The State of Colorado's Talent Development:

Competing in the 21st Century Economy

Prepared for:

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Visit e-colorado.org and www.state.co.us/owd for the Data Compendium for this report including all charts and tables collected during research for this report.

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Table of Contents

INTRODUCTION

The nation stands at a critical point in its history based on the competitive challenges facing the American economy and the country's ability to retain our current standard of living in the face of rapidly increasing global competitive pressures. Economic and workforce leaders across the nation point to an appropriately skilled workforce as the single most important differential in developing, recruiting and retaining leading and emerging businesses. The Colorado Workforce Development Council and the Workforce and Economic Information Coalition that sponsored this report believe that talent development is the single most critical driver in determining Colorado's future global competitiveness and standard of living. Infrastructure funding and investment strategy are also important, but they will flow to the economies and regions with the best and most productive workforce. This report and the associated Data Compendium are intended to illustrate how workforce and human capital have evolved from their previous "commodity" status to becoming the pivotal element in determining Colorado's 21st century economic vitality.

Additionally, Colorado's Governor has issued a clarion call in his Colorado Promise to invest in Colorado's statewide and regional economic development and job growth, education and healthcare, and improved information and data collection. This report seeks to respond to that call and to provide additional insight into where we stand on several key skills training and education issues. Colorado is a leader, its economy is strong and many of these strengths are outlined throughout this report. Likewise, the impact of the global economy and the never-ending changes it brings presents the state with several opportunities at an important point in America's history.

The simple reality facing the state is that the rules of economic competition among states and countries have changed drastically during the last two decades in ways that policymakers and business leaders are only beginning to fathom. The basic grounds of competition have changed from geographic location, natural resources and access to financial capital to the new competitive asset - human capital. As a result, the nature of work is changing and increasingly complex skills are required in most if not all industry sectors. It is only those states and regions that understand this change and fundamentally modify their human capital investment priorities that will thrive in this ever-changing economy.

The role of the state's P-20[1] talent development system is to prepare a workforce with the solid foundation of critical thinking, interpersonal and technical skills

[1] P-20 refers to the range of education and training activities starting with pre-kindergarten up through higher education and graduate school, including adult education for existing employees.

necessary to meet the rising global competition. The topics and themes in this report are designed to bring into focus the status of the state's workforce and to identify some of the key forces that will shape the workforce of Colorado's future. One important factor that should be recognized at the outset is the fact that a majority of the workforce for the next 15 years is currently working in the economy. As a result, there is an urgent need to create public/private partnerships to increase the existing skills of our current workforce.

The role of talent developers is to prepare a workforce with a solid foundation of critical thinking, interpersonal, and science, technology, engineering, and math (STEM) skills that will allow them to creatively adapt to all the disparate forces moving and shaping the worlds economy. The topics and themes in this report are designed to bring the talent development conversation into focus.

To better understand the strengths and weaknesses of Colorado's workforce in light of the globalizing economy, six factors have been distilled that are essential to continue the powerful performance of Colorado's economy. While there is good news in the economy, there are several challenges facing the state. Meeting and overcoming these challenges will depend on the state's talent development strategy. The major findings of this report are:

1. **The economy is strong and diverse**. Colorado has a strong economy in which there are very significant workforce opportunities and needs ranging from hospitality and tourism to health care to energy to high-tech employment. The economy is strong and growing, and there are ample opportunities across a wide spectrum of industries.
2. **Information technology jobs remain an important enabler across Colorado's economy**. While the dot.com bubble busted several years ago, information technology related positions continue to thrive across the economy. These occupations are not specific to any one industry and are "enabling" occupations that span across all industries to help improve productivity, efficiency, and quality.
3. **Developing a gold collar and STEM-ready workforce is essential to sustaining Colorado's strong economy**. Colorado is a leader in the high-technology economy. Continued strength in this area will be dependent on the state's ability to grow and maintain a "gold collar" workforce ranging from technicians to those with advanced degrees in science, technology, engineering, and math. Many industries will require the growth of individuals able to fill gold collar jobs ranging from energy to nanotechnology and including many others such as health care.
4. **Traditional business skills remain a critically important component of the economy**. As the economy has become more and more specialized during the last decade, Colorado has seen the increased importance and

growth of many traditional industries such as logistics, healthcare, education, tourism and a growing collection of business support services that are heavily dependent on employees with a strong set of "business skills"—teamwork, complex problem solving, customer management, cross-cultural (global) spoken and written communications, and continuous improvement and innovation skills.

5. **The graying of Colorado's workforce will provide workforce and service based challenges**. The graying of Colorado's population over the coming two decades will be a tsunami-like demographic force that will not only create a large retiree-replacement workforce demand, but the growth of the 65+ population from 400,000 to 1.2 million in 2030 will generate a high-potential economic driver for the state's economy—but only if the state can provide (and staff) the required services; and

6. **The Colorado Paradox remains one of the state's greatest challenges to long-term health and prosperity**. The Colorado Paradox is the state's documented challenge of a highly educated (and imported) adult workforce offset by poor high school graduation rates and low levels of post-secondary graduates. The Colorado Promise can help address these challenges. Weaving together the potential of the Colorado Promise with the underlying issues of the Colorado Paradox will require a new set of priorities for the entire P-20 education and workforce training system, for not only does the future economy need a larger and more skilled workforce pipeline coming out of high school (a central focus of The Colorado Promise), but the current and immediate-term economy needs the adult talent development system to provide many more current adult employees with a much stronger set of post-secondary "hard" as well as "soft" skills. This is particularly true given the fact that most of the workforce of 2020 is already working.

About the Data Compendium: This report provides a summary of major issues that emerged in the course of our research. The Colorado Workforce and Economic Information Coalition and the Corporation for a Skilled Workforce combined to create over fifty charts and tables to study the state across the broad prisms of workforce demand, workforce supply, the emerging workforce, socio-economic indicators, and quality of life. The full Data Compendium is available on-line at e-colorado.org and www.state.co.us/owd for the use by our partners and stakeholders in producing additional research and analysis.

MAJOR FINDINGS

The economy is strong and diverse

As illustrated by the employment table, the good news is that over the past two decades the state has built a strong technology-based economy on its historical foundation of agriculture, resource extraction, and tourism. By many measures, Colorado will continue to grow strong based on a diverse set of industries.

The high-tech economy is strong in Colorado. In the recently released State New Economy Index,[2] Colorado ranked ninth overall, including top ten rankings in Workforce Education (2nd), Entrepreneurial Activity (2nd), Patents (2nd), Initial Public Offerings (IPOs) (2nd), High-Tech Jobs (3rd), Venture Capital (4th), IT Professionals (6th), Gazelle Jobs[3] (8th), Fastest Growing Firms, (8th), Online Population (9th), and Scientists and Engineers (10th), These indicators suggest that Colorado's future technology-based economic growth for the next two decades will be strong, assuming momentum holds.

The Colorado Office of Economic Development and International Trade estimates that the economic power of the technology sector can be seen in the fact that high-tech exports totaling more than six billion dollars represent 55% of Colorado's total exports, creating a significant influx of state income. From a workforce perspective, it is important to note that almost half of these high-tech firms have 10 or fewer employees and more than 75% employ fewer than 50 workers. Nearly half of these firms have annual sales under $1 million, while another 25% average sales between $1-3 million. The positive implication of these many small firms is that it clearly illustrates the state's strong entrepreneurial growth capacity. However, smaller firms are often more vulnerable to workforce recruitment and retention issues.

Industry[4]	2006 Employment
Aerospace	54,000
Aviation	19,000
Bioscience	12,000
Energy	23,000
Finance	161,000
Information Technology	95,000
Telecommunications	43,000

While Colorado's high-tech economy is very strong, so too are other major parts of the economy. The Colorado industry profile developed by the accompanying "Top Ranking Industries" table clearly illustrates that the nature, growth potential and workforce needs of Colorado's economy goes well beyond just the technology based industries.

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[2] http://www.kauffman.org/items.cfm?itemID=766

[3] Gazelle jobs are jobs in firms with annual sales revenue that has grown 20 percent or more for four straight years. It is estimated that gazelle jobs are responsible for as much as 80% of the jobs created by enterpeneurs (State New Economy Index.)

[4] Colorado Business Outlook 2007; Denver Metro EDC cluster studies

Top Ranking Industries in Colorado

Composite Ranking	NAICS Code	Industry	01-06 % Change	2006 Avg Emp	Avg Ann $	Total % Change '05-'15	Location Quotient	01-06 % Rank	2006 Avg Emp Rank	Avg Ann $ Rank	Total % Change '05-'15 Rank	Location Quotient Rank	Composite Totals
1	213	Support Activities for Mining	165.2	9,678	$67,860	156.5	1.89	2	46	17	1	5	71
2	211	Oil and Gas Extraction	48.9	5,561	$129,428	103.6	2.24	5	63	1	2	2	73
3	522	Credit Intermediation & Related Activity	19.7	53,756	$54,236	41.2	1.1	10	6	25	18	30	89
4	541	Professional and Technical Services	7.2	163,023	$71,552	31.5	1.33	27	2	15	29	17	90
5	551	Management of Companies and Enterprises	51.0	26,992	$101,816	32.8	0.86	4	23	5	28	52	112
6	621	Ambulatory Health Care Services	16.7	82,920	$50,856	39.9	0.95	12	5	33	19	44	113
7	238	Specialty Trade Contractors	0.3	112,780	$38,376	59.4	1.41	42	4	46	8	14	114
8	236	Construction of Buildings	1.3	33,055	$54,028	50.7	1.1	37	17	26	10	28	118
9	531	Real Estate	9.9	33,693	$42,380	23	1.36	17	16	42	38	16	129
10	237	Heavy and Civil Engineering Construction	-2.4	21,812	$52,000	69	1.31	50	28	32	4	19	133
11	561	Administrative and Support Services	4.0	135,155	$29,276	71.1	0.99	34	3	62	3	40	142
12	511	Publishing Industries	-18.1	28,516	$72,904	24.1	1.92	72	20	13	35	4	144
13	444	Building Material & Garden Supply Stores	10.5	23,709	$30,628	43.4	1.08	16	25	59	16	32	148
14	516	Internet Publishing and Broadcasting	-2.3	1,078	$71,760	63.6	2	49	77	14	6	3	149
15	722	Food Services and Drinking Places	9.1	179,774	$13,884	37	1.15	19	1	86	21	24	151
16	622	Hospitals	12.5	50,143	$45,396	29.6	0.68	15	8	39	31	68	161
17	713	Amusement, Gambling & Recreation Ind	5.3	34,978	$21,476	25.8	1.51	32	14	76	33	11	166
18	486	Pipeline Transportation	8.6	832	$119,600	18.9	1.3	23	80	3	47	20	173
19	423	Merchant Wholesalers, Durable Goods	-11.2	53,526	$63,544	18	1.05	64	7	19	50	34	174
20	442	Furniture and Home Furnishings Stores	0.9	11,099	$29,952	47.3	1.14	39	40	60	13	25	177

Source: Colorado Department of Labor and Employment, Labor Market Information; and the U.S. Bureau of Labor Statistics

All of the data included is Colorado-specific. For complete detail on Industry Modeling methodology see Appendix A.

Together, these top 20 ranked industries are projected to add approximately 400,000 new jobs through 2015. Highlights from the table include:

- **The Energy cluster** is well represented with the top two industries in the model. Although relatively small, the mining, oil and gas sectors pay very well, are nationally extremely competitive, and are collectively projected to grow more than 125% (21,000 additional jobs) through 2015.
- **The Professional and Financial Services cluster** make up the next highly-ranked industries; they all pay well, draw upon a wide range of skills and experiences, pay an average wage over $54,000, and are projected to add 90,000 employees through 2015.
- **The Construction and related cluster** is well represented by Specialty Trade Contractors, Construction of Buildings, Real Estate, Heavy and Civil Engineering Construction, and Building Material and Garden Supply Stores, each of which is projected to grow by at least 40% over the next few years. The first three all rank in the top ten overall as well as top ten in projected growth rates of all the industries in Colorado. Together, these five industries represent a quarter of all industries in the top 20, an indication of a strong and healthy economy and a diverse set of skills.
- **Health Care** is well represented by Hospitals as well as Ambulatory Health Care Services, which together will add over 50,000 jobs during the next eight years with an average pay of over $45,000.
- **The Hospitality and Tourism** cluster is a strong cluster represented in the top 20 by Food Services and Drinking places as well as Amusement, Gambling, and Recreation. Together these industries account for over 214,000 Colorado jobs. The Food Services industry ranks first in the state for 2006 employment. Across the metro areas, this cluster is projected to grow between 26% and 33% through 2015.

More about "Support Activities for Mining"

So what is included in Colorado's top industry "support activities for mining?" Included in this industry are the following sub-industries: drilling oil and gas wells, support activities for oil and gas operations, support activities for coal mining, support activities for metal mining, and support activities for non-metallic minerals (except fuels.)

So what is meant by "support activities" across these various sub-industries? These include but are not limited to: directional drilling, drilling services (redrilling, spudding, tailing), reconditioning, reworking, servicing, cleaning, impounding, and many other too numerous to mention. For a more complete definition see a list of all related industries at: http://www.census.gov/epcd/naics/NDEF213.HTM#N213

Information technology jobs remain an important enabler across Colorado's economy

In the previous section we used a multi-factor model to identify the state's top *industries*. Yet, industry analysis allows us only a generic view of the state's talent development situation. A more specific view is provided by understanding the leading *occupations* within and across those industries so that we understand which jobs are truly driving the economy and critical industry sectors. (For example, hospitals are an industry for which top occupations include registered nurses, radiological technicians, and other health-care specific occupations plus many other occupations including management, financial, etc.)

Our cross-industry occupational model focuses on identifying "middle class jobs" that have a balance of employment, projected growth, and high wages. Typical lists (as available in our Data Compendium) rank occupations solely by employment and typically see entry level positions (such as retail salespersons, general office clerks, cashiers, waiters/waitresses) at the top. Looking at a list of top occupations across several factors allows us to examine the areas in which the state's talent development emphasis should be placed.

In looking at the top occupation table for Colorado, several things jump out as very notable:

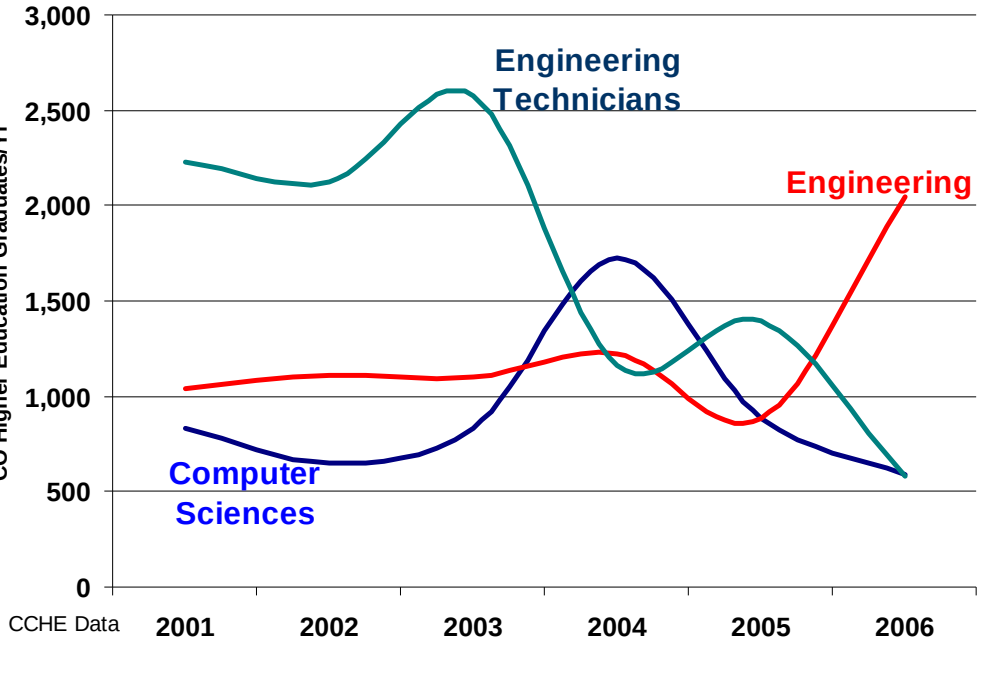
- **Information-technology** related positions dominate the list. Five of the seven top occupations are computer software engineers (applications), computer software engineers (systems software), computer systems analysts, network and computer systems administrators, and network systems and data communication analysts. Collectively, these five occupations are projected to add another 27,000 positions through 2015, only eight years away.
- **Management-related** occupations continue to provide a clear path to middle-class agility and prosperity in today's economy. Related occupations in this list beyond computer-specific examples noted above include: Construction Managers, General and Operations Managers, First-Line Supervisors of Construction Trades and Extraction Workers, Education Administrators, Marketing Managers, and Financial Managers.
- **Business and Finance** occupations also comprise a major portion of the list. These include Business Operations Specialists (all other), Cost

Estimators, Loan Officers, Accountants and Auditors, and Management Analysts, plus management related occupations.

- **Hospitality and Tourism** is an important group of occupations when we examine the largest occupations in Colorado based on 2006 employment (see Data Compendium.) Important occupations include waiters and waitresses, food preparation and serving workers, landscaping and grounds-keeping workers, and restaurant cooks. Additionally this sector employs many of the enabling occupations referred to in an later section of this report for design, management and supervision and logistics, as well as information technology etc. Together, these occupations are projected to provide over 185,000 jobs by 2015.

It is important to spend a minute discussing information technology occupations. Job stereotypes are often misleading with respect to these occupations. While some of these positions are computer professionals working for high-tech companies, most of these positions are "enabling" computer specialists, working in non-IT companies. Nationally, nearly 89% of new information technology jobs in 2004 came from non-IT companies[5].

However, there may be a challenge in the Colorado talent development pipeline for computer-related occupations. Using Colorado Commission on Higher Education 2



[5] Information Technology Association of America. http://www.itaa.org/eweb/Dynamicpage.aspx?webcode=TopStories&wps_key=8c0eb957-c19c-4126-bd6a-3327539dde30

001-2006 data across every degree level from certificate up through PhD, the state's total higher education system is graduating fewer and fewer computer science graduates each year, down to 589 in 2006. In 2001, 13% (4,100) of the states higher education graduates were engineers, computer scientists or engineering technicians; in 2006, that percentage dropped to 8% (3,200). Given the importance of the Colorado's technology base and workforce, that percent should be growing significantly, not shrinking.

In spite of projections that Colorado's computer-related occupations will need 27,000 new employees through 2015, if trends do not change, in the next eight years the state will graduate less than 6,500 computer-educated students, falling far short of demand. In contrast to roughly 600 computer-related graduates in 2006, the state graduated 7,000 healthcare-related graduates, 800 recreation and fitness graduates, and 1,300 communication and journalism graduates. For a state hoping to build a strong and globally-competitive technology based economy, these are noteworthy trends that provide policymakers and educators an opportunity to develop talent in-state rather than simply importing workers. This long-term solution will help the state become less vulnerable to employers who may choose to leave the state for other regions that have a more available and skilled workforce or project to have more computer graduates emerging from the educational system.

Top Ranking Occupations in Colorado

Overall Ranking	Code	Occupational Title	2005 Emp.	2015 Emp.	% Change '05 to '15	Avg. Ann. Wage ($)	Employment Ranking	Percent Change Rank	Wage Ranking	Total Ranking Score	Unemploy-ment Quartile	Part-Time Quartile	Percent self-employed	Education and Training - Primary Source
1	151031	Computer Software Engineers, Applications	13,867	21,711	56.6	85,570	38	38	43	119	L	VL	2.4	Bachelor's degree
2	151032	Computer Software Engineers, Systems Software	10,903	16,601	52.3	85,420	50	55	45	150	L	VL	2.4	Bachelor's degree
3	119021	Construction Managers	12,583	18,526	47.2	76,410	46	80	69	195	VL	VL	54.2	Bachelor's degree
4	151081	Network Systems and Data Communications Analysts	6,354	10,510	65.4	69,300	92	16	99	207	L	VL	19.9	Bachelor's degree
5	111021	General and Operations Managers	36,730	49,702	35.3	97,480	6	174	29	209	VL	VL	0.6	Bachelor's plus experience
6	151051	Computer Systems Analysts	11,946	17,218	44.1	73,840	48	98	78	224	L	VL	5.0	Bachelor's degree
7	151071	Network and Computer Systems Administrators	7,107	10,758	51.4	70,630	82	60	93	235	L	VL	0.6	Bachelor's degree
8	471011	First-Line Supervisors/Managers of Construction Trades and E	16,404	25,522	55.6	56,130	32	43	176	251	L	VL	24.7	Work experience in a related occupation
9	291051	Pharmacists	3,900	5,631	44.4	93,480	141	96	32	269	VL	H	1.7	First professional degree
10	131199	Business Operations Specialists, All Other	24,056	32,912	36.8	67,730	20	149	106	275	L	L	0.0	Bachelor's degree
11	113021	Computer and Information Systems Managers	4,505	6,155	36.6	108,760	121	152	20	293	L	VL	1.2	Bachelor's plus experience
12	131051	Cost Estimators	5,181	8,114	56.6	57,790	107	39	166	312	VL	VL	2.2	Work experience in a related occupation
13	132072	Loan Officers	7,292	10,329	41.6	61,540	76	114	134	324	VL	VL	2.7	Bachelor's degree
14	119032	Education Administrators, Elementary and Secondary School	3,503	4,998	42.7	75,940	160	109	70	339	VL	L	3.6	Bachelor's plus experience
15	132011	Accountants and Auditors	26,884	36,095	34.3	61,420	14	189	136	339	VL	L	10.9	Bachelor's degree
16	112021	Marketing Managers	3,770	5,084	34.9	96,900	145	181	30	356	L	VL	3.6	Bachelor's plus experience
17	131111	Management Analysts	10,035	13,079	30.3	84,260	53	263	47	363	L	L	24.7	Bachelor's plus experience
18	472111	Electricians	14,000	22,113	58	43,860	36	34	295	365	H	VL	9.5	Long-term on-the-job training
19	113031	Financial Managers	6,139	8,033	30.9	104,290	96	254	21	371	VL	VL	3.2	Bachelor's plus experience
20	472152	Plumbers, Pipefitters, and Steamfitters	10,730	17,489	63	43,600	52	22	299	373	H	VL	23.3	Long-term on-the-job training

Source: Colorado Department of Labor and Employment, Labor Market Information; and the U.S. Bureau of Labor Statistics

All data in this chart is Colorado specific except for the Quartile data, self-employed, and education and training source. These latter four columns all come from national data available through the U.S. Bureau of Labor Statistics. For the full Occupational Modeling methodology see Appendix A.

Developing a "gold-collar" and STEM-ready workforce is essential to sustaining Colorado's strong economy

One of the implications of maintaining and growing a technology-based economy is that the talent development process must provide a steady and growing supply of highly educated employees to support the existence and growth of technology sectors via both 2-year and 4-year college graduates. A growing area of national and statewide concern is focused on the availability of a workforce equipped with science, technology, engineering and mathematics (STEM) skills. While policy makers often focus on the higher-level degree occupations that are important to this field, the technician level occupations are just as important. These technician level jobs are increasingly referred to as "gold collar jobs."

This newly emerging gold collar title describes a range of occupations that are not easily classified in traditional workforce and occupational terms. These occupations require high levels of technical skill, applied knowledge and often physical dexterity. They do not necessarily require four-year college degrees, but they do require significant post-high school education of some kind, plus very often substantial work experience (which may include an apprenticeship or apprenticeship-like experience). Gold collar employees are a becoming an increasingly important part of the economy's human capital infrastructure (see text box below) and are important for traditional industries such as health care, manufacturing, energy and logistics. They are also important for emerging industries such as nanotechnology, biotechnology, avionics, materials science, alternative energy, photonics, and bio-engineering. In all industries, the process of innovation, design and production requires skilled gold collar technicians who are conversant with a range of technologies. Some have described gold collar jobs as a "white collar mind combined with blue collar hands."

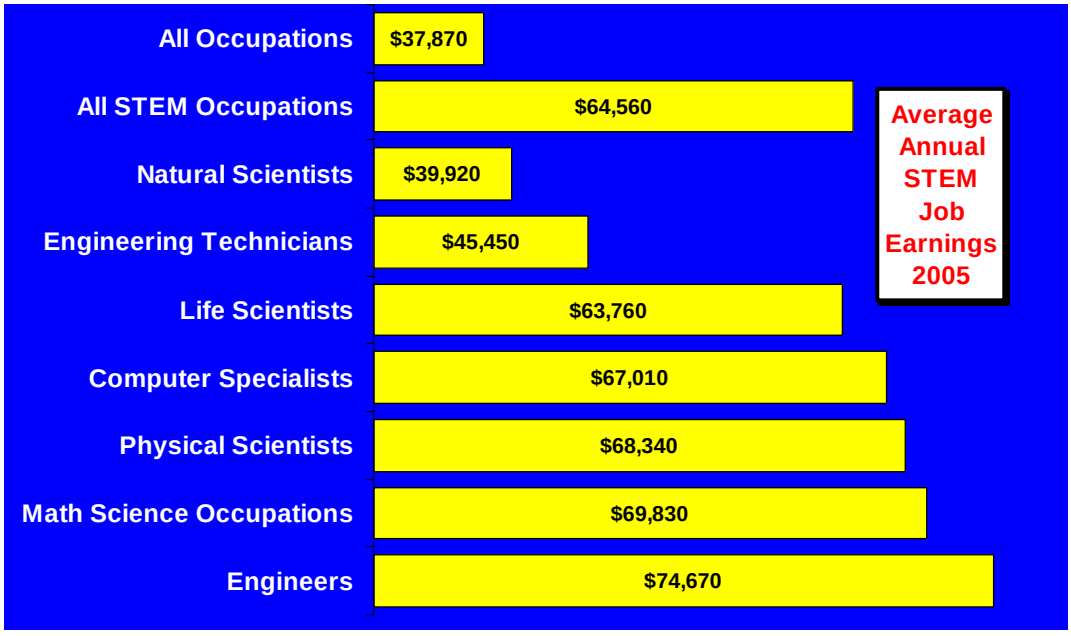
What is a Gold Collar Job?

Here are some of the many emerging Gold Collar job titles: network maintenance technicians (IT), histologist (biotech), CMC maintenance technician (manufacturing); aviation maintenance specialist (transportation); logistics planner (transportation); radiology technician (health care); intellectual property paralegal (administration); many kinds of medical laboratory technicians (healthcare); surgical technologist (healthcare); electron microscope operations and maintenance staff (research); high-pressure welding technician (energy); photonics equipment fabricators (communications); nanotechnology and alternative materials fabricator (manufacturing); and computer aided drafting, design and prototype technician and toolmaker (bioengineering).

Gold Collar employees who are needed to support existing as well as emerging technologies must be familiar with some combination of the following set of skills: Electro-Mechanical and Chemical; Biotechnology; Design & Manufacturing; Metrology/Precision Measurement; Information Technologies and Photonics/ Electro?-Optics.

The importance and skill requirements of these gold collar positions cannot be underestimated, for they are the essential system, process maintenance and operations staff for an increasingly complex set of technologies and processes. A workforce shortage in these areas will just as surely affect the operations of an existing or emerging industry as will a shortage of entry level workers or four-year educated design engineers. These positions are difficult to out-source, and so firms tend to be dependent on and limited by their local labor market. These positions often require only two years or less of post-graduate education and are well suited to community colleges and individuals interested in a career-ladder move. In fact, anecdotal evidence across the nation suggests that employers import advanced degree workers and hire entry-level workers from within the regional labor market, and concentrate their time and effort on interventions and strategies that can increase the technician level, often referred to as 12 plus (because they require some level of education and training beyond high school but may not require advanced degrees.)

Moving beyond gold collar jobs at the technician level we can then focus on the advanced degrees often required of STEM (science, technology, engineering, and math) related occupations. These STEM-related occupations are increasingly acknowledged by economic and workforce specialists as key to the nation's competitive advantage and they are certainly essential to Colorado's economy. Examples of four-year educated STEM jobs are Engineers and Engineering Technicians, Life Scientists, Computer Specialists, Physical Scientists and a range of math related occupations. Nearly all of the previously described "Gold Collar" jobs also



must be well versed in STEM skills. As the U.S. Bureau of Labor Statistics chart listing national STEM occupational earnings above suggests, these are well paying occupations, and thus are important drivers of the state's standard of living.[6]

Job Category[7]	2004-14 Growth Rate	National Job Openings (2004-14)
Life Scientists	21%	103,000
Physical Scientists	12%	94,000
Natural Science Technicians	14%	118,000
Computer Specialists	31%	1,350,000
Engineers	13%	507,000
Drafters & Engineering Technicians	10%	291,000
Math Science Occupations	10%	39,000

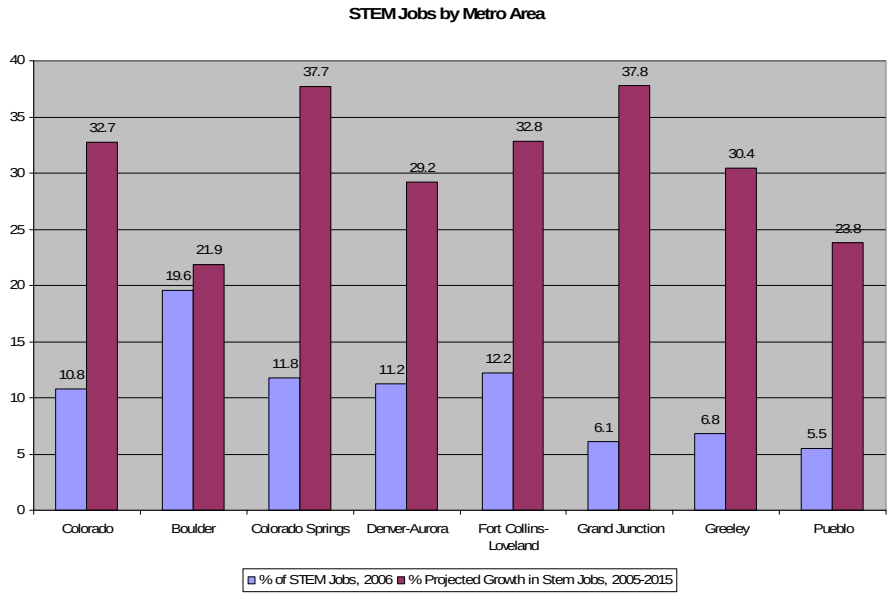
In the state's talent development efforts to grow a STEM-skilled, gold collar workforce, it is important to remember that many parts of the nation and the globe are working hard to grow technology-based economies, not just Colorado. Over the coming decade, as the baby boomer population retires, all regions and countries will be facing an increasingly strong skilled workforce demand. This demand will create an intensely competitive national and international skilled workforce market. Our national growth alone in demand for science and technology skilled individuals will be very significant, let alone the demand pressures from the rapidly industrializing countries around the world. As a result, Colorado must develop formal strategies to not only increase its ability to produce STEM-educated and gold collar employees, but also to retain these graduates in Colorado.

[6] Ibid.
[7] "What are Stem Occupations?", Occupational Outlook Quarterly, Spring 2007, Bureau of Labor Statistics

Furthermore, STEM occupations are concentrated in certain areas of the state more than others. Yet, all areas of the state are expected to see at least 20% growth in STEM related occupations from 2005 through 2015. To this end, in May 2007, Colorado was named as one of six states to receive a $500,000 grant from the National Governors' Association to establish STEM education centers. The intent of this grant is that these centers will serve as the foundation for improved and modern workforce development. Project participants will include the Center for Education Policy Analysis at the University of Colorado at Denver and Health Sciences Center, the Colorado Children's Campaign, the Colorado Department of Higher Education, and the Colorado Math, Science, Technology and Engineering Coalition (COMSTEC). The Colorado grant also triggers a $100,000 direct match from the Metro Denver Economic Development Council and Metro Denver Workforce Boards' WIRED Initiative and a $150,000 in-kind match from the Colorado Children's Campaign.

Traditional business skills remain a critically important component of the economy

When the growing and in-demand occupations for the next decade are matched up against the skills and knowledge that each of these occupations will need, the surprising (to some) result is the consistent importance of the so-called "soft skills."



Knowledge Needed for In Demand Jobs

Knowledge Requirement	Index of Need
Customer and Personal Service	100
English Language	97
Mathematics	94
Education and Training	91
Computers and Electronics	88
Clerical	85
Sales and Marketing	82
Administration and Management	79
Mechanical	76
Psychology	73
Design	70
Engineering and Technology	67
Building and Construction	64
Economics and Accounting	61
Law, Government, and Jurisprudence	58

Work Activities Needed for In Demand Jobs

Work Activities Required	Index of need
Establishing and maintaining interpersonal relationships	100
Getting informatio needed to do the job	98
Communicating with supervisors, peers, or subordinates	95
Organizing, planning, and prioritizing work	93
Updating and using job-relevant knowledge	90
Making decisions and solving problems	88
Identifying objects, actions, and events	85
Processing information	83
Monitoring processes, materials, or surroundings	80
Handling and moving objects	78
Working directly with the public	76
Performing general physical activities	73
Communicating with persons outside the organization	71
Analyzing data or information	68
Thinking creatively	66

Source: Colorado Labor Market Information, Skills Projection Program
(Index of need represents the likelihood that projected demand occupations will require the knowledge component.)

While science, technology, engineering, and math skills increase in importance, it is important not to overlook the increasingly complex set of soft skills that are going unmet. The Colorado Department of Labor and Employment estimates that 100% of all jobs projected to be in-demand over the next ten years will require "customer and personal service" as a core knowledge set. Likewise, "education and training" as a core knowledge set is indicative of the need for lifelong learning capabilities.

Among work activities, 100% of all jobs projected to be in-demand over the next ten years will require "establishing and maintaining interpersonal relationships." "Getting information needed to do the job" and "communicating with supervisors, peers, or subordinates" will also be required activities of over 95% of jobs projected to be in-demand. Likewise, "making decisions and solving problems" are joined by "analyzing data or information" and "thinking creatively" as activities needed by at least two-thirds of all jobs projected to be in-demand over the next ten years.

While we have clearly transitioned from an economy that is primarily focused on manufacturing to one that has a significant focus on a wide range of service industries, we have still not embraced customer service and interpersonal communications as core elements of the lifelong education and training system. Making sure these vitally important skills are not left behind in the rush to embrace high-tech skills will be an important balancing act for workforce and education policy leaders and practitioners in the future.

From the perspective of Colorado's talent development system, a concerted effort must be made starting in the earliest grades of the education system to infuse Colorado residents with the "soft skills" of teamwork, interpersonal communication inside and outside an organization, complex problem solving, gathering and utilizing information, and innovation and entrepreneurship. Evidence ranging from these occupational analyses to employer surveys repeatedly points out the importance of soft skills, and the difficulty of recruiting employees with those skills. In many ways, these are the most difficult skills for employers to impart to their employees because they are behavioral in nature. The implication is that these are among the most important skills for the formal education system to teach.

Building a 21st Century Talent Development Curriculum:

While there are many models available for the state to begin drawing from, one such model stands out as an example of a 21st Century Workforce Curriculum that merges technical, business, and soft skills to enable workers and employers alike. Ironically, it was developed with an information technology focus in mind, but is applicable to nearly all industries and occupations. The State of Colorado should consider this model, along with many other alternatives, as it seeks to ensure an appropriately skilled workforce.

Cross-Sector Core Skills

- Project Management
- Task Management
- Problem Solving

Core Technical Curriculum

- Analytical Skills and Problem Solving
- Business Organization and Environment
- Coordination and Communication Skills
- Core Computer and Hardware Software Skills
- Project and Process Flows
- Industry Specific Skills (e.g. architecture for architects)

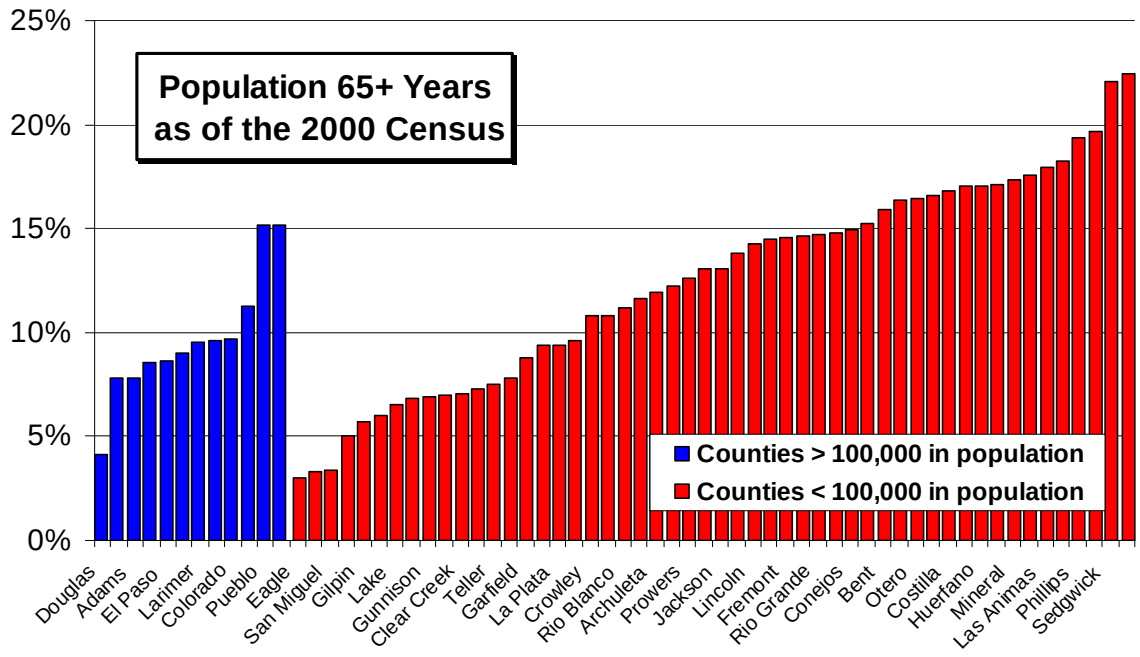
Employability Skills

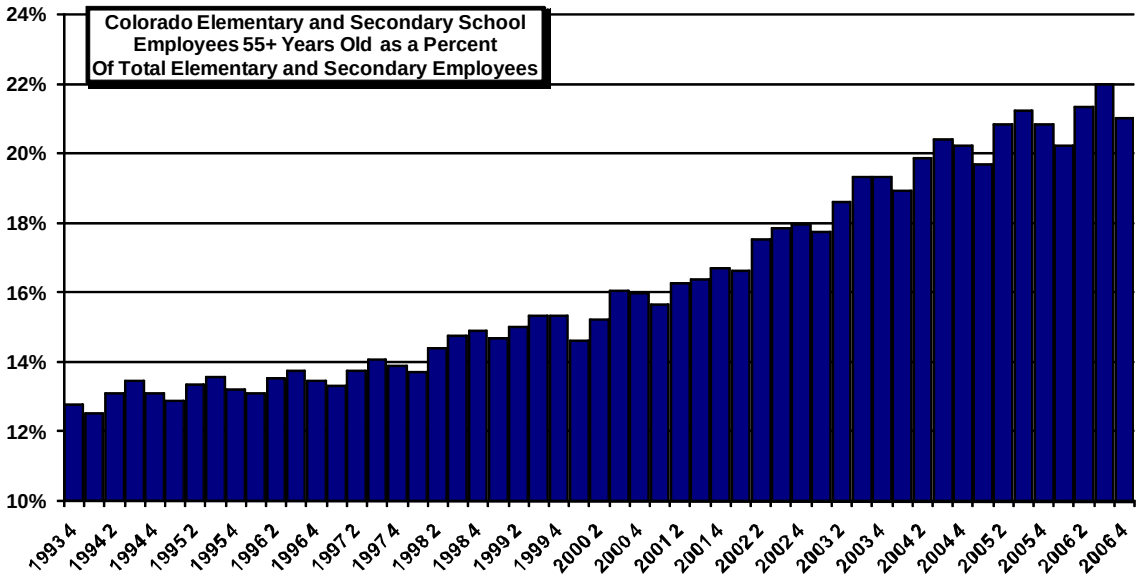
- Communication
- Organization
- Team Contribution and Leadership
- Professionalism
- Critical Thinking and Decision Making
- Customer Relations
- Self-Directed and Continuous Learning

Source: National Workforce Center for Emerging Technologies, adjusted by CSW to include industry-specific skills.

The graying of Colorado's workers will provide workforce and service based challenges

Thus far, we have concentrated our analysis on the demand side of top industries, occupations, and knowledge and skill sets. Yet, there remains a critical supply-side trend that is important to understand in maintaining and growing Colorado's economy. The impact of an aging workforce and baby boomer retirements will be a tsunami-like demographic force that will significantly change the workforce and economic dynamics of the nation





and the state in two fundamental but very different ways. The first impact will involve the need for Colorado's employers to replace these individuals as they retire. The second implication of this demographic shift is that the growth of the 65+ population from 400,000 to 1.2 million in 2030 will generate a high-potential economic driver for the state's economy—but only if the state is able to provide and staff the new retirement-related services required by this influx of customers.

With respect to the first issue, the task of recruiting and replacing retiring workers, the impact will not fall evenly across different industries and regions. Although there are some exceptions, the U.S. 2000 Census graph to the right illustrates that there is a significant difference in terms of median age between counties that have more than 100,000 in population and most of the counties that have less than 100,000 in population. The reality of a significantly older population in the more rural counties will have a powerful impact on the availability of a replacement workforce in those counties. While the aging population issue will impact all of Colorado, because of the decades-long out migration of younger people from the rural counties, this issue will be especially challenging for these counties.

Another perspective on the issue of replacing an aging workforce is to examine the age profiles of different employment sectors. While there are many sectors of interest and note that we can choose from, we will focus on the education system, given its importance in educating and training the state's future workforce. This example focuses on employees of Colorado's elementary and secondary school systems. As the graph below illustrates, the percent of employees over 55 years old employed by Colorado's elementary and secondary school system has risen from 12% in the early 1990s to 22% in 2006. There are no indications that this trend will abate. This rapidly aging employment profile should be of critical concern to a state that has placed such dependence on an economic base that requires highly-skilled, highly-educated employees.

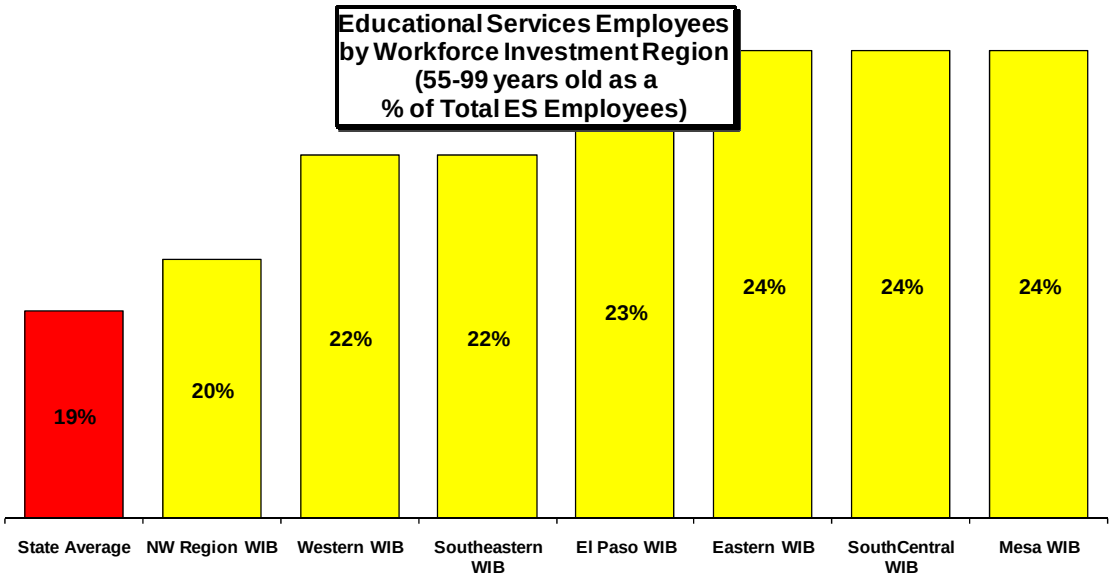
In a tight labor market, where will the replacement workers come from that will be needed to replace these teachers and other education related employees as they retire? What are the implications for Colorado being able to support an excellent and globally competitive K-16 education system that its current and future industrial base requires?

Even within the statewide Educational Services employment sector, which includes all employees of the Educational Service industrial sector, the impact of a graying population will fall unevenly on different regions of the state. As the graph illustrates, even though only an average of 19% of the statewide Educational Services employment group are over 55, this percentage rises to 24% when examination is more finely focused on the Eastern, South Central and Mesa workforce regions.

As has been stated previously, it is regions such as these that are perhaps in greatest need of an educated workforce and a strong educational infrastructure. Having a quarter of Educational Service sector employees in these more rural regions within ten years or less of retirement age is a serious issue for their economic future.

In light of the other educational challenges facing the state, and the importance of education in terms of national and international competitiveness, this is an employment sector that should receive special policymaker attention before the problem becomes too severe. Given the very localized nature of school district hiring practices, school districts are very much at the mercy of the available workforce, and rarely able on their own to help increase workforce supply. That is a role for state policymaker and educational institution leadership to take on.

Of course, education is not the only industry that will be impacted by the graying workforce. Indeed, we could have picked any number of occupations including utility line workers, registered nurses, and others. Among noteworthy trends are that 15% of the state's workforce is over the age of 55 along with 19% of Government employees, and 16% of manufacturing employees.



Consider the specific employment sectors that have the highest percentage of employees 55 to 64 years old. Of special concern is the significant numbers of older employees in the professional, scientific and technical services, for these are often highly skilled positions that are not easy to replace. Upwards of 20,000 jobs in the industry could need replacements within the next decade; expected new job growth in the industry will only compound the challenge.

These data bring the notion of a high-tech, STEM and gold collar driven economy full circle. Since many of the workers in these occupations are graying, the impact on the state's economy is likely to be significant. So too will the impact be felt in hospitality and tourism, health care, and construction, among many others.

Colorado Industries with the Greatest Number of Persons 55-64 Years

Rank	NAICS	Industry	Avg. Quarterly Employment*
		All NAICS subsectors (private ind.)	206,188
1	541	Prof., Scientific, and Technical Services	19,737
2	561	Administrative and Support Services	13,213
3	621	Ambulatory Healthcare Services	11,494
4	622	Hospitals	7,507
5	238	Specialty Trade Contractors	7,457
6	722	Food Services and Drinking Places	7,277
7	423	Merchant Wholesalers, Durable Goods	7,054
8	522	Credit Intermediation and Related Activities	5,660
9	452	General Merchandise Stores	5,548
10	524	Insurance Carriers and Related Activities	5,243

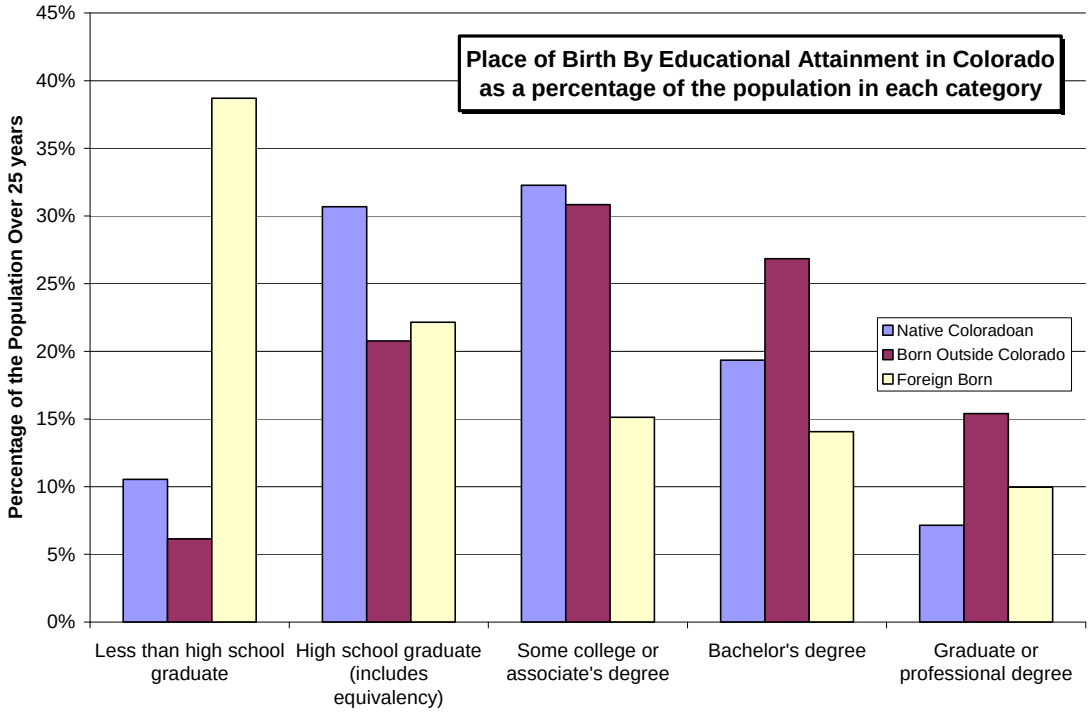
*Persons aged 55-64, Quarters 2005 3rd through 2006 2nd Source: U.S. Census Beau, LEHD

With respect to the second impact of Colorado's graying population, that of their economic power as consumers, a detailed analysis of older consumers demand patterns is beyond the scope of this analysis. However, it is clear from even the most cursory market research that the baby boomers will generate very significant demand in markets ranging from travel and tourism to all varieties of health care to a shift in housing patterns to delivery and in-home services of all types. Infrastructure changes will also be needed, as an older population will need cross-walks with longer-timed lights, street signs with larger lettering, and many other impacts. Colorado will have the benefit of these customers, with their significant levels of disposable income relative to previous retirement generations, but only if the state is able to provide the services that these "new" customers will

demand. That will place an even greater pressure on the state's workforce, as firms work to staff up for in-demand services.

The Colorado Paradox remains one of the state's greatest challenges to long-term health and prosperity

The Colorado Paradox centers on high rates of adult educational attainment and high-quality jobs offset by low secondary and higher education indicators. In a world in which highly skilled and innovative human capital is increasingly the single most important competitive asset that determines success or failure for a company, a region or a state, Colorado's core competitive advantage is very vulnerable to a shift in migration patterns.



The state does very well in traditional measures such as employment and wages, but as the chart[8] illustrates, a significant percent of the states highly educated workforce, the base of its national and international competitive advantage, is imported from other states and countries rather than created from within.

In essence, Colorado is fueling a significant portion of its economic growth with talent development investments made by other states in their residents

[8] U.S. Census. 2005 American Community Survey.

and their higher education systems. This is an extremely risky strategy. Net in-migration has, in fact, slowed significantly to a level of 50,000 individuals per year in 2006, after reaching a peak in 1993-2000 of over 80,000 individuals net in-migration per year.

As the Governor stresses in the "Colorado Promise," without a supply of appropriately educated and skilled employees, the Colorado economy—characterized by emerging industries that need both hard skills and soft skills—cannot successfully compete. The global and national demand for these skilled and highly educated employees will continue to increase. In the global and national context of a tight labor market, relying on other states and countries to provide Colorado's skilled human capital only works as long as other countries and states are able and willing to export their highly skilled employees to Colorado, and that does not seem likely to continue long term.

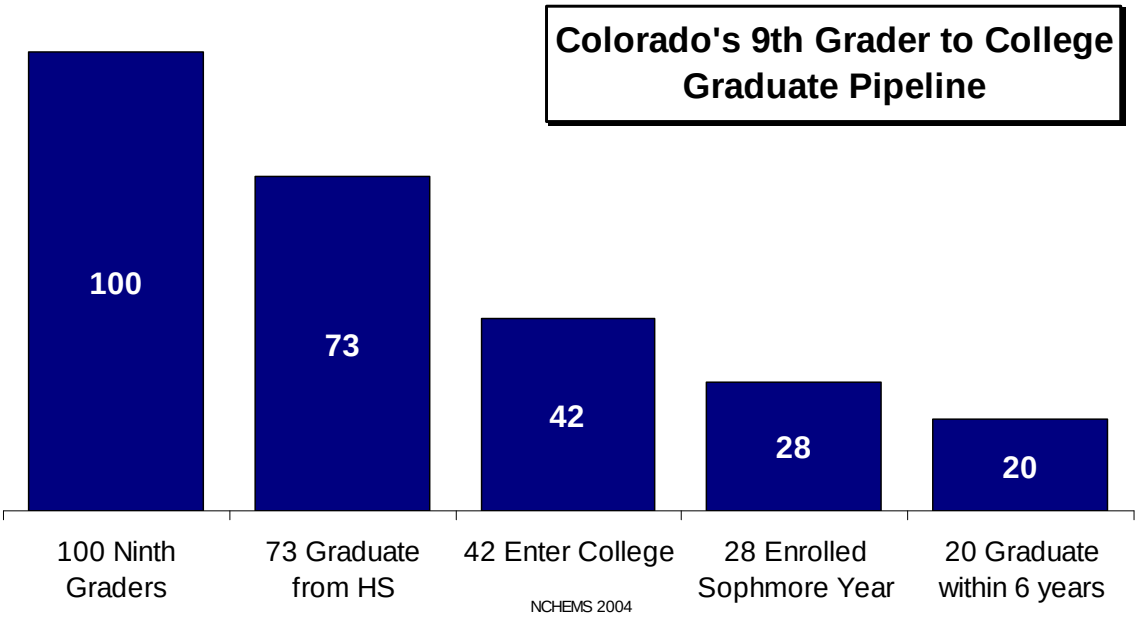
As a result of this historical dependence on imported talent and highly skilled employees, Colorado is extremely vulnerable to a shift in skilled employee migration patterns. Migration patterns are not the only challenge. Increasing the state's vulnerability is a under-performing K-12 education system, an under-funded higher education system and a shrinking ability to replace a skilled but graying workforce. The result of all of these factors is a very high-risk workforce situation that places the states economy and the future of many key employment sectors at significant risk. Consider from among recently available reports and data:

- The "leaky pipeline" (30% of high school students do not graduate; another 30% do not enroll in college; 50% of those who do enroll finish in five years)
- The "achievement gap" (the gap between the academic achievement of white versus minority students—the gap between white non-Hispanic and Hispanic students in particular is large and growing, even as Hispanic students represent a larger share of students than at any time in Colorado's history)
- The 328,000 working adults without a high school diploma, less than 5% of whom are enrolled in basic education courses
- The one-third of Colorado families not earning sufficiency wages
- The declining percentage (4.6%) of adults enrolled in higher education or training (down a full percentage point since 1992)

Further evidence of the state's reliance on importing highly educated employees is the assessment of the state's education system. The most recent National Center for Public Policy and Higher Education "Measuring

Up[9]" report card on state higher education gave Colorado a mixed bag of grades including a B+ in preparation, an A- in participation, an F in affordability, a B in completion, an A- in benefits, and an I in learning. But there are ominous danger signs ahead. Colorado ranks 32nd in the percent of high school graduates entering college anywhere in the country within 12 months of graduation.

To quote the report, "Colorado's strong performance in higher education could be undermined by large disparities in opportunity. The State is falling behind in the percentage of 9th graders graduating from high school in four years (see graph). As the well-educated baby boomer generation begins to retire, the young population that will replace it does not appear as prepared educationally to maintain or enhance the state's position in a



global economy. Since the early 1990s, colleges and universities in Colorado have become less affordable for students and their families. If these trends are not addressed, they could limit the state's access to a competitive workforce and weaken its economy over time."

The state currently ranks 49th in state and local support for higher education, and 48th in higher education spending per capita. Funding for public colleges and universities is diminishing rapidly. For example, state support for higher education plummeted 21% from 2001 to 2005. Colorado ranked 43rd in state and local public higher education support per capita in

[9] www.measuringup.highereducation.org/

2000. This position has eroded to 48th place in 2004. It also ranked 49th in K-12 spending as a percent of personal income. It is simply not possible to support a strong 21st century economy with well paying jobs with this kind of education system performance.

The Governor's "Colorado Promise" is bringing attention to many of these issues, as are several promising local initiatives supported by the Colorado Workforce Development Council including but not limited to: the Business and Education Talent Readiness Project (BETR) in El Paso County, the Adams County Education Coalition, and the Northern Colorado Regional Business Consortium. In addition, there are many local efforts that fall under the umbrella of the Metro Denver US Department of Labor funded WIRED initiative http://www.metrodenver.org/Wired.)

"The Colorado Promise is simple: It's about making a better future; a better future for our children and our grandchildren. It's about hope. It's about finding the common ground for the common good. It's about finding the strength in all of us – rural and urban, Western Slope and Eastern Plains. It's a promise of hope for everyone in this diverse state of ours…..Let's fulfill the Colorado Promise together by giving our children opportunities and our employers the best-educated workforce in the nation. Let's commit today, all of us, to reducing the high school drop-out rate and closing the achievement gap."

- (Excerpted, Governor Bill Ritter, Inaugural Address, January 9, 2007.)

RECOMMENDATIONS

Build increased support for STEM education programs

Unless the state system of higher education produces a significantly larger number of STEM educated graduates (on the order of a 200% increase), the state high-technology industries will be caught in a skilled workforce shortage with serious consequences. These consequences will include the continued need to import these workers from out of state and outside the country. This skilled workforce shortage will become even worse because the STEM-skilled employee demand from other states and abroad is rapidly increasing, creating additional recruitment and retention challenges. Some specific activities to explore:

- An annual STEM conference between educators, business leaders, and policy leaders focused on dramatically improving the state's STEM performance and graduation rates.
- Accelerating existing initiatives[10] that support the importance of STEM skills: these need to be accelerated, and similar programs need to be expanded to higher education.
- Partnering with existing college and career counseling programs such as the "College in Colorado" program and encouraging statewide effort to strengthen their emphasis on STEM careers and how they expand individuals' job opportunities.
- Developing a public-private system of STEM career student recruitment and internships, a key step in terms of increasing the volume of graduates.

Developing a system of scholarships, loan forgiveness, and other incentives for STEM graduates, to both attract them to STEM fields and to retain them in the state.

[10] Examples: the NGA funded STEM project, the Governor's P-20 Education Coordinating Council, WIRED, and other activities supported by the Colorado Department of Labor and Employment and the State Workforce Development Council.

Increase student, parent and educator awareness of gold collar careers and opportunities

In spite of the fact that Gold Collar occupations are growing in number, variety and demand they are largely invisible to the general public. Colorado can take the lead in this national issue and create a competitive workforce advantage for Colorado firms. Some specific activities to explore:

- Create a statewide gold collar employment and careers clearinghouse that provides information to the K-12 education system on Gold Collar careers.
- Create a specialized "One Stop" workforce referral system that focuses on placing adult Colorado residents into Gold Collar training and education programs, as well as related internships, or consider dedicating a series of one-stops across the state to STEM and gold collar related jobs.
- An annual Gold Collar conference between educators, business leaders, and policy leaders focused on improving public awareness of Gold Collar careers.

Significantly improve Colorado's talent development tracking and measurement capacity

Both of the following statements are true, and yet very contradictory: "Human capital is the essential element that will determine Colorado's economic future and standard of living" and "We do not have timely or detailed information systems tracking the quality, volume, type, demand or supply of Colorado's human capital investments and workforce assets."

It is not possible to manage what is not measured or tracked. Given that the quality and quantity of human capital now drives Colorado's economy, what is needed now are 21st Century tracking, measurement and information systems that treat human capital as the key state competitive asset that it has become. Two possible avenues to explore are:

Become the first state in the country to require employers to include occupational data when submitting their employee's unemployment insurance information. This information would significantly improve the ability of Colorado's public and private sectors to plan ahead and act proactively to meet workforce needs. Such a strategic and major initiative would need to be supported by additional expert staff.

- Follow states such as Minnesota, Texas, and Missouri in the creation of a performance measurement system for higher education institutions. Any human capital based competitive advantage will be based in the education and skills Colorado residents receive from higher education, not from the K-12 education system. Being able to have a more detailed and long-range view of the higher education "pipeline" will create a competitive advantage for the state in terms of the issues of recruitment, retention, human capital investment priorities, private sector partnerships, and linkages to the K-12 education system. Such a system could be built from existing administrative data housed by labor market information and education data shops now; developing ways to better leverage and integrate these data is quite possible.

Align education, workforce and private sector resources to maximize the effectiveness of the state's human capital investments

Colorado's public agencies and private firms invest upwards of $3 billion every year in various types of human capital-related education and training activities. It is important for the state to create a process that helps to measure, align, coordinate and overall work to generate the greatest yield on this massive but scattered investment. The current set of hundreds of public and private sector human capital, education, training and workforce related activities are largely invisible, disconnected, and have no common investment framework in which to make decisions and priorities. Some possible activities to explore:

- Create an ongoing survey of employers, educators, students and employees about their participation in training and education activities, and the type of training and education that they would like to be able to access, but cannot. This initiative will be important for the P-20 system to better understand the talent development needs throughout the state.
- Create a means to collect real-time critical skills shortage information beyond current data systems. Consider some type of employer skills panel that could keep the current pulse on these shortages so that state policy makers can be proactive rather than reactive to critical skills shortages.
- Create an annual resource map that catalogs all workforce and education-related activities. This resource map can be compared with perceived demand that comes from the private sector, and that information can be fed back to the key private and public stakeholders and leadership.

Promote and enhance regionally targeted industry strategies

To be effective, some workforce initiatives need to be specifically targeted, either to a geographic region, a specific occupation or demographic group. Here are some possible activities to explore:

- Issue competitive (or geographic area) grants that promote regionally targeted industry strategies including a focus on a specific industry (and occupations) and aligning resources and strategies of regional partners and employers in addressing workforce issues of that industry.
- Other versions of a targeted industry strategy include initiatives that are geographically targeted, such as a program directed at helping to respond to a broad based workforce shortage in selected rural counties resulting from a heavy proportion of retiring older workers and an insufficient supply of younger workers across many occupations.
- The central focus of this recommendation is that it is important to formally develop state and local partnerships that are designed to respond to specific and focused employment or geographic workforce issues. These initiatives work to anticipate and resolve current and future workforce needs for specific positions and/or specific regions, with dedicated funding, volume goals, and creative and powerful recruitment and retention strategies.

Create the lifelong learning and innovation state

Colorado should blaze a trail by becoming the first state in the nation to integrate soft skills such as customer service training, teamwork, entrepreneurship and innovation training into all levels of the pre-kindergarten to post-secondary educational system. Colorado should develop a 21st Century Workforce Curriculum that integrates technical, business, and soft skills. In short, curricula at all levels should have components of custom*er* service, entrepreneurship, and innovation. By combining a soft-skills new curriculum with an increased focus on STEM-related disciplines, Colorado will be the national standard-bearer in the 21st Century with respect to innovative Talent Development practices.

Maximize the participation and effectiveness of an older workforce

Colorado should begin maximizing an available older workforce by promoting them as mentors to new businesses. For example, retired accountants and lawyers could provide pro-bono, discounted or subsidized

services to new entrepreneurs and small businesses. The state should consider issuing incentive grants to local areas to pursue these tactics. Furthermore, employers are often cited as valuing an older workforce for their work ethic. This should be maximized and integrated into talent development approaches. However, a careful balance must be sought in the relationships between older and younger workers in the workplace. Anecdotal evidence suggests that there are often communication and cultural challenges to overcome and the state should help develop or promote state and regional training programs that help overcome these new workplace challenges. These approaches might also be folded into a regionally targeted industry strategy.

APPENDIX A: INDUSTRY AND OCCUPATIONAL MODELING

Industry Modeling

The Corporation for a Skilled Workforce applies industry modeling in order to look beyond one-dimensional criteria such as employment (which distorts "top" lists towards entry-level industries) or wages (distorts towards high-wage industries), or historical or projected growth rates (which do not factor in employment base or wage), or location quotients (which similarly do not factor in employment base or wages or even growth rates.)

Through Industry Modeling, we can look at all five of these factors simultaneously, comparing each industry against each other industry in Colorado in any one of the criteria, and assigning a ranking of 1 to the best industry, 2 to the next industry, and so on. We then repeat this process for all five criteria, and create a total cumulative ranking (lower is better.) We believe this creates a list of industries that have some combination of strong employment base, large known or projected growth, high wages, or have competitive advantages in employment relative to the national average (location quotient.)

For those not familiar with location quotients, these represent the rate of employment for the state relative to the rate of employment in the same industry for the nation. A rate of 1.0 means that Colorado has the same rate of employment for that given industry as does the nation. Anything less than 1 means Colorado has a lower rate of employment in that industry compared to the nation. Economists believe location quotients of 2.0 or higher point to significant employment advantage for a given area relative to the nation.

It is important to note that industry modeling only includes private sector data

Reading the table: The first column of data represents the rate of known employment change between 2001 and 2006; the next column represents 2006 employment, the next column the annual wage, the next column the projected rate of change between 2005 and 2015, and then the location quotient as explained above. The next five columns are then the rankings for those industries (in the same order of the five elements of data) compared to all other industries in Colorado.

For example: Looking at the second ranked industry, Oil and Gas Extraction we see that the known rate of employment change between 2001 and 2006 was 48.9%. Looking at the ranking column five over, we see that this represented the fifth highest rate of change of all industries in Colorado. Similarly, we see an average annual wage of $129,428 dollars for this industry; looking at the corresponding ranking column, we wee that this represented the highest wage of all industries in Colorado.

The final column represents the total for the preceding five columns. If the user chose to create an average ranking, they could take this composite total and divide it by five (the number of criteria ranked in the model.)

Occupational Modeling

Occupational modeling attempts to alleviate problems with looking at occupational data ranked by employment (which distorts the list towards entry-level jobs) or wages (distorts towards high-wage jobs) or growth (which does not factor in employment base or wage). Through occupational modeling we look at all three of these characteristics equally, by comparing each occupation against each other occupation in Colorado, and assigning a ranking of 1 to the best occupation, 2 to the next occupation, etc. We then add the rankings together, with the lowest total appearing first on the list. We believe this creates a list of "middle class jobs" that can become priorities of the workforce system.

Reading the table: The first column of data represents the employment total in 2005, the next column the projected total in 2015, the next the projected rate of change between 2005 and 2015, and finally the average annual wage. These are then assigned rankings and added together. We chose to rank the rate of change rather than the 2015 total because to rank them both would be placing double emphasis on the expected change. The Total Ranking Score then represents the cumulative ranking and determines the sort for the table.

About the Quartiles, Self-Employment and Education and Training: Each of these data elements are national; all other data in the charts are Colorado-specific data. Every occupation is assigned a national quartile ranking of unemployment and likelihood of part-time work. The quartile rankings represent national likelihoods and include these values: Very High, High, Low, and Very Low. The rate of self-employment represents the rate of jobs held by persons that report being self-employed. The education and training requirement indicates the lowest level of education and training acceptable for this occupation. These last four columns of data are national; all other data in this table is Colorado specific.

For example: Looking at the top ranked occupation, Computer Software Engineers-Applications, we see that the 2005 employment of 13,867 represents the 38th highest occupational employment compared to all other occupations in Colorado. As for quartiles, it has a low susceptibility to unemployment and a very low likelihood of being a part-time occupation. 2.4% of all jobs of this type in the U.S. are filled by self-employed persons.

Top Occupations by Employment: The chart below provides a look at the same criteria, but sorts the list based on 2005 employment. The first column indicates where the occupation ranks against other Colorado occupations based on the occupational modeling (e.g. retail salespersons is the 223rd ranked occupation using the modeling technique.

APPENDIX B: DEFINITIONS OF LOCAL AREAS

MSA/Area	County Code	County Name
Boulder - 14500	013	BOULDER
Co Springs - 17820	041	EL PASO
	119	TELLER
Denver - 19740	001	ADAMS
	005	ARAPAHOE
	014	BROOMFIELD
	019	CLEAR CREEK
	031	DENVER
	035	DOUGLAS
	039	ELBERT
	047	GILPIN
	059	JEFFERSON
	093	PARK

MSA/Area	County Code	County Name
Ft Collins - 22660	069	LARIMER
Grand Junction - 24300	077	MESA
Greeley - 24540	123	WELD
Pueblo - 39380	101	PUEBLO