



Cascades Science Center



CASE STATEMENT

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INTRODUCTION

Developing a child's love of science can be a world changing event. Tomorrow's workers will need a deep knowledge of science, technology, engineering, and mathematics (STEM) in order to fuel an increasingly innovation-based US economy. Inspiring passion for science must happen at a formative age so that a child's curiosity and fascination can fuel a life-long pursuit of knowledge. The Cascades Science Center Foundation (CSCF) is dedicated to sparking kids' imaginations and providing a venue for the whole family to discover and explore science. To achieve this, the CSCF will build and maintain a physical environment dedicated to scientific discovery, incorporating innovative design, experimental labs, and interactive group activities.

DEFINING AND ADDRESSING THE NEED

Defining the Need

Over the past 100 years, science has been the driving force behind economic success in the United States, leading to dramatic improvements in quality of life. The current global economy continues to be fueled by innovations that spring from the sciences. Our nation must provide the talent to succeed in this competitive world market, yet the scientific innovation and prowess of the United States relative to the international community is starting to decline. Public education alone has proven insufficient at producing world class science teachers and curricula. The current economic crisis has weakened resources at a time when new long-term investments are most needed. In the private sector, local companies are vying for the limited scientific talent pool in the Pacific Rim, competing for labor along with industries in Tokyo, Singapore, Bangalore, Shanghai and Silicon Valley. In addition to the difficulties of attracting new recruits, retention is critical. Even when local companies do attract workers from abroad, they do not necessarily settle in the United States permanently. Furthermore, research has shown that teachers tend to take up teaching positions in the cities in which they grew up rather than where they are trained; thus, failing to spark local youth's passion for science today decreases our chances of having top quality science teachers tomorrow.

Highlighted Facts

- 1) Fewer US students are filling the pipeline for future conveyance of advanced degrees in the sciences.
- 2) The number of US citizen STEM PhDs per capita relative to the number of STEM PhDs per capita in other countries has decreased.
- 3) While the number of patents granted by the US has risen dramatically over the years, when measured by the country of origin of the patent filer, Japan is the clear leader in number of patents filed. When measured by patents per research dollar spent, the US ranks tenth.
- 4) US students spend fewer hours in school than students in most Organization for Economic Co-operation and Development (OECD) countries. Spreading those hours across reading, writing, mathematics, and other subjects limit school teachers' ability to devote quality time to science in the classroom.

- 5) Teachers do not have all the right tools and training for science teaching.
- 6) Washington companies need a science educated workforce.

Note: See appendix for further details and source information

How CSC will address the Need



Studies have shown (Wright, 1980; Falk & Dierking, 1997) that experiences at science centers lead to deeper and longer lasting retention than much of what is covered in the classroom. As a science center of the 21st century, the CSC will be on the forefront of teaching and demonstrating tomorrow's science with constantly evolving content connected to issues that interest children in kindergarten through grade eight. The CSC will offer dynamic experiences for children, including hands on activities in a laboratory environment, much like the Oregon Museum of Science and Industry (OMSI). The CSC will supplement classroom scientific education by using multiple approaches to engage children in scientific exploration, including distributed learning centers,

mobile units, on-site participation at schools, and virtual space for continued collaboration.

DEFINING THE CSC AND FOUNDATION

Mission Statement

The Cascades Science Center Foundation will build a science environment in East King County, Washington that will inspire and develop a passion for science, mathematics and technology in elementary school age kids, and also be interesting to the whole family. With hands on, project-based experiments, it will become the nexus of science education, with constantly evolving content related to issues and trends of the time.

The Genesis of the CSCF

In 2006, Ellis Corets, a retired Boeing Engineering Manager and retired Vice President with Smith Barney, and a founding member of the Eastside Astronomical Society, realized that there is often a defining moment at which children gain or lose interest in science. Interest can be ignited by a seminal event, or lost by lack of positive association. Systems of education can often be so weighed down with conveying the basics that they miss the opportunity to inspire children at this critical age. Over the last two years, this insight has developed into a vision for a center that engages children through hands on, interactive learning and that is set apart from the more commonly encountered depiction of science as displayed in a static museum setting. This vision has attracted a diverse group of professionals who are invested in the Eastside community as a place to live, work, and raise their families. Many of the CSCF supporters are professionals who identify their successes and opportunities as a product of science education. At its core, the CSCF is a grassroots movement that is guided by a passion for science and education as a means to improve our community, region and nation, invest in our children's futures, and make the world a better place through scientific innovation.

Where the CSCF is now

The CSCF is in the formative period. It is refining and synthesizing its vision as communication and partnerships with public and private sectors evolve. The CSCF is concurrently developing resources through volunteers and preliminary fund raising. The board is establishing the basic organizational framework for the Center and its Foundation. The vision for implementation of the CSC is based on three distinct phases:

- 1) **Phase 1 (current):** Define the strategic plan, recruit key executives, formulate the fundraising program, and develop partnerships.
- 2) **Phase 2:** Execute programs within the community, and continue fundraising and developing content and resources.
- 3) **Phase 3:** Solidify the physical and virtual environment, and sustain high quality ongoing programs.

CSCF Organizational Assets

Currently the CSCF relies on the dedication and intelligence of its diverse board members. They are up and coming leaders in the community who provide knowledge and skills from a broad spectrum of disciplines, including economics, finance, law, architectural design, regional planning, science, real estate, engineering, education, medicine and information technology. The next step is to hire key executives who can implement the strategic planning efforts of the Board and share the CSCF vision with the community.

The CSCF has the following main areas of focus:

Content Development: We will collaborate with our public and private partners to co-develop or exclusively develop new teaching tools, experiments, demonstrations and programs. This will also include the ability to generate revenue through sales of these tools, experiments, and programs.

Partnership Development: We will develop high level partnerships with public and private entities by providing value to each entity. Partnerships will include the following:

1. **Local School Districts/Universities:** The CSC will provide access to its facilities which will house state of the art science demonstration tools which may exceed the budget capabilities of schools. The CSC will also help school districts train their science faculty by providing the latest science curriculum training models developed with leading research universities. The CSC will create tools, such as science experiment modules. The development of these products will be funded by grants or private industry donations.
2. **Private Industry:** The CSC can be a “test-bed” platform for demonstrating and testing new technologies. This approach would help develop new teaching tools.
3. **Foundations:** The CSC will collaborate with Foundations that have a mutual interest.

4. **The Public:** The CSC will be an influential leader in the community, cultivating public awareness and funding for science programs. The CSC will promote the Puget Sound to attract top talent and promote public and political support for science programs. The CSC will cooperate with a variety of groups, such as:

- a) **Elected Officials and Representatives**
- b) **Parents**
- c) **Local/Regional Scientific Associations**
- d) **Business Associations**

Resource Development: The CSCF will focus on three methods of raising capital and funding the foundation for a sustainable future:

1. We will solidify strategic partnerships with leading technology companies, philanthropic entities that promote education, influential civic leaders and educators, and the general community.
2. We will pursue development of tools, technologies and interactive experiments such as Science in a Box (a concept currently under development in collaboration with Burke Museum).
3. We will brand the CSC as a “must have” addition to the community such that cities will vie to be its home. The Center will be a cultural attraction, providing a testament to a community’s investment to education and urban redevelopment. With an enhanced reputation, the CSC can leverage both cities and private developers to subsidize much of the costs of developing a CSC site. Having a building will also allow the CSC to raise sustaining/operating funds.

MEASURABLE GOALS/RESULTS



We believe measuring educational results by test scores alone is an outdated mode of thinking, as it does not assess creativity, passion, or students’ ability to produce actual scientific products. We believe success needs to be gauged by the potential of things to come, and by results in real world applications. While long-term measurement may not offer the kind of immediate gratification that annual test scores do, the outputs mean far more.

The following are our proposed metrics of success:

- 1) Increase in the number of hours in student science education
- 2) Annual increase in the number of high school students electing to take upper level science courses

- 3) Annual increases in number of students applying to science majors in higher education
- 4) Increase in employment of local talent hired by science/technology companies
- 5) Increase in the number of patent applications from local talent
- 6) Increase in the number of science/math teachers applying to teach in local schools
- 7) Increase in the number of science training hours / teachers in the local schools
- 8) Increase in the private industry funding of science related programs in schools

SUMMARY



US students are falling behind in math and science, while other countries are graduating more scientists and engineers than ever before. At the same time the need for science, technology, engineering, and mathematics (STEM) in this country is increasing. The uncomfortable reality is that we still have a great deal to do if the challenges are to be addressed effectively, in time and at the necessary scale. The Cascades Science Center is committed to building and maintaining a physical environment dedicated to scientific discovery, incorporating innovative design and experimental labs that will inspire passion for science in kids. Thanks to hard work, good timing, and growing support of partner organizations, the CSCF has created some preliminary foundational assets.

We are pleased to announce below a series of new developments in support of our growing community awareness:

- **Business Plan:** Our business plan identifies the strategic planning, key players, community resources, business model and timeline of our initiatives.
- **Team:** We have a great team of people who are passionate about the vision and the mission of the CSCF, bringing in resources and registering powerfully on radar screens in the community. We are delighted to have a number of new appointments and developments within our team.
- **Advisory Board:** Influential community members make up an advisory board that informs our thinking, helps shape projects and programs, and widens our evolving ecosystem.

Our ongoing CSC action-research projects include:

- Creating Content Development for “Science in a Box,” partnering with Burke Museum and school districts
- Creating science day care programs (daily, weekly, annually)
- Designing science fairs, events, workshops, lectures, and venues to increase community awareness and participation
- Working in partnership with the private sector to connect resources and generate programs
- Working in partnership with science centers and educational institutions to create common, pooled resources

- Continuing an over-the-horizon study for our case statement with support from OMSI, SBA, Sacramento PowerHouse, and Burke Museum
- Exploring the links between science, education, identification of target groups, and teacher education

Our ongoing outreach efforts include:

- Publishing quarterly newsletters and providing blogs and entries on interactive internet tools, including Facebook and Twitter
- Presenting keynotes and/or moderating sessions at anticipated conferences in 2010
- Participating in science fairs at local elementary schools for three consecutive years

We expect to be able to announce further developments in the coming months—and would be very happy to answer any questions.

Providing avenues for young people to explore scientific and technological thinking undoubtedly will make our world a richer and more fulfilling place. We invite others to join us in this mission of bringing scientific discovery to generations of eager children. In the often repeated words of Ellis Corets, “We will inspire a child to the sciences, and we will change the world.”



1. **"The Draw of Home: How Teacher's Preferences for Proximity Disadvantage Urban Schools."** Donald Boyd, Hamilton Lankford, Susanna Loeb, and James Wyckoff. *Journal of Policy Analysis and Management*, Vol. 24, No. 1 (2005): 113-132 (2005).

2. **Science courses nearly extinct in elementary grades, study finds**

Asimov, Nanette, *San Francisco Chronicle*, October 25, 2007

http://articles.sfgate.com/2007-10-25/news/17265353_1_science-researchers-teachers

In a Lawrence Hall of Science at UC Berkeley and WestEd, an education think tank based in San Francisco survey of 923 Bay Area elementary school teachers, about 80 percent of those teachers said they spent less than an hour each week teaching science. Ten times as many teachers said they felt unprepared to teach science (41 percent) than felt unprepared to teach math (4 percent) or reading (4 percent).

3. **"Analysis of the effect of a museum experience on the biology achievement of sixth graders."**

Wright, Emmett L. *Journal of Research in Science Teaching*, Vol.17, No.2 (1980): 99-104

Abstract: This study compared results of pre- and post-tests given to students who made a three-hour visit to the Kansas Health Museum and to a control group that studied the same material in the classroom, also for three hours. Students who visited the museum "showed superior achievement" on a test on recall of facts, relationships between different bodies of knowledge, and knowledge transfer.

4. **"School Field Trips: Assessing Their Long-Term Impact."** Falk, John H. and Lynn D. Dierking. *Curator*, Vol. 40, No. 3 (September 1997): 211-218.

Abstract: Field trips to museums are memorable events. Based on interviews of 128 children and adults, this study found that "even after many years, nearly 100% of the individuals interviewed could recall one or more things learned on the trip, the majority of which related to content/subject matter." The authors ask: "How many other one-day school experiences would measure up as well?"

5. **National Science Foundation; US K-12 Education, Science & Engineering Indicators, 2008**

Concern about the relationship of science and mathematics achievement to American global competitiveness, workforce preparation, and development of an educated citizenry has drawn intensive public scrutiny of the achievement levels of American students in mathematics and science in recent years.

US 15-year-olds scored below the international average in both mathematics and science on the 2003 Programme for International Student Assessment (PISA) tests, which were intended to measure students' ability to apply scientific and mathematical concepts and skills to problems they might encounter outside the classroom. The PISA averages are based on scores from 30 industrialized OECD member countries.

6. **NSB Report Says U.S. Faces Scientist Shortage, 2004**

Quoted from: **Science and Engineering Jobs Study in America**
www.science-engineering.net

Although the United States currently ranks among global leaders in high-tech exports and R&D spending, a National Science Board (NSB) report warns that the country could face a shortage of scientists in coming years.

The biennial report, Science and Engineering Indicators 2004, was delivered to the president with a companion piece, "An Emerging and Critical Problem of the Science and Engineering Labor Force," that paints a bleak picture of the emerging U.S. science and engineering labor workforce.

The report observes "a troubling decline in the number of U.S. citizens who are training to become scientists and engineers, whereas the number of jobs requiring science and engineering training continues to grow." It shows that the United States now ranks 17th among the nations surveyed in the share of 18-to-24-year olds who earn natural science and engineering degrees. In 1975, the United States ranked third. At the same time, other countries, especially in Europe and Asia, have increased their investment in science and engineering education at higher rates than the United States and are continuing to develop enticing opportunities for their homegrown talent.

The 24-member federal advisory panel concluded that if immediate action is not taken to reverse these trends, U.S. research and education institutions may be irreparably damaged by 2020, and that "their preeminence has been lost to other areas of the world."

"Quality education in math and science is everyone's challenge and responsibility," the NSB writes. "The nation's economic welfare and security are at stake."

7. US engineering gap: number of degrees declining

Quoted from: Sheila Riley, EE Times March 14, 2008

SAN FRANCISCO — The numbers are cause for concern. While enrollment at individual U.S. engineering schools remains stable, the overall number of engineering degrees is declining, according to a report on engineering trends. Just how worrying depends on the degree level—bachelor's, master's or doctorate.

According to a February report by Engineering Trends, U.S. universities are awarding more engineering Ph.D.s than in the past. However, the report's authors predict that those gains will be lost because there aren't enough engineering students in the pipeline.

"The problems have taken root and they will be difficult to deal with," said Richard Heckel, founder and technical director of Engineering Trends, a consulting firm specializing in engineering education.

Small but steady declines in bachelor's degrees have occurred in the past three academic years. In 2004-05, some 76,632 engineering bachelor's degrees were awarded. In 2005-06, the number dropped slightly to 76,301. In 2006-07, it again decreased to 75,113.

The population of experienced engineers is aging, he said. "There's a serious problem in our country with people like me: gray-haired people who could retire tomorrow," Helfrick said. If large numbers do retire, the U.S. faces a severe engineering shortfall.

8. Want to stimulate Wisconsin's economy? More science, math, and tech grads will help

Still, tom, Wisconsin Technology Network, Jan 28, 2009

<http://wistechnology.com/articles/5426/>

In 2006, 62 percent of the doctoral degrees awarded in the United States were given to foreign nationals - most of whom return home.

9. Careers: Report Shows Engineering Jobs on the Decline

Quoted from: **Commission on Professionals in Science and Technology**
www.cpst.org

Edited by Victoria Burt, May 8, 2008

During the second half of the 20th century, strong demand in the U.S. for trained science, technology, engineering, and mathematics (STEM) professionals fueled significant growth across all of science and its allied fields.

But following years of rapid growth, the STEM share of all U.S. employment has dropped to levels last seen during the mid-90s, according to a report released by the Commission on Professionals in Science and Technology (CPST).

The report finds that since 2001, STEM professionals have accounted for a declining share of total employment in the U.S. The nation's scientific and technical workforce is still growing, but it is now lagging behind the growth of the U.S. labor force as a whole.

(Note: The declining number of STEM employees as a percentage of the workforce is not necessarily a response to a drop in employer demand for STEM skills; rather limited talent and continued demand have sparked increased efforts to find workers via alternative means, such as specialized visa programs.)

10. Statistics on Worldwide Patent Activities, World Intellectual Property Organization, 2007

http://www.wipo.int/freepublications/en/patents/931/wipo_pub_931.pdf

The United States ranks 10th based on the number of patents filed per research dollar spent. The United States patents office granted more patents than other national offices as of 2005, but nearly half of those patents went to foreign citizens. Japan is the country with the largest number of patents based on country of origin of the patent filer.

11. Also, the article "**STEM: A Foundation for the Future**" provides Microsoft's perspective on current student skills in science, technology, engineering and mathematics. The full article can be found at the following link:

http://download.microsoft.com/download/6/7/C/67C082EE-291C-4099-A8BF-F720A905E4E8/msft_stem_lores_112209.pdf