"Connecting Learners Digitally through Internet 2"

1. STATEMENT OF NEEDS

This project initiative is being designed to address the following institutional and audience needs:

Address Changing Audience Interests and Expectations vis-à-vis Interactive Technology. Museums and other informal science education (ISE) institutions continue to face challenges directly related to meeting our diverse audience's educational needs (and their entertainment interests, as exemplified by the popularity of reality TV shows where audiences interactively vote for "contestants" or preferred outcomes) in ways which are relevant, content-rich, innovative, experience-based and engaging. Similarly, the dynamic nature of the content now being presented precludes only developing "static" exhibit and public program offerings. To this end, The National Maritime Center (to be referred to as Nauticus in this proposal) has made a commitment to implement a five year, "top-to-bottom" reworking of our exhibit and public program offerings, including an increase in technology applications, based on the recommendations of a recently completed Strategic Plan (March, 2007, pages 30-34) for the organization.

Develop a "Digital Master Plan" for Wiring Nauticus for Distance Learning (DL)

Create an institution-wide Digital Master Plan for configuring the Nauticus campus fro high-bandwidth Distance Learning program initiatives. The Nauticus "campus" includes our main museum facility with its exhibits and three theaters, the Battleship U.S.S. Wisconsin and the docks, piers and water features of the site. The plan itself will include - but not be limited to - a technical feasibility study based on other organization's technology applications and best practices assessment, technical specifications and schematics related to hardware and infrastructure options, a proposed sequence timeline for equipment installation, testing and rollout, end-user assessment for compatibility and scalability-related issues, a preliminary catalog of program offerings with associated instructional goals and objectives and

Develop Distance Learning Programs for Internet 2 Applications. Technology applications in museums (Web sites, interactive multimedia kiosks, videos and films, real-time distance learning programs, etc.) present opportunities, as well as challenges. The development of digital content allows museums to increase the degree of interactivity and the amount (depth) of content presented, as well as putting greater control of exploration and discovery in the hands of our audiences. With the growth of Internet 2-enabled institutions, there exists a need to develop and rigorously assess program offerings that utilize the high bandwidth video capacity herein represented (for example, opportunities for museum visitors and classes to participate on remote field expeditions such as those distributed by "Immersion Presents" or being run by NOAA). Once Nauticus completes its link to the emerging Internet 2 "Abilene Backbone Network," we are committed to developing and offering these programs.

Enhance Science, Technology and Environmental Literacy. Effective instruction in the sciences is an active process, not one in which knowledge is viewed as an inert body of facts (NRC 2000). Many residents of Hampton Roads and other Virginia communities lack the resources to make informed decisions about environmental issues that directly affect their quality of life. This problem is compounded in socio-economically disadvantaged populations, many of whom live in heavily degraded areas with limited access to relevant information—much of which is now communicated via technological pathways. In this way, "virtual visits" and school programming via satellite, one and two-way video, Internet 2, or with a combination of these and other communications technologies can supplement the actual visits each year to our museums.

2. PROJECT DESIGN

Project activities and overall goals

Nauticus' aspires to be "real-time and contemporary" in our approach to content-driven exhibits and educational public programs, and to offer the most exciting visitor experiences possible. We explore Norfolk and the surrounding waterways,

from freshwater to salt water seas (Chesapeake Bay and the near-shore coastal zone): our "living seaport." From the presence of the largest naval fleet in the world, as represented by the famous battleship USS Wisconsin, to the vessels of commerce and trade from all parts of the globe that travel past our walls, to the environment and often fragile ecosystems that comprise the natural wonder of the Chesapeake Bay estuary.

Museums and other informal learning institutions understand that we have a role to play in enhancing our visitor's lives and the culture of our communities. We also recognize that citizens need to better understand and function in the increasingly scientific and technological world in which we live, work and play: a world that is increasingly showing us the anthropocentric effects of human activities on the environment upon which we all depend.

Nauticus, through our partnership with Norfolk State University (HBUC), will become connected with fiber optic cable to the Abilene Internet 2 Backbone Network. It is anticipated that this connection will be functional and tested by the first quarter of 2008. The high bandwidth capacity offered by this network will allow Nauticus to both import and export educational program offerings that use the high bandwidth of the system to deliver enhanced content, including high definition video. This includes real-time videos of expeditionary activities, i.e. scientific and technical research, being conducted by NOAA among others.

We need a plan to guide our deliberate push into Internet 2, expeditionary learning-based, highly interactive educational applications. This plan has to answer this simple question*: "How should we wire Nauticus?"*

Physically, we have a complex (and in some ways complicated) campus directly along the waterfront, we have rich stories to tell, experiences to share and relevant content to make available, and we are about to join a growing group of ISE institutions on the Abilene Internet-2 Backbone Network. All of us are just beginning to understand the full potential of this network, not only for what it can digitally deliver but for its effect on our very interactions together as sister institutions with parallel missions.

This project will allow Nauticus staff to analyze technology infrastructure and DL program offerings at identified sister institutions (those employing Internet 2 connectivity and those using other digital conduits (IP, ISDN, Satellite) and with this information, create a master plan for wiring the Nauticus Campus (the museum, battleship and waterfront docks). This plan will include Nauticus' first catalog of DL program opportunities and offerings.

This project has four integrated goals:
1. Develop an Institutional "Digital Master Plan" to Wire the entire Nauticus Campus for DL
2. Develop specifications and equipment options for DL programming and procure bids/quotes
3. Develop Nauticus' first catalog of DL "expeditionary learning" programs as outcomes of our assessment of other ISE Institution offerings (real-time and "canned"), audience and community needs assessment and germane research underpinning our own Digital Master Plan.
4. Evaluate and document audience impact and best-shared practices for the museum industry's use of DL programs as a whole, for dissemination via publications, the web and professional presentations.

These goals are linked to specific activities which will be undertaken as part of this initiative, including the following.

ACTIVITY	OBJECTIVES/OUTCOMES
Visit ISE partner institutions to observe and analyze their technology infrastructure and DL program offerings	Develop an understanding of challenges, successes, replicable infrastructure and program design models from other ISE Institutions
Identify both applicable technologies and "best practices" for DL program offerings (meta-analysis and literature review) relevant to Nauticus' mission and new exhibits & programming plan.	Analysis of information required to inform Nauticus' efforts and apply "best practices" strategies to our
Produce a digital master plan for Nauticus, with phased	An action plan for "wiring" Nauticus' campus that can begin to be

installation timelines, budgets, specs, etc.	implemented by mid-2009.
Develop the catalog of initial DL program offerings, both those internally generated by Nauticus and those available from other ISE institutions.	Interactive learning modules, training materials, and other resources for teachers and students in order to facilitate the classroom use of the digital materials.
Disseminate results of our process (Nauticus case Study) and the final plan to other museums and informal learning institutions	Put publications on-line. Present papers at professional conferences. Share hard copy reports with companion DVDs.

Digital technology and learning requires sensitivity to interface design, to navigation, to an appropriate and effective mix of human presence and ongoing interaction and feedback. We are adopting an expeditionary learning model. These are either real or modeled scientific expeditions, which use thematic interactive experiences "live-from-the-field," exhibits, experiments, field trips, and live cams, creating online activities and events to help parents, teachers, and professionals excite K-12 students about the "hands on" realm of scientific experimentation and investigation.

Advances in distance learning technologies now provide the opportunity to reach remote audiences unable to visit museums like Nauticus during the course of the (school) year. Visitors to Nauticus would also benefit from experiencing live expeditions to points around our planet, and being able to interact with scientists and others as they explore the living seaport. These technologies also lend themselves to the evaluation of various pedagogical techniques that bring scientific content to widely dispersed audiences. Distance learning initiatives allow learners to access more than our exhibits and programs; they bring learners "face to face" electronically with the people in those institutions outside the confines of our infrastructure— those scientists, educators, and the like beyond the walls of our museum.

While there are many resources (books, videotapes, posters, etc.) available to the classroom teacher, an actual visit to a science museum which integrates topics on science, maritime history, technology and the port's shipping industry along our waterways, is out of the reach to the majority of schools or visitors unless they are located within walking/driving distance to Nauticus.

Project management

The project team represents a multi-disciplinary cadre of educators, IT managers with experience in museum exhibit and program development and advanced technology and informal and formal learning evaluators familiar with research design, methodology and statistics.

Project Director. Rolf Johnson, B.S, M.S, Nauticus. Mr. Johnson is Nauticus' Deputy Director and is in-charge of exhibits, education and research. He brings over 30 years experience to the institution as a natural scientist, conservationist, museum curator, exhibit designer and Emmy award-winning producer of video and interactive multi-media programs. He was recently PI on a $700,000 Technology Opportunity Program (TOP) Grant from the US Department of Commerce. Johnson will provide administrative oversight on all aspects of the project design and as well as coordination with Nauticus staff, partners and consultants in the development, implementation, and evaluation of the project.

Pamela Gillespie, Technical Systems Director, Nauticus. As technical systems manager for Nauticus, Pamela Gillespie brings 10 years experience in IT systems management. She will be responsible for directing the infrastructure decisions made.

Stephen Teacher, Facilities Director, Nauticus. Mr. Teacher will work with the team on physical plant requirements for installing our interactive systems.

Miguel Ramlatchan, M.E.M., ODU: Mr. Ramlatchan is Director of Operations and Engineering, Office of Distance Learning at ODU and brings over a decade of experience in the field of distance learning technology (expertise in analysis, design, installation and technical support of the communication architecture and Internet, ISDN, and satellite for live feed or real-time connections).

Daniel Dickerson, Ph.D. ODU: Dr. Dickerson will contribute to the front end and formative evaluation, as well as co-author the Case Study for dissemination of results to professional audiences.

Evaluation Process

The evaluation for this initiative will be conducted by staff from Nauticus and Old Dominion University as well as by an independent, objective evaluator familiar with instructional technology applications in informal learning environments (Dr. Harouna Ba, Center for Children and Technology). Front end work will incorporate a meta-analysis of both the literature on DL programs in ISE and assessment of individual sister institutions assisting Nauticus with this project. Through application of quantitative and qualitative methods, we will build a body of empirical evidence that will serve to guide the development of our digital plan and act to inform decisions made by other ISE institutions. Specifically, we will employ meta-analysis methods to existing literature paying particular attention to convergent and divergent results. Additionally, we will examine the process of developing and implementing our digital plan using case study methods. Summative evaluation will include analysis of the Nauticus plan's feasibility and practical aspects of meeting the goals established in the formative work preceding the plan's completion.

Outreach plans

Nauticus will conduct limited public outreach for this first planning phase of the project. However, we will be documenting the process we engage in with the goal of producing a "Case Study" document for both printed/on-line distribution as well as for presentation to professional societies making the work which will occur as transparent as possible,

Scholarly/community involvement

The entire plan for upgrading exhibits and programs over the next five years at Nauticus draws heavily on our academic and community partners, both in Virginia and beyond. Nauticus has attracted a diverse and highly qualified group of alliance partners who are enthusiastically supporting our proposed collaborative work. As a de-facto catalyst, this project holds great promise for future collaborations as Nauticus prepares for our major re-working of the entire exhibit and program effort, as articulated in our strategic plan. The fact that these efforts can only succeed with the help of our academic and community partners elevates the importance of this initial effort for subsequent distance learning-related program work.

We will also be utilizing the talent represented by Nauticus' Exhibits & Education Advisory Council (see appended list). Representing many of the key institutions and agencies involved in education and cultural programs, this diverse group is currently expanding, with a projected membership of over 20 individuals representing a dozen institutions.

This proposal should also be viewed as the first in a series of steps on the journey of re-thinking Nauticus as a museum and as a bridge. Consequently, a rapidly expanding network of sister institutions in three, broad camps: those working in the Chesapeake Bay watershed and near-shore coastal zone, those working nationally in the US and those working internationally. This includes universities, NGOs and other ISE institutions and museums.

Since many of these organizations are also working to bridge traditional, informal education challenges with technological solutions, and since the emerging Internet 2 pipeline is being connected to more and more sites, the lessons learned by undertaking the process of developing a campus-wide network geared to producing and delivering interactive content and experiences can be disseminated to many interested readers.

3. PROJECT RESOURCES: TIME, PERSONNEL, BUDGET

As part of the implementation process for our strategic plan, Nauticus has committed significant financial and human resources to "upgrade" our exhibits and public program offerings. This includes dramatically increasing our ability to use technology for mission-driven program offerings. Both internal staff and external partners/consultants are on-board to assist us with these efforts. Adequate funds have been earmarked for the matching requirement of this proposal. In addition, we will actively seek additional sponsors (corporate and foundation) for this work and for the subsequent development and delivery of programs to our end-users.

4. IMPACT

Products

The following materials will be produced through this effort:

- A descriptive Digital Master Plan for Nauticus (the museum and galleries, the Battleship USS *Wisconsin* and the docks and piers of our waterfront home) with budgets, technical specifications, schematics, bid and vendor lists, etc. This plan will also integrate a more robust internet presence, primarily through the Nauticus website and links to collaborating organizations' websites.
- A Case Study of the process herein identified and conducted at Nauticus, including assessment of technical and educational outcomes (tbd) and expected as well as unanticipated results after completion of this phase.
- An Action Plan with associated budget for wiring the first sections of Nauticus: our theatres, the battleship, NOAA's Science on a Sphere and the Expedition Dock.
- A Nauticus catalog of initial Distance Learning Program Offerings.

Measurable results

We will be assessing the technical infrastructure options and recommendations themselves, as well as the pedagogical approaches which currently characterize DL interactive video expeditions and ISE/STEM offerings. The results of our analysis will be reflected in the institutional plan produced and in the Case Study document and program catalog linked to Nauticus' audience needs assessment.

Long-term impact post IMLS funding. First and foremost, the impact of IMLS funding for this initiative will be to provide Nauticus with a clear, well-researched and practical roadmap for moving the institution forward with an integrated plan to effectively wire a museum, not just a DL classroom or lab. As an outcome, Nauticus will become a contributing center for programs delivered over digital, high speed networks. Secondly, Nauticus believes that this project will not only have a positive and measurable impact on the audiences we serve, but will also contribute to the dialog on issues currently being researched in the field of Internet-2-based Distance Learning and expeditionary learning. This includes fostering successful museum-researcher collaborations, increasing the efficacy of real-time, interactive technology applications and increasing direct and measurable connections between museums and their communities. Nauticus, as part of the emerging "Abilene Internet 2 Backbone Network," will develop and provide programs to other Distance Learning institutions, as well as accepting programs from others, effectively opening opportunities for robust, real-time collaborations and shared expeditions to explore our part of North America's Atlantic coast.

These plans are exploring various mechanisms for increasing our connections to, and services Education Department at Nauticus is committed to providing educational opportunities for lifelong learning. Our *new* Center for Distance Learning, we reach beyond the boundaries of our Nauticus Campus, using emerging technologies to reach audiences across Virginia and the nation with the science of the sea. In our Center for School & Public Programs, we present on-site learning experiences for schools, families and other professional and social organizations. In our Center for Volunteer & Intern Resources, we provide direct training and active educational experiences for those involved with our mission while providing Nauticus with essential, expert assistance.

BUDGET FORM - PAGE FOUR

Section B: Summary Budget

	$ IMLS	$ Cost Share	$ TOTAL COSTS
1. Salaries and Wages	14,724.00	22,500.00	37,224.00
2. Fringe Benefits	4,676.00	7,146.00	11,822.00
3. Consultant Fees	17,500.00	19,500.00	37,000.00
4. Travel	14,820.00	2,444.00	17,264.00
5. Supplies and Materials		3,500.00	3,500.00
6. Services			0.00
7. Student Support			0.00
8. Other Costs			0.00
TOTAL DIRECT COSTS (1—8)	51,720.00	55,090.00	106,810.00
9. Indirect Costs	7,758.00	8,264.00	16,022.00
TOTAL COSTS (Direct and Indirect)	59,478.00	63,354.00	122,832.00

Project Funding for the Entire Grant Period

1. Grant Funds Requested from IMLS	59,478.00
2. Cost Sharing:	
a. Cash Contribution	19,500.00
b. In-Kind Contribution	43,854.00
c. Other Federal Agencies*	0.00
d. TOTAL COST SHARING	63,354.00
3. TOTAL PROJECT FUNDING (1+2d)	122,832.00
% of Total Costs Requested from IMLS	48.40%

* If funding has been requested from another federal agency, indicate the agency's name:

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