

NIA TRANSLATIONAL RESEARCH IN BEHAVIORAL AND SOCIAL RESEARCH ON AGING*

January 2003

The Behavioral and Social Research (BSR) Program, National Institute on Aging (NIA), embarked on a study in 2002 to assess the outcome of efforts to support translational or applied research, in particular the extent to which findings from applied research in the social and behavioral sciences have been translated into actual products or processes that benefit older Americans. BSR/NIA is currently supporting a number of activities to maximize progress in applied aging research, and this evaluation is consistent with these efforts. Key aspects of this evaluation include analyses of the Small Business Innovation Research (SBIR) grants supported by the BSR Program over the last decade, and the intersections between the SBIR Program and the NIA-funded Roybal Centers for Applied Gerontology.

The study had two broader objectives: (1) To inform the deliberations of the National Academy of Sciences (NAS) and the National Academy of Engineering (NAE) panel on “Adaptive Aging: From Technology to Gerontology;” and (2) to inform NIA program staff about ongoing intersections between the Roybal Center activities and the SBIR program, and possible ways to facilitate greater interactions to fully capitalize on the applied research findings. The NAS/NAE panel on Adaptive Aging, supported by an NIA interagency agreement and by the NRC’s Board on Behavioral, Cognitive and Sensory Sciences (BBCSS) and the Computer Science and Telecommunications Board (CSTB), was established to explore issues of adaptive aging through technology and to examine the potential of recent technological advances for improving the lives of the elderly. This workshop aims to identify high payoff areas in the development of technological devices that assist people who are aging normally, as well as those with disabilities and impairments.

I. SBIR Grants Program and the NIH Context¹

SBIR grants and contracts support research and development of new technologies and methodologies that have the potential for commercialization and public benefit. The SBIR Program was established with the Small Business Innovation Development Act in 1982 (Public Law 97-219). The reauthorization of the SBIR program 10 years later, Public Law 102-564 signed by the President on October 28, 1992, gave increased emphasis to private sector commercialization and required the National Institutes of Health (and other Federal agencies with extramural research and development budgets totaling more than \$100 million) to reserve a specified amount of their extramural research budgets for the SBIR program. In

* This report was written under contract to the Behavioral and Social Research Program, National Institute on Aging, National Institutes of Health, Department of Health and Human Services, by Rose Maria Li, M.B.A., Ph.D., Analytical Sciences, Inc. Assistance and input by NIA staff members (current and past), including Angie Chon-Lee, Angela Lingham, Richard Suzman, Michael D. Kerns, Marcia Ory, Andrew Galen and other 2002 BSR summer interns, and by Joanne Goodnight in the NIH SBIR/STTR Office, is gratefully acknowledged.

¹ The Small Business Technology Transfer (STTR) program is usually announced with the SBIR program in the annual Omnibus Solicitation. The STTR program requires the small business to have a formal collaboration with researchers at universities or other non-profit research institutions, and to play a significant intellectual role in the conduct of the STTR project. In contrast to the SBIR where the PI must have primary employment with the small business, the PI on the STTR may be from the research institution as long as s/he has a formal appointment with or commitment to the applicant small business. Currently, five Federal agencies with extramural R&D budgets over \$1 billion are required to administer STTR programs, including the Department of Health and Human Services (DHHS). The STTR Program was also reauthorized in 2002 through 2009. Beginning in FY2004, the STTR set-aside percentage will increase from 0.15 to 0.30 percent, and the statutory guideline for Phase II STTR awards will increase from \$500,000 to \$750,000. Each Phase II STTR applicant is now required to provide information for the SBA Tech-Net Database System. The STTR grants are not included in our review since they are much less prevalent. BSR had primary assignment on only 2 STTR (R42) grants that received their last year of Phase II funding in FY1998 and FY2000.

2000, the SBIR Program was reauthorized again (Public Law 106-554) through September 30, 2008, requiring a 2.5 percent set-aside, and with two major programmatic changes: The inclusion of a succinct commercialization plan in all Phase 2 applications, and the requirement that each Phase 2 applicant provide information for the U.S. Small Business Administration (SBA) Tech-Net Database System (<http://tech-net.sba.gov>).² Commercialization is defined as “the process of developing marketable products and/or services and producing and delivering products or services for sale (whether by the originating party or by others) to Government and/or commercial markets” (U.S. DHHS, 2002, p. 12).

Each agency SBIR program manages its own program and makes awards. The SBA plays an important role as the coordinating agency for the SBIR Program. It sets the guiding policies for implementation, reviews agency progress, and reports annually to Congress on its operation. The SBA also administers a number of databases (e.g., Tech-Net, Pro-net) with the ultimate purpose of facilitating business development. Despite the coordinating role of the SBA, there is currently no standardized method for assessing or weighing commercial potential in SBIR applications across agencies, or evaluating the success of the programs (U.S. GAO, 1999). Many of the evaluations by Federal agencies to date have focused on level of sales, success in obtaining developmental funding, and job creation. The NIA has drawn up new language with general guidelines for the 2003 Omnibus Solicitation that will highlight the commercialization plan in the review process in an effort to improve the review of commercialization plans.

The SBIR program is structured in three phases, the first two of which are supported using SBIR funds. The objective of Phase I is to establish the technical/scientific merit and feasibility of the proposed research and development effort. Preliminary data are not required for Phase I. The objective of Phase II is to continue the research and development efforts initiated in Phase I. Funding is to be based on the results of Phase I, scientific and technical merit, and commercial potential of the Phase I application. Phase II applications may be submitted either before or after expiration of the Phase I budget period, except for those applications electing to submit Phase I and Phase II applications concurrently under the Fast-Track procedures. The objective of Phase III, where appropriate, has primarily been for the small business to pursue with non-SBIR funds (either Federal or non-Federal) the commercialization objectives resulting from Phase I and II.

Applicants for the NIH SBIR awards may request up to \$100,000 for Phase I, for a period of up to 6 months, and up to \$750,000 for Phase II for a period up to 2 years. Prior to 1992, applicants could request up to \$50,000 for Phase I and up to \$500,000 for Phase II. These award levels for duration and amount are statutory guidelines, not ceilings. NIH allows an application to deviate from the guidelines as long as the request is well justified. NIH also allows the awarding of supplemental funding to existing Phase I or Phase II grants and extensions in project period. In 2002, NIH guidelines began allowing submission of post-Phase II applications, similar to competing continuation applications, to support large and commercially important SBIR grant projects (e.g., clinical trials) that require additional funds and time to bring to fruition. Such applications are expected to be infrequent, and would need to demonstrate high institute/program relevance and the likelihood of having important and immediate public health benefits (M.D. Kerns, personal communication, January 13, 2003).

Each organization submitting an SBIR grant application must qualify as a small business concern as defined by the SBA. These eligibility criteria include: For-profit U.S. business firm located in the United States with 500 or fewer employees; at least 51 percent U.S.-owned and independently operated; and the Principal Investigator's (PI's) primary employment must be with the small business at time of award and during the project period. In Phase I, a minimum of two-thirds or 67 percent of the research or analytical

² Tech-Net is an Internet-based database of information containing Small Business Innovation Research (SBIR) awards, STTR awards, Advanced Technology Program (ATP) awards, and Manufacturing Extension Partners (MEP) centers.

effort must be carried out by the small business concern. In Phase II, normally, a minimum of one-half or 50 percent of the research or analytical effort must be carried out by the small business concern.

Although there has been an increasing emphasis on commercialization over the years, successful commercialization is not the sole objective of the program. SBIR program objectives include using small businesses to stimulate technological innovation; strengthening the role of small business in meeting Federal research and development needs; increasing private sector commercialization of innovations developed through Federal SBIR research and development; increasing small business participation in research and development; and fostering and encouraging participation by socially and economically disadvantaged small business concerns and women-owned business concerns in the SBIR program (U.S. DHHS, 2002, p. 4). NIH in particular has taken the position that *all* of the SBIR program goals should be considered in the context of agency mission goals. Thus, NIH has used the SBIR program to support non-commercial goals, such as the ability to stimulate technological innovation that may have limited immediate commercial impact but may produce leaps in technical capabilities with long-term economic and societal impact. “The NIH does not agree that commercialization results should be the main or only measure used to evaluate the success of the program” (U.S. GAO, 1999, p. 84).

It is important to understand the review criteria for NIH SBIR applications since the likelihood of funding is highly correlated with the scientific peer review outcome. It is useful to see how the criteria have evolved in recent years, particularly with respect to the emphasis placed on commercialization. For FY1999 and earlier, the commercial potential was the fourth review criteria listed, after scientific or technical merit (Figure 1).

Figure 1: FY1999 NIH SBIR Review Criteria

1. The soundness and technical merit of the proposed approach. (Preliminary data is not required for Phase I proposals.)
2. The qualifications of the proposed principal investigator, supporting staff, and consultants.
3. The scientific, technical, or technological innovation of the proposed research.
4. The potential for the proposed research for commercial application or societal impact.
5. The appropriateness of the budget requested.
6. The adequacy and suitability of the facilities and research environment.
7. Where applicable, the adequacy of assurances detailing the proposed means for (a) safeguarding human or animal subjects and/or (b) protecting against or minimizing any adverse effect on the environment.

Beginning in FY2000, paralleling the change for regular NIH research applications, the NIH SBIR review criteria included Significance, Approach, Innovation,³ Investigators, and Environment (Figure 2). The Significance section places much greater emphasis on commercial potential, although it appears to be secondary to the importance of the problem. The NIH SBIR review criteria currently in place elevates consideration of commercial potential or marketability to the primary position under Significance, and contains the additional requirement for Phase II applications to include a Product Development Plan. There are additional criteria for Fast Track applications, amended applications, and applications involving human subjects, animals, and use of biohazards. The appropriate “weighting” of the review and award criteria is a function of the professional judgment of the grant application reviewers and NIH scientific program administrators.

³ Innovation is defined as “Something new or improved, including research for (1) development of new technologies, (2) refinement of existing technologies, or (3) development of new applications for existing technologies. For the purposes of PHS programs, an example of ‘innovation’ would be new medical or biological products, for improved value, efficiency, or costs.”

Figure 2: FY2000 NIH SBIR Review Criteria

1. Significance
 - a. Does this study address an important problem?
 - b. Does the proposed project have commercial potential to lead to a marketable product or process?
 - c. What may be the anticipated commercial and societal benefits of the proposed activity?
 - d. If the aims of the application are achieved, how will scientific knowledge be advanced?
 - e. Does the proposal lead to enabling technologies (e.g., instrumentation, software) for further discoveries?
 - f. Will the technology have a competitive advantage over existing/alternative technologies that can meet the market needs?
2. Approach
 - a. Are the conceptual framework, design, methods, and analyses adequately developed, well-integrated, and appropriate to the aims of the project?
 - b. Is the proposed plan a sound approach for establishing technical and commercial feasibility?
 - c. Does the applicant acknowledge potential problem areas and consider alternative strategies?
 - d. Are the milestones and evaluation procedures appropriate?
3. Innovation³
 - a. Does the project challenge existing paradigms or employ novel technologies, approaches, or methodologies?
 - b. Are the aims original and innovative?
4. Investigators
 - a. Is the Principal Investigator capable of coordinating and managing the proposed project?
 - b. Is the work proposed appropriate to the experience level of the Principal Investigator and other researchers, including consultants and sub-awardees (if any)?
5. Environment
 - a. Is there sufficient access to resources (e.g., equipment, facilities)?
 - b. Does the scientific and technological environment in which the work will be done contribute to the probability of success?
 - c. Do the proposed experiments take advantage of unique features of the scientific environment or employ useful collaborative arrangements?

For Phase II applications, in addition to the above criteria, to what degree was progress toward the Phase I objectives met and feasibility demonstrated in providing a solid foundation for the proposed Phase II activity?

Figure 3: Current NIH SBIR Review Criteria
Changes To FY2000 Criteria in Bold

1. Significance
 - 1. Does the proposed project have commercial potential to lead to a marketable product or process?**
Does this study address an important problem?
 - 2. What may be the anticipated commercial and societal benefits of the proposed activity?**
 3. If the aims of the application are achieved, how will scientific knowledge be advanced?
 4. Does the proposal lead to enabling technologies (e.g., instrumentation, software) for further discoveries?
 5. Will the technology have a competitive advantage over existing/alternative technologies that can meet the market needs?
4. Investigators
 - a. Is the Principal Investigator capable of coordinating and managing the proposed project?
 - b. Is the work proposed appropriate to the experience level of the Principal Investigator and other researchers, including consultants and sub-awardees (if any)?
 - c. Are the relationships of the key personnel to the small business and to other institutions appropriate for the work proposed?**

The Phase II applications must also be reviewed for the following criteria:

- 1. How well did the applicant demonstrate progress toward meeting the Phase I objectives, demonstrating feasibility, and providing a solid foundation for the proposed Phase II activity?**
- 2. Did the applicant submit a concise Product Development Plan that adequately addresses the four areas described in the [Product Development Plan]?**
- 3. Does the project carry a high degree of commercial potential, as described in the Product Development Plan?**

NIH requires that SBIR grantees submit the following reports within 90 days of the end of the grant support period unless an extension is granted by the Grants Management Office: Financial Status Report (OMB 269); Final Progress Report (no form); Final Invention Statement and Certification (HHS 568), whether or not an invention results from work under the grant; and Annual Invention Utilization Reports when the grantee has elected title to an invention or when royalties or licensing fees are generated for inventions that are not patented. SBIR recipients are supposed to report inventions to NIH within 60 days after the inventor provides written disclosure to the grantee's authorized official. The grantee has 2 years from time of disclosure to elect title, and 1 year after election of title to file a patent application.⁴

Sufficient time has elapsed to allow for a meaningful evaluation of the SBIR program.⁵ Indeed, the NIH SBIR Program Coordinator is undertaking a trans-NIH review of SBIR Phase II grants to evaluate the overall success of the NIH SBIR program. The NIH randomly selected for its SBIR review survey 55 NIA Phase II awards funded during the period 1992 and 2001. Responses were received from 37 awardees, a response rate of 67 percent, much lower than the overall 86 percent response rate for NIH as a whole. It is not possible to distinguish the SBIRs assigned to BSR. (Based on a review of the raw data, probably 25 to 50 percent belong to BSR.) Without SBIR funding, 92 percent of the NIA grantee respondents claimed that they would not have pursued their idea or action. SBIR funding also impacted on the hiring of additional personnel for 81 percent of NIA survey respondents, the raising of additional capital for 57 percent, and the credibility for finding partners for 84 percent.

A. Objectives, Scope, and Methodology

For the review of BSR/NIA-funded SBIRs, we attempted to identify the areas in the social and behavioral sciences that have seen the successful translation of basic research into products, processes, or services intended to benefit the health and well-being of America's older population. We focused on all the SBIR grant projects that received their last year of Phase II funding between FY1993 and FY2002. We focused on Phase II awards (as opposed to Phase I awards) because they represent those projects with presumably greatest development potential or merit, as evaluated by the NIH peer review process, and because their dollar values are more substantial. The Phase II grants awarded after the SBIR program was reauthorized in 1992 were presumably subject to a greater review emphasis on commercialization compared to the period earlier. We focused only on grants, since BSR had no SBIR contracts during this period.⁶

Specifically, we sought to examine 1) to which companies and for which projects the SBIR grants have been awarded over the last decade; 2) whether the Phase II grants produced any new technologies or innovative products; 3) whether any of the SBIR projects could claim lineage to BSR-funded basic research and centers funding; and 4) which products were commercially viable and what impact they have had (as measured by sales, press attention, impact on the everyday life of the elderly, etc.). We were especially interested in the extent to which the SBIRs intersect with the BSR research community; how interconnected the companies are to behavioral research and the social sciences, and to academic institutions; the extent to which integration with the BSR research community is helpful; and the

⁴ NIH has developed an optional online Extramural Invention Information Management System, known as "IEDison" (for Interagency Edison) to facilitate grantee compliance with the disclosure reporting requirements. Participation in IEdison reporting is not mandatory and information from these reports is not made publicly available. See <http://www.iedison.gov> for more details.

⁵ There has been relatively little independent research and evaluation of the SBIR program, particularly by academics. See U.S. General Accounting Office, 1999 calling for better evaluation of SBIR programs, Wessner, 1999 for a summary of the origins and operational challenges of the SBIR Program, and Wessner, 2000 for an assessment of the Department of Defense Fast Track Initiative.

⁶ About 95 percent of NIH SBIR awards are made through the grant (assistance) mechanism, and about 5 percent of NIH SBIR awards are made through the contract (procurement) mechanism.

hurdles/barriers or catalysts (if any) to successful research translation. We had also hoped to identify correlates of relatively more successful efforts (e.g., size and type of company, level of funding, number of other awards, linkages with the basic research community).

We examined all available records in paper and electronic form in BSR and NIA files. A number of factors presented challenges. Many of the paper files were incomplete or no longer available for grants that had terminated years ago. Although failure to submit timely final reports may affect future funding to the organization or awards with the same PI, we were unable to locate Final Progress Reports for most of our Phase II grants.

The available electronic resources also posed challenges. After 35 years of faithful service, NIH retired IMPAC (Information for Management, Planning, Analysis, and Coordination) in FY2002 and migrated to the next generation information management system for grant applications and awards, IMPAC II. As a result of this evolution, BSR program staff were unable to easily access reliable information for grants prior to FY1997 without intervention by professional programmers in the information systems office. However, we were able to supplement our total cost information by accessing the Small Business Administration's Tech-Net database, which contains information on SBIRs funded beginning in FY1983.⁷

For the period FY1993-FY2002, the Tech-Net Database System was excellent for providing total costs awarded for a particular SBIR project, and information on whether a small business concern is minority-owned or women-owned. However, other information is very incomplete, particularly for less established companies. (Only since FY2003 were Phase II SBIR grantees required to provide information for the SBA Tech-Net Database System.) For the vast majority of companies in our analysis, information was missing for number of employees, year the company was established, average annual gross revenue, web addresses, and date the profile was last updated. Tech-Net does not have specific outcome measures, and is apparently not designed to capture changes in company status. In cases where we knew of companies now defunct, bought out by another company, or with name changes, Tech-Net did not indicate such changes in status.

It was difficult in many cases to determine whether a product, process, or service was actually developed as proposed. We searched the Internet to locate company web sites in the hopes of being able to ascertain whether the product supported by SBIR funds was actually developed or mentioned, and whether NIA support was acknowledged. However, without other reliable means of gathering the information, it was impossible to assess how successful any product, process, or service has been, since such information was rarely encountered. Measures of successful commercialization are also infrequently discussed in grantees' progress reports, which is not surprising since successful commercialization could be years after Phase II is completed.

B. Descriptive Analysis

This review includes all the SBIR projects that received their last year of Phase II funding between FY1993 and FY2002 (Table 1). BSR/NIA had primary assignment on 69 such SBIR grants. These 69 grants were awarded to a total of 53 PI's from 48 companies. The full list of companies with project titles

⁷ The detailed information fields in Tech-Net profiles are: Title, Abstract, Expected Results, Award Type (SBIR, STTR, ATP), Phase 1 Year/Amount, Phase 2 Year/Amount, Name of Firm, Address, Contact Person, Contact Title, Contact Phone, Contact Email, Number of Employees, Minority Owned, Woman Owned, Funding Agency, PI Name, PI Title, PI Phone, PI Email, Solicitation Number, Solicitation Year, Contract/Grant Number; Agency's Tracking Number. The information for many of these fields is often missing. Many of the small business SBIR recipients also participate in the SBA's Pro-Net Procurement and Access Network. Business profiles in the Pro-Net system include data from SBA's files and other available databases, plus additional business and marketing information on individual firms. Businesses on the system are responsible for updating their profiles and keeping information current.

is available in Appendix 1. These companies together received nearly \$51 million (\$50,946,169) in SBIR funds from NIA/BSR alone.

Table 1: Distribution of BSR SBIR Phase II Grants by Last Year of Funding Received

Fiscal Year	Number of SBIR Phase II Grants	Total Costs	Average Total Costs
FY1993	6	\$3,136,536	\$522,756
FY1994	3	\$1,647,657	\$549,219
FY1995	8	\$3,854,224	\$481,778
FY1996	10	\$6,714,780	\$671,478
FY1997	6	\$4,814,238	\$802,373
FY1998	7	\$5,361,671	\$765,953
FY1999	9	\$7,776,774	\$864,086
FY2000	6	\$5,762,724	\$960,454
FY2001	7	\$5,830,552	\$832,936
FY2002	7	\$6,047,020	\$863,860
TOTAL	69	\$50,946,150	\$738,350

NIH SBIR applications are rated by reviewers on a scale from 100 (most meritorious) to 500. Reviewers are instructed to adopt a streamlining procedure whereby applications in the lower half, that generally would receive a score between 300 and 500, are not discussed and not scored. Priority scores during the 10-year period under review ranged from 125 to 281. The priority scores are not associated with a percentile for SBIR applications as they are for regular NIH research grants. If one can view priority scores as one measure of the “quality” of the SBIR applications, it is interesting to note that the average and range in priority scores generally increased (worsened) during the period FY1998 to FY2002, coinciding with the doubling of NIH budgets.

Although this review does not focus on the Phase I SBIRs, it should be noted that BSR/NIA also has had primary assignment on 84 Phase I SBIRs (valued at \$8,976,871) funded during FY1993 through FY2002 that have not (yet) led to Phase II grants (Table 2). (The Phase I grants that have a Phase II are included in Table 1).

**Table 2: Distribution of BSR SBIR Phase I Grants by Year of Funding Received
(Exclusive of Phase I Grants Captured in Table 1)**

Fiscal Year	Number of SBIR Phase I Grants	Total Costs	Average Total Costs
FY1993	4	\$ 199,999	\$ 50,000
FY1994	9	\$ 660,397	\$ 73,377
FY1995	4	\$ 377,648	\$ 94,412
FY1996	0	\$ 0	\$ 0
FY1997	12	\$1,168,624	\$ 97,385
FY1998	8	\$ 799,178	\$ 99,897
FY1999	7	\$ 738,746	\$105,535
FY2000	7	\$ 685,606	\$ 97,944
FY2001	18	\$2,297,622	\$113,881
FY2002	15	\$2,049,051	\$138,725
TOTAL	84	\$8,976,871	\$106,868

The 48 companies in our study that have completed Phase II grants were established in 21 States. Massachusetts, Virginia, Oregon, California, Maryland, and Illinois were particularly well represented in terms of number of companies awarded grants and total dollar value of awards (Table 3).

Table 3: Concentration of SBIR Phase II Recipients by State, FY1993 – FY2002

State	No. Companies	Total Awards (\$)	SBA State ranking, FY2001*
Massachusetts	7	\$11,976,137	2
Virginia	8	\$ 7,910,209	3
Oregon	3	\$ 5,184,068	20
California	5	\$ 4,509,527	1
Maryland	3	\$ 3,200,476	5
Illinois	3	\$ 2,241,205	16
Michigan	2	\$ 1,809,403	15
South Dakota	2	\$ 1,753,633	50
Ohio	2	\$ 1,679,954	6
Washington	2	\$ 1,373,091	11
Texas	2	\$ 1,356,764	8
New Jersey	2	\$ 1,240,590	10
Missouri	1	\$ 1,007,406	40
Colorado	1	\$ 849,636	4
Washington, DC	1	\$ 848,532	34
Wisconsin	1	\$ 823,944	23
North Carolina	1	\$ 750,000	21
Pennsylvania	1	\$ 726,083	7
Kansas	1	\$ 605,660	35
Connecticut	1	\$ 549,974	17
Kentucky	1	\$ 549,877	43
TOTAL	49	\$50,946,169	

* State rankings based on total SBIR awards for FY2001, the most recent year for which data are publicly available by the SBA.

The subject matter addressed by the SBIRs can be grouped into a number of broad categories (Table 4), with the most popular being training and improvement in quality of life, whether through behavioral or cognitive intervention, or improved functioning, as well as tools for research including data archives.

Table 4: Type of Product, Process or Service Proposed

Category	Examples	Number*
Training	Training for consumers, providers, on topics including menopause, HRT, nutrition, driving, sensory/cognitive function, AIDS, depression, survey methods, fire safety, AD care	18
Behavioral Intervention/Treatment Program	Homecare/telemedicine; behavior, home, and environmental modifications; ergonomics; injury prevention; driving; better communication	16
Tools for Research	Data and instrument archives, data storage; research bias detection tool	11
Improved Functioning/Quality of Life	Improve doctor-patient communication; assistive devices; memory enhancement/retention; medicine dispensers; improved hearing aids; nursing home alternatives	9
Cognitive Assessment/Intervention	Improve memory; driving, perception, motion; cognition and telephone surveys	6
Assessment Tool	LTC risk manual, CCRC financial viability, simulations, caregiver assessment, therapeutic environment	6
Caregiver Assistance	Telecommunication; home care scheduling/planning	4
Information Systems	Patient information; protocols	3

Category	Examples	Number*
Projections/Forecasts	LTC/retirement planning; projections, estimates, software development	3
Communication Systems	Home monitor, motion detectors, sensor devices	2
* Numbers are not mutually exclusive as there is some overlap.		

In terms of relationship to basic NIA/BSR-sponsored research, we found that a large minority of SBIR awards could claim some inspiration from NIA/BSR-sponsored basic research. Using a conservative interpretation of BSR influence (where uncertain influence was coded as no), we can tentatively claim about 43 percent (29/69) of the Phase II SBIRs under study as having some lineage to NIA/BSR-sponsored basic research, with some association either through regular R01 research grants, or P50 center grants.

A systematic search of the NIH CRISP Database allowed us to assess the relative experience of the Phase II SBIR PI's in terms of number of grants awarded.⁸ About 77 percent or 41 of the 53 PI's in our study had only 1 Phase II SBIR grant funded by NIA during our study period, but 8 of these 41 PI's were PI's on Phase II SBIR's from other NIH Institutes. In total, 14 of the 53 PI's were PI's on Phase II SBIR's from other NIH Institutes, and 26 have been PI's on Phase I or Phase II SBIR grants from other NIH Institutes.

A little more than 20 percent, or 11 of the 53 PI's, possess experience as PI's on regular NIH research grants (R01, R03), or have participated on a program project grant (P30, P50), 5 of whom were PI's on research grants from NIA. The vast majority of NIA/BSR PI's do not have experience as PI's on basic research grants. However, over 70 percent of the grants have some collaboration with academic and research institutions.

We were most interested in whether the SBIR Phase II grants actually produced the products, processes, or services proposed in the applications, **and** have them available in a form suitable for purchase. Since such data are not collected by NIH, we had to rely on other sources for this information, particularly company Web sites. As documented in Appendix 1, we could find valid Web sites for only half of the 48 companies in our study. From the available Web sites and any other reliable information we could find (including correspondence from former program officers), we concluded that of the 69 SBIR Phase II projects under study, 32 have produced the product proposed, 4 have produced a prototype only, 7 have not yet completed their development, and 5 did not or appear unlikely to produce the product due to time elapsed or change in company direction (Table 5). The outcomes for 21 grants were inconclusive or not known since we could not find information to confirm or dispute the successful development of the product. It is likely, however, that if the product is difficult to locate on the Internet, the probability of successful marketing will be low. The 43 grants that have either produced or are in process of producing their proposed product belong to 29 companies and 34 PI's. The products produced or in development tend to favor training media, behavioral interventions, tools for data analyses (including data archives), and assessment or evaluation tools (e.g., to compare different long term care options, nursing homes, living environments).

⁸ CRISP is a searchable database of Federally funded biomedical research projects conducted at universities, hospitals, and other research institutions. The database, maintained by the Office of Extramural Research at NIH, includes projects funded by NIH, Substance Abuse and Mental Health Services (SAMHSA), Health Resources and Services Administration (HRSA), Food and Drug Administration (FDA), Centers for Disease Control and Prevention (CDC), Agency for Healthcare Research and Quality (AHRQ), and Office of Assistant Secretary of Health (OASH). Users, including the public, can use the CRISP interface to search for scientific concepts, emerging trends and techniques, or to identify specific projects and/or investigators.

Table 5: Proportion of SBIR Phase II Grants by Deliverable Outcome

Type of Outcome	Number	Percent
Proposed Deliverable Produced <u>and</u> Available for Use/Purchase	32	46
Produced Prototype	4	6
Development Still In Progress	7	10
Not Produced or Not Likely To Be Produced	5	7
Unknown	21	30
TOTAL	69	100

Ten of the 48 companies completed more than one Phase II SBIR grant during the period under study. All the multiple R44 awardees are fairly well established, with the youngest company founded in 1993 (Table 6). The New England Research Institute (NERI) stands out with eight SBIR Phase II awards, followed by the Oregon Center for Applied Science (OCAS) with four. NERI and OCAS both have as their mission the application of scientific knowledge and technological innovation to address health care policy and public health education. They are therefore particularly suited to compete for SBIR funding. NERI and OCAS are relatively large in terms of employee numbers, providing a stable critical mass of about 250 and 45 people respectively, many with strong academic ties who also have been successful securing NIH R01 grants as well as SBIR grants from NIH Institutes other than NIA. For firms focused on research, the quality of the research is paramount, and success is often measured by multiple grant and contract awards.

Table 6: Companies with Multiple SBIR Phase II Grants Completed, FY1993 – FY2002

Company Name	Year Founded	Approx. Number of employees*	Number Awards	Total Costs Received
New England Research Institute (NERI) ♀	1986	250	8	\$ 5,991,587
Oregon Center for Applied Science (OCAS) ♀	1989	45	4	\$ 3,412,767
Compact Disc, Inc.	1986	16	3	\$ 2,282,875
Bonnie Walker and Associates ♀	1986	7	3	\$ 2,179,352
Hearthstone Alzheimer Care ♀	1992	195	3	\$ 1,659,952
Caretrends Health Education & Research Institute	1991	15	2	\$ 1,753,633
Creative Action, Inc. ♀	1988	7	2	\$ 1,679,954
Unicon Research Corporation	1979	23	2	\$ 1,552,999
Decision Demographics	1993	5	2	\$ 1,107,049
Sociometrics ♀ ▲	1983	19	2	\$ 997,157
TOTAL			31	\$22,617,325

*Number of employees at the time of Phase II application or from company Web site in 2002.
 ♀ Women-owned small business. Source: SBA Tech-Net Database System.
 ▲ Minority-owned small business. Source: SBA Tech-Net Database System.

Companies with the greater numbers of SBIR grants generally receive the most in total funding. As shown in Table 6, NERI garnered nearly \$6 million in SBIR funding from NIA/BSR during the period under study, representing about 12 percent of total funds expended. Indeed, the top 10 companies (in terms of number of SBIR Phase II awards) represent about 21 percent of the 48 companies under study, but they account for 45 percent of the Phase IIs completed, and 44 percent of the total funds awarded.

The SBIR projects pursued by the companies in Table 6 mostly relate to manual/teaching guide or video products, and software products, information databases, or data archives of some sort. The top four companies in Table 6 favor the development of multimedia training programs, particularly CD-ROMs and associated literature focused on a range of topics targeted to the elderly, their caregivers, or physicians.

Six of the companies listed in Table 6 (NERI, OCAS, Bonnie Walker and Associates, Hearthstone Alzheimer Care, Creative Action, and Sociometrics) are listed as woman-owned (one of which is also categorized as minority-owned), according to the SBA database. A woman-owned small business concern is one that is at least 51-percent owned by a woman or women who also control and operate it. "Control" in this context means exercising the power to make policy decisions, and "operate" means being actively involved in the day-to-day management. In this regard, BSR/NIA appears to have been successful in meeting one of the stated objectives of the SBIR Program, to foster and encourage participation by woman-owned business concerns. As only 12 of the 48 companies studied are woman-owned, the woman-owned firms are disproportionately represented among the most frequent award recipients in the group.

II. Roybal Centers

The objective of the Edward R. Roybal Centers for Research on Applied Gerontology program is to facilitate the translation of basic behavioral and social research into practical outcomes that benefit the lives of older people, and increasingly to stimulate "use-inspired" basic research in the behavioral and social sciences. These specialized centers help to fulfill NIA's mandate to foster research aimed at keeping people independent, active, and productive in later life. The centers were designed to move promising social and behavioral research findings into programs that can help improve the lives of older people and their families in such areas as computer skills, driving, exercise, retirement, caregiving, and nursing home care. The centers also establish contacts with service providers and related industry personnel to meet their objectives.

In 1993, six Roybal Centers were awarded 5-year grants. The Roybal Centers were recompeted in 1997 (See RFA AG-97-005 in the NIH Guide, <http://grants1.nih.gov/grants/guide/rfa-files/RFA-AG-97-005.html>), with six 5-year grants awarded beginning in FY1998. The Roybal Centers are again being recompeted in FY2003 with a January 21, 2003 application receipt date (See RFA AG-03-002 in the NIH Guide, <http://grants1.nih.gov/grants/guide/rfa-files/RFA-AG-03-002.html>)

The RFA in 1997, under which the current Roybal Centers were funded, made clear that improvements in behavioral indicators relevant to the practical domain (e.g., laboratory measures of cognitive functioning, health status, or subjective well-being) are considered interim goals, with the end point of individual projects being improvement in functioning in the practical domain itself. The Centers were also encouraged to focus on special populations of older people, e.g., minority, oldest-old, developmentally disabled, poor in rural areas.

At the time of application in 1997, the PI of a Roybal Center was required to be PI on at least two R01 (or similar) grants, one of which must be currently active at the RFA receipt date, and the other must have been awarded within 10 years of the receipt date of the RFA. Including the two grants held by the PI, the members of the investigative team are required to have a total of at least three R01 (or similar) grants awarded within 10 years of the receipt date of the RFA.

The structure of each Center consists of a management core to provide integration and unity to the component research projects and to administer faculty and study development programs; two to four component projects, at least one of which has a plan for field research; two to four pilot projects awarded to doctoral students or faculty members to conduct pilot research on investigator-initiated topics; and a dissemination core to help ensure that the findings reach beyond the academy. Each Center also has an advisory board with members from academia and community aging groups. The effectiveness of their research is being judged by the community, as well as by their peers. Note that there was no requirement or mention in 1997 that the Roybal Center PI be knowledgeable about product development,

commercialization, or marketing, or to have had any experience or familiarity with SBIR/STTR Programs. Unlike the 2002 RFA, there was no reference in 1997 to the SBIR/STTR Program at all.

The six Roybal Centers funded as part of the May 1997 RFA each has a different organizing theme (Table 7).⁹ With the exception of the University of Illinois at Chicago, all of the Roybal Centers had been funded as Roybal Centers the 5 years prior to the current project period that expires in June 2003. The currently funded Centers are designed to move promising social and behavioral research findings in a number of areas—exercise, computer skills, driving ability, care-giving, nursing home care—out of the laboratory and into programs that can help improve the lives of older people and their families. The Roybal Center investigators and their collaborators have generated over 250 refereed journal articles and published more than 100 books and book chapters.

Table 7: NIA Roybal Centers FY1993-FY2003

Roybal Center and collaborating institution(s); Grantee institution in bold	PI/Center Director	Organizing Theme	Total Costs Awarded FY1993- FY1997	Total Costs Awarded FY1998- FY2003
Boston University , NERI, & Miriam and Rhode Island Hospitals	Alan M. Jette, PhD	Fear of falling clinical intervention trials; enhancement of late-life function	\$2,124,261	\$ 2,842,789
Cornell University	Karl Pillemer, PhD	Promoting social integration in long-term care	\$2,397,443	\$ 3,001,631
University of Alabama at Birmingham	Karlene Ball, PhD	Enhancing mobility in the elderly	\$2,230,153	\$ 2,814,979
University of Illinois at Chicago*	Susan L. Hughes, DSW	Improved functional status and quality of life, including through better exercise adherence	*	\$ 3,374,984
University of Miami , Florida State University, & Georgia Institute of Technology	Sara Czaja, PhD	Enhancing computer interactions for older adults	\$1,565,001	\$ 3,173,722
University of Michigan & Georgia Institute of Technology	Denise Park, PhD	Designing psychologically optimal medical environments/technologies	\$2,563,423	\$ 3,047,079
			\$10,880,281	\$18,763,091
*No prior funding as a Roybal Center				

A. Objectives, Scope, and Methodology

We examined extant information about the Roybal Centers provided by BSR staff, including practical outcomes that have been reported elsewhere (e.g., Roybal Center Web sites, press releases, staff presentations, other publications). In December 2002, we surveyed the current Roybal Center PIs about their research translation efforts, their familiarity and/or involvement with the SBIR grant program, whether the Roybal Centers spun off or produced any SBIRs over the past decade, potential opportunities and barriers between the two programs, and ways to encourage development of products and services that will benefit the health and well-being of older people. The survey questions are included as Appendix 2.

⁹ All of the Roybal Centers except the University of Miami were funded as P50 specialized centers in the FY 1998-2003 project period. The University of Miami was funded as a P50 specialized center in the FY1993-1997 project period, and was converted to a P01 program project grant in FY1998, but still treated as a Roybal Center for all intents and purposes.

B. Findings

Four of the six Roybal Center directors returned a completed NIA/BSR survey: Boston University, the University of Alabama, the University of Illinois at Chicago, and the University of Michigan. Based on their survey responses and available materials, it appears that the Roybal Centers have produced many significant practical outcomes, examples of which are described in Table 8.

Table 8: Summary of Roybal Practical Outcomes

Roybal Center and collaborating institution(s); Grantee institution in bold	Examples of Practical Outcome(s)
<p>Boston University, NERI, & Miriam and Rhode Island Hospitals</p>	<p>Developed an effective nine-session group intervention program to mitigate fear of falling and accompanying restricted activity. Since 1997, <i>A Matter of Balance</i> has sold 470 manuals and 430 videos across the country by numerous hospitals, health agencies, and public health departments. The program was awarded several of the top industry health education awards, including the 1998 Archstone Foundation Award for Excellence in Program Innovation by the American Public Health Association. In April 2002, the program's implementation throughout the State of Maine by MaineHealth is being recognized by the National Council on Aging as one of five exemplary health promotion and physical activity programs in the country. (NERI, 2002 and e-mail correspondence from Alan Jette to Richard Suzman, December 18, 2002).</p> <p>Developed the "Late Life Function and Disability Instrument," which assesses both function and disability. Investigators around the world are beginning to use the instrument, which was originally developed for Roybal intervention studies, and several translations are underway.</p> <p>Developed a home strength-training program with high adherence rates that achieves significant gains in lower extremity strength and tandem gait, and overall declines in disability at the 6-month follow-up visit. In collaboration with the Robert Wood Johnson Foundation, the <i>Strong-for-Life</i> program has been successfully adapted to community-based health promotion programs in a wide range of settings across the United States. Approximately 210 <i>Strong-for-Life</i> videos, and 235 <i>Exercise: It's Never Too Late</i> videos have been sold.</p>
<p>Cornell University</p>	<p>Developed the <i>Partners in Caregiving</i> intervention to improve family-staff relationships in nursing homes.</p> <p>Identified resources that employing organizations can provide that may expedite retirement planning and may influence the timing of retirement.</p> <p>Developed and extensively tested a set of computer-assisted telephone interviewing instruments that measure trajectories of social support across the life course.</p>

Roybal Center and collaborating institution(s); Grantee institution in bold	Examples of Practical Outcome(s)
University of Alabama at Birmingham	<p>Pioneered an objective measure of visual information processing: Useful Field of View (UFOV), which has proven to be an excellent predictor of crash involvement in older drivers; intervention studies have found methods to expand UFOV to improve driving outcomes for older adults. The State of Oregon has recommended legislation mandating the UFOV evaluation developed by the Alabama Center for elder driver screenings. Use of this evaluation is under discussion with the National Safety Council, the AAA Foundation for Driver Safety, the Enterprise Car Rental Company, and several national insurance companies.</p> <p>Developed a driving assessment clinic that is being duplicated elsewhere.</p> <p>Developed the Timed Instrumental Activities of Daily Living assessment battery and some mobility instruments (Life Space Questionnaire, Driving Habits Questionnaire) that have been requested by other research laboratories, as well as an educational program for older drivers on how to reduce their driving risk.</p>
University of Illinois at Chicago	<p>Formed Senior Health Alliance Promoting Exercise (SHAPE) to educate the public about the importance of physical activity for seniors.</p> <p>Initiated SHAPE annual 3-mile <i>Get in SHAPE Chicago!</i> Senior Health & Fitness Walk. In 2002, more than 2,000 seniors participated in the event, which continues to receive considerable attention among the local and national press</p> <p>Pioneered a methodology to assess the capacity and demand for physical activity programming for senior in Cook County. The methodology has been refined and replicated by the Healthy Aging research network funded by the Centers for Disease Control and Prevention (CDC) and will be implemented in targeted communities in 7 states in winter 2002.</p>
University of Miami, Florida State University, and Georgia Institute of Technology	<p>Developed and validated training, instructional programs, and interface devices that help older people learn to use computers and other technologies effectively</p> <p>Working with industry to design a better computer "mouse" device and age-appropriate speech recognition technology for older adults</p>
University of Michigan and Georgia Institute of Technology	<p>Developed and tested ways to help physicians structure medical interactions and assessments that increase older adults' compliance with medical instructions</p> <p>Demonstrated that the forming of implementation intentions as a behavioral strategy improved senior adults' adherence to therapeutic regimens by more than 50 percent, and may prove to be a powerful way to improve overall patient health and decrease incidence of unnecessary doctor visits</p>

There are clearly many significant linkages between the Roybal Center activities and small business or industry. Examples of SBIR Program and other industry links are provided in Table 9.

Table 9: Intersections of Roybal Centers with SBIR Program and/or Industry

Roybal Center and collaborating institution(s); Grantee institution in bold	Nature of Intersection with SBIR Program and/or Industry
Boston University, NERI, & Miriam and Rhode Island Hospitals	<p><i>A Matter of Balance</i>, a nine-session group program developed by the Roybal Center consortium of which NERI is a partner, was also supported through an SBIR grant from NIA.</p> <p>The PI is collaborating with a small business to commercialize the SBIR work undertaken in computerized adaptive testing, a spin-off of Roybal measurement work.</p> <p>PI is formerly with NERI, and has worked on several SBIRs as PI, Coinvestigator, and consultant. PI is currently working in a consultant capacity on funded SBIR/STTR projects, while others from the Roybal group are working as Coinvestigators.</p> <p>Dr. Joan Hyde with Hearthstone Alzheimer Care, a recipient of SBIR funding, serves on the Advisory Board of the Boston University Roybal Center.</p>
Cornell University	No response received.
University of Alabama at Birmingham	<p>PI and Coinvestigator own stock in Visual Resources, Inc., the company that holds the patent to the Useful Field of View (UFOV) visual attention analyzer developed from Roybal Center research, and a recipient of an NIA SBIR to develop the UFOV technology. A Phase II SBIR grant is developing a home-based training program to improve field of view and driving performance for elderly drivers</p> <p>Partnered with the Psychological Corporation and licensed the assessment measures.</p> <p>Partnered with a large insurance company.</p>
University of Illinois at Chicago	<p>Coinvestigator has tested equipment for several exercise equipment manufacturers and provided feedback on product design.</p> <p>Partnering with LifeFitness, Inc., the global leader in the production of fitness equipment, in developing exercise equipment that is universally designed for both older adults and people with disabilities. This project is underway and will be completed in 2005.</p>
University of Miami, Florida State University, & Georgia Institute of Technology	<p>Center has collaborations with John Deere and Co. to investigate issues associated with display design, interface design, and user training for their advanced agricultural systems. Also collaborating with IBM on issues related to voice recognition software and telephone voice menu systems.</p> <p>Working with industry to design a better computer "mouse" device and age-appropriate speech recognition technology for older adults</p> <p>PI collaborated with Creative Action, Inc. to develop InterpreCare™, a system to improve communication in other languages by care providers, and EZ Wheeler Cart™ designed to lift loads to enhance daily activities of senior adults.</p>
University of Michigan & Georgia Institute of Technology	None reported.

From the survey responses received, it is clear that the Roybal Center directors have varying degrees of familiarity and engagement with the SBIR Program. One Roybal Center director was aware of the SBIR Program, had participated on SBIR applications as a consultant, but did not see many promising opportunities for meaningful interactions other than the possibility of producing some training materials. Three Center directors saw many potential opportunities for Roybal and SBIR program collaborations and industry linkages, and considered capitalizing on such opportunities as a natural outgrowth of the Roybal focus on making available as broadly as possible the applied research findings developed under the Roybal program. One Center director who has participated in many capacities on SBIR grants, including as PI, identified as a key barrier the difficulty in finding an appropriate small business partner who can do

their part in the project. In his words, “This has always been the biggest hurdle to overcome and the one that prevents us from doing more. We have plenty of spin-off ideas and limited numbers of partners.”

III. Future Directions

The need to demonstrate the return on Federal investment in research requires close monitoring of Federal research portfolio accomplishments. The 1993 Government Performance and Results Act (GPRA) encourages greater accountability and effectiveness, and requires Federal agencies to set goals and develop performance measures in budgeting programs. In seeking to examine a few key aspects of the BSR/NIA SBIR and Roybal Program outcomes, this report is intended to be helpful to the NAS panel in their deliberations about the success of translational efforts in the area of applied gerontology. In light of recent technological advances that could improve the lives of the elderly, regular assessments help provide staff with a greater capacity to stimulate researchers in the field to be creative in the development and application of new technologies, and to perhaps identify future areas of research with greatest potential for successful translation. The NAS has also recognized the benefit of regular assessment of the SBIR programs as a way to improve policymakers’ understanding of the program (Wessner, 2000).

There is certainly potential for the Roybal Centers to capitalize on the availability of SBIR funding to disseminate their applied research findings on a larger scale. Already, at least four of the Roybal Centers have ties to industry or small business projects to apply their findings commercially. The limitations to realizing more fully the potential for commercial application appear to be the development or packaging of products or processes that can be feasibly marketed, and the identification of appropriate small businesses to partner with the Roybal Centers. Because NIH SBIR applications must undergo a peer review process that is similar to that of NIH regular research grants, it can be extremely helpful for small businesses to seek the counsel of PIs on NIH research and center grants (such as Roybal Center principals) in meeting NIH peer review standards.

Commercialization is only one of many stated goals of the SBIR Program. NIH recognizes that in certain situations, immediate commercialization potential may be secondary to other program goals, such as stimulating technological innovation, meeting Federal research and development needs, or increasing the participation of small businesses and underrepresented groups in Federal research and development (U.S. GAO, 1999, p. 83). It is up to the sponsoring agency to determine if the goals of the SBIR Program and the needs of the agency are being met. The SBIR grants program requires the applicant to formulate the idea for a product, and to define the market and argue its potential for commercial application or societal impact. If NIA/BSR identifies a product gap or need, it should consider making use of SBIR contracts to more quickly close the gap.

We were less successful identifying readily available, consistently reported, and reliable outcome measures that would help us assess the success of the SBIR program in meeting program goals to improve the health and well-being of elderly Americans. We found that about 60 percent of the SBIRs in our review did produce and have made available their proposed products or processes. Most of the products produced were in the form of training media (manuals, CD-ROMs, videos), behavioral and cognitive interventions, research tools including data archives, and assessment or evaluation tools. Even crude measures of impact (as measured by sales, press attention, impact on the everyday life of the elderly, etc.) were difficult, if not impossible, to obtain from extant information systems. Final progress reports would be the logical place to report such results, but it might be unrealistic to expect results to be captured within 90 days of funding termination.

Although SBA is considered to have the most complete database on SBIR awards, company information is often missing, particularly for year established, number of employees, and expected results. Even if the information reporting improves in the future given the new reporting requirements imposed on grantees

beginning in FY2003, Tech-Net still will be of limited use for evaluation purposes because it collects no specific outcome measures and does not track changes in company status. NIA is in the process of acquiring a proprietary database program that will facilitate the tracking of SBIR applications from ideation to product development and sales. It is envisioned that this system will enable the NIA to comply more fully with the GPRA, and to assess the quality and direction of the SBIR (and STTR) program (personal communication, M.D. Kerns, January 13, 2003).

To properly assess outcomes, SBIR grantees should be followed for a period of time to see whether some commercial payoff ensued after NIA funding ceased. NIH recognizes that “If the responsibility is placed on the grantee, it is not clear what level of compliance can be expected, or what incentives exist for grantees to submit the data” (U.S. GAO, 1999, p. 85). If reporting is not required, there is likely to be selection bias among participants who do report.

Given the dearth of useful evaluative outcome measures, including whether a product, service, or process was actually produced as proposed, future agency assessments should: 1) Explore the possibility of accessing non-publicly available data captured by SBA, IEdison, and other sources, and assessing their usefulness for NIA evaluation needs; and 2) include a targeted survey designed to elicit the types of information sought. In particular, issues about hurdles/barriers or catalysts to successful research translation, and the extent to which cross-subsidies or some activities of the companies potentiate the most successful SBIR research projects. These types of questions could not be easily answered from extant materials and may best be answered through a survey format. More detailed case studies of the most active companies (e.g., those in Table 5), and Tibbets Awards winners can be undertaken to complement a general survey to try to assess how successful they have been in marketing their products or services.

References

- NERI. Summer 2002. “From Research to Practice: A Successful Transition.” *Network: The Newsletter of the New England Research Institutes*. Page 12.
- National Institutes of Health, Center for Scientific Review. January 2003. Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR) Guidelines for Reviewers. January 2003 Institute Advisory Councils. Also in PHS 398; PHS 2002-2. <http://www.csr.nih.gov/REVIEW/RevguideSBIR-STTR.pdf>
- U.S. Department of Health and Human Services. 2002. Omnibus Solicitation of the National Institutes of Health, Centers for Disease Control and Prevention, and Food and Drug Administration for Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Grant Applications. PHS 2002-2. [The PHS 2003-2 Omnibus Solicitation for NIH, CDC and FDA SBIR and STTR Grant Applications will be released on or around January 15, 2003.]
- U.S. General Accounting Office. 1999. Federal Research: Evaluation of Small Business Innovation Research Can Be Strengthened, GAO/RCED-99-114. Washington, D.C.: GAO.
- U.S. Small Business Administration. 2001 SBIR State Ranking. www.sba.gov/sbir/2001SBIRStateRanking.pdf
- Wessner, C., ed. 1999. *The Small Business Innovation Research Program: Challenges and Opportunities*. Washington, D.C.: National Academy Press.
- Wessner, C., ed. 2002. *The Small Business Innovation Research Program: An Assessment of the Department of Defense Fast Track Initiative*. Board on Science, Technology, and Economic Policy, Policy Division, National Research Council. Washington, D.C.: National Academy Press.

APPENDIX 1

LIST OF COMPANIES AWARDED NIA/BSR PHASE II SBIR (R44) GRANTS
FY1993 TO FY2002

▲ Minority-owned; ♀ Women-owned

Title of award in **bold** if product known to have been actually produced **and** available for use or purchase

Last FY of Funding	Company Name	Title of Award	Web Site Address (if known)
1996	Actuarial Forecasting and Research	Continuing Care Retirement Community Experience	
1998	Actuarial Research Corporation	Long Range Population Projection by Disability Status	www.aresearch.com
1999	American Research Corp of Virginia	Portable Multimedia for Family Caregiver Training	
1996	Amron Corporation	Noninteractive Home Monitor	www.amron.com
1998	Ascent Technology	Geriatric Independent Reading Device	
1995	Atlantic Microsystems ▲	Advisor for Caregivers to Alzheimer's Patients (ACAP)	
1997	Atlas DataSystems ▲	Scheduling and Planning System for Home Care Services	
2002	Biostatistical Programming, Inc.	Publication Bias in Meta Analyses for Mental Health	
1999	Bonnie Walker and Associates ♀	Fire Safety Certification System for the Elderly; Injury Prevention for the Elderly; Improving Staff Attitudes Toward Expression of Elderly	www.bonniwalker.net (under development)
2002	Caretrends Health Education and Research Institute	Multimedia Nutrition Education; Multimedia Alzheimer's Education in Assisted Living	www.caretrends.com
1993	Checkmate Engineering (purchased by Retractable Technologies, Inc.)	Automated Home Tablet and Capsule Dispenser	www.vanishpoint.com
1999	Compact Disc, Inc. (possibly purchased?)	CDROM Monitor Improves Older Persons Memory Readiness; Improving Older Persons' Memory Skills with CD-I TV; CD-Improving Older Persons Intentional Memory Skills	
1994	Computers in Psychiatry/ Psychology/ Healthcalls America, Inc.	Information System to Improve Home Health Care	
1995	Cosis Corporation ▲ (possibly purchased?)	Integrated Climbing/Reaching Product for the Elderly	
1999	Creative Action, Inc. ♀ (also Lifespan Associates)	The Interprecare System: A Language Intervention Product; Carrier Lift to Enhance Daily Activities	www.creativeactioninc.com
2001	Decision Demographics	Mature Market Profiler – A National and Local System; Older Americans Market – Forecasts for U.S. Counties	www.decision-demographics.com
1998	Decision Systems, Inc.	Support Environment for Grade Membership Model	
1995	Elder Source, Inc. ♀	Elders' Comprehension and Acceptance of Health Ed	
2000	Extended Home Living Services, Inc.	Assessment Protocol to Identify Home Modification Needs	www.ehls.com
1995	Healthcare Education Associates	AIDS and Aging – What People Over 50 Need to Know	
1999	Hearthstone Alzheimer	Resident Centered Information System for	www.thehearth.org/home/h

Last FY of Funding	Company Name	Title of Award	Web Site Address (if known)
	Care♀	Assisted Living; Design Criteria for Alzheimers Special Care Program; Dynamic Assessment for Nursing Homes	ome.html
1997	Innovative Designs/Environment/ Aging Soc	Environmental Assessment Protocol for Special Care Units	
1996	Innovative Enterprises International	Medication Compliance Assistance System	
2002	IRIS Media, Inc.	Retirement, Leisure, and Older Adults with Development Disabilities	www.lookiris.com
2000	JVC Radiology and Medical Analysis♀	Assessment of Doctor Elderly Patient Encounters	
1997	Lazo, Gertman and Associates, Inc.	Interactive Home Health Computer System	
1996	Lifepans, Inc.	Automation of Long Term Care Factor Guidelines	www.lifepansinc.com
1998	Mandala Sciences♀	Computer Tools for Outcomes Analysis of Hip Replacement	
1996	Mobile Care, Inc.	Healthcare Suites – A Homecare Alternative for Elders	
1998	National Council on Aging Develop Corp	Decision Support Software for Financing Long Term Care	
2002	New England Research Institute, Inc.♀	Media Training on Menopause for Health Professionals; Women in the Middle-Mid-aged Women and Menopause Video; Food for Life: Healthier Meals Elderly Can Live With; Videotape to Train Interviewers in Surveys of Older People; Physical vs. Mental Health of Older Persons – A Video; Communicating with Older Patients—A CDROM for Physicians; Older Patients and Physicians as Partners—A Video; A Brief, Telephone Administered Cognitive Instrument;	www.neri.org
1993	North Rim Systems	Management of Incontinence Care in Nursing Homes	
1999	Northwest Media, Inc.	Media-Based Approach to Planning Care for Family Elders	www.northwestmedia.com
2002	Oregon Center for Applied Science♀	Interactive Health Risk Appraisal for the Elderly; Dealing with Dementia: A Multimedia Guide for Caregivers; Care of the Aged: A Multimedia Staff Development Program; Menopause –Enhancing Women's Knowledge & Decision-Making;	www.orcasinc.com
1999	Public Data Queries♀	System for Managing Longitudinal Survey Data	www.pdq.com
1997	Research International, Inc.	Long Life, Rechargeable Hearing Aid	www.resrchintl.com
2001	RSK Assessments, Inc. (previously Star Mountain, Inc.)	Perceptual Correlates of Rear-End Collisions and Age	

Last FY of Funding	Company Name	Title of Award	Web Site Address (if known)
1999	RTZ Associates	Advancing Adult Day Care Services via a Standardized Cored Data Set	www.rtzassociates.com
1998	Sociometrics ▲ ♀	Microcomputer Data Archive of Social Research on Aging; Establishing the Gerontology Instrument Archive	www.socio.com
1993	Solon Consulting Group, Ltd (Bought by 3M in 1996)	Integrated Database for Aging Research	
2002	Strand Software ♀	Interactive Injury Prevention: A Multimedia CD-Rom	www.Strandsoftware.com
1993	Stratecision	A Model to Evaluate Long Term Care Insurance Policies	www.ltca.com
2000	Technoview	Information for Improved Care of Older Patients at Home	www.techoview.com
2000	U.S. Carelink (acquired by HEALTHvision in 1999)	An Electronic Community for Alzheimers Caregivers	www.healthvision.com
2000	Unicon Research Corporation	Compiling and Documenting the CPS on Compact Disc; Developing Public-Use Medicare Claims Data for AHEAD	www.unicon.com
1994	Virtual Worlds, Inc.	Driving Performance Analysis System	
2002	Visual Awareness, Inc. ♀ (formerly Visual Resources, Inc.)	Home Based Attentional Training for Older Adults	www.visualawareness.com
1995	Visual Resources, Inc. (became Visual Awareness, Inc.)	Perceptual Assessment Improvement of the Older Driver	

APPENDIX 2
SURVEY OF ROYBAL CENTER DIRECTORS
Evaluation of NIA Translational Research in Behavioral
and Social Research on Aging

Please return this completed questionnaire by December 20, 2002 to:

RLi@asciences.com

Please feel free to use additional pages as necessary. If you have questions about this survey, please contact Ms. Angie Chon-Lee, Office of the Associate Director, Behavioral and Social Research Program, National Institute on Aging, Email: chon-leA@nia.nih.gov or Phone: 301-594-5943.

I. Roybal Centers

- 1) According to the 1997 NIA RFA for the Roybal Centers, the individual projects in the Roybal Centers “should have as their goal a practical end point – improvement in some indicator or indicators of functioning... Improvements in behavioral indicators relevant to the practical domain (e.g., laboratory measures of cognitive functioning, health status, or subjective well-being) may be considered interim goals. However, the end-point is improvement in functioning in the practical domain itself.” What was the proposed practical end point goal of your Roybal Center, and has it evolved over the course of the project period?
- 2) Please define the “community” that you serve.
- 3) What strategies do you, your collaborators, and staff use to transfer research findings to the community as part of your currently funded Roybal Center?
- 4) What metrics or methods does your Center use to assess its success in achieving its purpose?
- 5) Are there any new developments or findings originating from your Roybal Centers since your last progress report?
- 6) What do you consider to be the most significant outcomes of your Center’s applied research efforts?
- 7) What do you consider to be the most significant accomplishments of your Center?
- 8) Are there products or services that could be developed from your NIA research or that of others affiliated with your Roybal Center? From other behavioral/social research you are familiar with? If so, please describe the types of product or service and any plans to develop them.
- 9) Have you considered commercializing a product or service developed as a result of Center activities, or partnering with a business entity to do so? If yes, please describe the context and outcome.
- 10) Have others in the Roybal Center considered commercializing a product or service derived from their NIA-funded research? If so, please explain the context and outcome.

II. SBIR/STTR Linkages

- 11) Are you familiar with the federally-funded Small Business Innovation Research (SBIR) and Small Business Technology Transfer Research (STTR) grant programs? [If not, skip to Question 13]
- Have you participated in any SBIR or STTR grant applications to NIH or other federal agencies over the last decade? [If not, skip to 12]
 - How were you introduced to the small business(es)? (e.g., contacted by the small business; you sought them out; etc.)
 - In what capacity (e.g., as PI, co-PI, consultant, etc.)?
 - Are you currently involved in a funded SBIR or STTR grant project (e.g., as a collaborator or consultant)? If so, please describe.
 - On about how many SBIR or STTR applications have you participated?

Please list the SBIRs or STTRs by project title or PI, and approximate time(s) of participation.

No.	PI Name	Project Title	Approx. Year
1			
2			
3			
4			

- Of the applications that you have been involved with, how many have been successfully funded?
- What products or services were developed, if any? What is your assessment of the innovativeness or success of the product or service developed from the SBIR/STTR projects? (Please list by project)

No. (from above)	Products or Services Developed	Assessment of Innovativeness or Success of Product or Service
1		
2		
3		
4		

- 12) Have you ever served as a reviewer on an NIH SBIR peer review panel?
- 13) How familiar and involved are the collaborators or affiliates on your Roybal Center with the SBIR/STTR grant programs?
- 14) Has your Roybal Center “spun-off” or produced any SBIR or STTR funded projects over the past decade?
- 15) What are potential opportunities and barriers between the Roybal and SBIR programs?