



**CERTIFICATE OF
COMPETENCE**

**GIS IN ECOSYSTEM
MANAGEMENT**

**EXECUTIVE SUMMARY
REPORT JULY 2016**



EXECUTIVE OVERVIEW

The Certificate of Competence in Geographic Information Systems (GIS) in Ecosystem Management (the “Certificate”) offers job-relevant training for career pathways in natural resource management, cartography, geospatial analysis, and software development in Hawai‘i. This grant funded initiative launched innovations and capacity building efforts which led to 82 participants earning the Certificate, 131 employers engaging directly with students, and the initiative achieving a 28% job placement rate in 2014-16.

INNOVATIONS

University of Hawai‘i Maui College (UHMC) led a U.S. Department of Labor TAACCCT Round 2 grant initiative, collaborating with Kaua‘i Community College, Hawai‘i Community College, and the Moloka‘i Education Center to run statewide GIS cohorts. Innovations included:

1. Development of a fast-track, compressed, hybrid GIS curriculum with new online modules, in-person labs, and field trips hosted by employers and community partners.²
2. Piloting of flipped-classroom teaching methods and new technologies to support problem-based learning using industry standard GIS and GPS tools such as ESRI’s ArcGIS.
3. Using outreach, promotion and networking with local technology, government, and natural resource employers to build local career pathways for incumbent workers, military veterans, nontraditional, and degree-seeking students.

ENGAGEMENT & NETWORKS

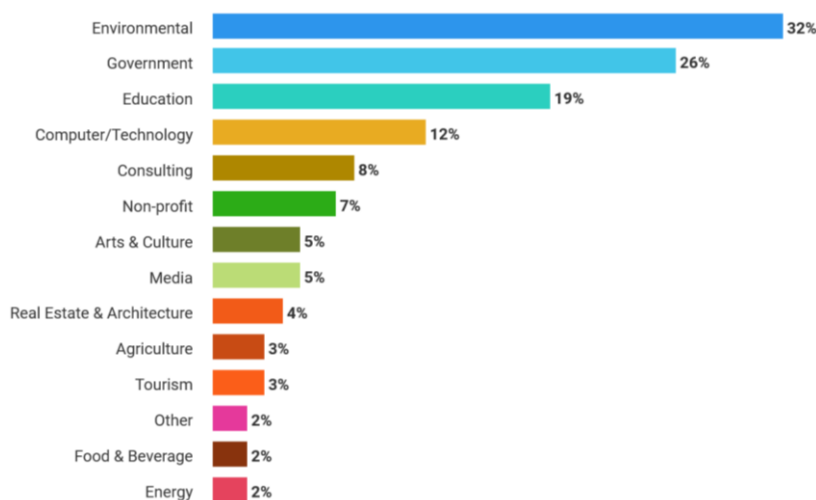
Employers from diverse industry sectors, including environmental, government, education, and technology supported the initiative by hosting hands-on field trip experiences, consulting on final projects, and participating in networking events.

OUTLOOK FOR GIS

Sixteen Maui employers, collectively employing over 500 staff and 500 volunteers, completed a post-initiative survey indicating that 88% already use GIS in their workplace.³ These 16 Maui employers plan to hire 11 full-time GIS positions, 10 part-time GIS positions, 1 contract GIS position and 9 interns with GIS skills in the next two years.³

Employers Engaged with Grant GIS Initiative

130 employers engaged with students during the grant period from these sectors:¹



ACTIONABLE INSIGHTS

This report presents the successful outcomes and actionable insights in support of sustaining the Certificate. Employers communicated interest in on-going collaborative initiatives and non-credit and credit training programs. Those students that earned the Certificate indicated interest in receiving advanced training in GIS programming, GIS modeling, and data analysis. Evidence from this grant initiative supports scaling these innovations, developing new trainings, and continuing to build the GeoTech community network in Hawai‘i.⁴

INNOVATIONS

Grant-funded innovations are drivers of change, capacity building, and a catalyst for community colleges to develop demand-based education. Innovations for the Certificate led by UHMC included online curriculum enhancements, investments in industry-standard technology tools, and strategic outreach initiatives to support recruiting and employer engagement outcomes.

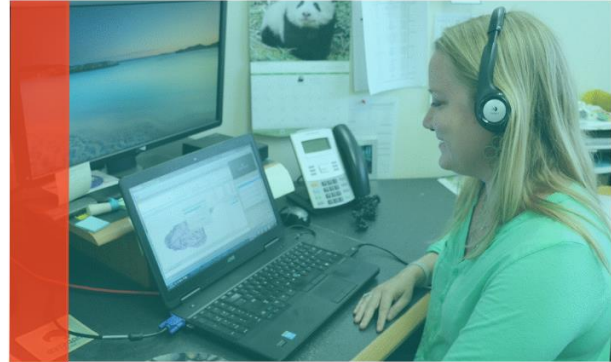
INTERACTIVE CURRICULUM



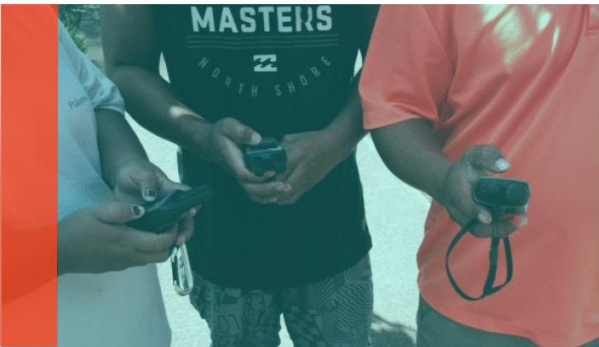
Developing hybrid GIS curriculum with new online modules, in-person labs, and field trips hosted by employers and community partners.²



Compressing completion time of an 8-credit Certificate to one semester.



TECHNOLOGY



Piloting of flipped-classroom teaching methods and new technologies to support problem-based learning using industry standard GIS and GPS tools such as ESRI's ArcGIS.

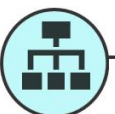


Management of 31 ESRI Educational Teaching Lab Pak software licenses and 147 student GIS licenses

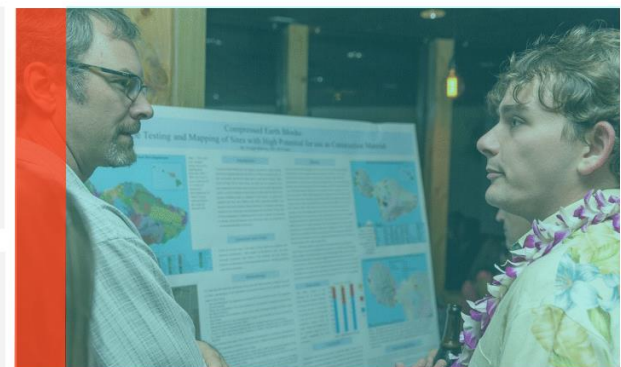
OUTREACH



GIS Showcase events facilitated student and employer networking each semester, with over 300 attendees throughout the grant period.



Building networks with local technology, government, and natural resource industries to attract incumbent workers, military veterans, non-traditional, and degree-seeking students through outreach and promotion



ENGAGEMENT & NETWORKS

Employers from diverse sectors supported the Certificate by hosting hands-on field trip experiences, consulting on final projects, and participating in networking events.

INDUSTRY ENGAGEMENT

Employer participation in the Certificate inspired students to learn about the real-life skills being taught in the labs and assignments.



Over 130 employers engaged directly with students during the four semester period, and over 40% worked with students on final projects for GIS 180.

The scope and variety of industry partnerships made during this grant initiative underlines the community support for workforce training opportunities like these.



LEVERAGING EMPLOYER RESOURCES

Ninety five employers provided significant time and resources to the initiative by hosting fieldtrips, providing data for projects and labs, reviewing curriculum, displaying student projects at statewide conferences and engaging attendees at GIS Showcases. Also several companies provided guest speakers who shared with students how GIS is used in the workplace.

Employer Participation Enhances Student Experiences



22 EMPLOYERS HIRED 23 GRADUATES

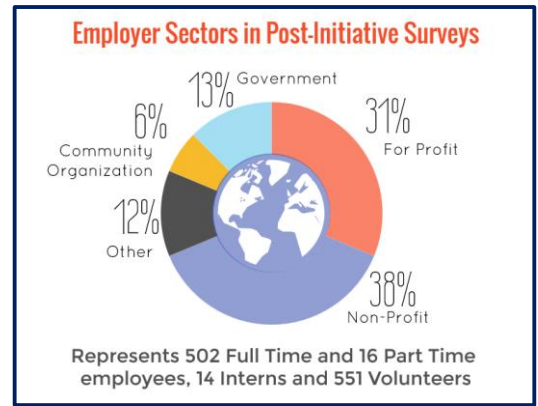
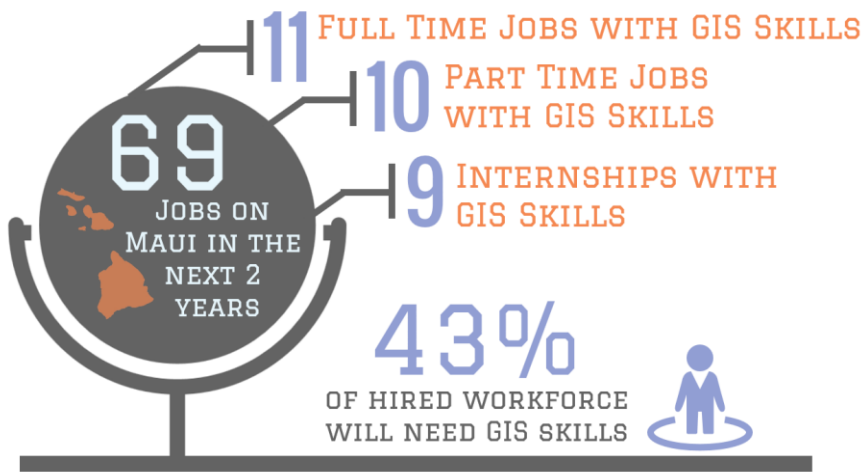
From Fall 2014 to Spring 2016, 107 students enrolled in GIS courses, and 82 earned the Certificate of Competence in GIS in Ecosystem Management. Of these 82 graduates, 48% were incumbent workers. In addition, another 28% of graduates were hired in GIS-related positions. Altogether, 75% of graduates are working in GIS-related jobs.



OUTLOOK FOR GIS

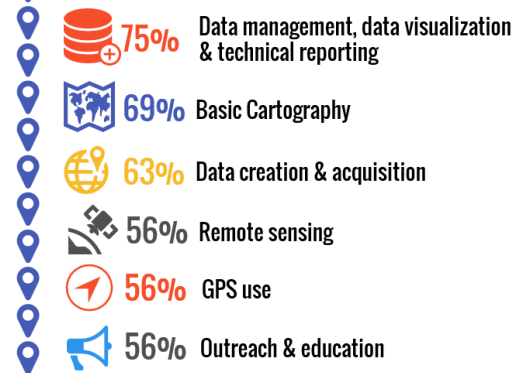
GIS skills are in demand among Hawai'i employers in the private, nonprofit, and government sectors. In a post-initiative survey with 16 Maui employers collectively employing over 500 staff and 500 volunteers, 87% responded that they already use GIS in their workplace.³ Primary uses of GIS among employers include data management, visualization and reporting, and basic cartography.³ These employers plan to hire 69 total jobs on Maui in the next two years, 43% of which would need to have GIS skills.³

MAUI NEEDS NEW GIS STAFF IN THE NEXT 2 YEARS



14 out of 16 companies already use GIS in the workplace

How do they use GIS?



HOW CAN WE RESPOND TO EMPLOYER NEEDS?

Local employers identified the challenges of implementing GIS into their companies due to cost of resources and staffing, lack of qualified staff, and limited offerings of training on island.³

Challenges for GIS Companies in Hawaii

64% Said COST was the biggest challenge to implement GIS in their work

39% Said they either have no current staff with GIS skills or have not been able to find local people with these skills to hire

Employers rated the Certificate as an excellent training experience.³ However, 69% of employers indicated they would prefer non-credit courses for ease of enrollment and more flexible scheduling.³ The survey results provided valuable data to enable UHMC to continue to respond to employer needs.

Employers rated the GIS Initiative "Excellent" in its ability to:

A+

- Train local students on entry level cartography and map creation
- Provide hands-on or real world experiences in the classroom
- Teach skills that are needed in Hawai'i's job market
- Involve them in the GIS initiative

ACTIONABLE INSIGHTS

There is growing interest in GIS in Hawai'i as demonstrated through community and employer engagement, survey responses, and statewide initiatives. Students earning certificates also indicated their interest in receiving advanced training in GIS programming, GIS modeling, and data analysis.⁵ Evidence supports that industry-based demand and student interest among diverse majors merits scaling training initiatives, developing new curriculum, and continuing to build the GeoTech community network in Hawai'i.⁴ Three actionable insights emerged from the survey:

#1 - SCALE UP

Open Education Resources

The University of Guam - Pacific Islands Climate Science Center and the Maui Invasive Species Committee requested course curriculum for use in their respective GIS training programs. As Open Educational Resource courses, the curriculum developed through the grant, featuring the Articulate online modules, are available to download, enhance, and scale for other training purposes at SkillsCommons.org.²

Other Pathways

Adding GIS tools and techniques to other courses is one way to enrich student learning and show the diversity of ways this technology can be used. Stand alone GIS modules have been taught in the following programs at UHMC:

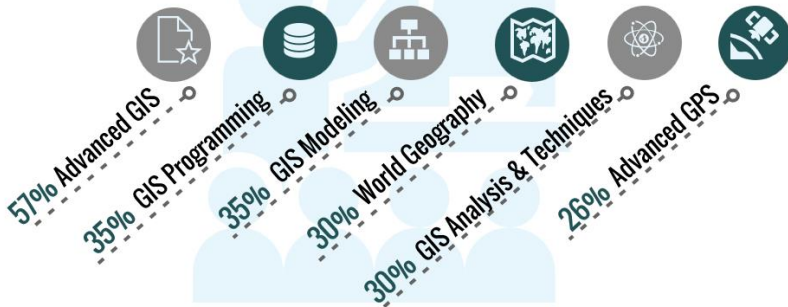
- Marine Options
- Environmental Health
- Upward Bound

Non-Credit Options

In the post-grant survey, employers indicated that they preferred training through non-credit classes (69%) over credited courses (44%).³ UHMC could develop these non-credit options through its Office of Continuing Education and Training.

#2 - EXPAND COURSES

% of Grads who want additional GIS training in:⁵



#3 - BUILD PARTNERSHIPS

ESRI

Continuing the relationship with ESRI is a value add to the college, saving money and time on direct software purchases. ESRI can also contribute data, IT support, and offer student networking opportunities. Building upon this relationship will also provide credibility in other GIS industry partnerships.

MEDB

Maui Economic Development Board's STEMWorks program teaches K-12 GIS programs statewide. These students will be ahead of the curve on GIS skills by the time they hit college. Updates and advanced courses in collaboration with partners like MEDB will be needed to keep these students engaged.

GOING FORWARD A Hawaii & Pacific GeoNetwork

The post-initiative survey of industry partners indicated that employers want to hear more about or partner on the following programs³:



Tech Meetups/Events
15 companies



Internships for STEM/GIS and Tech Students
12 companies



After School Tech Programs & Giving Back Network
10 companies



Innovative Conference Participation or TEDGeo Type of Event
10 companies



Targeted Training for Underrepresented Groups
9 companies

IMPROVING GEOTECH⁴ in Hawai'i & the Pacific:

Employers want:

- More curriculum linked to professional workflows
- To be able to demonstrate the value of GIS to upper management and employees
- A broader reach for GIS events and information
- Increased availability and quality of data available from State and County sources
- More networking events

REFERENCES

1. University of Hawaii, Maui College (2016). *GIS Program Report, 2016*. Retrieved from <http://maui.hawaii.edu/gis/report/>
2. University of Hawaii, Maui College (2016). GIS 150 and GIS 180 Curriculum. Retrieved from (GIS 150): <http://www.skillscommons.org/handle/taaccct/5368> and (GIS 180): <http://www.skillscommons.org/handle/taaccct/5494>
3. University of Hawaii, Maui College (2016). GIS Post Initiative Survey for GIS and Tech Industry, May 18, 2016.
4. This report is defining “Geotech” broadly as both geographic and technology industries which include GIS, Remote Sensing, UAVs, geo-spatial programming, geo-spatial visualization, cartography, surveying, and spatial app development.
5. University of Hawaii, Maui College (2014-2016). Weekly surveys for students in GIS 150 and GIS 180. Fall 2014 – Spring 2016 semesters.
6. Cover and footer photo: University of Hawaii, Manoa: School of Ocean and Earth Science and Technology, 2007. Maui Aerial Photography: Flight Line 20: Waihe’e Dunes Land Trust, North shore, West Maui. Retrieved from <http://www.soest.hawaii.edu/coasts/erosion/maui/aerials.php>

LOCAL RESOURCES LEVERAGED TO OUR PROGRAM BY THE FOLLOWING LOCAL COMPANIES:



FOR MORE INFORMATION ON THE CERTIFICATE OF COMPETENCE IN GIS IN ECOSYSTEM MANAGEMENT

GIS Initiative Website: <http://maui.hawaii.edu/gis/>

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