

# Manufacturing Institute for Research on Advanced Initiatives (MIRAI, 未来)

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## 1 Introduction

MIRAI is organized as a “federation” of research institutes collaborating on generally agreed upon research project areas, Figure 1. This research collaboration is done between sets of affiliates according to our guidelines for research project focus and desired outcomes. As such, the organization is composed of a central administrative office (MIRAI Directorate) and “satellite affiliate members” (MIRAI Affiliates). It is important that the Directorate be able to efficiently and professionally coordinate the interactions between the affiliate members, including: hosting the Board meetings, technical project meetings and coordinating the collaborative research projects as well as work with external funding agencies and organizations on potential MIRAI projects. It is expected that MIRAI Directorate would be hosted by one of the participants at their institutions (at least initially) so that costs could be minimized (for accounting support, office space, etc.)

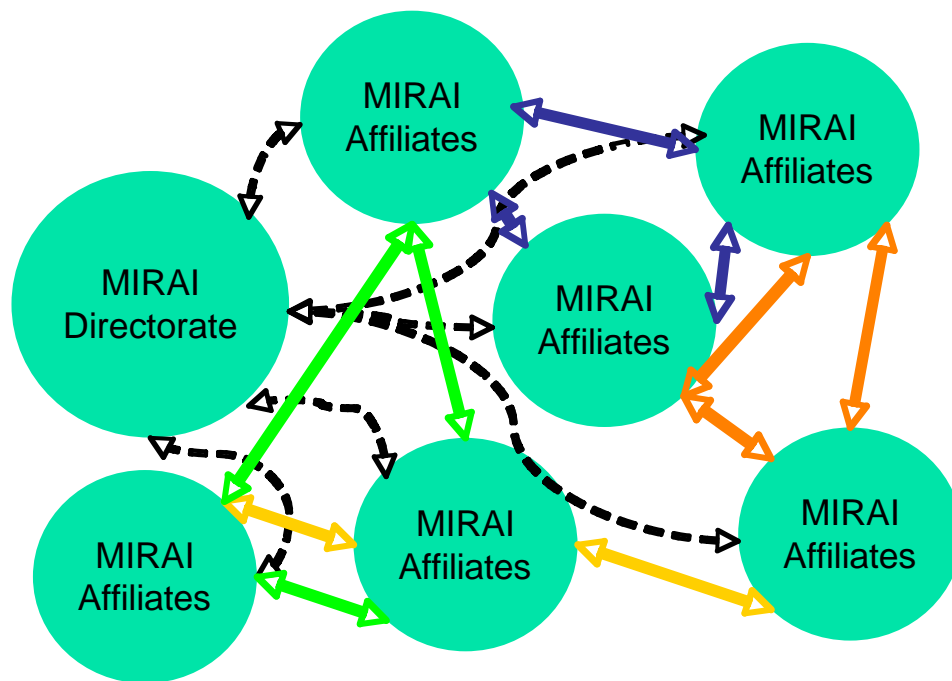


Figure 1 MIRAI “Federation” Organizational Model

The Directorate houses administrative staff support and the operating director (chief administrative person). The Directorate is responsible for:

- administrative support of the President and the Board
- organizing MIRAI technical meetings/review meetings
- communications among affiliates
- outreach and industrial liaison
- communication with potential supporters and potential affiliates

Directorate operations are financed by annual contributions from various resources (refer section 2). These funds are used for:

- overhead for host institution

- facilities and operation
- staff salary
- meeting costs (meeting room, food and refreshments, transportation and trip expenses for Board and President, staff)
- President expenses
- Other

## 2 MIRAI objectives

MIRAI will serve to raise the importance of manufacturing, provide efficient research environment for manufacturing technology, and attract good engineers through various educational tools with following objectives.

- To create a framework for collaborative research and education on the substantial issue facing sustainable manufacturing.
- To explore future manufacturing agenda, setup initiatives leading manufacturing society, and establish manufacturing research projects on advanced topics.
- Future agenda for manufacturing
  - Sustainability
  - Energy
  - Environment protection
  - High mix/high volume
  - Multi-scale manufacturing (fusion)

### 3 MIRAI Organization and operation

MIRAI will be comprised, initially, of a set of affiliates from US, Japan, and Korea, for example: University of California at Berkeley (Laboratory for Manufacturing and Sustainability (LMAS), Prof. D. Dornfeld), LBNL (Dr. K. Robinson), Keio University (Prof. I. Inasaki and Prof. T. Aoyama), RIKEN (Dr. H. Ohmori), Mori Seiki Co., Ltd. (Dr. M. Mori and Dr. M. Fujishima), KIMM (Dr. K. Hwang), KITECH (Dr. M. Han and Dr. K. Na), and Pusan National University (Prof. H. Jeong). These affiliates would be supported by resources, and collaboration with, industry in the Pan Pacific region as well as national government agencies. Industries would also be invited to participate as Corporate Members and, as such, would share in the governance of MIRAI. MIRAI, through the Board and the Directorate, would define a set of initial demonstration collaborative projects between at least two partners from differing countries, e.g. Keio-UC Berkeley-RIKEN, or KITECH-RIKEN-UC Berkeley. These projects would involve shared responsibility for research, exchange of researchers, and common reporting of progress in technical communications (e.g. in technical archival publications, conference proceedings, or special publications.) The MIRAI technical director would serve, with an advisory panel, to insure that the collaborations were effective and, importantly, resources were available. A draft organization chart is given in Figure 2.

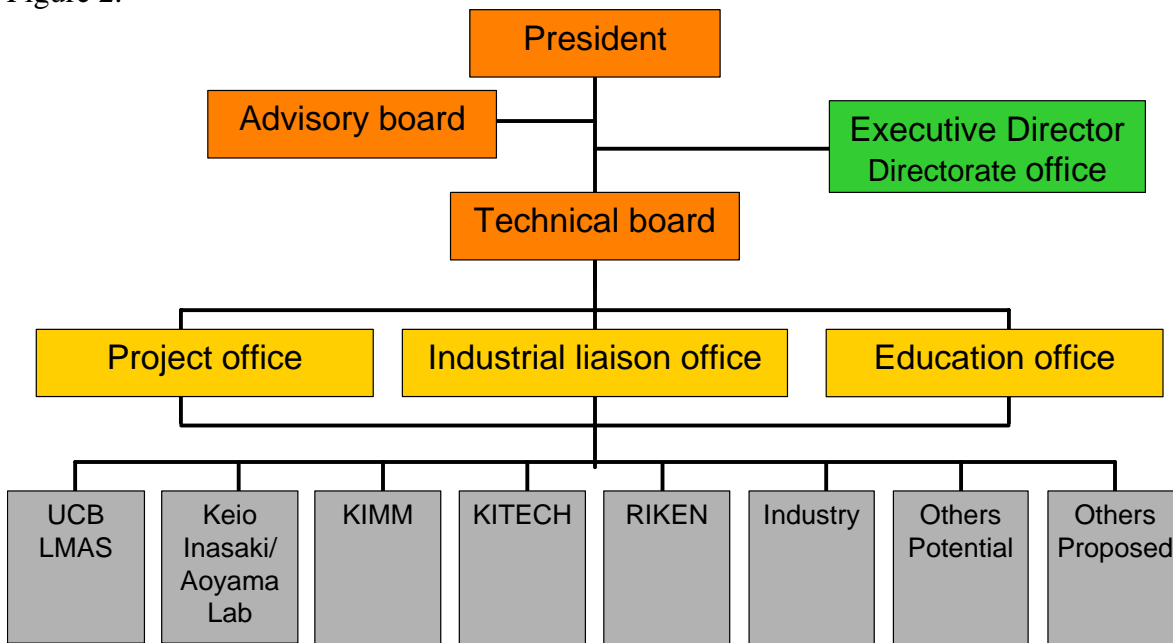


Figure 2. Organization chart (draft)

#### 3.1 List of participating institutions (current)

- Keio University, Yokohama, Japan
  - Inasaki's Lab (Prof. Ichiro Inasaki)
  - Aoyama's Lab (Prof. Tojiro Aoyama)
- RIKEN (The Institute of Physical and Chemical Research), Wako, Japan
  - Discovery Research Institute (Dr. Hitoshi Ohmori)
- KIMM, Daejeon, Korea (Dr. Kyung-Hyun Whang)
- KITECH, Incheon, Korea (Dr. Myeong Keun Han)

- Pusan National University, Pusan, Korea
  - NCRC (National Core Research Center for Hybrid Materials Solution) (Prof. Haedo Jeong)
- University of California, Berkeley, USA
  - LMAS (Laboratory for Manufacturing and Sustainability) (Prof. David Dornfeld)
- Lawrence Berkeley National Laboratory, Berkeley, USA
  - Engineering Division (Dr. Kem Robinson)
- Mori Seiki Co., Ltd., Nagoya, Japan

### 3.2 List of participating institutions: proposed (in discussion) and potential (to be contacted)

#### 3.2.1 Proposed

- Kobe University, Kobe, Japan
  - Moriwaki's Lab (Prof. Toshimichi Moriwaki)
- University of California, Davis, USA
  - IMS (Intelligent Manufacturing System) (Prof. Kazuo Yamazaki)
- University of Sao Paulo, Sao Carlos, Brazil (Prof. Joao F. G. Oliveira)

#### 3.2.2 Potential

- University of British Columbia, Vancouver, Canada (Prof. Yusuf Altintas)
- Mitsubishi Materials Kobe Tools Corporation, Akashi, Japan (Dr. Yasuyuki Yamada)
- Monterrey Institute of Technology, Monterrey, Mexico (Prof. Ciro Rodriguez)

### 3.3 Organization

- President
  - 3 year term
  - Elected by two boards (refer below)
  - Becomes a member of advisory board after the term
  - Makes final decisions on all items approved by two boards
- Directorate office (Executive director)
  - Permanent office, one or two administrative staffs
  - Support president and operating board
  - Coordinate three offices (project, industrial liaison, education)
- Advisory board (Chair)
  - Support and advise president in research agenda, policy, government and industrial relations, etc.
  - Acting member
    - 3 year term and one third will be replaced every year
    - Total of 6 members from participating institutions, industries, and governments

- Presidential voting right
- Honorary member
  - No limit on the number of member
  - Retired presidents, distinctive figures from outside
  - No voting right
- Operating board (Technical board) (Chair)
  - Executive decision on project, finance, events, etc.
  - Supervise three offices
  - Board member
    - 3 year term and one third will be replaced every year
    - Total of 10 members from participating institutions, industries, and governments
    - One senior manager and two managers per office
    - Presidential voting right
- Three offices
  - Project office
    - Project management, administrative support for collaboration
    - A technical director would serve to insure that the collaborations were effective and, importantly, resources were available.
  - Industrial liaison office: Industrial relations and public relations
  - Education office: Development of educational tools, planning lectures, online seminars, other educational events
- The business structure (The type of entity such as foundation or non-profit organization) will be determined

### 3.4 Meetings

- a. One board meeting around January
- b. One conference meeting per year
- c. Other meetings as required
- d. Meeting plans in near future
  - i. 3<sup>rd</sup> initiative meeting: January, 2007, Paris, France
  - ii. 1<sup>st</sup> board meeting: Summer, 2007, TBD
  - iii. 2<sup>nd</sup> board meeting: January, 2008, Paris, France
  - iv. 1<sup>st</sup> MIRAI conference: October, 2008, TBD
  - v. 2<sup>nd</sup> MIRAI conference: October, 2009, TBD

#### 4 Financial planning

##### a. Draft budget 1 (Assuming members can pay membership fee)

Items	Description	Rate	Periods	percent	Quantity	2007		2008		2009	
Inflation (4% per year)						Reduced	Full	Reduced	Full	Reduced	Full
<b>Administrative support</b>											
Operating Director	Associate Research Engineer II	\$7,625.00	12	50%	1	\$45,750.00	\$91,500.00	\$47,580.00	\$95,160.00	\$49,483.20	\$98,966.40
Secretary		\$4,000.00	12	50%	1	\$24,000.00	\$48,000.00	\$24,960.00	\$49,920.00	\$25,958.40	\$51,916.80
Operation expenses	fax, phone, paper, office supplies, etc.	\$800.00	12	100%	1	\$9,600.00	\$9,600.00	\$9,984.00	\$9,984.00	\$10,383.36	\$10,383.36
Benefits (22%)						\$15,345.00	\$30,690.00	\$15,958.80	\$31,917.60	\$16,597.15	\$33,194.30
<b>Subtotal</b>						<b>\$94,695.00</b>	<b>\$179,790.00</b>	<b>\$98,482.80</b>	<b>\$186,981.60</b>	<b>\$102,422.11</b>	<b>\$194,460.86</b>
<b>Conference and meetings</b>											
Meeting Space		\$10,000.00				\$10,000.00	\$10,000.00	\$10,400.00	\$10,400.00	\$10,816.00	\$10,816.00
Food		\$5,000.00				\$5,000.00	\$5,000.00	\$5,200.00	\$5,200.00	\$5,408.00	\$5,408.00
Travel expense											
	Board meeting										
	Air fare	\$1,500.00									
	Meal for 5 days	\$250.00									
	Taxi	\$150.00									
	Registration	\$600.00									
	Subtotal	\$2,500.00	2	50%	15	\$37,500.00	\$75,000.00	\$39,000.00	\$78,000.00	\$40,560.00	\$81,120.00
	Special meetings for fund raising, etc.										
	Air fare	\$1,500.00									
	Meal for 5 days	\$250.00									
	Taxi	\$150.00									
	Registration	\$600.00									
	Subtotal	\$2,500.00	4	50%	6	\$60,000.00	\$60,000.00	\$62,400.00	\$62,400.00	\$64,896.00	\$64,896.00
<b>Subtotal</b>						<b>\$112,500.00</b>	<b>\$150,000.00</b>	<b>\$117,000.00</b>	<b>\$156,000.00</b>	<b>\$121,680.00</b>	<b>\$162,240.00</b>
<b>Total before overhead</b>						<b>\$207,195.00</b>	<b>\$329,790.00</b>	<b>\$215,482.80</b>	<b>\$342,981.60</b>	<b>\$224,102.11</b>	<b>\$356,700.86</b>
Overhead	Max. 20%					\$41,439.00	\$65,958.00	\$43,096.56	\$68,596.32	\$44,820.42	\$71,340.17
<b>Total</b>						<b>\$248,634.00</b>	<b>\$395,748.00</b>	<b>\$258,579.36</b>	<b>\$411,577.92</b>	<b>\$268,922.53</b>	<b>\$428,041.04</b>

##### b. Draft budget 2 (Assuming no membership fee)

Items	Description	Rate	Periods	percent	Quantity	2007		2008		2009	
Inflation (4% per year)						Reduced	Full	Reduced	Full	Reduced	Full
<b>Administrative support</b>											
Operating Director	Associate Research Engineer II	\$7,625.00	12	50%	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Secretary		\$4,000.00	12	50%	1	\$24,000.00	\$48,000.00	\$24,960.00	\$49,920.00	\$25,958.40	\$51,916.80
Operation expenses	fax, phone, paper, office supplies, etc.	\$800.00	12	100%	1	\$9,600.00	\$9,600.00	\$9,984.00	\$9,984.00	\$10,383.36	\$10,383.36
Benefits (22%)						\$5,280.00	\$10,560.00	\$5,491.20	\$10,982.40	\$5,710.85	\$11,421.70
<b>Subtotal</b>						<b>\$38,880.00</b>	<b>\$68,160.00</b>	<b>\$40,435.20</b>	<b>\$70,886.40</b>	<b>\$42,052.61</b>	<b>\$73,721.86</b>
<b>Conference and meetings</b>											
Meeting Space		\$10,000.00			0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Food		\$5,000.00			0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Travel expense											
	Board meeting										
	Air fare	\$1,500.00									
	Meal for 5 days	\$250.00									
	Taxi	\$150.00									
	Registration	\$600.00									
	Subtotal	\$2,500.00	2	50%	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	Special meetings for fund raising, etc.										
	Air fare	\$1,500.00									
	Meal for 5 days	\$250.00									
	Taxi	\$150.00									
	Registration	\$600.00									
	Subtotal	\$2,500.00	4	50%	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Subtotal</b>						<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Total before overhead</b>						<b>\$38,880.00</b>	<b>\$68,160.00</b>	<b>\$40,435.20</b>	<b>\$70,886.40</b>	<b>\$42,052.61</b>	<b>\$73,721.86</b>
Overhead	Max. 20%					\$7,776.00	\$13,632.00	\$8,087.04	\$14,177.28	\$8,410.52	\$14,744.37
<b>Total</b>						<b>\$46,656.00</b>	<b>\$81,792.00</b>	<b>\$48,522.24</b>	<b>\$85,063.68</b>	<b>\$50,463.13</b>	<b>\$88,466.23</b>



c. Income

Proposal 1: Membership fees

- i. Full membership: membership on board
  - a. Academic institutions: \$X per year
  - b. Research institutions: \$2X per year
  - c. Industry: \$4X per year
- ii. Observer: can attend MIRAI conference, requires approval by board
  - a. Academic institutions: No charge (limited one year participation)
  - b. Research institutions: \$X per year
  - c. Industry: \$2X per year
- iii. Sponsors: Industry (TBD)

(Note: X to be determined based on discussion with minimum X=\$10,000)

Proposal 2: External contractor or employee

- i. Expected annual cost to cover one administrative secretary and administrative expenses would be about \$80,000 and This will be divided by the number of participating institutions (currently 7 institutions). The person can be hired in various forms which suit each institution's administrative guidelines. It can be "external contractor or employee", or "external consultant", or "expert", etc.
- ii. Sponsors: We are still pursuing membership fee for participating companies or reasonable contributions to create fund to operate the institution.

## 5 Funding Model

Phase I: Three objectives for funding for MIRAI at Phase I are;

- maintain smallest feasible administrative costs,
- cost sharing among participants,
- meeting and conference expenses by hosting institutions.

The present model for funding (Phase I) assumes that all the MIRAI affiliates would contribute an annual fee to the MIRAI Directorate. Those funds would be used to cover the costs outlined above. If there are not sufficient funds initially, then expenses such as travel costs to meetings for Board members and operating director salary would not be included or reduced (refer Section 5).

According to survey results, most institutions expect administrative difficulties to allocate membership fee. Alternative suggestions for expenses are as followings:

- Annual board meeting: A hosting institution covers expenses. Travel expenses should be covered by participants.
- Annual conference: A hosting institution covers expenses. It may charge the registration fee to cover the cost.
- Administrative costs:
  - Suggestion 1: One administrative secretary can be supported by participating institutions (approximate cost: \$80,000/year). The person can be hired as “outside contractor or employee (or whatever it is called)” by each institution.
  - Suggestion 2: At least one participating company or sponsor contribute fund to cover this cost. Any surplus can be used to cover other expenses.

Research funds in Phase I would be obtained by individual affiliate members from their sponsors/governments/industry collaborators directly. No research funds would be paid to the MIRAI Directorate or distributed by the Directorate. All collaborative agreements would be between the individual affiliates engaged in the collaborative work. The research projects would, however, have to be developed according to the general guidelines of MIRAI program (topics, scope, length of study, desired outcomes, etc. (these guidelines to be determined)) and would be reviewed annually by the MIRAI Board. In this way, issues of intellectual property, overhead of institutions, personnel, etc. would be handled by the individual affiliates.

Phase II: The Phase II funding model is the same as Phase I with the addition of the possibility of project funding through the Directorate. Funding organizations/industries wishing to support generic research involving a large number of affiliates could provide funding directly to the MIRAI Directorate and, according to their interests and the MIRAI Board’s governance, projects among the affiliates would be established and funded from MIRAI Directorate. This would necessarily require a minimum level of funding to make this effective – anticipated as \$100K/year minimum. This could accommodate the requirements of governmental agencies wishing to utilize

the entire MIRAI federation or companies wishing to benefit from a broad input of the affiliates.

Phase III: The Phase III funding model is the same as Phase II with the addition of the possibility of the MIRAI Directorate submitting proposals to funding agencies and organizations for the purpose of acquiring research support for MIRAI projects.

We anticipate that Phase I funding model would operate from start of MIRAI for the first few years (say until 2009 or 2010); Phase II model would be operating from 2010 on and Phase III model introduced after 2012 or later. If there is strong support for advancing this schedule, and MIRAI Directorate is able to accommodate this, the schedule could be adjusted.

## 6 Member benefits and obligations

The Pacific Rim MIRAI community will serve as

- forum for discussion among leading researchers and industry practitioners
- vehicle for collaborative research and education
- vehicle for input to governments and funding organizations in manufacturing research and education policy and funding

As part of MIRAI, members will have

- Benefits
  - Access to and participate in leading research programs
  - Joint research projects
  - Joint publications of research results
  - Share research ideas and sponsorship
  - Share resources of participating institutions
  - Educational tools such as expert lecture series, exchange students, on-line courses, joint courses, etc.
  - Exchange researchers
  - Serve as Board members and in technical leadership
  - Dissemination of research activities through website
- Obligations
  - Participate in collaborative research projects
  - Provide proper arrangement for exchange researchers and students
  - Participate in MIRAI meeting and conferences
  - Acknowledge MIRAI on MIRAI related publications
  - Support MIRAI administrative costs