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Globalization of MIT: GSSD on the WWW

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As an international institution focusing on science and technology, MIT has a long tradition of interest in public policy and innovations in policy responses. Looking toward the twenty-first century, almost everyone agrees that “sustainability” constitutes one of the international community’s major challenges and that strategies toward sustainable development are wanted

What is sustainability? And how would we recognize it if we, per chance, stumbled across it? Uncertainties and ambiguities aside – along with disciplinary priorities and political contentions – the fact remains that sustainability is more a vision and a challenge than an operational strategy guided by theory and buttressed by specific action. And its requirements and conditions seem to be more posited rather than subject to analytical rigor or based on empirical scrutiny.

But everyone agrees that the challenges are daunting in intellectual and policy terms. The Institute has made major commitments in supporting research and education related to sustainability, environmental management, and global

(Continued on Page 10)

Penny Wise and Pound Foolish: Re-Engineering Reengineering

James L. Kirtley Jr.

The process of “Reengineering” should have, as its objective, operation of MIT in a more cost effective fashion. There is nothing wrong with this. It is most important that we use our limited resources in the most efficient way possible so that we can do the most with what we have. Unfortunately, it appears that the people actually making decisions in this process may have allowed their focus to shift from cost effectiveness to cost alone. That is, they are looking only at the bottom line. Some of the changes that have been made or are in the works may sound good, but are not going to be beneficial in the long run.

An example is the new mail regime. In order to cut costs, MIT has established a number of satellite mail rooms to which the mail is delivered in bulk. These replace those efficient people who hustled mail to all of the offices. Now what happens is everyone must go to the mail room to get his or her mail (or those of us fortunate enough to have a secretary can send that person). The result is that MIT spends less in General and Overhead Pool funds on mail.

(Continued on Page 22)

Revolutionary Times Require Revolutionary Goals

Rosalind Williams

“It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair,...”

So begins *A Tale of Two Cities* by Charles Dickens, who certainly knew how to write an opener. In that novel he was writing about the creative destruction of the French Revolution, which rocked the two cities of Paris and London. At the end of the opening paragraph, Dickens concludes that his own time was no different from those revolutionary times: only superlatives seemed fit to describe his age as well as theirs.

And our age too. Dickens published *A Tale of Two Cities* in 1859, just a few years before MIT was founded. We at MIT now have every reason to believe we too are living in the best and worst of times. This institution, dedicated to generating change, is now tossed by many of the dynamic currents we ourselves have helped create. During the past several years, we have lived out

(Continued on Page 29)

From The Faculty Chair — Page 5

MIT In China — Page 7

Teach Talk — Page 8

Center for Advanced Educational Services — Page 13

EVAT Committee Report — Page 13

Also: Athena Training Opportunities; Remarks to the Corporation;

Recentering the S.A.T.; Benefits Enrollment; Letters; M.I.T. Numbers

Contents — Page 2

Globalization of MIT: GSSD on the WWW

Choucri, from Page 1

change. And MIT is not unique in this regard. A large number of research programs are underway as both faculty and students direct their attention to the intellectual and analytical challenges at hand. Almost every major international institution of research and education is engaged in sustainability activities.

Problem and Need

The essence of the substantive problem is that expansion of human activities (due to rapid population growth in conjunction with

resource uses and accelerated technological developments) continue to place strains on life supporting properties. Precisely **how** and **what** can be done about it is the essence of the policy challenge. Equally pressing is the information challenge. A cursory cruise through the World Wide Web (WWW) shows an avalanche of sustainability sites coupled with a dearth of “quality” materials (defining quality in terms of reliability, replicability, respectability, etc.).

More daunting is the challenge of making some sense of the cruise, the destination, and the contributions to enhancing understanding of sustainability issues, policies, strategies, or even mere “wishes.” What is now available to us all is akin to a sustainability-spaghetti-plate. What is needed is an intelligent system for sustainability studies, adaptive to changing conditions, responsive to scientific inquiry and technological responses, and accommodating the diversity of sustainability priorities and preferences.

Intelligent System for Sustainability Studies

What is an intelligent system in this context? It is one that streamlines maintenance (through uses of authoring tools and object-oriented programming) and enhanced applicability (automatic generation of WWW pages, automatic updates of data bases, and wide area network). These capabilities would reduce the transaction costs (not to mention inconvenience) inherent in WWW conventions and modalities. As pioneers in policy applications of intelligent systems, researchers in the

AI (Artificial Intelligence) Lab (in John Mallery’s group) have extended the basic server capabilities developed for the White House initiative on “reinventing government,” and collaborated in allocations to the domain of sustainability (with all the ambiguities and complexities therein).

Strategy and Logic

The Global System for Sustainable Development (GSSD) is an effort to provide some intelligent and adaptive order, both access to and contents of sustainability materials, on the WWW. It is also designed to engage the research and the policy communities in different parts of the world in an exercise of “sorting out” the sustainability-spaghetti-plate into some semblance of intellectual order and analytical coherence. GSSD consists of an agent interface, coupled to an intelligent-adaptive server, streamlined access to WWW search engines, subject-driven rules for search conduct, with “quality” criteria for site identification and use of materials.

For users who prefer the spaghetti-plate strategy (or the filing cabinet format), an “alpha option” is available, enabling them to by-pass any semblance of social science theory pertaining to sustainability, and skate unimpeded through the crevasses of the WWW. This “following the blue line links” – shades of the “yellow brick road” – constitutes the no-theory strategy.

As a collaborative initiative among researchers in the Artificial Intelligence Laboratory, the Department of Political Science, the Center for International Studies and the Technology and Development Program, the GSSD capitalizes on MIT’s international linkages and current collaboration with the set of international and regional institutions responsible for the “application” of sustainability concepts and theory. By far the most important element of the design involves the participation of undergraduate and graduate students from the initial conception to the present version. Here our purpose is to highlight the importance of *intelligence* in thinking about sustainability, and of *internationalization*

(Continued on next page)

WHAT IS THE PROBLEM?

On the subject of sustainable development there is not one single problem but several.

These include:

- **CONCEPTUAL AMBIGUITIES**

PERTAINING TO SUSTAINABILITY THEORY, PROCESS, ACTIONS, AND OUTCOMES

- **EXPLOSION OF INFORMATION**

INCLUDING DATA, DOCUMENTS, IDEAS, ASSESSMENTS, EVENTS, ORGANIZATIONS, NETWORKS, ETC.

- **OBSTACLES IN TRACKING**

WITH RESPECT TO CONTENT AND EVALUATION OF INFORMATION ON THEORY, POLICY, AND ACTION

- **ABSENCE OF GLOBAL CONFERENCING**

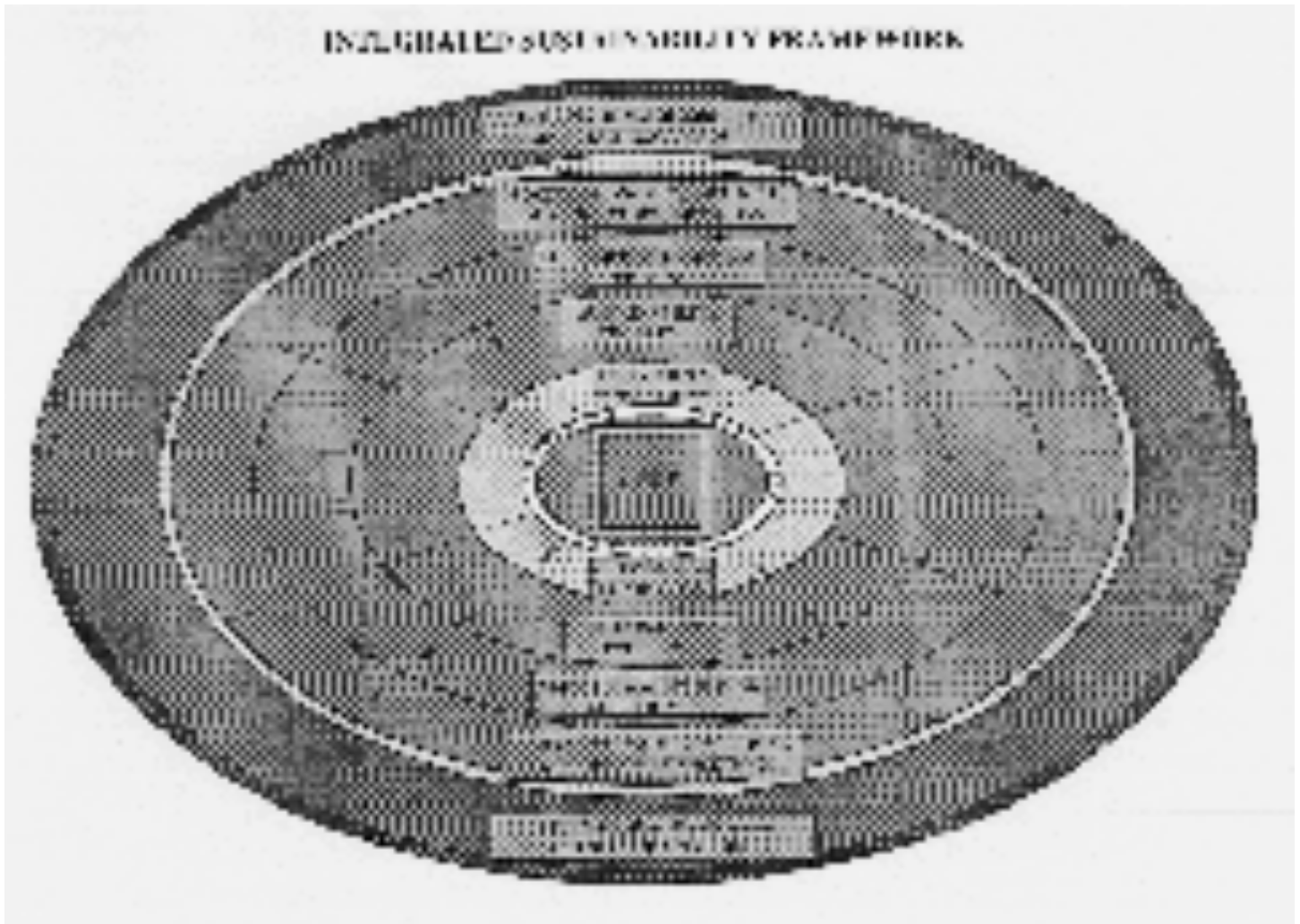
FOR INFORMATION SHARING, CONSENSUS BUILDING, REALITY-CHECKING, AND UPGRADING OF EVALUATIONS ON THEORY, POLICY, AND ACTION

- **DISCONNECTS AND LIMITED FEEDBACK**

WITHIN SNF SMONH INDYIYUYIOND OG (A) SCIENCE AND TECHNOLOGY, (B) BUSINESS AND INDUSTRY, AND (C) GOVERNANCE AND GOVERNMENTS WORLDWIDE

Globalization of MIT: GSSD on the WWW

Choucri, from preceding page



in the conduct of intellectual discussions and policy deliberations.

Design and Implementation

GSSD consists of *conceptual framework* (substance and coherence), *application* (user access, system input, and wide area network), *implementation* (adaptive code and user responsiveness); and *alpha system* (the no-theory option). The basic design begins with a principle of consistency, then subject to modification resulting from adaptation, use, and information-driven adjustments.

Conceptual coherence means integrated nested and hierarchical relation, starting from the core (population demands, economic performance, etc.) to activities and conditions, to views of sustainability-

related problems, to scientific and technical solutions, then to social, economic, and political solutions. The radial line facilitates “tracing outward” the consequences and proposed “solutions strategies” associated with specific sustainability dilemmas. The figure’s resolution does not show the set of entries within the radials. A “slice” is shown here for illustration.

Research and Education at MIT

Central to GSSD is contribution to education and research at MIT through the use of advanced technology. The interdisciplinarity of the substantive issues and of the application of innovative technology provides some challenges of interest to both students and faculty. Specifically, these challenges bear directly

on the missions of two initiatives reported in this issue of the *Faculty Newsletter* – namely, Education Via Advanced Technologies (EVAT) and the activities of the Center for Advanced Educational Services (CAES) [see Page 13].

In its design and objectives, GSSD is entirely consistent with the goals and objectives of EVAT as potentials are explored in the use of advanced technologies for drawing upon MIT’s unique capabilities. The GSSD initiative makes use of advanced technologies, but it draws upon intellectual insights and conceptual advances made on sustainability issues by faculty and students over the past several years. Many of these have been presented before the MIT Forum on Sustainable Development (an outcome
(Continued on next page)

Globalization of MIT: GSSD on the WWW

Choucri, from preceding page

of the Faculty Seminar on Global Environment and Sustainable Development over the past five years), and may well represent the state-of-the-art on sustainability dilemmas.

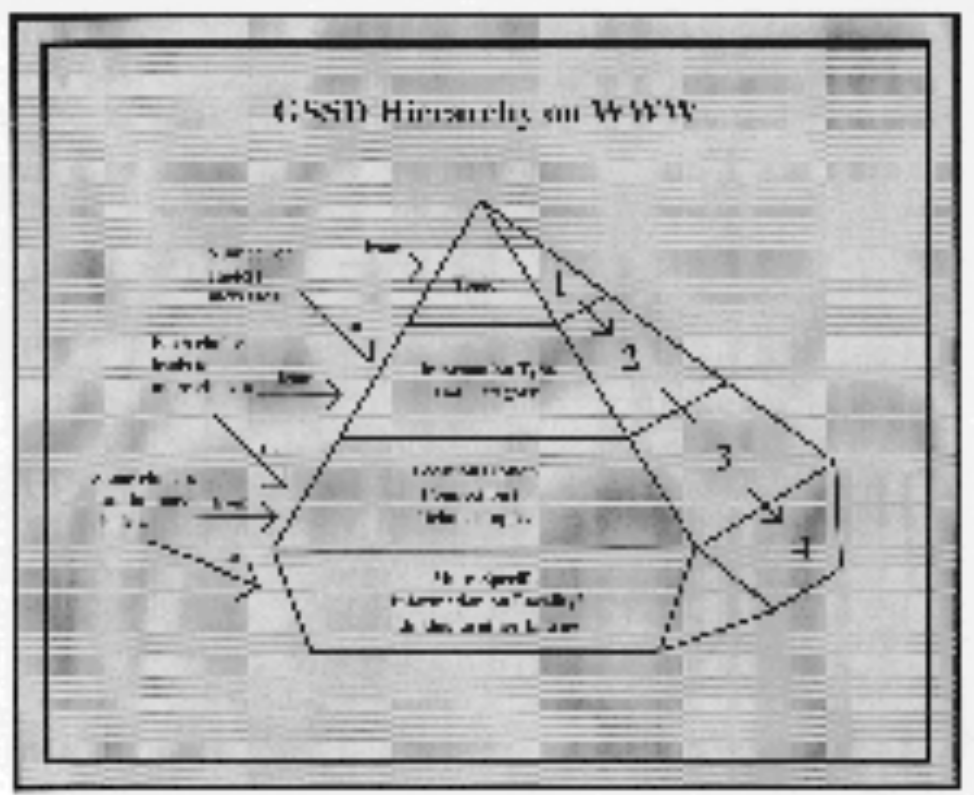
Student Participation in Sustainability Strategies

Wide-area networking provides practical opportunities for MIT students to participate in research and policy deliberations serving as “inputs” into the forthcoming inter-governmental evaluation of the Post-Rio process (the Conventions, Agenda 21, the Principles on Sustainable Development, the funds, etc.). Mandated by the General Assembly of the United Nations, the product of this evaluation will set the institutional and financing priorities for the global community during the next five years. It would benefit our students if we could facilitate their own access to these processes.

In this connection, the new CAES mission is of particular relevance. Utilizing advanced technology to distribute educational materials, CAES is establishing an important diffusion role for enhancing accessibility of MIT’s intellectual products. To the extent that the GSSD initiative can facilitate diffusion of education materials on sustainability and environment, there is a synergism between CAES (in educational services) and GSSD (as an interdisciplinary initiative addressing sustainability challenges).

World Wide Network and Enhanced Access

The wide-area network capabilities of GSSD provide a means of “leapfrogging” conventional modes of communication, conferencing, and feedback. For our purposes, the initial applications are for exchanges on research activities and inputs into policy developments. In practice, wide-area networking translates into participation of research teams in key nodes worldwide – i.e., Asia, Africa, Latin America, East Europe, and the industrial world. Regional offices of international institutions serve as the “field” links. Wide area conferencing capabilities are still to be fully framed and tested. Inputs from the “nodes” at this point help to anticipate some of the practical difficulties at hand.



An added dimensions of networking is connecting GSSD users to the national electronic networks established since Rio under the Agenda 21 program. This “connection” is a part of the GSSD implementation worldwide. To the extent that linguistic capabilities can be interfaced with GSSD, then “leap-frogging” communications would take place.

MIT as a Global Institution

There are two sides to this issue: one is MIT’s potential contribution to global thinking and policy response; the other is the globalization of MIT itself.

MIT’s institutional commitment to environmental research and education, and to improving the knowledge-base related to sustainability, have already contributed to new insights on sustainability – some information, some “findings,” some testable propositions, and some basic “theory” or precepts. As an evolving enterprise, these policies can well serve the international community if, through advanced technologies, they can be made more readily available and more easily accessible.

To the extent that faculty members and students do wish to “interface” with policy deliberation at the global level, GSSD is intended to facilitate this “interface.” Increasingly, the WWW is an important medium for global communication; so introducing some intelligence in sustainability materials and deliberations may well be a relatively low-cost and potentially high value-added outcome.

The other side of the coin is the globalization of MIT. So far, the Institute has focused on “internationalization” and on expanding international reach. Semantics aside, MIT internationalization has not kept pace with the globalization processes worldwide. The potential synergism between the goals and activities of EVAT and CAES on the one hand, and the world wide network of GSSD on the other, may enhance MIT’s role in the globalization process. In the sustainability domain, this involves interacting with international institutions responsible for designing and implementing strategies for sustainable development.✦