

Hearing Care for Adults - Chicago, November 16-18, 2009

AHEAD III

Assessment of Hearing in the Elderly: Aging and Degeneration - Integration through Immediate Intervention

Project Coordinator: Ferdinando Grandori

Institute of Biomedical Engineering CNR - Milano

European Commission - 7th Framework Programme
Area HEALTH – Chronic diseases – Hearing and degeneration

<http://www.ahead.polimi.it/>

Aging in the EU

- Europe is facing the burden of its ageing population
- 20% over 60 yrs in 2000, 28% by 2020!
- The imperative to prevent, delay and reverse functional decline of elderly is becoming more and more pressing

Hearing loss & aging

- Hearing loss is one of the most common chronic health conditions in the aging population
- In Europe it affects:
 - 16% of individuals aged 55-64 years
 - 24% of individuals aged 65-75 years
 - 39% of individuals over age 75

(data from EuroHear, 2004-2009, FP6)

Objectives (I)

- Project AHEAD III has been designed to:
 1. Provide evidence of the **effects** of hearing impairment in adults and particularly in the elderly
 2. Increase the awareness among administrators, policy makers, health care professionals and the public opinion about **early detection** and **intervention** for hearing impairment in adults and particularly in the elderly

Objectives (II)

3. Analyse **costs** associated with the implementation of integrated large scale, or nationwide, programmes of hearing screening and intervention in the elderly
4. Provide **minimum requirements** for screening methods and related diagnostic techniques

Objectives (III)

5. Develop **preliminary guidelines** on how to implement successful screening programs
6. Analyse **protocols and models** to be tuned to the local, social, and economical conditions of a country or region

AHEAD III -The structure

- Project Duration: 36 months
- Starting date: May 1st, 2008
- Coordination Action (FP7)
- partners from the European Area
- Independent Expert Panel (IEP, 28 groups)
- Budget: € 1,088,000 (~ \$ 1,530,000)

The Consortium

- Istituto di Ingegneria Biomedica, ISIB CNR, Milan – F. Grandori (Coordinator)
- Medical University of Vienna, Otology and Implant Department – W.-D. Baumgartner
- Cyprus Audiology Center, Nicosia-C. Thodi
- Dept. Otolaryngology at UKB, Hospital of the University of Berlin – A. Ernst
- Technische Universität München, Munich – T. Janssen
- VU University medical centre, Dept. of ENT/Audiology, EMGO Institute Amsterdam - S.E. Kramer
- Medical University of Lodz, Department of Environmental Otolaryngology, Lodz – M. Sliwinska-Kowalska
- Dept. of Neuroscience and Locomotion, Div of Technical Audiology, Linköping University Hospital, Linköping – S. Stenfelt
- UniversitätsSpital Zürich, Klinik für Ohren-Nasen, Hals- und Gesichtschirurgie, Zurich – R. Probst
- MRC Hearing & Comm. Group, Manchester University, Manchester - A. Davis
- University of Antwerp, Department of Biomedical Sciences - G. Van Camp
- University Hospital Pellegrin, University Victor Segalen ENT and Audiology Department, Bordeaux– R. Dauman
- HNO-Universitätsklinik Köln, Audiologie und Pädaudiologie, Köln - M. Walger
- ENT Department of Medical Faculty of University, Pécs - J. Pytel
- Institute of Physiology and Pathology of Hearing, Warsaw - H. Skarzynski
- Servicio de ORL Hospital Clínico Universitario U. de Valencia - J.Marco
- Audiology Dept., Swedish Institute for Disability Research, Örebro University Hospital - C. Möller

Overall Strategy

- Five closely interrelated issues are addressed:
 - **Aetiological** assessment and **epidemiology** of age-related hearing loss
 - **Main effects** of age-related hearing loss
 - **Screening, Diagnosis and Intervention:** methods and techniques
 - **International Conference on Adult Hearing Screening (AHS 2010)**
 - **Outcome measures**

Overall Strategy

- Provide an overview of the current status of knowledge on the topics of the project
- Identify areas of controversy and in which a consensus could be helpful
- Identify areas of insufficient knowledge with need of further research
- Prepare the ground for a consensus meeting on adult hearing screening and organise specialist meetings

Work Plan (1)

- Aetiological Assessment and Epidemiology of age-related hearing loss (WP3 AETIOL)
 - Evaluate the variety of aetiological factors of age-related hearing loss
 - Provide information about the occurrence of age-related hearing loss in as many EU states as possible
 - Monitor time trends for this specific sensory impairment in the elderly
 - Initiate and support collaborations and information/data exchange between health professionals and manufactures

Work Plan (2)

- Main effects of age-related hearing loss (WP 4 EFFECTS)
 - Evaluate the psychological impact on everyday life of age-related hearing impairment
 - Promote awareness of the consequences of undetected hearing loss
 - Promote a change in the attitude to hearing aids and rehabilitation instruments

Work Plan(3)

- Screening, Diagnosis and Intervention: methods and techniques (WP5 SCREEN, WP6 NEWTECH, WP7 INTERV)
 - Set quality standards and minimum requirements for the classical screening techniques/procedures
 - Evaluate preliminary results from new screening methods
 - Evaluate strategies of interventions
 - Optimise bridges between Early Hearing Detection and Intervention programme (EHDI) and the global health strategy

Work Plan (4)

- Outcome measures (WP 9, WP10)
 - Pursuing ways of networking with National, European and International Societies and Organisations.
 - Disseminate information among Associate and Third Countries.
 - Monitor progress of the implementation of EHDI Programmes (Early Hearing Detection and Intervention) in the European Area.

AHEAD III events

- 6th Annual Conference "Otorhinolaryngology", Lodz, Poland, 2008.
- XIV International Symposium in Audiological Medicine „IAPA 2008”, Ferrara, Italy, 2008.
- 9th International Congress on Noise as a Public Health Problem, ICBEN Mashantucket, USA, 2008.
- IX International Tinnitus Seminar, Göteborg, Sweden, 2008.
- XXIX International Congress of Audiology ICA, Hong Kong , 2008.
- International Session on AHEAD III at the 7th Annual Conference on ORL, 2009, Lodz, Poland.
- Round Table 'Hearing Screening in Adults' at the IX European Federation of Audiology Societies (EFAS) Congress, Tenerife, Spain, 2009.
- Round Table at the German "Capital Congress on Medicine", Berlin, 2009.
- International Collegium of Rehabilitative Audiology- ICRA, 2009.
- IFOS (International Federation of Otorhinolaryngological Societies) World Congress, Sao Paulo, Brazil, 2009.
- XXI IERASG (International Evoked Audiometry Study Group) Conference, Rio de Janeiro, Brazil, 2009.
- National Audiological Society in Netherlands, Amsterdam, 2009
- Swedish conference on Audiology (2010)
- Special Session/Round Table at the IAPA XVth Anniversary Symposium in Audiological Medicine, September 19-22, 2010, Krakow, Poland

AHS2010

Adult Hearing Screening International Conference

www.AHS2010.polimi.it June 10-12, 2010 Cernobbio (Como Lake), Italy



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IsIB - cnr

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Topics

- »» Epidemiology of hearing loss in adults
- »» Prevalence of hearing loss and auditory dysfunction
- »» Basic research: auditory neuroscience, anatomy and physiology of the auditory system, acoustics and psychoacoustics, speech perception: psychophysical and physiological issues, cognition, language, neural plasticity, neuroscientific advances: relevance to clinical assessment and intervention, modeling of the ear and hearing, signal processing
- »» Aging factors and degenerative neurologic disorders
- »» Behavioural, physiologic & aetiological assessment
- »» Screening methods and techniques
- »» Risk factors & Susceptibility
- »» Changes in speech, language and cognitive abilities associated with HL and aging
- »» Assessment and treatment of speech and communication disorders
- »» Hearing & balance problems
- »» Intervention strategies
- »» Development of hearing devices and instrumentation: Development of Hearing Aids, fitting strategies
- »» Issues on education and training

AHEAD III achievements



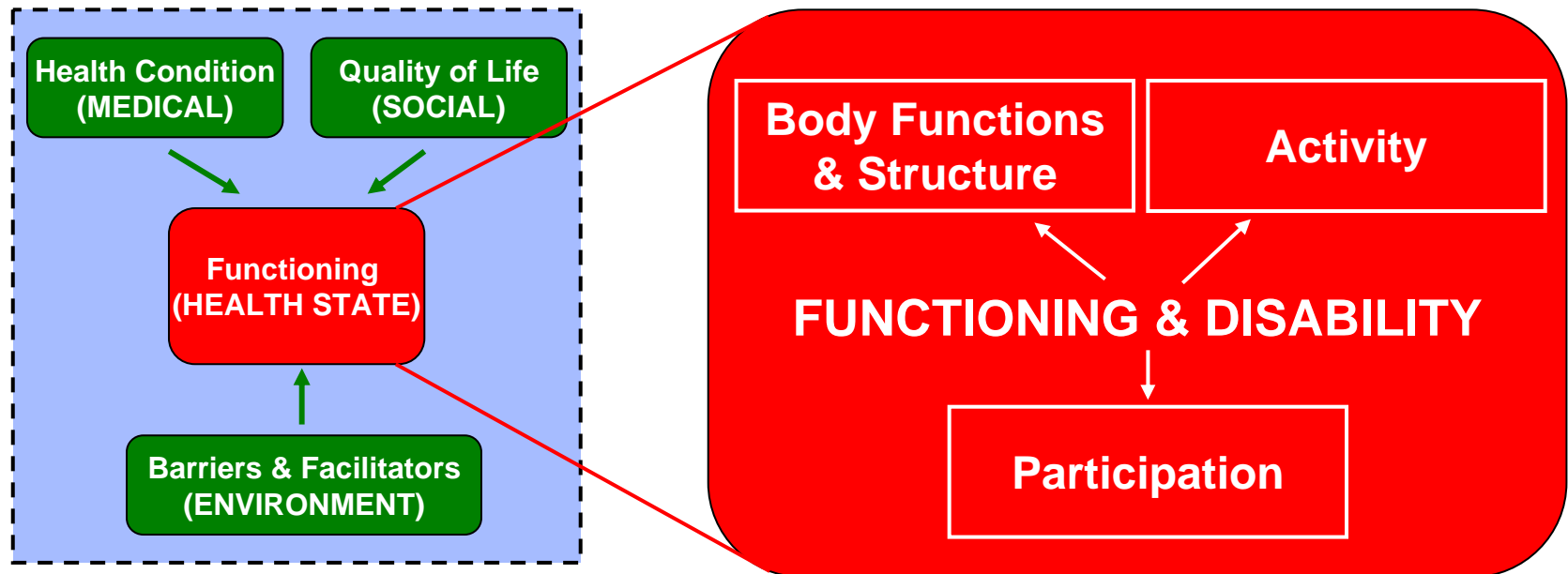
Preliminary application of the International Classification of Functioning, Disability and Health model (ICF) in the context of AHEAD III

Health and Disability

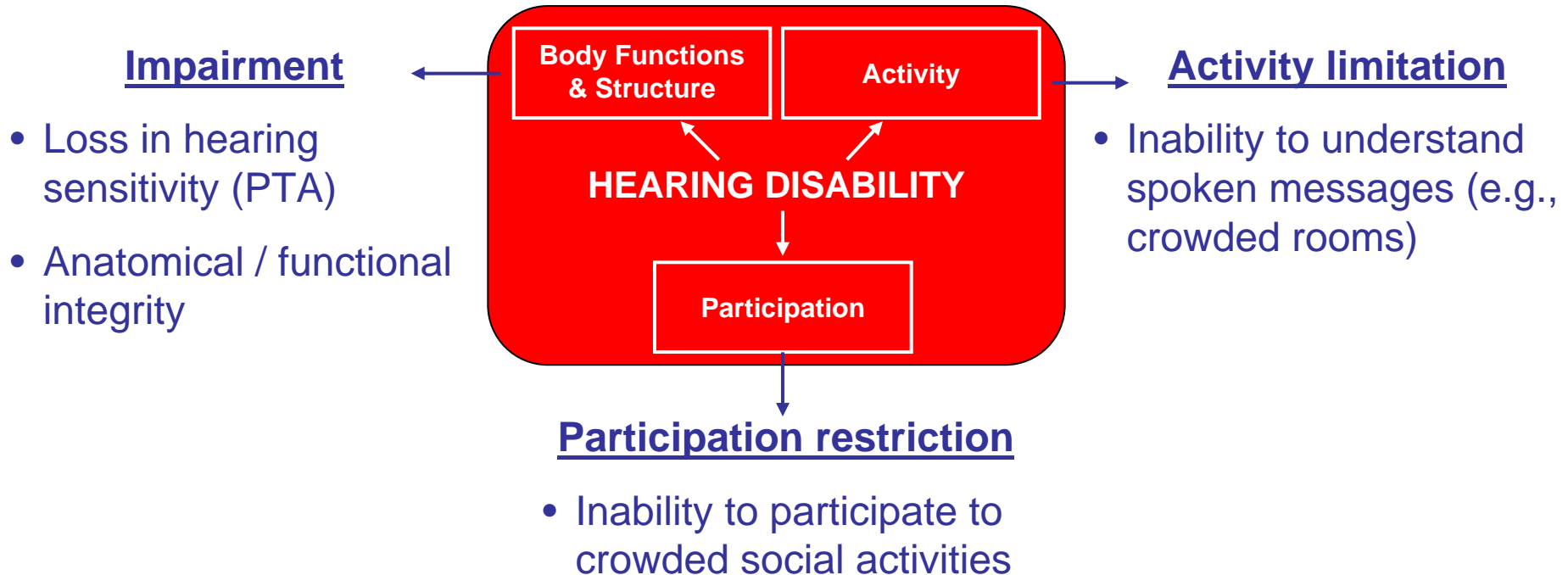
The ICF model

International Classification of Functioning, Disability, and Health

[WHO, 2001 – framework for health and disability]



The ICF Model in Hearing



✓ **UNIVERSALITY** → ICF is applicable to **all** people irrespective of health condition

✓ **PARITY** → disability must **not** be differentiated by etiology



SCREENING FOR HEARING DISABILITY

Screening and Intervention

✓ **SCREENING** approach

Screening for activity limitations or participation restrictions rather than screening for an impairment (which is a loss or abnormality in body structure or physiological function). Impairment information is only a partial picture of disability and it is not predictor of the lived experience of disability

✓ **INTERVENTION** approach

Adopt **three different levels** of intervention to match the three levels of disability (body functions and structures, activities and participation)

SCREENING – The basics

Screening is justified if all the following conditions are met:

- Prevalence
- The earlier the better
- Therapies/remedies exist
- Screening technologies are available
- Screening does not produce discomfort or damage
- Costs for screening pro-capita are low
- Organization of screening is neither too expensive nor too much demanding

Achievements – WP3 & WP4

Aetiological Assessment and Epidemiology of age-related hearing loss &

Main effects of age-related hearing loss

- Preliminary identification of the most relevant etiologies and pathophysiological mechanisms for hearing loss
- Identification of the most important psychological and social impact of hearing loss

Aetiological factors (WP3&WP4)

- Most relevant:
 - genetics (up to 50%)
 - noise
 - middle ear inflammations
 - cardiovascular disease
- Additional factors with less overall significance and importance:
 - smoking
 - diabetes
 - Hormones-gender
 - ototoxicity
 - diet

Pathophysiological mechanisms (WP3&WP4)

- Most relevant:
 - hair cell loss
 - strial and metabolic factors
 - cochlear conduction
 - changes of central auditory processing
 - peripheral and central neural degeneration
 - cognitive decline

Other health conditions interacting with hearing loss (WP3&WP4)

- Most relevant:
 - depression
 - loneliness
 - loss of vision
 - disturbances of gait
 - disturbances of balance
 - somatisation

Achievements – WP5 & WP6

Screening and Diagnosis: methods and techniques

- Identification of the minimum requirement for screening with pure tone audiometry
- Definition of “working” hearing loss in the elderly

Achievements – WP5 & WP6

Screening: methods and techniques

- Development of the template for the “Report on adult hearing screening technologies”

Achievements – WP5 & WP6

Report on adult hearing screening (AHS) technologies

- Section 1: general overview

- Description of the technology and the test procedure
- Dysfunction/disability/hearing loss targeted by the test
- Sensitivity/Specificity & Repeatability
- Applicability to the whole population
- Does the test involve or require functions or skills other than the auditory (e.g., visual, motor, short-time memory, ...)?
- Does the method require that preliminary instructions and/or training have to be provided to the subject?
- Is the test automated in terms of execution? Is the test automated in terms of interpretation of results?
- Average test duration. Which features / conditions determine variability of test time?
- Are the test outcomes dependent on the subject's education and culture? on language/ mother tongue?

Achievements – WP5 & WP6

Report on adult hearing screening (AHS) technologies

- Section 1: general overview
 - Is the technology sufficient to give a reliable screening outcome (pass/refer) without being complemented by other tests / exams / investigations?
 - Are the outcomes of the test also useful for planning treatment?
 - Does the technology require a controlled environment or controlled test conditions?
 - Calibration. Does the device need to be calibrated? If yes, how often? In which way? How expensive is the calibration?
 - Estimated cost per person: (i) device(s); ii) disposables; iii) time required for the personnel; iv) possible other costs.
 - Overall acceptance and subjective judgment.
 - Possible hygienic issues.

Achievements – WP5 & WP6

Report on adult hearing screening (AHS) technologies

- Section 2: summary
 - main strengths and weaknesses of the technology, and critical conclusions on its feasibility in AHS.
 - Describe if the technology should (or would need to) be adapted for being effectively used in AHS, and give possible suggestions for improving feasibility in AHS.

Important achievements – WP5 & WP6

Screening and Diagnosis: methods and techniques

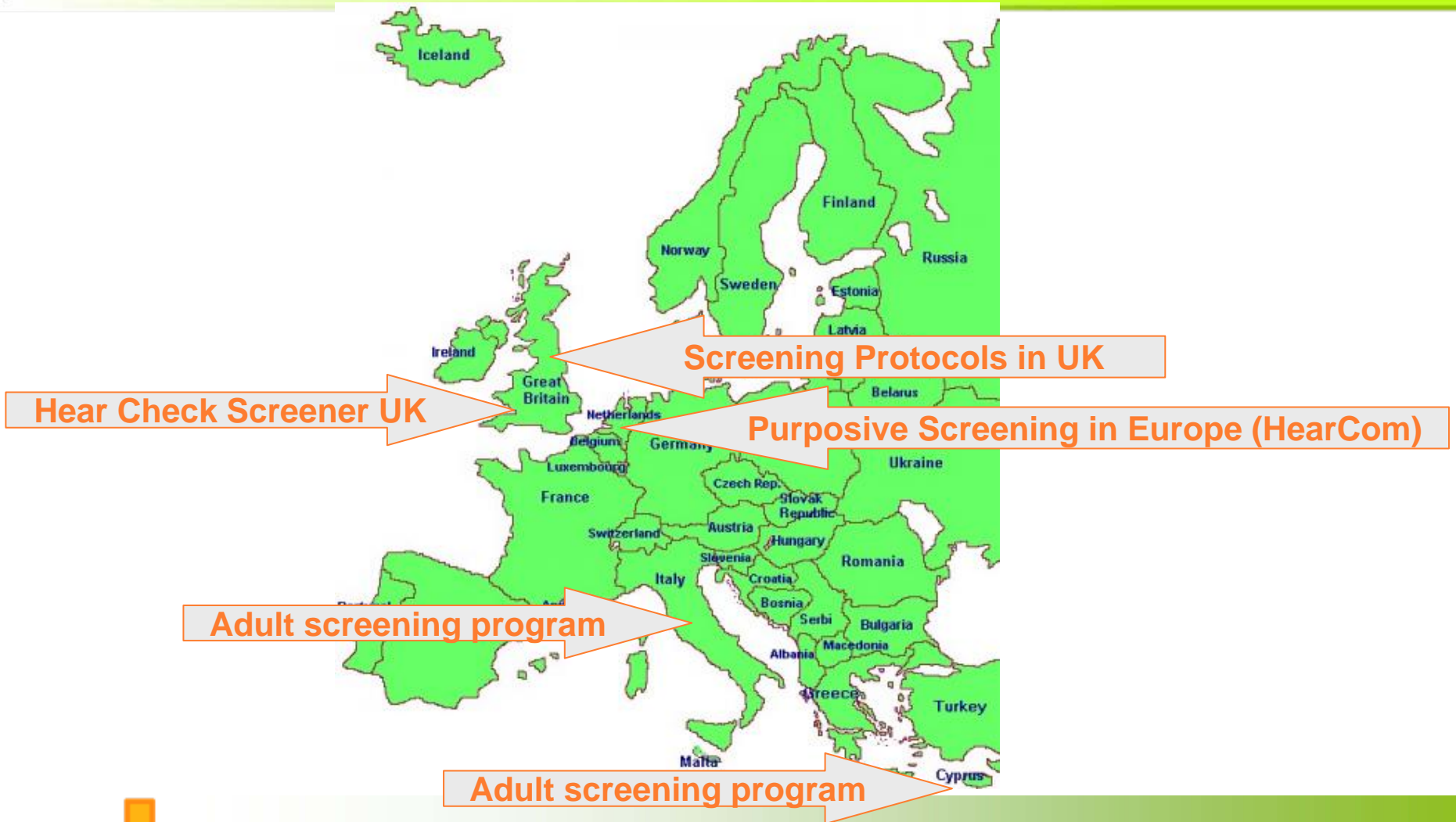
- Preliminary evaluation of different methods for hearing screening such as:
 - Questionnaires for hearing screening
 - Hearing screening using the telephone and the internet
 - Hearing screening with speech-in-noise tests
 - Hearing screening using genetic markers
 - Otoacoustic emissions for hearing screening in adults

Achievements – WP7

Intervention strategies (Sophia Kramer)

- Preliminary list of possible interventions following screening for hearing loss
- Establish contacts with current screening programs

Current screening programs



Achiev

- Systematic re
- in adults
- Development
- hearing screen

AHEAD III Questionnaire:
Interventions following hearing screening in adults

Is there any screening service for adult hearing in your area?

If so, what sorts of interventions are offered following the screening?

Do you have a case history for an adult receiving non-hearing aid intervention after screening? If yes, please add details

screening?

Would you consider introducing a hearing screening service for adults in your area, if you do not have one now?

Name

Institution

Thank you for completing this short questionnaire.
Please send your replies to Pauline Smith at paulineannsmith@aol.com

ring screening

ention following

Contribute to questionnaire: go to the AHEAD III website
<http://www.ahead.polimi.it/>

Achievements – WP10

Outcome Measures

- Contacts with screening programmes under planning and with European and International Societies and Organizations both in Europe and in the USA
 - the European Federation of Audiological Societies (EFAS)
 - the International Society of Audiology (ISA)
 - the International Association of Physicians in Audiology (IAPA)
 - the American Auditory Society (ASO)
 - the American Speech and Hearing Association (ASHA)
 - the International Centre for Hearing and Speech Research (ICHSR) in Rochester, N.Y. (USA)
 - the International Commission on Biological Effects of Noise (ICBEN)
 - the World Health Organization (WHO).

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