

**YEARLY ACTIVITY PLAN (YAP) – FB ‘09 – ‘11**

**Division/Attached Agency:**

**Program Name:**

**Program ID:**

**I. PROGRAM PLANNING**

**Problem, issue or opportunity statement:** Describe the problem, issue and/or opportunity your program is attempting to respond to.

A central component of DBEDT’s mission is its role in leading efforts to improve the competitiveness of Hawaii’s economy and businesses and to create the conditions to encourage and facilitate increased productivity, entrepreneurial effort and innovation. Within the nine departmental priority objectives, the Science & Technology Branch activities are aligned primarily to the Hawaii Innovation Initiative and contribute to several others. A key strategy is to help drive an innovation-based economy by directing more attention to expanding and diversifying Hawaii’s science & technology (S&T) sectors, including preparing Hawaii’s workforce to fill the expanding demand for highly skilled employees in these sectors, as well as tech-related jobs in all sectors of the economy. The foundation of creating this workforce is improving the State’s ability to deliver a quality education in science, technology, engineering, and math (STEM). The target audience for STEM education includes educators, policy makers, businesses, parents and students.

To support significant industry growth, Hawaii’s science & technology-based companies also need to develop new export markets. In order for the industry to grow by adding more companies, the commercialization of scientific innovation needs to be accelerated and Hawaii’s non-tech image (sun, sand & surf) must be broadened to include science & technology. The primary customers (participants) are local science & technology companies and academic research institutions, primarily in ocean science & technology, aerospace, and life sciences, (directories of these organizations are available). In FY 08, we added sustainable energy to our focus areas because of the increased emphasis on the need to become energy independent and the development of the Hawaii Clean Energy Initiative. The target audience for industry growth includes federal fund managers, potential investors and purchasers of goods and services, and science & technology media .

**Need and partners:** Provide quantitative evidence to show the scope and nature of the problem or opportunity you are working on. Identify partners you will be working with to address the problem, issue and/or opportunity. Describe why government should be part of the solution.

The Hawaii Science & Technology Council recently released a report entitled, “Innovation and Technology in Hawaii: An Economic and Workforce Profile,” which resulted from a study conducted in collaboration with DBEDT’s READ, and other units including the S&T Branch, the University of Hawaii, the Research Corporation of Hawaii, the four county economic development boards and others. The report indicated that:

- Hawaii’s private technology sector employment grew 3.3 % annually between 2002 and 2007, outpacing the state’s overall 2.5% economic growth for the same period.
- Hawaii’s science and technology companies and government entities created 31,106 jobs, or 3.6 % of the state’s employment.
- 23,985 technology jobs, or 77% of the total, are found in private sector companies.

## YEARLY ACTIVITY PLAN (YAP) – FB '09 – '11

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- Hawaii's private technology sector contributed about \$3 billion to the state's economy in 2007—a figure that represented 5 percent of the state's total \$61 billion economy.
- Tech employees account for 3.6 percent of the state's total employment, but they generated 5.4 percent of Hawaii's total worker earnings (\$2.1 billion).

These data indicate impressive potential and the growth to date can be attributed in part to government support in the form of the technology tax incentives, R&D funding from sources such as CEROS and HTDV, and assistance to small companies in the form of business training, export assistance, and generic marketing. The need for government to be involved in supporting the growth of the S&T industry remains because while continued growth relies on finding investment and markets outside of Hawaii, most of the companies involved are too small to compete effectively on their own. There is also a compelling need for DBEDT, as the economic development agency, to help insure that the education system can produce a workforce capable of supporting the economic development objectives of the State. The new alignment of the Science & Technology Branch within SMSD facilitates a closer working relationship with their workforce development efforts and the programs that support international exports, including S&T sectors, and the efforts to support international S&T education.

There are a number of organizations in Hawaii that provide support to the S&T sectors, each providing a suite of services and programs that work in concert to assist both the public and private sectors. The DBEDT S&T Branch continues to focus on two major program areas (the Office of Aerospace Development, housed within the S&T Branch, submits a separate YAP):

1. Human Capital Development: National recognition that the US has fallen behind many other countries in its ability to educate sufficient engineers and other highly trained workers to remain competitive in today's global marketplace was articulated in the 2006 report "Rising Above the Gathering Storm" and other recent publications. Understanding of this critical need for improved STEM education was a key component of the Governor's 2007 Innovation Initiative, spearheaded by DBEDT. The Innovation in Education bill contained several proposals to improve Hawaii's ability to deliver a quality STEM education which were included in Act 111 (SLH 2007). Education is a key responsibility of State government, through the Department of Education (DOE) and the University of Hawaii, and DBEDT has become an active partner in continuing to work with stakeholders to find ways to improve STEM education to support an innovation-based economy. Partners include: Department of Education (DOE), University of Hawaii (UH, including Community Colleges, College of Engineering, College of Education, P-20 Council, and Office of Technology Transfer and Economic Development [OTTED]), Workforce Development Council, private sector (including the Hawaii Science and Technology Council [HSTC], and the County Economic Development Boards [EDBs]).
2. Industry Support: The S&T Branch provides industry support in three areas:
  - Most Hawaii science & technology-based companies are small, with limited marketing budgets or expertise. Several companies have been successful at attracting defense and other federal funding, both competitive and earmarked, but there is a need to develop other markets on a national and global scale. For some companies, participation in DBEDT programs is their first introduction to trade shows, with highly qualified and concentrated audiences, as part of their marketing strategy. Without State assistance (financial and technical) they would not be willing to explore potential new markets.
  - Hawaii continues to suffer from a resort destination image in the minds of many funding agencies and potential investors, partners and purchasers of products and services. There is a need for a concerted effort to change the image by creating awareness of Hawaii's natural resources, infrastructure and achievements. This is a traditional role of government in tech-based economic development programs.
  - Successful efforts to grow an economy based on technological and scientific achievement in other regions have all included strong ties to academic research institutions as a source of intellectual capital, innovation, and technical skills. Several states have developed models that

## YEARLY ACTIVITY PLAN (YAP) – FB '09 – '11

closely tie academic policies to economic development objectives through a cooperative effort by government, industry and academia. There is a need for government, through its economic development agency, to support this effort by promoting UH-industry partnerships to facilitate tech transfer and the development of a skilled workforce that can support the S&T industry.

Partners include: High Technology Development Corporations (HTDC), Natural Energy Laboratory of Hawaii Authority (NELHA), UH (OTED and VP for Research), and the private sector (including HSTC and the EDBs), Hawaii Visitors & Convention Bureau (HVCB), and Hawaii Convention Center (HCC).

**Desired results (outputs, outcomes and impacts):** What will success look like? Describe what you expect to achieve in the short-term (0-2 years) and long-term (2-6 years).

### Human Capital Development

#### Short-term (0-2 years)

- Continue to work with stakeholder groups to maintain and institutionalize STEM education programs started under Act 111 (SLH 2007) and other initiatives to develop program traction and long-term viability.
- Continue cooperative program with UH to support and institutionalize STEM Workforce Development Program Office to provide statewide integration of STEM education efforts.
- Continue to work with stakeholders to insure continuation of efforts funded by STEM grant from the National Governors Association (FY08 & FY09) to implement a longitudinal tracking system to assess effectiveness of STEM programs, ensure that teachers are aware of STEM program opportunities; and provide a STEM portal (MySTEMHawaii.org) to increase access to STEM programs and improve awareness of importance of STEM skills.
- Continue to organize efforts to implement and institutionalize a STEM Communications program to ensure sustained and increased support of STEM programs.
- Continue to administer funding from the US Department of Education to increase access to college by under-represented groups with a focus on STEM disciplines.
- Identify and pursue new collaborations and funding sources to ensure schools have adequate resources to provide rigorous STEM programs.
- Identify additional policy initiatives to promote embedding strong STEM education programs throughout P-20 education.

#### Long-term (2-6 years)

- Continue to work with stakeholder groups to expand STEM education programs to ensure that: all high schools that want to become HiEST Academies have the resources available; that every elementary and secondary school has robotics and other contextual learning programs available; that there is a robust STEM professional development program that provides recurring training opportunities for new and in-service teachers; that internship and mentorship opportunities that benefit both students and businesses are readily available.
- Continue to work with stakeholder groups to strengthen collaborations and integrate STEM efforts so that resources are wisely used to serve all parts of the State.
- Continue to collaborate on efforts to align education, workforce and economic development efforts to ensure that the STEM pipeline is functioning to a well-prepared workforce to support tech-based industry sectors.

### Industry Support

## YEARLY ACTIVITY PLAN (YAP) – FB '09 – '11

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### Short-term (0-2 years)

- Continue to expand trade show participation in targeted sectors to increase S&T exports, generating revenues and providing new employment opportunities.
- Continue to develop tools to expand Hawaii's image from a resort destination to include a reputation as a leader in specific S&T sectors
- Continue to work with the UH through the EPSCoR program and the private sector to strengthen collaboration leading to targeted curriculum development and improved tech transfer.
- Continue to collaborate with stakeholder organizations to increase understanding of S&T in the community and remove barriers to industry growth and expanded employment.

### Long-term (2-6 years)

- Transition to primarily industry participation in established trade shows, graduate companies to sector-specific events, and identify new opportunities to support emerging industry sectors to support a steady increase of exports and expanded employment through expansion and retention of existing companies, new company formation and attraction of new investment.
  - Develop local network of S&T communications professionals to institutionalize input into the website and other communications tools to ensure Hawaii's achievements are known and the State is recognized as a leader in a number of S&T niches and a center of innovation in the Pacific.
  - Continue working with UH and industry to achieve a strong, mutually rewarding relationship with emphasis on key focal areas of competitive strength.
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**Influential Factors:** List the factors you believe will support or hinder your ability to impact the problem or opportunity.

### Support

- Increasing collaboration among education, government and business to support development of STEM education.
- Innovation Initiative has focused more administrative, legislative and community attention on importance of S&T industry sectors.
- Increasing cooperation among organizations with a focus on tech-based economic development.
- Growing commitment of UH to increasing their role in supporting the State's economic development objectives.
- More vocal voice for industry through the Hawaii Science & Technology Council.

### Barriers

- The severe economic downturn in the last year will likely result in further reductions in federal funding for R&D; however, the new federal administration appears to put more emphasis on science & technology so funding may not be as severely impacted, particularly in areas such as renewable energy.
- Increased competition. Many states have initiated economic development strategies based on science & technology. With Hawaii's smaller population base, we have fewer dollars to spend to compete with these other regions in raising awareness of opportunities in Hawaii.
- The "Not in My Backyard" attitude and public concerns about safety, health, and other issues related to new technologies. Examples include genetically engineered crops and other organisms, bioprospecting, the building of a regional biosafety laboratory, additional telescopes on Mauna Kea, etc.

**YEARLY ACTIVITY PLAN (YAP) – FB ‘09 – ‘11**

**Strategies:** List the “best practices” that have helped other programs achieve the kind of results your program promises.

1. Focus on niche opportunity sectors where Hawaii has recognized advantages based on resources, expertise and infrastructure.
2. Focus on activities where government can address a significant need that is not being met by industry.
3. Focus on supporting strong university-industry partnerships to facilitate workforce development and tech transfer.
4. Focus on policy development that supports science & technology.
5. Focus on developing a well-informed and supportive local community.
6. Focus on expanding Hawaii's sun, sand and surf image to include science and technology.
7. Focus on building the relationship with DOE and other stakeholders to pursue opportunities to improve Hawaii's STEM education.
8. Focus on building partnerships with private sector economic development agencies, the Hawaii Science & Technology Council, and other state and county agencies.

**Assumptions:** State the assumptions behind *how* and *why* the change strategies you have identified will work. Use “If - then” statements, i.e. “if \_\_\_\_\_ then \_\_\_\_\_ happens.”

1. If local science & technology companies mature and progress from R&D to commercialization, then more companies are gradually being formed or attracted, deepening the sector base and developing toward a critical mass.
2. If compelling local success stories, both in the private sector and at UH, are given broader dissemination through a strong communications program, then Hawaii's image will shift to include sun, sand, surf, AND science, encouraging increased investment.
3. If the interaction between the University of Hawaii and local S&T companies increases, resulting in more commercialization of UH inventions and stronger academic programs supporting industry needs, the University will become a stronger economic development catalyst.
4. If the Innovation Initiative is successful in elevating the awareness of the importance of STEM education and supporting a stronger coalition of educators, government agencies, and business leaders, then Hawaii will build a more productive and competitive workforce through improved STEM education.

## II. PROGRAM IMPLEMENTATION

**Resources:** Describe the resources available to support your program.

The Science & Technology Branch has a staff of five civil service employees, including the manager, three professionals, and a secretary. The R&D Coordinator's primary functional duties support the Office of Aerospace Development (separate YAP), as well as contributing to industry support activities. Operating funds to support core program activities are about \$175,000. In addition, in FY 10, DBEDT will continue to manage funds from a Department of Education grant to increase the college-going rate among underrepresented students. New federal and other external funding sources are being sought. The transfer into SMSD provides for additional synergy and leveraging of resources. Success is also dependent upon maintaining current partnerships (HTDC, UH, EDBs, HSTC, DOE, private sector, federal agencies) and building new relationships.

## YEARLY ACTIVITY PLAN (YAP) – FB '09 – '11

**Activities:** Describe each of the activities you plan to conduct within your program.

1. Human Capital Development:
  - Work with DOE, UH, and other stakeholders to facilitate implementation and institutionalization of the provisions of Act 111
  - Continue co-management of STEM Workforce Development Program at UH
  - Work with DOE and other stakeholders to carry out long term commitments based on the NGA grant and continue relationship with the NGA Center for Best Practices to make use of their expertise and links to other state's programs
  - Continue chairing the STEM Communications Team
  - Administer the US Department of Education Challenge Grant
  - Seek additional external funding to support STEM education initiatives
  
2. Industry Support:
  - Provide export assistance by organizing State pavilions at selected trade shows, offering participants a turn-key opportunity that reduces their risk by lowering the required investment of both time and money. This also assists the University of Hawaii to meet their need to raise awareness of their research achievements and attract funding, faculty and students.
  - Use a variety of communication tools to improve Hawaii's S&T reputation, including: displays at trade shows; production of brochures and reports; presentations at conferences; advertisements, editorials and articles in trade journals; websites; attraction of conferences to Hawaii; coordination/co-sponsorship of Hawaii S&T conferences; and personal communication.
  - Continue to work with UH to enhance a federal grant to increase UH competitiveness (EPSCoR) with an emphasis developing university-industry partnerships, student internships, and entrepreneurship activities statewide.
  - Co-chair EPSCoR subcommittee to develop a statewide S&T plan
  - Continue to participate in informal and ad hoc industry groups to develop and implement strategies to reduce barriers to industry growth

**Outputs:** For each program activity, identify what outputs you aim to produce.

1. Human Capital Development
  - Long-term plan for institutionalization and funding of STEM programs
  - Plan for integration and coordination of STEM programs
  - Support for MySTEMHawaii.org web portal and program directory
  - Agreement of STEM Communications Team on ownership and implementation of plan
  - Grant provided to non-profit to implement programs to increase college going rates and success
  - Proposals for additional funding for STEM education
  
2. Industry Support
  - Hawaii pavilions organized at three trade shows in each fiscal year
  - Industry sector brochures and directories updated and published; website expanded and maintained with regular contributions from industry and the research community; editorials and articles in trade journals; negotiations to attract S&T conferences to Hawaii
  - Projects with UH increase tech transfer and commercialization
  - Statewide S&T plan

**YEARLY ACTIVITY PLAN (YAP) – FB '09 – '11**

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**Outcomes:** Identify the short-term (0-2 years) and long-term (2-6 years) outcomes you expect to achieve.

Human Capital Development

Short-term (0-2 years)

- STEM education programs started under Act 111 (SLH 2007) and other initiatives have developed program traction and long-term viability at current funding levels.
- STEM Workforce Development Program Office is institutionalized to provide statewide integration of STEM education efforts.
- Programs developed under the NGA STEM grant have been tested and are functioning: longitudinal tracking system to assess effectiveness of STEM programs has collected data and provided policy guidance, STEM program awareness is incorporated in routine DOE teacher training; the STEM portal (MySTEMHawaii.org) is fully functional with the STEM community utilizing it to inform teacher, parents students and the general public about STEM programs and success stories.
- The STEM Communications Team is functioning smoothly to ensure sustained and increased support of STEM programs.
- The College Access Challenge Grant from US Department of Education has increased availability of information about college opportunities, with a focus on STEM disciplines, to under-represented groups.
- New funding sources have been identified to ensure schools have adequate resources to provide rigorous STEM programs.
- Policies supporting strong STEM education programs throughout P-20 education have been adopted.

Long-term (2-6 years)

- STEM education programs have been expanded to ensure that: all high schools that want to become HiEST Academies have the resources available; that every elementary and secondary school has robotics and other contextual learning programs available; that there is a robust STEM professional development program that provides recurring training opportunities for new and in-service teachers; that internship and mentorship opportunities that benefit both students and businesses are readily available.
- There is statewide integration of STEM efforts so that resources are wisely used to serve all parts of the State.
- Education, workforce and economic development efforts are aligned to ensure that the STEM pipeline is functioning to a well-prepared workforce to support tech-based industry sectors.

Industry Support

Short-term (0-2 years)

- S&T exports show steady growth, generating revenues and providing new employment opportunities.
- Hawaii's reputation as a leader in specific S&T sectors is more established
- Collaboration between UH and the private sector through the EPSCoR program has resulted in targeted curriculum development and improved tech transfer.

## YEARLY ACTIVITY PLAN (YAP) – FB ‘09 – ‘11

- There is greater understanding in the community about the importance of S&T to economic prosperity and less resistance to S&T projects.

Long-term (2-6 years)

- Contribution of the tech sector to the community has significantly increased.
- Hawaii is recognized as a leader in a number of S&T niches and a center of innovation in the Pacific.
- UH and industry have achieved a strong, mutually rewarding relationship with emphasis on key focal areas of competitive strength.

**Impact:** Describe the lasting impact you anticipate.

Hawaii's science and technology sectors contribute significantly to the State's economy through attraction of external investment and revenue, and increased employment opportunities in high-value jobs that attract and retain talent. Hawaii is recognized as a leader in certain S&T fields that have significant natural resource, infrastructure and personnel assets. S&T sectors are viewed locally as good investment opportunities and beneficial to the State as a whole. Hawaii students receive a high-quality STEM education that enables them to enter STEM careers, meeting the needs of our local industry, or apply critical thinking and S&T skills to all sectors of the economy. The result is a stronger, more productive and competitive economy that affords Hawaii's citizens a higher standard of living.

### III. PROGRAM EVALUATION

**Indicators:** Describe what SMART ('specific; measurable; action-oriented; realistic; and timed') indicators can be collected that would convey the status of your program.

There are two levels of indicators that are used to evaluate the success of this and other programs related to the Innovation Initiative. The program is designed to influence "Hawaii's Innovation Indicators" measures, in particular the following apply to the S&T Branch program:

- Proportion and performance of students in STEM programs
- College readiness, college-going and completion rates
- University, government and private industry R&D spending per \$1000 of GDP
- Patents issued per 100 workers
- Percent degrees earned in STEM majors at UH
- Technology sector growth and proportion of jobs
- Proportion of STEM jobs outside technology sector
- Growth in R&D jobs
- Percentage of STEM occupations in the economy
- Average earnings in STEM occupations

Specific indicators more directly related to program performance include:

- Number of participants in trade shows.
- Number of qualified leads generated by trade shows and other activities.
- Follow-up with trade show participants (quantitative & qualitative).
- Website activity.
- External funding generated.



**YEARLY ACTIVITY PLAN (YAP) – FB ‘09 – ‘11**

**c.**

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Director - Signature

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Date