Campus of Hope:
Using the Virtual World to Improve Our World

UNIVERSITY OF MICHIGAN-DEARBORN
COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
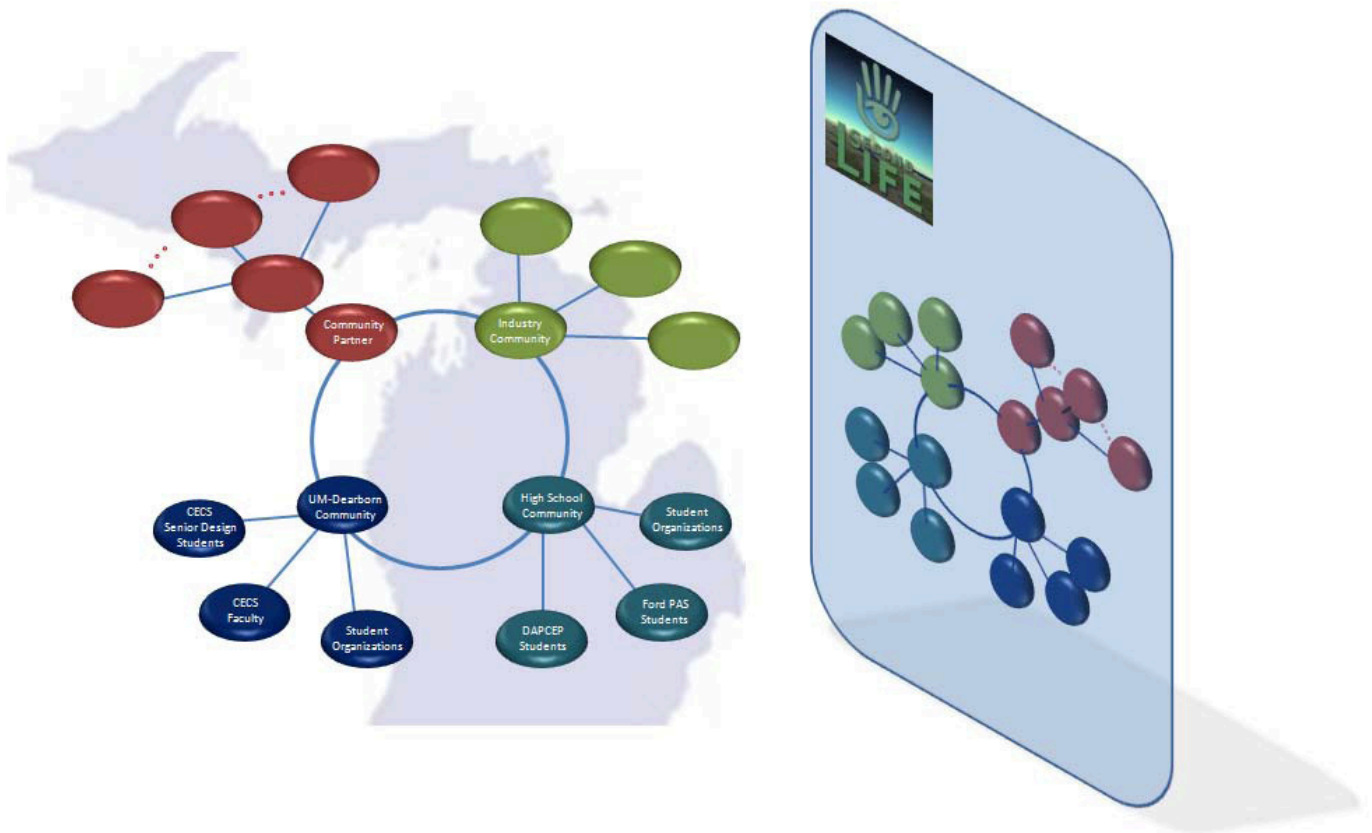
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INTRODUCTION AND PROJECT SUMMARY

A key component of the University of Michigan-Dearborn's Metropolitan Vision is Student Engagement, an effort to help students to see the point of the knowledge they are acquiring—the real-world impact that their knowledge can achieve. Students can increase the impact of their talents by learning to work together, to lend their talents to the needs of their communities, and to achieve real passion for the fields of learning they are pursuing. This project is a core element in furthering our vision of student engagement.

The College of Engineering and Computer Science at the University of Michigan-Dearborn (UM-Dearborn) is proposing to leverage computing technology to develop and build sustainable communities that bridge virtual and real worlds to address a pressing social problem through the use of college and high school students, the Second Life® 3-D (SL) virtual world and the Food Bank Council of Michigan (FBCM).

Second Life® is a 3-D virtual world that is created by its online participants (Residents). Since opening to the public in 2003, it has grown explosively and as of today is inhabited by millions of Residents from around the globe. It is a global community working together to build a new online space for creativity, collaboration, commerce, and entertainment. It strives to bridge cultures, welcomes diversity, values free expression, compassion and tolerance are the foundation for community in this new world. Virtual worlds are equipped with social networking facilities and online collaboration tools (integrating blogs, personal homepages and sometimes VoIP), which transformed them into highly valuable tools for e-learning and distance collaboration.

Our general approach is for UM-Dearborn students to build a Campus of Hope that will provide a presence for the Ford Motor Company Fund in Second Life and provide a structure for future development. The structure of the campus will be aligned with the pillars of community involvement. In addition, students will work with the FBCM as a vehicle to build a community among their network of food banks, conceptualize the parameters of their problems (e.g. efficient distribution of canned goods), collaboratively develop and test solutions (e.g. minimal cost delivery route), and **then implement the solution in the real world**.

Initially, we are planning three projects to implement in Second Life for our community partner. The first project is the implementation of a toolbox that would allow people from a network of food banks to plan and optimize food pickup and delivery routes. A second would be the creation of a virtual food drive to educate people using the 3-D environment about how their donations travel through the system and reach people in need. The third would be the creation of a virtual exhibit showcasing the needs of the community partner and the benefits of collaboration in virtual worlds.

The use of a virtual property or island as an engineering test bed has number of benefits. It allows geographically diverse stakeholders to interact with each other in real-time while working on a problem. The virtual island also serves as problem solution repository that can be used as case studies by educators and manipulated by stakeholders as parameters change. The virtual island can also be used to help build community awareness of the problems facing the community partner as it tries to complete its mission. The virtual environment may also serve to provide a realistic face on the people served by food banks in our state and create feelings of empathy on the part of its visitors.

USING THE VIRTUAL WORLD - INNOVATIVE APPROACH TO "BUILDING SUSTAINABLE COMMUNITIES"

The Ford College Community Challenge uses the term "Sustainable Communities" to describe healthy, livable communities that are poised to thrive in a global economy, encompassing a wide range of issues, from education to safety to mobility to arts and culture. To realize this goal, people from diverse backgrounds, regions and generations must have the ability to organize, collaborate, and exchange information on a broad scale in order to learn how to make a difference in their own community.

To address that challenge, UM-Dearborn is proposing to create the Campus of Hope in the three-dimensional virtual community of Second Life that is created entirely by its members or residents (see Attachment D for more information). The Campus of Hope will provide an environment that will facilitate the social networking of organizations with common missions centered on the pillars of community activity that are the focus of the Ford Motor Company Fund. The creation of this platform will enable the UM-Dearborn vision of building of communities on multiple levels (high schools, universities, community organizations, and industry) and in multiple dimensions (both the virtual and real worlds) to make a tangible difference. In addition, this project provides a vehicle for educating high school and college students in science and engineering while they work to address a pressing social need.

The proposed strategy is two-fold: (1) Develop an initial presence in Second Live that provides a framework for future detailed development over time by future student teams. This would include basic information for key local community organizations that are consistent with each of the Ford Motor Company Fund pillars. For example the American Heritage wing might include The Henry Ford, the Detroit Institute of Art and the Detroit Symphony Orchestra etc.; (2) In the Community Initiatives wing, students will create a fully functional environment to address the pressing social need of hunger in our state. The 3-D virtual world developed by students will allow food banks across the State of Michigan to collaborate, exchange of best practices, and access tools and resources for optimizing their operations. The goal is for solutions developed and piloted in the virtual world (e.g., truck routing simulations) to be **implemented in the real world**. Donors, government officials, industry partners can visit the site to better learn about the issues, challenges, and operations of food banks by being immersed in the environment. Virtual conferences can be held in the Campus of Hope classroom involving food banks around the nation and world further extending the community. New and innovative methods (e.g., virtual food drive) will be developed to engage and broaden volunteer participation, and ultimately to increase the ability to raise funds and distribute food to those in need.
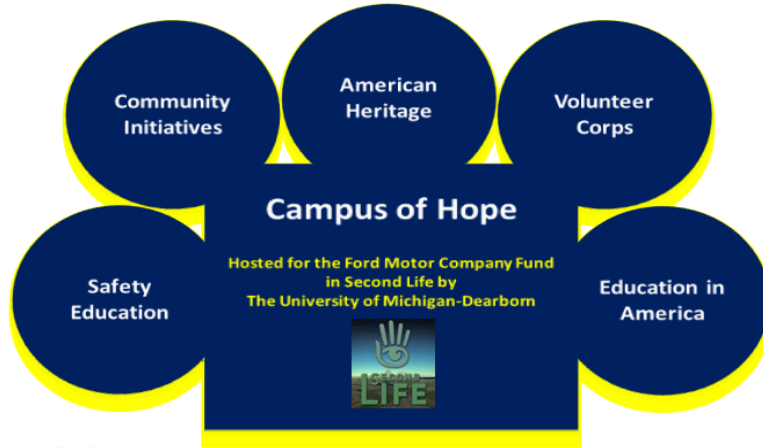

Figure 1: Campus of Hope – The Ford Motor Company Fund Presence in Second Life

A STUDENT DRIVEN PROJECT

The engine of this project and future development in Second Life will be the Senior Design teams primarily from the department of Computer and Information Science (CIS), with other departments within the College of Engineering and Computer Science (CECS) participating as their expertise is required. These teams are managed by the student team members, not the faculty advisor. The CIS capstone design experience is offered as two, two credit-hour courses which students complete over two semesters (eight months) and is required of all CIS majors (software engineering, computer science, and information systems). The CIS senior design course has a long tradition of working with community based partners. Dr. Maxim has supervised more than two hundred community-based student software projects since 1997. The dollar value of the software engineering work donated ranges from $40,000 to $80,000 per project and has created a great deal of good will in the community. This proposal is a logical extension of that tradition and provides a vehicle for future teams to build upon this work but to maximize their impact on the community beyond a single partner.

Student Project Manager and Development Team

A Graduate Student Research Assistant (GSRA) will be hired using the project funds to direct the work of establishing the Second Life Island. The GSRA will be assisted by two part-time student programmers and a part-time student graphic artist. This student team will serve as resources to both the community partner and the senior design teams to ensure a timely and quality solution is developed. This group will be responsible for the roll out and training of the FBCM and their network of food banks. This will be accomplished through both on-site visits and centrally held meetings.

Senior Design Teams

CECS senior design teams will be tasked with defining, developing, and implementing the solutions to the clients problems. In general, students work in three-or-four person teams with in the mutually agreed upon project defined with the sponsor. Once project teams assemble, class meetings consist of seminar-type class discussions on professional issues and team presentations of significant project milestone artifacts. In addition to the two hours of class-time each week, students put in at least six hours per week out-of-class on their project. The out-of-class time in the capstone course consists of team meetings, project planning, software design, product implementation,

presentation preparation, report writing, meeting with clients, and consultation with instructor. The six hours of outside work is very important as a means of fostering team development. The capstone projects generally require about 500 hours of student effort to complete
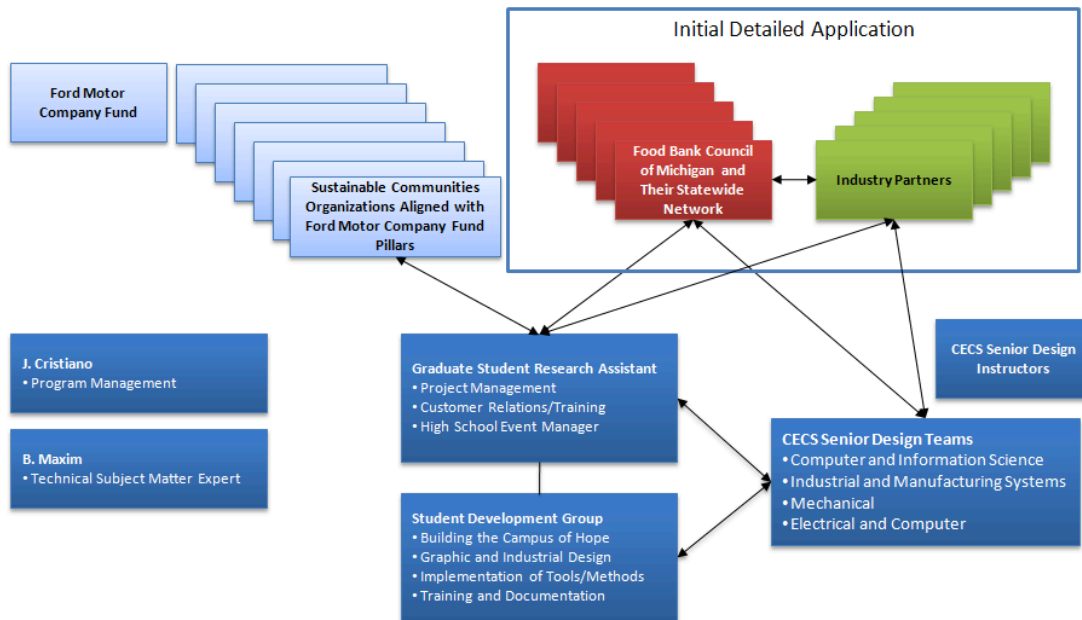

Figure 2: Student Teams Drive the Building of Communities

The role of the faculty in our course is that of a coach or mentor not a project manager. The students handle routine client contact. Project scheduling and progress tracking is also handled by the student teams. The instructor is available to help student teams resolve unusual problems with the project and the client. The instructor provides feedback on the milestone documents and presentations. A final presentation is required of all teams at the end of the second semester and includes a product demonstration and report. _Students must present a letter of acceptance from their client to the instructor in order to receive a grade._ The use of the client acceptance letter is a very important element of our course to drive home to students the importance of satisfying their clients' needs.

High School Student Participation

This project offers the opportunity to build a sense of community with students that extends beyond the campus population. To stimulate relationships between university and high school students and between high school students from diverse backgrounds, we will host a series of 3 one day events where we will bring high school students to campus to work together on the issue of hunger in our state. A diverse group of high school students (~30) will be invited to participate from our Detroit Area Pre-College Engineering Program (DAPCEP) as well as our Ford Partnership for Advanced Studies Program (PAS). Students participating in this program will work with UM-Dearborn students to become familiar with both the challenges and operations of the Food Bank Council of Michigan, science and engineering, and the virtual environment of Second Life. The goal of this activity is to forge friendships among the diverse group of students through their use of science and engineering to assist people in need, and indoctrinating them into a culture of community service.

AN URGENT AND UNMET COMMUNITY NEED

It is well documented that the State of Michigan facing extremely difficult times and in particular the need for vital assistance. The food banks have seen a 20% increase in the need for food assistance. Since 2003 the number of Michigan households receiving food stamps has increased 53%. One in five Michigan children under 18 is in a household qualifying for assistance. Food stamps provide assistance but it does not provide all of a families needs for food. These numbers are for those who qualify for food stamps, the difficulty is that many people do not qualify for food stamps in our state and they are the ever increasing number of the working poor. People, who have full time jobs, make too much money for assistance but cannot make ends meet due to the rising cost of food and fuel. These are the families that are truly vulnerable and need our assistance. It has been difficult for food banks to meet the rising need in the state of Michigan due to the struggling economy and a decrease in donations. The FBCM and its members are looking for new partnerships to assist us in the growing need of feeding those that are hungry in our state.

Figure 3: A Community of Communities Focused on Alleviating Hunger in Michigan

THE FOOD BANK COUNCIL OF MICHIGAN - A COMMUNITY-BASED PARTNER

The University of Michigan-Dearborn is pleased to be partnering with the Food Bank Council of Michigan (FBCM) for the initial detailed development on the Campus of Hope in Second Life. The mission of the FBCM is to provide statewide leadership to food banks in their efforts to alleviate hunger through the efficient distribution of food to those in need. The FBCM is made up of member regional food banks. The regional food banks, along with their subsidiary distribution organizations and branch warehouses, safely store and provide millions of pounds of surplus vegetables, fruits and other grocery items to more than 2500 local agencies serving each of the 83 counties in Michigan.

The FBCM also provides a central, single voice to address the issue of hunger. They educate and advocate about the need for food and food security for everyone. Food security is defined by the United States Department of Agriculture as: access by all people at all times to enough food for an active, healthy life. Food banks rely on donated surplus food to stock their shelves. The food may be free, but there is considerable cost to transport it into and around the state. Transportation is the single, largest expense in operating a food bank. While Michigan food banks have access to donated product from all over the country, the costs associated with getting the product here can be a barrier to families receiving assistance.

CAMPUS INVOLVEMENT

This project will primarily will be an interdisciplinary project involving students from the four departments (see Figure 2) within the College of Engineering and Computer Science (CECS) as necessary. Initially, the project will primarily involve student teams from the Computer and Information Science and Industrial and Manufacturing Systems Engineering. In addition, the team will require a graphic/industrial design person who will likely come from the College of Arts, Sciences, and Letters (CASL).

LEVERAGING EXISTING RESOURCES

The UM-Dearborn has agreed to waive the indirect costs normally charged for projects of this type. This means that the entire award amount will be available to support the project activities. This equivalent to a $30K contribution to the project by UM-Dearborn. In addition, the Henry W. Patton Center for Engineering Education and Practice (HP-CEEP) agrees to continue to cover the cost of the property in Second Life for a period of 4 additional years ($10K value). Also,

each term HP-CEEP also provides grants to support the activities of CECS senior design project teams which will provide an extra $5K in funding for this project.

In addition to the financial resources identified, relationships will be leveraged with DAPCEP, the Ford PAS program, as well as our many industry collaborators who may be able to assist with the issues facing the FBCM.

SUSTAINABILITY OF THE PROJECT
The CIS department has required senior design students to work on team-based software development projects with external clients since 1995 and plans to continue this practice for the foreseeable future. In addition, HP-CEEP will continue to pay the Second Life costs of maintaining the island for four years following the conclusion of the funding period so the development of the Campus of Hope will continue until at least 2013. The task of maintaining existing applications will be handled by enlisting the support of students from the UM-Dearborn chapter of Upsilon Pi Epsilon (UPE). Dr. Maxim serves as its faculty adviser.

EXTENDING THE LIFE OF THE INITIATIVE
The investigators are actively investigating funding sources to allow CIS senior design students to work with K-12 teachers and high school students to create educational game software to assist in the delivery of subject matter material. Games can be used to change attitudes, beliefs, and behaviors. Games can stimulate creativity and innovation on the part of their players. Role-playing games can help build players social skills. Virtual reality games can foster learning history and cultural heritage. Immersive game environments can be used to build players' knowledge and skills.
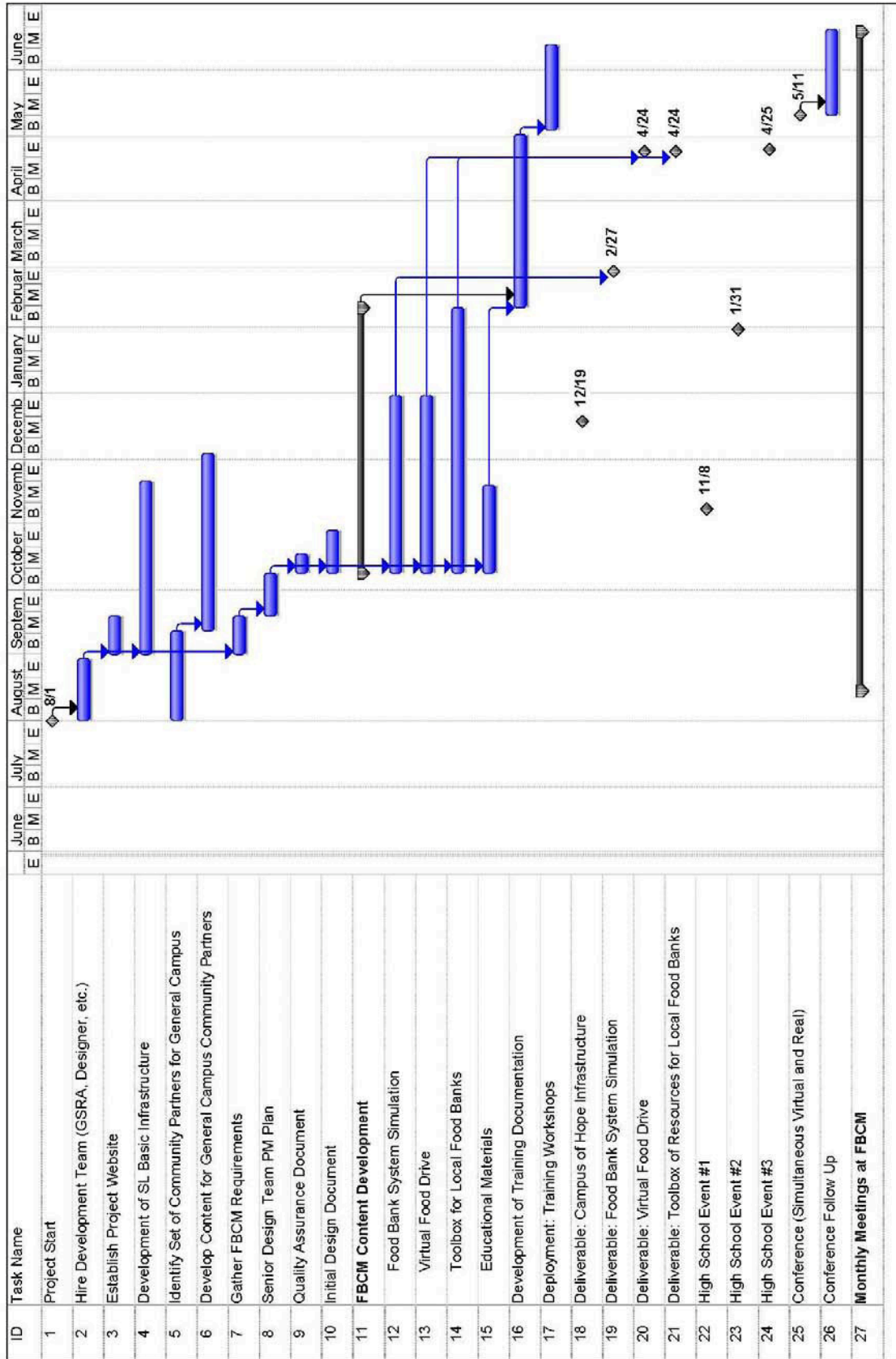
PUBLICITY/COMMUNICATION PLAN
The recognition of this project and support from the Ford Motor Company Fund will take multiple forms, using both traditional and non-traditional communication channels to raise awareness and reach the largest audience. These are summarized in Figure 4. Note that all public releases pertaining to the Ford Motor Company Fund will be mutually agreed upon.

	Passive	Active

Traditional	• Websites
	  ✓ UM-Dearborn
	  ✓ FBCM
	  ✓ Promise Island
	• CECS Publications
	  ✓ Dearborn Engineer
	  ✓ Catalyst
		• Press Releases
		• Newspaper Articles
		• Local Television
		• FBCM Publications
		• Recognition at Public Events
		  ✓ Chancellor Little/Dean Sengupta
		  ✓ Senior Design Competition

Non-Traditional	• Virtual Gifts in Second Life (SL)
	  ✓ Presentations
	  ✓ Information sheets
	  ✓ Ford College Community Challenge T-Shirts
	  ✓ Ford Vehicles
		• Hosting Periodic Events in SL
		• Simultaneous Real World and Virtual World Conference: *Using the Virtual World to Improve Our World*

Figure 4: The Publicity and Communication Plan use both Traditional and Non-Traditional Approaches

The key aspects of the publicity and communication plan lie in the non-traditional methods to be used. In particular, the access to information and the availability of "virtual gifts" that can be distributed in Second Life reach a large audience. A conference will be held simultaneously on campus and in Second Life entitled "Using a Virtual World to Improve our World". The purpose of this conference is to showcase the projects and publicize the needs and accomplishments of our community partner. It would be our hope to stimulate other people to undertake similar partnerships using resources from the real world and virtual worlds like Second Life.

ID	Task Name
1	Project Start
2	Hire Development Team (GSRA, Designer, etc.)
3	Establish Project Website
4	Development of SL Basic Infrastructure
5	Identify Set of Community Partners for General Campus
6	Develop Content for General Campus Community Partners
7	Gather FBCM Requirements
8	Senior Design Team PM Plan
9	Quality Assurance Document
10	Initial Design Document
11	FBCM Content Development
12	Food Bank System Simulation
13	Virtual Food Drive
14	Toolbox for Local Food Banks
15	Educational Materials
16	Development of Training Documentation
17	Deployment: Training Workshops
18	Deliverable: Campus of Hope Infrastructure
19	Deliverable: Food Bank System Simulation
20	Deliverable: Virtual Food Drive
21	Deliverable: Toolbox of Resources for Local Food Banks
22	High School Event #1
23	High School Event #2
24	High School Event #3
25	Conference (Simultaneous Virtual and Real)
26	Conference Follow Up
27	Monthly Meetings at FBCM

Second Life Frequently Asked Questions (from SecondLife.com)

What is the Second Life world?
Second Life is a 3D digital world imagined and created by its Residents.

Is Second Life a MMORPG?
Yes and no. While the Second Life interface and display are similar to most popular massively multiplayer online role playing games (or MMORPGs), there are two key, unique differences:

1. **Creativity:** Second Life provides near unlimited freedom to its Residents. This world really is whatever you make it, and your experience is what you want out of it. If you want to hang out with your friends in a garden or nightclub, you can. If you want to go shopping or fight dragons, you can. If you want to start a business, create a game or build a skyscraper you can. It's up to you.
2. **Ownership:** Instead of paying a monthly subscription fee, Residents can obtain their first Basic account for FREE. Additional Basic accounts cost a one-time flat fee of just $9.95. If you choose to get land to live, work and build on, you pay a monthly lease fee based on the amount of land you have. You also own anything you create—residents retain IP rights over their in-world creations.

Who will I meet there? And what is it really like?
Second Life is the size of a small city, with thousands of servers (called simulators) and a Resident population of over 13,802,889 (and growing). Residents come to the world from over 100 countries with concentrations in North America and the UK. Demographically, 60% are men, 40% are women and they span in age from 18 - 85. They are gamers, housewives, artists, musicians, programmers, lawyers, firemen, political activists, college students, business owners, active duty military overseas, architects, and medical doctors, to name just a few. There are even a fair number who make part or all of their real world living by being a creator in Second Life.

Video Introduction to Second Life (YouTube)
An **introduction** to **Second Life**, intended to introduce Texas State University to the virtual campus and the **Second life** world.
Link: http://www.youtube.com/watch?v=o1OOQqXDh8U

3D Library Visit: Using Second Life To Research Everyday Problems
ScienceDaily (Apr. 1, 2008) — Second Life is more than an on-line game for ETH Zurich. It is a handy three-dimensional tool used for resolving real issues. ETH Zurich Computer Science students recently used it to analyze and solve the everyday frustrations involved in borrowing a book from a library.
Full article: http://www.sciencedaily.com/releases/2008/03/080330225933.htm

A Job Interview You Don't Have to Show Up For
Microsoft, Verizon, Others Use Virtual Worlds to Recruit; Dressing Avatars for Success
By ANJALI ATHAVALEY
June 20, 2007

It's now possible to meet with recruiters without actually showing up for a job interview. Some employers are experimenting with Second Life, the online virtual community owned by San Francisco-based Linden Lab, to screen prospective hires. The program allows job seekers to create a computer-generated image to represent themselves -- known as an "avatar" -- and communicate with executives of prospective employers as though they were instant-messaging.

TMP Worldwide

Full article: http://online.wsj.com/public/article/SB118229876637841321-NkCuEAak8wFXmvmPVWkALxqNS3M_20070719.html?mod=tff_main_tff_top

Attachment E –Background Information on Project Team and Organization

John J. Cristiano, Co-PI
Director, Henry W. Patton
Center for Engineering Education and Practice

Dr. John J. Cristiano is the Director of the Henry W. Patton Center for Engineering Education and Practice (HP-CEEP). The center was found in 1992 with support from Ford Motor Company and Chrysler with the mission is to be a leader in incorporating engineering practice, design, innovation and concepts of manufacturing technology at all levels of education by integrating the teaching environment with the world of practice. Since that time, the center has funded over 150 research projects involving 56 companies, over 120 students and 50 faculty. In addition, HP-CEEP supports senior design projects in each of the four departments within the College of Engineering and Computer Science. Dr. Cristiano is responsible for stimulating and facilitating faculty research relationships, managing the partnerships between the university and industry with respect to the college's research and to facilitating the transfer and commercialization of Center developed technology.

Prior to joining UM-Dearborn, he served as the Assistant Director for the National Science Foundation Engineering Research Center for Reconfigurable Manufacturing Systems (ERC/RMS) and as an adjunct assistant professor at the University of Michigan. As an adjunct assistant professor, Dr. Cristiano taught the senior design course in the department of industrial and operations engineering, as well as courses on economic decision-making, engineering modeling, and project management The senior design course involved managing 10-15 student teams per term to solve industry problems. Projects can include topics such as inventory analysis and management, facilities layout, process simulation, workstation design and ergonomics, SQC, workflow analysis and design, database specifications, and TQM.

Dr. Cristiano is a past winner of the Shingo prize for Excellence in Manufacturing Research and the 2000 INFORMS Technology Management Section Best Dissertation Award. He is published in *Sloan Management Review*, *IEEE Transactions on Engineering Management*, *IEEE Transactions on Systems, Man, and Cybernetics*, and *Journal of Product Innovation Management*. Dr. Cristiano holds a B.S.E. in computer engineering and M.S.E. and Ph.D. in industrial and operations engineering from the University of Michigan.

Bruce R. Maxim, Co-PI
Associate Professor, Computer and Information Science

Dr. Bruce R. Maxim is Associate Professor of Computer and Information Science at the University of Michigan - Dearborn. His research interests include: software engineering, human computer interaction, game design, artificial intelligence, and computer science education. He has published a number of papers on the animation of computer algorithms, game development, and educational computing applications. He is co-author of a best-selling introductory computer science text and web content to support the world's most popular software engineering text. His recent research activities have been in the area of serious game development.

Dr. Maxim is the architect of the ABET accredited Computer Science curriculum and the ABET accredited Software Engineering curriculum at the University of Michigan-Dearborn. He is creator of 15 Computer and Information Science courses dealing with software engineering, game design, artificial intelligence, user interface design, web engineering, software quality, and computer programming. He also serves as the faculty advisor to the local computing honor society (Upsilon Pi Epsilon).

Dr. Maxim has supervised more than two hundred community-based student software projects since 1997. The value of the software engineering work donated ranges from $40,000 to $80,000 per project and has created a great deal of good will in the community. Dr. Maxim began teaching game design courses at the University of Michigan-Dearborn in 1999. His students have developed a large number of multi-media computer games. Several of these games were developed as collaborative projects between his students and digital animation students from the College of Creative studies in Detroit.