Made in Oregon:
The Future of Manufacturing

For the Oregon Business Council
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Since 2000, Oregon has lost more than 25,000 manufacturing jobs. The protracted nature of the current employment decline and the well-reported examples of out-sourcing of many jobs previously done in the US have accelerated concerns about our economic future. It's clear that the changes we're experiencing mean that we're not about to return to business as usual.

This white paper outlines Oregon's stake in manufacturing, reviews some of the overall trends in manufacturing in Oregon, offers key findings about the future of manufacturing and makes a series of recommendations about what Oregon can do to secure its economic future.

What is the future of manufacturing in Oregon? Some are prepared to say that we are entering into a post-industrial era, that making things will be of ever lesser economic importance and that we'll all shift to services. Is manufacturing an anachronism in an information and service economy, or will manufacturing continue to play a central role in shaping our state's prosperity? Manufacturing's role in the economy continues to be important, but Oregon's place in the increasingly global chain of manufacturing is changing. Despite the challenges manufacturing faces and the likelihood of job losses in some sectors, manufacturing remains a neglected, and under-appreciated asset that can be of great value to Oregon's future, if we take the right actions to realize its potential.

Our analysis, based on interviews with leading Oregon firms and an analysis of state and national data, shows that some of the common images are at odds with the economic realities.

The image—manufacturing is dying. The reality, manufacturing is changing, and it has always been changing. Our success depends on our ability to master the highest value parts of the manufacturing chain.

The image—foreign competition is killing Oregon jobs. The reality—many Oregon firms are competing successfully at the top of the global food chain. The ability to develop and execute successful global production and marketing strategies is the key to economic success.

The image—Oregon's manufacturing companies are doing worse than the nation. The reality--Oregon manufacturers are outperforming their competitors nationally in this recession. The reason that Oregon has high unemployment is due to a decline in the particular mix of companies that we have in the state.

The image—manufacturing is dumb, repetitive, low-paying work. The reality—the parts of manufacturing that we're doing well in tend to be well paid, and are increasingly dependent on our ability to quickly and efficiently produce innovative new products. Average manufacturing wages are more than a third higher than the state average wage, and are highest in globally traded industries like high technology and sports apparel.

The image—manufacturing jobs are going away and they won't come back. The reality—a lot of low wage jobs in manufacturing will never come back. But the opportunity exists to maintain and create many well-paid jobs in research, development, design, engineering, management and logistics—if we are a desirable place for knowledge-based industries and workers.

We're in the midst of sweeping, tumultuous change in the economy, and nowhere, it seems, is this change more apparent than in the tectonic shifts in the manufacturing sector of the economy. Manufacturing has been a decisive force in driving Oregon's economy forward during the 1990s, and been a primary cause of growth faltering in the past two years. Manufacturing has seen the most dramatic technological changes, but also faces the greatest challenges from globalization.

The difficult challenge is that the future of manufacturing won't be more of the same of what we've experienced in the past. The future of manufacturing will be new and different, in ways we can't fully predict. The future of manufacturing will involve not just new technologies and new products, but new firms and in some cases whole new industries. Consequently, our ability to be successful depends on creating new ideas, through research and innovation, and also on creating new businesses to translate those ideas into products—and jobs. If we do these things well, there can be a strong future for manufacturing in Oregon. If we don't we may be condemned to a more tenuous economic existence.

What will Oregon do to lay the foundations for the future of its manufacturing based economy? The answer to this question has critical implications for Oregon's economic well-being, and should serve as a guidepost for any thoughtful economic development strategy. Because of the stakes involved, a group of leading manufacturing firms, members of the Oregon Business Council, met to pool their knowledge and insight about trends in their firms and industries and address the question of the future of manufacturing in Oregon.

According to these manufacturing firms, Oregon manufacturers are doing well today and with the appropriate steps we can achieve a vision where manufacturing creates high wage jobs and supports the rest of the economy and public services. However, our conversations with the manufacturers also revealed that Oregon does not create a climate where this kind of activity can flourish. It is not just one issue - the manufacturers are concerned about the regulatory environment, business costs (energy, health care), workforce preparation, technology transfer and R&D. The good news is that these challenges are solvable, but to do so will require a different relationship between the broader community and Oregon manufacturers.

First and foremost, we need to recognize that manufacturing currently plays and will continue to play a critical role in Oregon's future. This depends on nurturing existing firms and promoting a climate where new firms (start-ups and recruited firms) can thrive. We offer several broad recommendations to guide our state in this regard:

--Encourage Innovation. New ideas for products and processes are the well-spring of economic prosperity. We need to encourage Oregon firms to develop these ideas, and support other institutions, like research universities, that buttress knowledge creation.

--Promote Entrepreneurship. New ideas, new companies, new investment all require entrepreneurs—individuals with who will take risk and create economic activity. We need to strengthen Oregon's tax system to incentivize entrepreneurs and work to strengthen the availability of venture capital.

--Support Global Strategies. All manufacturing firms compete in a global market. It's critical we acknowledge this basic fact and celebrate—and support—those firms working to develop global production and marketing strategies. Global competence is the key to success for Oregon based firms.

--Nurture, Attract and Retain Talent. Increasingly our manufacturing firms depend on getting the most talented people in the world to work for them. We need to support their efforts, both by strengthening local advanced education, and also by assuring Oregon continues to be a location of choice for the world's most talented workers.

--Develop Our Industry Clusters. Our best opportunities lie in clusters, ranging from traditional industries like forest products and food processing, to transportation equipment, electronics, and sporting goods and apparel. State leaders and local economic development efforts need to make the needs of industry clusters their highest priority.

--Enable Continuous Learning. Within manufacturing, all workers need higher levels of skill both to master steadily improving technology and to become more productive. We need to support both private, employer-led efforts to improve skills, and also maintain the infrastructure for basic and continuing education to continually upgrade worker skills.

--Maintain a Cost Competitive Environment. While Oregon cannot be the lowest cost location in a global setting, it must be cost competitive with other locations in the U.S.

I. Oregon Depends on Manufacturing

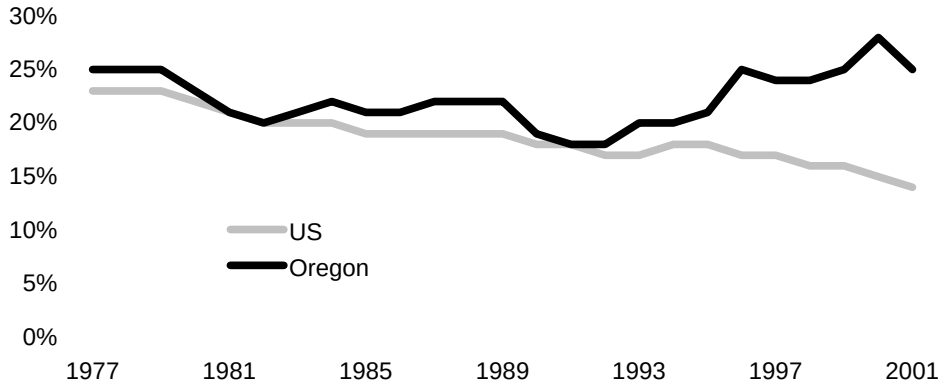
More than most states, and more than the nation as a whole, Oregon has continued to be a place where manufacturing has been a bulwark of the economy. Consider

- Oregon is an important national center for manufacturing, accounting for more than 10% of national semiconductor production, and significant amounts of metals, machinery and transportation equipment. Portland's manufacturing base is larger than many traditional industrial cities, like Pittsburgh, Baltimore, Cincinnati and Kansas City.

- In the 1990s, manufacturing employment in six primary manufacturing sectors (high tech, wood products, metals, transportation equipment, food processing and paper) grew almost 50 percent faster in Oregon than the rest of the nation—1.6 percent per year in Oregon vs. 1.1 percent nationally.

- Manufacturing job growth during the 1990s was a far bigger part of Oregon's economic expansion than elsewhere: manufacturing directly accounted for 8.6% of all new jobs in Oregon, as opposed to 3.6% of all new jobs nationally.

Manufacturing Percent of GDP



Source: Bureau of Economic Analysis

- And critically, while manufacturing has declined in importance as measured by its contribution to the gross domestic product (GDP) from 23 percent of GDP in 1977 to only 14 percent of GDP today, manufacturing continues to account for one-fourth of Oregon's GSP (gross state product), the same level it did almost 25 years ago.

- By 2000, manufacturing employment was about one-third more important to Oregon's economy than to the nation as a whole, accounting for 12.8 percent of Oregon's jobs, compared to about 9.2% of US jobs.

- Manufacturing jobs also generally pay higher wages than other sectors of the economy. Average manufacturing wages in Oregon in 20002 were $44,000, one third higher than the statewide average private sector wage of $32,750.

One of the defining characteristics of the Oregon economy has been (and continues to be) the fact that manufacturing activity represents a greater share of our economy than it does the nation as a whole. This was historically the case when we were dominated by natural resource industries, like wood products and food processing, and continues to be true now that Oregon has also developed strong concentrations of firms in high technology, metals, transportation equipment and other diverse sectors of the economy. Manufacturing accounts for more than 200,000 jobs in the Oregon economy. The principal components of the manufacturing sector, and their 2002 annual average employment levels were as follows:

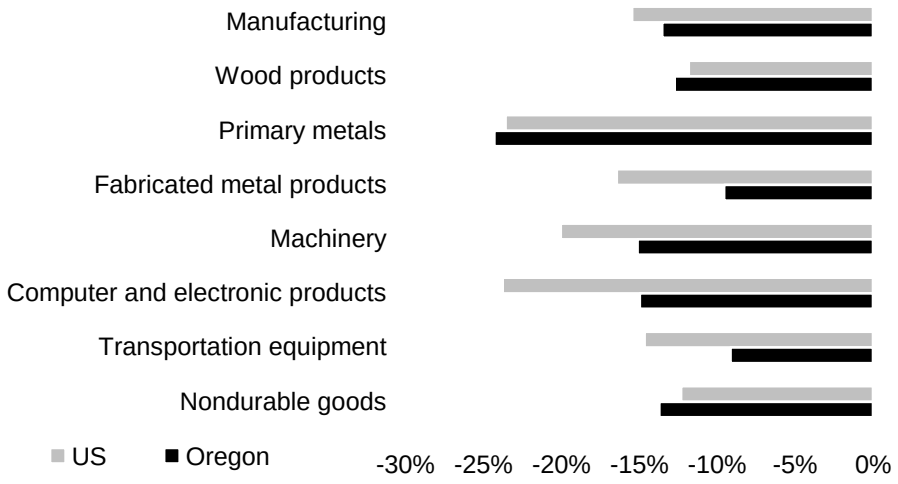
Oregon Manufacturing Employment, Annual Average 2002

Total Manufacturing	201,800
Durable goods	149,100
Computer and electronic product manufacturing	43,800
Wood product manufacturing	32,700
Fabricated metal product manufacturing	15,300
Transportation equipment manufacturing	15,000
Machinery manufacturing	11,900
Primary metal manufacturing	8,700
Nondurable goods	52,700
Food manufacturing	22,100
Printing and related support activities	8,100
Paper manufacturing	7,000
Plastics and rubber products manufacturing	6,300

Oregon is also considerably more dependent than the nation as a whole on the production of durable goods—those products that last a year or more. The durable goods sector is notable for a number of reasons. Demand for durable goods—long lived assets like trucks and motor homes, construction materials made of wood, and integrated circuits—is more cyclical than other parts of the economy. In addition, these kinds of traded goods are ones that are susceptible to global competition, and as the world economy has grown more integrated, US firms in these industries have faced competition from firms in other nations.

Oregon is outperforming the US in many key manufacturing industries. Over the economic cycle of the last three years, Oregon manufacturers have performed about the same as their national counterparts in many sectors (wood, primary metals), and done significantly better in others (electronics, machinery, transportation

Oregon Manufacturing Decline Generally Less than US
Job Losses in Manufacturing: July 2000 to July 2003



equipment). While national employment in electronics manufacturing is down 25 percent in the past three years, Oregon's employment is down only 15 percent—suggesting that Oregon firms have done a better job of weathering these economic hard times than their counterparts nationally.

Our dependence on manufacturing, and in particular, on the production of durable goods, means that Oregon has a strong stake in the future of manufacturing.

II. The Evolution of Manufacturing

Economies don't stand still—and Oregon's never has. The process of development has always been one Austrian economist Joseph Schumpeter called "creative destruction." Even in traditional industries, like lumber and wood products, that we think of as stable, and unchanging, there is in fact constant change and progress. Long gone are donkey engines, log rafts, and wigwam burners. Our objective is to understand the processes of economic change, and to be able to discern which paths lead forward, and which ones lead only to economic dead ends.

As the economy continues to evolve, we think that there are several factors that represent major challenges and opportunities for the future of manufacturing in Oregon.

Technological Change: It's difficult to fully appreciate the scale of technological change we've experienced in the past twenty years. In 1980, there were essentially no personal computers, a handful of fax machines and cell phones, and the Internet was a crude scientific experiment. Today, they are the commonplace tools of business—and life—in the developed world, and are fueling growth in developing countries as well. There's little reason to believe that technological progress will come to an abrupt end or slow dramatically in the next two decades. Future economic growth (and business opportunities) are likely to stem from extending these and other technologies in ways we can only dimly foresee.

Policy and Cost Issues: One of the core facts of life in the global economy is that the US is no longer the cheapest place to do business. Wage rates in the US are 10 times higher (or more) than in less developed nations like China. In addition, taxes and indirect costs tend to be much higher in the US. US firms generally have to provide health insurance for their workers. The tax policies of many countries also encourage exports—levying a value-added tax on all consumption (including imports) and rebating the tax to producers who export their products).

Innovation: Technological change doesn't just happen, of course. It is the product of the conscious efforts, particularly those of private sector firms, to create and develop new ideas. The new ideas can range from a new design for a chip, to a new design for an athletic shoe or rail car, to slightly better ways to manufacture things, or better branding or marketing. Patent data suggest that Oregon has become a more innovative place in the past decade.

Diversity of Consumption: The demand for most manufactured goods is becoming increasingly diverse. Rising incomes and more varied lifestyles create market niches for customized products. Computerized product design, flexible manufacturing technology, and sophisticated information technology enable firms to produce a wider variety of products economically. Shorter product life cycles, more frequent redesigns of products and continually improving technology put a premium on manufacturers abilities to understand the market and to act and react quickly. These long term trends, somewhat obscured by the recent recession, are likely to continue and even accelerate in the future. Growing incomes in the developed world, and the continued very rapid growth of incomes in newly industrializing countries will create expanding markets for innovative high quality products from a variety of industries.

New Channels to Market: The way in which manufacturers distribute and sell their products to end customers has changed dramatically in many industries in the past couple of decades. The value chain involved in transforming raw materials into the end products that businesses and consumers buy and use has become considerably more complex in the past several decades. In some industries, like wood products and food processing, there has been tremendous consolidation of retailing and distribution (with the emergence of big box stores, WalMarts, and the merger of national grocery chains). In other market segments, there has been an emergence of new ways to reach particular customer groups—boutique and specialty stores, expanded catalog sales, and the Internet. The shifting channels of distribution pose new challenges and opportunities for manufacturers to successfully sell their products.

We used to think of recessions as temporary departures from business as usual, a short period in which demand fell short of supply. But the current recession is not something that will end and return us to the same economy—and same jobs—that existed before the recession. All of these unfolding factors—technological change, income growth and attendant demand for quality and variety, and the emergence of new channels to market, coupled, as we will see, with globalization—means that the economy of the future will be different than the one of the past. And this means that the number and kinds of jobs will be different, too.

III. The Challenge--and Opportunity--of Globalization

An issue that seems to be on everyone's minds is the challenge of globalization. The emergence of a global economy has greatly changed the playing field for Oregon companies. Liberalization of trade has greatly expanded the list of global competitors. U.S. firms, including those in Oregon, face robust competitors all across the spectrum, from European firms that are as technologically advanced as U.S. firms, to Asian tiger countries (Taiwan, Korea, Singapore) that have matured considerably in their competence, to low cost producers with abundant labor, like China and India. The result of this competition is apparent throughout the US economy—Boeing struggles to compete against Airbus in an industry once dominated by the US, small American metals manufacturers see much of their traditional business bid away by Asian competitors, and routine work in everything from electronics assembly, to software, to tax preparation is growing in China and India.

Globalization of markets is an accomplished fact, one that Oregon businesses must deal with to survive. It is to our advantage if Oregon firms are adept and aggressive at developing the ability to compete globally. The good news is we've been successful, and our firms are healthier and Oregon is better off as a result. Today, many of our largest firms get a majority of our sales from outside the US. Tektronix, HP, Intel, Nike, just to name four, all get a majority of their sales outside the US market.

To tap these markets, we've had to pursue global strategies. Part of any firm's global strategy is global production, driven by two main factors—market access and production cost issues. In most industries, the only feasible way to serve global markets is to have global production, with many facilities geared to producing for nearby markets. In addition, particularly in Asia and China, global production affords some real cost advantages. And if Oregon firms don't tap these lost cost production areas, our competitors surely will, and we'll all be the losers.

Almost without exception, the kinds of products that are moving to offshore production are the routine, the lower value and cost sensitive parts of our product lines. They're the kinds of things we just can't do economically in the US anymore—and if we tried, we'd lose money and soon go out of business.

The good news is that while the lower end functions are moving offshore; the high end functions are staying, and in many cases becoming more concentrated here, in Oregon. In the past year,

several firms with far-flung operations have consolidated their activities here. Freightliner has relocated production of its Western Star line from Kelowna, British Columbia to Portland. LSI Logic has consolidated its production at its Gresham wafer fab. Increasingly, our Oregon workers are doing the lion's share of the high end tasks—research, development, product design and testing, marketing, logistics, finance and other high end functions—that demand the highest skills and pay the highest wages.

Our ability to compete globally means that there are more such jobs in Oregon that there would be if we could only sell into the US market. Tapping the global market is our opportunity, being smart enough to compete at the high end of the market is our challenge.

There's been a lot of talk lately about manufacturing dying in the US, and by implication in Oregon. Manufacturing isn't dying, but it is changing. Among our established firms, we don't expect big job growth in Oregon when the economy rebounds. But the jobs that remain in manufacturing can continue to be very good jobs, if Oregon companies pursue the right strategies, and if we provide an environment where they can succeed.

IV. Competing at the High End of the Market

The best opportunities for growing Oregon's manufacturing economy will come from innovation: ideas for new and better products, and more efficient and clever manufacturing processes.

Over the past several months, we've held in depth discussions with more than a dozen of Oregon's leading manufacturing firms in industries from forest products to metals, to transportation equipment, high technology and apparel. We've heard a consistent set of themes.

The bottom line is that success in manufacturing in Oregon is about being smarter. We have to be more innovative. We have to produce better designs and do it more quickly than our competition to stay ahead.

While higher volume, labor intensive, cost-sensitive routine production is vulnerable to low cost competition from newly industrializing nations, not all manufacturing will go overseas. Oregon firms keep vital core technologies close to home. Companies like Nike and Precision Castparts will continue to keep proprietary work and processes in Oregon to protect intellectual property. Hewlett Packard, ESCO and others report that cutting edge design can often only take place in a "sandbox" facility, where engineers can test their new ideas. And products that demand quick turnarounds or frequent changes, like custom circuit boards designed by Merix or specialized instruments made by Tektronix will advantageously be done here.

The profitable, high margin niches are in areas that demand speed, precision and originality, for example, prototyping the latest and most sophisticated high tech products while they're still in the design and early manufacturing stages

Smart firms need smart workers, and that shows up throughout manufacturing. Most importantly, in industry after industry, the occupational mix of the labor force is changing: every firm that manufactures something has a larger fraction of its workforce in designers, engineers, managers and other professionals that contribute knowledge, expertise and ideas to the enterprise.

Recruit talented people, where Oregon's quality of life is a decisive advantage, despite the fact that housing costs are higher and traffic congestion is worse than a decade ago.

Even among front-line workers, skill requirements are changing and increasing. Welders need not only to weld, but to be proficient in working with computer aided design and the management information systems used to drive the lean manufacturing process.

To many, manufacturing conjures up images of mindlessly producing the same widget, day after day, year after year, with little skill or imagination. But that kind of routine large volume manufacturing is largely a thing of the past. Most Oregon firms have been pushed by their competitors to be more nimble and innovative to survive.

Oregon manufacturers have responded in a variety of ways. They've developed proprietary products, production processes and designs. Oregon ideas have a profound worldwide reach—any video signal you see anywhere in the world was tested and adjusted by a Tektronix instrument, any Nike shoe you see was designed in Oregon, the most advanced Intel processors are engineered and produced in Oregon. Critical titanium parts in most of the jet engines powering commercial airliners were cast in Oregon by Precision Castparts. Innovation is the hallmark of lesser known firms, too. Leatherman Tool has developed a wide range of products designed to fit every market niche, including 4000 different product/package combinations for its distinctive folding tools. The cutting edge of the world's most efficient construction and mining tools are supplied by Oregon's ESCO.

Competing at the high end of the market requires a range of inter-related strategies. When one looks at the best Oregon manufacturers, one finds the following:

- We've built strong brands and reputations for quality in the minds of global consumers. Intel, for example, is the best known brand name in China.

- We've automated our production processes to make ourselves as efficient and responsive as possible.

- We've developed lean and flexible manufacturing systems that allow us to produce a variety of different products, to change production quickly to respond to market demand, and to quickly retool to produce new and better designs

- We've established ourselves as technology leaders in key fields, doing the most difficult and advanced work here in Oregon.

Our analysis of the Oregon economy shows that we will be successful in competing at the high end of the market, not in every kind of manufacturing endeavor, but most likely, in those fields in which we have a strong, established base of knowledge and activity. Oregon's particular strengths fall into a series of industry clusters—high technology, metals/machinery/ transportation equipment, sporting goods and apparel, food processing, wood products and some professional and creative services.

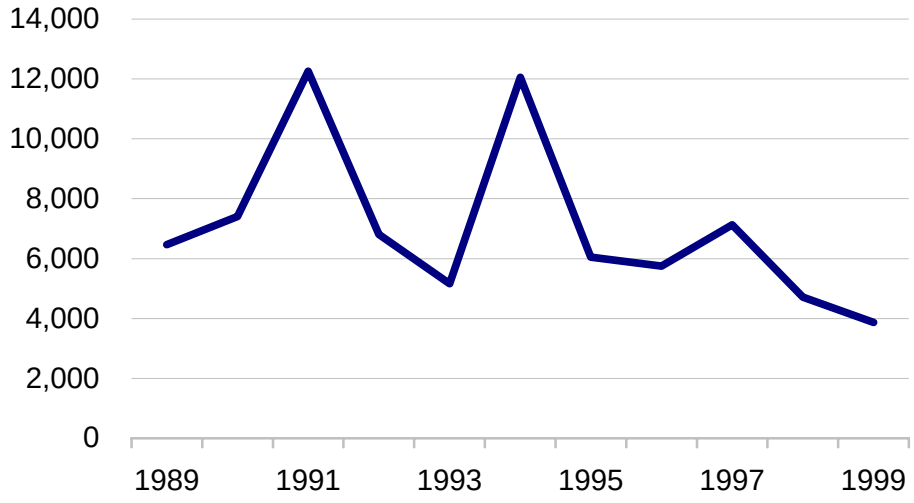
V. Entrepreneurship is Key

Because the economy doesn't stand still, we have to embrace change. A critical agent of change in the economy is the creation and growth of new firms. This is as true in manufacturing as it is in any sector of the economy.

Entrepreneurship will play a key role in creating the future of manufacturing. While existing manufacturing firms may not add many jobs, growth can still come from new firms with new ideas. Our interviews revealed that most Oregon manufacturing firms were in Oregon not because they chose this as the best possible location, but chiefly because they were started here, often decades ago. Once established in a particular location, firms don't tend to move. Consequently, encouraging entrepreneurship and new firm formation, and creating a supportive environment for the growth of such firms is critical to our economic future.

Oregon's recent performance in creating new jobs from the creation of new manufacturing businesses has ebbed in the past few years. The latest data from the US Small Business Administration shows a decline in manufacturing jobs from new firms. A key challenge will be reversing this decline.

Number of New Jobs in Manufacturing Start-Ups



Source: Small Business Administration

VI. Recommendations

If Oregon is to establish itself as a place that competes successfully at the growing high end of the global marketplace, it will have to do a number of things well. We offer the following recommendations.

--**Encourage Innovation.** The wellspring of our future economic prosperity is the continuing ability of Oregon businesses to create valuable new ideas. *As a state, we need to promote research and development activities of Oregon businesses*. We can do this in a variety of ways—through tax policies that recognize the value of research and development spending, to investments in related aspects of our education system that undertake industry-relevant research and training new talent

The state can also do a better job of connecting the research talents of its universities to the production capabilities of its businesses. Programs like ETIC—the Engineering Technology Industry Council—that foster stronger ties between business leaders and academic researchers are important and should be expanded.

--**Promote Entrepreneurship**. New growth and new jobs come from new firms. And new firms in Oregon, as elsewhere, are started not by strangers from far away, but by local residents, already rooted in the community. *The state needs to encourage and support citizens who want to start new businesses*. We can no more imagine what these businesses will be today, than the leaders of the state in the 1960s could have imagined that the state's only Fortune 500 company would be selling the world's best known brand of shoes and apparel.

The state can help provide incentives for new firm formation in a variety of ways—reducing the taxation of capital gains from entrepreneurial businesses, working to expand the supply of venture capital in Oregon and continuing to work to minimize the regulatory burden on all businesses, particularly start-up enterprises.

--**Support Global Strategies**: *We need to encourage Oregonians and Oregon businesses to think globally and to go global*. Embracing a more global view includes everything from cultural links, to transportation (particularly by air), receptiveness to trade, a positive outward look to the rest of the world and to companies that are pioneering our links to it.

Expanding our trade and our connections with the rest of the world doesn't weaken us—it strengthens Oregon's economy. We need to celebrate the often un-acknowledged progress (and prosperity) that

has come from the success that Oregon-based businesses have achieved in the global marketplace. The better job our businesses and citizens do of becoming savvy about the rest of the world, the better able we will be to compete successfully.

--**Nurture, attract and retain talent**. In a global, knowledge-based economy, companies succeed by hiring the very best people in the world. One of Oregon's hidden assets has been the pool of knowledge workers who have come to Oregon, and the attractiveness of Oregon as a place for to recruit knowledge workers. The common notion that new knowledge workers "take" jobs from Oregonians misses the point that their contribution of ideas to the Oregon economy makes this a healthier, more robust place.

We need to continue to invest in education at all levels in Oregon, from K-12 through our university system. The state's education reform plan has made some real progress in raising student achievement. There are many opportunities to re-focus parts of the state's higher education on research and skill development that would be directly relevant to Oregon business.

--**Develop industry clusters.** Oregon's manufacturing sector is not composed of a random assortment of businesses. We have particular world class strengths in a number of industry clusters. State policy and economic development efforts should focus heavily on the competitiveness and continued development of these clusters. *State and local development efforts should identify competitiveness issues affecting clusters*—including worker skills, technology, market issues, costs and regulations—work to address these issues.

In short, *we have to develop an environment where public sector leaders are persistently attentive to assuring a competitive environment for the states key industry clusters*. There is a key role for the Governor and the Oregon Economic and Community Development Department to play in leading this effort statewide. But working with locally and regionally relevant industry clusters should be a priority for city and county economic developers, city councilors and county commissioners, and every public leader with an interest in the state's economy.

--**Enable Continuous Learning**. Sadly, many of our ideas and institutions are a reflection of an older conception of the manufacturing economy, one where workers were expected to learn by rote, and repeat the same tasks, mindlessly, day after day, year after year. We assume that learning is done when a student receives a high school diploma, a community college certificate or a university degree. We have an unemployment system based on a 1930s era

notion that layoffs are temporary demand shortages, and that workers will be rehired to their old jobs when the downturn is over.

--**Maintain a cost-competitive environment.** While Oregon cannot be a low cost location for low skill, low value operations, it does need to be cost competitive with other locations that support high skill and high value activities. *Oregon needs to aggressively monitor the competitive impact on business costs of its tax system, workers compensation rate structure, and other issues like healthcare costs, government regulation, and tort liability costs*. If Oregon costs are out of line with costs in other states, it puts Oregon firms at a competitive disadvantage.

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