

The Nerken School of Engineering, Cooper Union

Report II

GLOBETECH-7

(Final Gateway Report)

Filename: CID - U - 21 - CU



Fall 2001 activities

April 23, 2002
Prepared for The Gateway Engineering Coalition
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Table of Contents:

1. Project Overview	1
2. Gateway Year 10 ('01 - '02) Project Phases	2
3. GLOBETECH' s Major Benefits	3
4. GLOBETECH-7 Phase II Status Report	4
5. Plans for the Future	8
6. Conclusions	9
7. Attachments:	11
7.a GTK-7 Internet Home Page	
7.b Content of the Sharing Information Page	
7.c Joint-Venture Contract Awards Page	
7.d Student Feedback	
7.e List of participating schools in the Globetech 1-7 Simulations	
7.f List of projects discussed in the Globetech 1-7 Simulations	

1. Project Overview:

The Global Technology Management Simulation (GLOBETECH) is an original Curriculum Innovation and Development (CID) project developed for the past seven (7) years at Cooper Union (CU) under the auspices of the Gateway Engineering Education Coalition. Its main purpose is to familiarize the undergraduate engineering students with the practical aspects of global technology management principles, current issues, and with international project negotiations, by using an Internet based International Joint-Venture Project Simulation as the learning tool.

The subject of GLOBETECH-7 (fall 2001) was: “New Energy Joint-Venture Projects in Poland, Taiwan, and the USA”. We also discussed a joint-venture project of an Interactive Television Station in Italy, which was added at the end of August to our program. We consider GLOBETECH-7 a very successful simulation due to its large and varied student team participation, the high level of their work on this project, and the considerable number (4) and variety of projects discussed. **Twelve (12) teams with a total of one hundred and four (104) students from four (4) schools, in three (3) countries, France, Italy, and the United States, participated in this simulation.** (For a list of participating teams please see Att. 7.a).

Besides the two teams of Cooper Union juniors and seniors, graduate engineering students from The North Carolina Agricultural and Technical University (NCA&T) - part of the Succeed Engineering Coalition, engineering students from the Milan Polytechnic, and MBA students from ESC – Toulouse (many of them with undergraduate engineering degrees), also participated in GLOBETECH-7. The high educational level and motivation of all student teams were the important factors in the success and superior learning value of this project.

The GLOBETECH project was inspired by the very positive "hands-on" experience gained by the EID-372 (Global Perspectives in Technology Management Course) students and this professor during the fall 1994 semester, while participating in the "ICONS" (International Communication and Negotiation Simulations) project sponsored by the University of Maryland at College Park.

GLOBETECH was conceived as a major component of an interdisciplinary undergraduate engineering course in Global Technology Management such as EID-372. To participate in this project, participation in a Global Technology Management course is not absolutely necessary. The simulation deals with issues such as: trends in and ways to economic growth in various parts of the world, global competitiveness strategies, international negotiations, technology transfer, operations optimization, global environmental issues, etc., and it can benefit students from a large spectrum of engineering and management courses.

As a matter of fact, ESC Toulouse, a major graduate business school in France, has structured a whole sequence of international management and marketing courses around participation year after year in the GLOBETECH simulation.

The main purpose of GLOBETECH is to familiarize the engineering students with the real and very complex political, economic, social, financial and technical issues influencing global technology decisions, thus better preparing them for a future of increased globalization.

2. Gateway Year 10 ('01 -'02) Project Phases:

The Gateway year 10 work for this project has three main phases as follows:

2.A Phase I – GLOBETECH-7 infrastructure development (Spring/Summer '01):

GLOBETECH-7 simulation infrastructure such as: background information, computer interface protocol, computer communication software, feedback questionnaires, etc., were developed during the spring and summer of 2001. For details see please Report I, GLOBETECH-7, dated April 18, 2002.

2.B Phase II GLOBETECH-7 simulation (Fall 2001):

The seventh simulation started as scheduled on October 04, 2001 and finished on December 15, 2001. Besides the e-mail and Internet Chat communications between the participating student teams, the simulation also included three "on-line" teleconferences with the teams from ESC Toulouse and NCA&T. This report discusses in detail the phase II GLOBETECH-7 work and results.

2.C PHASE I GLOBETECH-8 AND PHASE III GLOBETECH -7 work (Spring/Summer 2002):

In the spring/summer 2002 we will proceed with the preparation work of the Cooper Union sponsored GLOBETECH-8 simulation (the project has been institutionalized), and any additional GLOBETECH-7 related activities, such as participation to workshops and conferences, help with final project documentation, etc.

3. GLOBETECH' s Major Benefits:

GLOBETECH is a new, innovative, "hands-on" learning tool. Its main benefits are:

3.1 Develops students' multi-cultural awareness:

By discussing joint-venture projects in various countries such as China, Poland, France, the United States, India, etc., students have to impersonate United States or foreign decision makers such as private company managers or government representatives. In the process of preparing for the project, and during the simulation, they become familiar with the economical, political, technical, etc., status in the respective countries discussed in their project. The students solve technical and technology management problems, negotiate agreements, and award contracts in the political, economic, and cultural context of various countries quite different from the United States.

3.2 Emphasizes the cross-disciplinary nature of global technology management:

Through the technical, economic, political, social, financial, etc. background research they undertake in order to prepare for the simulation, students have to resolve issues related to many technical and social sciences fields.

3.3 Disseminates new learning methods and tools based on the use of modern information technology (the Information Highway) to all participants.

Since the simulation and all the communications between the groups take place on the Internet, students learn how to use the latest Internet based technology. They learn to use e-mail and Internet Chat quite effectively. With the help of Internet based teleconferences, they have the opportunity to see and hear

their peers in real time, discuss and negotiate various issues pertaining to the projects, and establish a bond with other students from various schools. _____

3.4 Develops familiarity with research and collaborative work via the Internet.

Students get also familiar with using the Internet for research, by gathering information from pertaining Internet sites related to their projects.

3.5 Develops students' essential working skills, such as: verbal and written communication, leadership, teamwork, and negotiating skills:

The students work in teams from the beginning of the project. They choose their own team leader, and all of them have to be familiar with the responsibilities of at least two other students in the team to be able to replace them in case it is needed. These measures strengthen their leadership and teamwork skills, and their sense of responsibility for this project.

Their communications skills are honed through writing the Requests for Proposals (RFP's) and Proposals, presenting them to their peers and competitors, posting them on the Internet for all to see, having to negotiate them, and award contracts. The negotiations for project contract awards are quite competitive, allowing students to develop and use all their communications and leadership skills to the fullest.

3.6 Exposes the students to important technical and managerial issues not covered in other courses:

GLOBETECH-7 familiarized the students with such critical and practical issues as new, environmentally friendly and renewable energy sources (fuel cells applications and wind power plants), environmental preservation, global ethics, technology transfer in the new energy and environmental fields, new developments in interactive television, etc.

3.7 Opens the door toward greater domestic and international collaboration in engineering education:

Through direct faculty and student contact, via the Internet, with teams from various domestic and foreign universities that participate in this project. Besides three teams of Cooper Union students, GLOBETECH -7 had participation from the North Carolina Agriculture and Technical University (NCA&T) and the ESC - Toulouse Graduate Business School.

4. GLOBETECH-7 Phase II Status Report:

(Fall 2001)

We are happy to report that the Globetech-7 simulation was successful, conducted at a high technical level, without any major setbacks. The Cooper Union teams started the preparation for writing the Requests for Proposals (RFP's) around September 15. The project started with a class lecture by this professor on the simulation scope and goals, the WWW site content and organization, project milestones, responsibilities, and schedule, research and content requirements for the RFP's, etc. The student teams prepared for about two weeks, and on October 09 the Cooper Union teams presented the Power Point presentations of their research and preparations for the RFP's. Our students prepared the RFP's for the Taiwan Fuel-Cell Scooters Project and the Wind Power Farm in Poland. Based on this work session, the draft RFP's were issued for this professor's review, and the final RFP's were posted on the simulation's web site as scheduled, on October 25, 2001. The other two RFP's, both issued by NCA&T, were also published on the simulation web site at the same time. Issuance of the RFP's represented the first major milestone of the project, and as such a lot of care and effort were given to its timely fulfillment by all the teams involved.

Meanwhile, this professor kept in touch with the professors and student teams from the other two participating schools, guiding them through the research process, team formation, schedule requirements, and all the other logistic and technical details related to the simulation. We also discussed and established the roles that each team would play during the simulation, and the schedule and the logistics of our "on-line" teleconferences.

Two of the NCA&T's teams volunteered to prepare the RFP's for the Wind Power Joint-Venture Project in the USA and The Interactive Television Project in Italy. The publication of these RFP's had to be on the same schedule as those from Cooper Union, requiring tight coordination of our teams' work.

Unfortunately we had some technical setbacks regarding our teleconference and chat communications with NCA&T, due to technical incompatibility of our teleconference systems, which was discovered in the last moment. Due to this, we were not able to establish visual and voice contact via the Internet with NCA&T,

being able to have only voice conferences via normal telephone lines, or Internet Chat. On the other hand, this setback taught students some of the realities of business, that difficulties can and will happen, generally at the worst possible time, and that it is important to be flexible and resourceful in order to overcome them. We are determined to take all the required measures to resolve these technical problems prior to next year's simulation. Our teleconferences with France worked relatively well this year, a reversal of situations from the previous year. Our teams had the full advantage of those communications.

The purpose of our first teleconference with ESC France was for the CU RFP teams to answer various questions from the proposal writing teams. The Proposal writing phase started, and the sixteen (16) responding proposals were posted on the project's net site by November 19, 2001. During the proposal-writing phase, the proposal and RFP teams were in contact via e-mail and Chat for various questions and clarifications.

Most student teams did a great job in preparing the proposals. For each project there were at least two proposals, and for some of them four or five, so the contract competition was quite intense, again, like in real life. The proposals from NCA&T, written by graduate students in an engineering college, emphasized more the technical aspects of the projects. Those written by ESC students, who were graduate business students, emphasized more the financial and managerial aspects of the projects. This was good, because we all could learn from the strengths and weaknesses of each proposal, compare and analyze them, and see what was well done and what was missing, or not sufficiently developed. We used this analysis as a basis for our discussions in the second round of teleconferences that took place at the beginning of December with both ESC and NCA&T. The Italy team had teleconferences only with NCA&T, since it competed with one of the Cooper Teams on one of the projects.

During the "on-line" sessions the students had many questions to clarify, so the negotiation part was minimal during the second set of teleconferences. However, negotiations between the teams took place afterwards, via chat and e-mail. We were limited in our negotiation time by the schedules of the participating schools and also by the four day Thanksgiving holiday that also cut out precious simulation time.

In my opinion, the project accomplished all its goals in a rather short period of time. There were frustrations on all fronts with the poor quality of communications, and with the lack of sufficient time for more in depth

negotiations between the teams. A big part of the problem is the fact that all students have obviously other commitments and they can't dedicate too much time to this particular project. Some of them work, all have different class schedules, so it is very difficult to get all of them together several times, for two hours each time, outside the normal class time, for teleconferences or project discussions. The different time zones in the United States and France or Italy (+ 6 hr.) also contribute at creating problems in scheduling of "on-line" communications. Another difficulty was the various holidays in all the countries during the semester, making scheduling even more difficult. For the ESC students, there was an additional aggravation due to the fact that their course schedule started November 1st and lasted only till December 15th, in an intensive mode, quite different from our schedule here in the USA.

Around December 10, based on the discussions among all teams, the RFP teams under the guidance of their professors decided the contract winning teams. The technical, financial, managerial, etc., reasons why these particular teams should get the contracts were well weighted and documented in Power Point presentations by the RFP teams. The contract winning teams and reasons for contract awards were published on the project's site on Dec. 15, 2001 (see please Att. 7.c).

For the CU students a project feedback session took place on Dec. 10, when students presented in MS Power Point their impressions about the course and the Globetech project. In general, the impressions were very favorable, students expressing satisfaction with the wide range of knowledge they were able to gain through this project and course (Att. 7.d).

The simulation officially ended on December 15, 2001. E-mail feedback was received from the participating faculty, Profs. William K. James (NCA&T), Maria Sanjaume (ESC-Toulouse), and Anxo Cereijo, Milan Polytechnic. The professors expressed their satisfaction with the project and desire to participate in the fall 2002 in our Globetech-8 project.

I would like to commend the considerable efforts of the Cooper Union student Alexander Lin, who despite his full load of courses and work, helped me with the computer interface, upgrading and modifying data on time, and supporting all the interface requirements of the project.

5. Plans for the Future:

(Spring/Summer 2002)

Based on the GLOBETECH-7 scope of work, the following additional activities will be undertaken in the Spring/Summer of 2001:

5.a) Development and finalization of a GLOBETECH-7 multimedia package:

A CD-ROM containing the WWW GLOBETECH-7 site materials, and videotape containing a summary of the main activities during the fall '01 simulation will be sent to Gateway Central together with a report, for further packaging. If any other materials are needed, we will make every effort to meet Gateway Central' s requirements.

5.b) Participation to Engineering Education conferences:

In order to increase faculty's familiarity with the this project, and the Global Technology Management course, this professor plans to present a paper at the 2002 ASEE Conference, in June 2002, in Montreal, Canada.

5.c) Development of the GLOBETECH-8 simulation:

Although the Gateway Coalition financial support will end in August 2002, Cooper Union plans to institutionalize this project and continue to offer it to all participating students due to its obvious merits. Starting in Spring 2002, we plan to develop the eighth GLOBETECH simulation. We plan to iron out most of our previous communications problems, and be able to further increase participation and diversity in this project. We also plan to build on our already extensive base of knowledge and experience, and work diligently to achieve above goals.

5.e) East Asia connection:

With the help of an NSF grant, this professor visited in the summer of 2001 six counties in East Asia: China, S. Korea, Taiwan, the Philippines, Thailand, and Singapore, to try to further develop CU's international contacts and increase participation in future GLOBETECH projects. I was well and warmly received in all schools that I visited, and I will try to convince some of the professors from these schools to participate with teams of students in our GLOBETECH-8 simulation.

6. Conclusions:

We believe that the 104 students, in 12 teams, from 4 schools and 3 countries achieved terrific results through their participation in this simulation. They substantially increased their knowledge in the areas of globalization, global technology management, international communications and negotiations, environmental concerns, new energy, etc.

We are grateful to the Gateway Coalition for providing the financial means, the leadership, and the encouragement to develop and offer this simulation at Cooper Union for the past seven years. We think that this unique, innovative experiment in multidisciplinary international long-distance collaborative work via the Internet was extremely successful, by involving over the years more than 350 students, from many countries and schools (see please attachment 7.e), and familiarizing both students and faculty with meaningful, Internet based joint-venture projects and collaboration (see please Att. 7.f). Based on the experience gained in this Gateway sponsored project, we are able now to institutionalize this simulation at Cooper Union and continue to offer it to our students and all participants.

We are well prepared to complete our remaining work on GLOBETECH-7 and start work on the GLOBETECH-8 simulation. Our project development team looks forward to repeat, and hopefully enlarge, student team participation from the United States and abroad.

The key to further growth and development of this project, in my opinion, is its stronger, more focused marketing to other schools, and the wider spread of Global Technology Management oriented courses. Gateway Central's suggestions and help regarding this subject would be most useful and welcome.

The Coalitions' workshop of last year has already produced good results for this project, and we are looking forward to this year's conferences and workshops as means of interesting other schools in this project.

The multimedia packages that we developed each year and deliver to Gateway Central might also be an important dissemination tool to other Gateway schools.

Global Technology Management training for engineers is a timely and important topic; the same can be said for international business negotiation

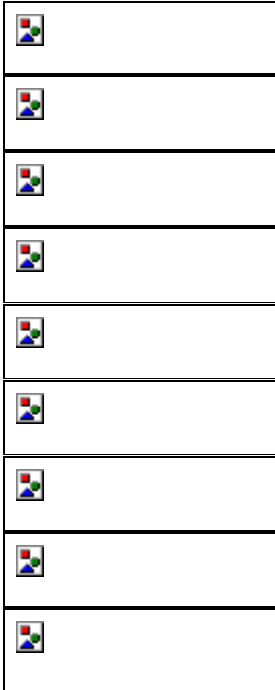
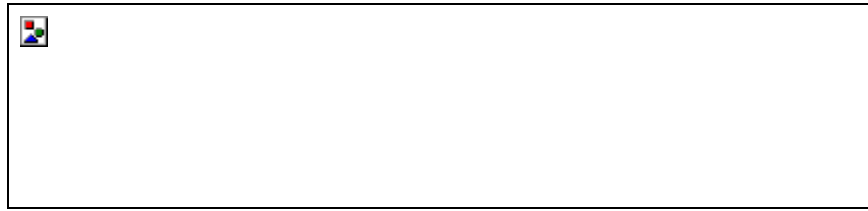
training. Major companies' executives, engineering education round tables, and conferences continuously address this pressing need. And yet, when a new, innovative, economical, state of the art, educational tool is developed for this training, we seem to have difficulty raising interest within our own engineering coalitions. As shown in my yearly reports, we had much more success with schools outside the Gateway Coalition than those within.

In 2002 and beyond we plan to concentrate all our efforts to develop GLOBETECH into a main stream, widely a recognized project, for the betterment of engineering education, and the benefit of Cooper Union students and all other participants.

Prof. Roxanne Jacoby, P.E.
Dept. of Mechanical Engineering
Nerken School of Engineering, Cooper Union
April 23, 2002

ATTACHMENTS 7.a through 7.f

7.a: The GLOBETECH-7 Home Page:

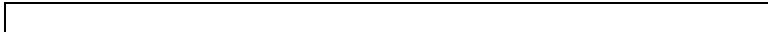
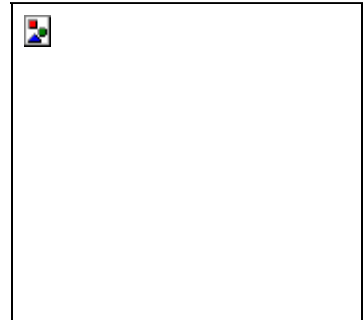


Simulation Subject: Course [EID-372](#), FALL 2001

New Energy Joint Venture Projects in Poland, Taiwan, and the USA

Globetech is conceived as a major component of an undergraduate interdisciplinary engineering course of Global Technology Management. The simulation deals with alternative energy sources, sustainable development, aspects of air pollution control, global competitiveness strategies, international negotiations, technology transfer, operations' optimization, etc.

This project aims to familiarize the engineering students with the real and very complex political, economic, social, and technical issues influencing global technology decisions.



7.b: The Content of the GLOBETECH-7 Sharing Information

Page:

Sharing Information

To submit resources for posting on this site, do the following:

1. It's best to submit files in HTML format; you can save files as HTML in Word
2. If files are not ASCII (*.txt, *.html, etc), unencode them (if you don't know how, ask for help in the computer lab)
3. Send files to Alex Lin (lin3@cooper.edu). Specify subject as "GTK-7"; identify yourself, your team and what you are sending clearly in the body of the message

Participating schools:

- a. [The Cooper Union](#)
- b. [The Business School of Toulouse](#) (Ecole Supérieure de Commerce, Toulouse)
- c. [Milan Polytechnic](#)
- d. [The North Carolina Agricultural and Technical State University](#)

You can also contact the lead professors and teams directly as follows:

Professors:

The Cooper Union, USA: Prof. Roxanne Jacoby (jacoby@cooper.edu)

Milan Polytechnic, Italy: Prof. Anxo Cereijo (anxo.cereijo@polimi.it)

& Prof. Paolo Ciuccarelli (paolo.ciuccarelli@polimi.it)

ESC-Toulouse, France: Prof. Maria Sanjaume (sanjaume@club-internet.fr)

NCA&T, USA: Prof. William K. James (wkjames@ncat.edu)

Participating Teams:

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☐ **Milan Polytechnic Team 1 ITV RFP(ITV-TV RFP):**

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We apologize for the temporary inconvenience but Toulouse teams can be viewed by clicking [here](#)

7.c: Content of the Join-venture Contract Awards Page:

Contract Awards

Enerquest Award:[Wind Power-USA](#) (Word document)

NCA&T Award:[Interactive TV- Italy](#) (Word document)

TG Tiger Motorcycles Award:[CleanTek \(ESC Toulouse-E\)](#) (Word document)

Wind Power Poland Award:[Euroblades \(ESC Toulouse-G\)](#) (Word document)

Thank you all for your participation on the project.

7.d: Student Course and Simulation Feedback:

Opinions of Class by Group 2

-Jackie Burke, Emerson Chin, Leroy Li, Bryant Ng

Positives:

- Presentations

It was a good opportunity to give all the students more practice in presenting material. Having power point presentations stressed the importance of preparing and making useful slides.

- Group work

In the real world, a lot of work will be team oriented. It was useful practice in letting us divide the work in our respective teams, work together, and organize.

- GTK Project

This simulation offered some real life experience in joint ventures and working with other parties. Moreover, it was good exposure in working with students from other countries and states, to see the different perspectives and work ethics.

- Real life concerns

Kennedy brought up very important concerns in the future that need to be addressed, such as environmental concerns and the importance of an international community.

- Focus on renewable energy

It is important to understand the growing concern about energy and the need to find renewable energy resources. The focus on renewable energy projects reinforced this idea.

- Negotiation principles

Though some of the ideas in *Getting to Yes* were obvious, it was helpful to have gone over them and discussed them.

Negatives

- Presentations

It was sometimes difficult to learn from the other students presenting in class.

-NCAT

This school was not really into the GTK project, so the simulation wasn't as interesting or exciting.

-Articles

Many of the articles were old and not recent. More focus should be place on current events.

Suggestions

- There was lot of material that needed to be covered in the midterm. Perhaps it would have been better to have another exam.

- The teleconference needs to be improved, specifically the technical difficulties.

-Although it is hard to implement, perhaps you could come up with suggested areas for projects, and the individual groups choose which topic or exact project to ask for RFP's in.

**7.d: List of Participating Schools in the
GLOBETECH 1-7 Simulations:**

No:	List of Participating Schools GTK-I to GTK-7 (1995 to 2001):	Simulation:	Year:
1*	Cooper Union, Nerken School of Engineering, New York, NY, USA	GTK-I to GTK-V	1995 to 2001
2	Carnegie Mellon University, Pittsburgh, PA, USA	GTK-II to GTK-IV	1996 to 1998
3	Drexel University, Philadelphia, PA, USA	GTK-V	1999
4	Rensselaer Polytechnic, Rensselaer, NY, USA	GTK-III	1997
5	Polytechnic University of New York, Brooklyn, NY, USA	GTK -III	1997
6	University of Pittsburgh, Pittsburgh, PA, USA	GTK-III	1997
7*	North Carolina Agriculture and Ttechnology State University (NCA&T), USA	GTK-6 to GTK-7	2000 and 2001
8	University Henri Poincare, Nancy, France	GTK-II, GTK-III	1996 and 1997
9	Ecole Nationale Superieure des Mines, Albi, France	GTK-IV	1998
10*	Ecole Superieure de Commerce (ESC), Toulouse, France	GTK-V to GTK-7	1999 to 2001
11	Tokyo Institute of Technology, Tokyo, Japan	GTK-II	1996

No:	List of Participating Schools (cont'd) GTK-I to GTK-7 (1995 to 2001):	Simulation:	Year:
12*	Technical University of Iasi, Romania	GTK-II	1996
13	St. Petersburg Technical University, St. Petersburg, The Russian Federation	GTK-II	1996
14*	Milan Polytechnic, Italy	GTK-7	2001

Note: The 5 schools marked (*) are expected to participate in the Globetech-8 simulation (fall 2002).

**Attachment 7.f: List of projects discussed in the
Globetech 1-7 simulations:**

Year:	Project No:	Title:
1995	1	Production of 300,000 cars per years in China
1996	1	Production of compact cars in China
	2	Production of minivans in Thailand
1997	1	Addition of air pollution control equipment for a power plant in Russia
	2	An air pollution monitoring project for the Autobahn, Germany
1998	1	Addition of air pollution control equipment for a power plant in China
	2	Photo-voltaic equipped dispensary vans in South Africa
1999	1	Photo-voltaic equipped dispensary vans in South Africa
	2	Fuel cell equipped taxis for the greater Los Angeles, USA area
2000	1	Fuel cell equipped buses for the greater Shanghai, China area
	2	Wind Power farm in France
	3	Wind Power farm in India
2001	1	Fuel cell equipped scooters in Taiwan
	2	Wind Power farm in Poland
	3	Wind Power farm in The USA
	4	Interactive Television Station in Italy