they will often involve at least the sharing of skills and know-how between the developed and developing world.

It can be said that the challenge of sustainable development runs in parallel with the challenge to improve construction quality via increased technical assistance.

Enhancing the role of information and communication

Increased transparency and accountablity in business practice and project delivery in order to build credibility with stakeholders will undoubtedly help make globalisation work. Two approaches are generally adopted: voluntary instruments such as codes of conduct, policy statements and charters on say sustainable development, and voluntary reporting.

The number of firm issuing corporate environmental reports is increasing dramatically, mainly owing to increased interest by the public and key stakeholders such as regulators and the financial sector. This has led to the further development of environmental performance indicators and reporting for self-assessment, as in the benchmarking of environmental performance, to improve competitiveness.

FIDIC's *Business Guidelines for Sustainable Development in Consultancy Services* recommend that voluntary reporting by firms covers the following general aspects of business practice:

- management policies and systems,
- stakeholder relations and partnerships,
- technology co-operation and the global environment,
- the input and output inventory of projects.

Some sector specific aspects are also recommended, namely reporting that:

- allows clients to select a supplier with strong sustainability credentials;
- shows the industry is taking action against cases of environmentally, socially or economically adverse business practice;
- shows the industry supports new values, covering broader boundaries for their project impact;
- shows the industry is ready, skilled and actively interested in seeking new solutions for sustainability in all aspects of business practice;
- promotes sustainable society, consumption patterns and lifestyles through education.

Specific industry initiatives include voluntary instruments and voluntary reporting.

a) Voluntary instruments

At the international level, mention has already been made of role of FIDIC's statutes, policy statements and code of ethics in promoting business practices. The federation's policy is to engage in formal instruments promoted from outside the industry if these complement FIDIC's efforts to improve business practice. This is the case with the United Nations *Global Compact*, the *Earth Charter* and the OECD antibribery convention that supports initiatives to develop business integrity management as part of a firm's quality management system (FIDIC published in 2001 *Guidelines for Business Integrity Management in the Consulting Industry*).

At the national level, member associations and partner organisations with national structures are urged to participate in national voluntary instruments equivalent or related to the international instruments.

b) Voluntary reporting

From a business practices perspective, the most important aspect of reporting is self-assessment, and the most common approach is benchmarking. Benchmarking involves comparing the performance of an industry, firm or project in key business activities against the performance of other firms or projects, and then using lessons learned from the best to make targeted improvements. The best performance achieved in practice is the benchmark.

A performance indicator is the measure of performance associated with an activity, so the information provided by an indicator can be used to determine how an industry, firm or project compares with the benchmark, and is therefore a key component in an industry's move towards best practice.

FIDIC is currently benchmarking the consulting engineering industry at the national industry sector level. *A National Capacity Index* based on 16 indicators to rank national industry sectors has been developed and published. The index gives a accurate indication of current capacity in a country. It also encourages national associations to undertake a minimum level of data collection and reporting, thereby gaining the experience and skills to undertake more comprehensive surveys at the firm level that can be used for benchmarking firm performance.

Ultimately, the vast majority of firms will have to be benchmarked as competition between them increases. National sectors will need to know the strengths and weaknesses, firms will need to know where to improve performance. Firm benching of the consulting engineering industry is carried out routinely, and with great effect, in Australia, Denmark and the United Kingdom, and several countries undertake regular surveys to generate snap-shot performance indicators.

The United Kingdom's benchmarking is unique in that it forms part of a government backed, multi-sector initiative. Published annually are series of sets of *Key Performance Indicators for the Construction Industry* that form part of a *Key Performance Indicators* framework comprising seven main groups of indicators. These sets comprise ten key indicators that focus primarily on projects at the client/contractor interface. A set for consultants is led by the Association of Consulting Engineers.

Performance monitoring vis-à-vis the environment is applicable to many types of projects. Projects with primary or secondary components that specifically address environmental issues, as well as projects whose activities may have a direct or indirect impact on the environment, need environmental performance indicators to evaluate their impact on the environment -

that is, to ensure that they are having the desired positive impact, to monitor any possible adverse impacts, and to guard against unanticipated effects. Given the diversity of environmental problems, the variety of contexts in which they arise, and the numerous possible solutions to them, no 'correct' set of indicators exists.

The development of useful environmental indicators requires not only an understanding of concepts and definitions, but also a good knowledge of policy needs. In fact, the key determinant of a good indicator is the link from measurement of some environmental conditions to practical policy options. Environmental indicators can be used at both the international and the national level as a tool for state-of-the-environment reporting, measuring environmental performance, and reporting on progress toward sustainable development. At the national level they can also be used for clarifying objectives and setting priorities.

When dealing with integration of the broad concept of sustainable development, the question remains on how should firms approach the concept in a systematic manner. Agreement needs to be reached on the type of performance indicators that should be used for standardised environmental and sustainability reporting. The *UNEP-ICC-FIDIC EMS Handbook* listed some 50 items that have been used in corporate environmental reports. FIDIC's *Business Guidelines for Sustainable Development in Consultancy Services* has made a selection from this list, and introduced several new items.

The United Kingdom Construction Industry Board has taken the lead in extending the United Kingdom's key construction indicators to include six environmental performance indicators for sustainable construction. It is planned to develop benchmarks for offices, houses and other types of buildings using these six indicators. Highly significant is the fact that data is not available for any of the six indicators for infrastructure facilities. This indicates that a considerable effort will be required in order to arrive at complete benchmark for the built environment, not only the environmental dimension but also the other dimensions of sustainability.

Firms are also developing and supplying tools based on performance indicators to help other firms evaluate, demonstrate and improve on the sustainability of their projects or the organisation's performance. For instance, SpeAR examines the natural resources and the environmental, economic and social issues associated with sustainability, and generates a sustainability diagram which indicates both the negative and positive effects of a project.

In some cases, sustainable development performance indicators are applied to groups of projects. These studies are highlighting the generally poor sustainability performance of projects in developing countries (see box overleaf: A comparison of local and international potable water projects in Nigeria).

A comparison of local and international potable water projects in Nigeria

The sustainability performance of two similar potable water projects in Nigeria has been compared. The first project was locally financed and involved the drilling of over 3,000 new bore holes and the rehabilitation of over 2,500 old ones, in 776 rural local government areas. The second was financed internationally and aimed to improve water supply services in urban and semi-urban areas through rehabilitation of the highest priority needs and addressing institutional weaknesses.

A comparison of several sustainability criteria suggests that the locally sourced, locally funded project achieved better results from a sustainablity perspective, mainly owing to the greater use of local professionals.

Criteria	Rating: Project 1	Rating: Project 2	Comments
Skill level	Average to above average	Average to above average	Locally available
Consolidation of experience	<20%	20%	Poor use and development of local personnel by national government and international lending agencies
Local capital preservation	100%	20%	Charge out rates for expatriates ten times higher than for equivalent local staff
Local industry utilisation	60%	20%	Essential equipment not manufactured locally
Utilisation of local personnel	100%	70% for consultancy services	Most work done locally with only advisory input
Skill transfer	80%	65%	Professionals or departments developed skills
Appropriate technology	80%	100%	Project mostly conceived locally
Technology transfer	Not applicable: used local resources	50%	Local consultants and state water agency staff updated knowledge

Source: K.A. Adeola, FIDIC 2001 Conference (September 2002; Montreux).

Part 4: Future challenges, goals and plan of action

Summary of assesment

The assessment of the output of the consulting engineering industry's Agenda 21 activity concluded that measures to ensure stakeholder participation in projects were the weakest, followed by initiatives to monitor the industry's performance.

The measures being used by the consulting engineering industry to implement the three dimensions of sustainability in project delivery and business practice were also reviewed, together with the industry's enabling initiatives to improve the business environment according to United Nations priorities for the 2002 World Summit on Sustainable Development.

A subjective ranking is that enhancing the role of information and communication is the weakest, followed by increased technical assistance. By contrast, means of implementation involving integrated project delivery and integrated management tools were comparatively well developed, and receiving widespread attention.

Comparing implementation needs with the means of implementation suggests that similar aspects are ranked as needing the most attention from both perspectives. These aspects are:

Implementation needs

- participation and consensus;
- targeting, resourcing and monitoring.

Means of implementation

- enhancing information and communication;
- increased technical assistance.

It would appear that the most important issues facing the consulting engineering industry involve enabling initiatives and means of implementation that:

- enhance information and communication to increase stakeholder participation and consensus;
- increase technical assistance by providing resources to monitor sustainable development.

Challenges and goals

a) Stakeholder participation and consensus

National and local Agenda 21 processes seek:

- active stakeholder and public participation; the processes of planning, implementation, monitoring and review should include the participation of stakeholders;
- transparency and accountability; the management of the strategic planning processes should betransparent, with accountability for decisions made;
- communication and public awareness; measures should be taken to increase public awareness of sustainable development, to communicate relevant information, and to encourage the development of stakeholder involvement in the strategic planning process;
- long-term vision and action plan; a strategic planning processes should be based on a long-term vision for the development, which is consistent with the capabilities, allows for short- and medium-term necessities, and has wide political and stakeholder support. A long-term, strategic action plan must also be prepared and implemented.

Clearly, these features can be introduced to some extent at the project level by firms. However, the firms' scope for action is limited since most of the features will be implemented by planning authorities.

Monitoring

A specific, industry-level action would be to help introduce systems that promote constructive discussions with stakeholders, accountability, public awareness and strategic planning. Fairly obvious candidates are monitoring and information systems. Experience with *Key Performance Indicators (KPI) for the Construction Industry* in the United Kingdom has shown that these indicators are used as benchmarks to set targets and achieve consensus.

Promoting the widespread adoption of similar systems, possibly extended to give greater coverage to sustainability indicators (based on a limited subset of proposed international indicators), can be taken up by FIDIC member associations (FIDIC's United Kingdom member association operates the United Kingdom construction industry KPI).

Systems to monitor adherence to voluntary sustainability initiatives and voluntary sustainability reports will also help build public confidence in the industry. At the very least, a challenge for the industry will be to ensure compliance with voluntary codes of conduct.

Aside from these voluntary aspects, a related challenge for the consulting engineering industry will be to support international agreements such as the Kyoto mechanisms by developing and implementing highly reliable monitoring systems. Some firms have already established such systems.

New modes of project delivery

In addition to specific actions, it is felt that there is there is an urgent need for a more global approach to implementing sustainability which makes use of new modes of project delivery, especially for smaller, community-based projects that encompass a range of new requirements.

These new requirements mainly relate to the need for increased public and stakeholder participation in the planning, implementation, monitoring and review of projects. But they also include efforts to improve the quality of construction.

Sharing in the decisions will necessitate sharing in other aspects, notably risk, management, liability, quality assurance and the like. These obligations are presently formulated in terms of procurement guidelines, bidding and tender documents, and in contracts for construction between a limited number of parties.

These new modes will not be based on existing innovative modes such as alliancing (see section 2.1.5) which focus on relatively large-scale projects in developed countries, where the primary goal is to deliver more using less resources.

Another alternative is to modify existing vehicles for sustainability goals. However, experience has shown that attempts to secure these goals by imposing constraints and requirements on a particular aspect of the project cycle such as procurement guidelines, bidding procedures or contractual terms, are ineffective and generally resisted.

Public-private partnerships (PPP) or private sector participation (PSP) are being explored as a possible delivery mode. PPPs can be restricted to simple management contracts, joint ventures, BOT projects, concessions, divestitures and privatisations that aim to help meet infrastructure needs by promoting private-sector involvement. They can also be extended to include several elements. The UNEP document *Public-Private Partnerships for the Urban Environment* outlines the broadest possible definition of a PPP as being a combination of:

- a framework for agreeing upon a community's vision,
- a traditional design-build contract,
- a form of joint venture agreement for joint responsibility,
- instruments for passive public investment through equities or debt guarantees.

IIED reports that large PPPs in the urban water supply sector are currently seeking ways to allow stakeholder participation in decisions and in management. Progress is slow, indicating that it will be an enormous challenge to implement broad PPP concepts on a relatively small scale with relatively unsophisticated partners compared with what has been the case up to now.

In addition, the private funding of infrastructure still only represents 10% of the total in developing countries, so there is little momentum for exploiting fully the possibilities offered by PPP.

Experience with PPPs has repeatedly illustrated the overriding importance of contractual terms, regulations, bidding procedures and market structure. So it is likely that developing the new modes will require a careful evaluation of all phases of the project delivery cycle in partnership with other actors in the cycle.

b) Credibility, transparency and accountability
Regarding credibility, transparency and accountability, national and local Agenda 21 processes seek:

- capacity for implementation; the sustainable development strategy must include realistic mechanisms to develop the capacity required to implement it;
- targets and indicators; targets must defined for key strategic economic, social and environmental objectives, with indicators through which they can be monitored;
- monitoring and feedback; systems should be in place for monitoring the implementation of strategies and the achievement of their defined objectives, for recording the results, and for reviewing their effectiveness as strategies for sustainable development, with effective mechanisms for feedback and revision within the planning process.

Once again, monitoring plays a central role. However, the need for technical assistance as an enabling initiative is matched by the concept that sustainable development requires realistic mechanisms to develop implementation capacity. Clearly, without technical assistance and technology transfer there will be little sustainable development.

The FIDIC prefers to speak in terms of capacity building because technology transfer adopts a one-way format from developed to developing countries that is now generally recognised as being unsatisfactory. Once again, monitoring may be an effective way to promote capacity building. FIDIC is currently promoting the benchmarking of firms and national industry sectors to encourage then to improve their capabilities.

Another challenge is to promote the identification of appropriate local capacity through some form of directory service of the type being developed by the World Bank and UNEP in the SANet initiative.

Plan of action

The industry's plan of action centres on initiatives that can be undertaken in collaboration with partner organisations, or by FIDIC in collaboration with national member associations. Current commitments are extensive, and need to be maintained because they fall within the scope of the secretary-general's summit priorities. Some of these are detailed below.

a) International organisations:

Industrial and Urban Environmental Management Systems: UNEP, ICC, ICLEI

- maintenance and promotion of training kits,
- organisation of training courses.

Business integrity: WB, IADB, TI;

- developing guidance documents,
- promotion assimilation by standards bodies,
- implementation of pilot programmes in the industry.

Quality and environmental management; ISO;

- developing guidance documents,
- harmonising industry standards.

Sustainable alternatives network; UNEP, GEF;

- facilitating proposal submission.

CEO workshops; GEF, WEFO;

- promotion cross-border private investment.

Contract documents and model agreement; WB, IADC, ADB, IADB;

- review and updating.

b) Member associations:

Capacity building;

- procurement guidelines,
- government initiatives,
- capacity benchmarking.

Quality management;

- promotion of industry-wide guidelines.

Business practice;

- quality of construction promotion,
- government as an informed buyer.

Sustainable development;

- development of business guidelines,
- sustainable development goals summarised in this review will be addressed by establishing task forces to,
- develop sustainability benchmarking and performance indicators,
- review integrated project management and business tools,
- contribute to international discussions on new forms of project delivery.

Annexe 1: The technology-based consulting industry

Technology-based design services are supplied on the one hand by the owners of investment, be they public or private. On the other hand, there are firms which sell these services in the open market. The latter are of two different types: those who sell services as their main activity, and constitute the technology-based consultancy industry, and those who sell services simply as an additional service to, for example, other suppliers of works or equipment. For these firms, technology-based design services represent a very minor part of their turnover.

Firms supplying technology-based design services have diversified into related areas that do not involve design (for instance, planning, inspection, management) so technology-based design services now imply all forms of technology-based intellectual services. This review focuses on the consulting engineering industry defined as independent, for-profit, organisations supplying technology-based intellectual services on a fee-for-service basis.

An estimate of the size of the market for technology-based design services can be obtained using macroeconomic data. A 1999 survey of 32 countries, mainly composed of three groups of European, North American and Asian countries of equal importance and including all major countries, indicated that gross fixed capital formation (GFCF) amounted to USD5,770 billion for the 32 countries out of a worldwide total of USD6,580 billion (GFCF is the purchasing parity adjusted 'rough investment' in construction and in durable goods).

Knowledge-based design services are required for all of the construction sector investment (52% of GFCF) and some 58% of the investment in durable goods (48% of GFCF). So investments requiring knowledge-based design services totalled USD5,250 billion.

On average, some 8.46% of this investment was spent on design services, so the potential market for technology-based design services was approximately USD444 billion worldwide.

Consulting engineering

The consulting engineering industry is composed of those firms for which the supply of services represents more than approximately 50% of their turnover. The survey indicated that these firms supplied USD237 billion – 63% of the potential market for technology-based design services – in the 32 countries surveyed. Worldwide, the market therefore represented a USD270 billion industry in 1999.

However, total employment in the industry is 2.3 million to 3.5 million (excluding China and India, about one job per 1,000 inhabitants), so the average annual turnover per employee is estimated from the survey to be about USD90,000. This figure – equal to the turnover per employee in Canada – is too high for a worldwide average. This is because the average of 8.4% of investment spent on knowledge-based design services is weighted towards developed countries for which data are available. The industry's worldwide turnover is more reasonably estimated as USD180 billion in 1999 with USD60,000 per employee per annum.

The main activities of firms surveyed in 1999 were as follows in terms of man-hours:

- construction and building services 63%,
- technology-based design 16%,
- management consultancy 3%,
- control and inspection 2%,
- training 2%.

So technology-based design services for construction and building amount to a worldwide turnover for the industry of approximately USD113 billion.

The remainder of the market (37%) was supplied by in-house by companies, or by those who sell services simply as an additional service to other suppliers for works or equipment. It is estimated that 50% of these services were for construction, so the total worldwide turnover for intellectual services in construction is some USD146 billion.

Construction and building services

In 1995, in the lower income developing countries, construction accounted for 4% to 6% of Gross Domestic Product (GDP); the gross output of the construction sector in the 15 EU member states amounted to approximately 11% of GDP; other EU data gives 9.7% of GDP in 1999. In most industrialised economies, the gross output is generally 10% to 14% of GDP. So for a total world GDP of USD29,300 billion and assuming a 11% share for construction, the world construction market is generally estimated as USD3,200 billion. The USD146 billion spent on technology-based design services is equivalent to 1.4% of the total construction market.

Technicalities of data collection mean that the international industry statistics generated by the OECD and the World Trade Organization (WTO) distinguish two overlapping sectors, namely engineering design and architectural services (knowledge-based activities used throughout construction project), and physical construction and related engineering services (design services provided for physical construction, installation and assembly, completion and finishing). The United States government limits design fees to 6% of the estimated construction cost. Fees for services supplied during physical construction should be added to give the total for intellectual services in construction.

The estimate of 1.4% for technology-based design services in construction is clearly significantly less that the more than 6% that may be hoped for in the United States. Design fees in the construction sector are no doubt relatively low, and certainly significantly less the 8.54% averaged over all capital investment. The construction sector, being a major industry, is very competitive. The requirement for sustainable construction should eventually be reflected in higher design fees, but to date there is no evidence that this is taking place.

Knowledge-based intellectual services for construction and building are typically distributed as follows in industrialised countries, example for Sweden:

- Design skills (for instance in Sweden, 2000)
  - industrial engineering: 54%,
  - civil and structural engineering: 20%,
  - energy and hydraulic engineering: 14%,
  - electrical engineering: 12%

The data indicates that industrial engineering represents the most important market for design skills.

Industrial clients are increasingly focusing on core activities by outsourcing design services. This trend has a profound effect on the consulting engineering industry since industrial engineering is a major activity. Design skills are being increasingly concentrated into large, multidisciplinary service providers, and the degree of concentration is much higher in industrial engineering than in other the areas that do not involve large, global manufacturing companies.

Only recently have non-industrial clients started to seek engineering services from large service providers. The thinking and approach adopted in industrial engineering is now being widely emulated in order to upgrade the quality of projects by applying the principles of industrial engineering. For instance, industrial scale assembly line procedures are increasingly being used for buildings to improve quality and working conditions.

However, the volume of engineering services purchased externally by industrial clients remains very much smaller than the volume supplied internally. The inverse is the case for general construction. So the trend to integrated full-service providers is having a relatively minor overall influence on the consulting engineering industry. This will continue to be the case since it is unlikely that a large percentage of clients in the non-industrial sector will become global in nature along the lines of say the automotive industry.

The conclusion is that any potential moves towards industrial construction techniques is unlikely to provide important opportunities for sustainable development. One simply cannot envisage quality, working conditions, building efficiency and the like increasing significantly throughout the world through the introduction of industrial assembly line techniques.

In terms of project type, knowledge-based intellectual services for construction and building are typically distributed as follows in industrialised countries-example for United Kingdom 1994:

- Project type (for instance in United Kingdom; 1994):
  - Transport: 42%,
  - Industrial and commercial buildings and facilities: 31%,
  - Land development: 12%,
  - Drainage, sewerage and waste: 4%.

The data indicates that projects that have historically involved mainly environment-related skills (land development, sewerage) account for some 16% of turnover, as opposed to 73% for buildings and transport. The conclusion is that the consulting engineering industry has been dominated in the recent past by engineering design activities for non-industrial construction and building services that do not involve environment-related skills.

Industry organisation

The dominance of what may be termed non-environmentally focused, non-industrial construction, and the likely continued dominance of non-industrial construction techniques, has had a profound effect on how firms operating in the technology-based design services industry are organised.

Starting in the early-1900s, most countries formed national associations of consulting engineers to represent the business interest of member firms as opposed to the professional interests of staff (these were handled at the individual level by professional associations). Member firms were characterised by the fact that their main business involved the independent supply of engineering-based design services on a fee-for-service basis, and their associations are recognised in their own right by government and multinational agencies.

The International Federation of Consulting Engineers (FIDIC, from its French acronym) was founded in 1913, and it was not until the late-1970s that regional federations for the industry started to be formed. Today's regional federations for the Americas and Europe are complemented by regional groupings of FIDIC national member associations in Asia and Africa. The FIDIC currently has 68 national member associations which meet annually to elect a FIDIC president and executive committee that is charged with implementing the decisions of FIDIC general assembly.

FIDIC policy is to have a single national association in each country, and an association applying for membership must produce official evidence showing that it represents the majority of firms supplying knowledge-based intellectual services. Such measures ensure that the industry's organisation remains coherent, with the potential for full representation.

The capacities of the national associations have varied in accordance with the development of the local industry. Local industries employing a total of 50,000 professionals have emerged in some ten African countries and in 12 to 15 Asian countries over the last 25 years. At the same time, some regions, notably South and Central America, saw their industries reach a peak in activity in the 1960s and 1970s.

With the enlargement of both FIDIC's and the industry's scope there has been a tendency for national associations representing various parts of the industry to group together, either as separate bodies within an umbrella federation (as in France in 1995 and Germany in 1992), or by merger (as in Spain and Sweden in 2001).

FIDIC's 68 member associations today represent firms employing a total professional and technical staff of 700,000 It is estimated that these associations represent 20% to 30% of total employment in the knowledge-based intellectual services industry. FIDIC aims to be fully representative of the industry by encouraging all firms to become members of a national association, and by establishing new national associations in countries where the industry has not yet been organised. There are inevitably some countries which have functioning and viable associations that are not FIDIC members for some specific local reason.

In developing countries with relatively low GDPs, the national association normally represents most of the nation's consulting skill and the local industry normally requires considerable strengthening. The picture is inversed in most developed countries where associations may sometimes represent less than 30% of consulting skills. The exception is eastern Europe where a despite a relatively high GDP, there is a strong demand for measures to strengthen and organise the industry.

Industry profile

It is important to consider the distribution of firm size, especially for developing countries. Small- to medium-sized enterprises (SMEs) as opposed to mid-sized firms are generally defined as firms with less than 50 employees with a turnover of less than USD10million. On this basis, 60% to 70% of consulting engineering industry firms worldwide are SMEs. FIDIC can only survey those firms that are members. Except in rare cases such as Japan, the percentage of SMEs in membership does not depend on the representativity of the national member association (given by the total member firm turnover as a percentage of the total market for technology-based design services). So data cannot be extrapolated to the case of full representativity.

Secondly, available data probably underestimate the importance of small firms because small firms tend not to be members of national associations, at least in developed countries. For instance, in Sweden and Canada in 1999, the average firm size of firms in membership (50 and 64, respectively) was significantly higher than the industry average of 11 for the United States.

All that can be said is that SMEs probably account for 10% to 20% of the industry's turnover worldwide. This estimate is confirmed by some data: in Sweden in 1999, 95% of the national association's SME members accounted for 20% of total revenue for design services in construction; in Canada in 1999, SME members represented about 10% total revenues for technology-based intellectual services.

Whether the distribution is changing globally is difficult to assess. The industry may be in dynamic equilibrium, with market forces – globalisation on the one hand, increased specialisation and new fields on the other – driving both consolidation into large firms and fragmentation into small firms. Data for

developed countries indicates that the largest companies are responsible for a general increase in firm size. For example, in Sweden the number of employees per firm increased from 49 in 1996, to 66 in 2001, with the most of the growth occurring in the largest 300 to 400 companies. On the other hand, small firms are growing rapidly in some countries (in the United States in 2000, 60% to 70% of new jobs in consulting engineering were created by SMEs).

Perhaps the most significant feature of the current market for knowledge-based intellectual services is the increasing importance of the non-traditional market players, especially in developing countries. These new players are mainly are not-for-profit organizations that enjoy sources of funding which are not based solely on fees for service. They include NGOs, universities, semi-privatised public bodies, etc. For the Asian Development Bank loans to NGOs increased from 5% of loans in 1990 to 38% in 1997, when 15% of lending involved NGOs. For the World Bank, between 1973 and 1988, only 6% of Bank-financed projects involved NGOs; in 1994, 50% of all approved projects included some form of NGO involvement.

According to the World Bank, from 1970 to 1985 total development aid disbursed by international NGOs increased ten-fold. In 1992 international NGOs channelled over USD7.6 billion of aid to developing countries; it is estimated that over 15% of total overseas development aid is currently channelled through NGOs.

Sub-sectors

Suppliers of knowledge-based intellectual services have historically organised their business interests in parallel with the qualifications of a dominant professional staff (engineering design firms employ engineers, architectural design firms employ architects, etc. – the list is almost endless). In some parts of the world, notably southern Europe, professional associations tend to represent narrow specialities, so there tend to be many small industry associations.

With the emergence of service conglomerates supplying a full range of technology-based intellectual services, notably in industrial engineering, and of new professional disciplines (biotechnology, computer sciences, etc.), the trend has been for bodies representing various parts of the technology-based intellectual service industry to group and merge. This process has tended to involve a larger number of associations in countries such as France with a more highly fragmented industry organisation.

However, separation into sub-sectors will persist, mainly due to the dominance of particular type of technology or approach in a certain sector. For instance, suppliers of information technology services represent a clearly defined sub-sector based around computer hardware; suppliers of architectural design services have a strong identity based around the cultural and artistic design values brought to the built environment.

The engineering-based consulting services aims to maintain a close interaction with related sectors. This is motivated by shared clients and goals in many strategic areas of business practice. For instance, FIDIC interacts closely with the architecture and contracting industries in matters relating to procurement and the selection of professionals, notably in relation to major public client groups such as the international development banks.

Given that the construction sector will continue to involve architects, engineers, project managers and contractors, sustainable development is seen by the consulting engineering industry as a strategic area requiring the creation of multi-sectorial partnerships.

Annexe 2: The consulting engineering industry's Agenda 21

Owing to the knowledge-based intellectual services industry's historically major involvement in the infrastructure sector, FIDIC believed an industry-level Agenda 21 process was of particular importance for ensuring that the industry moved forward coherently and effectively in tackling the challenges of sustainable development.

Agendas falling within the global Rio Agenda 21 framework take on many of the characteristics of agendas at higher and lower levels (global, regional and national). For an industry sector, the global Agenda 21 constitutes a framework defining the links between the concept of sustainable development as applied at other levels and the activities of the sector. Thus, each sector is expected to develop a sectorial agenda that will:

- act as a framework that adds value to other agendas (national, regional, sub-sectoral);
- structure co-ordination of the sector's activities with those of specialised partners;
- lead to the development of a source document that defines detailed measures.

Given its appreciation of the role it played in the environmental aspects of the various forms of infrastructure works that make up the built environment, it was natural for the consulting engineering industry to respond vigorously to the challenge of Rio and Agenda 21.

The industry's Agenda 21 process started with a deep appreciation of the situation in the publication of a policy paper *Consulting Engineers and the Environment* (1990), and in preparing for the Federation's 1990 annual conference *Sustainable Development - A Challenge for the Engineering Profession.* By 1994, just two years after Rio, the federation's environment committee issued a *Guide for Action: Consulting Engineers and the Environment* (1994) to alert national member sssociations of the importance on Agenda 21. It was clear that 'the application of the Rio principles to the decision making process in engineering projects worldwide, and particularly in developing countries, will impact substantially on the practice of consulting engineering'.

Detailed analysis

The emergence of sustainable development and information technology as major market forces prompted the industry in the mid-1990s to review its aims and objectives. The overwhelming importance to the industry of the built environment gave way to the vision, articulated in the 1999 strategy paper *Engineering Our Future*, that the consulting engineering industry was effectively composed of firms 'supplying technology-based intellectual services for the built and natural environment'.

This is not to say that the industry as a whole had not been aware of its obligations to the natural environment. One is simply stressing that the industry has historically focused on the construction of physical infrastructure where each unit, say a building, factory, or road, has a limited ecological footprint (a collection of units in say a housing estate naturally has a much larger footprint). However, it is fair to say that the historical context made the industry's Agenda 21 to orient the industry towards sustainable development of central importance.

With 65% of world's demand for knowledge-based intellectual service in buildings and construction being supplied by the consulting engineering industry, the industry remains largely responsible for designing and planning the construction, operation and maintenance of the infrastructure needed to meet the

world's ever-increasing demands for food, water, shelter, sanitation, energy, health services and economic security. So it tackles on a daily basis the problem of how to improve people's lives while conserving natural resources in a world that is growing in population. Sustainable development is therefore a central preoccupation.

As articulated in the document *Engineering Our Future* (1999), the consulting engineering industry's overall strategy in recognising that 'increasingly, sustainability will become the most important criterion for project acceptability' aims to: 'study and report on the adjustments necessary ... that will ... position the consulting engineering industry to be a major contributor to a sustainable future'. The document's recommendations took the form of a vision statement for FIDIC that stresses the industry's role as independent, private-sector supplies of services: 'The FIDIC represents internationally the suppliers of technology-based intellectual services for the built and natural environment..'.

That the industry places its obligations to society and the environment at the core of its activities is demonstrated by the fact that FIDIC has as its mission: 'To promote the business interests of members in relation to the provision of technology-based intellectual services for the built and natural environment, and while so doing, accept and uphold our responsibilities to society and the environment'.

This mission statement was developed into five specific objectives for the FIDIC that addressed the industry's key concerns, and in so doing demonstrated once again the industry's commitment to meeting its obligations to society and the environment. The objectives for FIDIC were to:

- represent worldwide the majority of firms providing technology-based intellectual services for the built and natural environment,
- to assist members with issues relating to business practice,
- define and actively promote conformance to a code of ethics,
- enhance the image of consulting engineers as leaders and wealth creators in society,
- promote our commitment to environmental sustainability.

Representativeness
Full representativeness ensures leadership and broad support within the industry and in society, and maintains the respect and support of those the industry hopes to influence. It thereby allows the industry to defend its opinions, positions and attitudes, thus reinforcing its commitment to ethics and a sustainable future.

Business practice
Focusing on business practice protects society and allows the industry to meet its commitments. These commitments have increased because a more comprehensive and multi-disciplinary role for consulting engineers has developed in response to clients and society seeking more complex, integrated solutions.

Code of ethics
To qualify for membership in the federation, a national association must demonstrate that its statutes, by-laws and regulations ensure that its members comply with FIDIC *Statutes, Bye-Laws and Code of Ethics*. Stressing the importance of the *Code of Ethics* derives from its special significance for the industry (many member firms are required to provide independent and impartial advice).

Image as leaders and wealth creators
Consulting engineers add value to projects by cost-effective engineering design and management – they create wealth and

improve the quality of life as primary providers of infrastructure; they fulfil these roles in an environmentally sensitive manner. The industry therefore proactively seeks opportunities to raise its members' profile so as to be identified as the value-added projects.

Sustainability
Sustainability will increasingly become the most important criterion for project acceptability, and the industry must identify ways in which sensitivity to environmental and social issues can be incorporated into projects, leading to improved overall solutions.

Initiatives

The overall strategy for the industry as articulated in the report *Engineering Our Future* (1997) led to a specific strategy paper *Sustainable Development in the Consulting Engineering Industry* (1999) and detailed *Business Guidelines for Sustainable Development in Consultancy Services* (2001) – or simply the 'Guidelines'. Implementation of the Agenda 21 process developed in these documents involved several initiatives, including dissemination and training activities.

Evaluation by performance

a) Methodology
Performance indicators for sustainable development are starting to be generated in some areas in which the consulting engineering industry supplies services (such as water treatment) and in some geographic regions. However, separating out the industry's contribution is extremely difficult. Moreover, only a few countries compile performance indicators for their national industry sector. Of these, very few include indicators relating to business practice in sustainable development.

The industry's guidelines for sustainable development recommend that firms introduce appropriate voluntary instruments for sustainablity (code of conduct, etc.) and undertake voluntary reporting covering several aspects of business practice (management policies and systems; stakeholder relations and partnerships; technology co-operation and the global environment; input/output inventory of projects). The Guidelines also list items for each aspect (top management statement, sustainablilty policy, etc.).

Progress in the uptake of voluntary instruments appears to be very slow (for example preliminary data show that only 4% of national association member firms based mainly in Europe, Asia and North America are subject to a code of conduct). The percentage of the industry turnover carried out by firms that publish a (voluntary) annual report which covers environmental performance appears to approach 10%.

b) Conclusion
It is concluded that there are today no reliable data available for judging whether the industry has improved its sustainable development performance. FIDIC plans a survey of the introduction of the voluntary instruments and sustainability reports in order to assess the industry's response to Agenda 21, and a strategic goal for the industry is to introduce performance indicators for sustainable development.

Evaluation by process outcome

Local and national expectations can be equated to the criteria being used to assess local and national Agenda 21 processes. Put simply, if a process needs to be assessed with respect to a certain criterion then it is likely that this criterion is important for local or national government, and by implication for the industry.

FIDIC has therefore evaluated the outcome of the consulting engineering industry's Agenda 21 process by referencing it to national and local agendas within the scope of management practice for sustainable development.

This evaluation in terms of assessment criteria for local and national agenda required a detailed analysis of these criteria, and the relation to the criteria for an industry agenda. A set of criteria in seven categories was developed to formulate a survey questionnaire for completion by member associations.

The criteria are considered valid because the industry provides services across a broad range of sectors at national and local levels. Moreover, the public sector at the local and national levels is a major client representing approximately 50% of turnover for firms supplying knowledge-based intellectual services, and a significant amount of the infrastructure and management work for the built and natural environment is funded by government.

a) National criteria

The global Agenda 21 has been variously described as:

- a global intermediary between general agendas (such as the Brundtland report) and the required national and local agendas for the built and natural environment;
- a blueprint for how to make development socially, economically and environmentally sustainable;
- a work plan to identify what needs to be done by all of us to achieve sustainable development;
- a guide for individuals, businesses and governments in making choices for less environmentally destructive developments, and ultimately a challenge to translate understanding into action in developing sustainable lifestyles;
- a guide for business and government policies, and for personal choices;
- more indicative than operational;

Several efforts have been made to translate global Agenda 21 intentions and perspectives into concrete policies and actions. It generally agreed that Agenda 21 should be integrated into society at all levels, from government to the individual citizen, each having different roles to play, and hence different tasks, in the Agenda 21 process.

For national agendas, the expectations were clear: the global Agenda 21 and the further implementation programme called upon governments to adopt national strategies for sustainable development that aim to build upon and harmonise their various sectoral economic, social and environmental policies and plans existing to ensure socially responsible economic development while protecting the resource base. They should also '...reflect the contributions and responsibilities of all interested parties, with assistance provided, as appropriate, through international co-operation'.

Each government will review at the WSSD 20002 the strategy being implemented and its effectiveness. There are no agreed international definitions or standards regarding what constitutes a national sustainable development strategy, except in the general terms as set out in Agenda 21 and the Programme for the Further Implementation.

However, the understanding of what constitutes a national strategy for sustainable development has developed since Rio. National strategies for sustainable development should be seen as processes not new plans: they should seek to ensure that strategic planning takes account of sustainable development issues. A national strategy for sustainable development is currently understood to be a comprehensive process of planning and policy, which integrates the environmental, economic and social objectives of society. It is also recognised that the priority

given to the three components of sustainable development in individual countries will vary, reflecting the diversity of social, economic and environmental conditions and differences in national sustainable development objectives.

A national strategy for sustainable development is characterised by adherence to certain basic principles of strategic planning sustainable development, and by a co-ordinated set of measures that ensure their implementation. Any national process which applies these principles, and which puts in place a set of mechanisms and procedures for their implementation, can therefore be considered to be a national strategy for sustainable development.

OECD has formulated a set of 12 key principles of strategic planning for sustainable development. These have been shown to correlate with five general principles of effective strategies for sustainable development. Rio and other principles for sustainable development have then been combined with the general principles of effective process management set out in the international standard ISO 9001 for quality management to develop four key criteria for each of these five principles.

These four key criteria cover the separate aspects and dimensions of the principle to which they relate. The criteria can then be assessed to provide a qualitative indicator of the progress made in implementing a national process of strategic planning for sustainable development. In forming judgments about a criterion, the assessment should establish if action being taken is relevant, appropriate, and effective.

The five principles and their criteria, reformulated in terms of industry sector requirements, are listed on page 58. The criteria address the outcome of the industry's 21 process as regards the focus of this industry sector review, namely the integrated management aspects of business practice.

b) Local criteria

Since many of the problems and solutions being addressed by Agenda 21 have their roots in local activities, the participation and co-operation of local authorities is a determining factor in fulfilling objectives. Some two-thirds of the statements made in Agenda 21 call for action to be taken by local government. Indeed, chapter 28 obliges all local authorities to complete, within a few years after Rio, a Local Agenda 21 – a process to achieve the goals of Agenda 21 at the local level, that includes a strategy, a plan of action and a range of follow-up activities. Local Agendas 21 have proliferated and more than 3,000 are underway worldwide.

Unlike the situation for national agendas, there are no agreed international definitions of a local Agenda. But several attempts have been made to define a local Agenda 21 process, notably the report *From the Earth Summit to Local Agenda 21*, the International Council of Local Environmental Initiatives (ICLEI) *Participatory Sustainable Development Process Criteria* and the *Aalborg Charter*, which has now been ratified by hundreds of cities throughout Europe, and has become the principal European vehicle for implementing local Agenda 21.

In the absence of a definite and thorough analysis of assessment criteria for local Agenda 21 processes, FIDIC has assembled a reasonably comprehensive, but far from exhaustive, list of criteria from these and other sources. Wherever necessary, the criteria have been reformulated in terms of an industry rather than a local region. They have then been categorised into the five general principles proposed for national criteria.

Missing from the list are the specialised criteria of the *Aarlborg Charter* that attempt to identify the scope of a local Agenda 21.

These are:

- operation within a sustainable area budget where a town or region has an inherent budget based on its per capita claim to the earth's bounty and the earth's capacity to absorb environmental damage,
- each town or region seeks to transform its negative externalities into positive inputs or resources for other processes within its boundaries.

The assessment criteria for national Agenda 21 strategic plans encompass the criteria that have been proposed in a more haphazard way by various sources for local Agenda 21 processes. So the methodology of basing an assessment on strategic planning principles is sound.

c) Industry criteria

It is necessary to ensure that the assessment covers all of the major relevant business processes. The good-practice guide *A strategic approach to energy and environmental management* has developed a model for linking engagement in sustainability to business management processes by considering criteria in six areas (policy, allocation of responsibilities, communication, auditing, operational procedures, forward planning).

Comparison with the five aspects of the Agenda 21 analysis indicates that operational procedures and forward planning are not included. Criteria for these two aspects taken from the guide have therefore been included to give assessment criteria in seven areas:

- sustainability,
- communications,
- allocation of responsibilities,
- policy,
- auditing,
- operational procedures,
- forward planning,

These seven areas form the basis of the questionnaire that was used to assess the industry's response to Agenda 21. It is noted that the present review focuses on management-related business practices. So the questionnaire only addresses these aspects.

The questionnaire, sent to FIDIC member associations and to persons who were familiar with FIDIC's Agenda 21 process, sought a qualitative reply to a question corresponding to each of the several criteria used to assess the seven aspects of business management in sustainable development.

It is appreciated that this formal assessment implies that the industry's Agenda process is formulated as a strategic plan. FIDIC has no such plan for sustainable development. However, it does have an overall strategy for the industry as articulated in *Engineering Our Future*. Secondly, strategic planning has moved beyond the formulation of a fixed plan to an adaptive process of managing change according to ISO quality management principles. FIDIC's response to the challenge of sustainable development involving the publication of a series of reports over a decade can be seen as an adaptive process of the type found in modern strategic planning.

d) Conclusions

The survey to assess the output of the consulting engineering industry's Agenda 21 activity in the area of management-related business practice ranked the output for the seven groups of criteria as follows:

- participation and consensus (weakest);
- targeting, resourcing and monitoring;
- forward planning;
- integration of economy, society and environment;
- operational procedures;
- comprehensive and coherent policy process;
- ownership and commitment consensus (strongest).

More specifically, the industry's Agenda 21 outcome was weakest in providing guidance on how to increase stakeholder and public participation in the planning, implementation, monitoring and review of projects. Lacking were adequate measures to ensure transparency and accountability, to communicate, and to build public awareness and long-term strategic partnerships.

Next came targeting, resourcing and monitoring. Few targets had been defined for key strategic economic, social and environmental objectives, with indicators through which they can be monitored. Nor were there systems for monitoring the implementation of strategies and the achievement of their defined objectives, for recording the results, and for reviewing their effectiveness as strategies for sustainable development.

At the same time, the industry had demonstrated the capacity to develop advanced management tools that integrated the three dimensions of sustainable development. Part of the industry's strategy, articulated in the strategy paper *Sustainable Development in the Consulting Engineering Industry,* was therefore to ensure the development of integrated project delivery and business management systems.

National agenda: Criteria for the five principles of effective national Agenda 21

Criteria for local Agenda 21 that have been defined by various sources are given in italics

1. Sustainability: Integration of economy, society and environment

Integration: plan based on a comprehensive and integrated analysis of economic, social and environmental issues, which clarifies links, resolves conflicts, and negotiates trade-offs.
Addresses economic, social and ecological needs together.

Social and poverty issues: plan integrates poverty eradication, gender issues and the short- and long-term needs of disadvantaged and marginalised groups into economic policy.
Addresses priority concerns.

Environmental and resource issues: plan integrates into economic considerations the maintenance of sustainable levels of resource use and the control of pollution to maintain a healthy environment.
A conscious attempt to relate environmental effects to underlying economic and political pressures.

International commitments: measures in place to help ensure compliance with international agreements on environmental and social issues.
An active effort to relate issues, decisions and dispositions to global impacts, both environmental and with respect to global solidarity and justice.

2. Communication: Participation and consensus

Involvement of significant stakeholders: the processes of planning, implementation, monitoring and review include the participation of stakeholders.
Active stakeholder and public participation.

Transparency and accountability: the management of the strategic planning processes is transparent, with accountability for decisions made.
Communication and public awareness: measures are taken to increase public awareness of sustainable development, to communicate relevant information, and to encourage the development of stakeholder involvement in the strategic planning process.

Long-term vision: the strategic planning process is based on a long-term vision for the development, which is consistent with the capabilities, allows for short- and medium-term necessities, and has wide political and stakeholder support.
Long-term, strategic action plan prepared and implemented

3. Allocation of responsibilities: Ownership and commitment

High-level commitment: the process of formulating and implementing the strategy is led by the main governing body, with evidence of high-level commitment from firms and national associations.
Commitment to define and work with industry problems within a broad ecological and multi-sectoral framework, over a greatly extended time-frame.

Broad-based political support: the strategic planning process has broad-based industry support.
Planning through a stakeholder group which serves as the coordination and policy body
Citizens and major stakeholder groups brought together into the planning and implementation process.

Responsibilities for implementation: responsibility for implementing strategies is clearly assigned to bodies with the appropriate authority.
Participatory assessment and target-setting through negotiations with all possible representative movements, interest groups, and partner organisations.
Empowering and liberating process that maximises the principle of locally bounded, informed choice within globally recognised limits.

4. Policy: Comprehensive and coherent policy process

Build on existing processes: strategy for sustainable development is based on existing strategic planning processes, with co-ordination between them, and mechanisms to identify and resolve potential conflicts.
Consultation with partners to create a shared vision and to identify proposals and priorities for action.

Analysis and information: strategy is based on a comprehensive analysis of the present situation and of forecasted trends and risks, using reliable information on changing environmental, social and economic conditions.
Balance-seeking, where any proposition may be put on the table, with its implications being tested through modelling, and its negative imbalances being brought towards equilibrium through negotiation and further modelling.

Realistic goals: strategy is based on a realistic analysis of national resources and capacities in the economic, social and environmental spheres, taking account of external pressures in the three spheres.

Decentralisation: the strategic planning processes embrace both industry sector and sub-sectoral levels, with two-way iteration between these levels.
Focused policy for achieving cross-sectoral integration of concerns, values and goals in planning, decision-making and policy implementation.

5. Auditing: Targeting, resourcing and monitoring

Budgetary provision: the strategy is integrated into the budget process, such that plans have the financial resources to achieve their objectives.

Capacity for implementation: the sustainable development strategy includes realistic mechanisms to develop the capacity required to implement it.

Targets and indicators: targets defined for key strategic economic, social and environmental objectives, with indicators through which they can be monitored.

Monitoring and feedback: systems are in place for monitoring the implementation of strategies and the achievement of their defined objectives, for recording the results, and for reviewing their effectiveness as strategies for sustainable development, with effective mechanisms for feedback and revision within the planning process.

Monitoring and reporting procedures for the process and its stakeholders

Consulting industry questionnaire

Does the outcome of the consulting engineering industry's Agenda 21 process in the area of management-related business practice:

Sustainability:

- reflect that that outcome is based on a comprehensive and integrated analysis of economic, social and environmental issues, which clarifies links, resolves conflicts, and negotiates trade-offs between the three dimensions?
- integrate into business practice poverty eradication, gender issues and the short- and long-term needs of disadvantaged and marginalised groups?
- integrate into business practice the maintenance of sustainable levels of resource use and the control of pollution to maintain a healthy environment?
- integrate into business practice compliance with international agreements on environmental and social issues?

Communication:

- integrate into business practice the participation of stakeholders in the planning, implementation, monitoring and review of business practice?
- integrate into business practice management procedures for strategic planning processes to develop business practice that are transparent, with accountability for decisions made?
- integrate into business practice measures to increase public awareness of sustainable development, to communicate relevant information, and to encourage the development of stakeholder involvement in the industry's strategic planning process?
- integrate into business practice the development of practices based on a long-term vision for sustainability, which are consistent with the industry's capabilities, allow for short- and medium-term necessities, and have wide government and stakeholder support?

Allocation of responsibilities:

- integrate into business practice measures to ensure that the process of formulating and implementing new practices is led by the industry's main governing bodies, with evidence of high-level commitment from firms and national associations?
- have broad-based industry support?
- ensure that responsibility for implementation new business practices is clearly assigned to bodies with the appropriate authority?
- ensure that the development of business practice is based on existing strategic planning processes, with co-ordination between them, and mechanisms to identify and resolve potential conflicts?

Policy:

- ensure a comprehensive analysis of the present situation and of forecast trends and risks in business practice, using reliable information on changing environmental, social and economic conditions?
- have a basis in a realistic analysis of industry resources in the economic, social and environmental dimensions of business practice, taking account of external pressures on the three dimensions?
- embrace both other sectors and sub-sectoral levels within the industry, with two-way iteration between these levels?
- include integration into the FIDIC budget process, such that plans to develop business practice have the financial resources to achieve their objectives?
- include mechanisms to enhance the capacity required to develop business practice?

Auditing:

- Include targets for key strategic economic, social and environmental objectives in developing business practice, with indicators through which they can be monitored?
- Include systems for monitoring the implementation of new business practice, the achievement of defined objectives in the area, and the recording of results?
- Include effective mechanisms for feedback, and for revising the process used to develop business practice?

Operational procedures:

- Measures to integrate into business practice the use of planning tools and key performance indicators?

Forward planning:

- Have an action plan for the regular updating of recommended business practices?

Annexe 3: Enhancing environmental impact assessment

a) Environmental management
The *UNEP-ICC-FIDIC Environmental Management System (EMS) Resource Kit* addresses virtually every business and management activity within a firm, including those relating to obtaining planning permission for new construction projects. Largely inspired by the ISO 14001 standard for environmental management and by the *European Environmental Management and Audit Scheme,* use of the kit helps improve the quality of environmental impact assessment.

Published in 1993, the kit forms the basis of an ongoing series of EMS train-the-trainer courses. An accompanying guide and a handbook were published in 2000. Questionnaires distributed to course participants were used to review the effectiveness of the kit, and the information received helped in updating the 1st Edition in 2000.

b) Urban environmental management
Environmental management systems offer the most comprehensive solution to addressing the environmental impacts of public-sector operations. Local authorities and government departments are starting to implement EMSs certified to the ISO 14001 international standard (a total of nine in the United Kingdom, in 2000, for example). Some local authorities and city administrations are also certifying public facilities.

The *UNEP-ICLEI-FIDIC Urban EMS Training Resource Kit* published in 2001 aims to provide a systematic approach to managing urban environmental issues. For those who intend to be certified under the ISO standard, even if at a later stage of EMS development, the kit provides information on how to proceed. By guiding city managers through the implementation of an EMS, the kit also provides tools to integrate sustainable development planning and local Agenda 21 strategies into urban management practice.

(c) Guidelines for sustainable development
FIDIC *Guidelines for Sustainable Development in Consulting Services* illustrate in detail the importance of the structured approaches incorporated into sustainablity impact assessment and other integrated management concepts for determining potential environmental and social impacts. They argue, furthermore, that analyses of this type should be developed, and staff trained, to the point that integrated management tools can be offered as a standard service to clients. FIDIC is therefore heavily engaged in developing these types of tools for the consulting engineering industry.

d) Code of ethics
FIDIC's *Code of Ethics* requires that staff belonging to member firms 'provide all services with integrity and faithfulness'. FIDIC further requires that firms belonging to national member associations comply with the code. Regular verification of associations' statutes is therefore undertaken, and the penalty for non-compliance is exclusion from membership.

e) Client-consultant agreement
The use of standard agreement helps promote good business practice by highlighting poor performance and allowing the development of a considerable body of information on its application. FIDIC therefore publishes and promotes a standard *Client-Consultant Model Services Agreement.*

Project feasibility assessment is among the agreement's many areas of application, of which environmental impact assessment forms a part. The agreement states: 'The consultant shall exercise reasonable skill, care and diligence in performance of his obligations...'. Attempts to clarify this obligation by reference

to other conceptual frameworks such as best practice, recognition by reputable bodies, etc. have only introduced additional terms that are subject to further interpretation. FIDIC therefore advocates that firms should leave courts of arbitration to decide if there has been a breach. The exception is when a consultant is called upon to guarantee fitness of purpose where, as is the case for contracts, specific criteria can be included in the agreement.

As part of its programme to develop appropriate management tools, FIDIC ensures that its *Client-Consultant Model Services Agreement* continues to incorporate the latest developments. The Agreement was updated in 1999, and a revised guide was published in 2001. The update mainly concerned provisions for the settlement of disputes. The trend in recent years for traditional third-party types of conditions of contract been to replace the third-party, so-called 'engineer's', decision with a dispute adjudication board as the first step in resolving disputes in order to reduce the cost of disputes.

Likewise, in the *Client-Consultant Model Services Agreement,* immediate arbitration in the case of a dispute has been replaced by referral to mediation in order to make the use of a cost-efficient standard agreement more attractive. If arbitration fails, the dispute is referred to a generally lengthy process of arbitration.

f) Quality management

Clients seeking knowledge-based intellectual services increasingly require assurance that suppliers operate a formal quality management system. FIDIC supports its policy that '...member firms must have a commitment to excellence through the implementation of a quality management system...' by publishing a best practice *Guide to Quality Management in the Consulting Industry,* interpretative *Guidelines for the Interpretation and Application of the ISO 9001:2001 Standard for the Consulting Engineering Industry* and a *Quality Management Training Kit.* The documents were updated in 2001 to reflect the latest developments in quality management practice, notably the focus on processes and continual improvement rather than documentation.

g) Quality-based selection

The World Bank argues that the choice of the appropriate method of selection is related to the nature, size, complexity, likely impact of the assignment, technical and financial considerations, and on the particular circumstances of the borrower. It is therefore necessary to carefully define the assignment, in particular the objective and the scope of the services, before deciding on the selection method. The various methods for the selection of consultants under the bank's guidelines are, in order of importance:

- quality-cost based selection, based on the quality of the proposals and the cost of the services to be provided. It is the method most frequently used to select consultants under bank funded assignments. Once a price is introduced the selection process becomes biased in favour of lowest fee rather than quality;
- quality-based or qualification-based selection – when more than one supplier qualifies to execute the assignment.
- selection under a fixed budget; least cost selection;
- single source selection, commercial practices; single source selection: when the downstream assignment is a natural continuation of previous work.

Although the cost of engineering services for the average facility typically represents less than 1% of the total lifetime cost of construction, operation and maintenance, the design can have a major impact on all other costs. Investing in quality design services at the outset of the project often results in long-term savings. Indeed, the quality of the services provided by a designer is the single most important factor in determining the overall

construction and life cycle costs of infrastructure.

Few clients are likely to select their consultant on price alone as it is obvious that satisfactory professional services depend on qualifications and competence. The dilemma facing the client is how to balance ability against price, and how to quantify what is traded off in technical competence, managerial ability and trust against a perceived cheaper service. Although it is possible to write a performance specification for the physical aspects of the project itself, it is difficult to write suitable specifications for how a consultant should perform or to adequately describe the required scope of engineering services.

Quality-based selection (QBS) is a procurement process that allows a client to choose the best professional for the job. Working together, the client and the consultant can define the project objectives, and the scope of the services is then agreed and an appropriate fee negotiated. QBS provides clients with a selection process that is straightforward and easy to implement, is objective and fair, can be well documented, and is open to public scrutiny.

Since 1972, all United States federal government agencies have been required by law to use the QBS procedure for selecting design professionals. The private sector has followed the lead, and nearly 40 states now mandate the use of a similar procedure.

There is unanimity in all the international development banks, and all consulting associations, that assignments should be assigned on a QBS basis when a project:

- has large downstream impact;
- would have disastrous impact if it failed;
- involves scope of work and terms of reference that are difficult to define because of the novelty or complexity of the assignment, or the need to select among innovative solutions, or due to particular physical, social, or political conditions;
- cost proposals are not easily comparable because the assignment can be carried out in different ways.

The QBS procedure is generally recognised as involving drafting the terms of reference for the selection; drawing up a list of suppliers which appear to be qualified, followed by a short-list; invitation for proposals; assessment of proposals; supplier selection and fee negotiations (invite the top-ranked firm to negotiate a fee for a mutually agreed scope of services). If agreement cannot be reached, negotiations are started with the second ranked firm, and so on down the list. The FIDIC *Client/Consultant Model Services Agreement* is recommended as an instrument to reach agreement between the client and the supplier.

To improve transparency, FIDIC recommends that the scope of work for each assignment be clearly defined, that the quality standards for all projects be clearly defined and rigorously enforced, and that introducing cost into QBS for quality-cost based selection (QCBS) be used with great caution.

Proposals on how to introduce cost into QBS have been accepted in principle by the international development banks. They are based on the principle that percentage ranking accorded to cost criteria should depend on the long-term social and environmental impact of the project and on its complexity, with a limit of approximately 10% otherwise cost effectively becomes the sole criterion.

Consultants in developing countries benefit from low costs. However, the industry as a whole recognises the importance of maintaining overall quality at the highest possible global level. FIDIC national member asssociations and regional groupings for Africa and Asia, and allied regional federations for

Europe and the Americas, have therefore jointly endorsed the industry's proposals for introducing cost into QBS.

Although the World Bank currently selects the majority of its consultants for bank-fund assignments using QCBS, as the requirement for more sustainable projects increases, it is envisaged that QBS may become the primary method for selecting consultants. The industry works towards this objective by ensuring that that the application of QBS in business practice is fully supported and widely promoted in contacts with clients, funding agencies and development banks.

h) Review of procurement guidelines

International and regional lending agencies and development banks, and national development agencies are major clients for firms supplying technology-based intellectual services. FIDIC, as the body representing the industry worldwide, is charged with coordinating policy discussions with these banks and agencies. The main focus for the coordination of practices between consultants and the various agencies is the biennial BIMALACI meeting hosted by one of the lending agencies, for which FIDIC co-ordinates the invitation of representatives of other sectors.

Through FIDIC, the industry interacts closely with the lending agencies in the areas of consultant selection, procurement, capacity building and business management (risk, quality, integrity), to the extent FIDIC contracts are integral parts of most of World Bank standard bidding documents. In the other direction, firms register with the World Bank and its sister regional organisations, and not with FIDIC.

Technical quality and independence of advice have remained the key considerations in hiring consultants, but as indicated above, cost has become an important factor in the selection process for some agencies. FIDIC has recently commented on several development bank consultant selection guidelines in *Building the Capacity of the Consulting Engineering Industry.* Proposals seek to encourage meaningful participation by local firms from developing countries in bank-funded project. This is because a viable, private sector, local consulting sector it is essential for implementing strategies for all forms of development, including sustainable development.

Annexe 4: Social aspects of business practice

New techniques for incorporating social aspects into business and project management are described under project screening, social analysis, and partnership development.

Project screening

- categorising and screening are the key activities for integrating sustainable development into project design and planning. Using such techniques, firms can identify the important sustainable development aspects of the project as a basis for specifying services;
- it is essential that all projects go through a sustainability screening at an early stage in the project. The initiative can primarily be taken by the client, but the supplier should take a proactive position by advising the client, or by proposing modifications to the project;
- the aim should be to identify the relevant environmental, social, and economic risks of the project as early as possible.

An example of a sustainability checklist for the initial, integrated screening of projects is given in the FIDIC *Guidelines fir Sustainable Development in the Consulting Industry* (2001). It builds upon: *EIA in Development Co-operation* (Ministry of Foreign Affairs of the Netherlands) *Checklist of Environmental Characteristics* (Department of Environment Affairs, South Africa), *Handbook for Incorporation of Social Dimensions in Projects* (Asian Development Bank, 1994), *European Partners for the Environment* (EPE, 1996), *FIDIC Strategy Paper on Sustainable Development in the Consulting Engineering Industry* (FIDIC, 2000), *Proceedings OECD/DAC Workshop* (December 1996), *Project Financing - Sustainable Solutions* (EFCA-FIDIC, 2001).

Social analysis

- if a project permits, firms should take concrete steps to reorient their work in a direction that gives greater coverage than at present to social factors which enhance sustainability;
- participation activities should include enhancing a participatory approach by involving key stakeholders, and by promoting public participation;
- it may be necessary to include in the project items that promote the development of appropriate institutional frameworks for stakeholder and public participation;
- clients should be advised to make the project cycle more flexible through the use of socio-cultural impact assessment and similar participatory approaches.

Recommended approaches involve stakeholder analysis using a stakeholder table drawn up in collaboration with stakeholders, and the development of a communication strategy framework to ensure stakeholder participation.

a) Stakeholder analysis

Stakeholder analysis aims to ensure that key stakeholders (stakeholders which are highly critical for the success of a project)are involved and participate in all project phases, to assess the positive and negative effects of the project on the major stakeholders, and to determine the communication strategy towards the stakeholders. The types of stakeholders are:

- primary stakeholders directly affected by the project (beneficiaries, their representatives and other persons or groups directly affected);
- secondary stakeholders indirectly affected by the project (national, regional and local authorities, organisations, governmental and non governmental, institutions, industry, enterprises, education institutions and the general public);

- project stakeholders directly involved in the project outcomes but not directly affected by it (actors in project identification, formulation, appraisal, implementation, monitoring and evaluation).

A stakeholder table is drawn up at the initial project phase to list:

- all the project stakeholders and their type,
- degree of involvement of each stakeholder in the project,
- each stakeholders' attitude towards project and implementing agencies,
- positive and negative effects of the project on each stakeholder as determined by socio-cultural impact assessment,
- the importance and influence of each stakeholder for project.

The table is extended and refined at the project preparation phase with additional information on:

- the project effects, both positive and negative, on the stakeholders. Socio-cultural impact assessment may be used to assess the effects on the primary stakeholders, and a workshop organised to determine effects on the key stakeholders;
- the required level of participation of all stakeholders;
- the primary stakeholders' willingness to participate;
- a communication strategy towards each stakeholder.

Socio-cultural impact assessment is conducted through a survey to determine the impact of the project on the primary stakeholders. Both the positive and negative effects of the final impact of the project should be examined. Criteria include: health, environment, service level, financial costs, cultural values, customary rights, land ownership, and community organisation

b) Communication strategy framework
The communication strategy should aim to:

- ensure optimal communication between the project and the stakeholders, and vice versa;
- assess the communication needs of the stakeholders;
- determine communication objectives (messages);
- assess the methods of communication,
- monitor and evaluate communication material;
- enhance creation of awareness, participation, attitude and/or behaviour.

Partnership development

The need for new technology, a greater cross-fertilisation of ideas to address complex problems and a stronger advocacy have encouraged firms to reach out to other international players in the market that are not traditional partners. This opportunity has become increasingly more viable and constructive because shared values based on sustainable development are now readily understood.

The strategic development of partnerships is recommended because it represents a systematic approach to manage relationship building based on:

- key components; strength of purpose, committed leaders, an assertive process based on a formal structure for joint ownership, decision-making, roles, and working procedures;
- criteria for success; convergence on a defined project and way of working, success in converting discussion into concrete action, the ability to maintain consistency of purpose;
- management principles; partnership design and relationship learning.

UNEP contribution to the World Summit on Sustainable Development

The mission of the United Nations Environment Programme (UNEP) is to provide leadership and encourage partnerships in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations. **The UNEP Division of Technology, Industry and Economics (DTIE)** contributes to the UNEP mission by encouraging decision-makers in government, business, and industry develop and adopt policies, strategies and practices that are cleaner and safer, make efficient use of natural resources, ensure adequate management of chemicals, incorporate environmental costs, and reduce pollution and risks for humans and the environment.

This report is part of a series facilitated by UNEP DTIE as a contribution to the World Summit on Sustainable Development. UNEP DTIE provided a report outline based on Agenda 21 to interested industrial sectors and co-ordinated a consultation process with relevant stakeholders. In turn, participating industry sectors committed themselves to producing an honest account of performance against sustainability goals.

The full set of reports is available from UNEP DTIE's web site (http://www.uneptie.org/wssd/), which gives further details on the process and the organisations that made it possible. The following is a list of related outputs from this process, all of which are available from UNEP both in electronic version and hardcopy:

- industry sectoral reports, including
  - accounting
  - advertising
  - aluminium
  - automotive
  - aviation
  - chemicals
  - coal
  - construction
  - consulting engineering
  - electricity
  - fertilizer
  - finance and insurance
  - food and drink
  - information and communications technology
  - iron and steel
  - oil and gas
  - railways
  - refrigeration
  - road transport
  - tourism
  - waste management
  - water management

- a compilation of executive summaries of the industry sectoral reports above;
- an overview report by UNEP DTIE;
- a CD-ROM including all of the above documents.

UNEP DTIE is also contributing the following additional products:
- a joint WBCSD/WRI/UNEP publication entitled *Tomorrow's Markets: Global Trends and Their Implications for Business*, presenting the imperative for sustainable business practices;
- a joint WB/UNEP report on innovative finance for sustainability, which highlights new and effective financial mechanisms to address pressing environmental, social and developmental issues;
- two extraordinary issues of UNEP DTIE's quarterly *Industry and Environment* review, addressing key regional industry issues and the broader sustainable development agenda.

More generally, UNEP will be contributing to the World Summit on Sustainable Development with various other products, including:
- the Global Environmental Outlook 3 (GEO 3), UNEP's third state of the environment assessment report;
- a special issue of UNEP's *Our Planet* magazine for World Environment Day, with a focus on the International Year of Mountains;
- the UNEP photobook *Focus on Your World*, with the best images from the Third International Photographic Competition on the Environment.

Sustainability profile of the Consulting Engineering industry

• Achievements

- The industry responsible for planning the infrastructure needed to meet the ever-increasing demand for services has successfully mainstreamed sustainability into business practice.
- Efforts to date have focused on management tools that integrate the social and environmental dimensions into project delivery.
- The industry has also recognised the importance of the enabling environment by promoting initiatives that enhance business integrity, quality of construction and capacity building.

• Unfinished business

- An assessment of the industry's Agenda 21 outcome indicates that the further development of means to implement sustainablity requires greater attention to stakeholder participation in project delivery.
- Meeting infrastructure needs in developing countries also requires harnessing the resources of smaller firms which will have to expand their capabilities.
- Finally, the industry's performance needs to be continually assessed with respect to international commitments, and local and regional sustainability agendas.

• Future challenges and possible commitments

- The industry's skills will be able to make significant contributions to the priority programme areas and sectors that have been identified by the United Nations Secretary-General.
- However, delivering sustainable infrastructure in developing countries requires new methods for procurement and project delivery.
- They must be supported by ongoing initiatives that generate confidence and trust from all stakeholders, both public and private.

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