

## Cross Fertilisation

*(Output from ITF Theme Day, Aberdeen)*

### A Collaborative Approach to Investment in Technology

**The Industry Technology Facilitator (ITF)** is a not for profit organisation owned by, and with access to funds from major oil and gas operating and service companies that comprise its membership. ITF has an impressive track record in delivering finance to help develop new initiatives for oil and gas technologies from early stage joint industry projects (JIPs) through to field trials and commercialisation. Since 1999, ITF has supported 135 projects worth in excess of **£39 million** in funding. ITF's key objectives are to identify technology needs, foster innovation and facilitate the development and implementation of new technologies.

A fundamental element of ITF's role as an internationally recognised champion for facilitating research, development and deployment of technology innovation within the upstream oil and gas industry is to engage with key industry sources. ITF uses a proven process, working in collaborative participation with both its Members and industry to identify technology needs and potential solutions.

**The ITF process**, illustrated below as a step-by-step course of actions, endeavours to bridge the gap between the industry's large global players and development community with the ultimate aim of implementing new technology solutions:

**STEP 1** - Understand and Identify Technology Needs

**STEP 2** - Engage the Development Community / Invite Proposals

**STEP 3** - Evaluate Proposal Submissions

**STEP 4** - Secure Funding

**STEP 5** - Assist the Launch of JIPs

**STEP 6** - Facilitate the Implementation of Technologies

ITF has contractual confidentiality arrangements with all its Members and will enter into a parallel agreement with all developers submitting proposal applications. Proposals will be submitted to our Members only for the purpose for which they are provided, i.e. assessment for funding support and implementation.

Proposals submitted under this Theme will be reviewed for financial sponsorship by **all ITF Members** therefore this is an excellent opportunity to gain a global audience in seeking support for your technology. The focus of all ITF themes is to identify technologies which bring clear benefits to sponsors but which require assistance in **research, development, and/or field trial**.

For details of ITF's full Portfolio of Members, please visit our Website - [www.oil-itf.com](http://www.oil-itf.com)

## ***Background to the Theme***

This Call for Proposals is the collective output of an ITF 'Cross Fertilisation' Theme Day held in Aberdeen on 20<sup>th</sup> November 2008.

The 'Cross Fertilisation' event was attended by delegates who explored issues common to other industries, discussing cross-over ideas and shared technologies, successfully stimulating dialogue among relevant, actively-engaged participants to develop new avenues for research and innovation.

The Theme Day included a number of keynote speakers representing a variety of sectors out with the oil and gas industry. This was followed by an intensive, facilitated workshop which brought together ITF Members, Operators, Service Companies, Small and Medium-sized Enterprises and research and academia players. Attendees discussed the potential application of innovative technology from their respective industries for transfer into the oil and gas industry, the output of these discussions has formed the basis of this Call for Proposals.

### **Theme Timeline**

Each ITF Theme follows a nine month timeline from Theme Day to Theme Completion. The following list of tasks describes the key milestones and their associated date:

Theme Start / Theme Day	Nov 08
Call for Proposals Issued	Feb 09
Deadline for Receipt of Proposals	Mar 09
ITF Due Diligence	Feb - Jun 09
Member Review and Voting	May 09
Technical Clarification Meeting	Jun 09
Members finalise commitment to sponsor	Aug 09
Theme Complete	Aug 09

## An Open Invitation to Global Technology Developers

*“Doing anything well involves questioning conventional solutions in a creative, meaningful way”*, John Makepeace (2009)

As the demands on energy supplies increase, the oil and gas sector has to seek reserves in areas with ever more demanding technology challenges. Simple reapplication of traditional incremental changes will not alone unlock the future potential of our industry. The industry needs to think ‘out-of-the-box’ in order to find of the game changing technologies that meet the future challenges. Industry sectors such as defence, power generation, medical, pharmaceutical, electronics, aerospace, and many others may offer solutions to these challenges. (ITF members have already supported meaningful technology projects from industries as diverse as pharmaceutical and music sectors.)

The oil and gas industry is beginning to develop relationships out with the sector and nurturing partnerships that increase the speed of technology development. ITF is in a prime position to harness these partnerships to bring a proven process and a structured approach to developing ideas from other industry sectors for the benefit of offshore oil and gas futures.

This document aims to stimulate those ideas and seeks proposals from global development expertise which address the intent of our ‘Cross Fertilisation’ call. ITF and its Members will jointly assess all submitted proposals and our Members will potentially fund those proposals of greatest interest.

As with the nature of this call ITF anticipate the majority of proposals to focus on early stage ‘exploratory’ ideas of low value development. However, ITF will continue to welcome proposals which are considered to be further along the technology readiness level scale.

It should be noted that ITF have a very successful record in this area with more than 50% of our ‘pioneer’ projects developing into full scale Joint Industry Projects (JIPs).

ITF and its Members will not prescribe specific technology solutions, but instead use the output gathered from the Theme Day to stimulate innovative proposals that offer potential solutions to identified needs. Key technology drivers, as identified by ITF Members, are the desire to maximise current and future resources and to enhance recovery of reserves in a more cost effective, safe, and sustainable way.

The list of technology challenges identified below is not exhaustive and should be viewed as examples based on the output from the theme day. The proposer is free to show innovation in submitting meaningful ideas that offer potential benefits to the industry.

This is an open invitation to any organisation seeking sponsorship for **innovative technologies** for use in the oil and gas industry, to submit proposals for **research, development, and / or field trial** in the suggested areas.

The method for submitting a proposal is described later in this document.

## Technology Insights

The call is open to all industries who feel that they can contribute to the call. Some industries present at our Theme Day came from the following industries:

*Aerospace, Astronomy, Biotechnology and Medical, Defence, Electronics, Materials, Nuclear, Pharmaceutical, Power Generation, and Renewable Energy*

In order to provide some insight an example of what may seem initially as an odd pairing of the medical profession and the oil and gas industry on closer inspection provides many unexpected connections. The following challenges appeal to both industries:

- Both work through long tubes (vascular systems for doctors; pipelines for engineers)
- The main problem is that these tubes get clogged up (coronary artery deposits; mineral scale in tubing)
- Both rely on pumps to get fluid through the pipes (hearts, mechanical hearts; all manner of artificial lifts)
- Plumbing requires connections (arterial grafts; threaded connections)
- Both rely on sophisticated imaging to see where human eyes cannot (inside tiny blood vessels; 10,000 feet below ground)

The following notes serve as a guidance as to where synergy may exist for transfer of technology into the upstream oil and gas sector. They are not meant to be exhaustive, prescriptive, or industry sector restricted; but are meant to be indicative of where some solutions may exist. It is recognised that many other potential synergies will exist.

Our Theme Day revealed only a small collection of companies not currently involved in the upstream industry but having, in some cases, quite remarkable innovations able to address upstream technology challenges. The purpose of our Cross Fertilisation Call for Proposals is to reveal those innovative technologies that have potential to address real challenges in the upstream oil and gas industry.

We can begin to evaluate options by creating a number of technology categories such as the following:

### Coatings and Materials

There are many developments working in the coatings and materials arena. The technologies being developed include coatings which are ultra-hydrophobic, as well as oxidation and corrosion resistant, while also exhibiting self-healing characteristics. There may be a number of potential subsea flow assurance applications for these materials. Other developments include ice-phobic and thermal barrier coatings which are non-toxic.

Thin film nanometer-sized particles that require no further processing can now be deposited onto to surfaces, which may have applications for seal faces, poorly lubricated applications, or those areas exposed to high temperatures and corrosive fluids. Such technology may allow micro electro-mechanical sensors to be packaged for deployment in high temperature, high pressure and highly corrosive environments. The technology has the potential to protect sensors in up to 400°C environments and is progressing toward 1,000°C applications. This type of technology should have applications in deep wellbore and reservoir applications.

## **Communications, Electronics, and Power**

Communications, electronics, and power providers are also making available applicable innovations. Developments of a new class of electronic devices merging solid state electronics with thermionic vacuum electronics are emerging. The results could be enabling technology for extremely high temperature applications. The electrical performance of these electronic devices is potentially temperature insensitive implying possible uses in logging while drilling, measurement while drilling, and formation evaluation tools deployed in deep, high temperature wells.

In this same category advances in lithium battery technology and other power sources such as vibration energy harnessing devices offers local power generation systems for low power sensor and instrumentation power. Moreover the nuclear industry may offer 'relative safe' larger capacity power sources with small reactor system that utilise non-uranium and non-plutonium sources (e.g. thorium). One can readily envisage applications for these technologies as power sources for long-life seabed sensors and step out subsea developments. This technology could also significantly reduce the size, weight, and handling requirements for seabed equipment, seismic nodes and underwater unmanned vehicles.

Many other examples where technologies could be harnessed may include ...

- High bandwidth wireless communication
- Underwater acoustic communication and network
- Wireless sensor networks
- Data communication through water
- Data compression for subsea acoustic communication

## **Inspection and Monitoring**

Inspection and monitoring is another fruitful area to seek out innovations residing within other industries. New technologies for non-destructive inspection may offer entire systems that have the potential to offer superior spatial resolution, higher contrast, better penetration, and faster inspections than eddy current testing, ultrasonic inspection or X-ray imaging; and can work on a range of different materials.

Already existing in other industries are structural health monitoring technologies that incorporate miniature piezoelectric transducers embedded in thin flexible, printed circuit films. These devices may be attached to structures to provide real-time condition based monitoring to detect corrosion, fatigue cracks, and impact damage. The technology may be able to identify very small cracks, determine which direction they are spreading and how rapidly.

Other examples where inspection and monitoring technologies could be harnessed may include ...

- Use of 3D virtual environments
- Situational awareness pictures
- SAR imagery for oil slick detection
- SAR interferometry for millimetric vertical survey
- Imaging of wind speed/wave height
- Identify areas to prospect using satellite imaging
- Detection tagging - markers with memory
- Chemicals to capture and record information

## **Environment, Health, and Safety**

Technologies are prevalent in other industries for dealing with significant environment, health, and safety issues and that are relevant for the upstream petroleum industry.

Routinely the nuclear industry is dealing with remote technologies and automated processes for dealing with harsh environment intervention. Tank cleaning is a prime example where automation has been adopted in this industry that could be applicable in decommissioning programmes. The automotive industry regular uses automation in manufacture, employing techniques that could possibly be adopted for use in down-hole well service applications.

Important new technology for tracking and studying the effects of noise on marine mammals are emerging. These systems are able to discriminate between manmade acoustic sources and marine mammals. This important new technology holds substantial promise in the Arctic and other areas where seismic surveys and drilling operations must comply with the Marine Mammal Protection Act.

\* \* \* \*

It is possible to cite many other examples of technological innovations, developed for other industries, but having applicability in the upstream petroleum industry. If these technologies can be successfully transferred into the oil and gas industry, they may facilitate the development of hydrocarbons in some of today's most challenging environments.

If you believe you have a technology similar to some of the areas described above then we would like to hear your ideas and proposals on how such technologies can benefit and be transferred to the upstream oil and gas industry.

See below how to submit a proposal.

## Process for Submitting a Proposal

### Register Interest with ITF

Register your interest as early as possible by sending an email to Ryan McPherson at [r.mcpherson@oil-itf.com](mailto:r.mcpherson@oil-itf.com)

### Visit the ITF Website - [www.oil-itf.com](http://www.oil-itf.com)

On the ITF Home page, click on the "How to Submit a Proposal" button or follow [this link](#) to access all the information required to submit a proposal.

### Read the 'Project Application Guidance' Document

This document is available to view or download from the 'ITF Downloads' / 'Proposal Submission' section of the ITF Website. Reading this document prior to submitting a proposal is essential. If you require further clarification or are unsure if your proposal is suitable for submission, please call ITF (Contact Details appear later in this document).

### Download and Complete the 'Project Application Form'

This form is available to download from the 'ITF Downloads' / 'Proposal Submission' section of the ITF Website.

### Download and Complete the 'Project Presentation Template'

This template is available to download from the 'ITF Downloads' / 'Proposal Submission' section of the ITF Website.

### Email the Completed 'Project Application Form' and 'Project Presentation Template' to ITF

Email the Completed 'Project Application Form' in *Microsoft Word format* (not PDF) and the 'Project Presentation Template' in Microsoft PowerPoint format (not PDF) to Ryan McPherson at [r.mcpherson@oil-itf.com](mailto:r.mcpherson@oil-itf.com) no later than **30<sup>th</sup> March 2009**. Proposals received after this date may not be processed.

### Qualifying Technologies

In order to qualify for potential sponsorship, technologies submitted in response to this Call for Proposals must:

- be applicable to at least one of the identified requirements
- be novel or innovative
- demonstrate a clear business case for support
- have a clear and demonstrable path to commercialisation and implementation

Note: Proposals submitted to any other ITF Call in the past nine months or any previously unsuccessful applications should not be resubmitted without first consulting ITF (contact information provided later in this document).

### Qualifying Organisations

Proposals are invited from any organisation including SME's, academia, research institutions, large organisations, consortiums or alliances. Proposals may be submitted by a national or international organisation and equal opportunities will be extended to all proposers. Please keep in mind however that should your proposal be taken forward, you will be required to participate in meetings and make presentations to interested parties in the UK and in the English language (teleconference and video conference are acceptable).

## **ITF Contact Information**

If you would like to discuss any matters related to this call or any other issue related to ITF, please contact any of the following people:

Ryan McPherson - ITF Technology Analyst (Cross Fertilisation Theme Manager)

Email: [r.mcpherson@oil-itf.com](mailto:r.mcpherson@oil-itf.com)

Tel: +44(0)1224 853410

Keith Mackie - ITF Technology Analyst

Email: [k.mackie@oil-itf.com](mailto:k.mackie@oil-itf.com)

Tel: +44(0)1224 853411

Adele L'Etang - ITF Technology Analyst

Email: [a.letang@oil-itf.com](mailto:a.letang@oil-itf.com)

Tel: +44(0)1224 853407

David Liddle - ITF Operations Director

Email: [d.liddle@oil-itf.com](mailto:d.liddle@oil-itf.com)

Tel: +44(0)1224 853403

Contact Address for all of the above:

ITF  
The Enterprise Centre  
Exploration Drive  
Bridge of Don  
Aberdeen  
AB23 8GX  
UK

For more information on ITF please visit the ITF Website - [www.oil-itf.com](http://www.oil-itf.com)