

Terms of Reference for a Scheme for International Cooperation in Advanced Manufacturing

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Terms of Reference for a Scheme for International Cooperation in Advanced Manufacturing

I. PREAMBLE

This document sets forth the Terms of Reference for the partners of the Intelligent Manufacturing Systems (IMS) scheme for international cooperation in research and development in Intelligent Manufacturing Systems. These Terms of Reference are not intended to create obligations under international or domestic law.

II. PURPOSE

The IMS scheme is an international and multilateral cooperation scheme in which Participants work cooperatively to boost industrial competitiveness, solve problems facing manufacturing worldwide, and develop advanced manufacturing technologies and systems to benefit humanity. Its purposes are to:

1. enhance knowledge-based manufacturing in industry to improve the quality of life and citizens and improve the global environment;
2. share manufacturing knowledge and to transfer it to future generations;
3. increase the participation of SMEs in international collaborative activities;
4. adapt educational and training activities to support the knowledge-based manufacturing industries; and
5. contribute to establishing common, global norms and standards.

III. RATIONALE

Manufacturing has been and continues to be an important element in the global economy. It remains a primary generator of wealth and is critical to establishing a sound economic basis for economic growth.

Properly managed international cooperation in research and development in advanced manufacturing can help improve manufacturing operations.¹ IMS provides the framework within which cooperative research and development activities can flourish.

IMS –

1. provides a structure for global, “forward-thinking” syntheses (e.g., roadmaps, analyses, foresight);
2. fosters the creation of networks to reinforce interaction and collaborative research and development;
3. fosters the development of consortia to undertake collaborative research and development projects (including cooperative work on pre-standardization topics);
4. provides an intellectual property rights management framework (Technical Appendix 1) for international collaboration and dissemination activities; and
5. disseminates research results broadly.

¹ The IMS collaboration scheme was launched in 1995, following the conclusion of a successful Feasibility Study. The duration of the initial IMS collaboration scheme was set at ten years up to 2005. Based on the experience gained in this initial phase, the partners to the IMS scheme decided to expand and improve on the initial phase. The Next-Phase IMS Working Group set up by the parties of IMS and the IMS International Steering Committee recommended that the partners to IMS renew the scheme with a modified framework for international multilateral collaboration in IMS.

IV. OPERATING PRINCIPLES

IMS collaborative activities proceed on the following bases:

1. contributions to, and benefits from such cooperation, are equitable and balanced;
2. collaborative projects have industrial relevance;
3. collaborative project should include where possible academic participation;
4. collaborative projects are carried out by inter-regional, geographically distributed consortia;
5. collaborative projects can occur throughout the full innovation cycle;
6. IMS project activities under government sponsorship or using government resources should not involve competitive research and development;
7. results of collaborative projects are shared through a process of controlled information diffusion; and
8. there should be protection for an equitable allocation of any intellectual property right created or furnished during cooperation projects.

V. STRUCTURE AND FUNDING

IMS is governed by a management structure that consists of:

1. An International Steering Committee;
2. An Inter-Regional Secretariat; and
3. Regional Secretariats.

A. Funding for the Management Structure

- a. Each Participant will fund its own participation;
- b. Each Participant will determine the method by which its own participation will be funded;
- c. Each Participant will contribute in an equitable manner in funding or in kind to defray the costs of operating the Inter-Regional Secretariat;
- d. Each Participant will be responsible for supporting its own delegation; and
- e. Each Participant will have the right to audit the operations of the management structure.
- f. Principles for setting up and executing the IRS budget shall be in accordance with Technical Appendix 2.

B. Funding for the Projects

1. Each Participant will fund its own participation; and
2. Each Participant will determine the method by which its own participation will be funded.

VI. MANAGEMENT STRUCTURE

A. IMS International Steering Committee. The IMS International Steering Committee will oversee the IMS scheme. Members must be eminent representatives of the Participants' industrial, academic, or governmental/public administration sectors who are knowledgeable in manufacturing issues. Members must be willing and able to devote the necessary time and effort involved in guiding the IMS scheme.

1. *Composition.* Two members and one observer from each Participant will normally comprise a Participant's delegation.

Selection of delegation members is at the discretion of each Participant, in accordance with the appropriate laws and provisions of their respective Participant governments/public administrations. Designation of alternate delegation members is recommended, but not mandatory.

Each delegation will have a head of delegation who will serve as the chief spokesperson for the delegation. Selection of the head of delegation is at the discretion of each Participant, in accordance with the appropriate laws and provisions of their respective Participant governments/public administrations.

Each Participant's delegation to the meetings of the IMS International Steering Committee may be accompanied by two representatives from its designated Regional Secretariat. Additional attendance is at the discretion of the chair of the IMS International Steering Committee.

2. *Consensus.* The IMS International Steering Committee will reach decisions by consensus of its members.

3. *Chair.* The chair of the IMS International Steering Committee will rotate among the Participants and will be decided by the IMS International Steering Committee. The term of each chair will last for thirty months. During the term when a Participant chairs, that Participant also is responsible for organizing the Inter-Regional Secretariat. The Participant which is to take the following term will serve as vice chair.

4. *Responsibilities.* The IMS International Steering Committee will determine policies and strategies for undertaking, and for the evolution of, the IMS scheme, including the matter of new Participants. It will also:

- a. provide overall guidance, set strategic priorities, review, amend, and update Technical Appendices 3, 4, 5, 7, and 8 and additional Technical Appendices within the scope of these Terms of Reference, and oversee the implementation of IMS;
- b. oversee the Inter-Regional Secretariat and approve its budget;
- c. provide international promotion for IMS and for manufacturing as a generic discipline;
- d. endorse projects as provided in Section X;
- e. set performance metrics of the scheme and provide a regular report in respect of same;
- f. ensure activities undertaken under this scheme are done in a manner consistent with the purpose, principles and structure agreed upon by the Participants;
- g. foster communication among the International IMS Steering Committee, the Inter-Regional Secretariats, and the project consortium members;
- h. sponsor and approve new IMS documents; and
- i. form interim task forces or committees (e.g., for technical or legal issues), if necessary, to accomplish its work.

B. Inter-Regional Secretariat. The Participant that chairs the International Steering Committee will be responsible for organizing and managing the Inter-Regional Secretariat. The Inter-Regional Secretariat's primary role is to execute the policies and actions as decided by the IMS International Steering Committee. The responsibilities of the IMS Inter-Regional Secretariat are listed in Technical Appendix 4.

C. Regional Secretariats. The governments/public administrations and public organizations of the Participants will organize and manage their respective Regional Secretariats in a manner they see fit. The responsibilities of the IMS Regional Secretariat are listed in Technical Appendix 5.

VII. TRANSITION TO AND COMMENCEMENT OF THE IMS SCHEME

A. Transition. It is the intention of the Participants that IMS projects endorsed under the original scheme should be considered to be continued to be endorsed by the current ISC and its successor upon commencement of the new IMS scheme. Other IMS activities, including processing of applications to become a Participant, shall continue without interruption.

B. Commencement. The IMS scheme will commence upon:

- (1) the ratification of the Terms of Reference for the IMS Scheme by at least three (3) Participants. Participants under the pre-existing IMS Scheme become new Participants under this scheme when they ratify these Terms of Reference;
- (2) the appointment of the members to the IMS International Steering Committee; and
- (3) the designation of the Regional Secretariats.

VIII. DURATION OF THE IMS SCHEME

Participants will review the scheme every five (5) years to determine whether it should be continued, modified or terminated. A Participant may withdraw at any time subject to twelve (12) months' notice to other Participants.

IX. ADMISSION OF NEW PARTICIPANTS

The IMS International Steering Committee can admit new Participants. The procedures for admission of new Participants are set forth in Technical Appendix 6.

X. FORMATION AND EVALUATION of PROJECT CONSORTIA AND OTHER COLLABORATIVE INSTRUMENTS

The IMS International Steering Committee shall have the authority to set the procedures for: (i) project consortia and formation, evaluation and review; these procedures are set forth in Technical Appendix 7; and (ii) other collaborative instruments within the scope of these Terms of Reference.

XI. SMALL AND MEDIUM-SIZED ENTERPRISES

The Participants individually and the IMS International Steering Committee will develop mechanisms to enlist SMEs directly and indirectly in the IMS scheme. A representative list of these mechanisms is in Technical Appendix 8.

XII. DISSEMINATION OF RESULTS

Dissemination of information is of the utmost importance and is required in the IMS scheme. However, all information dissemination must comply with the intellectual property rights provisions in Technical Appendix 1. This includes the dissemination of interim and final project technical results.

Information dissemination will occur at the project, regional and inter-regional levels. This dissemination shall be, but not limited to, written reports, international symposia, and publications by members of the academic sector.

Technical Appendix 1: Intellectual Property Rights Provisions for Research and Development Projects

Objectives

These provisions lay down mandatory requirements as well as recommended principles for PARTNERS which wish to participate in a PROJECT conducted within the Intelligent Manufacturing Systems Scheme (IMS SCHEME). The objectives of these provisions are to provide adequate protection for intellectual property rights used in and generated during joint research and development PROJECTS under the IMS SCHEME while ensuring:

- (a) that contributions and benefits by PARTICIPANTS, from cooperation in such PROJECTS, are equitable and balanced;
- (b) that the proper balance is struck between the need for flexibility in PARTNERS' negotiations and the need for uniformity of procedure among PROJECTS and among PARTNERS; and
- (c) that the results of the research will be shared by the PARTNERS through a process that protects and equitably allocates any intellectual property rights created or furnished during the co-operation.

Article 1: Definitions

1.1 ACCOUNTING. The sharing of any consideration such as royalties or other license fees by one PARTNER with another PARTNER when the first PARTNER which solely or jointly owns FOREGROUND discloses, licenses or assigns it to a third party.

1.2 AFFILIATE. Any legal entity directly or indirectly owned or controlled by, or owning or controlling, or under the same ownership or control as, any PARTNER. Common ownership or control through government does not in itself create AFFILIATE status.

Ownership or control shall exist through the direct or indirect:

- (a) ownership of more than 50 percent of the nominal value of the issued equity share capital, or
- (b) ownership of more than 50 percent of the shares entitling the holders to vote for the election of directors or persons performing similar functions, or right by any other means to elect or appoint directors, or persons performing similar functions, who have a majority vote, or,
- (c) ownership of 50 percent of the shares, and the right to control management or operation of the company through contractual provisions.

1.3 BACKGROUND: All information and INTELLECTUAL PROPERTY RIGHTS except BACKGROUND RIGHTS owned or controlled by a PARTNER or its AFFILIATE and which are not FOREGROUND.

1.4 BACKGROUND RIGHTS: Patents for inventions and design and utility models, and applications therefor as soon as made public, owned or controlled by a PARTNER or its AFFILIATES, a license for which is necessary for the work in a PROJECT or for the commercial exploitation of FOREGROUND, and which are not FOREGROUND.

1.5 CONFIDENTIAL INFORMATION: All information which is not made generally available and which is only made available in confidence by law or under written confidentiality agreements.

1.6 CONSORTIUM: Three or more GROUPS which have agreed to carry out jointly a PROJECT.

- 1.7 COOPERATION AGREEMENT: The one or more signed agreements among all PARTNERS in a CONSORTIUM concerning the conduct of the PROJECT.
- 1.8 FOREGROUND: All information and INTELLECTUAL PROPERTY RIGHTS first created, conceived, invented or developed in the course of work in a PROJECT.
- 1.9 GROUP: All PARTNERS in a given PROJECT from the geographic area of a PARTICIPANT.
- 1.10 IMS SCHEME: The Intelligent Manufacturing Systems Scheme.
- 1.11 INTELLECTUAL PROPERTY RIGHTS: All rights defined by Article 2(viii) of the Convention Establishing the World Intellectual Property Organization signed at Stockholm on July 14, 1967 (see Technical Appendix 1.A.), excluding trademarks, service marks and commercial names and designations.
- 1.12 NON-PROFIT INSTITUTIONS: Any legal entity, either public or private, established or organized for purposes other than profit-making, which does not itself commercially exploit FOREGROUND.
- 1.13 PARTICIPANT: Australia, Canada, the European Union and Norway, Japan, Korea, Switzerland, the United States and any other country or geographic region whose participation in the IMS SCHEME may be approved in the manner determined by the PARTICIPANTS.
- 1.14 PARTNER: Any legal or natural person participating as a contracting party to the COOPERATION AGREEMENT for a given PROJECT.
- 1.15 PROJECT: Any research and development project carried out by a CONSORTIUM within the IMS SCHEME.
- 1.16 SUMMARY INFORMATION: A description of the objectives, status and results of a PROJECT which does not disclose CONFIDENTIAL INFORMATION.

Article 2: Mandatory Provisions

Each COOPERATION AGREEMENT must contain substantive terms and conditions that are fully consistent with each of the provisions 2.1 through 2.13 in this Article and the definitions used in each COOPERATION AGREEMENT shall be those specified in Article 1 of this document.

Where a PROJECT or a potential PARTNER or its AFFILIATES is subject to government requirements, whether by law or agreement, and such requirements will affect rights or obligations pursuant to the COOPERATION AGREEMENT, the potential PARTNER shall disclose to the other PARTNERS all such requirements of which it is aware prior to signing the COOPERATION AGREEMENT. PARTNERS must ensure that ownership, use, disclosure and licensing of FOREGROUND will comply with these mandatory provisions if the PROJECT is subject to government requirements.

PARTNERS will, at the outset of a PROJECT, promptly notify one another of their AFFILIATES which will be involved in the performance of the PROJECT, and will notify one another of any changes in the AFFILIATES so involved during the life of the PROJECT. At the time of entering into a COOPERATION AGREEMENT, and immediately after new legal entities have come to meet the AFFILIATE definition, PARTNERS may exclude AFFILIATES from the rights and obligations set forth in these provisions in accordance with the terms of the COOPERATION AGREEMENT.

Written Agreement

2.1 PARTNERS shall enter into a written COOPERATION AGREEMENT that governs their participation in a PROJECT consistent with this document.

Ownership

2.2 FOREGROUND shall be owned solely by the PARTNER or jointly by the PARTNERS creating it.

2.3 A PARTNER which is the sole owner of FOREGROUND may disclose and non-exclusively license that FOREGROUND to third parties without ACCOUNTING to any other PARTNER.

2.4 A PARTNER which is a joint owner of FOREGROUND may disclose and non-exclusively license that FOREGROUND to third parties without the consent of and without ACCOUNTING to any other PARTNER, unless otherwise agreed in the COOPERATION AGREEMENT.

2.5 A PARTNER may assign its sole and/or joint ownership interests in its BACKGROUND, BACKGROUND RIGHTS and FOREGROUND to third parties without the consent of and without ACCOUNTING to any other PARTNER.

PARTNERS who assign any of their rights to BACKGROUND RIGHTS or FOREGROUND must make each assignment subject to the COOPERATION AGREEMENT and must require each assignee to agree in writing to be bound to the assignor's obligations under the COOPERATION AGREEMENT in respect of the assigned rights.

Dissemination of Information

2.6 SUMMARY INFORMATION shall be available to all PARTNERS in other PROJECTS and to the committees formed under the IMS SCHEME.

2.7 The CONSORTIUM will make available at the end of the PROJECT a public report setting out SUMMARY INFORMATION about the PROJECT.

License Rights

Foreground

2.8 Each PARTNER and its AFFILIATES may use FOREGROUND, royalty-free, for research and development and for commercial exploitation. Commercial exploitation includes the rights to use, make, have made, sell and import.

However, in exceptional circumstances,

(a) PARTNERS may agree in their COOPERATION AGREEMENT to pay a royalty to PARTNERS which are NON-PROFIT INSTITUTIONS for commercial exploitation of FOREGROUND which is solely owned by such NON-PROFIT INSTITUTIONS; and

(b) PARTNERS may agree in their COOPERATION AGREEMENT to pay a royalty to PARTNERS which are NON-PROFIT INSTITUTIONS for commercial exploitation of FOREGROUND which is jointly owned with such NON-PROFIT INSTITUTIONS, provided such royalties are both small and consistent with the principle that contributions and benefits in the IMS SCHEME must be balanced and equitable.

2.9 A non-owning PARTNER and its AFFILIATES may not disclose or sub-license FOREGROUND to third parties except that each PARTNER or its AFFILIATES may, in the normal course of business:

(a) disclose FOREGROUND in confidence solely for the purposes of manufacturing, having manufactured, importing or selling products;

- (b) sub-license any software forming part of FOREGROUND in object code;
or
- (c) engage itself in the rightful provision of products or services that inherently disclose the FOREGROUND.

Background

2.10 A PARTNER in a PROJECT may, but is not obligated to, supply or license its BACKGROUND to other PARTNERS.

2.11 PARTNERS and their AFFILIATES may use another PARTNER'S or its AFFILIATES' BACKGROUND RIGHTS solely for research and development in the PROJECT without additional consideration, including, but not limited to, financial consideration.

2.12 PARTNERS and their AFFILIATES must grant to other PARTNERS and their AFFILIATES a license of BACKGROUND RIGHTS on normal commercial conditions when such license is necessary for the commercial exploitation of FOREGROUND unless:

- (a) the owning PARTNER or its AFFILIATE is by reason of law or by contractual obligation existing before signature of the COOPERATION AGREEMENT unable to grant such licenses and such BACKGROUND RIGHTS are specifically identified in the COOPERATION AGREEMENT; or
- (b) the PARTNERS agree, in exceptional cases, on the exclusion of BACKGROUND RIGHTS specifically identified in the COOPERATION AGREEMENT.

Survival of Rights

2.13 The COOPERATION AGREEMENT shall specify that the rights and obligations of PARTNERS and AFFILIATES concerning FOREGROUND, BACKGROUND and BACKGROUND RIGHTS shall survive the natural expiration of the term of the COOPERATION AGREEMENT.

Article 3: Provisions that need to be addressed in the Cooperation Agreement

PARTNERS shall address each of the following items in their COOPERATION AGREEMENT:

Publication of Results

3.1 PARTNERS shall address the issue of the consent required, if any, from the other PARTNERS for publication of the results from the PROJECT other than SUMMARY INFORMATION.

3.2 PARTNERS shall address the issue of whether PARTNERS which are NON-PROFIT INSTITUTIONS may, for academic purposes, publish FOREGROUND which they solely own, provided that adequate procedures for protecting FOREGROUND are taken in accordance with Articles 3.3 and 3.4.

Protection of Foreground

3.3 PARTNERS shall identify the steps they will take to seek legal protection of FOREGROUND by means of INTELLECTUAL PROPERTY RIGHTS and upon making

an invention shall notify other PARTNERS in the same PROJECT in a timely manner of the protection sought and provide a summary description of the invention.

3.4 PARTNERS shall address the issue of prompt notification of all other PARTNERS in the same PROJECT and, upon request and on mutually agreed conditions, disclosure of the invention and reasonably cooperate in such protection being undertaken by another PARTNER in the same PROJECT in the event and to the extent that a PARTNER or PARTNERS which own FOREGROUND do not intend to seek such protection.

Confidential Information

3.5 PARTNERS shall identify the measures they will take to ensure that any PARTNER which has received CONFIDENTIAL INFORMATION only uses or discloses this CONFIDENTIAL INFORMATION by itself or its AFFILIATES as far as permitted under the conditions under which it was supplied.

Dispute Settlement and Applicable Laws

3.6 PARTNERS shall agree in their COOPERATION AGREEMENT on the manner in which disputes will be settled.

3.7 PARTNERS shall agree in their COOPERATION AGREEMENT on the law which will govern the COOPERATION AGREEMENT

Article 4: Optional Provisions

PARTNERS may, but are not required to address each of the following provisions in their COOPERATION AGREEMENT:

- AFFILIATE PROVISIONS
- ANTITRUST/COMPETITION LAW ISSUES
- CANCELLATION AND TERMINATION
- EMPLOYER/EMPLOYEE RELATIONSHIPS
- EXPORT CONTROLS AND COMPLIANCE
- FIELD OF THE AGREEMENT
- INTENT OF THE PARTIES
- LICENSING PARTNERS IN OTHER PROJECTS
- LICENSOR'S LIABILITY ARISING FROM LICENSEE'S USE OF LICENSED TECHNOLOGY
- LOANED OR ASSIGNED EMPLOYEES AND RESULTING RIGHTS
- NEW PARTNERS AND WITHDRAWAL OF PARTNERS FROM PROJECTS
- POST COOPERATION AGREEMENT BACKGROUND
- PROTECTION, USE AND NON-DISCLOSURE OBLIGATIONS REGARDING CONFIDENTIAL INFORMATION
- RESIDUAL INFORMATION
- ROYALTY RATES FOR BACKGROUND RIGHT LICENSES
- SOFTWARE SOURCE CODE
- TAXATION
- TERM/DURATION OF AGREEMENT

There are likely to be other provisions the PARTNERS will need to put into their COOPERATION AGREEMENTS depending on the particular circumstances of their PROJECT. PARTNERS should seek their own expert advice on this and note that no additional terms may conflict with Articles 1 and 2 of these provisions.

Technical Appendix 1.A: Convention establishing the World Intellectual Property Organization (Stockholm, 14 July 1967)

Article 2(viii) defines Intellectual Property to include:

“...the rights to literary, artistic and scientific works; performances of performing artists; phonograms, and broadcasts; inventions in all fields of human endeavour; scientific discoveries; industrial designs; trademarks, service marks, and commercial names and designations; protection against unfair competition; and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields.”

Technical Appendix 2: Financial Accountability and Principles for Setting up and Executing the IRS Budget

1. ISC and IRS members should avoid conflicts of interest insofar as decisions relating to the IRS budget are concerned.
2. All revenue and expenditures must be incorporated in a single set of accounts² to be approved by the ISC.
3. The balance between revenue and expenditure must be respected at all times.³
4. The budget shall be annual with exceptional carry-overs.⁴
5. There should be no transfers of appropriations between line items of budget expenditure, unless formally approved by the ISC.
6. All revenues shall constitute a common pool.⁵
7. All expenditures shall be reasonable, justified and in accordance with the principles of sound financial management.
8. The IRS shall respond to all reasonable requests to report on its financial activities.
9. Regional contributions shall be based on fair principles, and will be paid in accordance with a defined schedule subject to late fees. Regional contributions will be based on the approved IRS budget and will be structured in different tiers, related directly to the size and level of development of each Participant's economy. The Initial Participants will be allocated in two tiers as follows:

Tier 1: European Union & Norway, Japan, United States
Tier 2: Australia, Canada, Korea, Switzerland.
The maximum amounts for the contributions will be 200,000 CAD or equivalent per annum for Tier 1; and 125,000 CAD or equivalent per annum for Tier 2
10. The foregoing principles shall be incorporated in a document on IRS operational guidelines.

² Revenue and expenditures need to be in one single budgetary document; which is subject to approval.

³ Expenditures should not be increased simply to keep revenues and expenditures in balance

⁴ By way of example, an "exceptional carry over" may be made as a provision against negative cashflow from year to year, to preserve operational flexibility.

⁵ All contributions shall form a common pool and no members' contribution/revenue can be designated for use with a certain purpose only; concomitantly, no expenditure may be assigned to a particular contribution.

Technical Appendix 3: IMS Technical Themes

In general, any Project that addresses the IMS Scheme objectives as set forth in these Terms of Reference is considered an appropriate topic for an IMS Project. IMS Projects might also address one or more of the following technical themes:

1 **Total product life cycle issues**

- *Future general models of manufacturing systems.* Examples for that theme are the proposals of “agile manufacturing”, “fractal factory”, “bionic manufacturing”, “holistic enterprise integration”, etc.
- *Intelligent communication network systems for information processes in manufacturing.* To understand the productivity of global distribution and global sourcing, the communication networks and tools and their applications have to be improved.
- *Environment protection, minimum use of energy and materials.* Environment, energy and materials questions have reached a complexity that can only be handled via cooperation with a variety of specialists. Due to the fact that the conditions in that field are very different in different regions a common understanding and harmonized views for the response of manufacturing technologies to environment protection are necessary.
- New ideas and methods for recyclability that are globally accepted should be developed under the IMS umbrella.

Harmonized assessment and economic justification models for new manufacturing systems.

2 **Process issues**

To enable the needs for rapid response to changing requirements and to saving human and material resources and to improving working conditions for employees the following themes can be identified.

- *Clean manufacturing processes that can minimise effects on environment.* Process emission minimised systems. Process disposal minimised systems.
- *Factory (process) life-cycle pre-assessed systems.* *Minimum consumption of energy.* Energy efficient processes that can meet manufacturing requirements with minimum consumption of energy. Integrated cycled process for less energy consumption
- *Modules of energy conservation type.* Production management technology of energy conservation type.
- *Technology innovation in manufacturing processes.* Methods that can quickly produce different products through “Rapid Prototyping Methods”. Manufacturing processes that can flexibly respond to changes in labour conditions, changes of products or materials.
- *Improvement in the flexibility and autonomy of processing modules* that compose manufacturing systems. Open distributed systems and their modules that can match both unmanned, man-machine mixed and labour intensive systems, and can metamorphologically architect system components in correspondence with changes of products.
- *Improvement in interaction or harmony among various components and functions of manufacturing.* Open infrastructure for manufacturing. Inter-

connected information systems such as “remote ID” among respective modules.

3 Strategy/Planning/Design tools

Manufacturing takes place in a global economy. How and where raw materials are transformed is a strategic decision. The decision is complicated in terms of what to make and where to make or buy it, in what is becoming a single global economy.

Many of today's manufacturing organisations are designed using vertical and hierarchical structures. The move towards hierarchical structures is and will continue to require major changes in organisations, systems and work practices. We need methodologies and tools to help us to define appropriate manufacturing strategies and to design appropriate organisations and business/work processes.

Methods and tools to support business process re-engineering. Modelling tools to support the analyses and development of manufacturing strategies.

Design support tools to support planning in an extended enterprise or virtual enterprise environment.

4 Human/Organisation/Social Issues

- *Promotion and development projects for improved image of manufacturing.* Manufacturing engineers tend to be at the bottom of the pay scale relevant to other engineers, and the profession as a whole has a lower stature. Therefore ITC considers as projects globally recognised, strong professional societies and educational institutions for the promotion of manufacturing as a discipline. These proposals include the creation of international organisations to promote manufacturing.
- *Improved capability of manufacturing workforce/education, training.* Engineering education has often tended to emphasize theory over process. In addition, basic education has not always met the needs of industry, producing graduates with often-inadequate skills. This has led to industries that are poor at turning innovation into successful products. This necessitates a change in priorities and closer ties between industry and educational institutions. As well, changes in system organisation means that training within companies is a continuous process which seeks to update the skills and increase the potential of employees - the crucial elements in any system.
- *Autonomous offshore plants* (integration of supplementary business functions in subsidiaries). Offshore plants were originally meant to increase market share and decrease production costs: development of the transplant labour forces were a secondary consideration. However, giving more autonomy to these plants enables them to react more flexibly to changing conditions in the areas where they are based, and is consistent with organisational ideas of decentralisation, empowerment and hierarchy flattening. It also serves to contribute to domestic development in the countries where the plants are located and further the IMS goal of spreading widely basic manufacturing knowledge.
- *Corporate Technical Memory* - keeping, developing, accessing. Often in a manufacturing enterprise knowledge and sources of information are isolated or locked. “Organisational Learning” is a strategy for translating

such knowledge into a framework or a model that leads to better decision-making and could be an important theme within IMS.

- *Appropriate performance measures for new paradigms.* New paradigms of manufacturing must offer superiority in performance from the points of view of Costs, Quality, Delivery and Flexibility. The first three are familiar performance criteria used for mass production, while flexibility is a key attribute of new paradigm manufacturing. To increase the acceptance of new paradigms performance evaluation methods should be developed.

5 Virtual/Extended Enterprise issues

The extended enterprise is an expression of the market-driven requirement to embrace external resources in the enterprise without owning them. Core business focus is the route to excellence but product/service delivery requires the amalgam of multiple world-class capabilities. Changing markets require a fluctuating mix of resources. The extended enterprises which can be likened to the ultimate customizable, reconfigurable, manufacturing resource is the goal. The operation of the extended enterprise requires take up of communications and database technologies that are near to the current state of the art. However, the main challenge is organisational rather than technological.

Research and Development opportunities in this area are:

- *methodologies to determine and support information processes and logistics* across the value chain in the extended enterprise.
- *architecture (business, functional and technical) to support engineering co-operation* across the value chain, e.g., concurrent engineering across the extended enterprise.
- *methods and approaches to assign cost/liability/risk and reward* to elements of the extended enterprise.
- *team working* across individual units within the extended enterprise.

Technical Appendix 4: Responsibilities of the IMS Inter-Regional Secretariat

The Inter-Regional Secretariat will have responsibility to:

1. provide logistics for inter-regional meetings and proposals,
2. maintain and distribute IMS meeting materials and other documents,
3. provide logistics for inter-regional publicity at the direction of the International Steering Committee,
4. educate new and prospective Participants,
5. disseminate information during, and upon the conclusion of, projects,
6. assist with inter-regional consortia formation,
7. organize and arrange studies and/or work as requested by the International IMS Steering Committee, and
8. undertake other appropriate tasks as assigned by the International Steering Committee.

Technical Appendix 5: Responsibilities of the IMS Regional Secretariats

To support the IMS Scheme, the Regional Secretariats will:

1. provide regional logistics for inter-regional meetings and proposals,
2. maintain and distribute IMS meeting materials and other documents within respective regions,
3. provide logistics for regional meetings and promotion,
4. disseminate information during and upon the conclusion of projects within respective regions,
5. assist in consortium formation within and across respective regions,
6. support regional delegations in attending the International IMS Steering Committee meetings,
7. facilitate regional selections and reviews, and
8. work with regional infrastructure groups to facilitate the IMS Scheme.

Technical Appendix 6: Admission of New Participants

Procedures for admission of new Participants to the IMS scheme are as follows:

1. The admission process begins with a letter of inquiry/interest from a ministerial or senior government/public administration level in the prospective Participant, addressed to the chair of the IMS International Steering Committee.
2. Each IMS head of delegation shall be alerted to the receipt of this letter of inquiry/interest. Each IMS Participant is chartered to evaluate the application and respond through its respective head of delegation to the chair of the IMS International Steering Committee.
3. If all IMS Participants accept the application, the chair of the IMS International Steering Committee shall inform, in writing, the applicant that if the applicant can ratify these Terms of Reference, then the IMS scheme will admit the applicant as a full Participant.

This process shall be completed as soon as practical, and in no case should take longer than three (3) months after receipt of the letter of inquiry/interest.

Technical Appendix 7: Project Consortia Formation and Evaluation

The Regional Secretariats together with the Inter-Regional Secretariat provide assistance in forming consortia for IMS projects.

A. Basic Consortium Formation Document

Each consortium will prepare a basic document that explains the:

1. IMS technical themes addressed by the Project,
2. Industrial relevance of the Project,
3. Project work plans, organization and structure,
4. Basic information, including contact information, of Project Partners,
5. A consortium cooperation agreement that addresses the intellectual property provisions and other legal requirements for the consortium; and
6. Other relevant information to facilitate project endorsement.

B. International Coordinating Partner

An international coordinating partner must be appointed by each consortium. The appointed international coordinating partner must be an entity with the necessary resources and expertise to lead the project to its completion. International coordinating partner duties include:

1. Coordinate consortia formation;
2. Coordinate preparation of full proposal and cooperation agreements;
3. Act as the primary contact for all communication between the consortium and the International Steering Committee and Inter-Regional Secretariat; and
4. Facilitate successful execution of the project.

C. List of Interested Entities

Within a region, its Regional Secretariat will distribute to all organizations in the industrial, academic and governmental sectors identified as potential project partners the basic document, the domestic funding opportunities, and the domestic agenda for the IMS scheme. The Regional Secretariat will compile a list of interested entities. The list must include the area of interest and the capabilities of each of the interested entities.

D. Exchange of Project Proposals

Any entity can submit preliminary proposals to its Regional Secretariat for transmittal to, and posting by, the Inter-Regional Secretariat.

Regional Secretariats will distribute these proposals to interested entities within their Regions. Based on the information, potential Partners can strive to form international consortia.

E. Evaluation, Selection and Review of Projects

Proposals and Projects must be consistent with the Purpose and the Principles of the scheme, and the intellectual property provisions set forth in Technical Appendix 1.

1. Project Selection Criteria

- a. Industrial relevance
- b. Compliance with the Technical Themes in Appendix 3 as may be amended from time to time by the IMS International Steering Committee
- c. Scientific and technical merit
- d. Adoption, commercialization and exploitation potential
- e. The IMS International Steering Committee shall assess compliance with the IPR provisions in Technical Appendix 1.

- f. Value-added

2. Consortium Selection Criteria

- a. *Inter-Regional Distribution of Partners.* Consortium partners must be from at least three Participants. Partners from applicant Regions may participate in consortia on a case-by-case basis.
- b. *Balanced Contributions and Benefits.* The consortium partners will show how the contributions to, and the benefits from, participation are equitable and balanced. To this end, Partners' contributions to the Project should be identified by scale and scope.
- c. *Inter-Regional Leadership.* The inter-regional consortium must appoint an international coordinating partner for the consortium to carry out the duties described in Section B above.
- d. *Dissemination of Results.* The consortium must commit to and submit a plan to disseminate project results, including the lessons learned in forming and managing IMS consortium, and non-proprietary technical results permitted by the IPR provisions.

3. Project Endorsement

The project endorsement process consists of three stages. The IMS International Steering Committee and Inter-Regional Secretariat will endeavour to move the entire endorsement process expeditiously.

- a. *Project Abstract Evaluation.* The consortium must submit an abstract of the planned research. This abstract shall be submitted to the Regional Secretariats for initial regional reviews. Each delegation will make a recommendation to the International IMS Steering Committee. Proposers of unapproved projects will be given feedback as to why they did not receive support.
- b. *Full Proposal Evaluation.* The consortium must submit a final proposal using a standardized format for detailed evaluation by all Regions. The final proposal shall include the formal commitment of each Partner to the principles, the structure and the IPR Provisions of the IMS scheme, and will include a signed consortium cooperation agreement.
- c. *Final Endorsement.* Final endorsement will be made by the IMS International Steering Committee based on the regional recommendations and the submitted proposals.

F. Project Review

The IMS International Steering Committee, through the Inter-Regional Secretariat, will monitor and review progress regularly. To facilitate this, each consortium will submit an annual summary report, in a standardized format, to the IMS International Steering Committee.

Any Region may review progress of Partner(s) from its Region at any time as it sees fit.

Technical Appendix 8: Role Of IMS vis-à-vis Small And Medium-Sized Enterprises (SMEs), Universities and Government Research Institutes

All regions should consider activities such as:

- A. Clear and well documented advice on IPR issues.
- B. A “road map” of existing constraints in law or custom in the Participants’ territories, and their practical implications.
- C. Help desks for answering simple queries.
- D. An electronic partner search facility specifically oriented to SMEs.
- E. An electronic register of “expressions of interest” by SMEs, which are looking for opportunities to join existing or emerging project clusters.
- F. An ongoing “case-book” of IMS experiences with donations from project teams.
- G. Dissemination events specifically geared to various SME sectors.

The list is not exhaustive, and research should continue alongside the evolving scheme, to monitor the participation of SMEs, and to identify further needs.

The items listed above also are useful for encouraging the participating of universities and government research institutes. Harnessing the educational role of universities in dissemination of results of research through to the next generation of practitioners is necessary.