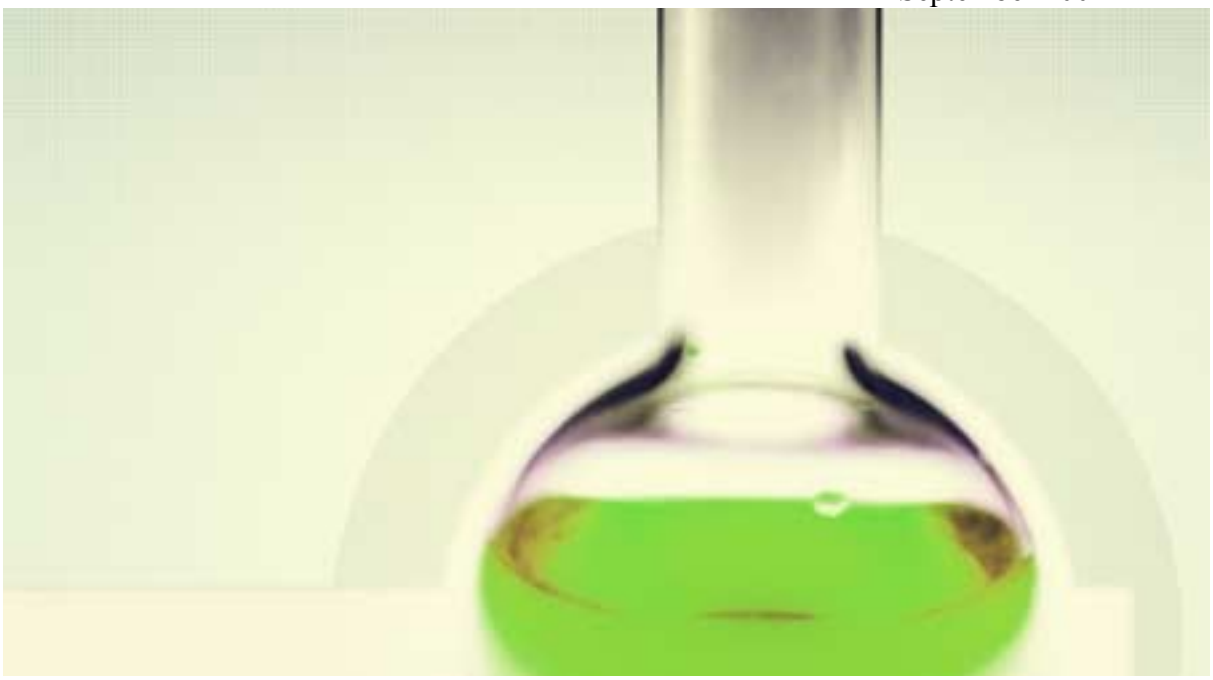
Colorado's Place in the Sun: A Bioscience Future

First Annual Implementation Report and Plan Amendment

September 2004



An Action Plan to Grow Colorado's Bioscience Cluster

State of Colorado Office of Economic Development and International Trade

Edited By: Mr. Anthony Del Vicario

ACKNOWLEDGEMENTS

The *Action Plan to Grow Colorado's Bioscience Cluster* was released in March 2003. During the 2003-2004, the Management Group which was formed to create the plan, met regularly to track progress on implementation of the three strategies and eighteen action items. This group decided to document the status of the industry and progress on the original plan by producing this first annual update of the *Action Plan*. Management Group members include:

David Allen, Assistant Vice President for Technology Transfer, University of Colorado
Holli Baumunk, Director, Economic Development, Metro Denver Economic Development Corporation
Denise Brown, Executive Director, Colorado BioScience Association
Kathleen Henry, President and CEO, Colorado State University Research Foundation
Christine Shapard, Director of Biosciences and Emerging Technologies, Colorado Office of Economic Development and International Trade

This report was compiled and edited by Anthony Del Vicario, a professional from the bioscience industry. As a volunteer, he worked over a six month period with the Management Group to complete the project.

The original 2003 plan was prepared by the Battelle Memorial Institute. This plan proved to be relevant, timely, and a good roadmap for all of the stakeholders. The comprehensive format and methodology employed by the consultants enhanced the Management Group's ability to both track implementation and update the report. The Management Group would also like to thank the industry representatives who gave their time and provided candid feedback which was invaluable to the plan update. Generous sponsors provided the resources for the 2003 Action Plan, including:

Amgen, Inc.
Colorado Economic Development Commission
Colorado Institute of Technology
Metro Denver Economic Development Corporation
IBM Corporation, Life Sciences
Governor's Office of Economic Development and International Trade

For additional information about either the 2003 Plan or this First Annual Implementation Report, contact:

Denise Brown
dbrown@cobioscience.com
720-859-4153

Christine Shapard
Christine.Shapard@busdev4.state.co.us
303-892-3850

Table of Contents

Executive Summary

In 2002 the Governor's Office of Innovation and Technology partnered with a management team that included industry, university and government representatives along with the Battelle Memorial Institute's Technology Partnership Practice to assess the status of the Colorado bioscience sector and ultimately develop a plan outlining the action agenda needed to make the biosciences a key driver of Colorado's economy. The report titled *Colorado's Place in the Sun: A Bioscience Future, An Action Plan to Grow Colorado's Bioscience Cluster* was published In March 2003. A little more than a year later, the Management Group that was formed to oversee the development of the Plan took the lead on drafting an update to this report. The resulting report provides an update to the original action plan including an industry update; report on progress of original goals, industry perspective and key findings and conclusions.

The bioscience industry in Colorado during 2003-2004 reflected the overall economy in the state; slow unsteady growth marked by a few key events which evolved into a more stable growth pattern during the last few months of 2003 and continuing through the first quarter of 2004. In late October-early November 2003 Myogen and Pharmion, two Colorado biotechnology companies, completed IPO's raising in excess of $150 million. (Rocky Mountain News). This increased the number of public biotechnology companies in Colorado to eight, up from six in 2002.

Other industry events of note included a May 2004 approval of the Pharmion drug Vidaza™, gaining orphan drug status for the treatment of MDS, myelodysplastic syndromes, a bone marrow disorder. OSI Pharmaceuticals, which is based in New York but operates a research and commercial facility in Boulder, received fast track status from the FDA for its oncology product Tarceva™ in April 2004. Pfizer, Inc. opened a regional sales office for its pharmaceutical business in Centennial in late 2003. Conversely, FeRx, a San Diego, CA company with research operations at the Fitzsimons incubator facility announced in May that it was closing its research facility in Colorado due to the failure of its experimental cancer treatment to show benefits in a clinical trial (Rocky Mountain News 5/26/2004). In December, 2003 Baxter Hemoglobin Therapeutics announced they were closing their facility in Boulder impacting 150 employees. Overall bioscience employment in Colorado grew slightly, up 1.0% from 2002-2003 as reported by the Colorado Department of Labor and Employment. The Colorado BioScience Association built a new database during the spring of 2004 in which it identified roughly 150 medical device companies and 100 biotechnology and pharmaceutical companies in Colorado. The number of bioscience establishments grew 3.2% from 2002-2003 also as reported by the Department of Labor and Employment. The disparity in establishments vs. companies is noted by the fact that multiple locations of a company can be counted as separate establishments as well as single employees for a company who are located in Colorado.

The original action plan to grow the bioscience cluster identified three main growth strategies. These included creating a business climate conducive to the growth of

bioscience companies, creating a bioscience entrepreneurial culture that turns research discoveries into new products, services and companies and expanding the research base and building research excellence. There were quite a few events and accomplishments over the past year towards the achievement of these three strategies which will be addressed later in the report. There were however a handful of key events which define the major initiatives over the past year. These include the creation of the Colorado BioScience Association, the creation of the Colorado Venture Capital Authority $50 million fund, the revitalized technology transfer development programs developed at CU and CSU, the continued build out at the former Fitzsimons site and the award of a Regional Biocontainment Laboratory to CSU coupled with the groundbreaking for the new Centers for Disease Control, CDC vector-borne disease control lab on the CSU Foothills Research campus.

One of the more prominent and potentially significant events for the bioscience industry was the passage and signing of Senate Bill 106 into legislation in March 2004. The legislation creates a new state venture capital program, the Colorado Venture Capital Authority, a $50 million venture fund for seed and early-stage investments for Colorado small and growing businesses. The oversight board for this ten year fund has recently been finalized and a selection of a fund manager will occur later this year.

In October 2003 the former Colorado Biotechnology Association and the Colorado Medical Device Association merged to create the Colorado BioScience Association (CBSA). As of spring 2004 membership in the new organization exceeds 270. A bioscience company database was recently created which identified over 250 Colorado biotechnology, pharmaceutical, medical device and natural products companies. CBSA will serve as the communication and advocacy link for the Colorado bioscience cluster. While this accomplishment may seem small in scale, it is critical in scope, establishing a more unified voice for the Colorado bioscience cluster.

CSU Research Foundation (CSURF) is investing in a model program via the CSURF Commercial Opportunity Fund, or COF. The fund was established in 2003 by the CSURF Board of Trustees for the purpose of providing financial support to increase the probability for commercial success of promising and commercially viable technologies developed in university research.

Similarly, the CU Technology Transfer Office will begin the execution of a Proof of Concept (POC) program in early fall 2004. The POC program is specifically designed to make awards to University investigators whose inventions have the potential to become platform technologies supporting the creation of new companies. The funding will help carry an invention across the divide between research funding and market directed commercial investment.

The Certificates of Participation (COP's) for the education infrastructure at Fitzsimons were approved in 2003. Other planning is proceeding, including the relocation of The Children's Hospital which broke ground in early 2004. The current plan has UCHSC development being substantially concluded by 2007. Research One is planning an

October, 2004 opening. May 2004 the White House approved a plan to overhaul the Veterans Affairs system including a new VA hospital at the Fitzsimons site opening in 2008.

The Centers for Disease Control, CDC, is supporting a significant expansion of the BioSafety Level 3 labs at CSU. Work is scheduled to begin in August 2004. The US Department of Agriculture and the CDC continue to work closely with CSU on biosecurity programs to include proposals to the Department of Homeland Security and the National Institute for Allergy and Infectious Disease (NIAID).

Local governments, economic development agencies and private developers increased their planning and dedication of resources to support the industry. A prominent example is the designation of the new Bioscience Park at Stapleton announced by Forest City Developers in 2003.

While these major initiatives are an indication that progress has been made towards the realization of the action plan outlined in the original plan, much work remains to be done. There are still significant issues and areas which need to be addressed. Some of the most prominent include the lack of a comprehensive industry communications strategy and plan, a strong understanding of the workforce requirements for the next decade and a well defined, executable strategy for industry and the research institutions to more robustly collaborate. Specifically, they must find a way to mine the research infrastructure for new technologies, products and services, ultimately turning them into successful firms. Colorado's research institutions, industry, venture firms and academia all echo this need. A recent panel on the Growth Opportunities and Challenges of Colorado's Emerging Biotechnology Industry identified the university relationship with industry, investment in technology transfer and a free flow of technology out of research and universities as critical to the success of the biotechnology industry in Colorado.

Section I: Industry Update

This section will include data updates from the Colorado Department of Labor and Employment as well as reference the following reports and presentations: the Ernst &Young Global Biotechnology Report 2004; the Battelle Health and Life Sciences State Bioscience Initiatives 2004 report; Frost & Sullivan 2003 Outlook of the Medical Devices Industry; Pricewaterhouse Coopers Trends in Public and Private Equity Markets Presentation; Burrill & Company State of the Biotechnology Industry…Circa 2004 report; and the ccintellect/Denver Business Journal technology index survey. Links to the reports, companies and contact information where available, can be found in Appendix D.

In 2003 there were seven biotechnology company IPOs in the US, all of which occurred in the fourth quarter and two of which are Colorado companies. The 33% increase in Colorado public biotechs brought the total to eight statewide. These eight companies increased revenues by 28% to $134 million, reduced losses 244% to $134 million and grew their market capitalization 153% to $1.74 billion, as reported by Ernst & Young.

Colorado was one of 15 Regions/states in the E&Y report and it ranked near the bottom, a reflection on the number of public companies. Burrill & Co. reported 17 biotechnology IPOs in the first five months of 2004 during its presentation at the BIO 2004 Conference, further indication of the sector recovery. Pricewaterhouse Coopers reported another 4 IPOs in June, bringing the US total to 21 for the first half of 2004. PwC also noted the trend towards later stage development pipelines for the IPOs reflecting an effort to reduce risk. In 2003 the US biotechnology industry measured 315 public companies, revenue of $45.2 billion, R&D of $13.3 billion, and a market capitalization of $342 billion as noted by Burrill/E&Y.

Pricewaterhouse Coopers reported on the Trends in Public and Private Equity Markets at a July meeting organized by the CBSA. Looking at the venture capital trends, PwC reported that biotechnology and medical devices were ranked number 3 and 5 respectively for the top venture capital sectors in 2002 and ranked 2 and 5 in 2003. In quarter 1, 2004, a total of $1.3 billion was invested in the lifesciences, with $325 million going to medical device companies and just under $1 billion to biotechnology companies. The $1.3 billion represented 28% of the total $4.6 billion invested in the first quarter this year, an increase over the 23% lifescience investments in 2002 and 27% in 2003.

Another positive growth indicator for the bioscience sector is the collaborations with "Big Pharma." While down slightly from 2002, there were 384 biotechnology/pharma collaborations in 2003 as reported by Burrill & Co. This strategic partnering trend is expected to continue, with the pharmaceutical industry looking towards biotechnology companies to bolster its development pipeline.

The number of public companies, venture capital investments and biotech/pharma collaborations are important barometers of industry size, strength and viability at the national level, however regional and state activity is growing rapidly. In its 2004 report, Battelle noted that only 14 states were targeting biosciences in 2001, a number which has now jumped to 40. Battelle further reports that 24 states have a sizable employment base in one bioscience industry sub-sector and 33 states have a specialization (as defined by location quotients*) in at least one industry sub-sector.

*Location quotients (LQ) are a common measure of the concentration of a particular industry or industry sector in a region relative to a reference area. A location quotient greater than 1.0 indicates that the region is relatively concentrated in the particular industry. In this report, location quotients are used to report state industry concentrations relative to the US. (As noted in the original Battelle report, page 12)

The Battelle report identified 4 bioscience industry sub-sectors including Agriculture Chemicals and Feedstocks, Drugs and Pharmaceuticals, Medical Devices and Equipment, and Research and Testing. A fifth sub-sector, Hospitals and Laboratories is typically excluded from the bioscience sector because of the difficulty in separating research hospitals, institutes and academic health centers from the overall hospital sector. This sector is also excluded from the Colorado Department of Labor and Employment bioscience data as well. Total US employment in the four sub-sectors exceeds 885,000 as reported by Battelle. Colorado employment accounts for less than 2% of the total.

Table: Employment % by Sub-sector

	Ag Chem/Feed	Drugs/Pharma	Med Dev/Equip	Research/Test
National	17%	33%	37%	13%
Colorado	1.9%	20.4%	51.5%	26.2%

*Note: National data from Battelle, Colorado data from Colorado Department of Labor and Employment.

As noted in the table above, Colorado's concentration in the Medical Device and Research and Testing sub-sectors, responsible for 78% of bioscience employment, results in greater than average location quotients for those sub-sectors. Colorado has a specialization (LQ>1.20) in the Medical Devices and Equipment sub-sector with a location quotient rating of 1.38 (Battelle). Thirteen other states also have a specialization in this sub-sector. In the Research and Testing sub-sector, Colorado is one of two states with a concentration (1.2>LQ≥1.0) as defined by its location quotient of 1.07 (Battelle). Only nine states have a specialization in this sub-sector.

The Colorado Department of Labor and Employment publishes a Quarterly Census of Employment and Wages or QCEW report, formerly the ES-202 report. Key measures include employment, wages and establishments. A direct comparison to the Battelle statistics reported in 2003 is difficult due to the fact that the Battelle figures are based on calculations made to the ES-202 data. This year's report will effectively serve as a benchmark to use in future years with the data coming from the state Department of Labor and Employment's QCEW report, utilizing NAICS (North American Industry Classification System) Codes. Due to the fact that selected NAICS codes include sectors beyond the biosciences, some calculations are necessary to arrive at "final" figures.

Based on a comparison of 2003 and 2002 QCEW data, the Colorado bioscience sector saw minimal employment growth (+1.0%), more aggressive wage growth (+11.1%) and moderate growth in establishments (+3.2%). Bioscience employment was slightly above 14,300 in December 2003, annual wages (as measured by Quarter 4, 2003 wages) rose to just over $63,800 and the number of establishments measured just above 430. While the one year metrics are a positive indicator of growth, the two year trend for employment shows that we have not fully recovered from the job losses sustained in 2002. The following table shows percent (%) change for employment, wages and establishments across the four industry sub-sectors noted above:

Table: % Change in Colorado Employment, Wages and Establishment by Sub-sector

2003 vs. 2002	Ag Chem/Feed	Drugs/Pharma	Med Dev/Equip	Research/Test
Employment	22.4%	7.8%	-3.2%	3.6%
Wages	49.3%	10.7%	6.5%	16.7%
Establishments	25%	-10.9%	2.1%	6.2%

*Note: Employment was measured by comparing Dec., 2003 to Dec., 2002. Wages were measured by comparing Q4, 2003 to Q4, 2002 and projecting annually. Establishments were measured by comparing Q4, 2003 to Q4, 2002.

While the Agricultural Feedstock and Chemicals sub-sector appears to show significant growth, the small size of the sector results in significant % changes. As noted above, this sub-sector is responsible for less than 2% of state employment in the biosciences. Overall, the state bioscience sector showed less growth in employment than in establishments. This could be a reflection of the downsizing or elimination of establishments coupled with the new establishments not being in a position to absorb the employee populations of the establishments which are downsizing or exiting the market.

During interviews with industry executives, the concern that Colorado has a limited window of opportunity to establish itself as a bioscience sector nationally was raised. The increase in the number of states targeting the biosciences supports this concern. Battelle further reported that states were making significant investments in the sector as noted by the $510 million investment in the Scripps Florida Biotechnology Research Institute and the $440 million investment in Arizona state university bioscience facilities. Over 20 states used a portion of their tobacco settlement funds for bioscience research in 2003. Of the various initiatives defined by Battelle, Colorado was specifically noted for its "university related research parks," a distinction shared by 31 other states. A review of the key initiatives shows that Colorado has efforts underway in the majority of initiatives defined and thus compares favorably. While this should be viewed positively, there should also be a sense of urgency in accomplishing the key initiatives, lest Colorado find itself looking at the states that have passed it by in bioscience sector development. Finally, while there are significant efforts underway at the state level, each state has its own priorities, resources and specific areas of focus.

The medical device industry was the subject of focus in a Frost & Sullivan 2003 report on the Outlook of the Medical Devices Industry. The US Medical Device market projected $63.2 billion in revenues in 2003, with projections of $68.9 billion (+9%) in 2004 and $74.5 billion (+8.1%) in 2005. In a further breakdown of sales, large companies ($500 million +) generated 65% of the revenues. Medium companies ($100-499 million) and small companies ($0-99 million) were responsible for 25% and 10% respectively. F&S reported that global opportunities are prevalent in this industry with a trade surplus between $4-5 billion each year. The Cardiovascular market is the largest of the medical device markets, with revenues of $14.7 billion worldwide reported. Hotter growth sectors include among others, cardiovascular, orthopedics, minimally-invasive applications, drug delivery and chronic conditions.

Frost & Sullivan identified five strategies to maximize growth opportunities:

- Continuum-Based Strategies
    - Identify bottlenecks and development opportunities in a given technology's usage process.
- Synergy Strategies
    - Combine multiple technology areas to develop better therapies and improved outcomes

- Platform Leveraging Strategies

    - Apply existing technologies in new ways to reduce costs/expand use
- Redefinition Strategies
    - Redefine traditional technologies to increase growth
- Demographic Strategies
    - Identify new opportunities based upon changing disease patterns, populations and patient preferences

In April and May of 2004 ccintellect and the Denver Business Journal fielded a technology index survey. Over 215 responses representing over 180 companies were received, with the largest subset of 38 (17%) responses from the bioscience community. (See Appendix C for the bioscience data supplement). Further inspection of the bioscience data revealed some interesting conclusions, relative to the overall survey. Bioscience subset responders were optimistic in their expectations of performance in the coming 6 months (July – December 2004) with 74% expecting an increase in revenues and 68% expecting an increase in profits, though the overall survey responders were even more optimistic with 79% and 73% expecting increases accordingly. Reflecting a national trend, 45% of bioscience responders reported receiving funding in 2003 as compared to 22% of the overall survey. Bioscience responders were equally optimistic when compared to overall responders in that they expected to increase employment in R&D/Technical and Sales/Marketing/Business Development in the first half of 2004 as compared to the second half of 2003. Accordingly, the bioscience responders reported an expected budgeted increase in R&D/Technical (68%) and Sales/Marketing (66%). When asked about their overall level of satisfaction with doing business in Colorado, the bioscience responders were 63% "completely satisfied or somewhat satisfied" versus 57% of the overall survey (a significant increase over the 38% rating in 2003). Yet of those, only 5% of bioscience responders and 10% overall survey responders were "completely satisfied," an indication that while Colorado is performing relatively well on this rating there is still room for improvement.

In terms of "importance to your success as a business," both the overall survey and bioscience subset identified "Pro-business state and local government," "a growing economy," and "low/moderate costs of doing business" as the top three responses. However when looking at the overall level of satisfaction with Colorado as a business location, those same responses ranked 4th, 5th and 6th overall. In the bioscience subset, 2 of the bottom 3 responses for overall level of satisfaction were "availability of venture capital" at 11% and "incentives from state and local government" also at 11%, a finding echoed in interviews with other stakeholders for the plan update.

Section II: Plan Approach

The March 2003 original report sought the input of state research institution leaders, researchers, entrepreneurs, CEOs of bioscience companies, economic development organizations and other service providers in order to determine what specifically needed to be done to ensure that Colorado fully realized the opportunities resulting from the revolutionary changes occurring in the biosciences. As part of this update, key

stakeholders and contributors to the original plan were re-interviewed to gain their feedback and perspective on progress against initiatives, the original strategy and action plan, industry perspective and their thoughts on a revised action plan for the next twelve months. Selected key data points provided in the initial report were also updated for this report. Due to the inability to replicate all the key data points found in the original report, a decision was made to only include key data points which can be updated going forward.

One segment of the original report examined the foremost bioscience regions around the country and identified key success factors which enabled these centers to achieve such successful growth.

- Engaged research organizations with active leadership across research, technology commercialization and industry partnerships;
- Intensive networking across sectors and with industry;
- Available indigenous capital covering all stages of the business cycle;
- Discretionary federal or other R&D funding support;
- Workforce and talent pool on which to build and sustain efforts;
- Access to specialized facilities and equipment; stable and supportive business, tax and regulatory policies; and
- Patience and a long-term perspective

These are the eight key success factors that enabled San Diego, San Francisco, Boston and other premier regions to achieve their growth. A recent Battelle Memorial Institute report which studied bioscience growth across the nation identified these same key success factors for bioscience clusters to achieve successful results. In the original report Colorado was compared to the "Best Practice Bioscience Regions" in order to determine our strengths and weaknesses as well as identify opportunities and threats to our growth. The results of that analysis formed the foundations of the main strategies which became the basis of the original growth plan. The three key strategies were then further broken down into a series of high-level action items. This update to the original action plan revisits the key success factors, action items and overall strategies and addresses them in a roadmap for the next 12 months.

Section III: Report on Progress of Original Goals
Major Initiatives in 2003-2004

Strategy One: Create a business climate sensitive to and supportive of the needs and issues facing bioscience firms.

Action 1.1 Enact a Bioscience Package of tax incentives to be triggered as the state's economy improves, to support the growth of Colorado's bioscience companies.

- Given the fiscal environment of the State in 2003, a decision was made not to pursue new tax incentives that would have a negative impact on revenues in 2004. With recent indications that the fiscal climate is improving, CBSA and OED are

exploring initiatives of other states that have resulted in legislation that has created a positive tax environment and/or an entrepreneurial climate.
- CBSA and OED are tasked with an education effort with state level elected officials during the 2004 interim to begin to re-introduce the idea of NOL legislation for subsequent sessions.
- The Metro Denver Economic Development Corporation is developing strategies to recruit and retain bioscience industry in Colorado. The MDEDC is uniquely situated to mobilize regional resources and provide leadership and programs to support their strategies. The MDEDC has committed funding and provided leadership as a partner in many key 2003-2004 projects (see 1.6 below). MDEDC's contributions have been especially significant in the funding and implementation of the 2003 State Plan.

Action 1.2 Appoint a high-level Bioscience Advocate within state government.

- This objective has been met with the appointment of the Director, Biosciences and Emerging Technologies Initiative in the Governor's Office of Economic Development and International Trade. As such, the remaining initiatives for this action item have been consolidated under Action 1.5.

Action 1.3 Review and ensure that state Medicaid policies relating to pharmaceuticals do not discourage building the bioscience industry in Colorado.

- In 2003/2004 CBSA testified against pricing legislation in Colorado in order to emphasize the negative impact on Colorado bioscience companies when fair reimbursement for products is threatened. For this reason and because of critical issues related to public safety and health, CBSA also lobbied against the reimportation initiatives and supported strengthening intellectual property laws nationally and internationally.

Action 1.4 Strengthen the voice of the bioscience industry in Colorado by forming a unified Bioscience Industry Association

- This goal has been met by the creation of the Colorado BioScience Association in late 2003. The new goal is to address the larger technology community by fostering a relationship so that artificial barriers or definitions do not form as the various technologies unite in product creation in the marketplace.
- CBSA will act as necessary to mobilize and organize Colorado's industry relative to key national issues. CBSA will continue to work with the leadership of other bioscience industry affiliated groups such as CPIA (Colorado Photonics Industry Association), CNI (Colorado Nanotech Initiative) and CSIA (Colorado Software and Internet Association) to ensure a unified industry voice and maximize opportunities for collaboration.
- In spring 2004 a Colorado Entrepreneurial Hothouse Initiative was created. The initiative is aimed at unifying all sectors of the entrepreneurial community and turning Colorado into an entrepreneurial hothouse through targeted, supported

initiatives. Stakeholder groups, such as CBSA, will support these and other similar efforts that are consistent with the Colorado BioScience Cluster Growth Plan.

Action 1.5 Create a focus on the biosciences within the Governor's Office of Economic Development and International Trade.

- This goal has been significantly bolstered by the appointment of Christine Shapard to the position of Director, Biosciences and Emerging Technologies Initiative. The new Office has identified resources for specific projects and events and is currently fundraising on a project by project basis.
- OED continued to provide leadership in strategic activities in 2004 by assuming a lead role in BioWest 2004 with the support of FRA and CBSA. Over 500 attendees are expected to attend the conference. In 2004 the OED increased state visibility at the MDMA (Medical Device Manufacturers Association) annual meeting and substantially increased state visibility at the 2004 BIO Conference with the creation of the Colorado Pavilion at the trade show.
- In June 2004 OED hosted trade development representatives from Australia, Belgium, Canada, Germany, Israel, Japan, the Netherlands and the United Kingdom for a two day program on Colorado's bioscience and IT industries.
- Also in June 2004 OED took a trade mission to Shanghai, China in support of a Colorado bioscience company looking to enter the market in China.
- OED continues to market existing business incentives for biotechnology companies, such as enterprise zones, research and development tax credits. Active recruitment efforts have significantly increased with the appointment of the Director.
- The OEDIT formed the "Advance Colorado Center" in September 2004 to foster the growth of fledgling non-profit associations and business support programs that will meet the needs of targeted industries within Colorado. Recognizing the importance of the bioscience industry to Colorado's growth, the first approved tenant of the new center will be the Colorado Bioscience Association.

Action 1.6 Develop and implement an industry-led, comprehensive communications strategy to educate and inform citizenry, elected officials, the nation and the world about Colorado biosciences.

- In 2003, the brochure *Biotech is Booming in Colorado* was created to highlight the current state of the biotechnology and life science sectors in Colorado and to identify key resources that may be contacted by parties interested in the advantages and benefits that Colorado has to offer.
- In June 2004, the *BioScience Colorado* magazine was created to inform and promote Colorado's bioscience industry. The magazine was a joint effort of the OED and CBSA. The 40 page magazine will be distributed at trade shows, to local media, elected officials, national site selector consultants, venture capital firms, and interested individuals and groups. Over 11,000 copies have been

published and CBSA will update this important communication vehicle on at least an annual basis.

- OED will integrate a life sciences component in its efforts to market partnering opportunities with international companies. OED will continue to coordinate international and national efforts with the Metro Denver Economic Development Corporation (MDEDC) and local economic development councils as noted in Action 1.5. OED has included the bioscience sector in its marketing activities, i.e. the OED DVD.
- The OED Statewide Emerging Industry Study, entitled *Colorado's Economic Opportunities: Today, Tomorrow and the Future* was released in January 2004 and provides information about regionally based opportunities for the development of biosciences. Upon the release of the study, the management group will incorporate the findings into the state implementation plan.
- A bioscience portal on the state website is being developed under OED and will list companies, service providers, and rationale for why Colorado is best for bioscience. Target Q4 2004.
- The OED will distribute a twice monthly email newsletter specific to the biosciences and emerging technologies. Target: August 2004
- In July 2003, Governor Owens and Denver Mayor Hickenlooper led a trade visit to the West Coast and as a result a large number of contacts with the VC community in California were made. OED followed-up on those contacts at the BIO Conference in June 2004.
- CBSA assists in providing timely, relevant information about Colorado's bioscience companies to economic development agencies to support their marketing and recruitment efforts. CBSA has developed a referral protocol with OED as well as with its companies related to relocation and expansion.
- The Metro Denver Economic Development Corporation is raising significant funds for a five year national marketing campaign. $12 million has been raised to support this effort. The management group will work with MDEDC in providing bioscience messages and strategies for recruitment and retention.The MDEDC has identified the bioscience sector as a key priority within their strategic plans to promote the region. This decision was supported by MDEDC's additional survey work and analysis of Colorado's bioscience industry. The MDEDC is supporting Colorado's bid to host BIO 2010 and has partnered on key initiatives including: BioWest 2004, The *Bioscience Colorado* magazine, BIO 2004, and the Medical Device Manufacturers Trade Show.

Action 1.7 Use the Colorado Institute of Technology to work with industry to identify and address emerging bioscience workforce needs at all levels.

- Early Fall 2004, CBSA will establish a workforce committee comprised of representatives from the public four and two year universities and colleges as well as private schools and industry to identify workforce training and education needs. This effort will be coordinated with the Colorado Institute of Technology and will focus on developing work skills sets required by the industry and projections for creation of new jobs. Related issues including internships, job

websites, etc., will be addressed as components of this effort. A working conference will be held in during the winter of 2004-2005 with representatives of higher education and the bioscience industry.

- The OED is coordinating its biosciences recruitment and retention efforts with CIT, to ensure that CIT understands the industry's needs and is able to respond.
- The Biosciences programs at the Community College of Aurora, the certificate and degree programs in computational biology at UCD, the bioscience program at Metro State College, the graduate programs in bioinformatics at the CU Health Sciences Center and the CU Colorado Springs certificate program continue to develop and are supporting the retraining effort for bioscience industry workers. All these programs represent key educational efforts which are providing the workforce for Colorado's bioscience industry. Despite a difficult economy, Colorado's higher institutions are maintaining and expanding these programs due to their importance.
- The State's business schools and colleges are aware of the opportunities that the bioscience industry creates for their graduates and are actively seeking avenues to establish new internship programs and coordinate with the industry to ensure that graduates have appropriate skill sets required to be successful. For example, CU, CSU, and UNC continue to build their entrepreneurship programs, which have the best curriculum for entering the bioscience sector.

<u>Strategy Two</u>: Grow the State's bioscience cluster by creating a bioscience entrepreneurial culture that turns research discoveries into new products and services and cutting edge firms and provides appropriate incentives to research institutions and industry.

Action 2.1 Provide comprehensive in-depth entrepreneurial assistance to bioscience entrepreneurs and companies.

- The OED and IT are trying to implement a number of key activities such as increasing access to capital, providing technical assistance, improving regulatory and licensing environments, building intellectual capacity at state universities, creating industry clusters and improving entrepreneurship education by supporting and investing in incubators such as CTEK which in turn are offering high tech entrepreneurial assistance to start-ups.
- CBSA, working with the Management Team, will convene a working session with front-range stakeholders, with an emphasis on participation by incubator managers, to understand current entrepreneurial infrastructure and related resources. Gaps will be identified and, to the extent possible, the group will identify strategies to address gaps and/or reduce duplication. The initial target for this session was early 2004, but the timeframe has been revised to early 2005. A template for identifying comprehensive entrepreneurial services has been provided by the Battelle Memorial Institute.
- CU's Technology Transfer Office initiated the Colorado Technology Commercialization Partnership (CTCP) program in the summer of 2003, in conjunction with the CU Leeds School of Business, local volunteers and

advocates from the Front Range business community and funded in part by a grant from the Colorado Institute of Technology. The purpose of the pilot program was to assess potential and examine processes that broaden the capacity of the TTO. Based on the success of the program CU's TTO expanded the program for the summer of 2004 and has applied to the National Science Foundation for a grant to support the CTCP program for three years.

- The Fort Collins Business Incubator is providing valuable start-up services to entrepreneurs. A Fort Collins bioscience planning group has been formed which is developing a local implementation plan for the industry. This effort is unique and may be useful as a model for local planning by other regions within the State. The effort includes the offices of the Mayor, City Manager, Northern Colorado Economic Development Council, as well as local bioscience companies and CSU. The effort is led by the Fort Collins Incubator. The goal of the effort to "localize" action items from the State Plan.
- CTEK technology incubator has started to provide services to biotechnology companies and is creating new expertise within their organization to further serve the bioscience industry.
- CTEK has recently merged with CVC and renamed the new organization CTEK Venture Centers. The business model will change somewhat by creating business catalysts across the state.
- The Fitzsimons Redevelopment Authority is expanding development options and may seek a private sector development partner to accelerate the growth of the bioscience park. FRA has initiated a program to outsource entrepreneurial education and training assistance services for the incubator companies in residence since it does not have the resources to do so in-house. The Service Provider and Outsource Referral programs fall within the "best practices" established for incubators.

Action 2.2 Create a privately managed Colorado Bioscience Seed Fund and encourage a bioscience focus for angel investor networks.

- CTEK is introducing bioscience companies to their Angel network. New financings occurred through the network in 2004.
- Up to three private funds which would target seed stage investments in Colorado are currently under development. Announcements are expected from at least one of these efforts before the end of 2004.

Action 2.3 Enact legislation that would use state tax credits to guarantee investments in private venture capital companies willing to invest in Colorado companies.

- OED, along with numerous industry and research partners strongly supported the passage of Senate Bill 106 which was signed into legislation in March 2004. The legislation creates a new state venture capital program by terminating the second half of the original CAPCO program. The new program, titled the Colorado Venture Capital Authority creates a $50 million venture fund which will be available over a 10 year period for Colorado seed and early-stage investments for

small and growing businesses. One quarter of the funds will be earmarked specifically for investments in rural Colorado and another quarter to companies locating in distressed urban areas. A fund manager or managers will be selected later this year and CBSA is encouraging the new Board to establish one designated biosciences fund.

Action 2.4 Undertake activities that celebrate successful bioscience role models.

- CBSA-sponsored events, such as Bio Breakfast and Life Science Thursday are designed, in part, to highlight the accomplishments and innovation of Colorado life science companies. At least 8 of 45 total programs in 2004 are highlighting Colorado's successes.
- BioWest 2004 will provide a more visible opportunity to celebrate Colorado successes in October. The conference will include a Technology Transfer Showcase which will highlight technology transfer successes and focus on the actions and strategies leading to those successes.
- CU holds an Annual Technology Transfer Awards event in late October, provides cash awards to faculty and an Annual Award which is placed in the "Pinnacles of Invention" a CU technology transfer Hall of Fame.
- A new CU e-newsletter was started during summer 2004. Over the next year a new publication will highlight CU faculty technology transfer success. The TTO is also developing an Inventor Handbook with outside contractors including the DaVinci Institute.
- CU TTO is coordinating events involving all Colorado research organizations as part of the Technology Transfer Showcase at BioWest 2004. More information on CU TTO can be found at www.cu.edu/techtransfer
- The CSU technology transfer program celebrates successes at an awards banquet in January of each year. The Technology Transfer Award recipient is usually a university faculty member. An Awards Banquet booklet which identifies Honored Researchers and Issued Patents Issued in the past year is published and distributed.
- Throughout the year a quarterly e-newsletter highlights successful technology transfer efforts and past e-newsletters can be found on the CSURF web site at www.csurf.org

Action 2.5 Explore opportunities to establish plant and animal based pharmaceutical and nutraceuticals production within Colorado.

- Elbert County is moving forward with a biomass generator and plant and an animal based pharmaceutical park. Feasibility studies are being completed with funding assistance from the Colorado Department of Local Affairs.
- Key stakeholders worked to prevent legislation that would have created a duplicative regulatory environment for plant based pharmaceutical industry. Key stakeholders worked with the State Department of Agriculture to create the state process and support that department's reasonable and responsible position in the state's role to participate in the regulatory process. The State Department of

Agriculture held public hearings across the State that explained the science behind plant based pharmaceuticals and allowed the public the ability to provide comment.

- CBSA and other stakeholders will create strategies to support manufacturing and production opportunities in Colorado. Colorado Corn Growers took a significant lead in the development of opportunities related to Meristem, a French pharmaceutical company. The Corn Growers sponsored a trip to France with Colorado legislators and other policy makers to visit the Meristem operations. Meristem visited Colorado in November, 2003. Unfortunately the Meristem opportunity did not materialize however a model for responding to these types of opportunities was developed.
- The role of CSU as the preeminent science resource related to these issues will be supported and promoted. The CSU public policy center is currently working on a paper regarding the complex and numerous issues associated with growing and processing plant made pharmaceuticals. As this industry grows in Colorado, the ability of our science programs to keep pace is essential. Therefore, funds for related research efforts will be sought by key stakeholders.

Action 2.6 Continue to build and strengthen technology transfer/commercialization capacity of universities.

- Colorado's research institutions require increased technology transfer resources to meet the demands and expectations of university investigators, the industry and other stakeholders.
- A committee of CBSA members has outlined an agenda regarding technology transfer and sponsored research issues it believes are relevant to supporting the continued improvement and growth of Colorado's research institutions' commercialization and industry collaboration efforts. CBSA will engage each institution in separate dialogue and planning process meetings using the new agenda as a guide for discussions. Research institutions will be asked to add items to the agenda.
- In 2002 the CU TTO developed a long term strategic plan. TTO revisited the strategic plan in a 2003-2004 Action Plan and determined that it remained a viable road map. A 2004 annual report will be released in August.
- See Table below for Technology Transfer statistics for FY 2003-2004 for CU, CSURF and National Jewish
- NJH developed a plan for a gap funding mechanism to invest in technologies and will be seeking funding to implement those plans in FY 2005.
- At CSU/CSURF, a robust examination of peer institutions has been undertaken and a revamped tech transfer operation should be announced by CSURF and CSU by the end of the calendar year.

Technology Transfer Statistics for FY 2003-2004

	CU Total	CU Bioscience	CSURF Total	CSURF Bioscience	National Jewish
Invention Disclosures	147	87	46	30	10
Patent Applications*	100	62	31	21	3
Issued Patents*	18	11	10	4	3
Licenses/ Options	42	16 (8 Colorado)	8	6	16
Start-ups	9	5 all Colorado	2	1	1
Licensing Revenue	$8.5 million	$5.8 million	$0.74 million	$0.65 million	$0.76 million

*US Only

Action 2.7 Create Technology Development Funds to support proof of concept and other commercialization activities.

- CSURF is investing $100,000 in a model program in the current year via the CSURF Commercial Opportunity Fund, or COF. The fund was established in 2003 by the CSURF Board of Trustees for the purpose of providing financial support to increase the probability for commercial success of promising and commercially viable technologies developed in university research. The COF financial assistance is not for basic research activities but rather for developing technologies to the point they are commercially viable. The COF financial assistance will be recovered before other royalty payments are made and the funds will be made available for future projects.
- The CU TTO will begin the execution of a Proof of Concept (POC) early fall 2004. The POC program is specifically designed to make awards to University investigators whose inventions have the potential to become platform technologies supporting the creation of new companies. The funding that POC provides will help carry an invention across the divide between research funding and market directed commercial investment. The POC program will utilize the University License Equity Holdings Incorporated (ULEHI) to launch the start-up businesses. It is anticipated that approximately $300,000 will be available for FY 2004-2005 and the awards will be in the $50,000 to $100,000 range.

Strategy Three: Expand the research base and build research excellence in the state's bioscience niches.

Action 3.1 Complete full physical development of UCHSC/UCH Fitzsimons Campus to help anchor Colorado's bioscience research base for the future.

- The COP's for the education infrastructure at Fitzsimons were approved in 2003. Other planning is proceeding, including the relocation of The Children's Hospital which broke ground in early 2004 (CS). The current plan has UCHSC development being substantially concluded by 2007. Research One is planning an October, 2004 opening and construction has begun on the new Barbara Davis Center, which will house clinical and research activities. University Hospital inpatient facilities are nearing completion and the VA hospital will move to the site by 2008. A new research and clinical center focusing on addiction has been added to the plan.
- In early 2004 the Board of Directors of the Fitzsimons Redevelopment Authority, in anticipation of identifying a new Executive Director for the FRA, initiated an exercise to assess past progress and determine the future direction and vision for the Authority. The board held a number of discussions which led to the formulation of a new Vision Statement (See Appendix B for the Statement and Implementing Principles) and a commitment towards a more entrepreneurial approach in the development of Fitzsimons.

Action 3.2 Encourage collaborative partnerships between academic research and industry by providing funding for collaborative university/industry applied research projects, streamlining industry contracting, and designating an industry liaison.

- University technology transfer groups have developed programs that provide pre-venture funding much like the old CATI program. Due to university funding of the CU POC and the CSURF COF, these programs are limited in their capacity to address funding needs of the majority of promising new technology companies emerging from these universities. Both CU and CSU are actively seeking partners that can leverage their early stage funding programs through side by side, or other syndication type approaches to address this critical gap funding need.
- The FRA in conjunction with UCHSC developed a database designed to identify research areas and expertise that can be shared with industry. While it does not offer funding, it creates the ability to help identify collaboration opportunities between industry and the university This is the first step in creating a statewide database for all research institutions.

Action 3.3 Identify opportunities and compete for national and federal institutes and centers of excellence in Colorado's bioscience niche areas.

- The NNSA Sandia National Labs signed a memorandum of understanding with CU Colorado Springs for future collaborations in May 2004.
- A four-fold expansion of the BioSafety Level 3 labs at CSU is scheduled to begin in the summer 2004 and will be supported by the CDC.
- The USDA and CDC continue to work closely with CSU on biosecurity programs to include proposals to the Department of Homeland Security and the National Institute for Allergy and Infectious Disease (NIAID). The new NIAID funded

Regional Biocontainment Laboratory at CSU will offer opportunities for private sector collaboration in the area of developing new vaccines, therapeutics and diagnostics for emerging infectious diseases.

Action 3.4 Develop a pilot program of product development and technical assistance support for the medical device, advanced manufacturing and bioagricultural development industries.

- No progress has been made towards this initiative.

Section IV: Industry Perspective

Part of the update process included a return to some of the original industry members interviewed by the Battelle Institute. The purpose was to gain their perspective on the progress made as an industry over the past year, to gain their feedback regarding the overall growth strategies and finally to assess whether they had the resources required to drive success available to them. The feedback from the participants has been presented below in a manner to highlight themes, supported with some specific comments where appropriate.

At a high level, the industry assessment of how Colorado has progressed as a bioscience cluster ranges from the sentiment that "much has been accomplished" to the other end of the spectrum where "very little if anything significant" has been accomplished. Upon further questioning most industry representatives agreed that there have been accomplishments towards the goals outlined in the original Growth Plan but that in some cases these accomplishments have been relatively minor.

As group, the industry representatives remained optimistic that the Colorado bioscience industry will continue to grow, though some expressed concern that there is a narrow window of opportunity for Colorado to establish itself nationally as a bioscience cluster. This fact is supported by data from the Battelle report noted earlier which identified 40 states as targeting the biosciences. Colorado is not currently known as having a strong bioscience presence. There were some universal comments and concerns. These generally related to the lack of angel and seed stage capital for the bioscience industry as well as the desire to see more firms created out of the technologies discovered in the universities and research institutions. Improvements in technology transfer efforts were noted by some representatives yet the relationship between university research and industry was found in need of more focus.

The representatives had mostly positive comments regarding the ongoing development at Fitzsimons and its capabilities as an incubator. In particular the more entrepreneurial approach recently communicated by FRA was positively noted though there were a few concerns that Colorado should have additional centers of excellence and not rely solely

on Fitzsimons. One respondent pointed out the opportunity to collaborate between the Fitzsimons and Stapleton redevelopment efforts.

While there was a universal call for more local seed/early stage funding, most representatives stated that it was their responsibility to secure the necessary resources and if they were doing their jobs successfully this would not be an issue. The other near universal comment was for the state government to take a stronger interest and play a larger role in supporting the bioscience industry though there was some skepticism that this could realistically occur, given the current economic/budget climate and other issues of focus.

Formation of the CBSA and its activity in the state legislature were identified as positive accomplishments. The continued growth of the association was noted though some participants noted the lack of medical device company presence in the association membership relative to the sector presence in state. The quantity and quality of educational programs being offered to entrepreneurs by CBSA and other local associations was noted as a significant improvement over the past year.

The ccintellect/Denver Business Journal Technology Index Survey also served to provide industry feedback and this information has been included in Section I Industry Update and also Appendix C. Some general themes that were not necessarily reflected in the hard data points but rather were intimated by the survey respondents included the need to get more venture capitalists (East coast and West coast) to set up local operations in Colorado, the need to get the local angel investor network more comfortable with bioscience investing and finally to communicate nationally that Colorado is not closed for business.

Finally, communication was noted by most participants as another area for expanded focus. This came in a number of forms including communication (and cooperation) locally as well as generating a larger presence nationally. It was also noted that both the communication process and message content were equally important.

Overall, the industry representatives as a group were optimistic that Colorado would continue to grow the bioscience cluster, though most felt this would occur organically. Local funding, research/industry collaboration, increased activity at the state level and communication were cited as areas for continued and expanded efforts.

Section V: Findings and Conclusions

Over the past 15 months a significant number of initiatives have been addressed with some being fully completed. While there is a general sentiment that “much has been accomplished” there is still a cautious optimism that pervades the bioscience community. The greatest mistake that can be made at this time is to focus wholly on the successes. While there must be an appropriate recognition and celebration of the successes, there must be an even greater focus on the significant issues that must continue to be addressed

as well as those that have not yet been addressed at all. This section will identify positive findings, completed initiatives and areas of continued or new focus Additionally, Appendix A takes Table ES-5: Summary of Proposed Strategies and Actions from the original plan and updates it to identify where initiatives have been completed, where new or refocused initiatives have been identified and where renewed or intensified efforts are required.

Progress has been made towards the achievement of all three strategies, though in some areas the progress is clearly more advanced than others. The key stakeholders are more organized now than ever before given the activities of the CBSA and other organizations at the leadership level. Priorities have been acknowledged both in the original plan and again in this first update. The original action plan and now this update provide a framework from which to grow a successful bioscience cluster. Most action items identified in the original plan are still relevant and this update addresses those that are no longer relevant or that have changed over the past year. The data points identified in the original plan and updated this year provide a benchmark or baseline from which to track industry growth. This update will allow us to compare Colorado to the nation and to track our growth versus other bioscience growth clusters.

There have been a handful of "completed" initiatives as originally outlined in the original action plan. While these initiatives are largely completed and the action item substantially implemented, in many cases there is a need to expand the focus, to continue moving in the same direction and maintaining a level of focus or to continue monitoring so as not to backslide on the success or come up short in the near term. A good example is Action Item 2.3 which was largely addressed by the signing of Senate Bill 106 and the creation of the Colorado Venture Capital Authority. While this bill addresses the need for a new fund creation, the fund itself does not solely focus on the bioscience industry. Thus a concerted effort must be made on the part of the bioscience industry to advocate for the utilization of those funds in the bioscience community. Other completed initiatives include Action 1.2 with the appointment of Christine Shapard to the position of Director, Biosciences and Emerging Technologies Initiative in the Governor's Office of Economic Development and International Trade. Action 1.4 was met by the creation of the Colorado BioScience Association yet there must be a continued effort to coordinate activity with other bioscience industry-related associations at the leadership level. Action 2.4 has been addressed with a number of initiatives including the Biobreakfast meetings, Life Science Thursday's, BioWest Annual Conference, Technology Transfer Showcase and various newsletters, award presentations, banquets and bootcamps. Action 2.7 has been addressed at the technology transfer level with the creation and implementation of the CU Proof of Concept program and the CSURF Commercial Opportunity Fund. Continued efforts in this area are expected.

If we are to realize a viable and vibrant bioscience cluster there is significant work that needs to continue. There are areas that have yet to be addressed, areas that need increased focus and areas where we must maintain our focused efforts. Some of the most prominent areas include the lack of a comprehensive industry communications strategy, a strong understanding of the workforce requirements, a well defined, executable strategy for

industry and the research institutions to successfully collaborate, and a stronger entrepreneurial infrastructure. Action 1.6 was created to address the need for a comprehensive communications strategy for the bioscience industry. There has been a high level of activity towards the achievement of this initiative yet most of the action steps address elements or components of a communications plan rather than the comprehensive strategy development. The workforce requirements for a future Colorado bioscience industry have yet to be articulated and a workforce committee must be assembled to address this critical question. Action 1.7 was developed to address this area and while a few accomplishments can be noted, the overall initiative has not shown any real progress. Action items 2.6 and 2.7 demonstrate that significant progress has been made by university technology transfer yet Action 3.2 points out we still have a ways to go. Action 3.2 identifies the need to encourage collaborative relationships between academic researchers and industry through a variety of approaches. Through the course of developing this update, it has become increasingly apparent that this is a major component of any successful growth strategy for the bioscience cluster. The key stakeholders must find ways to more robustly and more successfully mine the research infrastructure for new technologies, products and services with the ultimate goal of turning them into successful firms. The research institutions, industry, venture firms and academia all echo this need. A stronger entrepreneurial infrastructure, particularly in the bioscience industry is needed to help drive the necessary collaboration and firm creation between research and industry.

The original plan concluded that Colorado's "bioscience sector has developed largely by serendipity and if left alone would be likely to continue to grow somewhat." In the first year after the original plan was published a directed and concerted effort was put forth by many key stakeholders in driving the implementation of the growth plan. A number of initiatives have been met, but there is significant work that must continue and new work that must start, in order to move from "achievement by serendipity" to achievement as a direct result of implementing a clear strategy and action plan. While the economic upturn in Colorado appears to be having a favorable impact on the bioscience industry, true cluster growth will come from a consistent effort and focus on the growth plan with a successful implementation resulting in the biosciences becoming a key driver of the state economy.

Appendix A

Updated (Table ES-5) Summary of Proposed Strategies and Actions

Strategy One: Create a business climate sensitive to and supportive of the needs and issues facing bioscience firms.

Action 1.1 Enact a Bioscience Package of tax incentives to be triggered as the state's economy improves, to support the growth of Colorado's bioscience companies.

Action 1.2 Appoint a high-level Bioscience Advocate within state government. ***Completed***

Action 1.3 Review and ensure that state Medicaid policies relating to pharmaceuticals do not discourage building the bioscience industry in Colorado.

Action 1.4 Strengthen the voice of the bioscience industry in Colorado by forming a unified Bioscience Industry Association. ***Completed/Continue efforts***

Action 1.5 Create a focus on the biosciences within the Governor's Office of Economic Development and International Trade. ***Refocus on new Action 1.5***

New Action 1.5 Build economic development policies, strategy and related resources for bioscience industry to support emerging companies looking to expand in Colorado or those looking to relocate. This effort must employ elements of recruitment, growth, and retention.

Action 1.6 Develop and implement an industry-led, comprehensive communications strategy to educate and inform citizenry, elected officials, the nation and the world about Colorado biosciences. ***Intensify Efforts***

Action 1.7 Use the Colorado Institute of Technology to work with industry to identify and address emerging bioscience workforce needs at all levels. ***Intensify Efforts***

Strategy Two: Grow the State's bioscience cluster by creating a bioscience entrepreneurial culture that turns research discoveries into new products and services and cutting edge firms and provides appropriate incentives to research institutions and industry.

Action 2.1 Provide comprehensive in-depth entrepreneurial assistance to bioscience entrepreneurs and companies.

Action 2.2 Create a privately managed Colorado Bioscience Seed Fund and encourage a bioscience focus for angel investor networks.

Action 2.3 Enact legislation that would use state tax credits to guarantee investments in a "fund of funds" that would invest in private venture capital companies willing to invest in Colorado companies. ***Completed/New Focus on new Action 2.3***

New Action 2.3 The Colorado Venture Capital Authority needs to ensure the implementation of these funds into the bioscience industry.

Action 2.4 Undertake activities that celebrate successful bioscience role models. ***Completed/Continue efforts***

Action 2.5 Explore opportunities to establish plant and animal based pharmaceutical and nutraceutical production within Colorado. ***Refocus on New Action 2.5***

New Action 2.5 Maintain an efficient regulatory environment and create opportunities to grow the plant and animal based industries.

Action 2.6 Continue to build and strengthen technology transfer/commercialization capacity of universities. ***Continue Efforts***

Action 2.7 Create Technology Development Funds to support proof of concept and other commercialization activities. ***Completed/Focus shift to New Action 2.7***

New Action 2.7 Create a state funded bioscience fund to support proof of concept activities which should be coordinated between CU, CSU, DU and NJH.

<u>Strategy Three</u>: Expand the research base and build research excellence in the state's bioscience niches.

Action 3.1 Complete full physical development of UCHSC/UCH Fitzsimons Campus to help anchor Colorado's bioscience research base for the future. ***Continue Efforts***

Action 3.2 Encourage collaborative partnerships between academic research and industry by providing funding for collaborative university/industry applied research projects, streamlining industry contracting, and designating an industry liaison. ***Intensify Efforts***

Action 3.3 Identify opportunities and compete for national and federal institutes and centers of excellence in Colorado's bioscience niche areas.

Action 3.4 Develop a pilot program of product development and technical assistance support for the medical device, advanced manufacturing and bioagricultural development industries. ***Intensify Efforts***

Appendix B

FITZSIMONS REDEVELOPMENT AUTHORITY
VISION STATEMENT
JUNE 2004

BACKGROUND:

In February 2004, in anticipation of identifying a new Executive Director for the Fitzsimons Redevelopment Authority, the Board of Directors of the Authority initiated an exercise to assess past progress and determine the future direction and vision for the Authority. As part of this exercise, a study was completed which gathered and summarized input on these matters from a broad array of constituents. Using this information, the board held a number of discussions which led to the formulation of this Vision Statement.

VISION STATEMENT:

The Fitzsimons Redevelopment Authority, in close collaboration with its partners, the City of Aurora and the University of Colorado, will stimulate economic growth by creating a world-class scientific community at Fitzsimons which includes, but is not limited to, entrepreneurial life science organizations, related support services and high-quality amenities.

IMPLEMENTING PRINCIPLES:

In implementing its vision, the Authority will be guided by the following principles:

1. The Authority should take an entrepreneurial approach to the development of Fitzsimons.
2. The Authority should leverage outside resources to achieve its goals, including:
    a. Partnering private real estate developers to expedite development.
    b. Creating an Advisory Panel to the board with national experts in pertinent fields.
3. The Authority should target uses that are relevant and compatible to the University of Colorado Health Sciences Center campus, but should take a broad and flexible view in considering the compatibility of such uses.
4. The Authority should recruit experts both to its staff and its Advisory Panel to develop implementation strategies.

Appendix C

Denver Business Journal / ccintellect Colorado Technology Index

Results Brief for the First Half of 2004 – Colorado BioScience Association (Special Edition)

July 29, 2004

ccintellect

customer insight. market impact.
1621 18th Street, Suite 40 Denver, CO 80202
Contact: Ben Wright
t 303.292.3300 x10
m 720.427.6079
f 303.292.3303
ben.wright@ccintellect.com
www.ccintellect.com

Colorado BioScience Association
Data Supplement

July 29, 2004

Study Objectives

- To uncover insight into the Technology Economy in Colorado
- To enable technology interested decision makers to move forward with the best information possible
- To assemble and communicate the current needs of technology firms
- To identify where technology companies are expecting to invest in the upcoming six months
- To hear how technology firms feel about doing business in Colorado
- To provide a baseline for periodic updates, future studies in Colorado, and studies in other Markets

Respondent Profile

- 38 Biotech/science professionals answered the DBJ/ccintellect Tech Index survey.
- The survey was fielded in April and May, 2004.

1. How important is each of the following to your success as a business?

Using data from Q5 (Importance) and Q6 (Satisfaction) we calculated an Importance/Satisfaction c score to identify the top issues that policy makers should focus on in the coming year for the BioScience industry.

For Spring 2004:

Item	Important	Satisfied	ccintellect Importance/ Satisfaction c score
Pro-business state and local government	76%	37%	116
A growing economy	74%	39%	108
Low/moderate costs of doing business	76%	50%	103
Incentives from state and local government	53%	11%	95
Available technical/scientific talent	82%	71%	92
Availability of venture capital	47%	11%	84
Ability to recruit technical/scientific talent	82%	79%	84
Infrastructure to commercialize technology developed at universities	47%	16%	79
Proximity to colleges/universities	71%	66%	76
Ability to offshore workforce to save cost	16%	11%	21

The ccintellect Importance/ Satisfaction c score is used to evaluate opportunity. The formula used to calculate the score is: [Importance + (Importance - Satisfaction)] = Opportunity

2. Please indicate your overall level of satisfaction with Colorado as a business location for each of the following:

For Spring 2004:

Item	Satisfied
Ability to recruit technical/scientific talent	79%
Available technical/scientific talent	71%
Proximity to colleges/universities	66%
Low/moderate costs of doing business	50%
A growing economy	39%
Pro-business state and local government	37%
Infrastructure to commercialize technology developed at universities	16%
Incentives from state and local government	11%
Availability of venture capital	11%
Ability to offshore workforce to save cost	11%

3. How did your Colorado operations perform in the last six months of 2003 (Jul – Dec 2003), relative to the previous six months in terms of:

	Decrease	No change	Increase	Don't Know	No Answer
Revenues	16%	50%	34%	0%	0%
Profits	16%	45%	39%	0%	0%
Outside funding you have received	3%	55%	29%	8%	5%
Employment	8%	50%	42%	0%	0%
Number of new products launched	5%	55%	34%	5%	0%

4. For the period Jan-June 2004, relative to the previous six months in terms of:

	Decrease	No change	Increase	Don't Know	No Answer
Revenues	8%	34%	55%	3%	0%
Profits	8%	34%	53%	5%	0%
Outside funding you have received	3%	61%	26%	8%	3%
Employment	3%	50%	47%	0%	0%
Number of new products launched	8%	50%	39%	3%	0%

5. How do you expect your Colorado operations to perform in the **upcoming** six months of 2004 (Jul – Dec 2004) in terms of:

	Decrease	No change	Increase	Don't Know	No Answer
Revenues	3%	16%	74%	8%	0%
Profits	3%	18%	68%	11%	0%
Outside funding you have received	0%	47%	37%	13%	3%
Employment	5%	34%	61%	0%	0%
Number of new products launched	3%	53%	37%	8%	0%

6. How do you expect the number of full-time employees (by job type) employed at your Colorado operations to change in the first six months of 2004 (Jan-June 2004) compared to the previous six months (Jul – Dec 2003)?

	Decrease	No change	Increase	Don't Know	No Answer
Executive staff ("C" Level, President, VP)	3%	76%	18%	3%	0%
Sales/Marketing/PR/ Business Dev't Staff	0%	58%	37%	5%	0%
Administrative Staff	5%	68%	18%	5%	3%
Research/Dev't or Technical Staff	3%	47%	45%	5%	0%
Other Staff	3%	63%	18%	13%	3%

7. How do you expect your budgeted spending to change in the upcoming six months of 2004 (Jul – Dec 2004) relative to the first half of 2004?

	Decrease	No change	Increase	Don't Know	No Answer
Technology/IT	3%	39%	47%	11%	0%
Business Services/ Management	8%	50%	34%	5%	3%
Research/ Development	8%	21%	68%	3%	0%
Sales/Marketing/PR/ Business Development	3%	29%	66%	3%	0%
Operations	16%	50%	26%	8%	0%
Non-technical Equipment	5%	84%	5%	5%	0%
Contract/Part-time Labor	16%	34%	42%	8%	0%
Facilities Costs (Office, Commercial, Industrial)	5%	55%	32%	8%	0%

8. Did you receive funding in the 2003 calendar year?

	Spring 2004
Yes	45%
No	53%
Don't Know	3%
No Answer	0%
Grand Total	100%

9. For respondents answering Yes in Q17, from what source did you receive funding during the 2003 calendar year?

Note: Multiple answers were accepted from each respondent. n=total number of responses.

n=17

	Spring 2004
Bank Loan	13%
Angel investment	13%
Family and friends	11%
Venture funded	8%
IPO	5%
Personal/Business Credit Cards	3%
Other*	13%

*Other sources include NIH grants, Private placements, SBIR, and Sponsorships.

10. Please indicate the approximate amount. Spring 2004 data only.

	# of respondents	% of respondents
$100,000 and under	2	18%
$101,000 - $500,000	3	27%
$501,000 - $1 million	2	18%
$1.1 million - $10 million	2	18%
$10.1 million or greater	2	18%
Grand Total	11	100%

11. What is your overall level of satisfaction with doing business in Colorado?

	Spring 2004
Completely Satisfied	5%
Somewhat Satisfied	58%
Neutral	18%
Somewhat Dissatisfied	8%
Completely Dissatisfied	11%

12. Does your company have plans to relocate in the next 24 months?

	Spring 2004
Yes	13%
No	68%
Don't Know	18%
No Answer	0%
Grand Total	100%

13. For respondents answering Yes to Q23, where is your company planning to relocate?

All five (5) plan to relocate to Metro Denver.

Appendix D Industry Update Reports, Links and Contact Information

1. Colorado Department of Labor and Employment QCEW Report

   http://www.coworkforce.com/lmi/es202/index.htm

2. Ernst &Young: Resurgence. The Americas Perspective. Global Biotechnology Report 2004

   http://www.ey.com/global/content.nsf/US/Health_Sciences_-_Library_-_Resurgence:__Americas_Biotechnology_Report_2004

3. Battelle Health and Life Sciences. Laboratories of Innovation: State Bioscience Initiatives 2004 report and presentation from the BIO 2004 Conference Report available on the BIO website at

   http://www.bio.org/speeches/pubs/battelle2004.pdf

4. Frost & Sullivan 2003 Outlook of the Medical Devices Industry presentation

   Presentation not available online. Website: www.frost.com

5. PriceWaterHouse Coopers LLP. LifeSciences Comes Back to Life: Trends in Public and Private Equity Markets. Presentation, July 2004

   Presentation not available online. Website: www.pwc.com

6. Burrill & Company State of the Biotechnology Industry…Circa 2004 presentation from the BIO 2004 Conference

   Contact Burrill & Co. for further information. Website: www.burrillandco.com

7. ccintellect/Denver Business Journal technology index survey. Colorado BioScience Association Data Supplement, July 29, 2004

   Contact Ben Wright at ccintellect: ben.wright@ccintellect.com