

An Online Platform for the UN Technology Facilitation Mechanism

Independent Technical Assessment Findings

Full Report*

June 2017

*Note: This document represents findings of the independent technical assessments as mandated by the member States in the 2030 Agenda for Sustainable Development (paragraph 70) and the Addis Ababa Action Agenda for Financing for Development (paragraph 123). The independent technical assessments are prepared by the Institutes of Science and Development, Chinese Academy of Sciences (CASISD), DNV GL, and the Overseas Development Institute (ODI) (in alphabetical order). This document is a consolidated version of individual assessment reports.

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1. Executive Summary

The Inter-agency Task Team (IATT) secretariat has brought together the three technical assessments of the planned Online Platform for the Technology Facilitation Mechanism (TFM) at the request of the UN member States¹. The overall assessment comprises two parts: (A) Assessment of options for architecture, management and governance structure; (B) Assessment of the benefits and financial costs of various options for the online platform. Part A has benefitted from two assessors: one technical assessment was carried out from a developing country perspective by the Institutes of Science and Development, Chinese Academy of Sciences (CASISD) in Beijing, and the other from a developed country perspective by the Overseas Development Institute (ODI), London. Part B benefits from one assessor. It was carried out by DNV GL, the Netherlands.

Each assessment for Part A describes relevant details of 20 relevant websites and platforms, of which 5 were examined by both, making a total of 35 different platforms covered by the assessments altogether. Of these, 23 are public initiatives (2 no longer operative and one still in establishment phase), and 12 private (four no longer functioning). The public platforms are operated by multilateral organisations (the UN and the EU), and by OECD and developing country government agencies. It is recommended that readers visit up to six of these websites with particular value for the platform process. The several most useful sites are identified on pages 45-46 below and pages 51-60. The examination of the platforms was supplemented by three telephone interviews by ODI with online platform operators, a UN platform, an EU platform, and an OECD country platform. The CASISD carried out a survey of potential users of a UN online platform which had 53 respondents: 40 are in China, 7 in other developing countries and 6 in OECD countries. CASISD also did 5 in-person interviews with potential platform users in Thailand.

The two assessments were informed by distinct approaches. The CASISD focused on the ‘market’ aspects of the platform, and collected views and expressed needs of potential users, through its survey and interviews, exploring the prototype platforms laid out in the framework provided by the background papers done for the IATT (in particular Antic and Liu, 2015). The ODI focused on the implications of online activity for technology transfer, exploring the continuing salience of tacit knowledge in the transfer processes, and reviewing existing research on the issues of open innovation and two-way platforms.

The ODI assessment provides the following key messages:

- i. The online platform should support actual technology transfers via matchmaking, not be simply an information repository for policy and/or scientific information.
- ii. An online platform alone is insufficient, and must be linked to the provision of technology transfer services offline.
- iii. A key group of platform users is therefore public agencies and private suppliers of such services within country-based innovation ecosystem. A second key group is global corporates with

¹ See the 2030 Agenda for Sustainable Development (paragraph 70) and the Addis Ababa Action Agenda for Financing for Development (paragraph 123).

potential to increase the scale and scope of technology transfer internationally, and who can use the platform to source technologies as well as supply them.

iv. Matchmaking offered by the platform should be of two types: matches between technology suppliers and technology demanders, as well as matches between technology transfer service providers and enterprises, especially those in developing countries, where there is limited supply of providers of these services.

v. The platform is best structured as a network of country-based networks, which will distribute effort, financial costs and service provision and also lower overall cost. The member networks will deploy their own resources and determine their own pace and direction of growth. However, the critical start-up phase – during which the platform must demonstrate its worth to all groups of users – will require more and centralised resources, including specialist technology transfer service providers.

vi. The process of establishing the platform is as important as its structure, as there is a strong element of ‘path dependence’ where early success leads to more success, but early difficulties could on the other hand create further difficulties. There are two key issues to get right in the critical start-up phase. The first is to focus on a niche market, specifically one or two (and no more) sectors linked directly with the SDGs, for example one or two of health, education, water and sanitation, or renewable energy, and focus further on the markets within these sectors concerned with addressing the needs of the poor. The second key issue in starting a platform is to attract at the outset some large ‘anchor’ participants on one side of the technology transfer process, specifically some large corporations seeking technology to address the needs of the poor in the one (or two) selected sectors.

vii. The platform will need a small team once it is fully operative, but it is crucial that it be permanently ‘animated’: through frequent updates and news, and live events (e.g. webinars) to enable direct participant contact.

The CASISD assessment supported several of the above points, in particular

- the platform should support online transactions and user groups should include technology transfer agencies as well as companies (corporations) engaged in technology transfer,
- the platform operating entity should include (or can access) specialist technical knowledge,
- the platform should be organised as a network of networks,
- the platform should ensure frequent updating of platform content, as well as live events and initiatives, and
- the importance of ease of customer use (which was taken for granted by ODI)

The CASISD assessment differed from the ODI assessment in arguing in favour of a broader scope for the platform. It made an explicit choice amongst the three options outlined in the IATT Background Paper by Antic and Liu (2015), opting for the middle approach which includes an information repository including scientific publications, equipment and technology blueprints, patents, software and policy documents (with published material available on open access financed by the platform),

together with user communication and interchange and wiki functions. The CASISD argued that a platform incorporating these features would enable actual technology transfer transactions, and pointed out that the latter would require also online payment facilities and security encryption of private information. The ODI took a different approach, arguing that the platform should simply enable matchmaking in the sense of initial contact between parties involved in technology transfer, with their further interaction in the actual transfer process taking place beyond the platform itself. The ODI assessment also suggested that an information repository function for the platform would likely not be very useful or add value for users.

Nevertheless, as a mandated function by the member States, the CASISD assessment highlighted the importance of the dissemination of relevant open access scientific publications. Indeed, scientific publications are important element in a number of platforms, such as [NASA's techbrief](#), and the [Portal of Chinese Science and Technology Resource](#).

Part B report by DNV GL concludes that the development and maintenance of the online platform, when implemented per the desired scenario, will require recurring financial and human resource, with an estimated \$ 2,000,000 to develop the platform and an annual \$ 1,200,000 to maintain it. If the requirement is to have translation into 6 official UN languages, an annual budget of \$ 1,000,000 should be reserved. There are alternative implementation modalities which can drive down cost and there is potential for attracting the required resource over the planned life cycle of the platform. It is also concluded that the skill set of the human resource should not be limited to the IT domain, but rather focus on service development, process management and facilitation of networks. This endeavour is not to be a project for which temporary financing is made available, but rather an enduring service provision that is developed and sustained over at least the next 10-15 years.

It is recommended that:

1. A vision statement is developed for the platform that covers intent, depth and breadth, governance, involvement of content partners and overall technical architecture.
2. The vision for the platform should recognise that it is not just about an IT platform but about creating and animation a network of actors in the STI domain, including national and regional innovation centres and the corporate private sector, with a focus on service provision for brokering demand and supply for STI content and subsequent deal making.
3. An overview is created of the various Science, Technology and Innovation (STI) areas that have an impact on the Sustainable Development Goals (SDGs) and a selection is made of focus areas therein.
4. A multi-year roadmap is developed that offers stakeholders an insight in the sequencing of activities and where they can contribute. Service development and process management is of key importance in making the platform and the technology transfer it seeks to support.
5. To demonstrate early results as required by stakeholders, DNV GL recommends to adopt a modular, iterative approach following agile software development principles, after creation of a vision, selection of priority areas and specification of a software architectural framework.

6. To focus on delivering a minimum viable product early on, to learn from user feedback, to build confidence with donors and to inform subsequent steps in the delivery roadmap. For this, the proposed iterations 1 and 2² would be particularly suitable and would define a first tranche of financial commitment from donors, following pre-build work on concept development and project start-up. The minimum viable product would need to be in English only.
7. When a development partner is identified for the platform, a broad skill set is demanded. The success of the online platform is not only dependent on its IT performance, but on other aspects as well such as community building, development of content partnerships, content validation, oversight, outreach, social media campaigning, inter-agency coordination, liaison with STI centres around the world and support to an advisory board.
8. A specification is developed and agreed that details the platform functionalities such that an implementation partner can precisely budget development and maintenance cost. It is not required to have an a priori full specification: an evolutionary approach based on an agreed architecture will be better suited.
9. Various financing models are detailed and explored with stakeholders.
10. Seek to fund an enduring service provision that is developed and sustained over at least the next 10-15 years.
11. A project team is mobilised soonest to initiate platform and service development, to be led from UNDESA.

These recommendations above are based on the results of the independent assessors that responded to the Part A of the Term of Reference (ToR)³.

DNV GL observes that the focus on the technical development of the platform may obscure the time and effort that needs to go into promotion, content management and community building. Furthermore, as baseline figures were not available to DNV GL with respect to the number of STI areas as well as required depth of coverage of those areas, assumptions had to be made.

² Iteration one is estimated at \$250K and iteration two at \$500K. This would be a good package to get early on confidence from donors, see in particular the table on page 39 of this report.

³ The ToR is available at: <https://sustainabledevelopment.un.org/TFM>

2. Introduction

2.1 Context and stakeholders

The key stakeholders for this assessment are the United Nations Inter-agency Task Team (IATT) on Science, Technology and Innovation (STI) for the Sustainable Development Goals (SDGs) and the United Nations 10-Member Group to support the Technology Facilitation Mechanism. They have been seeking an independent technical assessment as the basis for the development of an online platform, as mandated in the SDGs, the 2030 Agenda for Sustainable Development (paragraph 70) and the Addis Ababa Action Agenda for Financing for Development (paragraph 123).

UN Member States have agreed that the online platform will “establish a comprehensive mapping of, and serve as a gateway for, information on existing science, technology and innovation initiatives, mechanisms and programmes, within and beyond the United Nations,” “facilitate access to information, knowledge and experience, as well as best practices and lessons learned, on science, technology and innovation facilitation initiatives and policies” and “facilitate the dissemination of relevant open access scientific publications generated worldwide”. It is expected that the online platform will function as an integral part of the broader Technology Facilitation Mechanism (TFM). For more information, please refer to <https://sustainabledevelopment.un.org/TFM>.

The IATT, in support of UN Member States, has so far: (i) conducted an initial mapping of existing STI initiatives within the UN system; and (ii) developed three broad options for an online platform, with low, mid and high levels of ambition (see Annex B). These options seek to reflect inter-governmental deliberations and how such a platform could link to other elements of a TFM such as the Multi-stakeholder Forum on STI for SDGs and the TFM’s emphasis on capacity building.

2.2 Assessment scope

The assessments “take into account best practices and lessons learned from other initiatives, within and beyond the United Nations, in order to ensure that the portal will complement, facilitate access to and provide adequate information on existing science, technology and innovation platforms, avoiding duplications and enhancing synergies.”

The overall assessment comprised of two parts: (A) Assessment of options for architecture, management and governance structure; (B) Assessment of the benefits and financial costs of various options for the online platform. Part A has benefitted from two assessors – one from a developed country (ODI) and one from a developing country perspective (CASISD), to ensure political usefulness of the overall assessment. The scope of the Part B’s work, undertaken by DNV GL, was guided by seven substantive questions and – to the extent possible - aims to provide answers to these questions regarding benefits and financial costs of various options for the online platform.

3. Part A: Options for architecture, management and governance structure

3.1 General considerations on technology transfer and facilitation

In this section some of the characteristics of technology transfer are explored and technology policy in order to address the basic challenge facing the platform, that of making it useful to actors in the creation, acquisition, diffusion and transfer of technology, understood as productive knowledge. Establishing and running a platform is a manageable task, but if the platform is not useful, it will soon be redundant and moribund.

Three broad sets of actors are identified, and their related activities, who are potential users of a UN online platform. A first question is which of these groups the platform should aim to support and assist through increased access to information, knowledge and networks. The three groups are:

- (a) suppliers and users of technology, one or both of which are likely to be enterprises producing and distributing goods and services, and which may be actors in a technology transfer and/or joint producers of technology;
- (b) technology service providers who support technology transfers and transactions by initiating linkages between suppliers and users of technology, and/or by providing technical validation and certification, legal, financial or other services to one or both parties to the transaction; and
- (c) technology/STI policymakers who develop the regulatory frameworks and markets within which technology suppliers and users transact and technology service providers operate.

The significance of the second group for the platform should not be understated, as this group is the critical enabler of technology transfer. But it is in limited supply in most developing countries, which is a major factor in the low level of technology transfer as well as the low success rate of technology which is transferred. Though it is not mentioned explicitly in the resolutions and background materials for the platform, the platform's main target audience should be this group, and building its capabilities in developing countries a primary aim.

Secondly, the nature of innovation and of technology transfer (the creation and exchange of productive knowledge) needs to be considered, in particular by understanding both as services with characteristics which are different from those of physical goods. Services have four such specific characteristics:

- (a) Simultaneous production and consumption, involving direct interaction between the producers and the consumers, and often making it difficult for users to assess quality prior to purchase.
- (b) Heterogeneity, meaning that services can be customised differently for specific consumers, but raising the transactions costs of selling services.
- (c) Intangibility, further complicating pre-purchase assessment by potential consumers, and making reputation and quality assessment of the service producer more significant.
- (d) Perishability, meaning that production capacity has a time dimension: if the production capacity of a service producer is not used at a particular time because the service is not purchased, the capacity is wasted, even though the producer can provide the same service at a later date.

In the case of technology transfer, these characteristics are important because each is linked to the tacit knowledge aspect of technology creation and exchange. Tacit knowledge is complex knowledge which is hard to make explicit (or codify) in documents or blueprints, and the exchange of which usually requires frequent and extensive direct interaction between the actors. By definition, tacit knowledge is difficult to transfer even through written or oral communication. Naturally, technologies vary in terms of the nature and extent of tacit knowledge transfer required, but a process of tacit knowledge exchange is inherent in all technology transfers, reflecting the latter as provision of a service rather than imply the sale of a good (a blueprint, document or other physically-defined 'package' of knowledge). Technology transfers therefore involve learning by the technology user and take time and effort of both parties, raising transaction costs. All technology transfers also involve some degree of innovation in the sense of adaptation of the technology to the context and circumstances of the buyer (including their absorptive capacity), reflecting simultaneous production and consumption, as well as heterogeneity.

It should be noted that similar considerations apply to policy formulation, which can be understood in part as a process of knowledge creation or acquisition, meaning that tacit knowledge is also inherent. Although the idea of 'best practice' is commonly used in relation to policy (whether for STI or any other arena), policy is in fact shaped by its context, so that policy documents (i.e. the codification of policy) exclude and do not (indeed cannot) take account of much tacit knowledge and information needed to adapt the document for use in a different environment.

The tacit knowledge dimension of both technology transfer and technology policy implies that a knowledge repository – understood here to mean a 'library-type' passive database of information – on its own is inadequate for any online platform as part of a technology facilitation mechanism – direct interaction between the producer and consumer of knowledge is essential and must be enabled by the facilitation mechanism. An online platform facilitates initial contact and ongoing interaction between two parties, but also poses challenges in the communication of tacit knowledge. In the case of a UN mechanism targeting a global audience, or indeed any knowledge transfer mechanism targeting an international audience, there are additional challenges. One set of these relates to language barriers and more generally 'cultural distance' between two parties in any potential exchange, which can hamper the learning and human resource development processes involved, as well as to legal and regulatory differences between the actors' countries. Another set relates to the issue of absorptive capacity on the technology user (recipient) side, and the inequality between developed and developing countries in this respect.

Though a service by itself, technology transfer generally requires additional services – evaluation and validation of the technology, legal services including contracting and intellectual property protection, and financial services including credit provision – which are necessary in part because of the difficulties arising from the intangibility characteristic of knowledge transfer as a service, but are also linked to the 'public good' nature of knowledge which makes it difficult to assess quality and negotiate price and other aspects of the exchange, without actually transferring the knowledge. These complementary services are often not able to be provided by one or both actors in a technology transfer, creating a market for such services and a pool of service providers who are a distinct group of potential users of an online platform.

Thirdly, it is worth briefly rehearsing here the implications for a UN platform of significant recent changes in the nature of R&D and innovation, specifically the emergence and growth of 'open innovation' (Chesbrough, 2003a). This refers to a shift away from a closed innovation model, in which companies "generate their own ideas that they would then develop, manufacture, market, distribute and service themselves" through internal R&D. The rise in numbers of knowledge workers and their mobility, which is linked in turn to the emergence of risk finance vehicles such as venture capital, as well as the growth of outsourcing of production and distribution activities within a company's value chain have contributed to increased outsourcing of R&D and design segments and insourcing of external R&D and design in which firms seek out externally-generated ideas which they can commercialise. Thus 'open innovation' reflects a situation in which innovation is itself increasingly a networked activity drawing on multiple sources of knowledge by bringing together several firms and research organisations which cooperate in their (joint) innovation activities. Open innovation is a distributed or horizontal process of innovation, in contrast to the vertically integrated processes which characterised (most) innovation activity during the 20th century.

The process of open innovation – searching for technologies to buy and for buyers of a company's own technology, and then undertaking technology transactions including adaptation – overlaps considerably with technology transfer, so that as open innovation increases with more corporates in more sectors using the approach, it will (or should) lead to an improvement in both efficiency (lower transactions costs) and effectiveness (productivity of transferred technology in use) of technology transactions in general, including the technology transfer process.

Secondly, open innovation reduces false positives (technologies that initially look promising but later fail) like closed innovation, in addition open innovation identifies false negatives, technologies that do not look promising initially but later find useful and profitable applications, so that they can be exploited (Chesbrough, 2003a). This is an important characteristic for technology transfer to developing countries, the primary concern of the platform, because it underlines the potential for open innovation to source technology from developing countries, for transfer to other developing as well as developed countries. As the corporate sector's engagement in open innovation broadens and deepens, the potential for technology transfer both to and from developing countries will also expand.

Thirdly, open innovation also increasingly involves corporations going beyond their existing business networks to search for new technologies and for solutions to challenges they have identified. Online platforms offer a search tool to supplement the supply of innovators, but like open innovation, the use of online platforms for innovation is a very recent phenomenon, and successful business models in either public or private sectors are still evolving.

3.2. Summary of the selected existing online platforms

3.2.1 Basic elements of platform operation

Basic System of the platforms

To ensure its authenticity, effectiveness, smooth matching, and the ability to provide personalized service, it is important to build a specialized online platform management system that provides member management, information management, credit management, interaction channel, business member management. The platform should possess three distinct advantages---it should allow resource sharing, meet the demand for personalized service and make technology transactions available anytime and anywhere.

Detailed Database

With the purpose of matching the needs and services, it is necessary to establish a database that contains research team information, technical solutions information, enterprise demand information, third party service information and transaction process information. On average, government-initiated platforms possess more data on local enterprises and on technology transactions but lack in data on research teams and on research achievements.

The Operation and Promotion of Platform & User Experience

Optimizing the platform, making it search engine friendly and increasing its amount of traffic can effectively enhance the platform's popularity and its amount of traffic. In the effort to improve the user experience of technology exchange, one should take into account not only the visual hierarchy of Internet online product, but also the logic of business procedure and users' learning cost. The platform should be rationally operated and universally managed. Only in this way can users' experience be improved.

3.2.2 The Main IT Functions of Platform

Information Retrieval and Publication

Information publication and retrieval are the basic functions of online technology platform. The information published on the platform is mainly related to the supply and demand of technology, which is an elementary method to achieve the goal of technology transfer. Information retrieval refers to a method which the platform used to improve user experience via the webpage design and database. [The Gaohang Website](#) and [the Keyi Website](#) and [the JiE Website](#) have all classified their patents and technology information to make it more convenient for their users to search information. [The JiE Website](#) in particular, provides its users with keyword searching function in order to lower the difficulty of finding the needed information.

Information Exchange

Online Platform also provides the information exchange function, which is another key part of technology transactions. The users of [Yet2](#) can send a request of technical reference for details to the technology providers to explore the details of the technologies owned by the providers. In return, technology providers are obliged to respond to the inquiries. Users can also send ideas of problem-solving to the enterprises seeking technologies in response to the technology demanding information posed on the website. After that, the enterprises seeking technologies are obliged to offer feedbacks to their ideas. Similar to Yet2, [the Xiaoguo Website](#) allows users to communicate

privately through the In-site Mail function, which enabled the participants to exchange contact information.

Technology Resources and Services

Technology resources refer to scientific and technological achievements, technology experts and service agencies with a focus on the efficiency of resources, the cooperation model of service resources and the specialization subtopics of resources. Scientific and Technological resources are key elements for the platforms that supplies technologies. Some of the technology transfer platforms that provide add-in services containing technology expert modules. For instance, [the Keyi Website](#) has developed the module of “old master”, offering consulting services to human resources management, the Xiaoguo Website also developed a similar module named “technology expert”.

Technology Exchange Security

Technology Transfer online platform requires the establishment of online technology transaction management and security systems, such as online transfer notarization systems, technical data transfer encryption systems, the third-party payment guarantee systems, to solve the core issues in technology transactions, including contract signing, technology material delivery and payment, so as to enable the online technology transactions and to open a green channel for technology transfer.

Matchmaking

Matchmaking offered by the platform should be of two types: matches between technology suppliers and technology demanders, as well as matches between technology transfer service providers and enterprises, especially those in developing countries, where there is limited supply of providers of these services.

3.2.3 Basic Pattern of the Platforms

One-Way Information Platforms

Despite the fact that there are very few private-owned technology transfer platforms that provide technology demand information or technology supply information, some public-owned platforms proved the opposite. The examples would be the Defence Innovation Marketplace and Technology Match Market of National Defence Ministry, as well as NASA’s Spinoff Database. Besides, the Patented Technology Exhibition Website (<http://www.zlshow.com/>) is also an one-way platform given that it only offers supplier information.

Two-Way Information Platforms

Two-way information platforms contain both information about technology providers and demanders, epitomized by Patent Transaction Website (<http://www.patmm.com/>), which was in the charge of SooPat and some governmental websites, such as Jiangsu Province Intellectual Property Public Service platform, which contains “patent recommendation” (<http://www.jsipp.cn/>) and “demand and supply information” modules in its website, and Guangdong Province Intellectual Property Public Information Service Platform(<http://www.guangdongip.gov.cn/>), which contains the modules of “available technologies” and “demanding technologies”.

Comprehensive Trading Platform

Most of online technology transfer platforms offer diverse services based on the demand and supply of technologies. The creative services offered by online technology transfer platforms include information communications, expert consulting, patent retrieval, technical analysis and trading agreements drafting. Given that the operation of this type of platform requires abundant resources, the comprehensive trading platforms are usually established and operated by private sectors, evidenced by the emergence of [JiE](#), [KeYi](#), [Gao Hang](#) and [Yet2](#).

3.3 Lessons from existing platforms

This section presents summary descriptions of 20 online platforms supporting innovation or closely related activities, nine in the private sector and the other eleven publicly-funded, and draws relevant lessons for the platform. More details of a list of existing platforms are available at Annex C.

3.3.1 Private online platforms

Private online platforms focus in the first instance on matchmaking between buyers and sellers of technology. One early academic review – based on a survey of the use of online platforms by 25 European medium and large companies – argued that these platforms faced a limited market, with corporates offering only old technologies with limited value, put on offer by corporates trying to license their outdated innovations (Lichtenthaler and Ernst 2008). It noted that the full presentation of technology on a platform takes resources and time with an opportunity cost for current innovation effort, and as a result corporates preferred to explore technology sales within their existing business networks. The expected returns to technology vendors from using private platforms were low and the supply of offers was therefore small.

This research was limited in scope, focusing primarily on the ‘old’ vertically integrated model of innovation, and on the market potential of technology transfer between corporates. But three points relevant for the platform emerge from this research, which are further confirmed by examination of private online platforms today. The first point is that a successful matchmaking platform for technology transfer requires an active demand-side: “offering a technology through the internet is a relatively passive approach...the initiative for the actual technology transaction has to come from the potential licensee” or potential user of the technology (Lichtenthaler and Ernst, 2008, 17). As a result, private online platforms have become increasingly oriented towards ‘in-bound’ open innovation activities by corporations, that is, where the corporation is the technology buyer. The platform’s role is often to help the corporation implement an open innovation approach to meet an already-specified need, via ‘challenge’ competitions providing a prize for the winning entry, or to provide initial screening of unsolicited submissions across a wider spectrum of arenas.

The second point is that platforms are more successful if the supply side of their market is focussed on unexploited technologies, rather than on extracting residual value from older technologies. In other words, platforms are better suited to support technology transfer as part of innovation, rather than technology transfer long after the innovation phase is completed. This helps to ensure a ready supply of technologies to a platform, whether from small firms, universities or individual researchers looking to create a market for their innovation, and from large corporates which may have generated innovations and inventions in their internal R&D for which they have no specific use in their own operations, but which they can monetise by selling to another firm, quite possibly in a

completely different sector, if such a buyer could be found. The latter was the original motivation for yet2.com, one of the more successful (i.e. surviving) private online platforms (see below).

A third point is that it has proven difficult for private platforms to create a profitable business model on the basis of an information exchange facility alone, in other words, to extract value purely from matchmaking activities. Those private online platforms which have proven durable – and there appear to be very few – have done so in two ways, both of which – crucially – require active support from the platform operator to one or both parties looking to engage in a technology transfer transaction.

First, private firms earn fees paid by corporations using the online platform for matchmaking to support their ‘open innovation’ activities, as well as commissions when searches lead to successful transactions, that is, contracts between technology ‘seekers’ and ‘solvers’. Many platform operators provide active brokerage services to connect the parties, going beyond operating a ‘passive’ database. In other words, the operators process, screen and assess submissions of technology for corporate technology buyers received via their own platform or via open innovation portals custom-built and managed for their clients, or they manage ‘challenge’ competitions on behalf of the buying corporation, or they undertake ‘technology scouting’ by searching for available technologies which meet a corporate client’s specified need, and then connecting the parties. Because of the potential for adverse selection problems, screening is essential and initial screening is often undertaken by the platform operator rather than the technology seeker, especially when large numbers of submissions are solicited. Less often, platform operators provide active brokerage services for corporate sellers of technology which the latter have developed but decided not to exploit themselves, by searching for potential buyers, including in their own databases. A commission may be paid only once a technology is actually transferred: many introductions do not lead to a successful outcome, and those that are successful, that is culminate in deals between technology seller and buyer, may take a very long time to reach that point. Alternatively, there may be a fixed fee for managing and screening submissions.

Second, platform firms earn fees by providing technology transaction support services (technical evaluation, legal and financial) to one or both parties. There are of course many technology consulting firms which provide these services to transacting parties but do not run online search or matchmaking platforms, but the point here is that firms which have begun by setting up online platforms hoping to earn revenues from pure brokerage services (search/matchmaking) have found that their business model needs to be supplemented by transaction support services – the flow of deals yielding commissions is too sparse.

Below eight online platforms are described briefly, of which three are no longer operating.

1) Yet2: Founded in 1999, and now has three offices in the US, Europe and Asia supporting open innovation activities for global companies, which are identified as the main target. Yet2 claims 150 000 users (mostly individuals or small firms trying to develop technology solutions in response to requests from large companies or sell them already-developed technology) and 800 brokers globally. The company has made 10 000 introductions (550-600 per annum), but the number of actual transactions is very small: it reached 100 successful technology deals after ten years in 2009, and 150 in 2012. Yet2 operates a search platform (marketplace), which inspection shows currently has about 1800 technology needs listed, and about 4750 technology offers. But its website indicates that

“from its roots as an open innovation marketplace ... Yet2 has evolved to become expert Open Innovation consultants”. The search for a viable business model for an online platform led Yet2 to start to offer consulting services in 2002, just three years after the company began, and in 2004 to shift its matchmaking focus from corporate selling of technology (out-licensing) to corporate buying (acquisition). Amongst its services are technology scouting, and open innovation strategy development and portal management (clients including inter alia Unilever, DuPont and Anheuser-Busch), as well as patent acquisitions. Yet2 charges a membership fee, set at \$4,000 to \$30,000 in 2008 (Asphera, 2008), a consulting service fee (\$30,000 to \$40,000 in 2008), and a commission for successful deals, set at a percentage of the deal, but with a minimum of \$10 000 and a pre-defined cap. It also may receive an income stream from future IP income arising from deals (Jahn, 2005).

2) *NineSigma*: Founded in 2000, and now has offices in US, Europe, Asia (Japan and Korea), South Africa, Brazil and Australia. It has more than 2 million ‘solution providers’ in its network and had received over 35 000 proposals. It had completed 1000 projects by 2007 and 1500 by 2009 (150 per annum). Challenges for many large corporations (including Nike, Cisco and NASA) appear to be its high-profile service, with substantial rewards, such as a Nike challenge offering a \$50 000 prize. But it also offers matching services and advisory services, for example convening expert panels to validate offered solutions. NineSigma receives a discovery fee and a success fee in the case of a signed contract, that is, a successful technology transfer.

3) *Innocentive*: Founded in 2001 within Eli Lilly, the pharmaceuticals company, from which it separated in 2005. In 2012, it acquired OmniCompete, a British company. It focuses mainly on crowdsourcing technologies using challenges, and claims a network of 380 000 people, who have participated in 2000 challenges, with 62000 solutions offered, and \$50 million in rewards distributed. Innocentive pays particular attention to managing the IP issues between the ‘solvers’ and ‘seekers’ in its challenge competitions. Innocentive receives a ‘posting’ fee as well as a commission for a successful deal.

4) *Imaginatik*: Founded in 2000 in the UK and listed on London Stock Exchange AIM on 2006. Its main business is to support ‘open’ innovation within large companies and their existing networks, that is, to source ideas from employees across the company and from customers. It also provides consulting on innovation strategy for its clients. At end-2016, Imaginatik had 39 corporate clients and was losing money, according to its annual report. Imaginatik is an example of what might be termed ‘semi-open innovation’ as the population from which ideas are sourced is delimited to existing stakeholders (or a subset of these) of the innovating organisation. Having a defined and targeted audience of this sort changes the problem definition for managing an online platform.

5) *CrowdSpirit (defunct)*: Founded in France in 2007, and closed about 2011. The idea behind it was crowdsourcing of product conception, design and marketing, with a financial reward promised to those who had contributed to an innovation once a product had been ‘picked up’ by a corporate producer and had reached the market. But the challenges facing the business model of resolving IP and incentives to ‘the crowd’ could not be overcome, leading to the demise of the platform (Chanal and Caron-Fasan, 2010; Roth, 2011). The company’s aim of aggregating innovation into a product to sell to corporates was financially unviable, and it did not have the capability to offer technology consulting services to supplement its online platform.

6) *Ideascale*: Founded in Seattle in 2009, with over 25 000 customers, many in the public sector, and 4.5 million users. Its platform offers crowd innovation for ‘communities’ of users, as well as an open innovation platform for enterprises.

7) *Innovation Exchange (defunct)*: Listed in Wikipedia and in periodical articles as an online platform founded in Canada in 2006 to support open innovation by corporations and compete with Yet2 and Ninesigma, but the website is no longer operative.

8) *Patent & Licence Exchange and IP Exchange International (IPXI) (both defunct)*: These were efforts to create marketplaces for intellectual property which would allow direct trading in the IP rights themselves (as distinct from the equity of the owners of the rights), enabling a “simpler, faster and cheaper [process] than the lawyer-intensive process of negotiating bilateral licences for intellectual property, the high cost of which discriminates against small companies, leaves patents unused on the shelf and hampers innovation” as argued by The Economist (2012) in an article on IPXI, which was also featured by Forbes (Groenfeldt, 2013) and the WIPO Magazine (McClure, 2012). But having opened its exchange in early 2013, after four years of consultation and market development, and having enlisted a number of corporates as potential licensors, IPXI closed in early 2015 because, it argued, potential IP licensees preferred to wait until litigation was underway before negotiating with licensors over licence fees and royalties. Though not an online technology transfer platform per se, an IP exchange would make technology transfer more efficient by greatly lowering transaction costs.

9) *Conclusions on private platforms*: In sum, there are several lessons for the UN platform from this brief overview of private online platforms. First, the large number of defunct private firms reflect that online platforms for innovation and technology transfer are still in their infancy, with business models that are still emerging rather than mature. It has proved difficult to scale up the level of technology transfer, and the number of technology deals completed via online platforms appears to still be relatively small, as reflected in even the most successful examples such as Yet2 and NineSigma. The platforms have very large pools of technology suppliers, but a much smaller number of corporate users (technology seekers and buyers), and thus a very small number of successful deals. The online platforms do not eliminate the contracting or tacit knowledge challenges facing technology transactions. There is limited scope for small firms to source technology directly via online platforms, because search is effort-intensive, requiring considerable investigation and evaluation of a technology’s effectiveness and suitability for the firm’s needs. Even for large firms, there is a trade-off between using online platforms to increase the number of submissions to a challenge or ‘request for proposals’ relating to a specific problem, and the time and effort required to screen submissions, which is usually outsourced to the platform operator.

Secondly and related to this, there is limited value in an online platform itself, since value emerges not from the quantity or volume of matches which look promising at first sight, but rather from successful evaluation and adoption of technology by the ‘seeker’. The financial viability of platform operators requires active brokering and thus significant human resources. Many platform operators therefore supplement their online platform offering with value-added technology transfer services, that is, support to the ‘offline’ interaction between the two parties whose initial contact was facilitated by the platform. This requires considerably more human resources than simply running a search facility. Mortara (2010) found that 53% of 42 technology intermediaries surveyed – only some

of these operated online platforms – provided legal and negotiation support until the contract was concluded, with 19% continuing to support the relationship after that point.

Fee structures range across a spectrum from free access (usually publicly-funded), through flat fee rates for individual services or for time spent, or a membership/subscription fee giving access to a suite of services, to a success fee (specified percentage of a deal concluded), with many platforms using more than one fee type (Mortara, 2010).

Finally, financial incentives are evidently essential to induce individual technology suppliers to participate in technology crowdsourcing exercises – challenges with relatively substantial rewards are the most commonly-used mechanism, and experimentation with using open source software-type models in other settings has failed, as in the CrowdSpirit example.

3.3.2 Public platforms

This section discusses publicly-funded platforms, linked to UN agencies, the European Union, and national and sub-national governments. In broad terms, the public sector platforms on one hand reinforce the key lessons illustrated by the private sector platforms, in particular the need for online platforms to be embedded in organisations which also provide technology transfer support services to platform users, and on the other hand point to the strengths of a network structure for efficiency and effectiveness reasons.

1) *South-South Global Assets and Technology Exchange (SS-GATE)*: Launched in 2009 by the UN Office for South-South Cooperation, and based in Shanghai. It focuses on three sectors: agriculture, clean energy and health. SS-GATE operates via an online platform where technology buyers and suppliers can list their needs and offers respectively. The matchmaking platform is supplemented by the provision of technology transfer services including technical evaluation, training, legal support and financial support. The latter are facilitated by around 50 ‘country centres’, pre-existing independent organisations such as business associations or public agencies (for example the National Institute of Design and Technology in Vietnam). The country centres have joined the SS-GATE network, and provide in-kind support to the platform, in particular, some staff time and marketing effort within their national business communities. The country centres are the mechanism for individual businesses in their own countries to access SS-GATE and post technology needs or offers, and they mobilise local technology transfer service expertise to assist firms who have identified matches. International technology transfer support is thus in effect one of the services the ‘country centre’ organisations offer their own members. SS-GATE itself has a small core staff of about 10 people in Shanghai, and is more accurately understood as a network, indeed a network of networks, since the country centres are themselves in many cases nodes of networks. SS-GATE charges transacting parties a very small percentage of the value of each successful deal. Country centres cannot be contacted via the SS-GATE site, and projects are listed only by country, with no search facility for sector or other criteria.

SS-GATE reports that it has listed over 7000 projects, with over 2300 of these matched, and 1000 transacted, up to 2015. About 10% of the matches have taken place at live matchmaking events, usually on the side lines of international conferences.

2) *European Cluster Collaboration Platform (ECCP)*: This is not a technology transfer platform per se, but a matchmaking platform for cluster management organisations in Europe to link with others

within Europe and further afield by creating partnerships amongst clusters to support internationalisation by cluster members who include producers and other 'ecosystem' organisations. Clusters are concerned with facilitating collaboration amongst member firms, supporting member firms' innovation activities including by finding technologies for them to buy and buyers for technologies they have developed, and enabling member firms' access to private and public funding.

The ECCP platform facilitates the growth of a network of cluster networks, in a bottom-up process where clusters voluntarily link with each other. By forming partnerships and consortia with clusters elsewhere, the 'reach' of each cluster's member firms and organisations is expanded, enabling collaboration in production and innovation, leading to increased output, exports and productivity. The ECCP is beginning to support European clusters linking with counterparts outside Europe.

Notwithstanding that it is not dedicated exclusively to technology transfer, ECCP offers important pointers for the UN platform, while also underlining the importance of clusters (and their management and research organisation members) in providing innovation and technology transfer support to firms, small and large. It is commonly-agreed that "innovations spread further across networks with a higher degree of clustering. In principle, clusters can promote diffusion where a seed node exists inside them, but they are more difficult to penetrate when not targeted during the initial seeding phase" (Vega and Handel, 2017).

The ECCP is funded by the EU, and has been in existence for some years, but was a moribund and unfocussed website which was re-launched in early 2016 with new operational management provided by a small private firm, running the website with a full-time staff of only four people. The platform has now been rebuilt and has 500 member clusters across Europe. The platform hosts the EU-funded European Strategic Cluster Partnerships – Go International (ESCP-4i), as an important purpose is to establish partnerships amongst European clusters which can then link with clusters in North America, Asia and elsewhere.

The network is free for cluster organisations to join, but individual firms may not join. Membership is a requirement for clusters to access many forms of EU financial support to industry clusters. Member clusters are required to supply detailed information and profile for posting on the website, where the search facility includes:

- sector (50 sectors plus a detailed list of 'emerging industries'),
- 'technology fields' (several hundred listed),
- cluster size: both the number of participating firms disaggregated by size – SMEs, large companies, research organisations, and 'other ecosystem actors', as well as number of cluster management staff,
- services offered, and
- past participation in cooperation activity in EU-funded support programmes and others.

The platform operator suggested that a key to the success of the revived platform is that it is 'animated' through frequent updates presenting news about matchmaking events, conferences, innovation challenges, publications and so on. There is a search page for events, including matchmaking events, conferences and workshops, seminars and webinars, training courses, and study tours. Crucially, this facility is fully up to date (past events have been removed) and easy to search – events in chronological order with clear graphics identifying sectors of interest. Arguing that "the human touch is essential", the platform operator also interacts directly with members in two

ways: it mounts its own matchmaking events bringing members together, often with counterparts from outside Europe, and it holds regular monthly webinars. Although the website has a Twitter 'window' with a rolling display of member clusters' tweets, the ECCP does not enable direct chat or exchange amongst members, and – interestingly – does not have its own direct presence on social media such as LinkedIn or Facebook. The platform operator argues that this would discourage visits to the website itself, whether by members or others, restricting usage of the search facilities for partnerships or events.

3) [European Enterprise Network \(EEN\)](#): This is a parallel organisation to ECCP, also funded by the EU and started in 2008. The EEN network provides support for SMEs in the areas of international partnerships, business internationalisation especially export growth, and innovation. Like the ECCP, it is a network of networks, with 600 member organisations including innovation support organisations, universities and research institutes, regional development organisations and chambers of commerce and industry. Member organisations are found in the 27 EU member states as well as 38 countries outside the EU, of which 27 are non-OECD countries, and 23 are outside the Central and Eastern European region. EEN claims to be the world's largest support network for SMEs internationalisation.

Individual businesses cannot join but can search on the website for their local EEN contact point, which they contact directly (rather than via the EEN site). The local EEN contact point – most often the local or regional development agency – provides information about the firm's innovation environment (policy, local support services, funding), and assists the firm to access individualized innovation advice and support services from local agencies on technology and innovation brokerage, marketing, access to finance and IPR. The EEN network thus provides businesses an entry point into their local or regional innovation and internationalisation ecosystem.

EEN also has country websites in own languages: although these are (surprisingly) not linked to the overall EEN site, they do enable contact with local member agencies and also individual advisors. Some of the national sites also have search facilities for business partnerships and for technology offers and requests by individual businesses.

4) [Nordic Innovation Accelerator \(NIA\)](#) and [Global Cleantech Cluster Association \(GCCA\)](#): The NIA is a cleantech-focussed platform which grew out of the Finnish cleantech cluster which was set up in 2006, when the Finnish government established four sectoral clusters. The cleantech cluster was based on an existing regional (sub-national) cluster in the Lahti area which was given a mandate to build a national network for the sector. The Finnish cleantech cluster began to link with other European cleantech clusters in 2010 (there were 12 at the time), and at the same time with cleantech clusters in North America, and these contacts led to the GCCA being formed. The NIA online platform was set up in late 2013 with support from the regional development agency in the Lahti area and the Veolia water, waste and energy management corporation, on whose innovation accelerator open portal model the NIA was based. In 2016, the Finnish cluster began to use it, together with cleantech clusters in Sweden, Denmark, Norway (Estonia has also since joined). The GCCA had already been formed in 2011 by the Finnish and Swiss clusters together. It soon had over 30 members, and today has grown to 57, of which fewer than 10 are in developing countries. It is a network of networks, which has grown from the bottom up, with very limited central co-ordination and therefore very low costs for maintenance and expansion. Each member cluster is itself a

network acting independently, using its own resources and determining its own pace and direction of growth, so that the GCCA as a whole is a 'multi-track' network. The Finnish cleantech cluster is supported by the Finnish Confederation of Industry and has 9 staff, while the NIA platform has only three staff, also based in Finland, with funds and in-kind support including additional personnel time provided by Finnish public agencies (universities and regional development agencies). GCCA itself apparently has no full-time staff but is managed via its member organisations. The bottom-up process and distributed administration is seen as a strength as the disappearance of one or two nodes will not threaten the wider network.

GCCA's initial aim was to "provide a gateway for established and emerging cleantech companies to gain exposure to potential investors, new markets, influential networks, innovative technologies and best practices" (Guest contributor, 2011). The NIA online platform enables this goal, by supporting matchmaking for both technologies and investor funding, as well as open innovation calls by corporations. The involvement of Veolia as a corporate 'anchor tenant' was identified by NIA as crucial to attracting future corporate technology seekers. The NIA's direct involvement in the transaction is limited – aside from the pure matchmaking function, it will link the parties with its networks of local expertise able to provide technology evaluation (due diligence) and other transaction support services. Participation in matchmaking and open calls is free for SMEs, and has a surprisingly low) flat fee for corporations.

NIA reports that there have been five calls to date (reflecting the platform's recent establishment), of which four have led to new business partnerships, with each call producing on average 20-30 qualified responses from technology suppliers within four months, of which five submissions were selected for further discussion by the technology buyer. Use of the NIA online platform is being expanded via the GCCA, and at end-2016, the platform was licensed for use by GCCA members in Switzerland, China and Canada. GCCA has run an international awards competition since 2011, the entrants to which are presented on its database accessible to technology selling companies.

The focus of NIA and GCCA on a single sector is seen by the NIA as a strength in bringing focus to the platform, though this is combined with the recognition that the 'cleantech' sector is interpreted differently across countries, which has resulted in GCCA having a weak presence in some countries where the sector's scope is very narrowly defined. From the perspective of the UN platform, the important points are firstly that the NIA online platform has emerged 'organically' out of the national sectoral clusters as a tool for the clusters to expand their member firms' markets internationally via technology sales, and secondly that the platform had involvement from the outset from a major global corporation in the sector, which saw potential benefits to itself from linking with the clusters. Related to these points, is that the online platform is intended only for identification of potential technologies or buyers, with the full technology transaction being supported by the cluster and corporate human resource offline networks. Only clusters, not individual firms can join, and this poses a challenge if the GCCA network is to expand into developing countries, as many countries do not have cluster organisations, or enough firms in the sector to support a cluster. This applies of course to other sectors as well, not only cleantech, and suggests that one aim of the online platform could be to support cluster organisational development in addition to technology transfer, given the centrality of cluster organisations to the latter.

5) Kibo Technology Management System (KTMS): This is an open online platform introduced in 2014 by the Korean Technology Finance Corporation (KOTEC, a government agency) to support its technology transaction support services to Korean SMEs, which pre-dated the online platform. KOTEC includes a Technology Appraisal Centre which comprises over 160 PhDs and another 600 technology experts in 54 locations, who assist the SMEs to identify their technology needs, and are further supported by a wide external network of around 1000 experts. The KTMS online platform is housed by a Technology Convergence Centre within KOTEC which searches for a match in the database, which contains about 240 000 offers of technology and about 1000 requests, and then provides transaction support to the parties in relation to due diligence, contract negotiation and finance for licensing, development and production. In 2015, 262 transactions for 456 technologies were transferred to Korean SMEs using this system including the online platform (up from 166 transactions for 254 technologies in 2014). Use of the platform is open so it can be used for matchmaking technology transactions between international buyers and sellers, though access to other KOTEC services requires companies to have a presence in Korea.

This online platform is evidently very successful in terms of the number of successful technology transfers it has supported. But as part of a national innovation system which itself is very successful, its success is not easily generalizable, while its success underlines that platforms cannot be free-standing entities, but require complementing with very substantial use of expertise.

6) Start-up Nation Central (SNC): This is an Israeli online platform aiming to showcase Israeli technology for sale to global corporations. It was started in 2013 after the 2009 publication of a book about the country's technology and innovation ecosystem by two Israeli journalists, entitled Start-Up Nation: The Story of Israel's Economic Miracle. The site indicates that there are 5500 startups in Israel and 350 R&D centres owned by global corporations, but does not report how many are listed on its own site. It focussed initially on three sectors – cybersecurity, agricultural technology and digital health, and has since expanded to 12 sectors, including fintech, robotics and machine learning, ecommerce and biotechnology. Its search engine is however unsophisticated, providing very little information on the start-up companies or on their technologies and products, with searches relying on a non-searchable set of keywords entered by the start-ups companies themselves.

7) Asian and Pacific Centre for Transfer of Technology (APCTT): The APCTT is a UN ESCAP centre based in India, aiming to “to strengthen the technology transfer capabilities in the region and to facilitate import/export of environmentally sound technologies to/from the member countries.” The website has three focus areas, two of which (technology intelligence and STI) appear to host mainly APCTT programme outputs. The third focus area is technology transfer, and provides a basic search engine to explore technology requests, offers and joint venture partnerships. Users can enter keywords and choose one of 38 sectors, as well as one country for a search. The site has at present about 1150 offers of, and 530 requests for, technology, plus 66 JV partnership offers. A random search for ‘rice’ turned up seven offers, and one for ‘pump’ yielded three offers. Each offer provided very little information about either the technology or the company supplying it, and in particular no date indicating when the technology offer/requests were posted. The site does offer a messaging facility for interested buyers to make direct contact with the supplier. Notwithstanding this, the APCTT appears to be a little-used and poorly-maintained site. It offers the platform only negative lessons.

8) Innovation Policy Platform (IPP): This site was set up by the OECD and the World Bank in 2013 to “provide easy access to knowledge, learning resources, indicators and communities of practice on the design, implementation, and evaluation of innovation policies... More broadly, it facilitates knowledge exchange and collaboration across countries and regions” according to its homepage (www.innovationpolicyplatform.org). It is well-structured with topic pages, country pages, statistical resource pages, and a page for ‘communities of practice’, that is, exchange between policy practitioners. However, thorough perusal of the site suggests it is essentially a repository for OECD STI-related publications, and its structure reflects OECD concerns and priorities. The site appears to be little used, as the most recent events listed are for 2015. The community of practice pages also simply present OECD projects and have no recent exchanges. Like the APCTT, this platform offers negative rather than positive lessons.

9) China International Technology Transfer Centre (CITTE): This is a platform set up by the Ministry of Science and Technology in China, and the Beijing local government, intended to facilitate global technology transfer for Chinese industry. Its online platform offers matchmaking and technology transfer services, and it reports a database containing thousands of Chinese companies. The English language website which was accessible in early 2017 now seems inaccessible.

10) Med (EU): Med is a regional cooperation programme supported by the EU amongst ten Member States and three candidate countries, with one of four priorities being innovation. Seven MED projects developed a project in 2011 on ‘Policies for Smart Growth: Web-based platforms for knowledge and technology transfer’, including matchmaking tools and interactive communities. The project does not appear to have been continued into the MED programme’s 2014-2020 cycle. But the MED peer review process recognised the value of online portals to support innovation, while highlighting key weaknesses, including the need for support tools to be backed by human interaction. “Especially when it comes to knowledge exchange and technology transfer or even commercialization of such technologies, nothing can replace human interaction. As such, platforms need to be used in parallel to other face-to-face activities of knowledge and technology transfer...Furthermore, the effectiveness of all web-based instruments aimed at networking and knowledge exchange depends on the[ir] capacity to actively involve users” (Programme Med, n.d.).

11) Platform for Disaster Risk Reduction (DRR) technology sharing: This is not yet an established online platform, but has been the subject of discussion within UN fora since 2010, in particular through UNISDR, the UN Office for Disaster Risk Reduction charged with implementation of the International Strategy for Disaster Reduction (ISDR). The Korean National Emergency Management Agency (NEMA) undertook a pilot project to examine options for a proposed online platform for DRR technology sharing. NEMA has successively constructed four types of platform and assessed each according to criteria of usability, level of use, and usefulness (Kim et al., 2016, Lee and Kim, 2015). The four types of platform examined are (in order) a document repository, a newspaper and discussion forum, a technology exchange market enabling offline trades, and a two-sided market (network). The first three platform structures were rejected due to inherent problems: the document repository was not useful due to the excessive and unstructured supply of technologies with limited information content and ability to support communication between suppliers and potential users. The newspaper plus discussion forum might address the latter problem but maintenance was excessively labour- and time-intensive. The technology exchange market found it difficult to attract potential technology users without considerable marketing effort by the platform

operator, which was the same obstacle facing the second, 'newspaper', model. The fourth option was advocated by Kim et al (2016) (and also Lee and Kim, 2015) based on its incorporation of four key features identified as essential by an expert survey which reviewed each platform model:

- (i) priority to end-user needs, rather than platform management needs;
- (ii) focus on problem-solving for users, not simply on the 'passive' display of technology;
- (iii) incorporation of communication tools, to enable user interaction; and
- (iv) business opportunities must be available to attract technology providers.

This process of experimentation and testing the DRR platform provides two important messages for the UN platform. The first message relates to platform design, where these four features need to be taken account of, and the second to the sequencing of the process, which suggests that it is not optimal to envisage the platform evolving from a simpler model such as the document repository to a more complex one, as usage and interest grow. This may not be a viable strategy because failure to attract users at the early repository stage will effectively render the platform moribund, making the later stages impossible to realise. An effective platform requires that the basic structure is in place at the outset.

3.3.3 Summary of lessons for the platform

This section summarises the lessons to be drawn for the UN platform from the examination of twenty platforms above, and spells out the key messages to be taken into account in designing and implementing the platform.

1) Actual technology transfer: The platform should support actual technology transfers via matching and linkage, thereby assisting users to solve problems they face in their production and innovation activities. It should not aim to be simply a repository for information dissemination, whether on technologies and scientific publications, or on STI initiatives, mechanisms and 'best practice' policies (or a 'gateway' to other sites where for dissemination). 'Gateways' or repositories are not well utilised, and often become 'ghost towns', to use the marketing jargon, as in the cases of the Innovation Policy Platform or the APCTT above. Enabling problem-solving attracts participation as the private platforms show, attracting both corporate technology buyers ('seekers') and technology providers ('solvers'). But site 'animation' is needed also, including frequent updating and other visible changes, and offering live events for participants.

2) An online platform is a tool for innovation ecosystems, not a substitute for them: As demonstrated by all the examples, successful and unsuccessful, discussed above, an online platform alone is not sufficient – it needs to be a complement to, and linked closely with, the innovation ecosystems within which the platform's users (technology transferors) act. Interaction between the users (technology suppliers and requestors) is one aspect of this, but the platform also needs to engage directly with the innovation service providers within the ecosystems, and facilitate the off-line activities which enable technology transfer – its value in this regard will be crucial in 'marketing' the platform.

3) Participants: Users of the platform should include enterprises (including public enterprises) producing goods and services in developing and industrialised countries, who are potential users and suppliers of technology. But other groups are critical to include as users:

(i) First, it is important to underline that SMEs even in industrialised countries for the most part do not have the capabilities (or the time) to do their own technology ‘scouting’, but instead rely on cluster agencies, business associations and other support services. This is even more strongly the case in developing countries, so that it is likely that SMEs especially from developing countries will not be able to make much direct use of the platform. Rather, a primary objective of the platform should be to support the provision of those services to SMEs, by enabling ‘matchmaking’ between SMEs (in developing countries in particular) and technology scouts, evaluators, and providers of legal and financial services. In this way, the platform could facilitate ‘open innovation’ of a sort by SMEs, that is, the sourcing of technologies and ideas from outside the organisation.

Therefore a key group of users of the platform should be innovation ecosystem organisations and agencies in developing and industrialised countries, such as cluster agencies, technology transfer service providers, local/regional development agencies, innovation financiers, and universities research institutes and NGOs engaged in innovation and technology transfer. Given that many developing countries lack sector cluster agencies and innovation ecosystems and that pools of technology transfer expertise are not easily available in those countries, the platform needs to both assist developing country participants in technology transfers in accessing the necessary services to support the transfer, and to contribute to building further long-term capacity in these services, perhaps through matchmaking of service providers in different countries. The financing of services to support technology transfer and of capacity-building in such services is beyond the remit of the platform, but could perhaps be taken up by the IATT.

(ii) Corporations with the potential to scale up the use of technologies internationally, who can both provide technologies for developing countries as well as to source and commercialise ‘South’ innovations – technology transfer should not be a uni-directional flow from developed to developing countries. Corporate participation can support the platform’s capacity to meet the SDGs, because corporations operating in multiple countries provide a (very significant) channel for technology transfer between countries. But the discussion above shows that corporate participation in technology marketplaces works best when they use the marketplace to source technologies as buyers, rather than to sell technology: effective supply of technology by corporations to developing countries is more likely to occur via their operational activities – investment, trade, value chain coordination – than through direct technology transfer.

A strategy like that of the NIA to focus at the outset on ‘anchor’ corporate participants seems appropriate for the platform, as bringing a small number of key corporations on board will be crucial to establishing the platform’s credibility amongst all sets of actors. This may be difficult to achieve and will require considerable time and effort, but should nonetheless be part of the strategy to establish the platform. An option for the platform to consider would be for it to host open innovation type calls as well as challenge competitions for corporations, with these calls and challenges in ‘SDG sectors’ such as health, education or WASH and specifically aimed at meeting market needs in low income countries. This could attract corporations to the platform as well as SMEs including those in developing countries, with technologies with scalable potential.

(iii) A third group to be included should be policymakers, in STI but not only in STI, as policymakers in other arenas may also be able to use the platform to support the technology needs of public service provision in their own efforts to address the SDGs.

4) Sector focus: The platform should be focused on production sectors, including service sectors which directly impact on the SDGs, such as health, education, renewable energy or water and sanitation. Almost all the platforms discussed above had a sector focus in the sense that the user was required to identify sector(s) of interest when initiating a search. Cluster agencies and other sector-focussed services are crucial for SME support. There is also a strong argument for online platforms to focus on a few 'niche' areas when they are first established, so as to develop their credibility and usability and to build traction, before expanding into a wider 'market'. This was the approach followed by Start-Up National Central, for example. Choosing to focus only on the four SDG-linked sectors mentioned above would be a sensible approach for the platform.

5) Network of networks: From the perspective of efficiency (cost) and effectiveness (likelihood of success), basing the online platform on a network of networks is likely to work best, reflecting decentralisation of operational resources (and financial cost) and locating technology service provision closer to the ultimate users. Building the network from the bottom up and accommodating nodes of different complexities and sophistication within a 'multi-track' framework is also desirable, with an identified responsible agency within each component network. The successful EEN network and the growing NIA network both have this structure. So does SS-GATE, which illustrates that even though many developing countries may have limited existing networks, there are nonetheless business associations of chambers which can be brought into networks which would support these organisations' efforts to develop additional capabilities.

In thinking about building a network of networks as the user base of the platform, one consideration should be language. The platform will (perhaps inevitably) use English only, certainly at the outset, and this in itself presents a barrier to the platform's direct use by many SMEs not only in developing countries but even in industrialised countries. This is another argument favouring a central role for innovation and sector ecosystem actors as users of the platform.

6) Platform operation: As the node at the centre of the network of networks, the online platform should require only a small core operational staff, whose role will include quality control of network participation (in particular the provision of adequate and up-to-date information), website management and maintenance, and marketing, especially the 'animation' of the platform, by frequent updating of content, publication of new material and advertising of live events (such as webinars) convened by network participants.

Many of the platforms discussed above had a larger staff during their construction phase than once they became operational and the software and platform development process were complete. This is likely to apply to the UN platform, but consideration (subject to financial resources) should be given to staffing a section of the organisation with technology transfer experts during an extended development phase –with technical expertise in the selected focus sectors, as well as in legal and financial issues relevant to technology transfer, these could be located in key developing countries. This could begin to replicate in a much more modest fashion, the structure of KOTEC/KTMS. It goes well beyond the brief of an online platform, but as has been emphasised, a free-standing online platform will be of limited value unless complemented by provision of necessary services. As and

when the platform gains traction and its usage increases, especially amongst technology service providers, it should be possible to scale back the 'in-house' provision of services.

7) Process is central: As will be evident from the above, the process through which the platform is established is as important as the structure. There is a lot of evidence that the process of establishing a platform is path-dependent, so that identifying the right initial steps, and their sequencing, and applying adequate resources to implement them, is essential. Doing the first steps right will make possible a 'virtuous circle' where early success breeds later success. The essential feature of any online platform is that increasing returns to scale can be achieved once a threshold level is passed in terms of usage by agents on both sides of the market. But reaching the 'threshold' level is difficult, and as the discussion above also illustrated, failure to get there is not uncommon – in other words, a vicious circle is also possible, leading to 'ghost town' platforms with little utility. The points above about attracting some 'anchor' corporate participants, about focusing initially on a few selected sectors, and about establishing an 'in-house' staff of technical experts and legal and financial advisors in a few selected countries, are all intended to support the platform reaching the threshold (though it is hard to specify the threshold exactly).

3.4 Architecture, functional requirements and user groups

The discussion above has already indicated the main points which need to be made in this section, which pulls the discussion together to outline the proposition for the UN platform. It is worth reminding ourselves that online matchmaking or search-oriented platforms – whatever the reason for the search, be it romance or technology – 'work' because they provide both economies of scale for the platform operators and economies of scope for their users, which includes ease of use and low transaction costs relative to alternatives. The architecture of a platform comprises four features: "a list of functions; the components needed to perform the functions; the detailed arrangement of and interfaces between the components; and a description of how the system operates through time and under different conditions. (Baldwin and Woodard, 2009, citing Whitney, 2004).

The functions of the platform are

- (i) to enable matchmaking between agents in different user groups – producer enterprises supplying and requesting technology – where matchmaking is taken to mean establishing initial contact with each other, to open an exploratory discussion (to take place offline) on a potential technology transaction between them;
- (ii) to enable one or both parties in a match arising from (i) to identify and make contact with agencies or experts who can assist them with the discussion and the transaction arising from the match in (i);
- (iii) to enable 'matchmaking' between producer enterprises and technology service providers outside the context of a specific technology transaction, where the former seeks the assistance of the latter in locating technology, whether via the platform or through other channels, and then in the transaction to bring it into the organisation;
- (iv) to host technology challenges and open innovation calls for corporations to find and implement technologies to support meeting the SDGs.

The user groups have been identified above:

- (i) SMEs;
- (ii) corporates;
- (iii) organisations supporting innovation and sector clusters, including regional and sectoral business associations, research institutes, universities, local and regional development agencies, venture capital and other 'upstream' finance providers, law firms with IP expertise;
- (iv) individual technical experts.

The components of the platform needed to achieve these functions are a database and a search engine to enable users to explore the database, as well as a submission portal for entries in challenges and open innovation calls. The database should contain a standard defined information set about each type of user, and submissions should be moderated and verified by the platform managing agency in collaboration with national network nodes, to ensure completeness and authenticity. For the SME user, the information supplied should include sector, size, technology fields of interest, as well as some fields which provide an indication of the innovation and technological capabilities and absorptive capacity of the enterprise and its management. Technology fields of interest – keywords – should be drawn from a specified list which would need to be maintained and expanded.

Other components should be aimed at animating the website for marketing purposes, such as rolling windows for advertising events and for displaying relevant tweets, or windows displaying success stories and testimonials.

The interfaces between the components should include a communication facility for initial contact between users, as well as some ability to indicate preferences ('likes'), and to 'save' results. The search engine should be able to produce multiple results from a single search. The submission portal for challenges and calls should have a security feature so that submitters' IP is protected. Another interface between the components should be a facility to host webinars via the platform, an important means for platform users to interact with each other.

As argued above, the governance structure of the platform should reflect a network of networks, with national network nodes in participating countries, along the lines of the SS-GATE network of country centres, or the EEN network. In both examples, the country nodes are agencies which are funded in country, either by public funds (national or EU) or else collectively by enterprises. Although it means that country nodes will devote resources to the platform only up to a level of their own choice, and the platform will have limited leverage to make demands on the nodes, this bottom-up approach makes sense since the platform, and the larger process of which it is a part, will only be effective if it is seen to be useful and to be meeting its goals.

The platform faces two challenges in regard to governance and the related issue of funding. The first challenge is that even if a decentralised, bottom-up network of networks model is the most appropriate and once up and running, it economises on operational resources from the centre, a network of this type would still require considerable resources, financial and human, in its start-up phase, to engage with key actors in the different user groups to develop a detailed understanding of their needs and incentives to participate. This may take time, as illustrated by the three- to four-year gestation period even for a small and focussed network such as NIA. It is however essential to

inaugurate the platform only once it already has acquired a minimum number of participants for whom it would be immediately beneficial, as the increasing returns nature of all online platforms implies a path-dependent process – a site that starts well is likely to carry on growing, a site that starts badly – with evidently limited interest and usage - will likely enter a downward spiral towards ‘ghost town’ status.

The second challenge which the platform will face is in regard to hosting open innovation calls and challenges, which may be an essential feature to attract corporate users, but which are unlikely to be effective unless the users are corporations – as the above discussion of private platforms and open innovation suggests, attempts to crowdsource on both sides of the market – technology supply and technology use – have not worked; what has worked is crowdsourcing technology supply for users who are willing to pay for the exercise and for the technology. On the one hand, open innovation challenges require considerable in-house resources in particular of technical expertise, as a key part of the offering from platforms to corporations to host these facilities, is that the platform provides initial screening and assessment of submissions, relieving the corporation of this potentially onerous task. It is unlikely to be possible for the platform, or the agency housing it, to maintain a permanent staff of technical experts to undertake these tasks. On the other hand, there are several private platforms already in the market providing hosting services for corporate open innovation portals or managing open innovation processes on a fee for service basis, so that the UN platform would be in effect entering competition with these existing platforms. One possible way to address this would be to work with one (or perhaps more) of the existing online platforms and to restrict the UN platform focus in relation to open innovation to niche areas or specific focus issues, such as innovations linked clearly and explicitly to achieving the SDGs. The private platform would then undertake the screening and quality control of submissions, and at the same time, expand their corporate, sectoral and geographical scope.

4. Part B: the benefits and financial costs of various options for the online platform

Part B assessment is based on the recommendations of the independent assessors delivering Part A assessment above. These assessors, being the Chinese Academy of Sciences and the Overseas Development Institute, have recommended to develop component (Dynamic Exchange of Knowledge, Experiences) as the basis for the online platform. The Part B assessment is structured around a set of questions that were provided to the assessor by the IATT secretariat.

4.1 Question 1

Do IATT's three indicative components/stages of an online platform (see Annex B) adequately inform Member States on possible cost and benefit scenarios? How can this summary table be extended to give Member States adequate information about possible costs and benefits of each option?

The independent assessment by CASISD for Part A of the Term of Reference (ToR) concluded that component 2 is the recommended way forward for the online platform. In particular (cited from the assessment):

“

- An information exchange platform should be established, and the functions are free to all users.
- Key functions of the platform include information repository, periodic updates, linkages with external websites, user uploading, information interaction, online learning, contents search and contents delivery.
- Main users of the online platform include public and private entities, decision makers, global technology users, international development organizations, entrepreneurs, academics and researchers, civil society and intermediaries. And different kinds of users of the online platform may possess different requirements.
- Main contents of platform include UN documents, policies, activities, news, cases, education resources, publications, and so on.
- Finally, key management points of the platform are reflected in the aspects of information management, user management, promotion, performance evaluation.

“

The independent assessment by ODI for Part A of the ToR states that the platform alone is insufficient and that additional measures will need to be taken to make it a success, particularly around service development, process management and facilitation capabilities of the staff supporting the platform.

For Member States to appreciate the costs and benefits of the above, DNV GL recommends that the summary table of Annex B of this report is extended to include:

#	Item to be added	Rationale
1	Vision statement	To remind readers of the overarching vision for the online platform, so that they can appreciate the proposed functionalities in context of the longer-term objective.

2	Benefit case	A statement of the intervention logic leading to desired outputs, outcomes and impacts that the online platform is aiming to create. Such a statement will offer readers a frame of reference to appreciate how the platform will do what it is intended to do.
3	(Prioritised) technology areas per SDG and prioritised SDGs	<p>The number of technology areas across SDGs to underpin the online platform will impact the cost and effort for, inter alia:</p> <ul style="list-style-type: none"> • Soliciting and agreeing content partnerships • Creating IT-interfaces with online (big and rich data) sources • Defining and agreeing terminologies to structure content on the platform and support the search facility <p>ODI's assessment suggests to focus primarily on productions sectors, including service sectors that impact the SDGs, such as health, education, renewable energy or water and sanitation. Clearly, the number of SDGs to be supported will impact the cost and effort. It is now assumed, given the focus on the STI forum 2017, that the initial set of SDGs is:</p> 
3	Desired languages, quality of translation and amount of translation	<p>The number of languages, quality of translation and amount of translation that the platform should be delivered will impact the cost and effort for, inter alia:</p> <ul style="list-style-type: none"> • Hiring translators (costs varies across a spectrum of bilingual volunteers, students and professional translators) • Number of words to translate (costs varies if one opts for full translation in all desired languages of all fixed and dynamic platform text)⁴ • Rephrasing technical content to fit the users' needs and backgrounds (so translating <i>within</i> the same language) • Design of the platform: more languages means that there will need to be more facilities to manage translations, more attention to page design and being able to handle design exceptions across languages
4	Target levels for users and usage	The target number of users and usage will provide an upper bound for the cost of the hosting infrastructure.

⁴ It is assumed that all uploaded content (reports, presentations, etc.) are left in the language it is authored in.

4.2 Question 2

Considering best practices, lessons learned to date and future prospects, what additional or refined scenarios, including evolution over time, may be worth considering?

DNV GL believes that the following additional and refined scenarios are worth considering:

4.2.1 Working on providing 'glue technology' to integrate disparate content sources.

As there is already a vast collection of sources with technology information to support SDGs, there is merit in pulling content from those sources using tools that can scan, label, sort and catalogue that information. These tools already exist in subdomains (e.g. climate change, renewable energy: e.g. www.climatetagger.net) and consist of a combination of a controlled vocabulary and software to analyse content on web nodes that have provided access to the tools. This approach allows each of the nodes to (selectively) link to sources on other nodes, thereby creating an eco-system of connected nodes, which each one specialising in their own area, but pulling in information from nodes that provide additional content that is relevant for the readership of the recipient node.

To achieve this for the online platform, it will require:

1. A coordinated effort to create the controlled vocabulary, either by harmonising existing terminologies or creating one standard terminology. Ideally, the vocabulary is not a flat list of terms, but a network of interconnected terms, so that it is possible to use the interconnections for making inferences: e.g. if the software finds technology content, labels it with an appropriate term in the vocabulary, it can 'know' that that technology is suitable for SDG 13, simply because the label is connected to that SDG.
2. Development of software to scan, label, sort and catalogue existing content, using the controlled vocabulary.
3. Equip the online platform with a search engine that can handle the labels provided
4. Continued maintenance of the terminology: this will be required as STI is a dynamic domain.
5. Promotion within and beyond UN organisations to facilitate adoption and connecting repositories to the UN controlled vocabulary.

4.2.2 Working based on open knowledge and open data

STI content delivery through an online platform will be greatly facilitated if such content is accessible through open, free digital channels and not hindered by expensive subscriptions or being locked behind passwords. The open science and broader open data movement could be embraced and accelerated if the online platform would be based on the same ethos and principles.

Integrating national and regional science, technology and innovation centres networks into a network (a network of networks)

Much of the STI content is available through national or regional institutes and networks promoting science, technology and innovations as well as global corporates. It could be considered to create a network between national and regional STI centres and networks (or organisations with a similar remit), through which seekers of solutions can be signposted to the right providers.

Combined with the scenario presented under 4.2.1, information provision to users can be augmented with additional services provided through such centres, such as advice on technology transfer, financing options, partnerships, etc.

This would mean that the team supporting the online platform in this alternative implementation scenario would require a skill set that is focussed on service development, process management, facilitation of brokering and dealmaking, over and above a skill set that is more IT-focussed.

This alternative implementation scenario is in line with the recommendations provided by ODI as part of the independent assessment for section A of the ToR.

Use technology transfer issues as an organising framework

The online platform is essentially there to aid technology seekers in identifying fit-for-purpose solutions for SDG impacts and creation of enabling environments for such solutions. Therefor the sourcing and vetting of STI information could be undertaken using the seven “C’s” for the Successful Transfer and Uptake of [Environmentally Sound] Technologies (United Nations Environment Program, 2003). These are briefly paraphrased from the original source below:

Context: technology transfer does not take place in a vacuum. The performance of a given technology is dependent on a wide range of factors, making identification of an environmentally sound or otherwise appropriate technology more complex.

Challenges: examples of challenges include shortfalls in technology creation and innovation, underperformance in technology sourcing, suboptimal enabling environments, and insufficient and unverified information. Small and medium enterprises are disproportionately impacted by these challenges.

Choice: a key aim of barrier removal is ensuring that technology recipients and users can make informed choices by being able to identify and procure the most appropriate technology for a given application in each locale.

Certainty: a lack of certainty, and the consequential high levels of risk, both real and perceived, are recognized as major impediments to the successful establishment and ongoing operation of functional markets. The common perception that many technologies are “emerging”, and hence “unproven”, means there is little confidence in their economic, commercial or technical viability. Removing barriers to technology transfer often translates into decreased risks and therefore increased certainty, for the key stakeholders such as the developers, suppliers, financiers, insurers, recipients and regulators. One example is ensuring access to sufficient, verified information. Risk assessment and management capabilities for financial institutions are also of special importance.

Communication: efficient and effective two-way communication and cooperation between key stakeholders will do much to remove barriers. Technology transfer often involves a dissonant mix of informal actors (e.g. innovators) working in formal and highly regulated settings. Effective communication is a requisite to harmonizing the contributions to the processes of technology transfer being made by diverse players.

Capacity: enhancing the transfer of technologies that support sustainable development is largely about creating favourable circumstances for technology transfer – ensuring all stakeholders have the ability (potential and realised) to fulfil their roles and meet their responsibilities, expeditiously. Generally, government is the principal player in creating an enabling environment for technology

transfer, but financial and insurance institutions and international organizations can also be influential. Capacity obviously includes finance.

Commitment: a joint commitment is required to overcoming the challenges, providing technology users with the choice they deserve and desire, increase certainty, thereby reducing risks, enhancing communication between technology transfer stakeholders and building and strengthening the enabling environment and thus the capacity for technology transfer.

DNV GL proposes that the platform is seeking to support sharing of good practice and lessons learned across these important areas of technology transfer.

These are the additional and refined scenarios that DNV GL offers for consideration.

4.3 Question 3

What are the cost implications, including through alternative implementation modalities if relevant (e.g. building from scratch; leveraging existing platforms through harmonization of interfaces; reduction of duplication and strengthening of synergies)?

To be able to appreciate the cost implications, it is important to understand the cost drivers for developing and maintaining an online platform of the recommended type (information exchange). Note that all costs are based on purchase of the goods and services from the commercial, developed countries' markets. Discounts or in-kind contributions are not assumed.

Cost driver	Cost elements	Comments	Estimate	Basis
Hardware	AV equipment for photography and moving image	IT hardware service provision included under hosting	\$ 2,000	3-yearly
Software	Development tools, issue tracker tools, content/digital asset management system, database management, community management, semantic and search tools, web reporting tools, security and access control management, translation management, newsletter tool, multimedia editing suite	Although it is assumed that open source software will be used, experience shows that a license budget will be required to develop and maintain the online platform	\$ 20,000	Annually
Hosting and support	Platform hosting fees for multiple servers, assuming a DTAP infrastructure (development, test, acceptance and production set-up), helpdesk, hardware and software upgrades and testing, security audits and risk management, domain	Hosting cost will scale over time as web traffic grows. This is factored into the estimate	\$ 15,000	Annually

	name registration and renewal costs			
Maintenance	Content partner connectivity maintenance Original content authoring, reviews, approvals and publishing ⁵ Platform functional modifications Platform reporting and evaluation Taxonomy maintenance and search engine tuning Community moderation Social media campaigning User management Web ranking optimisation	Assume 10 partnerships for each SDG, so 170 partnerships Assume 17 on-line communities that require moderation Best implemented through a small team of 4-7 staff led by P5-level manager plus flexible external support. It should be noted that the skill set of this team needs to be broader than 'just IT'. See recommendations.	\$ 500,000 for dedicated support team \$ 250,000 reservation for flexible external support	Annually
Planning and development	Platform vision development, strategy formulation, policies, standards and guidelines		\$ 100,000	One-off
	Marketing and promotions		\$ 100,000	One-off
	Architecture design		\$ 100,000	One-off
	Platform development		\$ 750,000	One-off
	Platform visual identity and user interface design		\$ 100,000	One-off
	User testing, measuring and evaluating user satisfaction		\$ 100,000	One-off
	Taxonomy development		\$ 250,000	One-off
	Project management		\$ 150,000	One-off
	Documentation		\$ 75,000	One-off
	Training		\$ 100,000	One-off
	Content development and integration planning		\$ 100,000	One-off
Governance	Advisory board inception		\$ 75,000	One-off
	Advisory board meetings	Assume 1/year	\$ 150,000	Annually
	Development of a content partnership ToR and governance thereof		\$ 250,000	Annually

⁵ Note: translation costs have not been factored in. These are covered separately in section 0 of this report.

The rounded estimates for the recommended scenario to be implemented are:

Development cost	\$ 2,000,000
Operational cost (annually)	\$ 1,200,000

To demonstrate early results to stakeholders, DNV GL recommends to adopt a modular, iterative approach following agile software development principles, after creation of a vision, selection of priority areas and specification of a software architectural framework.

When one regards the costs within this context of a modular, iterative approach, DNV GL proposes the following breakdown over time and functionality:

Phase	Description	Suggested Duration	Suggested Functionality Delivery	Estimate
Concept	Development and agreement of vision, value proposition priorities, roadmap, cost, success criteria, use cases and principles for development, short-term and long-term financing, governance design	2-6 ⁶ months	n/a	\$ 100,000
Inception	Team formation, detailing of use cases, technical strategy, set-up of work environment, release plan, governance initiation	1-2 months	n/a	\$ 100,000
Construction and Transition	Series of development iterations and releases	1 iteration and releases/month max, 15-20 iterations/releases	Progression through releases <u>focussed on</u> : 1. Establishment of architecture, web presence, brand/look-and-feel; 2. Search and retrieval; 3. Matchmaking; 4. Content partner interoperability; 5. Community support.	1. \$ 250,000 2. \$ 500,000 3. \$ 500,000 4. \$ 350,000 5. \$ 200,000
Operate and Support	Organisational: Develop and deliver content partnerships, governance delivery Technical: training, maintenance, back-up, improvement releases, translation ⁷		Focus is on (re)prioritising, strategy refinement and service development, expanding partner content visibility, improved matchmaking and match aftercare, community support, monitoring and evaluation	\$ 1,200,000 annually

⁶ Duration is highly dependent on ability to secure and release (short-term) funding.

⁷ Translation costs have been left out of the costing over time. Refer to Question 4 for cost indications for translation.

In response to the question around alternative implementation modalities, DNV GL suggests to consider the following:

- Additional cost efficiencies can be achieved through working entirely on open source principles. It should be noted that this may come at the expense of functionality and a requirement to have additional dedicated staff.
- Set-up of (sponsored) programming competitions for non-critical parts of the platform in the shape of e.g. hackathons or university projects.
- Development of partnerships with blue chip private sector players in the IT domain and beyond.
- Mobilisation of the wisdom of the crowd to source content for the platform, using a wiki-type modality of operation.
- Investment in developing semantic interconnectivity plugins to achieve an eco-system of content nodes that enhance each other.
- Demonstrate leadership in developing an open science/open knowledge movement around STI for SDGs.

4.4 Question 4

What are the cost implications for having multi-language version of the platform?

As with the previous assessment question, it is useful to understand the variables and cost drivers for translation.

The following variables are considered in the assessment. Where appropriate, an assumption is presented with respect to their values.

Variable	Assumed value	Rationale
Number of languages supported	6 official UN languages	The online platform is to be a prime UN channel for facilitating technology transfer and thus should be accessible in the official languages
Scope of translation	Only system menus, help texts and editorial content	It is too resource intensive to have third party content translated to 5 other languages
Required quality level of translation	Professional translation	The quality of the platform is in part determined by the quality of the texts
Number of pages	17 SDG goals, 10 main technology areas per goal, 20 subpages per technology area, resulting in 3,400 pages	The number of pages is a factor in the translation cost estimate
Number of original content words per page	500 words, resulting in 3,400*500 words = 1,700,000 words	The number of words per page is a factor in the translation cost estimate. The number varies between 300-1,500 and an average of 500 is assumed ⁸

⁸ Note: this is a low number of words, possibly lower than the current practice for UN-related platforms. However, web pages are best ranked and read if with fewer words.

Number of system variable words in the platform	200 words	These are the texts of menu items, button texts, error messages, etc.
Number of help pages	50 pages, 1,000 words, 50,000 words in total	
Number of taxonomy terms	10,000 words	The number of terms to label technologies and other interventions to achieve the SDGs
Per word cost of translation ⁹	\$ 0.12	This is for translation into one language

With the above, with an estimated total of 1,760,200 words, it is assessed that the following translation costs are implied for the online platform:

\$ 211,224 per language pair. Assume furthermore that the base language of the platform is English and that no incoming content is translated into any of the other official languages, there are five language pairs that need translation support, so resulting in a total translation cost estimate of just over \$ 1,000,000.

Note that the cost will be spread over time, as not all content will require translation in a one-off exercise. Cost efficiencies will be possible using other than per-word translation contracting principles as well as drawing on in-kind contributions, in-house translation services or translation crowdsourcing.

Note that no cost is estimated for deployment of copywriting and science communication skills, although they are likely to be an important success factor for the platform.

4.5 Question 5

What are the cost implications to develop a mobile App of the online platform?

It is estimated that a budget of between \$ 90,000 - \$ 150,000 would need to be reserved for truly interactive, native app that is available for both iOS and Android via the respective app stores. For a native, basic access to the online platform app with no additional functionality, a budget of less than \$ 50,000 is required.

In all cases, one should expect an annual cost for maintenance, which is estimated to be at 10% of the original development cost.

It is recommended that during the design stage of the online platform, principles of responsive design are embraced, so that the platform can be accessed through a smartphone or tablet browser easily.

⁹ Note: per hour or other bulk translation contracting are not considered here.

4.6 Question 6

How to identify the online system developer who will develop and maintain the basic online system?

DNV GL believes that a broader perspective should be adopted when developing the platform, as it is not a pure IT-project, as concurred by ODI. Aspects such as user community building, development of content partnerships, content validation, oversight, outreach to users, social media campaigning, inter-agency coordination, liaison with STI centres around the world, private sector engagement and secretarial support to an advisory board will all be critical to delivery success.

It is beneficial to identify a well-networked, neutral and respected hosting¹⁰ international organisation from amongst the STI Forum stakeholder base that will incubate the platform, arranges its promotion and oversees both its technical development as well as its content depth and breadth. DNV GL believes that UNDESA is well-placed to take on the hosting, given its current role in the STI landscape and coordinative action.

The host would report to an (advisory) board. The mandate and composition of the board co-varies with provenance of funds and other contributions to the platform's success.

Since the question focusses on identification of a system development, it should be noted that the development of the platform requires a distinctly different skill set than what is required in a steady-state. This may mean that two different service providers may be required over time: one responsible for development, and one responsible for maintenance.

In the selection procedure for an IT development partner, either directly via a call for tender against a ToR or via delegation to the host, it is recommended that the following aspects are considered:

- Competence and experience in online platform development in the context of international organisations.
- Proven track record in delivering semantic, interconnected web architectures.
- Experience with open data standards, web mining and content discovery.
- Professional issue tracking and version management.
- Partnership with web hosting organisation.
- Ability to deliver locally to facilitate coordination and communication.
- Experience with and commitment to documentation, training and hand-over to enable transition to a maintenance partner.
- Incentive-based pricing.

4.7 Question 7

How to ensure financial and technological sustainability of the platform until 2030 and beyond, given the vastly changing landscape of technology trends, and the need for ongoing substantive management (content collection and curation, facilitation of interactions, data analysis and results measurement, etc.) and technical maintenance (IT hosting, administration, feature improvements, architecture upgrades)?

¹⁰ Note: not an internet hosting party, but an organization, consortium or network that acts as the host for the entire service.

Since the recommendation emanating from the work performed under section A of the ToR is that the online platform is to be free for all users, it should be assumed that there will be no income stream from the user base.

Given the budget estimates provided in section 4.3 as well as section 4.4 of this report, structural funding will need to be available to sustain the platform until 2030, indeed exactly because of the vastly changing landscape of technology trends and required management effort.

There are several financing pathways which could be considered to (part)-fund the endeavour:

- Multi-year country donorships, preferably non-earmarked to enable dynamic allocation of funds to emerging tasks.
- Corporate sponsorships, either in-cash or in-kind. It should be arranged such that there is no market disturbance by commercial sponsors. A sponsorship program could be attractive to the business sector through additional brand value creation, networking opportunities or dissemination of information on technology solutions.
- Implementation of a staggered content partnership model. One functionality could be that solution providers can present their solutions in a virtual exhibition centre on the platform, for which they contribute a fee. The fee can vary using parameters such as organisation size, country of provenance, duration of exhibition, number of exhibits or number of visits to exhibit pages.
- Secondment programme that offers a rolling participation into the operations of the platform, thereby reducing staff costs. Secondees could be recruited from content partners of the platform and selected based on their affinity and experience with certain technology areas.
- In-kind contribution to platform oversight by the science and technology community.
- Adoption of alternative, cost-efficient implementation modalities as introduced in section 0 of this report.
- Forge an alliance of content partners that are interconnected through smart web interfaces, thereby reducing the cost of maintaining one, central platform.
- Promote a strategy of soliciting content from the crowd and create a STI for SDG Wikipedia, with oversight from the science and technology community¹¹.

Develop linkages with stakeholders with a view to creating a mutual necessity for ongoing use and development of the platform.

4.8 Observations, conclusions and recommendations

4.8.1 Observations

This section of the report is based on the results of the independent assessors (ODI and CASISD) provided earlier in this report.

DNV GL observes that the focus on the technical development of the platform may obscure the time and effort that needs to go into promotion, content management and community building.

Furthermore, as baseline figures were not available to DNV GL with respect to the number of STI areas as well as required depth of coverage of those areas, assumptions had to be made.

¹¹ Note: this model has been partly adopted by a knowledge platform for aviation safety, www.skybrary.aero, which is developed and maintained by DNV GL

4.8.2 Conclusions

This report concludes that the development and maintenance of the online platform, when implemented per the desired scenario, will require recurring financial and human resource, with an estimated \$ 2,000,000 to develop the platform and an annual \$ 1,200,000 to maintain it. If the requirement is to have translation into 6 official UN languages, an annual budget of \$ 1,000,000 should be reserved. There are alternative implementation modalities which can drive down cost and there is potential for attracting the required resource over the planned life cycle of the platform. It is also concluded that the skill set of the human resource should not be limited to the IT domain, but rather focus on service development, process management and facilitation of networks. This endeavour is not to be a project for which temporary financing is made available, but rather an enduring service provision that is developed and sustained over at least the next 10-15 years.

4.8.3 Part B Recommendations

The assessor for part B recommends that:

1. A vision statement is developed for the platform that covers intent, depth and breadth, governance, involvement of content partners and overall technical architecture.
2. The vision for the platform should recognise that it is not just about an IT platform but about creating and animation a network of actors in the STI domain, including national and regional innovation centres and the corporate private sector, with a focus on service provision for brokering demand and supply for STI content and subsequent deal making.
3. An overview is created of the various Science, Technology and Innovation (STI) areas that have an impact on the Sustainable Development Goals (SDGs) and a selection is made of focus areas therein.
4. A multi-year roadmap is developed that offers stakeholders an insight in the sequencing of activities and where they can contribute. Service development and process management is of key importance in making the platform and the technology transfer it seeks to support.
5. To demonstrate early results as required by stakeholders, DNV GL recommends to adopt a modular, iterative approach following agile software development principles, after creation of a vision, selection of priority areas and specification of a software architectural framework.
6. To focus on delivering a minimum viable product early on, to learn from user feedback, to build confidence with donors and to inform subsequent steps in the delivery roadmap. For this, the proposed iterations 1 and 2¹² would be particularly suitable and would define a first tranche of financial commitment from donors, following pre-build work on concept development and project start-up. The minimum viable product would need to be in English only.
7. When a development partner is identified for the platform, a broad skill set is demanded. The success of the online platform is not only dependent on its IT performance, but on other aspects as well such as community building, development of content partnerships, content validation, oversight, outreach, social media campaigning, inter-agency coordination, liaison with STI centres around the world and support to an advisory board.

¹² See table on page 39.

8. A specification is developed and agreed that details the platform functionalities such that an implementation partner can precisely budget development and maintenance cost. It is not required to have an a priori full specification: an evolutionary approach based on an agreed architecture will be better suited.
9. Various financing models are detailed and explored with stakeholders.
10. Seek to fund an enduring service provision that is developed and sustained over at least the next 10-15 years.
11. A project team is mobilised soonest to initiate platform and service development, to be led from UNDESA.

5. References

5.1 Platforms and organisations examined

The following organisations or platforms (websites) have been examined online (and via interviews as indicated). It is strongly recommended that the Group members themselves examine those indicated in **bold** and with two asterisks ** in particular, as well as others listed as far as possible.

5.1.1 Public sector

Note: The website information on ECCP, NIA/GCCA and SS-GATE was supplemented through telephone interviews with key personnel.

Asian and Pacific Centre for Transfer of Technology (APCTT, UNESCAP) www.apctt.org

China International Technology Transfer Center (CITTE)

****European Cluster Collaboration Platform (ECCP) (EU) www.clustercollaboration.eu (also interviewed)**

European Enterprise Network (EU) www.een.ec.europa.eu (Individual EEN country websites at https://en.wikipedia.org/wiki/Enterprise_Europe_Network)

Innovation Policy Platform (OECD & World Bank) www.innovationpolicyplatform.org

KTMS, online platform managed by Korean Technology Finance Corporation (Kotec) www.kibo.or.kr or <https://tb.kibo.or.kr/ktms>

****Nordic Innovation Accelerator www.nordicinnovationaccelerator.com and **Global Cleantech Cluster Association www.globalcleantech.org (also interviewed)**

SS-GATE (South South Global Assets and Technology Exchange, UN Office for S-S Cooperation) www.ss-gate.info (also interviewed)

Startup Nation Central (Israel) www.startupnationcentral.org

5.1.2 Private sector

Answer platform from Practical Action <https://answers.practicalaction.org/>

Crew on-line marketplace with estimates of 30,000+ app and website projects.

<http://howmuchtomakeanapp.com/>

CrowdSpirit (defunct)

Ideascale www.ideascale.com

Imaginatik www.imaginatik.com

Innocentive www.innocentive.com

Innovation Exchange (defunct) www.innovationexchange.com

NineSigma www.ninesigma.com

Patent & Licence Exchange (defunct) www.pl-x.com (inactive: defunct web page at www.crunchbase.com/organization/the-patent-license-exchange#/entity)

REEGLE thesaurus <http://www.reegle.info/glossary>

****Yet2** www.yet2.com

5.1.2 Reference sites for cost estimates:

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https://www.finance.wa.gov.au/cms/uploadedFiles/Government_Procurement/Website_Governance_Framework/website_cost_reporting_worksheet.xls

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6. Annex A: Cases of selected existing online platforms

In this part, several existing STI-related online platforms are selected from within and outside the UN system as benchmarks and best practices. As examples within UN system, CTCN, IPP and SS-GATE are selected. As for cases from outside the UN system, several ones from China, USA, Germany, Japan and Korea are analysed. Generally, the governance, objectives, functions, features, users, information and contents of these platforms are analysed. Besides, a further list of STI-related platforms is shown in appendix A, where more platforms from worldwide are included, and the key information about them is shown.

6.1. Relevant online platforms within the UN system

6.1.1 Climate Technology Centre and Network

<https://www.ctc-n.org>

Governance

The Climate Technology Centre and Network (CTCN) is the operational arm of the United Nations Framework Convention on Climate Change (UNFCCC) Technology Mechanism and is hosted by the United Nations Environmental Programme (UNEP) in collaboration with the United Nations Industrial Development Organization (UNIDO) and 11 independent, regional organizations with expertise in climate technologies.

The consortium partners of the CTCN include Asian Institute of Technology, Bariloche Foundation, Council for Scientific and Industrial Research, Deutsche Gesellschaft für Internationale Zusammenarbeit, Energy Research Centre of the Netherlands, Environment and Development Action in the Third World, National Renewable Energy Laboratory, The Energy and Resources Institute, Tropical Agricultural Research and Higher Education Centre, UNEP DTU Partnership, UNEP-DHI Partnership- Centre on Water and environment, United Nations Environment Programme, United Nations Industrial Development Organization, and World Agro forestry Centre.

Objectives

The CTCN promotes the accelerated, diversified and scaled-up transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries. It provides technology solutions, capacity building and advice on policy, legal and regulatory frameworks tailored to the needs of individual countries. The mission of CTCN is to stimulate technology cooperation and enhance the development and transfer of technologies to developing country parties at their request.

Functions

The main functions of the CTCN are to: (1) manage requests from developing country NDEs and deliver responses; (2) foster collaboration and access to information and knowledge to accelerate climate technology transfer; (3) strengthen networks, partnerships and capacity building for climate technology transfer.

The main services of CTCN are: (1) Technical assistance. The CTCN provides technical assistance in response to requests submitted by developing countries via their nationally-selected focal points, or National Designated Entities (NDEs). (2) Information and knowledge. The CTCN fosters collaboration and access to information and knowledge to accelerate climate technology transfer. (3) Network and

collaboration. The CTCN actively seeks members from all geographic regions with an array of sector experience. Membership is cost-free. Through its Network, the CTCN mobilises policy and technical expertise from academia, civil society, finance and private sectors to deliver technology solutions, capacity building and implementation advice to developing countries.

The activities of CTCN's Network includes: (1) Technical services. Providing technical assistance funded by the CTCN in response to developing country requests (selection conducted through a competitive bidding process among Network members). (2) Information exchange. Sharing/receiving information (data, lessons learned, reports, case studies) at CTCN events and via the CTCN's online knowledge centre. (3) Capacity building. Presenting online and in-person tutorials and workshops on your fields of expertise to peers and developing country stakeholders.

Operation

The Climate Technology Centre & Network facilitates the transfer of technologies through three core services: (1) Providing technical assistance at the request of developing countries to accelerate the transfer of climate technologies; (2) Creating access to information and knowledge on climate technologies; (3) Fostering collaboration among climate technology stakeholders via the Centre's network of regional and sector experts from academia, the private sector, and public and research institutions.

The CTCN consists of two parts: a *centre*—a coordinating entity located in UN City Copenhagen—and a worldwide *network* of organizations that delivers CTCN services—both virtually and actually. In short, the centre operates the network, and together they constitute the CTCN. The CTCN network is a wide and diverse system of international, regional and national member institutions. Serving as the core of the CTCN, network members respond to climate technology requests from developing country Parties to the UNFCCC. In addition, network members participate in CTCN events, exchange information, and provide experts for webinars, e-learning courses and other types of trainings offered by the CTCN.

Features

Through providing technical assistance, the Centre will receive requests from outside, then the Centre can quickly mobilizes its global Network of climate technology experts to design and deliver a customized solution tailored to local needs. The CTCN does not provide funding directly to countries, but instead supports the provision of technical assistance provided by experts on specific climate technology sectors.

Architecture

The visualization architecture of CTCN is shown as follows. The main modules of this online platform are consisted of: technical assistance, technology library, capacity building, network, and news & multimedia.

6.1.2 Innovation Policy Platform

<https://www.innovationpolicyplatform.org>

Governance and objectives

The Innovation Policy Platform (IPP), developed by the Organization for Economic Co-operation and Development (OECD) and the World Bank is a web-based interactive space that provides easy access

to knowledge, learning resources, indicators and communities of practice on the design, implementation, and evaluation of innovation policies. IPP is financed by the Competitive Industries and Innovation Programme (CIIP), which was set up by the World Bank Group, with the European Union (EU) and the African Caribbean and Pacific Group of States (ACP), along with the Governments of Austria and Switzerland.

The Platform helps users learn how innovation systems operate, identify good practices across different countries, conduct statistical benchmarking and devise and apply effective policy solutions. More broadly, it facilitates knowledge exchange and collaboration across countries and regions.

The Innovation Policy Platform (IPP) is a joint initiative developed by the OECD and the World Bank. The aim of the platform is to provide policy practitioners around the world with a simple and easy-to-use resource that supports them in the innovation policy-making process. This is done in two ways. Firstly the IPP provides comprehensive information about innovation policy, and secondly it facilitates collective learning about innovation policy, (both the conceptual and the how-to-do aspects), tailored to the needs of developing and developed countries.

IPP focuses its areas in: (1) Innovation policy platform; (2) innovation Financing; (3) Innovative Entrepreneur definition; (4) Entrepreneurial capabilities.

Functions and tools

- A living knowledge repository of publications, case studies, country profiles, and policy briefs drawn from the extensive experiences of the OECD, the World Bank, and other organizations.
- Communities of practice that provide meeting places to learn about and engage with current projects, events, organizations and other initiatives taking place in the field.
- An interactive data visualization tool that allow users to easily access and plot indicators relevant for innovation policy.
- A qualitative database of national policies and governance arrangements in support of science, technology and innovation policy design, implementation and evaluation.
- User-friendly site navigation and smart semantic linking that assists users in framing innovation policy issues and finding relevant content throughout the Platform.
- Search capabilities that enable easy access to the most current analytical work and operational know-how.

Users

- Policy makers who design and implement innovation policy
- Advisors and analysts who inform policy making through concept development, analysis and advice
- International organizations who work with countries to improve the design and implementation of innovation policies
- Nongovernmental stakeholders such as private sector firms, NGOs, and entrepreneurs engaged in innovation policy processes
- Students, including those participating in online learning courses hosted on the IPP

6.1.3 South-South Global Assets and Technology Exchange

<http://ss-gate.info>

Governance and objectives

South-South Global Assets and Technology Exchange (SS-GATE) was set up in 2008 by the United Nations Office for South-South Cooperation, SS-GATE promotes the identification, sharing and transfer of innovations and technologies between developing countries.

SS-GATE has designed an innovative matchmaking system through which developing countries can seek and obtain technologies and investments from private sector companies in other Southern countries in a number of key development sectors including health care, energy services, agricultural production, housing and infrastructure.

There are two basic components to the matchmaking system: (1) A website where Southern governments, institutions and companies can list specific needs for goods, services, information and resources – and where private sector companies in other Southern countries can offer services, products and/or financing to meet those needs; (2) Local facilitation and transactional support provided by SS-GATE country centres, regional hubs and the SS-GATE secretariat in Shanghai, China.

Features

SOUTH-SOUTH. SS-GATE enables Southern countries to have access to appropriate, adaptable and affordable research, policies, practices, technology and financial resources from other Southern countries.

TRANSACTIONAL. While most donor-supported initiatives focus on information provision, SS-GATE facilitates actual transactions through a market mechanism, offering both online and off-line end-to-end supporting services. This allows for transparent exchanges of technology, assets, services and financial resources.

ONLINE AND OFFLINE PLATFORMS. Transactions and services are supported both online via the SS-GATE website and in physical spaces via Country Centres located in numerous countries around the world, as well as regional hubs.

MARKET-DRIVEN. SS-GATE welcomes private sector engagement in solving the world's most challenging health and development issues and allows fair competition in a market-driven environment.

MULTI-STAKEHOLDER. SS-GATE endorses a multi-stakeholder approach to South-South and Triangular cooperation, engaging public and private sectors, academia and civil society and supporting public-private partnerships to enhance communication, coordination and collaboration to collectively achieve common goals for improving global health and sustainable development.

SUSTAINABLE. SS-GATE is designed to be self-sustaining, with a modest fee structure levied on successful transactions.

6.2. Relevant online platforms outside the UN system

6.2.1 Online platforms from developing countries

(1) Zhejiang Online Technology Market

<http://www.51jishu.com>

General information

Zhejiang Online Technology Market (ZOTM) was the first online technology market in China, organized by Zhejiang Provincial Government, Ministry of Science and Technology and the State Intellectual Property Office, and it was put into use in 2002.

Functions

The main functions of ZOTM include:

- Online Bidding. The platform provides an online “Bidding Hall”, including bidding for science & technology achievements and technical difficulties.
- Science & technology Mall. In this module, the platform provides four kinds of information: (a) demand of technology or service from firms; (b) science & technology service in aspects of patent, trademark, copyright and other firm businesses; (c) display of science & technology achievements including patents, trademarks, copyrights and technologies; (d) information about science & technology talents.
- Technology evaluation. The platform provides the service of technology evaluation using modern method, and this is helpful for investment, transformation, and licensing.
- Information about business, research, activity, and policy in relation to STI.
- Expert consulting. A large amount of researchers are involved in the platform to provide consulting for users.
- Experience database and weekly spotlight. This function allows users to share their experience and initiate discussions.

c. Key factors in management

- Member registration. The platform is generally an information repository, collecting information about technology supply, technology demand, policy, research, etc. Yet it also has some high-level functions such as technology evaluation, online bidding, contract registration and so on. While not all the functions are open to everybody, users have to register in the website to get access to some of the functions.
- Management of experts. In the expert consulting system of the platform, hundreds of experts in different areas from different provinces and different organizations are collected. The platform lists the location, experience, position, status, specialty of the experts, as well as their availability and consulting price.
- Link with external specialized technology market. ZOTM set a link with a specialized market for agricultural technology as part of it.
- Management of different levels of technology market. In the sub-provincial level, there are also some online platforms in Zhejiang, and they are linked with ZOTM.
- Combination of online platform and offline activities. The platform was managed by government before 2012, and the operation body changed to a firm since 2012. In the process of operation, the platform is connected with offline activities, such as the annual technology transaction week and the technology auction.

Portal of Chinese Science and Technology Resource

<http://www.escience.gov.cn>

The platform is the portal site for the Platform of the National Science and Technology Infrastructures (NSTI) which is supported by the Ministry of Science and Technology (MoST) and the Ministry of Finance (MoF) of People’s Republic of China.

Objectives

The website builds up the information sharing so as to realize material resource sharing through the information and networking technology. The website will 1) systematically integrate the useful science and technology resource and information across the main industries, national sectors, local and foreign organizations; 2) form the logical resource management pattern; 3) become the convergence center of resource information in China, the window of information publication and achievement layout, the platform of service sharing, the supporting system of resource management decision-making and the exchange center of science and technology resource and information domestically and abroad.

The mission of the website is:

- to facilitate the science and technology resource allocation and usage efficiently,
- to expedite the transform of the scientific research method,
- to ensure the equal opportunity for the whole society to share the science and technology resources and participate the science and technology innovation,
- and finally to promote the ability of the science and technology innovation in China.

Functions

The main functions of the website are shown as the follows:

- the integration of resources. The website integrates a large amount of technological resources information including research and test base and large scale scientific instruments, scientific data, natural science and technology resources, and technological literatures.
- the search engine of science and technology resource information database. The platform will provide the database search and navigation services for researchers through the website.
- the dynamic announcement of science and technology resource information;
- the achievement introduction of the Platform of the National Science and Technology Infrastructures;
- the navigation of science and technology resource websites.
- the website also possesses the functions of technological information release (including news), science popularization and display of the achievements of national science and technology basic conditions platform construction.

The columns are: Policy and Regulation, Standard and Criteria, Local Platform, International Exchange, Research and Experiment Foundation, Industry Innovation Platform, Resource Dynamics, Main Achievements and Join Us.

Contents

The website includes many information resources and resources information. These resources come from various professional platforms, joining units, social donation, purchase, exchange authenticated by the state formed under the basis of national science and technology basic platform, and the science and technology resource information audited at home and abroad.

The following resource information is integrated in the platform:

- Research base and large scale of scientific instruments The large scientific instruments, laboratory wind tunnel, measurement-based standard, analytical and test methods, and emergency cases and other information resources, as well as material erosion, ecological system, special outdoor environment and disaster and other resource information of national outdoor observation station.

- Scientific data Observation, survey and research data information in meteorology, sea, earthquake, earth system, agriculture, forestry, transportation, medicine and health, advanced manufacturing, geology and mineral resources, etc..
- Natural science and technology resources Animal and plant species, bacterial species, experimental materials, reference material, samples, human heredity and other resources.
- Scientific literatures Printed journals in foreign language, full text of journals of online version, Chinese e-library resource information, and state, industrial, local and foreign standard literature information.
- Local features of resources various local science and technological basic platform construction formed the characteristic resources information, including industrial technology innovation, commercialization of scientific findings, and local technological information, etc.
- Technology Website Cluster Link to hundreds of professional science and technology sites of the industry, department, locality and foreign countries, forming a technology website cluster with extensive coverage and rich content
- Special technology resources information. Some key and hot issues for the social development also forms knowledge service topics in the website, for instance, automobile, environmental protection.

d. Featured services

Special service is a kind of special resource service method of the website for the national major emergency, users' demands and hot issues. The special services shall focus on the current hot issues to carry out re-organization and display of the scientific resources. The website provides special topics for foods safety. The topic subject covers the food production standard, toxic substance detection, emergency event analysis associated with the food safety fields, and many other kinds of high-quality scientific resources. Recently, for the farmer's disease treatment, the special topic of "population and health science and technology resources serve for three-tire health care network" is developed.

e. Access

The website is open to the whole society; which provides information technology resources navigation, special service introduction and valuable information resources personal services for the majority of scientific and technological personnel and the public. Users realize single-point login with other scientific resources websites by registration on the website, and carry out operations such as order of large scientific instruments and equipment, and ordering of literatures and resources, and access to the one-stop services provided by the resources owners.

(3) China Technology Exchange-JiE Website

<http://www.ctex.cn/>

a. Basic Information

The China Technology Exchange is a technology transfer platform co-established by the Beijing government, SIPO, and Ministry of Science and Technology on August 13, 2009, registered as a limited responsibility company. The registered capital of the company is 224 million RMB. Building on the innovative idea of service "Technology+Capital+Service", the China Technology Exchange aims to build a "technology exchange online platform", a "technology financing innovation platform" and an "operating platform for the commercialization of technology policy". By cooperating with consulting firms, brokerage firms and evaluating agencies, China Technology Exchange provides

reasonable-priced and efficient services for the commercialization of intellectual properties, such as patented technologies and brands, in the forms of transference, permit, stock purchasing, financing and merger.

The China Technology Exchange established JiE Website, an Internet-based technology exchange platform, with the purpose of advancing the normalization of technology trade system and procedure, standardization of technology information publication, the integration of intermediary services, and the real-time implementation of bidding, to enhance the efficiency of technology trade market. China Technology Exchange went online on December 18, 2014. It offers market services to the participating parts of technology transactions and provides a combination of on-line and off-line services. All the transaction partners, as well as the intermediary agencies and government agencies engaging in the transactions, can register as members of the website. The JiE Website not only charges service fees for every completed transaction but also pays the commission to the participating agencies, providing the agencies and individuals with strong incentives to participate in technology transfer exchanges.

b. Main Functions

Until early 2016, the JiE Website has accumulated considerable popularity in China and became one of the leading technology platforms in the field. It has also built 48 branch platforms and a state-wide network. At present, the Ji E website has published 60 thousand project threads, and attracted both over ten thousand registered members and 1 million visits per year.

Online Bidding

The Website provides online bidding services for batch transfer projects, which allows buyers to engage in the online biddings for technologies, patents, brands and technology enterprises' equities.

Online Roadshow

Targeting at key projects and key partner organizations, the online roadshow service provides the technology demanders and technology providers with project exhibition services and channels of communication. In terms of roadshows for projects, with the purpose of offering better service to innovative enterprises, in the close to a hundred roadshows it organized, the JiE Website has improved the delivery of information to investors through the marriage of programmes, animation productions and interviews.

Online Exhibitions

Organizing online exhibitions integrates online and offline exhibitions, which has attracted more visitors and made matchmaking easier.

Building Branch Platforms

Based on industry and regional industrial distribution, the JiE Website provides platform building services for public institutions and technology transfer institutes. The platform's professional services support the regional innovation system constructions in various fields, forming professional services covering online and offline, software and hardware, information technology support and commercialization of scientific and technological achievements.

Distinct Platform for State-owned Technology

The JiE Website developed a “trading system for State-owned technology and scientific achievements” and a “publicity system for state-owned scientific and technological achievements transactions” and they are put into use in October 2015. The “state-owned technological and scientific system transactions” provides a formal and transparent pricing mechanism for research institutes and universities, to build bridges between capital and the achievements. Meanwhile, the “publicity system for state-owned scientific and technological achievements transactions” offers synchronized publication systems both on and off the field, making the publication of the commercialization of technologies more balanced in a commercialized demonstration. Furthermore, the system is an independent running unit that preserves the fourth party channel of supervision.

c. Features

Mutual Complementation with Other Internet-based Platforms

Besides JiE Website, China Technology Exchange also participated in the establishment and management of “Zhongguancun technology transfer and Intellectual Property Platform” (<http://www.zgcipex.com/>), which shares the same database with the China Technology Exchange. The platform possesses two types of functions: technology transfer functions and intellectual property functions. And its main uses include enterprises, research institutes, universities, industry associations, industry alliances and investment agencies. Given the fact that the JiE Website is also created and managed by the China Technology Exchange, it can coordinate with the “Zhongguancun Technology Transfer and Intellectual Property platform”. This conclusion is supported by the evidence that same information was posed on both the JiE Website and the “Zhongguancun Technology Transfer and Intellectual Property Platform”.

Coordinating with the innovative service of China Technology Exchange

Aiming to provide high-quality retrieving, consulting, exchange and business services, the JiE Website-initiated IPOS was launched in August, 2010. The China Technology Exchange also offers other services, such as intellectual property factoring platform, technology consulting, technology trust, patent value analysis and patent auction. Since it is the China Technology Exchange that offers all the services, the JiE Website can integrate the above services and improve its functions.

The Integration of Online and Offline Services

One of the main features of the Ji E Website is its ability to integrate on-line and off-line services. It provides various types of services, including policy consulting, directional technology matching and roadshows, enterprise demand research, technology agents training, public innovation consulting, park planning and investment attraction, forming a personalized and efficient new model of technology transfer services and promoting the commercialization of scientific and technological achievements. Relying on the technological and scientific resources in universities, research institutes and technology enterprises, the China Technology Exchange has established cooperative relations with numerous renowned agencies in the field throughout world, including law firms, accounting firms, asset valuation companies and bidding & tendering companies. Besides, the China Technology Exchange has been attempting to build a state-wide technology service network. It has established a branch office in Yangling, a trading center in Chengdu and numerous work stations in

Changsha, Shenzhen, Dongguan, Ningbo and Fuzhou. For this reason, the Ji E Website can make use of the off-line resources provided by the China Technology Exchange and enable the delivery of messages via its online platform.

(4) Keyi Website

<http://www.1633.com/>

a. Basic Information

Branding itself as a superb technology transfer platform and a basic service provider for technology market, the Keyi website - - was established by Xiamen Zhongkai Information Technology Co., Ltd. in May 2007. The platform integrates E-commerce services and technology transfer services, providing key supports at the joint points of technology transfer, such as exhibition, marching, pricing, and forming a set of mature and pragmatic market operation rules and norms. In terms of the integration of technological resources, the Keyi Website aims to improve the abundance and efficiency of resources, to motivate the technology contributors and to integrate the relationship between business and technology. In terms of regional services, as a basic service provider for technology market, thanks to the Keyi Website’s innovations in the field of system, policy and service, it has developed a distinct model of operation in regional technology markets and an effective, sustainable and expandable regional technology innovation service system. The model of operation has been adopted and proved effective in places, such as Siming in Xiamen Province, Xian in Shaanxi Province, Gaochun District in Nanjing City.

b. Key Services

Technology Transfer Services

The Keyi Website has developed new methods of technology resource collection and of presentation by offering high-quality services and improving good experience. It improves the efficiency of the platform by giving its members the freedom to publish key resources. To meet the medium and small enterprises’ demands, the platform has created tens of thousands of multidimensional topic seminars and expert consulting centers with the purpose of integrating and manufacturing technology resources. After seven years of hard work, the team has accumulated abundant and efficient resources (table 6.1).

Table 6.1 Projects of Keyi Website

Projects	Number
Exchangeable Technological Achievements	240 000
Experts	Over 60 000
Cooperative Agencies	Over 1 000
Centers for Technology Consulting	Over 30 000

Procedures

The Keyi Website integrates E-commerce services and technology transfer services, developing the technology transfer whole-process service. It has created a pricing evaluation service system for technology transactions, which provides its members with reference materials regarding the pricing of technology. It also created an online trade show service system in order to facilitate communications between experts and enterprises. In addition, the Keyi Website initiated the technology transaction service system, aiming to solve the three node problems in technology exchanges, including the guaranteed payments for capital, the capital security technologies, and the norms of off-line services, in order to improve the success rate of the commercialization of technological and scientific.

Technological Innovation Service System

Under governmental guidance, the Keyi Website's regional technological innovation service system pursues market-oriented operation and adopts the "1+1+N" structure. The First "1" refers to the competent department of regional technology innovation service system, as the competent authority for regional technology. Its main responsibilities include purchasing professional services, proposing platform policies, and guiding direction of work. The second "1" refers to the basic service providers for the commercialization of innovative system, whose responsibilities include providing supporting services for the service agencies entering the platform. The "N" refers to the technological innovation-related professional service agencies, including the centres for technology transfer in universities, industry alliances, financial service agencies, intellectual property service agencies, testing service agencies, industrial design centres, as well as advisory and training agencies.

After years of exploration, countless innovation attempts and long-term resource accumulation, to fill the void of good-quality basic service providers for innovation technology provider, and to actively play the role of innovative technology provider, the platform provides manufacturing and exhibition services for service agencies and local enterprises, organizes all sorts of matchmaking events, solves joint issues in technology transfer, such as pricing, guarantee payment, service payment, designs platform norms and establishes credit and evaluation system. These measures are expected to create an open, efficient and sustainable regional technological innovation environment and to improve both the service environment for agencies that entered the platform and the service agencies' ability to provide services, satisfying the needs of enterprises seeking personalized technology transfer services.

(5) China: ScientistIn

<http://www.scientistin.com/>

Overview:

The ScientistIn aims to be a leading company of sharing expertise and learning, launched in 2013, its main work is to match need and solutions for researchers, scientists and entrepreneurs or local governments. Besides the searching functionality, other functions of ScientistIn are available for registered users only.

The core visions of the ScientistIn are:

- 1) Finding the value in knowledge
- 2) Share expertise and learn.

Operation

Briefly, ScientistIn operates through both an online communicate platform and a search engine, which work in concert to match need and solutions, for users to find solutions or publish requirements.

The ScientistIn modle incorporates two mechanisms:

1. An online communicate platform similar to Social Networking Services
2. A search engine for users to search for the experts in specific area.

For the Social Networking Services. Before the registration visitors make a selection for the role. Specifically, the role of expert can be regard as a solution provider. In contrast, the role of customer tend to be a solution seeker.

In addition, it is a somewhat complicated process of registration, verify of Email address and mobile phone will be required.

For the search engine. It seems that this type of search engine is based on published papers and patent literatures, then classified the authors or inventors by means of extract information from these materials. Furthermore, ScientistIn provides a range of consulting services and technology expertise to premium users based on the database, which also composed of papers and patent literatures.

User experience

According to CASISD's experience, because of the special business models of ScientistIn, most of its services are available to enterprise users or premium users only. That is to say, as for a free user, just the service of Expert Finding was experienced by the way of the search engine provided by ScientistIn. To be honest, the function described above does not differ from other databases such as CNKI.net. In conclusion ScientistIn seems to be a commercial platform rather than a free one.

(6) India: The innovation technology platform

Basic information

Background: Sustainable development is a major challenge and opportunity in India. To drive its sustainability agenda further, India needs an inflow of both capital and innovative technology solutions. Energy and environment are critical to the growth trajectory and the Innovation Technology Platform is targeting to bring the global best in bridging technology gaps whatsoever. Hence, it is the main objective of The Platform to connect technology innovators with Indian project opportunities

Coverage area: India

Technology focus: Related environment fields (energy, water, waste, climate change etc.)

Gaps: Information is not updated in timely, not enough information on the website

Type of information: Services information; Projects information; Events information

Main target users:

1. the technology developers
2. the solution seekers
3. Government authorities
4. the research and development fraternity

Architecture: The visualization architecture of FK is shown as follows. The main modules of this online platform are consisted of: About, Services, Partners, Projects, Presentations Events, Q & A, Contact,

Characteristic: specialization

Objectives

First, help India come to terms with its challenges by attracting cutting edge technologies and best practises across its most challenged sectors.

Second, connecting companies and institutions with their Indian counterparts and/or with concrete Project Opportunities in India. Supporting with know-how, hand holding and potential finance (intended Sustainable Development Impact Fund) to reduce overall challenges and risks implied by doing business in India.

Third, the opportunity mapping would be available to the companies participating in the Platform. After careful screening of innovative technologies, the Platform aims to provide an interface between solution providers of countries and project proponents in India. It is also possible for a company to approach the Platform on the basis of defining the solution and benefit it provides and the platform will evaluate the interest in India.

Lessons in terms of management

The innovation technology platform keep Close connection with big company. It works in close contact with major Indian companies to provide guidance and advice to international companies wishing to bring cutting edge technology to the market. The Platform is currently working with IL&FS (Infrastructure Leasing and Financial Services Ltd.), India's leading Infrastructure and financial services firm which has a long history and experience in the country with regards to developing technology and infrastructure across over 30 sectors. The Platform with its partners seeks to provide technical know-how, substantial execution experience to help provide guidance and implementation of pioneering solutions to the country.

6.2.2 Online platforms from developed countries

(1) USA: Yet2

<http://www.yet2.com/>

General information

Yet2 was founded in 1999, invested by 3M, Siemens, Bayer, Honeywell, DuPont, P&G, Caterpillar and some other multinational corporations. Yet 2 is a pioneer in using online platform to realize technology transaction, and it has more than ten thousands registered members all around the world. The position of Yet 2 is a global open innovation and technology scouting services company with offices in the US, Europe and Asia.

Privately owned and managed, yet2 deliver for clients on a global scale and offer a bespoke service to the specific regions, enabling global companies of all industries to collaborate on a variety of technology transfer initiatives supporting their business growth through external collaboration. Yet2 works across a range of company sizes and engages with: Global 1000, Small/Medium Enterprises, Venture Capitalists, Incubators, Accelerators, Research Institutions and Technology Brokers.

Yet2 is a global platform with comprehensiveness information and functions. The main information includes: 1) Patent Transactions; 2) Active Projects information; 3) Media information (Technology Marketing Report, Open Innovation Newsletter, Tech Need Challenge etc). And the main targets are: 1) Global 1000/Small/Medium Enterprises; 2) Venture Capitalists Enterprises; 3) Incubators; 4) Accelerators; 5) Research Institutions; 6) Technology Brokers.

Architecture of the platform

Seen from the homepage of the platform, its architecture is consisted of six parts.

- About. The mission, history, management team, and careers of the platform are introduced.
- Services. This part includes the main services of the yet2, they will be shown in detail later.
- Case studies. This part included the cases that yet2 finished in aspects of technology scouting, OI consulting, patent transaction, strategic deal flow, business development, deal support, etc.
- Active projects. This part displays the active projects of yet2.
- Media. Reports and news are included in this part.
- Contact. The contact information of yet2 in North America, Europe and Asia are given in this part.

Main services

- Open Innovation Consulting. Yet2 works with companies thinking through many different challenges and questions and helps them identify the next steps for effective execution.
- Technology Scouting. Yet2 employ a range of methodologies, networking and search tools to execute customized projects for clients with a focus on bringing only commercially-viable opportunities to the table. Their technology scouting services can be delivered in three ways: Topic Specific Scouting, Strategic Deal Flow (annual retainer, broader topics), and Innovation Tours/ Virtual Hubs.
- Out licensing technology. yet2's out licensing and business development division works with companies looking to find new markets and applications for their technology solutions.
- Open Innovation Portal Management. yet2 provides a fully customized open innovation (OI) portal and submission management system aligned with corporate branding and message helping companies attract and find new and emerging technology and market opportunities.

- Patent Transactions. yet2 assists clients on several aspects of building a patent acquisition program, including identifying target patents, monitoring market activity, filtering patents for transact ability and advising on direct patent purchases. Their proprietary patent scoring algorithm speeds both our evaluation of portfolios and our clients' prioritization of available portfolios. Their database of patent assignments enables users to efficiently monitor transactions made by both competitors and non-practicing entities (NPEs). In addition to their buy-side services, yet2 also serves as a trusted IP broker advising on how best to monetize your existing patents to achieve maximum market value. They provide guidance on how the market will respond to the offering, prepare marketing materials and communicate directly with their network of global patent buyers.
- Yet2 Marketplace. The yet2 Marketplace has been connecting technology sellers, buyers and brokers since 1999 and was the first cross-industry global marketplace for technology transfer.

Focus of technology fields

Yet2 have knowledge of working across all sectors but have a pedigree in the following specialisms:

- FMCG (Personal Care, Homecare, Food & Beverage)
- Automotive/Aerospace
- Healthcare & Life sciences
- Electronics
- Sustainable and Natural Materials
- Chemicals
- Oil & Gas
- Digital
- Manufacturing & automation

Strength and weakness

Firstly, yet2 is very experienced. Yet2 considerable experience has made it proficient in articulating technology needs and technology value propositions for clarity and broad industry interpretation; Yet2 are experienced deal-makers who know how to ask the right questions and set the right expectations. With over 16 years' experience of successfully delivering over 10,000 introductions for its clients. Secondly, various types of customized services. Yet2 then provide a range of Open Innovation services to enable an organization to execute successfully against their OI strategy whether for existing, adjacent or new technology and market opportunities. And its execution methods are high touch, collaborative and interactive enabling iterative refining of the strategic goals and even changing the direction of projects when needed. Some of these challenges can be addressed by our highlighted services, for others yet2 provide a more bespoke service. Last, Anonymous services can protect privacy. Yet2 say they understand that discretion is necessary in many cases, and it can give customer total anonymity when required.

Although there are many advantages, but there are also weakness YET2. For instance, Yet2 invested by some big companies, so it may be unfriendly to small companies and non-member companies. On the other hand, too many services make it is not a single service which is the best.

Lessons in terms of management

Yet2 has a team of technology broker to provide personalized service for technology providers and demanders. For the technology provider, the company helps the customer to identify and select the target application area, draft the introduction document, promote the technology through the

network and personal relationship, and assist the customer in the transaction and negotiation. For the technology demanders, the company's consultants help customers determine technical requirements, identify possible solutions, and maintain the confidentiality of communications documents, companies use a worldwide information network and professional looking for customer needs, and then according to the needs of customers will be screened, the most suitable technology solution to the customer review. Once the customer finds the appropriate technology solutions, the company will assist the customer to communicate with the technical supplier to achieve the transaction.

(2) USA: Experiment

<https://experiment.com>

Experiment is an online platform for discovering, funding, and sharing scientific research. It is based in New York City, consisting of scientists, designers, and technologists passionate about helping ideas grow. The mission of Experiment is to democratize science.

Backers of the platform directly fund the project scientists, so there is no overhead involved (compared 50-60% when receiving a grant at a university). Experiment is an all-or-nothing funding platform. This means the project must reach the funding target, or no one's pledges are charged. Anyone can start a new experiment, as long as the results can be shared openly. All projects are rigorously reviewed, provided feedback, and scientifically approved by the Experiment team. Scientists share progress, data, and results directly with backers, many widely available as open access and citable.

(3) Japan Technology Exchange Market Corp.

<http://technomartga.com/>

History

Authorized and managed by the Japanese Ministry of Economy, Technomart was established as the first institute specialized in technology transactions in 1985. Its mission was to collect and manage information that are key to the reinvigoration of manufactory, business and mining industries, and to submit the information to enterprises, with the purpose of not only promoting interactions between different regions, between different industries and between different enterprises, but also narrowing the technology differences between different industries and strengthening Japan's industrial base. The Japan Technology Exchange Market Co., adopts a membership system. Members are classified into three categories: regular members, information members and sustaining members. The members can enter the platform via E-Technomart and can participate in the various technology-related seminars and meetings undertaken by the Technomart. The Japan Technology Market Exchange Co., began to take charge of patent circulation promotion business after the authorization from the Japan patent office in 1997. After its disbandment, Technomart's business was assigned to the Japan Institute of Invention and Innovation, the Japan Patent Information Organization and the Japan Industrial Location Center.

Japan Institute of Invention and Innovation undertook patent circulation assignment dispatch business and intellectual property breeding business. The Japan Patent Information Organization

undertook the patent circulation database exposed business services. And the Japan Industrial Location Center's newly-established technology trade market departments took charge of membership-based technology transfer service. After the reform in June 2006, the Technology Trade Market Department was disbanded and the Japan Industrial Location Center was transformed into an incorporated foundation. Thereafter, the Japan Technology Exchange Market Co., was established to take over the business of the Technology Trade Market Department in 2008. The Japan Technology Exchange Market Co., is dominated by the staffs that used to work for technology trade marketing department. One example would be its head, Yoshi Tanaka.

Operating Model

Given that the Japanese Technology Exchange Market Corp., is a private joint-stock company, it is not affiliated to any institutes. According to Yoshi Tanaka, despite that the Japan Technology Exchange Market Corp., operates as a private enterprise at present, it aims resume its technology transfer intermediary business and conducting other business on the basis of the network of the Japan Technology Exchange Market and of the Japan Industrial Location Center, so as to transform itself into a business corporation and to absorb member business, applying for financial aid from the government. President Tanaka asserts that the development of technology exchange hinges on the level of financial aid from the government. The main reasons behind the collapse of Japan Technology Exchange Market Corp., include the loss of participating member enterprises, and the decrease in both the number of technological transactions and financial support from government.

The Japan Technology Exchange Market Corp got information from three sources: the patent database in the National Center for Industrial Property Information and Training (INPIT), its communications with enterprises entering all sorts of exhibition meetings, technology enterprises participating in various technology transfer exhibitions, and its partner institute overseas. Japan Technology Exchange Market Corp., provides the following services: organizing meetings for the technological transactions that benefits small and medium-sized enterprises, along with venture capital corporations; serving as intermediary between the enterprises seeking technologies and technology providers; providing support for the development and selling of related application products; training International personnel through both Japanese and foreign language schools.

State of Operation

Since its establishment in August 2008, the company has been in the midst of a losing streak—it has facilitated very few technology transactions and earned slender margins. This disappointing state of operation can be explained by several factors. First, the traditions of technology transfer in Japan are different from that in other countries. In most of cases, rather than selling the ownership of their technologies, technology providers prefer to transfer use permits—usually five years, to the enterprises seeking technology. And only after the transferee companies launch production and make a profit are they obliged to pay brokerage fees to an intermediary, which significantly has shrunk the profit made by intermediaries. In addition, the lion's share of intermediaries' customers is medium and small-sized enterprises. The technology transactions between large enterprises, however, are usually carried out in the form of bilateral exchanging technology use permits. In this process, the large enterprises are not required to resort to intermediaries, which have shrunk the revenue of technology transactions overall. Finally, due to their concerns on maintaining their pre-eminence in a certain field, technology providers in many cases refuse to participate in technology

transactions. The three factors jointly explain the small number of technology transactions and the failure of Japan Technology Exchange Market Corp.,

(4) Germany: Innovation Market

<http://www.germaninnovation.org/>

The Innovation Market was founded in 1998 as an effort of the German Ministry for Research and Education to facilitate communications between inventors, funding providers and enterprises. The information on the website is categorized into three topics: innovations seeking funding, innovations seeking enterprises, enterprises seeking innovations. To guarantee the quality of its services, Innovation Market's 18 innovation partners in Germany are responsible for scrutinizing all the technological materials posted on the website. Besides publishing technology transaction information, the Innovation Market also provides other technology transaction-related services, such as report writing, technology assessment, operational planning and legal consulting.

(5) Korea Institute for Advancement of Technology

Founded in April 2000, the Korea Institute for Advancement of Technology (KIAT) - <https://www.kiat.or.kr/site/engnew/index.jsp> - is a technology transfer-promoting organization established and funded by both the South Korean government and the private sectors in the country. It is affiliated to the Ministry of Trade, Industry and Energy in the South Korea. The KIAT aims to establish a technology transfer system for public and private sectors by building a national-level technology transfer database and network. The model it adopts for promoting technology transfer involves technology transactions, technology assessment, as well as enterprise merger and acquisition. Thanks to its advanced operating mechanism, the KIAT has become the largest national-level technology transfer institute in South Korea.

2.3 International online platforms

(1) Feeding Knowledge

Basic information

Feeding Knowledge (FK) is under the Expo 2015 Program for cooperation on research and innovation on Food Security. The Program will contribute to building up the Legacy of Expo, whose claim is: "Feeding the Planet, Energy for Life". Feeding Knowledge has been developed and managed by CIHEAM-IAMB and Politecnico di Milano-METID. Its service covers most of the Mediterranean area, and it focuses on technology of Food Security to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

The information on FK includes: 1) Database, including experts, organizations, research and free sources (e-books, links etc); 2) Event information (Mostly about EXPO); 3) information on best Practices. The main target users are agricultural and rural players. The architecture of FK is shown as follows. The main modules of this online platform are consisted of: e-Collaboration, Database, Best Practices, Local Point & Events.

Strength and weakness

Make full use of EXPO as a platform to reach broad stakeholders across a wide range of institutions and geographies. As a worldwide exhibition, EXPO attracts a large number of tourists as well as experts and scholars. EXPO can lead to more attention to the platform. (At the Conference Center of Expo Milano 2015, the week from the 7th to the 11th of July was dedicated to Best Sustainable Development Practices with more than 600 participants from all over the world)

But the weakness of this platform is also obvious. First, this platform is based on EXPO, over time, people will gradually forget EXPO, and then the role of this platform is minimal. Secondly, the field of this platform is only the field of food Security, too specialized information will lead to less information useful to users. Finally, this platform is completely free, there is no way to profit will lead to loss of the platform

Lessons in terms of management

A new concept was invented by FK that calls "Local points" that play a key role in Feeding Knowledge Program, acting as "amplifiers" of the scientific Network at the local level and as a "hub" for stakeholders needs. By Local point which supporting the enlargement of the Euro-Mediterranean scientific network at the local level through the identification and invitation of experts and organizations, FK could generate and maintain active traffic of interactions. And FK also promoting the debate on white papers, stimulating contributions from local researchers and experts, it could accumulate and renew relevant and timely knowledge repository by experts.

(2) Nordic Innovation Accelerator

Basic information

Nordic Innovation Accelerator™ is an Open Innovation platform. NIA's services include the Call Catalyst & Match Maker online tools and the Cleantech Venture Day™ -event. NIA offers companies an opportunity to showcase their innovations on an international forum and for corporates a way of finding new solutions. Nordic Innovation Accelerator focus on clean technology, and covers a geography of all around the world.

Its type of information includes Call Catalyst, Match Maker and Events information. The main target users are SMEs & startups, corporates, investors and clusters. The visualization architecture of FK is shown as follows. The main modules of this online platform are consisted of: CALL CATALYST, MATCH MAKER, NEWS & EVENTS, ABOUT & PARTNERS.

Strength and weakness

NIA has great network around the world and cleantech filed. NIA is co-founder and holds a seat in the Global Cleantech Cluster Association (GCCA) Management Team: global access to capital, corporates and markets to drive global clean technology deployment. Excellent background and network makes the platform has strength.

But there is also a disadvantage that must be mentioned, that is the available information on the site is less. In order to get more information, the user must register. In addition, the website is unfriendly to overseas visitors

Lessons in terms of management

NIA has 2 great services tools, which ensures the continued profitability of the platform. The first one is called CALL CATALYST, with this tool, large corporates search for innovative solutions for their challenges. And offers an effective way for large corporates to find solutions for renewal and a way for start-up and growth companies to find new business opportunities. This approach gives the growth companies a direct link to offer the solutions to the right person at the corporate level. For Corporates this is a simple way to find best solutions to support their own R&D. The second one is called MATCHMAKER. NIA is an international, open business network where you can find an INVESTOR or a PARTNER. The Match maker tool offers you a platform to present your company to international investors and easy access to contacts with potential partners. These two tools can provide accurate services for different needs

(3) NetKite

The title:

NetKite: European project aiming at setting up a cross border network, focused on established or new public/private partnerships and inspired by Open Innovation philosophy

Keywords:

Business Incubation, Technology Transfer

Overview:

Launched in 2013, NETKite is a Euro-Mediterranean cooperation program, which is supported and funded by ENPI CBC MED, carried out in partnership with six organizations from Cyprus, France, Jordan, Egypt, Tunisia, the Palestinian Territories and two associated authorities of Amman and Bethlehem. And the naming of the "NETKite" originated from the Cross-border **NET**work to foster **K**nowledge-intensive business **I**ncubation and **T**echnology transfer. NETKite's purpose is to strengthen the international cooperation in the Mediterranean and to establish a Mediterranean innovation lab. The overall objective of NETKite is to create a cross-border network around the Mediterranean region, focused on existing or of new activation public/private partnerships, inspired by the open innovation approach and the Living Labs model, to support the innovation transfer, in order to make it functional to the growth and the modernization of local economic systems and to the generation of new qualified and sustainable jobs.

Vision

1. Facilitate the use of purposive knowledge in generating new companies and making the existing ones more competitive.
2. Support the economic development of the Mediterranean regions.

Operation

Briefly, NetKite operates through both an online communication platform and an e-learning platform, which work in concert to match need and solutions, for users to post ideas or share projects, list brainstormers or create a challenge. According to CASISD's experience, there is no evidence to show that NetKite charges for the use of the both learning and communication platform.

The NetKite module incorporates two mechanisms:

1. An Open Innovation Platform
2. An E-learning Platform

The Open Innovation Platform focus on create a communication platform for user who want to discuss their ideas or innovative projects. Moreover, the E-learning platform, which is an internet based teaching and sharing system, focus on provide a series of training programme for users who need training in entrepreneurship and innovation.

How to use the NetKite:

- a. Register and Explore

Visitors don't need to register to access news, reviews and articles as these are fully accessible to all visitors whether registered or not. On the other hand, visitors will need to register in order to experience the communication or e-learning platform provided by NETKite.

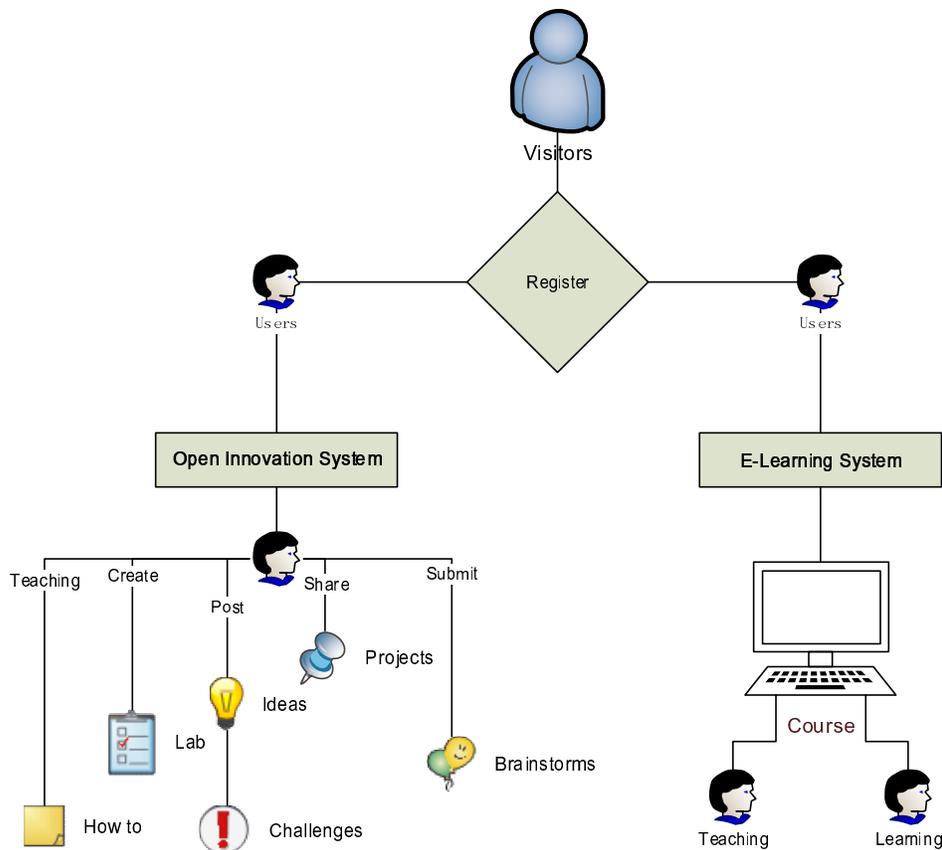
- b. Share your work and Contribute to ideas

For registered users, it is quite easy to use the two platforms of NETKite. After login the NetKite account, users can choose a platform based on their needs.

It is possible to discuss ideas and project, meet collaborators, with formal and informal cooperation methodologies in an Open Innovation environment. Therefore the system of Open Innovation (named "OI Platform") in NetKite allows users implement matchmaking between supply and demand of innovative solutions by ways of share their works or exchange their experiences, especially for the users who are look for partners, investors, skills and contributions for further development.

- c. Learning

The E-learning system, which can be used by all members of the NetKite, is design for the users who want learn about entrepreneurship and innovation. It provided a set of independent learning units about knowledge management and collaborative work.



- * **IDEA:** an idea is what you have in mind no matter if it's at an embryonic or more advanced stage
- * **PROJECTS:** a project is an innovative and higher level product compared to an IDEA. It is detailed and related to implementation, production and the development of an innovative.
- * **CHALLENGES:** A CHALLENGE is a competition where you can win a prize for your project.
- * **BRAINSTORMS:** BRAINSTORM is a tool where you can talk about a topic or a problem, or search for help from within your community.
- * **HOW-TO:** HOW TO is an easy tool that will help you to create small guides can show you how to make something.

User experience

According to CASISD's experience, the platform of NetKite is really easy and user-friendly. The registration process is very simple, without any fees or verification (especially Email verification). It means that it is easy for new users to experience the platform provided by NetKite. However, there are obvious defects in NetKite. The most obvious one is that the number of active users was fairly small, possibly because the NetKite tend to be a non-commercial project. For example, the date of latest ideas or projects published on the OI platform is about two months ago. Meanwhile the

number of total ideas is less 50. Furthermore, there is no available courses for users currently. To summarise, it was hard to get useful and effective information from NetKite.

(4) APCTT

Tags from the website:

Web Url: <http://apctt.org>

Web Title: Asian and Pacific Centre for Transfer of Technology

Web Description: APCTT is a regional institution of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) servicing the Asia-Pacific region.

Web Keywords: Innovation, Technology, Transfer of Technology

Overview:

The Asian and Pacific Centre for Transfer of Technology named "APCTT", which is a subsidiary body of ESCAP, established on 16 July 1977 in Bangalore. In 1993, the Centre moved to New Delhi, India. The objectives of the APCTT are to assist the members and associate members of ESCAP through strengthening their capabilities to develop and manage national innovation systems; develop, transfer, adapt and apply technology; improve the terms of transfer of technology; and identify and promote the development and transfer of technologies relevant to the region. To achieve the above objective, the functions of APCTT are as follows:

- 1) Research and analysis of trends, conditions and opportunities;
- 2) Advisory services;
- 3) Dissemination of information and good practices;
- 4) Networking and partnership with international organizations and key stakeholders;
- 5) Training of national personnel, particularly national scientists and policy analysts.

Focus areas of the APCTT are:

Science Technology and Innovation, Technology Transfer and Technology Intelligence in area of renewable energy, biotechnology and nanotechnology.

The core vision of the APCTT:

To strengthen the technology transfer capabilities especially for the SMEs in the region, meanwhile, to facilitate import/export of environmentally sound technologies to/from the member countries.

Operating Model and Key Functions of APCTT:

Briefly, based on organized a large number of regional & national workshops, meetings and conferences, APCTT has accumulated a great deal of useful information, data and materials about the field of innovation or transfer of technology. So that the APCTT can operate through a completely free information platform for users to access or download above resources in the

form of e-periodicals, guidebooks, manuals, directories and handbooks. Meanwhile the Center also offers a series of Databases for registered users. Additionally, another information source is the Center Event List. It enables users to obtain the information about workshop, conference and salon organized by the APCTT.

In view of the above, the Key Functions of APCTT could be described as a semi-government online innovation and technology resource center.

How to use the APCTT:

1. Explore

The articles and other resources could be either accessed or downloaded free of cost to all visitors whether registered or not. It's important to point out that little news can be found on the official Website of APCTT. Instead, users should be link to the web of **APCTT Periodicals** (<http://www.techmonitor.net/>) to obtain the latest information on the technology innovations and events provided by APCTT. To summarize, the online-resources of APCTT can be divided into four parts: Databases, E-Periodicals, Guidebooks and Manuals and Directories, Handbooks or CD ROMs. List of APCTT Periodicals as follow:

Asia-Pacific Tech Monitor;

Biotechnology;

Food Processing;

Non-conventional Energy;

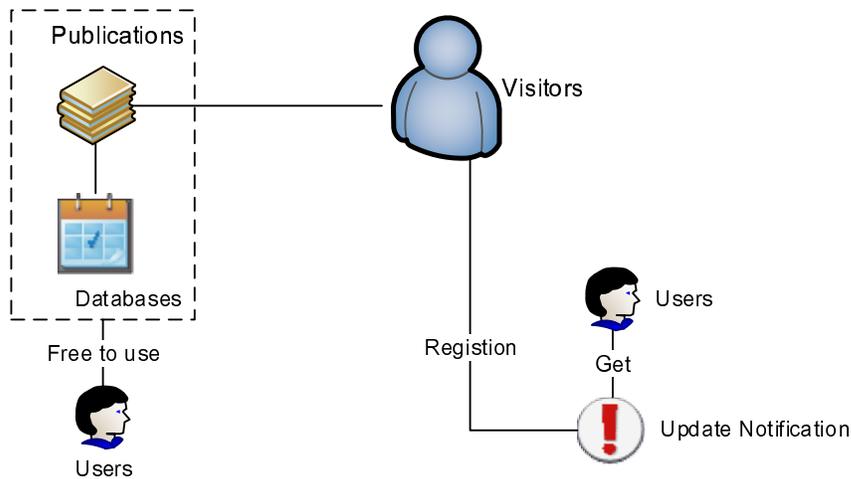
Ozone Layer Protection;

Waste Management;

2. Publications & Databases

Compared with other Websites, which are focus on Innovation and technology transfer, a noteworthy feature of APCTT is that there isn't substantial different in the user authority of registered users and non-registered users. As mentioned above, all visitors could download the publications and use the Databases.

Furthermore, there is a slight difference between the two groups of users, that is to say, the registered users will be notified of the updates for APCTT news or events by Emails.



User experience:

According to CASISD’s experience, the functions of APCTT.org are easy-to-use without a complex registration process and any charges of fees. Accordingly, the big advantage of APCTT.org is that APCTT creates an authoritative source of trusted information for policy makers and researchers.

But, the limitation of APCTT is that the interactive function of APCTT.org. It proved difficult to post a comment on this site and nowhere to exchange experiences or ideas with other users. Hence

The APCTT regard as a policy analysis toolset, rather than a platform of communication.

(5) SciDev.net

Tags from the website:

Title: Science & technology for global development news & analysis.

Description:SciDev.Net offers news, analysis and information about science and technology for global development; including agriculture, environment, health, governance, and more.

KeyWords: Bringing science and development together through news and analysis.

Overview:

SciDev, which the main office of is based in London, is a company limited by guarantee and a registered charity in England and Wales. Base on a worldwide network of registered users from developing countries. The SciDev.Net, which officially launched on 3 December 2001 and relaunched in June 2013, is the world's leading source of reliable and authoritative news, views and analysis on information about science and technology for global development. According to the official description,SciDev.Net currently receives funding from four institutions: UK Department for International Development, Swedish International Development Cooperation Agency, International Development Research Centre(Canada) and São Paulo Research Foundation(Brazil). Meanwhile,SciDev.Net also receives financial support from private corporations or individuals.

The core vision of the SciDev:

The mission of SciDev is to help individuals and organisations apply evidence and insights from science and technology to decision-making to have a positive impact on equitable and sustainable development and poverty reduction.

Operating Model and Key Functions of SciDev:

To facilitate the mainstreaming of more science and technology evidence for development. SciDev.Net provide four key supporting factors:

Access to accurate, understandable information for an audience interested in supporting the improved well-being of the poor in the global South

Analysis of research findings, exploring socioeconomic implications and facilitating local relevance

Capacity to support and sustain uptake of research, including working with partners to provide specialist training on communicating science

Space and incentives for key relationships with champions of science and technology.

Briefly, the **SciDev** operates through a content platform for visitors to obtain timely news, accuracy data or information and reliable analysis reports. Meanwhile, visitors can post comments on **SciDev.net** by registering as a registered user. In our experience, moreover, anyone signing up with SciDev.Net have an opportunity to receive free email alerts, which feature the latest material posted on the website. Registration to SciDev.net is free and simple.

The **SciDev** model incorporates two mechanisms:

1. Content platform
2. Online Training platform (<http://scidevnet.teachable.com/>)

The Content platform focus on poste news or reports for user who want to get the latest information about science and development, especially for the global south. Moreover, though the Online Training Platform, SciDev offers high-quality training program for scientists and journalists.

The chosen of free or premium courses will depend on user's needs.

How to use the SciDev:

1. Explore

The articles and other contents are fully accessible to all visitors whether registered or not. Furthermore, all of works on SciDev.net (unless stated) are available for visitors to read and use, such as republish online or in print, for free.

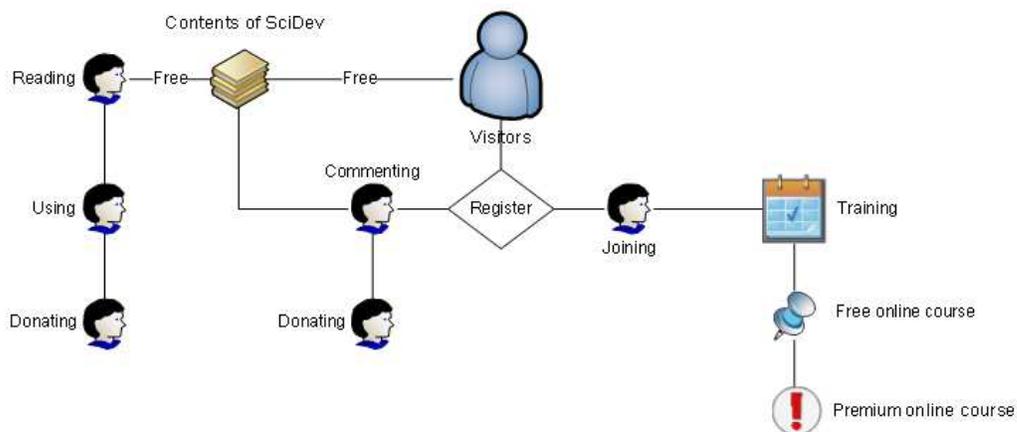
2. Commenting and Joining Online Training Program

For registered users, it is possible to comment and discuss any articles on the SciDev.net. It can be regard as form of communication between authors and users. Additionally, users will find a wide variety of choices available in **Online Training Program**.

3. Donation

The support of users would go a long way to keep the contents of **SciDev.net** free as well as provide essential training and resources for users. If you would like to send a donation,

One can contact with SciDev.net anytime.



User experience

According to CASISD's experience, based on reliable information and resources, **SciDev.net** could be seen as an informative, useful and excellent tool with for researchers. In addition, the users also benefits from a more flexible and enlightened copyright policy. Unless otherwise stated, the copyright, database rights and similar rights in all material published on SciDev.Net are exclusively licensed to SciDev.Net. Then SciDev.Net makes the written content of this website available for use by others under a Creative Commons Attribution 2.0 licence. Under the terms of this licence users are permitted to: copy, distribute and display the work as well as make derivative works. On the other side, as for an informative website, SciDev.net primarily provides content-based services, but the Interaction and communication function of **this site** are very limited Compared with the large amount of articles, few comments can be found under the contents. It means that the number of active users of the web is low.

Overall, **SciDev.net** is a well-designed and noteworthy website for researchers and students in life and natural sciences.

6. Bioversity International

<http://www.bioversityinternational.org/>

Basic information

Bioversity International is a global research-for-development organization. Its vision is that agricultural biodiversity nourishes people and sustains the planet. This organization delivers scientific evidence, management practices and policy options to use and safeguard agricultural and

tree biodiversity to attain sustainable global food and nutrition security. And the online platform does a lot in achieving those objections.

Main contents

The main contents and thus the functions of this website are clear, including the following parts.

(1) Bioersivity International Initiatives. This module introduces the initiatives conducted by the organization, including the background (practical challenge), research solutions, research examples and results.

(2) Partners. The partners of the organization shown in the website include research partners and funding partners. Also, the latest news about their partners are displayed.

(3) Research. This module introduces the cross-cutting themes, and why, where and what they do. Also, the research portfolio and the research impacts are included.

(4) e-Library. A lot of information are included in this module, including publications, databases, training materials, and so on.

7. Annex B: Elements of three indicative components/stages for the online platform

	“Why” – demands and rationale	“What” – key platform functions	“How” – technical requirements, operational model, cost implication
Component 1: One-Stop Portal as a One-Way Dissemination Channel	<ul style="list-style-type: none"> • Broad mandates of an online platform, as defined by PGA Report on Structured Dialogues and SG Synthesis Report • Stocktaking identified numerous relevant online platforms • Some Member States emphasis on existing platforms and request for focus on one stop access 	<ul style="list-style-type: none"> • Repository of relevant UN documents, including on mapping of technology facilitation initiatives • Curated inventory of technologies, catalogue of platforms and directory of actors, UN, other public, and private • Periodic updates on ad hoc products (good practice, lessons); and progress of policy dialogues and relevant efforts 	<ul style="list-style-type: none"> • Some interoperability with services linked • Part time maintenance team (subject matter expert and web service technician) • \$100-500k per year?
Component 2: Dynamic Exchange of Knowledge, Experiences	<ul style="list-style-type: none"> • Food for thought paper outlined interactive and participatory aspects beyond dissemination • Stocktaking identified no UN platforms “truly interactive” on such aspects; experiences suggest it takes time and concerted efforts • Initial mapping of UN facilitation initiatives indicated full mapping requires open information channel on demands and non-UN initiatives 	<ul style="list-style-type: none"> • Common taxonomies (technology clusters and policy areas under SDGs and targets) as participation framework • Community of Practice, user-generated contents, tools for knowledge capture • Facilitated exchanges of contents and discourses with public and private participants, including through Multi-stakeholder forum on STI for SDGs and other key global, regional, national, industry forums 	<ul style="list-style-type: none"> • User identification, access control, wiki-type metadata architecture, quality assurance of dynamic contents • Full time mid-size team of program administration and community moderation; with key influencer contributions • \$1-3m per year?
Component 3: Integrated Delivery Channel	<ul style="list-style-type: none"> • Broader TFM activities emerged, such as coordinated STI capacity building program • Online platform may be a channel for coordination and delivery 	<ul style="list-style-type: none"> • [depends on substance proposal of coordinated STI capacity development; if it should include online and offline delivery, contents coordination and integration, etc.] 	<ul style="list-style-type: none"> • Requires technical and programmatic management • Cost depends on ambitions

Source: These options were identified by IATT members based on work by Antic and Liu (2015).

8. Annex C: List of existing platforms

Hereby a list of STI-related platforms is provided, these platforms are selected from within and outside the UN system and from countries all over the world (mainly developing countries). These platforms are divided into five types: firm owned platforms, government operate platforms, government back and firm operate platforms, university or institute owned platforms, and others. And the key information including vision/mission, objectives, functions/services, resources/ contents/ information, users, focus/areas of the platforms are displayed.

1. Firm-owned platforms

Table 8.1 lists some key information of the selected firm-owned online platforms. They are different from each other in many aspects according to their businesses, and the platform is a support of their businesses. Some of the platforms are free searching, some need registration, and some need to be paid for. These platforms have various kinds of functions, while some are specialized and some are comprehensive.

Table 8.1 list of firm owned platforms

Name and website	Notes	Access and charge
Universal for Technology Transfer (Egypt) http://www.uttweb.com/	Vision: laboratory and scientific equipment and supplies business Information: products, partners, services	Open access
Knowledge platform (Pakistan) http://www.knowledgeplatform.com/	Service: design, content, technology and support.	Open access
InnoCentive (USA) https://www.innocentive.com/	Service: help solve challenges in many fields Speciality: crowdourcing Resources: webinars, cases, Solution Snapshots	Open registration, Free
Pwc Open innovation platform https://openinnovation.com.au	It connects large corporates, government, researchers and startups at scale, around market opportunities.	Open access
Innovation enterprise (UK)	Functions: summits, webinars, on-demand contents, marketing, research	Open access

https://theinnovationenterprise.com/		
Nordic Innovation Accelerator http://www.nia.fi	NIA offers companies an opportunity to showcase their innovations on an international forum and for corporates a way of finding new solutions.	Open registration, Free
Global Technology Interface http://www.globaltechinterface.com/	The platform can be used for all the features from display, discovery, connect, open innovation, repository of data, news, webinars, etc. Its clients include global corporates and NGOs.	Searching based on registration
China Technology Exchange (China) http://www.ctex.cn/	Objective: S&T service provider Information: patent, trademark, IP financing Information source: institutes, universities, high-tech firms, IP agencies	Open registration, Partly free
Kejibang (China) http://kjb114.com/	Function: technology, transfer, S&T crowdsourcing Information: technology supply and demand, service, expertise, financing	Open registration, Partly free
Keyi Net (China) http://www.1633.com/	Objective: platform of ability application and technology transaction Information: S&T activity, patent, expert, R&D team Information source: institutes, universities, high-tech firms, IP agencies	Open registration, Partly free
Gaohang Net (China) http://www.gaohangip.com/	Objective: intellectual property service and transaction Information: patent, trademark, copyright, news, cases Information source: institutes, universities, high-tech firms, IP agencies	Open registration, Partly free
Yunying Net (China) http://www.okfirst.cn/	Objective: intellectual property service Information: patent, trademark Information source: firms and universities in local province	Open registration, Partly free

China Pharmaceutical technology Net (China) http://www.pharmtec.org.cn	Objective: service in R&D, technology transfer and S&T consulting Information: industry-specific information, technology advancement, database, scientific publications	Invited registration, free
Military-civilian technology transfer platform (China) http://www.cimirh.com/	Objective: promote military-civilian integration Information: technology supply and demand, policy, S&T document, S&T project Information source: firms, universities, institutes, governments	Open registration, Partly free
Scientists Online (China) http://www.scientistin.com/	Information: scientist, project, case Information source: universities, institutes	Open registration, Partly free
Xiaomuchong (China) http://muchong.com	Type: online forum Information: journals, papers, communications Information source: mainly individuals	Open registration, Partly free
Feitianzhongzhi (China) http://www.techina2025.com/	Objective: technology sharing Focus: aerospace science and technology Information: technology demand and supply, news	Open registration, free

2. Government operate platforms

Table 8.2 lists the key information of some selected government operate platforms. Most of these platforms are constructed and provided as public products, namely they are funded by government capital. As a result, most of them are free, even though some requires registration. However, a significant disadvantage of these platforms is that their information updating is relatively slow.

Table 8.2 list of government operate platforms

Name and website	Notes	Access and charge
Innovate in Brasil (Brasil) http://www.innovateinbrasil.com.br/	Information: skilled labor, technological infrastructure, companies with R&D, government projects and incentives for R&D	Open access

IndiaBioScience (India) https://indiabioscience.org/	Information: news, grants, resources Focus: life sciences	Open registration, free
The innovation technology platform (India) http://innovationplatform.in/chrome/	Objective: connect technology innovators with Indian project opportunities Focus: energy, water, waste, climate change and related environment sectors	Open access
China International Technology Transfer Center (China) http://www.cittc.net	Objective: technology transfer Backed government: Ministry of Science and Technology Information source: institutes, universities, firms	Open registration, free
Yangtze Delta S&T resource sharing platform (China) http://ts.csjpt.cn/	Objective: S&T resource sharing Area: Shanghai, Jiangsu, Zhejiang Information: links with kinds of technology platforms in various fields	Open registration, free
Northern technology Net (China) http://www.ntem.com.cn/	Targeted at technology transfer Mainly based at Tianjin Information: technology, policy, exhibition	Open registration, free
China-Arab States Technology Transfer Center http://www.casttc.org/	Information: technology supply and demand, expert, exhibition Government: China and Arab	Invited registration, free
Capital S&T Resource Platform (China) http://www.sdtjpt.gov.cn/	Objective: sharing of laboratory and equipment, promote R&D cooperation Information: laboratory, equipment, project, policy Backed government: local government	Open registration, free
Sciencepaper Online (China) http://www.paper.edu.cn/	Information: papers, researchers, journals Backed government: Ministry of Education	Open registration, free

3. Government back and firm operate

Government back and firm operate platforms means that the platforms are (partly) funded by government capital and operated by firms. Generally, these platforms are free or partly free.

Table 8.3 list of government back and firm operate platforms

Name and website	Notes	Access and charge
Open Innovation Platform (Cuba) http://www.in-cubator.org/	Goals: improve products and services	Open registration, Partly free
National University Technology Transfer, National eastern Tech-Transfer Center (China) http://www.gaoxiaotech.com/	Objective: S&T service Speciality: mainly based on Shanghai, targeted at universities Information: technology, expert, project Backed government: local government	Open registration, free
Xiaoguo Net (China) http://www.jsxiaoguo.com/	Objective: technology transfer Speciality: mainly based on Jiagnsu, targeted at universities Information: S&T achievement, expert, technical problem, investment and financing, database, policy Information source: mainly universities inside and outside Jiangsu Backed government: local government	Open registration, free
China agricultural technology transfer platform (China) http://www.caasttc.com	Users: regional governments, agricultural firms Information: agricultural S&T resources, S&T consulting and training, exhibition	Open registration, free
Zhejiang Online Technology Market (China) http://www.51jishu.com/	Objective: technology transaction Information: technology request and supply, expert Backed government: local government	Open registration, free

Some other local S&T platforms (China)	Shanxi: http://www.xatrm.com/	
	Sichuan: http://www.sckjcg.gov.cn/	
	Shijiazhuang: http://www.sjzkjdsc.org/	
	Jilin: http://www.jlpstm.com/	
	Jining: http://www.jnppc.com/	
	Lanzhou: http://www.gssti.cn/	
	Chongqing: http://www.cqkjfdsc.com/	

4. University or institute owned

Table 8.4 lists some of the selected platforms owned by universities or institutes. These platforms are open access and free, yet some need registration. Usually, the platforms are established to provide a convenient place to show their research information about activities, researchers, intellectual property, publications and technology transfer.

Table 8.4 list of university or institute owned platforms

Name and website	Notes	Access and charge
VUB TechTransfer (Belgium) http://vubtechtransfer.be	Information: projects, funding, expertise, licensing, news, cases Operator: Vrije Universiteit Brussel Users: researchers, companies	Open registration, Free
Center for technology transfer(Bulgaria) http://www.ctt.bg.ac.rs/en/	Operator: University of Belgrade Goals: promote technology transfer Information: news, researchers, industry, technologies	Open access
BCRC-Egypt http://bcrc-egypt.com/	Operator: Cairo University Information: news, activities, publications	Open access
UCI applied innovation (USA) http://www.ota.uci.edu/	Operator: University of California Information: faculty resources, industry resources, available technologies	Open access

CT Technology Transfer Center(USA) http://www.t2center.uconn.edu/	Information: educational programs, technical assistance, knowledge sharing	Open access
Feeding Knowledge (FK) www.feedingknowledge.net		
CASIP (China) http://www.casip.ac.cn/	Information: intellectual property, database, policy Operator: Chinese Academy of Sciences (CAS) Focus: intellectual of the institutes of CAS	Invited registration, Free
Intellectual property and technology transfer platform (China) http://jszy.zju.edu.cn/	Information: patent, technology, technology broker, expert Operator: Zhejiang University	Open registration, Free
Some other university or institute owned platforms aimed at technology transfer	Tsinghua University: http://www.ittc.com.cn Peking University: http://www.pkuttc.com/ China S&T University: http://tt.ustc.edu.cn/ Fudan University: http://www.fdzhuanyi.fudan.edu.cn/ Harvard University: http://otd.harvard.edu/	
China scientists online (China) http://iauthor.cn/	Information: scientist Operator: Chinese Academy of Sciences	Open registration, Free

5. International online platforms

International online platforms are either owned by international organizations or international firms. These platforms are aimed at global users, and most of them are free.

Table 8.5 list of other kinds of platforms

Name and website	Notes	Access and charge
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<p>CTCN (UN) https://www.ctc-n.org/</p>	<p>The CTCN provides technology solutions, capacity building and advice on policy, legal and regulatory frameworks tailored to the needs of individual countries.</p> <p>Main functions: manage requests from developing country NDEs and deliver responses; foster collaboration and access to information and knowledge to accelerate climate technology transfer; strengthen networks, partnerships and capacity building for climate technology transfer</p>	<p>Open registration free</p>
<p>Innovation Policy Platform(IPP) https://www.innovationpolicyplatform.org/</p>	<p>Aim: to provide policy practitioners around the world with a simple and easy-to-use resource that supports them in the innovation policy-making process.</p> <p>Functions: Firstly the IPP provides comprehensive information about innovation policy, and secondly it facilitates collective learning about innovation policy, (both the conceptual and the how-to-do aspects), tailored to the needs of developing and developed countries.</p>	<p>Open registration free</p>
<p>World Economic Forum (WEF) http://www.weforum.org/</p>	<p>WEF engages political, business, academic and other leaders of society in collaborative efforts to improve the state of the world. Together with other stakeholders, it works to define challenges, solutions and actions, always in the spirit of global citizenship. It serves and builds sustained communities through an integrated concept of high-level meetings, research networks, task forces and digital collaboration.</p>	<p>Open access</p>
<p>World Science Forum http://www.sciforum.hu/index.html</p>	<p>It gives participants the possibility to exchange their views regarding - among others - the relationship between science and society, the importance and relevance of science for Society, its future, the related financing issues as well as its relationship to political and civil institutions.</p>	<p>Open registration, free</p>

<p>Asian and Pacific Centre for Transfer of Technology (UN)</p> <p>http://www.apctt.org</p>	<p>Activities: Science Technology and Innovation, Technology Transfer and Technology Intelligence.</p> <p>Emphasis: renewable energy, biotechnology and nanotechnology</p>	Open access
<p>SciDevNet</p> <p>http://www.scidev.net/global/</p>	<p>Focus: agriculture, environment, health, governance, enterprise, communication</p> <p>Information: news, views and analysis about science and technology for global development</p>	Open registration, free
<p>Feeding innovation</p> <p>https://feeding-innovation.ilri.org/</p>	<p>Main information: news, photos, videos</p>	Open access
<p>ProlInnova (Kenya)</p> <p>http://www.prolinnova.net/</p>	<p>Focus: agriculture and natural resource management</p>	Open access
<p>Food science and technology platform (Kynya)</p> <p>http://www.fstpkenya.com/</p>	<p>Focus: food and nutrition related industry/institutions</p> <p>Mission: facilitates attainment of food security through intellectual network, capacity building and policy advocacy.</p>	Open access
<p>Internet 2 (USA)</p> <p>http://www.internet2.edu/</p>	<p>Internet2 provides a collaborative environment where US research and education organizations can solve common technology challenges and develop innovative solutions in support of their educational, research and community service missions.</p>	Open registration, free
<p>Development gateway</p> <p>http://www.developmentgateway.org/</p>	<p>An international nonprofit delivering technology and information solutions for international development</p>	Open access
<p>Stories of innovation (UN)</p> <p>http://www.unicefstories.org/</p>	<p>This site contains a sampling of UNICEF's Innovation initiatives, resources, media coverage, and first person posts on how UNICEF country offices are creating</p>	Open access

	innovations in programme, process, partnership and product.	
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