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INSIGHTS

RESEARCH AND INNOVATION



INSIDE:

BUILDING A NEW
ECONOMIC SECTOR

What is a RESEARCH & INNOVATION ECONOMY?



Research and innovation are very broad concepts, but they add up to a simple economic activity: creating new things and new ways of doing things. While science, engineering and technology are often associated with it, innovation can occur in any industry, from a new style that upends the fashion industry to a new breed of corn that can resist drought.

Building a research and innovation sector of the economy in Hawaii comes with its own challenges and opportunities.

"Hawaii's assets are its people," says Dr. Patrick K. Sullivan, CEO and founder of Oceanit, which he describes as a mind-to-market company that delivers technology and solutions in aerospace, energy, engineering, life sciences and information systems. Oceanit was recently awarded a patent for the Nanobes system, a targeted cancer treatment that decreases toxicity to patients while increasing its bioavailability. "With more confidence in the ability of its youth to innovate and

deliver, Hawaii can innovate in many sectors, for example, aerospace, energy or medical, because Hawaii does not suffer from 'technology group think', where everybody sees the world through an identical lens. We can think more openly about how to address problems."

Physical assets are also prominent, such as the Pacific Ocean for ocean sciences and Hawaii's highest peaks for astronomy. "Building up Hawaii's infrastructure – this includes high speed broadband, prototyping, etc. – would accelerate innovation," says Sullivan.

Sometimes the challenges and opportunities are two sides of the same coin. Our isolation and the great expense required to transport fossil fuels here means energy prices are the highest in the nation, increasing the cost of doing business and sapping capital from areas that would benefit from research and innovation, like education. However, with unmatched wind, wave, solar and geothermal resources, Hawaii's natural environment makes our state an ideal fit to develop renewable energy research and innovation.

Recognizing this, the state passed a law requiring 100 percent of electricity sales to come from renewable resources by

Building up Hawaii's infrastructure – this includes high speed broadband, prototyping, etc. – would accelerate innovation

2045, the most aggressive clean-energy goal the world has ever seen and one that is attracting public and private organizations and an unprecedented amount of research and economic activity.

Rather than confining Hawaii's entrepreneurial spirit to renewable energy, the state and local businesses and organiza-

tions are seeking ways to bring that same dynamic to other industries, hoping to build a new sector that can balance our dependence on tourism and the military.

The High Technology Development Corporation (HTDC), a state agency growing the tech and innovation economy, launched the 80/80 Initiative in the fall of 2015. By 2030, it aims to create 80,000 new tech and innovation jobs earning more than \$80,000 (in 2015 dollars).

"Our vision for Hawaii is to create not just jobs, but interesting jobs," says Robbie Melton, Executive Director and CEO of HTDC. "Our kids might go away to school, but they'll come home because there are really fascinating jobs that pay well."

The legislature has been supportive, funding three new programs to help support HTDC's vision. And while the government can help with funding, reducing red tape and providing other resources to support innovation, the private sector will be where the start-ups, accelerators, talent and ideas that drive innovation ultimately come from.

Neither side can do it alone. Both public sector leaders like Melton and private sector visionaries like Sullivan agree: it will take a community and an ecosystem to bring to life a research and innovation economy in Hawaii. ●

ENERGY PERFORMANCE CONTRACTING

Energy Performance Contracting (EPC) is an innovative financing technique that pays for energy upgrades with future cost savings.



The Energy Services Coalition (ESC) ranked Hawaii first in the nation in EPC with \$295.82 invested per capita.

APPROVED OVER
\$376M
CONTRACTS SIGNED

A total of over \$376M in performance contracts signed by state and local government agencies will save in excess of an estimated \$964M.

4,374
JOB YEARS CREATED

3,339,119M
BTUs ENERGY SAVED

Source: http://energy.hawaii.gov/wp-content/uploads/2014/12/DBEDT_2015ERC-Report_Nov2015.pdf

WHO'S WHO IN HAWAII RESEARCH AND INNOVATION?

HTDC htdc.org

A state agency established by the Hawaii State Legislature in 1983 to facilitate the development and growth of Hawaii's commercial high technology industry.

Blue Startups bluestartups.com

A technology accelerator that concentrates on helping scalable-technology companies, including Internet, software, mobile, gaming and e-commerce compete on a global scale.

DevLeague devleague.com

Hawaii's first web developer coding boot camp. It offers hands-on practical experience, providing students with highly valued real world web developing skills.

Hoana Medical hoana.com

A high-tech medical device developer revolutionizing patient care through the development of seamless and invisible sensing technology.

Oceanit oceanit.com

An engineering, science and research company employing teams of nanotechnologists, structural engineers and biochemists who reject old norms and create breakthroughs that move whole industries and communities forward by morphing its teams together and apart, and aligning the best experts in each discipline to solve some of the world's toughest problems.

Energy Exclerator energyexclerator.com

A start up program that offers an accelerated pathway to help innovation companies navigate markets in Hawaii and the Asia Pacific through funding and identifying strategic relationships in an ideal economic environment that catalyzes their long-term growth.



Expert Q&A

ROBERT HARRISON

HAWAII BUSINESS ROUNDTABLE



Robert Harrison
Chairman of the Hawaii
Business Roundtable

Robert Harrison, Chairman and Chief Executive Officer of First Hawaiian Bank, currently serves as Chairman of the Hawaii Business Roundtable (HBR). HBR is a statewide public policy organization made up of Hawaii CEOs and senior executives who lead businesses that account for more than \$25 billion in gross revenue in Hawaii and employ over 80,000 people. He shared with us HBR's perspective on the importance of growing a research and innovation sector here.

Q: WHY DO WE NEED A RESEARCH AND INNOVATION ECONOMY IN HAWAII?

RH: To keep our community vibrant and our economy expanding, we will need to focus on another sector, beyond the defense and visitor industries, that will bring new dollars to Hawaii's economy.

A research and innovation sector that fosters a research environment to fuel innovative ideas and promote entrepreneurship will position Hawaii well for future economic growth and expansion.

According to a state Department of Business, Economic Development and Tourism study, the sector generated an estimated \$9.4 billion GDP impact, accounting for 13.3 percent of total GDP in 2012. Including direct, indirect and induced impacts, the sector accounted for an estimated 13.8 percent of total jobs, 14.2 percent of labor earnings (\$5.4 billion) and 15.1 percent of total tax revenue (\$940 million). We need more of the new dollars, wide range of jobs and tax revenue that the research and innovation sector adds to the state's economy, so that our young people may continue to live and work in Hawaii and enjoy the quality of life that we all hope for them.

Q: WHAT IS NEEDED TO GROW THIS SECTOR HERE?

RH: One of the underlying keys to a research and innovation sector is having an excellent research university. Top research universities produce multiplier effects by attracting high-caliber talent and much-needed dollars benefitting the entire innovation community. A University of Hawaii Economic Research Organization (UHERO) study found that the \$2.32 billion of education-related expenditures attributable to the University of Hawaii (UH) generated \$3.61 billion in local business sales, \$1.10 billion in employee earnings, \$194 million in state tax revenues and over 28,500 jobs in Hawaii in fiscal year 2012.

With its temperate climate and geographical location, Hawaii is fortunate to have a natural laboratory that is unrivaled in the areas of renewable energy, astronomy, aerospace and ocean sciences. We also have a unique history of immigration that offers medical researchers valuable access to a culturally diverse ethnic population. UH has developed a worldwide reputation for its excellence in these areas and it is the core to the growth of our research and innovation economy.

Q: WHAT IS HBR DOING TO FOSTER A RESEARCH AND INNOVATION ECONOMY?

RH: HBR is one of many organizations recognizing that public and private partnerships and collaboration between business, labor, government and the community are needed to build an innovation economy.

We support UH and its efforts to create more high-quality jobs and diversify Hawaii's economy by leading the development of a \$1 billion innovation, research, education and training enterprise by 2025 that addresses the challenges and opportunities faced by Hawaii and the world.

HBR is working with the state, UH and the state Department of Education to create a workforce development plan that will provide our children with the education and skill sets needed to fill the diverse jobs of the future. We are convening a broad, community-based task force to determine the next steps in the development of an innovation economy.



Integrated Communities

RESEARCH, INNOVATION AND AGGLOMERATION

What do integrated communities have to do with research and innovation? As it turns out, when properly developed, the area around transit can lure the types of firms we need to get a research and innovation sector going. It all starts with integrated communities.

Integrated communities offer a mix of housing options, complete streets and close proximity to the basic necessities for work, shopping and entertainment. Complete streets make neighborhoods near a rail stop more friendly for people on foot and on bicycle. A mix of housing options ensure customers and a workforce for a variety of businesses. The increased quality of life and reduced time commuting – one of the major pain points for Honolulu's workers and their employers – benefit the economy and help attract a skilled workforce.

Easy access to work, a high quality of life and a skilled workforce: that's great for all residents and businesses. But when a certain level of density is achieved, it creates a powerful magnet for businesses in the research and innovation sector because of the effects of agglomeration.

Agglomeration is the natural clustering of certain types of businesses, many of which are likely to flourish and attract one another. A study on the economics of agglomeration by the Center for Transit-Oriented Development uncovered a positive association between knowledge-based industries and densely populated business areas in close proximity to a transit center. It found that knowledge-based industries compose 45 percent of jobs in transit zones with very high employment density.

An effect related to agglomeration is knowledge spillover. With closer proximity, information and knowledge transfers



intensify via the variety of transactions that can take place between firms, from formal business partnerships to semi-formal networking and informal socializing. Thanks to their flexibility and because they tend to face resource constraints, entrepreneurial start-ups in high-tech industries have the most to gain from the business advantages of agglomeration, including knowledge spillovers, collaboration and shared inputs on everything from office space to talent. It's been well-documented that

agglomeration was a key element in the tech industry booms in Silicon Valley, California, Route 128 in Boston, and in IT clusters in Denver and Houston.

The lesson for Honolulu is clear: firms in innovative industries are more likely to be attracted to transit-rich locations. With the thoughtful development of our transit zones, we can encourage agglomeration that favors innovation. Building integrated communities can mean building a research and innovation economy. ●



Contractor Profile

CHRIS BAZE

HAWAIIAN DREDGING CONSTRUCTION COMPANY

Hawaiian Dredging Construction Company's Building Information Modeling (BIM) Manager, Chris Baze, recently moved to an off-grid cabin in Mililani. Located on a horse ranch and powered entirely by solar and batteries he installed, the cabin's "endless do-it-yourself projects" keep him and his wife busy in their free time. He talked with us about Hawaiian Dredging's approach to innovation.

COMPANY:
Hawaiian Dredging Construction Company

GENERAL CONTRACTOR:
Building, Heavy (Civil), Waterfront and Foundations, Power and Industrial, Commercial

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"We're not just looking at BIM or laser scanning," says Chris, who's been with Hawaiian Dredging since 2009. "We're looking at how these different technologies can work together to improve our workflows."

BIM provides models of designs that don't yet exist; laser scanning provides data from existing structures. By combining the two, Chris and his team save time, money and a lot of headaches.

One example is Hawaiian Dredging's gut and conversion of Edmondson Hall at UH Manoa into a lab space. Because it required air lines, gas lines and many other utilities to be crammed in, every millimeter mattered.

But Edmondson Hall was hiding a trap. "Evidently in the original construction of the building, they had a formwork breakage for one of their pours," Chris reports. "They had engineered a solution where they put in a beam and moved the column about three feet, but that wasn't reflected on any of the as-built plans." Fortunately, his team caught the discrepancy early.

But it's a predicament all too common in the design process for renovations. "You've got a design-bid-build job where the designer had to make some assumptions because he couldn't really see what was going on, the contractor wins the job, they demo, they go to complete their work

and there's a lot of unforeseen problems," says Chris.

Chris' team avoids the issue by laser scanning a building after the soft demo. The point cloud of real-world data produced by a laser scanner can be overlaid directly in an architect's CAD files to find any difference between the actual space and the projected design before work starts. "It becomes immediately apparent that the point cloud is showing the column in one place and the plans are showing it in another place," he says.

Failure to catch that problem would have been catastrophic for the project. "Not only do you have a man-hour problem; you're going to install lab equipment and realize it doesn't fit. Now you have material that has to be adjusted, you might have to scrap things that had already been purchased, it could easily turn into weeks' worth of delays and material reorders, especially in renovation where you're stuck with the existing structure that's already there."

Instead of facing those potentially massive costs, Chris' team did three scans on each of Edmondson Hall's four floors. What did this innovative solution require? A single person scanning for half a day. ●

Afterword

JOHN WHITE
EXECUTIVE DIRECTOR, PRP



MAKING THE MOST OF OUR INVESTMENT IN RAIL

The fundamental value of rail is in transit – that is, connecting places. The vast majority of those connections are between home and work. Nationally, 59 percent of all transit trips taken are to or from work. In Hawaii, the potential value of rail is dramatically increased because, unlike most cities where less than 20 percent of jobs are connected by rail, Honolulu's rail system will connect 41 percent of jobs (57 percent including envisioned extensions). That's why rail was a smart investment in the first place.

To capture and enhance that value, we can develop the area around rail stations into a catalyst for good jobs thanks to the effects of agglomeration. Polling indicates that one of Hawaii's biggest concerns is a lack of well-paying jobs. When accompanied by integrated communities, rail can address this concern by playing a central role in fostering a research and innovation sector.

The opportunity to realize the full value of rail – not just connecting places, but creating the conditions that favor innovation and the many jobs and other economic benefits it brings – is ours for the taking. Will we seize it?

If we bow down to political pessimism regarding rail, we're in danger of wasting this chance. Unfounded fears about rail being a go-no-where investment can become self-fulfilling if they cause us to give up on our best options, to forego development that would make rail the success we envisioned when we embarked on this journey. Let's move rail ahead with optimism and use this once-in-a-generation chance to build a better Hawaii for residents, workers and the innovative economy we want to have here.



Learn more about Integrated Communities

We'd like to visit your office, trade association or other group to share a short, powerful presentation by John White about integrated communities and their importance for the future of Hawaii. Please email Cheryl Walthall at cwalthall@prp-hawaii.com for more information or to schedule a visit.



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