DEPARTMENT OF EDUCATION

National Institute on Disability and Rehabilitation Research

AGENCY: Office of Special Education and Rehabilitative Services, Department of Education.

ACTION: Notice of proposed funding priorities for fiscal years 2000–2001 for Rehabilitation Engineering Research Centers (RERCs).

SUMMARY: The Assistant Secretary for the Office of Special Education and Rehabilitative Services proposes funding priorities for two Rehabilitation Engineering Research Centers under the National Institute on Disability and Rehabilitation Research (NIDRR) for fiscal years 2000–2001. The Assistant Secretary takes this action to focus research attention on areas of national need. We intend the priorities to improve rehabilitation services and outcomes for individuals with disabilities. This notice contains proposed priorities under the Disability and Rehabilitation Research Projects and Centers Program for an RERC related to technologies for children with orthopedic disabilities and an RERC on low vision and blindness.

DATES: Comments must be received on or before January 18, 2000.

ADDRESSES: All comments concerning these proposed priorities should be addressed to Donna Nangle, US Department of Education, 400 Maryland Avenue, SW, room 3418, Switzer Building, Washington, DC 20202–2645.

Comments may also be sent through the Internet: donna__nangle@ed.gov

You must include the term ''Disability and Rehabilitation Research Projects and Centers'' in the subject line of your electronic message.

FOR FURTHER INFORMATION CONTACT: Donna Nangle. Telephone: (202) 205–5880. Individuals who use a telecommunications device for the deaf (TDD) may call the TDD number at (202) 205–2742. Internet: donna__nangle@ed.gov

Individuals with disabilities may obtain this document in an alternate format (*e.g.,* Braille, large print, audiotape, or computer diskette) on request to the contact person listed in the preceding paragraph.

SUPPLEMENTARY INFORMATION:

Invitation To Comment

We invite you to submit comments regarding these proposed priorities.

We invite you to assist us in complying with the specific requirements of Executive Order 12866 and its overall requirement of reducing regulatory burden that might result from these proposed priorities. Please let us know of any further opportunities we should take to reduce potential costs or increase potential benefits while preserving the effective and efficient administration of the program.

During and after the comment period, you may inspect all public comments about these priorities in Room 3424, Switzer Building, 330 C Street S.W., Washington, D.C., between the hours of 9 a.m. and 4:30 p.m., Eastern time, Monday through Friday of each week except Federal holidays.

Assistance to Individuals With Disabilities in Reviewing the Rulemaking Record

On request, we will supply an appropriate aid, such as a reader or print magnifier, to an individual with a disability who needs assistance to review the comments or other documents in the public rulemaking record for these proposed priorities. If you want to schedule an appointment for this type of aid, you may call (202) 205–8113 or (202) 260–9895. If you use a TDD, you may call the Federal Information Relay Service at 1–800–877–8339.

These proposed priorities support the National Education Goal that calls for every American to possess the skills necessary to compete in a global economy.

The authority for the Secretary to establish research priorities by reserving funds to support particular research activities is contained in sections 202(g) and 204 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 762(g) and 764). Regulations governing this program are found in 34 CFR Parts 350 and 353.

We will announce the final priorities in a notice in the **Federal Register**. We will determine the final priorities after considering responses to this notice and other information available to the Department. This notice does not preclude us from proposing or funding additional priorities, subject to meeting applicable rulemaking requirements.

Note: This notice does *not* solicit applications. In any year in which the Assistant Secretary chooses to use one or more of these proposed priorities, we invite applications through a notice published in the **Federal Register**. When inviting applications we designate each priority as absolute, competitive preference, or invitational.

Rehabilitation Engineering Research Centers

The authority for RERCs is contained in section 204(b)(3) of the Rehabilitation Act of 1973, as amended (29 U.S.C. 764(b)(3)). The Assistant Secretary may make awards for up to 60 months through grants or cooperative agreements to public and private agencies and organizations, including institutions of higher education, Indian tribes, and tribal organizations, to conduct research, demonstration, and training activities regarding rehabilitation technology in order to enhance opportunities for meeting the needs of, and addressing the barriers confronted by, individuals with disabilities in all aspects of their lives. An RERC must be operated by or in collaboration with an institution of higher education or a nonprofit organization.

Description of Rehabilitation Engineering Research Centers

RERCs carry out research or demonstration activities by:

(a) Developing and disseminating innovative methods of applying advanced technology, scientific achievement, and psychological and social knowledge to (1) Solve rehabilitation problems and remove environmental barriers, and (2) Study new or emerging technologies, products, or environments;

(b) Demonstrating and disseminating (1) Innovative models for the delivery of cost-effective rehabilitation technology services to rural and urban areas, and (2) Other scientific research to assist in meeting the employment and independent living needs of individuals with severe disabilities; or

(c) Facilitating service delivery systems change through (1) The development, evaluation, and dissemination of consumer-responsive and individual and family-centered innovative models for the delivery to both rural and urban areas of innovative cost-effective rehabilitation technology services, and (2) other scientific research to assist in meeting the employment and independent needs of individuals with severe disabilities.

Each RERC must provide training opportunities to individuals, including individuals with disabilities, to become researchers of rehabilitation technology and practitioners of rehabilitation technology in conjunction with institutions of higher education and nonprofit organizations.

The Department is particularly interested in ensuring that the expenditure of public funds is justified by the execution of intended activities and the advancement of knowledge and, thus, has built this accountability into the selection criteria. Not later than three years after the establishment of

any RERC, NIDRR will conduct one or more reviews of the activities and achievements of the Center. In accordance with the provisions of 34 CFR 75.253(a), continued funding depends at all times on satisfactory performance and accomplishment.

Proposed General RERC Requirements

The Assistant Secretary proposes that the following requirements apply to these RERCs pursuant to these absolute priorities unless noted otherwise. An applicant's proposal to fulfill these proposed requirements will be assessed using applicable selection criteria in the peer review process. The Assistant Secretary is interested in receiving comments on these proposed requirements:

- The RERC must have the capability to design, build, and test prototype devices and assist in the transfer of successful solutions to relevant production and service delivery settings.
- The RERC must evaluate the efficacy and safety of its new products, instrumentation, or assistive devices.
- The RERC must involve individuals with disabilities and, if appropriate, their representatives, in planning and implementing its research, development, training, and dissemination activities, and in evaluating the Center.

Absolute Priorities

Under an absolute priority we consider only applications that meet one of these absolute priorities (34 CFR 75.105(c)(3)).

Proposed Priority 1: Technologies for Children with Orthopedic Disabilities

Background

It is estimated that 6 million children, age 18 and younger, in the United States have some type of disability. The prevalence of children with orthopedic impairments in the U.S., including paralysis and congenital anomalies, is roughly 420,000 (8.4 percent) (LaPlante, M. and Carlson, D., ''Disability in the United States: Prevalence and Causes,'' *1992 Report of the Disability Statistics Rehabilitation Research and Training Center,* NIDRR, U.S. Department of Education, 1995). The majority of these children are unable to perform a major activity or are limited in the amount or types of major activities, including education and play, they can perform (Wenger, B.L., Kaye, H.S. and LaPlante, M.P., ''Disabilities among children,'' *Disability Statistics Abstract (No 15),* NIDRR, U.S. Department of Education, 1996). Children with disabilities present unique challenges for health care professionals when compared to adults with similar disabilities. For example: children experience periods of accelerated growth affecting shape, strength and body alignment; their body sizes are disproportionate to adults—they are not scaled-down adults; they experience developmental stages that affect their fine and gross motor skills; their capabilities change as they mature and as they learn to control their bodies and their environment; and parental expectations about their child's disability can influence medical treatment and therapeutic interventions.

Chapter 5 of NIDRR's Long-Range Plan (64 FR 45766) discusses the importance of research and development activities that will enhance mobility and improve manipulation for individuals with orthopedic impairments. Children with orthopedic impairments present unique challenges for rehabilitation specialists. The technology to 'replace' a child's missing limb does not exist today. It is possible, however, to restore considerable function with a prosthesis. The usefulness of such a device depends largely upon its weight, how well it fits, how easy it is to control and its durability, reliability and aesthetics. Continual developmental changes, including physical, emotional, and social growth, make it difficult to fit a child with a prosthesis and to determine the most appropriate time for introducing a prosthesis to a child. For example, the importance of fitting a child early with a prosthesis is well cited. However, there continues to be discussion about which developmental milestones to consider when determining the most suitable prosthesis for a child (Patton, J.G., ''Development approach to pediatric upper-limb prosthetic training,'' *Atlas of Limb Prosthetics: Surgical, Prosthetic, and Rehabilitation Principles,* Mosby, St Louis, pgs. 778–793, 1992).

In addition to congenital and acquired amputations there are other conditions that can cause orthopedic impairments in children. Cerebral palsy (CP) is a motor disorder originating from a central nervous system injury that occurs before, during or shortly after birth. Children under the age of five who sustain brain injuries are also classified as having CP. The disability ranks third among childhood disabilities (LaPlante, M.P., *Disability risks of chronic illness and impairments,* Disability Statistics Program, San Francisco, CA., 1989) and is the most common cause of paralysis in children (Wenger, B.L., Kaye, H.S. and LaPlante, M.P., op. cit., 1996). The reported prevalence of CP in the U.S. is two per thousand and the incidence is approximately one per thousand live births (Turk, M.A., ''Early development-related conditions,'' *Assessing Medical Rehabilitation Practices: The Promise of Outcomes Research,* Marcus J. Fuhrer, ed., pgs. 371–372, 1997). Individuals with CP typically have abnormal muscle tone, muscle weakness, primitive reflexes, or uncoordinated movements requiring seating and orthotic interventions for postural control and alignment (Cook, A.M. and Hussy, S.M., *Assistive Technologies: Principles and Practice,* Mosby, St. Louis, pg. 237, 1995). Spina bifida is a congenital anomaly in which the neural tube that forms the spinal cord does not fully develop, leading to a number of lower extremity problems, including muscle paralysis, hip dislocations, knee hypertension, and club feet. The reported incidence of spina bifida is between 0.5 and 1 per thousand (Turk, M.A., op. cit., pgs. 378–379, 1997).

The most common management strategy for motor impairments caused by cerebral palsy and spina bifida is developmental therapy (i.e., physical, occupational, speech and language therapies). However, orthotics, specific spasticity-reducing regimens (Baclofen pumps, botulinum toxin injections), orthopedic surgery, and adaptive equipment also are used in intervention. Orthotics are used on both upper and lower extremities to improve function, to prevent or compensate for anomolies, and to control muscle weakness, spasticity and structural instability. Most orthotic devices (e.g., ankle-foot orthoses) are designed to be rigid. Dynamic orthoses and splints for gait, spasticity and contracture management may have significant application.

Adaptive equipment is used to improve functional independence in mobility, self-care, communication, environmental control, and school activities. There is no definitive study on how to make the best choice among all the options or which improves function the most (Turk, M.A., op. cit., pg. 376, 1997).

Composite materials have much to offer in prosthetic and orthotic design. They are strong, lightweight, and durable. However, these materials require different and more costly manufacturing techniques than those used with traditional materials such as metal and thermoplastics. A problem associated with composite materials is that they are difficult to postform, a process whereby prosthetic or orthotic devices are adjusted slightly during final fittings (White, M., ''Development of an advanced lightweight composite orthosis,'' Presented at ASM

International—Aeromat '92, New Trends in Advanced Composites, Anaheim, CA., May 20 1992).

Leisure time is critical to a child's well-being and development. Play is one means for children to master developmental tasks and learn important behavioral and social skills. The ability to interact effectively with the environment through play can affect a child's self-esteem, behavior, self-awareness, confidence, and competency (Masten, A.S., ''The development of competence in favorable and unfavorable environments: Lessons from research on successful children,'' *American Psychologist,* vol. 53, pgs. 205–220, 1998). Children with disabilities, including those with amputations, cerebral palsy and spina bifida, encounter many challenges in their attempts to engage in learning and play activities. Often sensory and motor impairments severely limit the degree to which they are able to negotiate their environment and interact with others. Facilitating play for these children involves adapting the environment and providing appropriate technologies that will enhance interactive play and social skill development. The product market is challenged to meet the demands of millions of children with disabilities and their families who need alternative strategies in order to engage in recreation and social activities.

Priority 1

The Assistant Secretary proposes to establish a RERC on technologies for children with orthopedic disabilities to identify and develop technologies that will help children with orthopedic disabilities to overcome functional deficits and to support their ability to learn, play and interact socially. The RERC must:

(1) Develop and evaluate new, lightweight upper and lower limb prosthetic and orthotic devices for children;

(2) Investigate the use of dynamic orthoses for controlling spasticity and contractures for children with orthopedic impairments including those with cerebral palsy and spina bifida;

(3) Identify, develop, and evaluate models for determining when during children's development to introduce assistive technologies and prosthetic and orthotic devices;

(4) Investigate, develop, and evaluate technologies, and strategies for their use, that will enable young children, including children with cerebral palsy and spina bifida, to participate in interactive play and socialization activities; and

(5) Develop and implement, in consultation with the NIDRR-funded RERC on Technology Transfer, a utilization plan for ensuring that all new and improved technologies developed by this RERC are successfully transferred to the marketplace.

In carrying out the above required activities, the RERC must:

- Develop and implement, during the first year of the grant and in consultation with the NIDRR-funded National Center for the Dissemination of Disability Research (NCDDR), a plan to effectively disseminate the RERC's research outcomes to all appropriate target audiences including: clinicians, engineers, manufacturers, individuals with disabilities, families, disability organizations, technology service providers, businesses, and journals;
- In the third year of the grant, conduct a state-of-the-science conference on technologies for children with orthopedic disabilities and publish a comprehensive report in the fourth year of the grant;
- Collaborate on research projects of mutual interest with the RERC on Prosthetics and Orthotics, the RERC on Wheeled Mobility, and the RRTC on Children with Special Health Care Needs; and
- Address the needs of children with orthopedic disabilities from minority backgrounds and cultures.

Proposed Priority 2: Low Vision and Blindness

Background

According to recent estimates there are more than 3 million Americans with low vision, and almost one million who are legally blind (National Eye Institute, ''Vision research: A national plan 1999–2003,'' A report of the National Advisory Eye Council, National Institutes of Health, 1999). Approximately 7.8% of persons over 65 cannot see well enough to read newspaper print (Nelson, K.A., ''Statistical brief #35: Visual impairment among elderly Americans: statistics in transition,'' *Journal of Visual Impairment and Blindness,* vol. 81, pgs. 331–334, 1987), and the number of persons in this age group is projected to increase twice as fast as the population as a whole (Schmeidler, E. and Halfman, D., ''Statistics on visual impairment on older persons, disability in children, life expectancy,'' *Journal of Visual Impairment and Blindness,* vol. 91, pgs. 602–606, 1997). Blind and visually impaired individuals face major barriers in information access and handling, orientation and mobility, and access to jobsites and public facilities, resulting in very high rates of unemployment (Kirchner, C. and Schmeidler, E., ''Prevalence and employment of people in the United States who are blind or visually impaired,'' *Journal of Visual Impairment and Blindness,* vol. 91, pgs. 508–511, 1997; Hagemoser, S.D., ''The relationship of personality traits to the employment status of persons who are blind,'' *Journal of Visual Impairment and Blindness,* vol. 90, pgs. 134–144, 1996). There is also a growing and underserved group of individuals with a combination of multiple sensory, physical and cognitive impairments (Malakpa, S., ''Job placement of blind and visually impaired people with additional disabilities'' *RE:View,* vol. 26, pgs. 69–77, 1994).

The leading causes of vision impairment in children in the U.S. are cortical visual impairment (35%), retinopathy of prematurity (ROP), optic nerve hypoplasia, and other retinal conditions (Murphy, D. and Good, W.V., ''The epidemiology of blindness in children in California,'' American Academy of Opthalmology, pg. 157, 1997; Oxford Register of Early Childhood Impairments Annual Report, The National Perinatal Epidemiology Unit, Ratcliffe Infirmary, pgs. 32–36, 1998). As a result of improvements in medical diagnosis, treatment and technologies, more premature infants are surviving birth. However, a significant number of newborn infants experience traumatic conditions that include blindness and cognitive and motor deficits. New approaches and technologies are needed to identify and separate the sensory and cognitive deficits so that habilitation can be planned and monitored more effectively (Good, W.V., Jan, J.E., deSa, L., Barkovich, A.J., Groenveld, M. and Hoyt, C.S., ''Cortical visual impairment in children : A major review,'' *Survey of Opthalmology,* vol. 38, pgs. 351–364, 1994). Intervention in the very young age groups offers maximum promise of cost effectiveness and independent functioning throughout life.

Wayfinding refers to the techniques used by persons who are blind or visually impaired as they move from place to place independently. Wayfinding is commonly divided into orientation and mobility skills. Orientation refers to the ability to monitor one's position in relation to the environment. Mobility refers to one's ability to move safely, from one location to the next with a limited amount of veering. Orientation and mobility are prerequisites to success at school, on the job, and in daily living. Various electronic devices and environmental modifications have been used in

attempts to improve wayfinding and to reduce veering. Current technologies, including clear-path and drop-off detectors, do little to prevent veering.

Low vision or blindness frequently coexists with other disabilities including hearing loss, cognitive impairments and mobility limitations. Individuals with multiple disabilities present technological challenges and require complex adjustments to achieve functionality in and across environments (Greenbaum, M.G., Fernandes, S. and Wainapel, S.F., ''Use of a motorized wheelchair in conjunction with a guide dog for the legally blind and physically disabled,'' *Archives of Physical Medicine and Rehabilitation,* vol. 79(2), pgs. 216–217, 1998).

The most common cause of visual impairment among the aging population is Age Related Maculopathy (ARM) (Fletcher, D.C. and Schucard, R.A., ''Preferred retinal loci relationship to macular scotomas in a low-vision population,'' *Opthalmology,* vol. 104, pgs. 632–638, 1997). Visual impairments among this population impact a wide variety of activities of daily living. Further, visual impairment is often accompanied by hearing loss, cognitive deficits, and motor dysfunction. Many older individuals reside in congregate care settings (i.e., nursing homes) where the prevalence of eye disorders can be as high as 90% (Marx, M.S., Werner, P., Feldman, R. and Cohen-Mansfield, J., ''The eye disorders of residents of a nursing home,'' *Journal of Visual Impairment and Blindness,* vol. 88(5), pgs. 462–468, 1994; Whitmore, W.G., ''Eye disease in a geriatric nursing home population,'' *Opthalmology,* vol. 96, pgs. 393–398, 1989; Horowitz, A., ''Vision impairment and functional disability among nursing home residents,'' *The Gerontologist,* vol. 34, pgs. 316–323, 1994). These facilities could be a platform for reaching many consumers with simple vision screening technologies that would permit non-clinical personnel to rapidly screen residents for visual impairments and make appropriate referrals. Currently, methods for assessing ARM include, but are not limited to, residual visual function and identifying optimal locations on the retina for reading and other tasks (Fletcher, D.C. and Schucard, R.A., op. cit., 1997). These methods address one eye at a time, and the advantages of binocular vision are often lost (Paul, W., ''The role of computer assistive technology in rehabilitation of the visually impaired: A personal perspective,'' *American Journal of Opthalmology,* vol. 127(1), pgs. 75–76, 1999; Schuchard, R.A. and Kuo, K., ''Retinal correspondence and binocular perception characteristics in low vision people with binocular eccentric PRLs,'' *Investigative Opthalmology and Vision Science,* vol. 91, pgs. 602–606, 1999).

Chapter 5 of NIDRR's Long-Range Plan published on December 7, 1999 (64 FR 68575) discusses the importance of directing research and development activities toward the problems faced by individuals who have significant visual, hearing, and communication impairments. The number of individuals with both severe hearing and visual impairments (deaf-blind) is small but increasing. The greatest challenges persons with multiple sensory impairments face are communication and access to information technology (Engelman, M.D., Griffin, H.C. and Wheeler, L., ''Deaf-blindness and communication: Practical knowledge and strategies,'' *Journal of Visual Impairments and Blindness,* vol. 92(11), pgs. 783–798, 1999). Individuals who are deaf-blind rarely use Braille for communication purposes. To date, technologies for individuals who are deaf-blind have focused primarily on tactile interpreting for face-to-face communication.

In today's complex and multifaceted electronic world, access to graphical and spatial information is critical for persons who are blind or visually impaired to be successful in school and work (Kent, D., ''Book review: Let's learn shapes with Shapely-Cal,'' *Journal of Visual Impairment and Blindness,* vol. 92(4), pgs. 245–247, 1998). Tactile graphical information and spatial and geometric concepts are difficult to represent for persons who are blind. Converting pictures or signs into raised tactile form has proven to be costly and time consuming (Horsfall, B., ''Photopolymers, computer-aided design, and tactile signs,'' *Journal of Visual Impairment and Blindness,* vol. 92(11), pgs. 823–826, 1998). Audio and audio-tactile methods of graphics presentation and spatial and geometric concepts may promote parity between individuals who are blind or visually impaired and others in a variety of environments including school, work, and recreation.

Priority 2

The Assistant Secretary proposes to establish an RERC that will identify and develop technologies that will improve assessment of vision impairments and promote independence for individuals with low vision and blindness. The RERC must:

(1) Investigate, develop, and evaluate new screening technologies that will identify and differentiate between vision and cognitive impairments in infants;

(2) Develop and evaluate new wayfinding technologies that can be used by persons with coexisting disabilities;

(3) Investigate, develop, and evaluate simple vision screening and assessment technologies and approaches for identifying visual impairments associated with aging;

(4) Investigate, develop, and evaluate new technologies to facilitate face-to-face communication for individuals who are deaf-blind and methods that will enable individuals who are blind or deaf-blind to navigate and interpret graphical, spatial and geometric information; and

(5) Develop and implement, in consultation with the NIDRR-funded RERC on Technology Transfer, a utilization plan for ensuring that all new and improved technologies developed by this RERC are successfully transferred to the marketplace.

In carrying out the above required activities, the RERC must:

- Develop and implement, during the first year of the grant and in consultation with the NIDRR-funded National Center for the Dissemination of Disability Research (NCDDR), a plan to effectively disseminate the RERC's research outcomes to all appropriate target audiences including: clinicians, engineers, manufacturers, individuals with disabilities, families, disability organizations, technology service providers, businesses, journals, organizations representing minorities and other underrepresented groups;
- In the third year of the grant, conduct a state-of-the-science conference on technologies for individuals with low vision and blindness and publish a comprehensive report in the fourth year of the grant;
- Collaborate on research projects of mutual interest with NIDRR-funded RERCs on Information Technology Access and Telecommunications Access, RRTCs on visual disabilities and appropriate professional organizations; and
- Address the needs of children with vision disabilities from minority backgrounds and cultures.

Proposed Additional Selection Criterion

The Assistant Secretary will use the selection criteria in 34 CFR 350.54 to evaluate applications under this program. The maximum score for all the criteria is 100 points; however, the Assistant Secretary also proposes to use the following criterion so that up to an additional ten points may be earned by

an applicant for a total possible score of 110 points:

Within these absolute priorities, we will give the following competitive preference to applications that are otherwise eligible for funding under these priorities:

Up to ten (10) points based on the extent to which an application includes effective strategies for employing and advancing in employment qualified individuals with disabilities in projects awarded under these absolute priorities. In determining the effectiveness of those strategies, we will consider the applicant's success, as described in the application, in employing and advancing in employment qualified individuals with disabilities in the project.

For purposes of this competitive preference, applicants can be awarded up to a total of 10 points in addition to those awarded under the published selection criteria for these priorities. That is, an applicant meeting this competitive preference could earn a maximum total of 110 points.

Applicable Program Regulations: 34 CFR Parts 350 and 353.

Program Authority: 29 U.S.C. 762 and 764.

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Note: The official version of document is the document published in the **Federal Register**. Free Internet access to the official edition of the **Federal Register** and the Code of Federal Regulations is available on GPO Access at: *http://www.access.gpo.gov/nara/index.html*

(Catalog of Federal Domestic Assistance Number 84.133E, Rehabilitation Engineering Research Centers)

Dated: December 13, 1999.

Judith E. Heumann,

Assistant Secretary for Special Education and Rehabilitative Services.

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