Sample Application

2009 National Leadership Grants for Museums

Planning Grant Demonstration Category

Chicago Horticultural Society Chicago, IL

The Floral Report Card: A Climate Change Education Initiative

Partners: The Chicago Botanic Garden and its five collaborators seek a planning grant to develop the Floral Report Card: A Climate Change Education Initiative, a model for effectively integrating citizen science and technology into school programs to engage youth and increase science literacy. Collaborators include organizations with expertise in formal and informal education, educational technology, horticulture, plant conservation science, and large scale program implementation. The University Corporation for Atmospheric Research provides expertise in educational technology and climate change while the Meaningful Science Consortium and Northwestern University offer extensive experience in all areas of formal education. Botanic garden partners include the State Botanic Garden of Georgia, the North Carolina Botanical Garden, and the University of Washington Botanic Garden. Participants will also include as many as 50 teachers and students from schools in proximity to project partners.

Time Frame: Beginning in October 2009, the planning process and implementation plan design will unfold over a year's time, with bi-annual meetings of all participants and quarterly steering committee meetings. During months with no full participant meetings, all collaborators will be involved in monthly conference calls to ensure that the planning process moves forward at the appropriate pace.

Community Needs: Science and technology may be the destruction or salvation of modern society, depending on how they are understood and used by future generations. Current generations are responsible for ensuring that our youth are prepared with both the knowledge and ability to address global environmental challenges, use technology well, and develop new, innovative, and sustainable ways of living. To be full participants in 21st century society, today's youth must genuinely understand what science is, how it is pursued, and how it shapes public policy, technology development, and individual and collective life experience. However, there is a significant disparity between current reality and the need for a scientifically literate public, especially in large, urban public school systems, where students on average perform lower than suburban counterparts on national science assessments. Science-based museums are called upon to reach out to these populations to support student engagement and learning in science.

Intended Audience: It is essential that science-based museums use their expertise and services to engage students and teachers—especially in urban public school systems—with meaningful science activities. Research shows that students, especially in under-resourced schools, view science as difficult and remote from their lives. Through the development of appropriate and compelling informal science education programs, museums can have important and lasting impacts on the scientific literacy and success of urban youth. Research has shown that many teachers face serious challenges teaching science, including lack of training in the field, insufficient equipment, materials and supplies, and little support for implementing innovative teaching practices. Providing support for students and professional development for science teachers can therefore be a powerful component of any science-focused museum-school partnership.

Activities/Outcomes: The goals of the planning process for this project are threefold. The first goal is to create a detailed logic model that identifies inputs, goals, objectives, outputs and outcomes for the implementation of the project that will refine goals and objectives, and specify the most appropriate technology and educational materials for project implementation. Second, a detailed five year implementation plan that identifies key checkpoints in the implementation process and coordinates the implementation of the various educational, technology, and horticultural aspects of the project will be developed. The third goal is to identify key personnel including an advisory board, additional botanic gardens, and schools interested in participating.

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Narrative

1. ASSESSMENT OF NEED

Science and technology may be the destruction or salvation of modern society, depending on how they are understood and used by future generations. Current generations are responsible for ensuring that our youth are prepared with both the knowledge and ability to address global environmental challenges, use technology well, and develop new, innovative, and sustainable ways of living. The decisions that will be required of our youth depend more than ever on the ability to critically evaluate scientific claims and repercussions. For example, even now, legal decisions are being made regarding the safety of genetically modified foods, the ethics of stem cell research, energy production and use, and not least, the impacts of all of these on our environment. In order to be full participants in—and to lead—21st century society, today's youth must have a genuine understanding of what science is, how it is pursued, and how it shapes public policy, technology development, and individual and collective life experience.

The disparity between current reality and the need for a scientifically literate public is greatest in large, urban public school systems. According to the most recent National Assessment of Education Progress (NAEP) in science (NAEP 2005), students in large cities perform significantly lower on the NAEP in science than those in any other type of location in the country, with an average NAEP score of 136 (out of 300) in comparison to an average of 146 in mid-size cities and a high of 155 in rural areas. With almost one-third of our nation's youth living in large cities, this is of critical concern.

Of additional concern, students of color, who comprise the majority in many large urban school systems, on average perform lower than their white, suburban, and rural counterparts. For example, African-American students, on average nationally score 124, and Hispanic students 129, in comparison to white students' average score of 160. Poorer students also score lower, with those eligible for the National School Lunch program scoring 130 in comparison to 159 for other students. These results are consistent across grade levels, with both grade 4 and grade 12 scores reflecting these gaps. These scores are of particular concern considering the changing demographics of the United States. According to the 2000 Census, the number of people who identify themselves as African-American increased between 15.6- 21.5%, and the Hispanic population increased by almost 60% between 1990 and 2000, while the total population of the U.S grew by only 13.2%, and the white population grew only 5.9%. In light of the ongoing achievement gap in science between underserved populations and other students as well as the increasing percentage of diverse ethnic groups that make up the US population, it is essential that science-based museums reach out to these populations to support student engagement and learning in science.

In particular, science-based museums in urban locations are uniquely positioned to effectively engage students in science learning. Research has shown that, in general, students' academic motivation decreases steadily from the early grades of elementary school into high school (National Research Council 2004), and this is particularly true of science. Students, especially in under-resourced schools, view science as remote from their lives (Nieto, 1994). It is perceived to be a difficult subject and only appropriate for top students. Evidence suggests that intellectual engagement in science is dependent on three psychological variables: (1) students' beliefs about their competence, (2) their values, goals, and interests, and (3) a sense of social and personal connectedness (Higgenbotham et. al. 2006). Students generally will not engage if they feel that they lack the capacity to achieve, or if they have no control over results. Through the development of appropriate and compelling informal science education programs that provide these components, museums can have important and lasting impacts on the scientific literacy and success of urban youth.

Additionally, science-based museums are well-placed to provide important support for science teachers that can amplify positive impacts on urban youth science literacy. Teachers are charged with conveying knowledge and understanding to their students on topics defined by the national science standards and benchmarks (American Association for the Advancement of Science, 1993; National Research Council 1996), and they play a formative role in developing students' impressions and attitudes regarding science. However many teachers do not have sufficient scientific content knowledge or familiarity with emerging technologies to teach science effectively (Bybee, 1997; Kaser and Bourexis, 1999; Linn et al., 1999; Mogk, 1996; U.S.

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National Research Center, 1998). Research on science teaching in urban schools has shown that it is often unsuccessful because many teachers are untrained in the field, have insufficient equipment, materials and supplies, and little support for implementing innovative teaching practices (Barnett et. al. 2004, Darling-Hammond & Sclan 1996, United States Department of Education, 2001). Science-based museums are well-placed to provide important support for science teachers that can amplify positive impacts on urban youth science literacy. Providing support and professional development for science teachers can therefore be a powerful component of any science-focused museum-school partnership.

Finally, evidence shows that programs incorporating real-world research, technology and collaborative learning, interaction with scientists, and a social responsibility component promote science engagement in youth at higher levels than those that do not. Other research demonstrates that teenagers from diverse urban and suburban communities are motivated by experiential learning activities that connect them to future peers, adults, and other teenagers. Equally important is traditional motivation research that suggests active participation in meaningful projects supports students' interest and engagement as well as learning.

The Chicago Botanic Garden and its collaborators seek a planning grant to develop the Floral Report Card: A Climate Change Education Initiative. This project will create a network of botanic garden resource centers to engage teachers and students through a variety of hands-on science activities and technologies. By focusing on one of the most urgent contemporary issues—the impact of climate change on plants—this planning process will yield curricula that can command the attention of young people and supply content that is sorely lacking in science education. Despite the massive impacts climate change will have on plants—and people—education resources that address plant science and climate change are absent from available sources.

The Informal Science Education Opportunity

As a public service organization, one of the Chicago Botanic Garden's primary missions is to ensure that its scientific and educational resources are available to a wide, diverse audience, with a mandate to reach out to communities that do not actively seek out museum resources. As a specifically science-based museum, the Chicago Botanic Garden faces the additional challenge of engaging these audiences in science, a field in which diverse populations are significantly underrepresented. One way to reach large numbers of youth in the community is through schools, which also have the infrastructure to support the use of museum resources. Within this structure, informal education institutions can offer real-world research opportunities, hands-on activities, and experiences for both teachers and students that are not possible through the formal education system (National Academy of Science, 2009).

In a recently published report, the National Academy of Sciences (National Academy of Science 2009) endorses informal science experiences as a means of engaging youth in science in ways that enhance and support school settings. NAS offers a "strands of science learning" framework, an expanded version of the formal education framework developed by the National Research Council (2007), that articulates six science-specific capabilities supported by informal environments and identifies how this framework can serve as a conceptual tool for organizing and aligning formal and informal science learning opportunities. The six interrelated aspects of science learning covered describe what ideally students will do cognitively, socially, developmentally, and emotionally when engaging in science in any setting.

Strand 1: Experience excitement, interest, and motivation to learn about phenomena in the natural and physical world.
Strand 2: Come to generate, understand, remember, and use concepts, explanations, arguments, models and facts related to science.
Strand 3: Manipulate, test, explore, predict, question, observe, and make sense of the natural and physical world.
Strand 4: Reflect on science as a way of knowing; on processes, concepts, and institutions of science; and on their own process of learning about phenomena.

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Strand 5: Participate in scientific activities and learning practices with others, using scientific language and tools.
Strand 6: Think about themselves as science learners and develop an identity as someone who knows about, uses, and sometimes contributes to science.

The NAS emphasizes that the goals of schools and informal, non-school settings are both overlapping and complementary (p312). However, creating working informal/formal education collaborations requires that informal institutions understand the formal education system and that teachers, schools, and districts look beyond traditional pedagogical methods. To a certain extent, this is already happening on a small scale with individual museum-school partnerships. However a large scale, replicable, and sustainable model of a science-based partnership that provides large numbers of students with real research experience is sorely needed.

In light of these needs and opportunities, the Chicago Botanic Garden and collaborators propose a planning grant to explore the potential of a school-museum partnership that explicitly uses the new NAS framework to organize a series of informal learning experiences and align them with classroom-based learning progressions. A learning progression is the organization of scientific concepts in education so that learners revisit important concepts and practices in increasingly sophisticated ways, over multiple years (National Research Council, 2007). The components developed through the planning process are ultimately aimed at 1) increasing students' interest in and understanding of science concepts, 2) increasing the capacity of teachers to teach science effectively, and 3) engaging disaffected communities with museum resources through the incorporation of a technology-rich citizen science initiative with school-based learning progressions.

2. NATIONAL IMPACT AND INTENDED RESULTS

The development and testing of this model can impact the field of informal science education in three critical ways. First, the model offers the opportunity to extend the reach of an individual museum's partnerships beyond its on-site capacity. In so doing, the approach also provides a way of combining ongoing hands-on research experiences with museum resources and expertise in a way that is not generally possible at on-site exhibits—and at a much larger scale. Third, the project develops new models of technology use, in which students (and the public) will be able to meaningfully engage with museum resources and research data from remote locations.

Extending the Museum Reach

One of the ongoing challenges of educational and cultural institutions is the ability to share resources remotely. Museums of all types are challenged with communicating the importance of their collection to youth without the benefit of direct experience. While the development of virtual tours and other web-based media address this somewhat, even these do not provide authentic experiences with museum content. For a science-based museum, one way to extend an authentic experience is to have youth participate in activities that recreate the practices of experts. Citizen science, by nature, offers the opportunity for such participation. The Chicago Botanic Garden and collaborators are proposing an extended citizen science project model that will take advantage of an ongoing on-site research program and web-based data and analysis tools and provide students with opportunities to engage in their own data collection and analysis. This model provides a large-scale, but resource-efficient way of engaging potentially hundreds or thousands of schools. By integrating an existing citizen science model into the classroom, the collaborators propose a new model of off-site interaction with schools, in which students are actively—but remotely—participating in the scientific work of the institution.

Exploring Shared Enterprises between Formal and Informal Learning Settings

Second, the proposed project will provide the opportunity to explore how the National Science Academy's six educational strands can support shared enterprises between informal learning experiences and schools. This project will contribute to the emerging work being done on how informal settings can play a complementary role in supporting learning progressions. Project partners propose to design a program with

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the explicit intent of supporting learning progressions in a manner tightly aligned with K-12 science curriculum goals, while at the same time, providing students with the opportunity to engage in informal learning experiences in their community and with peers across the country. While the Climate Change Gardens will be integrated into the curriculum of the school, the project as a whole offers extensive access to opportunities for extended and more involved participation supported by educational technology, additional resources and access to experts in the field.

Using Technology to Meaningfully but Remotely Engage Students with Museum Resources and Research

There are available collaborative and data-analysis technologies, supporting sophisticated data analysis and visualization, that have not been leveraged in informal education or citizen science settings. Northwestern University, for example, has been a leader in the development of educational visualization technology for school-based environmental science curricula through the Geographic Data in Education (GEODE) initiative (http://www.geode.northwestern.edu/software.htm). The GEODE MyWorld software allows students to uses existing climate-related data sets (temperature, cloud cover, ground cover, rainfall, albedo etc.), to manipulate multiple variables and generate comparative data visualization maps on-the-fly. Integrating these kinds of data analysis tools with dynamically changing information will fundamentally deepen the educational experience. Thoughtful integration of existing technologies, such as GEODE and those developed by NASA, will enable museums to work with schools across the country and will support increased numbers of school partnerships. Other technologies that will be considered include communications technologies, smart phones, web-based social networking sites, and GIS technology. The benefits of incorporating various types of technology into classroom learning are well documented and include "significant improvement in attitudes toward technology, self-efficacy toward science, and modest, yet significant, improvements for geographic data analysis for students who used GIS (Audet & Paris, 1997)." Because technology is so widely used in multiple sectors and applications, this project offers the additional benefit of providing students with a proficiency in important vocational skills.

The proposed project will provide a model through which museums can engage students in research work. There are few, if any, active citizen science projects that allow participants access to the data and also provide user-friendly tools for data analysis. Even those projects with specific resources for students rarely provide more than an annual report of the findings compiled by researchers (Monarch Larva Monitoring Project, Monarch Watch, Journey North, Christmas Bird Count, Cornell Lab of Ornithology, Great Worldwide Star Count). At best, students are given access to computer-generated data tables that can be printed out or downloaded for manual analysis or analysis in other computer programs such as Excel (Globe, BudBurst). The integration of emerging technologies will allow museums to more directly and meaningfully interact with students off-site.

For example, students might be charged with investigating whether differences in temperature or in rainfall most affect plant growth and then predicting what might happen to plant populations given different climate change scenarios. To do this, students would break into groups and choose individual variables to test. They could then collect data from their school garden (or on other plants in their community) over a season and compare it with data collected by other students in participating schools in different climate regions. Students could check their conclusions by comparing their results with available national and global environmental data, such as NASA's global data for temperature, rainfall, humidity, reflectivity, and ground cover. These reports could be posted on the project website as educational resources for other participants. In this way, students will have the opportunity to 1) collaborate with peers across the country, 2) communicate with experts at all participating botanic gardens 3) use their own and other student's data to draw conclusions, 4) understand their research in historical, national, and global contexts, and 5) communicate their findings with the general public.

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3. PROJECT DESIGN AND EVALUATION PLAN

Project Design

Program partners will leverage an existing national scientific research project on climate change, which already incorporates a citizen science component aimed at botanic garden visitors. The current research project includes the installation of a network of "climate change gardens" at botanic gardens across the country in fall 2009 that will create a nationwide "ecological antenna" to monitor the effects of a changing climate on plant growth and survival. For this, botanic garden staff and volunteer citizen scientists will record climate data and a standard set of phenological events, such as first day of flowering and fruiting. This data will be used in climate change models to help predict the impacts of climate change on plants and the important services they provide to people and wildlife.

Chicago Botanic Garden scientists have designed a climate change garden kit that will be tested at six botanic gardens and community organizations in the United States, representing three different hardiness zones. The kits consist of: 1) cloned plants of five species, each collected from four USDA hardiness zones; 2) a meteorological station; 3) a raised-bed kit, including soil, using ecologically-friendly materials; 4) a digital camera for repeat photo-monitoring; 5) data collection procedures; and 6) access to an Internet-based database for data inputs. Environmental response variables that will be measured include: (a) dates of first open flower, peak flowering, first fruit ripened, and last fruit ripened; (b) total flowering period; and (c) fecundity. These gardens are replicated in a range of climatic conditions yet maintain standard growing conditions and eliminate the confounding effects of genetic variance with the use of clones. In this scenario, plants in each garden act like a network of climate sensors or "phytometers."

Plant responses to the different climates of participating gardens will allow inferences about how the species might respond to future climate change—i.e. how will zone 5 plants respond if the climate becomes more like zone 7? The species selected for the monitoring gardens are long-lived, native species that exhibit a variety of breeding systems and wide geographic ranges, which allow them to be planted in different climates across the country. They have flowering times that are initiated by temperature, as opposed to daylength; are easy to clone; and are attractive in a garden setting. Each species will be represented by four ecotypes from each of the USDA hardiness zones 4, 5, 6, and 7. The climate change gardens offer a methodology for citizen scientists to explore the implications of climate change for plants.

The IMLS planning grant will test the viability of climate change gardens as scientific and educational resources and will develop or adapt related curricula and technology for schools, teachers, and students. Results will have broad impacts by demonstrating the potential for and best practices associated with citizen-science and technology to engage youth in science and increase science literacy in a wide range of demographics.

Project Goals

The Chicago Botanic Garden and its partners seek to develop a model through which citizen science and existing technologies can effectively be integrated into school programs to engage youth and increase science literacy. The adaptation of the climate change garden to a school setting, including the development of resources to support its use by teachers and students, provides an ideal context. A basic outline of desired program components has been identified, including: 1) climate change gardens; 2) curriculum materials for diverse audiences; 3) web-based resources including educational data analysis software and interactive communication tools; 4) teacher professional development; 5) researcher mentorship for teachers and students; and most importantly 6) an effective and replicable structure for supporting schools in its implementation. For each of these components to be successful, the program design must be informed by a variety of perspectives including informal museum educators, museum-based scientific researchers, horticulturalists, formal educators and administrators, students, curriculum design experts, and educational technologists. By incorporating the perspectives of teachers, students, and administrators in the project

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development, project partners will ensure that the final program plan, its goals, objectives, and implementation strategy will align with the needs and structure of formal education institutions.

The goals of a planning process for this project entail:

1) Creating a detailed logic model that identifies inputs, goals, objectives, outputs and outcomes. This will require partners to:

- Clarify the specific goals and objectives for each component of the project
- Identify the goals and objectives of each individual component of the project
- Identify the most appropriate and useful educational and technology resources available
- Identify the most appropriate and useful educational and technology resources to be developed or adapted

2) Creating a five-year implementation plan which will require partners to:

- Identify key check-points in the overall implementation process
- Create a timeline for the propagation of garden plants that will allow for a phased installation of gardens at locations across the country
- Coordinate the implementation of the education, technology, and horticulture components of the program
- Create an evaluation plan to assess progress toward goals throughout the proposed implementation

3) Identifying and recruiting key personnel and participants for implementation, possibly including:

- An advisory board
- A group of botanic gardens interested in participating
- Specific interested schools that represent diverse populations near each botanic garden

With these goals achieved, the project will be well positioned to apply for implementation funding from appropriate sources and to begin program development, once funding is secured.

Planning

The proposed Floral Report Card education initiative requires expertise in a wide variety of disciplines at very different types of organizations (formal, informal, academic and research). As such, developing a realistic and comprehensive plan that incorporates all components of the project – the garden itself, scientific content, curriculum and materials, educational technology, and its appropriateness for the formal education context – requires experts to share knowledge, exchange ideas, and determine the best overall approach to integrating these elements. The complexity of emerging technologies and the challenge in motivating youth audiences in science require an intensive investigation of all options and best practices in interactive technologies that might be used to support student learning. This will require investigation into the newest technologies and their practical applications, as well as feedback from students and teachers on their effectiveness and usability. This collaboration is particularly important because in many cases, educators, researchers, horticulturalists, and technology experts do not regularly cross paths, if at all.

To effectively explore the possibilities, experts in botany, horticulture, formal and informal education, and technology will be assembled to understand the entire scope of the project and the requirements of each component. Participants will then work to: 1) coordinate the development of all the individual components; 2) identify existing best practices associated with each; 3) identify the specific materials and technologies to be developed or adapted; and 4) define the specifics of its implementation. In addition to domain experts, the planning group will include administrators, teachers, and students from five schools in the Chicago area that represent diverse populations and ages, including two high schools, two K-8 schools, and one grade 7-12 school.

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The Process

The planning process will be coordinated by the Chicago Botanic Garden, who will host an initial two-to-three-day meeting of all collaborators. This meeting will familiarize all the partners with the goals and project components, identify critical questions and challenges, determine the specific roles for each collaborator, create planning sub- committees as necessary, assign tasks to committee members, and develop a planning timeline. Meetings of all participants will take place twice throughout the project, the initial meeting and a second halfway through. A professional facilitator will be hired to work with lead staff at the Chicago Botanic Garden to ensure that all the necessary topics are covered and that comprehensive records of discussions are kept. In addition, project partners will immediately establish a file-sharing website where notes from all meetings and conference calls will be posted, and all participants can view, comment on, and edit key documents and plans.

A core committee, including one representative from each organization and area of expertise will be established to manage and supervise the entire planning process. The participants of this core committee will be responsible for supervising the planning process at their individual institutions. The core committee will meet face-to-face quarterly to ensure that all aspects of the planning process are aligned and to review the work that has been done up until that point. The core committee meetings will take place at different participating organizations as their specific areas of expertise are the topic of discussion.

In addition to quarterly face-to-face meetings, there will also be monthly conference calls. The primary purposes of the conference calls will be to ensure that all participants are aware of the progress that has been made, provide input based on individual expertise, and address any challenges that may come up between group meetings. Notes from each conference call will be emailed to all participants and posted on the group website.

To ensure student engagement with the program and proposed technologies, project partners will convene four student focus groups from different demographics throughout the planning process. This way, partners will better understand the technologies that students currently use, what they would use if available, and how best to structure in-school use. Effective use of technologies like text messaging, social networking sites, forums, Flikr, YouTube, and others requires communication not only from students, but between students, education experts and technology developers. Students will be asked to make suggestions for activities, evaluate the educational approach, and test the technology as it is developed or adapted. Student comments will then be fed back into the development process. While all student participants will not be able to attend quarterly meetings, partners will convene a representative student committee to ensure their interests are communicated.

While educators plan curricula and technology components, CBG and collaborator scientists will install six climate change gardens. The selected plant species are native to many parts of the country and are known to have broad adaptability, but a test trial will help confirm this and identify any problems that might arise.

Evaluation Plan

Planning project goals include the development of a logic model to help participants clarify aspirations and purpose and to build into an implementation plan the ability to measure progress. Dr. Carol Brewer of the Brewer Science Education and Assessment Consulting Team will participate in the planning process to help ensure this outcome. Dr. Brewer's evaluation and assessment expertise will contribute to the knowledge base on effective learning and teaching as well as offer insights into the development of innovative design, use, and assessment of interactive learning environments in support of science education.

4. PROJECT RESOURCES

Chicago Botanic Garden (CBG) staff will administer the grant and be responsible for the design, implementation and completion of the planning project. Dr. Jennifer Schwarz Ballard, director of the

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Garden's Center for Teaching and Learning, will lead the process, assisted by a part-time temporary coordinator. CBG scientists, Dr. Kayri Havens, director of plant research and conservation and Dr. James Ault, director of environmental horticulture, CBG (www.chicagobotanic.org) will contribute their expertise in plant conservation and horticulture. Bianca Rosendorn will provide technical support to the planning process. The project builds on CBG's experience bridging informal and formal education programs and draws on more than 10 years' experience with its Science First, College First, and Green Youth Farm programs for underserved urban teens, which were recognized by a 2004 National Award for Museum Services. These programs, as well as CBG's citizen-science program, Plants of Concern, are featured at: www.chicagobotanic.org/ctl/afterschool; www.chicagobotanic.org/community/index.php; and www.plantsofconcern.org. Additionally, CBG has led 16 botanic gardens nationwide and two international botanic networks to link plant record databases. This *PlantCollections* database project required a similar group planning process, meeting facilitation, quarterly conference calls, and off-site meetings.

Northwestern University and the Meaningful Science Consortium

Dr. Steven McGee, director of the Meaningful Science Consortium and faculty at the Northwestern University Office of STEM Education Partnerships (OSEP), brings expertise in large scale education program implementation, educational technology, and curriculum development. With most schools needing better quality earth science and biology curricula, OSEP anticipates that many schools will be eager to consider the proposed curriculum materials in their classrooms. OSEP also is linked with the Meaningful Science Consortium (MSC) (http://www.meaningfulscience.org/), composed of four institutions that are committed to science education reform: Northwestern University, The Biological Sciences Curriculum Study, It's About Time, and the University of Illinois at Chicago. The MSC was established to provide an instructional development system to the Chicago Public Schools.

University Corporation for Atmospheric Research (UCAR)

Dr. Sandra Henderson and Kirsten Meymaris from the University Corporation for Atmospheric Research (UCAR) (www.ucar.edu), Boulder, Colorado, have worked closely with CBG on a number of projects, including Project BudBurst (http://www.windows.ucar.edu/citizen_science/budburst/), a phenology-based citizen science project. Science educators in UCAR's Office of Education and Outreach have expertise in all aspects of Internet-based citizen science field campaigns, including development of websites and the cyber-infrastructure needed to support such campaigns. They are also experienced with interactive visualizations and GIS.

Botanic Garden Partners

Anne Shenk and Dr. James Affolter at **The State Botanical Garden of Georgia**, University of Georgia, Athens, Georgia, provide expertise in environmental education and informal education, curriculum development, teacher-training, botany, design of scientific research, and program evaluation. For over fifteen years, the State Botanical Garden of Georgia has been working to develop and implement state-wide programs in public schools. Dr. Soo-Hyung Kim will be involved in the planning process for the **University of Washington Botanic Gardens (UWBG)** in Seattle, Washington. A center of botanical research, education, and outreach in the Pacific Northwest, the UWBG has two sites, the Washington Park Arboretum and the Center for Urban Horticulture. The research and education programs at UWBG encompass the award-winning program in restoration ecology, plant conservation, environmental horticulture, plant physiology, and popular public programs serving youth, adults, and professional audiences. The highlights of the youth programs at UWBG are the Seedlings and Saplings Programs that currently serve over 6,000 students from preschool through eighth grade. Dr. Peter White will represent the **North Carolina Botanical Garden,** part of The University of North Carolina at Chapel Hill, North Carolina. These institutions have been leaders in native plant conservation and education in the southeastern United States for more than 30 years. The diversity of climates and experiences represented by this geography will contribute valuable voices and interesting contrasts to the planning process.

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School Partners

Five Chicago area schools will be involved in the planning process. The five schools include four within the Chicago Public School district and one suburban high school. Demographics of participating CPS schools reveal an average low-income population rate of 84.3%, in contrast with an 11.5% low-income rate at the suburban school. Populations at two schools are widely ethnically diverse, one is comprised almost exclusively of African-Americans (98.3%), one is largely Hispanic (64.5%), and one is primarily white (60.7%). The schools include two elementary schools (grades pre-K to 8), one middle-to-high school (grades 7 through 12), and two high schools, one in Chicago and one suburban, of comparable size.

Two teachers from each of the Chicago area schools will participate in the two major meetings. Two of these teachers will be represented on the core committee that will meet quarterly. Additionally, CBG staff will conduct focus groups with approximately 10 students at each school, and botanic garden partners will host similar sessions with students in their locations.

To support the Floral Report Card planning process, the Chicago Botanic Garden and collaborating partners request a $99,679 grant. These funds will be matched by another $86,217 or 46% of the total $185,896 project cost.

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BUDGET FORM - PAGE FOUR

Section B: Summary Budget

	$ IMLS	$ Cost Share	$ TOTAL COSTS
1. Salaries and Wages	3,000.00	14,398.00	17,398.00
2. Fringe Benefits	300.00	3,556.31	3,856.31
3. Consultant Fees	5,250.00		5,250.00
4. Travel	30,900.00	2,000.00	32,900.00
5. Supplies and Materials		12,000.00	12,000.00
6. Services	38,977.00		38,977.00
7. Student Support			0.00
8. Other Costs	8,250.00		8,250.00
TOTAL DIRECT COSTS (1—8)	86,677.00	31,954.31	118,631.31
9. Indirect Costs	13,001.55	54,428.00	67,429.55
TOTAL COSTS (Direct and Indirect)	99,678.55	86,382.31	186,060.86

Project Funding for the Entire Grant Period

1. Grant Funds Requested from IMLS	99,678.00
2. Cost Sharing:	
a. Cash Contribution	74,382.31
b. In-Kind Contribution	
c. Other Federal Agencies*	12,000.00
d. TOTAL COST SHARING	86,382.31
3. TOTAL PROJECT FUNDING (1+2d)	186,060.31
% of Total Costs Requested from IMLS	5,400.00%

* If funding has been requested from another federal agency, indicate the agency's name:
U.S. Botanic Garden

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CHICAGO BOTANIC GARDEN
INSTITUTE OF MUSEUM AND LIBRARY SERVICES
NATIONAL LEADERSHIP PLANNING GRANT

SCHEDULE OF COMPLETION

Activities	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
Establish collaborative website													
Committee Meeting (full)		$8,500						$10,000					
Steering Committee Meeting		$1,500			$6,000			$1,500			$5,650		
Facilitator		$1,500						$1,500					
Conference Calls	$300		$300	$300	$300	$300	$300		$300	$300	$300	$300	
Goals & Tasks													
Create a detailed logic model					$30,300								
Clarify goals and objectives for the overall project													
Integrate 6 NSA Educaton Strands into goals													
Identify the goals and objectives of each component													
Identify the educational resources that need to be developed													
Identify the technology resources to be developed													
Create a 5 year implementation plan									$ 18,000				
Identify key check-points in the implementation process													
Create a plant propagation and garden installation timeline													
Coordinate education, technology, and horticulture													
Create an evaluation plan													
Identify and recruit key personnel and participants										$ 7,000			
Identify an advisory board													
Identify a group of botanic gardens interested in participating													
Identify schools that represent diverse population for participation													
Report to IMLS												$ 5,229	
Compile results													
Identify Future Funding opportunities													
Submit Report													
TOTAL COSTS PER MONTH	$300	$11,500	$300	$300	$36,600	$300	$300	$13,000	$18,300	$7,300	$5,950	$5,529	$99,679

Sample

PARTNERSHIP STATEMENT

Complete one of these forms for each formal partner.

Legal name of applicant organization (5a from Face Sheet): Chicago Horticultural Society

1. Legal name of partner organization: Northwestern University
2. Partner DUNS number: 160079455
3. Mailing address:

   Street1: Office of Sponsored Research Street2: 633 Clark Street

   City: Evanston State: Illinois Zip+4: 60208

4. Partner Web address: http://www.northwestern.edu
5. Partner project contact name: Susan G. Ross

   Title: Director

   Telephone number: 847/491-3003 E-mail: OSR-Evanston@northwestern.edu

6. Governing control of partner (choose one):

☐ State Government
☐ County Government
☐ City or Township Government
☐ Special District Government
☐ Regional Organization
☐ U.S. Territory or Possession
☐ Independent School District
☐ Public/State Controlled Institution of Higher Learning
☐ Indian/Native American Tribal Government (Federally Recognized)
☐ Indian/Native American Tribal Government (Other than Federally Recognized)
☐ Indian/Native American Tribally Designated Organization
☐ Public/Indian Housing Authority
☐ Nonprofit with 501(c)3 IRS Status (Other than Institution of Higher Education)
☐ Nonprofit without 501(c)3 IRS Status (Other than Institution of Higher Education)
☒ Private Institution of Higher Education
☐ Individual
☐ For-Profit Organization (Other than Small Business)
☐ Small Business
☐ Hispanic-serving Institution
☐ Historically Black Colleges and Universities (HBCU's)
☐ Tribally Controlled Colleges and Universities (TCCUs)
☐ Alaska Native and Native Hawaiian Serving Institutions
☐ Nondomestic (non-U.S.) Entity
☐ Other (specify)

7. What is the partner organization's mission? [500 characters] The Meaningful Science Consortium is a capacity-building project in the Chicago Public Schools that works collaboratively with teachers and administrators to support effective instruction. In the context of a three-year reform-based science curriculum that has environmental science as an integrating theme, the Consortium provides professional development, coaching, assessment, and professional networking opportunities to a diverse network of high schools in the Chicago Public Schools system.
8. Describe the partner organization's service area (audience served, including size, demographic characteristics and geographic area) [500 characters] The Meaningful Science Consortium serves students, teachers, and administrators in the Chicago Public School system high schools. The city of Chicago includes a large population of underserved students, and the high schools serve over 110,000 students in all. MSC presently works closely with 12 CPS high schools, which are distributed throughout the city and reflect the overall Chicago demographics, with variations at each school.
9. List the partner's key roles and responsibilities in the project: [1000 characters] The Meaningful Science Consortium will offer support and direction on curriculum development, formal education programming, educational technology and large scale program implementation, in addition to participating in full meetings, steering committee meetings, and conference calls. The MSC will play a lead role in ensuring that the program developed is appropriate for formal education contexts.

Sample

Please note:

A. Submission of this application by the Authorized Representative of the applicant organization reflects the partner organization's agreement with the following statements:

- We will carry out the activities described above and in the application narrative.
- We will use any federal funds we receive from the applicant organization in accordance with applicable federal laws and regulations as set forth in the program guidelines and the terms and conditions of the grant award.
- We assure that our facilities and programs comply with the applicable federal requirements and laws as set forth in the program guidelines.

B. Prior to submission of the application, the applicant will ensure that the partner organization has provided to the applicant a signed original of this Partnership Statement for the applicant's records. Such original will be made available to IMLS, if requested by IMLS.

Sample

PARTNERSHIP STATEMENT

Complete one of these forms for each formal partner.

Legal name of applicant organization (5a from Face Sheet):

1. Legal name of partner organization: University Corporation for Atmospheric Research (UCAR)
2. Partner DUNS number: 07-833-9587
3. Mailing address:

   Street1: 1850 Table Mesa Drive Street2:

   City: Boulder State: CO Zip+4: 80305
4. Partner Web address: http://www.ucar.edu
5. Partner project contact name: Beverly Broach

   Title: Agreements Administrator

   Telephone number: 303-497-8876 E-mail: bbroach@ucar.edu
6. Governing control of partner (choose one):

☐ State Government
☐ County Government
☐ City or Township Government
☐ Special District Government
☐ Regional Organization
☐ U.S. Territory or Possession
☐ Independent School District
☐ Public/State Controlled Institution of Higher Learning
☐ Indian/Native American Tribal Government (Federally Recognized)
☐ Indian/Native American Tribal Government (Other than Federally Recognized)
☐ Indian/Native American Tribally Designated Organization
☐ Public/Indian Housing Authority
☒ Nonprofit with 501(c)3 IRS Status (Other than Institution of Higher Education)
☐ Nonprofit without 501(c)3 IRS Status (Other than Institution of Higher Education)
☐ Private Institution of Higher Education
☐ Individual
☐ For-Profit Organization (Other than Small Business)
☐ Small Business
☐ Hispanic-serving Institution
☐ Historically Black Colleges and Universities (HBCU's)
☐ Tribally Controlled Colleges and Universities (TCCUs)
☐ Alaska Native and Native Hawaiian Serving Institutions
☐ Nondomestic (non-U.S.) Entity
☐ Other (specify)

7. What is the partner organization's mission? [500 characters] UCAR serves as a hub for research, education, and public outreach for the atmospheric and Earth system science community. UCAR's mission is to support, enhance, and extend the capabilities of the university community, nationally and internationally, understand the behavior of the atmosphere and related systems and the global environment, and foster the transfer of knowledge and technology for the betterment of life on Earth.

8. Describe the partner organization's service area (audience served, including size, demographic characteristics and geographic area) [500 characters] UCAR is a world leader in supercomputing for the geosciences, providing services to NCAR researchers, UCAR member universities in North America, and affiliates worldwide. The UCAR consortium consists of 71 UCAR Members, North American universities that grant Ph.D.s in areas related to atmospheric science, 19 UCAR Affiliates who offer bachelor's and master's programs in the field, and 48 International Affiliates.

9. List the partner's key roles and responsibilities in the project: [1000 characters] The University Corporation for Atmospheric Research (UCAR) (www.ucar.edu) will guide the investigation and identification of technology resources appropriate for the Floral Report Card project in addition to participating in all planning activities as outlined in the grant proposal (Committee meetings steering committee meetings, and conference calls). UCAR will advise on citizen science, interactive visualization

and GIS technology as related to the development of FRC technology plans and goals. In addition UCAR will host one of the steering committee meetings.

Please note:

A. Submission of this application by the Authorized Representative of the applicant organization reflects the partner organization's agreement with the following statements:

- We will carry out the activities described above and in the application narrative.
- We will use any federal funds we receive from the applicant organization in accordance with applicable federal laws and regulations as set forth in the program guidelines and the terms and conditions of the grant award. ***see below**
- We assure that our facilities and programs comply with the applicable federal requirements and laws as set forth in the program guidelines.

B. Prior to submission of the application, the applicant will ensure that the partner organization has provided to the applicant a signed original of this Partnership Statement for the applicant's records. Such original will be made available to IMLS, if requested by IMLS.

***UCAR requests the opportunity to review and negotiate the terms of the award before acceptance of the award.**

Beverly J. Broach

Beverly J. Broach
Agreements Administrator

1/30/09

Date

PARTNERSHIP STATEMENT

Complete one of these forms for each formal partner.

Legal name of applicant organization (5a from Face Sheet): Chicago Horticultural Society

1. Legal name of partner organization: The State Botanical Garden of Georgia
2. Partner DUNS number:
3. Mailing address:

   Street1: 2450 South Milledge Avenue Street2:

   City: Athens State: GA Zip+4: 30605

4. Partner Web address: http://www.uga.edu/botgarden/
5. Partner project contact name: Jim Affolter

   Title: Director of Research

   Telephone number: 706 5426144 E-mail: affolter@uga.edu

6. Governing control of partner (choose one):

☐ State Government
☐ County Government
☐ City or Township Government
☐ Special District Government
☐ Regional Organization
☐ U.S. Territory or Possession
☐ Independent School District
☒ Public/State Controlled Institution of Higher Learning
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☐ Indian/Native American Tribal Government (Other than Federally Recognized)
☐ Indian/Native American Tribally Designated Organization
☐ Public/Indian Housing Authority
☐ Nonprofit with 501(c)3 IRS Status (Other than Institution of Higher Education)
☐ Nonprofit without 501(c)3 IRS Status (Other than Institution of Higher Education)
☐ Private Institution of Higher Education
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☐ Small Business
☐ Hispanic-serving Institution
☐ Historically Black Colleges and Universities (HBCU's)
☐ Tribally Controlled Colleges and Universities (TCCUs)
☐ Alaska Native and Native Hawaiian Serving Institutions
☐ Nondomestic (non-U.S.) Entity
☐ Other (specify)

7. What is the partner organization's mission? [500 characters] The State Botanical Garden of Georgia is a public educational facility operated under the auspices of the University of Georgia. It's mssion is to foster appreciation, understanding, and stewardship of plants and nature through collections and displays, horticultural gardening, educational programs, and cooperative research with the colleges and Universities of Goergia and other private, public and government agencies and organizations.
8. Describe the partner organization's service area (audience served, including size, demographic characteristics and geographic area) [500 characters] The Garden is a university affiliated botanical garden accomplishing teaching and research missions supporting many academic disciplines. Over 200,000 annual visitors with diverse backgrounds enjoy this public garden's many natural areas and display gardens, plus the 75+ educational programs, special activities and events offered annually. These visitors come mainly from Georgia; often from other states and countries.

9. List the partner's key roles and responsibilities in the project: [1000 characters] The roles and responsibilities of the The State Botanical Garden of Georgia, University of Georgia include 1) contributing expertise on informal science education, 2) providing a regional perspective on the development of all program elements, 3) ensuring that the garden elements and design work in a variety of climates and ecosystems, 4) participate in meetings, steering committee meetings and conference calls as noted in the proposal, and 4) provide comments and suggestions as the group develops the goals,

Sample

objectives and implementation strategies for the Floral Report Card: A Climate Change Education Initiative. In addition, SBGG also agrees to host one of the full participant meetings planned during the funding period.

Please note:
A. Submission of this application by the Authorized Representative of the applicant organization reflects the partner organization's agreement with the following statements:

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- We will use any federal funds we receive from the applicant organization in accordance with applicable federal laws and regulations as set forth in the program guidelines and the terms and conditions of the grant award.
- We assure that our facilities and programs comply with the applicable federal requirements and laws as set forth in the program guidelines.

B. Prior to submission of the application, the applicant will ensure that the partner organization has provided to the applicant a signed original of this Partnership Statement for the applicant's records. Such original will be made available to IMLS, if requested by IMLS.

Sample

PARTNERSHIP STATEMENT

Complete one of these forms for each formal partner.

Legal name of applicant organization (5a from Face Sheet): Chicago Horticultural Society

1. Legal name of partner organization: University of Washington Botanic Gardens (UWBG)
2. Partner DUNS number: 605799469
3. Mailing address:

   Street1: 4333 Brooklyn Avenue NE Street2: Campus Box 359472

   City: Seattle State: WA Zip+4: 98195-9472

4. Partner Web address: http://depts.washington.edu/urbhort/
5. Partner project contact name: Lynne Chronister

   Title: Director, Office of Sponsored Programs

   Telephone number: 206-543-4043 E-mail: osp@u.washington.edu

6. Governing control of partner (choose one):

☐ State Government
☐ County Government
☐ City or Township Government
☐ Special District Government
☐ Regional Organization
☐ U.S. Territory or Possession
☐ Independent School District
☒ Public/State Controlled Institution of Higher Learning
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☐ Indian/Native American Tribal Government (Other than Federally Recognized)
☐ Indian/Native American Tribally Designated Organization
☐ Public/Indian Housing Authority
☐ Nonprofit with 501(c)3 IRS Status (Other than Institution of Higher Education)
☐ Nonprofit without 501(c)3 IRS Status (Other than Institution of Higher Education)
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☐ Small Business
☐ Hispanic-serving Institution
☐ Historically Black Colleges and Universities (HBCU's)
☐ Tribally Controlled Colleges and Universities (TCCUs)
☐ Alaska Native and Native Hawaiian Serving Institutions
☐ Nondomestic (non-U.S.) Entity
☐ Other (specify)

7. What is the partner organization's mission? [500 characters] UWBG is part of the University of Washington (UW). The primary mission of the UW is the preservation, advancement, and dissemination of knowledge. The University preserves knowledge through its libraries and collections, its courses, and the scholarship of its faculty. It advances new knowledge through many forms of research, inquiry and discussion; and disseminates it through the classroom and the laboratory, scholarly exchanges, creative practice, international education, and public service.

8. Describe the partner organization's service area (audience served, including size, demographic characteristics and geographic area) [500 characters] The UWBG which includes Washington Park Arboretum (the state arboretum) have approximately 320,000 visitors annually. Over 8,000 schoolchildren have been served through educational programming and 10,000 through public education programs. Youth populations and communities served by UWBG include public and private schools and community groups from the greater Seattle area, including many inner-city students.

9. List the partner's key roles and responsibilities in the project: [1000 characters] The roles and responsibilities of the University of Washington Botanic Gardens include 1) contributing expertise on informal science education, 2) providing a regional perspective on the development of all program elements, 3) ensuring that the garden elements and design work in a variety of climates and ecosystems,

Sample

4) participate in meetings, steering committee meetings and conference calls as noted in the proposal, and 4) provide comments and suggestions as the group develops the goals, objectives and implementation strategies for the Floral Report Card: A Climate Change Education Initiative.

Please note:
A. Submission of this application by the Authorized Representative of the applicant organization reflects the partner organization's agreement with the following statements:

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- We will use any federal funds we receive from the applicant organization in accordance with applicable federal laws and regulations as set forth in the program guidelines and the terms and conditions of the grant award.
- We assure that our facilities and programs comply with the applicable federal requirements and laws as set forth in the program guidelines.

B. Prior to submission of the application, the applicant will ensure that the partner organization has provided to the applicant a signed original of this Partnership Statement for the applicant's records. Such original will be made available to IMLS, if requested by IMLS.

Sample

PARTNERSHIP STATEMENT

Complete one of these forms for each formal partner.

Legal name of applicant organization (5a from Face Sheet): Chicago Horticultural Society

1. Legal name of partner organization: North Carolina Botanical Garden
2. Partner DUNS number: 003203213
3. Mailing address:

   Street1: Campus Box 3375 Street2: University of North Carolina at Chapel Hill

   City: Chapel Hill State: NC Zip+4: 27599-3375

4. Partner Web address: http://www.ncbg.unc.edu
5. Partner project contact name: Peter White

   Title: Director

   Telephone number: 919-962-0522 E-mail: peter.white@unc.edu

6. Governing control of partner (choose one):

☒ State Government
☐ County Government
☐ City or Township Government
☐ Special District Government
☐ Regional Organization
☐ U.S. Territory or Possession
☐ Independent School District
☐ Public/State Controlled Institution of Higher Learning
☐ Indian/Native American Tribal Government (Federally Recognized)
☐ Indian/Native American Tribal Government (Other than Federally Recognized)
☐ Indian/Native American Tribally Designated Organization
☐ Public/Indian Housing Authority
☐ Nonprofit with 501(c)3 IRS Status (Other than Institution of Higher Education)
☐ Nonprofit without 501(c)3 IRS Status (Other than Institution of Higher Education)
☐ Private Institution of Higher Education
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☐ For-Profit Organization (Other than Small Business)
☐ Small Business
☐ Hispanic-serving Institution
☐ Historically Black Colleges and Universities (HBCU's)
☐ Tribally Controlled Colleges and Universities (TCCUs)
☐ Alaska Native and Native Hawaiian Serving Institutions
☐ Nondomestic (non-U.S.) Entity
☐ Other (specify)

7. What is the partner organization's mission? [500 characters] to inspire understanding, appreciation, and conservation of plants in gardens and natural areas and to advance a sustainable relationship between people and nature
8. Describe the partner organization's service area (audience served, including size, demographic characteristics and geographic area) [500 characters] Our audience is: (1) The community. NCBG lies near the center of the state in the Research Triangle Area (pop.1.5 million), known for universities and research institutions. The largest ethnic groups are Caucasian (69%), African American (24%), and Hispanic (6%). (2) UNC faculty, students, staff, and alumni. NCBG supports teaching and research and provides outdoor education and experiences. (3) Schoolchildren and teachers. (4) Special populations. The Horticultural Therapy Program serves specia
9. List the partner's key roles and responsibilities in the project: [1000 characters] The roles and responsibilities of the North Carolina Botanical Garden include 1) contributing expertise on informal science education, 2) providing a regional perspective on the development of all program elements, 3) ensuring that the garden elements and design work in a variety of climates and ecosystems, 4) participate in meetings, steering committee meetings and conference calls as noted in the proposal, and 4) provide comments and suggestions as the group develops the goals, objectives and implementation strategies for the Floral Report Card: A Climate Change Education Initiative.

Sample

Please note:

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- We will use any federal funds we receive from the applicant organization in accordance with applicable federal laws and regulations as set forth in the program guidelines and the terms and conditions of the grant award.
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B. Prior to submission of the application, the applicant will ensure that the partner organization has provided to the applicant a signed original of this Partnership Statement for the applicant's records. Such original will be made available to IMLS, if requested by IMLS.

Sample