

**Arizona University System  
Technology and Research Initiative Fund (TRIF)**

**Proposition 301 Business Plan,  
The University of Arizona**

**Optical Science and Technology Plan  
(OSTP)**

1/13/2003

# Optical Science and Technology in the New Economy

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## SECTION 1 – EXECUTIVE SUMMARY

This business plan is designed to support funding for a broad multidisciplinary initiative in optical sciences in Southern Arizona that will from this point forward be designated as the Optical Science and Technology Plan (OSTP). OSTP has profound implications for the New Economy of the State of Arizona. This plan outlines the opportunities in Arizona for economic growth in high tech optics. It documents the success of the University of Arizona in fueling this economic engine and discusses the pivotal role of the University in assuming academic and technological leadership.

OSTP is seeking \$22.4 M to support (1) research and technology development, (2) workforce development and (3) technology transfer and technology support for the Arizona Optics Industry Association (AOIA) and its member companies. These three areas are integrally related and pertinent to the proposal's New Economy emphasis.

**Research and Technology Development** - The research and technology development portion of the proposal focuses on three areas: (a) a photonics component concerned with novel nanocomposite materials and optical systems; (b) imaging and sensor components that will meet the higher demand for precision optics with a wide array of practical implications; and (c) an astronomical instruments and large telescopes component devoted to enterprises that may define the next generation of optics for large telescopes in space.

**Workforce Development** - The workforce development portion of the proposal offers realistic and attainable solutions to the severe shortage of trained personnel in optical science and technology. Strategies developed will improve two-year technical training, undergraduate and graduate curricula in optical science, recruit students to optics career choices, and reach-out to optics companies through short courses that include web-based learning centered technology. A special focus of workforce development is targeted by Pima Community College (PCC) to train optomechanical and optoelectronic technicians. PCC houses the Workforce Development arm of the Small Business Development Center and is a well-equipped partner to train technicians in the local optics market. According to AOIA, this program will fill a 'critical need' for trained technicians locally.

**Technology Transfer and Outreach** - The support of AOIA companies to encourage new technologies and technology transfer is important to the growth of the industry cluster. OSTP suggests means for identifying and pursuing commercial opportunities and for ensuring that The University of Arizona and State of Arizona reap the maximum possible economic benefit.

OSTP calls for close collaboration between the University of Arizona and the AOIA. Special visiting scholars programs will bring personnel from corresponding industrial affiliates to the campus for collaboration on mutually beneficial research projects and related initiatives. This will further enhance application opportunities and commercialization potential.

OSTP is viewed against ten measurable performance objectives. Three examples of these speak strongly to the research-economy interface: (a) the University will prepare and submit at least two proposals each year to potential federal and industrial collaborators to maximize the return on state funding; (b) the University will foster the creation of at least one start-up company every three years based on optical technology development under this initiative; and (c) the University will strive to attract a major federally funded grant within two years to develop a major research emphasis in new optical technologies.

OSTP is designed with budget assumptions that entail a gradual shifting from state funding toward federal and industrial funding within several years' time. It is expected that the return on investment to the state from OSTP will be substantial. According to Cahners InStat, the worldwide optical components and materials market represents a multibillion-dollar industry.

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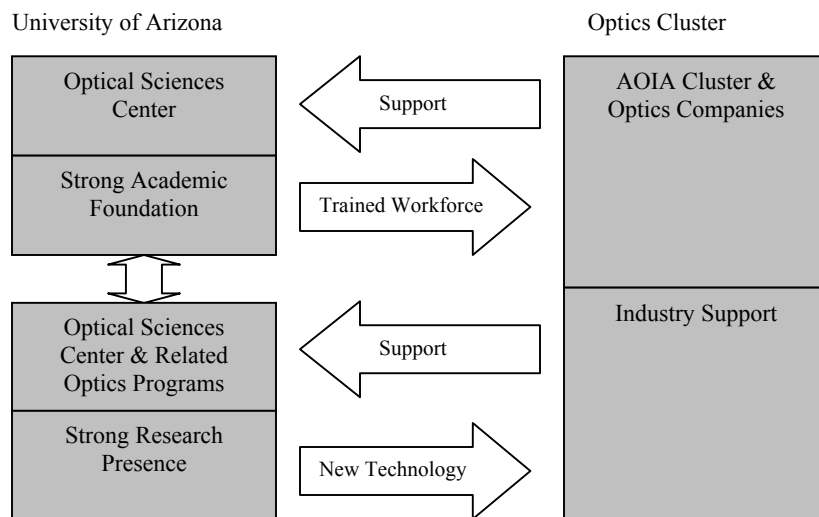
## SECTION 3 – CORE VISION/ PROJECT DESCRIPTION

### 3.1 Brief Overview of Industry/ Area Addressed by Initiative

The University of Arizona has a unique strength in the area of optics technology including a dedicated Optical Sciences Center with over 50 Researchers and Faculty and 180 students, plus strong optics programs in three other colleges. Three areas comprise the greater optics community of Tucson: academic, research, and industry. The interaction of these components creates several synergistic outcomes including:

- Practical education and in-the-classroom career training
- Career awareness programs (K-12)
- Capabilities for technical training through Pima Community College
- World-renowned research and technology transfer track-record.
- A thriving Governor’s Strategic Partnership for Economic Development (GSPED) industry cluster supported by the skilled UA and PCC educated professionals.
- The interaction of university, research, and industry approaching a critical mass necessary for significant future growth.

The illustration below demonstrates the synergy in OSTP:



Together these factors have created an optics community unsurpassed locally, nationally, and globally.

The impact of this robust program on economic growth has been evidenced through the 120 Optics related companies currently in Tucson and paying \$750 million in salaries annually, a rate nearly twice that of the average annual wage for Tucson. GTEC has identified Optics as the third fastest growing segment of Tucson’s economy and has therefore targeted it in their strategic plan for state-wide growth.

### 3.2 Mission/Goals/Values/Vision of College, University, and Department Responsible

**Mission** - Create a university industry alliance that supports the growth of an Optics cluster that is an engine for growth in OSTP. This initiative creates a broad multidisciplinary research and

education program dealing with optical sciences and technology. It has profound and wide-ranging implications for the continued growth and development of optical science and technology in the New Economy of the State.

**Goals** - The goal of this initiative is to support the development of the New Economy in Arizona through an integration of academic and technical leadership in one of the foremost GSPED industries targeted for growth in Arizona. This initiative includes components of research and technology development, workforce development, and the provision of technology transfer and technology support for the Arizona Optics Industry Association (AOIA) companies.

### 3.3 Products or Services Provided by the Project

Products and services provided by OSTP fall into three categories; (1) research and technology development focusing on three-core technology groups within optics (photonics, imaging and sensors, astronomical instruments and large telescopes), (2) workforce development activities, and (3) technology transfer and outreach activities.

#### (1) Research and Technology Development

- The funding of research projects and/or gap funding to provide for prototyping and proof of concept regarding the following:
  - Photonics – novel nanocomposite materials, devices, and optical systems.
  - Imaging and Sensors – wide array of practical applications including ultraviolet and infrared sensors.
  - Astronomical Instruments and Large Telescopes – new enterprises that define the next generation of optics for large telescopes in space.

#### (2) Workforce Development:

- Pima Community College will collaborate with The University of Arizona in the development of a new two-year degree program for optical technicians to work in the optoelectronic and optomechanical areas.
- Expansion of graduate and undergraduate Optics programs
- UA educational programs to upgrade K-12 science education
- The Professional Masters Degree Program of UA melds practical science education in mathematics, physics, chemistry, biochemistry and others to practical business application.
- The Associates in Technology Program of UA's Berger Entrepreneurship Program allows technical students to pair up with business students for one year of curriculum and application of new business development and technology development.
- New short courses in optical science and technology will be developed at the UA specifically for industrial training purposes in the area of optical science and technology. These will be offered on a distance learning platform and can be delivered anywhere in Arizona. A novel approach using a web-based text is currently under development on the campus and will be incorporated into the proposed courses.
- Arizona high school teachers and students will be engaged in statewide continuing education seminars that will prepare teachers to teach optical science and conduct optics experiments in the classroom and will introduce students to various career opportunities with optical science education.

#### (3) Technology Transfer and Outreach:

- Faculty and staff will work closely with The University of Arizona's Office of Technology Transfer and the Arizona Optics Industry Association to identify research products that have potential for technology transfer. Periodic meetings

will be held between University of Arizona faculty and staff and industrial partners to identify venture capital opportunities and to keep the enterprise solidly on track in its developmental New Economy goals.

- Increase licenses and spin-off companies in optics through the Office of Technology Transfer
- Establish technology outreach programs
- Increase number of world-class faculty in Optics
- Increase major Optics research projects
- The Office of Technology Transfer and Berger Entrepreneurship Program offer a business plan development team to work with optics disclosed technologies. optics business plans have seen great success through this program.

### 3.4 Positioning

The University of Arizona is a Research One institution. The UA positions itself as providing high quality education at low cost and prides itself on developing a learning environment built on a 'culture of collaboration'. A similar positioning strategy defines UA's approach to attracting faculty and students. The University is considered one of the best educations for the dollar in the country. This is especially true for the internationally recognized Optical Sciences Center.

The City of Tucson positions itself similarly to attract workers and companies. The Greater Tucson Economic Council states its positioning strategy as low business costs, low costs of living, and high quality of place including climate. Their marketing mantra is 'come for the technology...stay for the lifestyle.'

The cluster organizations are also part of this positioning strategy. Specifically, the support network and broad array of services provided by the clusters are used to attract technology-based companies. The clusters boast formal ties with the University through the Optical Sciences Research Center, the Office of Economic Development, and the UA Science and Technology Park. Such ties provide valuable links for further development of synergistic relationships between academia and industry in the greater optics community.

### 3.5 Competitive Advantage

The sustainable competitive advantage of OSTP is synergy - *cooperation, collaboration, and teamwork*. Simply put, the established interconnection of academia and industry in the optics community will allow Proposition 301 dollars to have a much more immediate, broad, and realized impact. The Optical Science Center of The University of Arizona and optics programs in the Colleges of Science, Engineering, and Medicine are world renowned for their research and are built on a solid foundation of world-class researchers, professors, and students. The University is closely tied to the surrounding business community through affiliate organizations, annual events such as Idea Funding and the AOIA cluster group. These connections provide several synergies including:

- The University of Arizona and Pima Community College join to provide a high-quality workforce for the companies.
- The business community can provide the UA with funding for research projects and internships providing students with real world science experience.
- Sponsored research produces new technology, which fuels growth and provides the potential for new company formation and therefore new jobs.

# Optical Science and Technology in the New Economy

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## SECTION 4 – THE MARKET

### 4.1 Competitive Assessment

The competitive environment for OSTP consists of three central components: (1) unique alternatives available to core participants i.e. students and faculty, (2) alternatives to traditional degree programs and traditional methods of supplying intellectual property (IP), (3) direct rivals.

- (1) Attraction and retention of core participants in the greater optics community are essential to the ability for the optics industry to continue to catalyze growth in the local economy and compete with better funding locales such as Rochester, NY. The core participants are namely students and faculty of the University of Arizona and PCC program participants. The alternatives in education and employment cannot be more attractive elsewhere if Tucson is to leverage this industry as an engine for economic growth.
- (2) OSTP will enable The University of Arizona to offer alternatives to traditional degree programs that will better prepare students for the emerging economy. New and expanded courses will be developed both at the undergraduate and graduate levels. Additions to the undergraduate curriculum will increase the number of students that can be trained in optical science and enhance options in various optical specialties, including bio-optics and astronomical optics. Cannibalization of the degree seeking population is not a concern as the two have been primarily mutually exclusive in the past and also can be used in conjunction by an individual graduating from the UA and seeking additional certification.
- (3) While other universities and research institutions are competitors, they also present unique opportunities for collaboration and further reaching benefits. Greater Tucson Economic Council has been working to develop collaborative relationships with Rochester, New York, Ottawa, Canada, Hermosillo, Mexico, and various European cities. The University of Arizona's reputation in optical sciences only enhances the opportunity for further cooperation and growth.

### 4.2 Market Size and Trends

The market for OSTP includes students, faculty, companies, and other affiliates that comprise the greater optics community with the common goal of catalyzing economic growth. This complexity makes the market difficult to quantify. However, some key figures resulting from the University of Arizona's Office of Economic Development's *Industry Clusters in Southern Arizona: 2001 Status Report* the following "Key Cluster Findings" for optics were:

- Thirty percent of the current optics workforce are engineers.
- Optics "revenues per employee" were \$265,000, the highest of the six GSPED clusters in Southern Arizona and a reflection of the high intellectual value added component in the industry.
- Almost 40% of optics revenues were from local sales-the highest of the six clusters.
- Optics firms had the highest proportion of female and/or minority ownership (30%).
- Annual revenues were estimated at \$363 million.
- Optics had the highest percentage of small start-up firms in the six clusters studied.
- Optics had the highest percentage of revenue (37%) from local area and highest percentage of procurement (27%) spent locally.
- Optics had the highest percentage of firms (84%) that have commercial interactions with other optics firms.

#### 4.3 Sales Forecast

Forecasting sales based on the viability of this Prop 301 initiative is not practical. An approximation in primary and tertiary impact can be obtained from the periodic increase in cluster revenues, which would encapsulate existing company growth, new company relocation, and new company startups.

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### SECTION 5 – OPERATIONAL STRATEGIES

#### 5.1 Development and Production

##### 5.1.1 Development Status

Currently, the University of Arizona is in year two of the Commerce and Economic Development Commission, (CEDC) initiative which has paved the way for OSTP and in general technology community building activities that can impact the economy. Some key economic indicators set forth for CEDC and revamped for OSTP have been met or exceeded as seen below.

|   | <i>Measure</i>                                    | <i>Projected</i> | <i>Actual</i> |
|---|---|------------------|---------------|
| 1 | New faculty attracted                             | 6                | 3             |
| 2 | Industrial affiliates                             | 2                | 11            |
| 3 | Spin-off companies                                | 0                | 2             |
| 4 | Major research                                    | 0                | 2             |
| 5 | Growth in optics-related undergraduate enrollment | 9                | 30            |
| 6 | Growth in optics-related graduate enrollment      | 5                | 12            |

This information provides reasonable confirmation that the University is on track if not ahead of schedule to meet or exceed the economic goals of the project as a whole.

##### 5.1.2 Production Process

The process by which local economic stimulus will be generated is a three phased approach.

- Phase 1 – Prop 301 dollars will be leveraged to create and improve upon infrastructure ranging from building additions and renovations to information and communication mechanisms such as a website and super computer.
- Phase 2 – Prop 301 dollars will be used in an ongoing series of production activities surrounding research development, technology development, workforce development, and technology transfer/outreach.
- Phase 3 – Prop 301 dollars will be matched and phased out by affiliate company sponsorships, large science and research grants, and the ongoing attainment of federal project grants e.g. SBIR grants.

##### 5.1.3 Cost of Development

The cost of developing and maintaining OSTP will rely primarily on in-kind contributions in time from existing academic and industry leadership. In addition to this human capital the continued recruitment of new leadership comprises a significant portion of the cost of development. Additional costs include capital expenditures related to the creation and maintenance of infrastructure items. Additional details are available in Section 7 of the business plan.

##### 5.1.4 Labor Requirements

Specific labor requirements of implementing the program of activities described in Section 3.3 relating to workforce development are detailed in the budget information provided in Section 7.

### 5.1.5 Expenses and Capital Requirements

See Section 7 for detailed information on the projected expenditures and capital requirements for implementation and maintenance of the program of activities and infrastructure items.

## 5.2 Marketing & Promotion

### 5.2.1 Strategy

The primary strategy for marketing to students and faculty is the quality of education that can be obtained at The University of Arizona for comparatively lower costs. Additionally, a selling point will be the complete offering of technical and practical training that can accommodate the career goals of graduates whether, it is in research and technology and working with the OSTP's collaborators, or additional education through non-degree certificate programs, enrollment in a University MS and PhD programs, or employment by one of the local high-tech firms.

The marketing strategy of the greater optics community is a well-planned and executed program of activities. Through AOIA and Breault Research marketing efforts a city-wide marketing effort is currently under-way publicizing Tucson as "Optics Valley" from the Mayor's website, to banners at the airport, this campaign is designed to position Tucson as the world leader in attracting optics companies, talent, intellectual property, and capital support.

Greater Tucson Economic Development Council and UA Office of Economic Development is actively engaged in promoting Tucson as a core optics platform in Rochester, New York, Ottawa, Canada, and Europe.

### 5.2.2 Promotion Mix

The promotion mix will utilize existing channels for advertising, direct marketing, personal selling and public relations. These channels are outlined below in Section 5.2.3.

### 5.2.3 Advertising and Promotion Methods

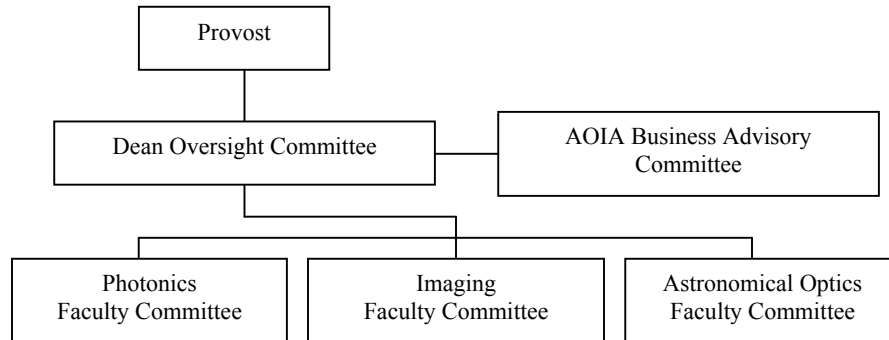
The marketing strategy will utilize existing channels for advertising, public relations, and promotion. Among these are:

- Advertising:
  - Billboards
  - Websites
  - Print: magazines, academic journals, newspapers
- Direct Marketing
  - Website and word-of-mouth.
  - Direct mail to targeted audiences
- Personal Selling
  - Information and outreach to students, teachers and undergraduate students in Arizona.
- Public Relations
  - Website
  - Office of Economic Development Status Reports:
    - University/Community Proposition 301 Technology Report
    - Annual Cluster Industry Report
  - Annual University of Arizona Optics Conference
  - Optics Valley speaker series

- Ad hoc forums

### 5.3 Project Management

#### 5.3.1 Organizational Chart and Description



The organizational management structure behind OSTP is constructed of three faculty committees (photonics, imaging, astronomical optics) who report directly to a dean oversight committee, who in turn report to the UA Provost.

#### 5.3.2 Advisory Board and Oversight

The Arizona Optics Industry Association Business Advisory Committee is the primary entity for business oversight and is comprised of five industry members charged with providing periodic feedback and review of the initiative.

#### 5.3.3 Support Services

- University – Office of the Vice President for Research and Graduate Studies, Office of Technology Transfer, Office for Research and Contract Analysis, Sponsored Projects Services and the Office of Economic Development.
- Technology Start-up – Tucson Technology Incubator, TechBizLaunchPad
- Research & Development – UA Science and Technology Park
- Marketing – Breault Research, Office of the Mayor
- Publicity – Arizona Daily Star, Arizona Wildcat, and others.
- Technology Finance – Beach Fleischman, Ernst & Young, and others.
- Technology Law – Snell and Wilmer, UA Attorney’s Office,
- Business Development – The Berger Entrepreneurship Program, Eller College of Business and Public Administration
- Others – TechBizLaunchPad, business training for techies programs

### 5.4 Risk & Strategy to Overcome Risks

#### 5.4.1 Legal Risks/Means to Minimize Risks

Litigation associated with technology transfer from University to the marketplace.

- Creating positive relationships between the Office of Technology Transfer and the principal investigators minimizes litigation.
- Present seminars on intellectual property and technology transfer issues and the expanded outreach programs with the Law College of The University of Arizona will create a system for prevention and quick resolution of legal conflicts.

#### 5.4.2 Regulatory Problems/ Means to Minimize Risks

[Not applicable]

#### 5.4.3 Political Risks/ Means to Minimize Risks

[Not applicable]

#### 5.4.4 Business Risks (Supply and Demand) and Plans to Address Them

The major issues are availability of external funding for optics, the availability of outstanding faculty members to hire, and the availability of outstanding students to bring into the program. The University of Arizona is currently involved in a consortium to develop support for a national initiative for funding in optics. We hope to have a cross-agency funding initiative in place in two years. The current economic downturn has resulted in a large pool of outstanding people in the field of optics who are seeking faculty positions. The TRIF funds will allow the University of Arizona to be very competitive in recruiting some of these people if we act quickly. The pipeline of outstanding students remains the biggest problem. We are working on several local initiatives with K-12 science teachers to attract more students into optics. Nationally we are working with organizations such as the Optical Society of America and SPIE to develop optics education programs that will attract more students into the field.

#### 5.4.5 Competitive Risks and Strategy for Addressing Them

Optics is such an important field that many states are currently investing in optics research and education programs in their universities. For Arizona to maintain its position as the leading university in the field of optics we must continue to hire the most outstanding faculty members in the world. Outstanding faculty members are the key to attracting outstanding students and developing outstanding research programs. The focus of our TRIF funds in this initiative is hiring and supporting outstanding faculty members.

The proposed new Photonics and Imaging Programs are both sensitive to competitive risks from the few competing programs that exist world-wide and to unsolidified demand for the specific programs. Conversely, the UA's competitive edge in educating optical scientists is unparalleled, and as long as the demand for Photonics and Imaging-specific research remains strong, the UA is ideally positioned to leverage its existing strengths to become a leader in educating Photonics and Imaging specialists. The opportunity risk of not funding OSTP lies in the potential for better-funded programs like that of Ottawa, Canada and Rochester, NY to create these highly demanded programs and out muscle Tucson as the leading optical sciences center.

Proposition 301 funding is based on an allocation of sales taxes based on a fixed percentage. In troubled economies, such as the one currently being experienced, consumer confidence is expected to wane and with it general sales will subside. Loss in funding would have a significant negative impact on our optics initiative.

### 5.5 Sustainability

#### 5.5.1 Anticipated Funding Sources for On-Going Support

The TRIF funding in this initiative is being used to:

- Expand support of priority areas such as undergraduate and graduate academic programs in optics and the operation of our unique astronomy assets;
- Expand our current program into new areas of photonics and optical imaging;
- Finance the construction of new space for optics teaching and research.

The operational funds for the research thrust areas will be transitioned onto externally funded grants and contracts. The faculty salaries will be transitioned onto base state funding. The debt service for the construction is a twenty-year commitment and it is assumed that TRIF funding will be available for this duration. It should be noted that optics is currently a highly competitive field. If we stop our TRIF investment in people and programs in this area we will lose our ability to compete with states who are investing far more in this field than Arizona. Therefore we plan to continue investing TRIF funds in new optics people and projects as we transition our initial investments to other funding sources.

#### 5.5.2 Timeline for Transitioning Away From TRIF Support

The new faculty hires are programmed to transition from TRIF to base state funding on three to five year time scales based on availability of state lines. The research projects supported initially are estimated to transfer from TRIF funding to external grant or contract funding in a three-year time frame.

## Optical Science and Technology in the New Economy

### SECTION 6 – GOALS/METRICS/OUTCOMES

#### 6.1 Specific, Realistic, & Measurable Goals

##### 6.1.1 ROI

| SEC #   | ITEM   | FY 2002  | FY 2003  | FY 2004   | FY 2005   | FY 2006   |
|---|--|----------|----------|-----------|-----------|-----------|
| 6.1.2   | Licensing revenues attributable to optics                | *        | *        | *         | *         | *         |
|   | <b>Number of optics start-up companies</b>               | <b>0</b> | <b>1</b> | <b>0</b>  | <b>0</b>  | <b>1</b>  |
|   | Number of patents filings attributable to optics         | *        | *        | *         | *         | *         |
|   | Arizona sponsored research                               | *        | *        | *         | *         | *         |
| 6.1.3   | Number of relocated companies                            | *        | *        | *         | *         | *         |
| 6.1.4   | Jobs attributable to relocation                          | *        | *        | *         | *         | *         |
|   | Jobs attributable to start-ups                           | *        | *        | *         | *         | *         |
|   | Jobs attributable to expansion                           | *        | *        | *         | *         | *         |
|   | <b>Number of new faculty experts attracted</b>           | <b>6</b> | <b>4</b> | <b>2</b>  | <b>2</b>  | <b>2</b>  |
| 6.1.5   | Non-degree certificate training program created          | P1       | P2       | P3        | P4        | P5        |
|   | New Photonics specialty created                          | P1       | P2       | P3        | P4        | P5        |
|   | <b>Growth in optics-related undergraduate enrollment</b> | <b>5</b> | <b>5</b> | <b>10</b> | <b>10</b> | <b>15</b> |
|   | <b>Growth in optics-related graduate enrollment</b>      | <b>9</b> | <b>3</b> | <b>0</b>  | <b>0</b>  | <b>0</b>  |
| 6.1.6   | Government project grants obtained                       | *        | *        | *         | *         | *         |
|   | SBIR grants obtained                                     | *        | *        | *         | *         | *         |
|   | <b>Large research grants obtained</b>                    | <b>0</b> | <b>1</b> | <b>1</b>  | <b>1</b>  | <b>1</b>  |
|   | <b>Number of affiliate sponsorships obtained</b>         | <b>2</b> | <b>2</b> | <b>2</b>  | <b>2</b>  | <b>2</b>  |
| 6.1.7   | Website created  | P1       | P2       | P3        | P4        | P5        |
|   | Facility upgraded  | P1       | P2       | P3        | P4        | P5        |
| <p>*Indicates metrics not yet estimable. These will be added in coordination with the Office of Economic Development's development of the system by which growth will be tracked and attributed in the <i>University/Community Proposition 301 Technology Report</i>.</p> |  |          |          |           |           |           |

##### 6.1.2 Technology Transfer

Technology transfer is an important area of measuring the goals and economic outcomes of OSTP because information is readily available through the Office of Technology Transfer and this information is naturally a good measure of the viability of the relationship between university research and local industry. Licensing revenues, number of start-up companies, number of patents filed, and Arizona sponsored research are the key technology transfer measures that will be used.

##### 6.1.3 Companies Relocating

Relocating companies is an immediately measurable sign of economic growth. This measure has direct bearing on the growth of local technology jobs, tax base, aggregate revenue growth, and all indicators of economic growth.

##### 6.1.4 Work Force Contributions

Work force contributions are broken up into those portions of the workforce attributable to relocating companies, new companies, expansion of existing companies, and the related attraction of faculty.

##### 6.1.5 Specific Curriculum Innovations

Curriculum innovations will be tracked in phases concerning particular education initiatives, such as the creation of a new Photonics specialty and the creation of a non-degree technical training program. Five phases indicated with “P1-5” will be outlaid as incremental stages to completion and maintenance/operation of proposed activities.

Additionally, curriculum innovation involves the expansion of existing degree programs through both attraction of faculty to support the expansion and eventually the periodic growth in graduate and undergraduate enrollment.

#### 6.1.6 Partnerships/Collaborations

Partnerships and collaborations in this case represent collaborations in the form of financial or measurable strategic support. Partnerships and collaborations will be measured using increase in affiliates, increase in major federally funded research projects, and more specifically, SBIR grants obtained.

#### 6.1.7 Other

Other metrics will include the tracking of progress on infrastructure items including:

- The (P1) design, development, (P2) testing, launch and (P3-5) maintenance of a website for OSTP.
- The completion of facility upgrades that will be tracked using five phases based on percentage of completion or debt service attributed.

### 6.2 Timeline For Achievement of Goals

Included in Section 6.1.1 above.

### 6.3 Early Proof of Performance

#### 6.3.1 Implementation of Goals for First Three Years

During the first three years of the initiative to enhance optical science and technology, the goals include:

- Hiring twelve new world class faculty members in targeted areas of expertise;
- Recruiting six new optics companies as Industrial Affiliates of the program;
- Starting a new spin-off company in optics;
- Winning two new federally funded major research projects;
- Recruiting twelve new graduate students in optics;
- Recruiting twenty new undergraduate students in optics.

#### 6.3.2 Special Efforts to Produce Rapid Results

During the first year of this program we have actively pursued all of the goals listed above. To obtain international exposure for our optics initiative, we hosted a number of events including the first annual International Conference on Photonics, the Optics Valley Lecture Series, and a special meeting between venture capitalists and optics entrepreneurs. All of these were very successful. We sought and obtained ABET accreditation of our undergraduate Optics Engineering degree program which will make this a more attractive degree option for undergraduate students. We initiated the collaboration with Pima Community College for training optics technicians, which is critical for local workforce development in AOIA companies.

The results of our efforts have been highly successful:

- Six of the twelve new faculty members were hired in the first year;
- Eleven new companies became Industrial Affiliates in optics during the first

- year significantly surpassing our three year goal;
  - Two new spin-off companies were started during the first year surpassing our three-year goal;
  - Two major research awards (>\$1M/year) were obtained during the first year thus meeting our three year goal;
  - Thirty new graduate students were recruited into the optics program during the first year thus significantly surpassing our three year goal;
  - Twelve new undergraduate students were recruited into the undergraduate optics program during the first year, which is more than half our three-year goal.
- These achievements demonstrate the early proof of performance for this initiative.

SECTION 7 – PRO FORMA FINANCIALS

7.1 Detailed Funding Request, Including Sources

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University of Arizona

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**PROP 301 / TECHNOLOGY & RESEARCH INCENTIVE FUNDING REQUEST**  
**Optical Science & Technology in the New Economy**

|  | FY 2002*      | FY 2003**      | FY 2004                           | FY 2005       | FY 2006       |
|--|---------------|----------------|-----------------------------------|---------------|---------------|
| FTE Positions.....                     | 21.00         | 28.0           | 28.0                              | 23.00         | 19.00         |
| Personal Services.....                 | 1,019,700     | 3,012,183      | 1,549,400                         | 1,371,820     | 1,142,127     |
| ERE @ 19.5%.....                       | 198,800       | 537,297        | 302,100                           | 267,500       | 222,700       |
| All Other Operating.....               | 2,281,500     | 1,986,472      | 1,648,500                         | 1,560,680     | 1,835,173     |
| TOTAL OPERATING BUDGET REQUEST.....    | 3,500,000     | 5,535,952      | 3,500,000                         | 3,200,000     | 3,200,000     |
| <br>TOTAL CAPITAL PROJECT REQUEST..... | <br>1,000,000 | <br>1,000,000  | <br>1,000,000                     | <br>1,000,000 | <br>1,000,000 |
| <br>GRAND TOTAL.....                   | <br>4,500,000 | <br>6,535,952  | <br>4,500,000                     | <br>4,200,000 | <br>4,200,000 |
|  |               | *revised 01/02 | **revised 01/03<br>(carryforward) |               |               |

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7.2 Cash Flow Statement (If Applicable)

[Not included, will be included when developed]

7.3 Income Statement (Resources and Planned Expenditures)

[Not included, will be included when developed]

