

Research and Education Collaboration: Assessment

Harvard Medical School

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1. General Background and Aims

Biomedical sciences and healthcare have entered a global and accelerating phase, exemplified by the increasing migration of healthcare professionals and biomedical scientists, international cooperation in science and in the delivery of healthcare, and the creation of international quality standards. The realization that many parts of the world are facing similar problems such as the shifting epidemiology of disease, changing demographics and emerging threats to the health of populations has made collaborations across borders a necessity rather than an option. Despite the common threads, each country or region nonetheless faces its own unique challenges and opportunities.

Portugal is one such example. The country cannot depend on remaining competitive based on low-production costs, given the competition from Eastern Europe and China. Portugal's systems must adapt and the country's human and intellectual capital must grow to ensure Portugal's future success and advancement. In the area of healthcare, the provision of care, the education of healthcare professionals at all levels—basic, translational, clinical and healthcare systems research, and healthcare management—and the creation, maintenance and utilization of infrastructure are all crucial to the success and development of the overall system. Healthcare is an expanding portion of Portugal's economy, having grown in absolute and relative value to constitute 9.8% of GDP in 2004 (Source WHO). The success of investments in science in the 1990's has provided a model for Portugal and has formed the basis for some of the recent international efforts of the Portuguese Government through the Ministry of Science, Technology and Higher Education (MSTHE).

Over the last 18 months, the MSTHE has entered into contracts with selected international institutions: with MIT in areas of Engineering Systems and Business Management; with Carnegie Mellon University in the areas of Communication and Information Technology; with the University of Texas at Austin in the area of Digital Media, Advanced Computing and Technology Commercialization, and most recently with the Fraunhofer Institute in Germany in the area of application and dissemination of Communication and Information Technologies. At the end of 2006, the MSTHE approached Harvard Medical School (HMS) to initiate a similar alliance in the area of biomedical and health sciences, including the creation and dissemination of content to the public.

HMS is generally regarded as the leading academic institution in the USA in healthcare education, research and clinical care. HMS has more than 10,000 faculty members and about 7,500 trainees in clinical and research careers. It is affiliated with 18 hospitals, clinics and research institutes, and its faculty provides healthcare for about 2 million patients across its system. HMS' combined research funding exceeds 1 billion dollars on an annual basis, and it has extensive collaborations with industry and internationally. HMS asked Harvard Medical International (HMI) to lead the assessment phase due to its international experience and structure, having worked in over 30 countries. HMI was established in 1994 as a non-profit subsidiary of the University and HMS to explicitly address international collaboration in the areas of healthcare delivery, education and research. The Harvard Health Publications (HHP) was established to provide information for the public through the publication of newsletters, books, monographs and electronic media, either as its own entity or for other providers. In addition, the Harvard School of Public Health (HSPH), the Kennedy School of Government (KSG), and the Harvard Business School (HBS) all have great interest and experience in international healthcare markets and systems. HMS therefore seems to be an appropriate partner for the MSTHE.

Consequently, on April 16, 2007 the MSTHE and HMI on behalf of HMS signed an agreement with an associated technical annex that governed an assessment period from April 16 to July 16, 2007, culminating in a final assessment report. The major goals and objectives of the assessment period were to evaluate the following areas of interest:

- The development of **research and education programs** aimed at improving competence and capability and fostering innovation in three key areas in the biomedical sciences:
 - Knowledge generation and dissemination
 - Biomedical research at all levels and product development practices, processes, procedures and infrastructure
 - Entrepreneurship and career development
- The development of **graduate training and education programs for physicians** emphasizing the vertical and horizontal integration of science, clinical medicine and quality management
- Activities oriented towards the **public understanding of science** and the social appropriation of the knowledge generated
 - Production and development of new medical content appropriate for the public and targeted to medical specialties
 - Development of communications and public affairs functions within medical faculties

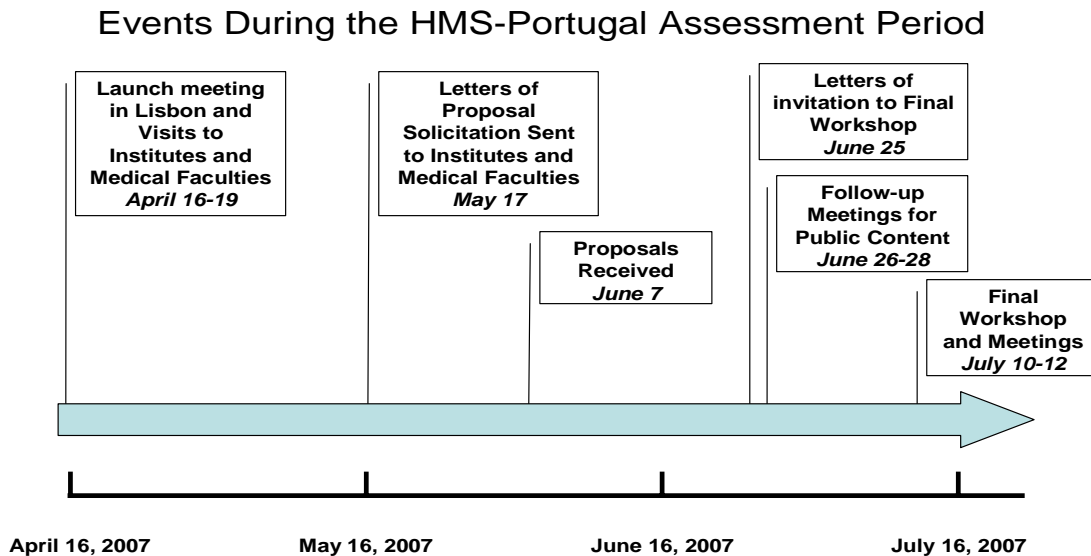
It is important to note that the Harvard team was not asked to provide a comprehensive review of the status of biomedical and health sciences in Portugal. Others have done so in recent years (see below). The purpose of the assessment was rather to look for opportunities and synergies for collaborations between Portuguese efforts and institutions and those at HMS. The findings were meant to serve as a basis for a future proposal and subsequent collaboration, a process which will follow this assessment period, as agreed upon between the two parties.

2. Approach, Process and Findings

The HMS team was well aware of pre-existing relationships and collaborations in biomedical and health sciences between Harvard and Portuguese scientists, but decided to initiate the assessment process with an open forum in order to foster a collaborative and “grass roots” process during the assessment. Prior to the first visit of the team, certain documents were provided as background for the upcoming workshops, visits and exchanges. These documents included the October 2002 report by the European University Association entitled *Evaluation of the 5 established Faculties of Medicine in Portugal* [sic], the *Global Report on the Evaluation of the Research Units on Health Sciences* chaired by Dr. Ruy V. Lourenço, the December 2005 *Overall Report: Evaluation of Research Units* by the FCT, and *Health Strategies in Portugal: The National Health Plan 2004-2010* published by the Ministry of Health and the High Commissioner of Health. The findings and recommendations of these reports were taken into account during the period of assessment, planning, and proposal development for future activities and collaborations. In addition to these summary reports, the HMS team was provided with documents from all of the Institutes and Faculties including but not limited to annual reports, research publications, student dissertations, curricula, marketing and admissions brochures, etc. In addition, the team went to the websites of the various Institutes and Medical Faculties for further information.

An initial HMS team was recruited based on the general goals and objectives listed above. The team consisted of Drs. David Golan, Adrian Ivinson, Tomas Kirchhausen, and Anthony Komaroff, under the leadership of HMI (Drs. Thomas Aretz, Robert Crone and Amanda Pullen). Dr. Tiago Outeiro, a Portuguese biomedical scientist working at the Massachusetts General Hospital at the time of the first visit, accompanied the team as a liaison for the April 16-19, 2007 visit. Since that time, he has moved back to Portugal as a scientist at the IMM and has had no role in the team's subsequent work or in writing this assessment report. The team is grateful for his contributions and efforts. Prior to the last workshop and in response to the Portuguese request for expertise in Healthcare Policy and Management (see below), Dr. Miles Shore joined the team. Brief biographies are appended in Appendix A.

Below is a brief timeline of the various events during the assessment process:



Launch Meeting and Visits (April 16-19, 2007)

The program and list of participants for this meeting and the visits are attached in Appendix B. The purpose of the program and visits was for the HMS team to gain better insight into the activities and capabilities of the medical faculties and research institutes and to provide an open forum for discussions about the proposed programs and their desired outcomes. During the launch meeting, the HMS team and the Portuguese institutions made formal presentations, which are found in Appendix C.

On April 17-19, the HMS team visited the following institutions:

- April 17 (Drs. Aretz, Crone, Golan, Ivinson, Kirchhausen, Outeiro):
 - UMIC (with Dr. Komaroff)
 - School of Medicine, University of Lisbon (FMUL)
 - Institute for Molecular Medicine (IMM)
 - School of Medicine, New University of Lisbon (UNL)
 - ITQB/IBET
 - IGC

April 18 (Drs. Aretz, Golan, Ivinson):

School of Medicine, University of Coimbra (FMUC)

Neuroscience and Cellular Biology Center, Coimbra (CNC)

April 18 and 19 (Drs. Aretz and Golan):

Instituto de Biologia Molecular e Celular, Porto (IBMC)

School of Health Science, University of Minho, Braga (Minho)

School of Medicine, University of Porto (FMUP)

IPATIMUP

Biomedical Science Institute Abel Salazar, University of Porto (ICBAS)

School of Medical Sciences, University of Beira Interior, Covilhã (UBI)

Findings:

Table 1 below provides a brief summary of the findings by the HMS team, organized according to common themes elicited during the visits, and aligned with the overall goals of the collaboration. To reiterate the point made above, this table is not meant to provide a comprehensive review, but rather represents a set of notes for the HMS team outlining activities and resources at the various institutes and schools possibly related to the creation of future joint programs. The intent was not to point out strengths and weaknesses in individual institutions, but rather to define existing programs and resources upon which to build and interests that could define the future roles of the various organizations, at least at the beginning of the collaboration.

Table 1

Medical Schools and Associated Laboratories	MD-PhD or PhD Programs	Translational and Clinical Research	Public Content	Support Structures and Systems
<p>Universidade da Beira Interior - Escola de Ciências da Saúde</p>	<ul style="list-style-type: none"> ○ Some existing programs and research 	<ul style="list-style-type: none"> ○ Some clinical research ○ Concentration in prevention and public health 	<ul style="list-style-type: none"> ○ Active involvement with community and health centers ○ Existing content in prevention (local champion) 	<ul style="list-style-type: none"> ○ Well developed e-learning platform with extensive content especially in the clinical skills area ○ Excellent model of IT system ○ Faculty development and curriculum quality assurance; interested in developing fellowships ○ Very interested in the development of virtual learning environment including assessment
<p>Universidade de Coimbra - Faculdade de Medicina</p>	<ul style="list-style-type: none"> ○ Existing PhD programs in biomedical science, technology, nursing ○ HARPA program being planned ○ IBILI – integrated program for aging and degenerative diseases (esp. brain imaging, retinal degeneration) 	<ul style="list-style-type: none"> ○ Oncology and pediatric hospital ○ 20 health centers ○ Cardiovascular center ○ CIMAGO virtual network for translational research, esp. in carcinogenesis & oncobiology ○ IBILI – degenerative diseases translational research ○ Target identification ○ Various programs including liposome gene Rx in CV, cancer, respiratory ○ Intent to create clinical research unit, starting with cardiology ○ EV.CT.SE – EU network of ophthalmology clinical trial centers (Tübingen, London, Paris, Coimbra) 	<ul style="list-style-type: none"> ○ Existing connection to Azores ○ Forensic State Lab ○ Postgraduate program in journalism and health 	<ul style="list-style-type: none"> ○ National PET imaging network center ○ Retinal imaging ○ Faculty development programs ○ Forensic State Lab ○ CIMAGO ○ IBILI – existing network ○ Virtual reality center ○ HARPA: cytogenetics and microbiology ○ EVI GENORET – EU net on functional genomics ○ EV.CT.SE – EU network of ophthalmology clinical trial centers ○ EUROVISION NET MIRROR – eye imaging

Medical Schools and Associated Laboratories	MD-PhD or PhD Programs	Translational and Clinical Research	Public Content	Support Structures and Systems
Universidade de Lisboa - Faculdade de Medicina	<ul style="list-style-type: none"> ○ Existing programs, most at IMM ○ Bioengineering program with Technical University of Lisbon ○ Participant in 5+2 specialist/PhD program submitted to MOH/MOS 	<ul style="list-style-type: none"> ○ “Partnership with MOH” needed to support physicians in research ○ Wish to establish clinical fellowships 	<ul style="list-style-type: none"> ○ “Mission”: Public education; CPD (e.g. European course in sleep sciences) ○ E-learning platform for curriculum including PDAs 	<ul style="list-style-type: none"> ○ Preventative and social medicine ○ Institute for Advanced Education ○ Simulation center ○ New integrated curriculum in planning stage ○ Genomed – network for genetics (IMM)
Universidade do Minho - Escola de Ciências da Saúde	<ul style="list-style-type: none"> ○ Existing programs that are integrated with school ○ Undergraduate MD-PhD program(5+3+1) existing in collaboration with Columbia and Jefferson (2 students/yr to begin with) 	<ul style="list-style-type: none"> ○ Various clinical research programs 	<ul style="list-style-type: none"> ○ Existing e-learning platform and extensive on-line materials for medical students ○ Community outreach and teaching program ○ CPD programs 	<ul style="list-style-type: none"> ○ Faculty development ○ European school of neurosurgery ○ MD curriculum is student-centered, horizontally & vertically integrated, culture of assessment
Universidade do Porto - Faculdade de Medicina	<ul style="list-style-type: none"> ○ Existing PhD programs including health services research ○ Undergraduate research programs 	<ul style="list-style-type: none"> ○ Main hospital and its departments have multiple efforts in clinical research and applied research (fetal monitor) ○ Shifting to disease-oriented research – yet to be realized ○ Existing QA research in surgery (with Shukri Khuri at VA at HMS) 	<ul style="list-style-type: none"> ○ Bologna model curriculum ○ Many outreach programs at all levels ○ Online content 	<ul style="list-style-type: none"> ○ E-learning platform and content ○ Simulator development especially OBGyn ○ Center for medical education (with JHU)
Universidade do Porto - Instituto de Ciências Biomédicas de Abel Salazar	<ul style="list-style-type: none"> ○ Part of GABBA; other programs in several disciplines including bioengineering with institutes and other schools 	<ul style="list-style-type: none"> ○ Some clinical research including clinical research teams and international collaborations 	<ul style="list-style-type: none"> ○ Great interest in public education and creation of information and platform; program has begun ○ Existing high school programs ○ Existing research programs for students, industry funded 	<ul style="list-style-type: none"> ○ Veterinary medicine degree ○ Beginning of e-learning platform ○ Simulation

Medical Schools and Associated Laboratories	MD-PhD or PhD Programs	Translational and Clinical Research	Public Content	Support Structures and Systems
Universidade Nova de Lisboa - Faculdade de Ciências Médicas	<ul style="list-style-type: none"> ○ Existing collaboration in health services research (especially mental health) with HMS (Ron Kessler) 	<ul style="list-style-type: none"> ○ 	<ul style="list-style-type: none"> ○ Existing relationship with GPs for medical student education ○ Mental health interest in research and community outreach ○ Public health interest ○ Tropical medicine 	<ul style="list-style-type: none"> ○ Coordination of mental health ○ PDAs in clinical areas for support of student education
Centro de Neurociências e Biologia Celular (CNC)	<ul style="list-style-type: none"> ○ Existing programs in experimental biology & biomedicine (4 yr) with international faculty (MIT, ENI NET) ○ International school of neurosciences ○ Important player in the field of neurosciences 	<ul style="list-style-type: none"> ○ Outreach programs to hospitals and industry including applied research and clinical research ○ Tech transfer spin-off (BIOCANT) – genomics, cell biology, biotech, microbiology, bio-informatics, systems biology, technology platforms ○ “From molecule to behavior” ○ Existing capabilities 	<ul style="list-style-type: none"> ○ Existing student-in-the-lab program ○ Could play a key role, especially in the neurosciences 	<ul style="list-style-type: none"> ○ Services provision to hospitals and industry ○ ENI NET – European neuroscience network
Instituto de Biologia Molecular e Celular (IBMC) and INEB	<ul style="list-style-type: none"> ○ Seven major areas of research, all with major areas of integration ○ GABBA program is existing collaboration in graduate education (4 yr PhD) between the two medical schools in Porto and the three associated labs (IBMC/ INEB/IPATIMUP) – 25% do research in US, 25% in UK; only 3-4% are MDs 	<ul style="list-style-type: none"> ○ Multiple projects with industry ○ Bone regeneration collaborations between INEB & Harvard (David Mooney, Myron Spector) 	<ul style="list-style-type: none"> ○ Some existing outreach programs ○ Workshops and symposia 	<ul style="list-style-type: none"> ○ Cores in various areas including protein production and purification ○ Center for genetic diseases with comprehensive family screening ○ Existing collaborations with IPATIMUP (IBMC: cell biology & animal models; IPATIMUP: oncobiology & population genetics)

Medical Schools and Associated Laboratories	MD-PhD or PhD Programs	Translational and Clinical Research	Public Content	Support Structures and Systems
Instituto de Medicina Molecular (IMM)	<ul style="list-style-type: none"> ○ Existing PhD programs including participation in GABBA and EMBL programs ○ Extensive post-docs ○ Extensive publications ○ Starting a world class PhD program, to be involved in a program at the national level 	<ul style="list-style-type: none"> ○ Start-ups including GenoMed, Technophage, Alfama 	<ul style="list-style-type: none"> ○ Existing outreach programs ○ Workshops and seminars ○ Involved in many of the Ciencia Viva initiatives ○ Group called Associacao Viver a Ciencia which could participate 	<ul style="list-style-type: none"> ○ Core facilities in confocal/2-photon microscopy, flow cytometry, microarrays, bioinformatics, animal facility, biobanking
Instituto de Patologia e Imunologia Molecular da Universidade do Porto (IPATIMUP)	<ul style="list-style-type: none"> ○ Part of GABBA ○ I3S – collaboration with IBMC and INEB for investigation and innovation in health sciences 	<ul style="list-style-type: none"> ○ Translational research using tissue ○ Clinical-pathological studies using tumor tissue banks 	<ul style="list-style-type: none"> ○ Mobile lab: educational service schools ○ Online interactive programs for K-12 ○ Prevention programs (e.g. cancer screening) ○ Podcasts ○ www.infocancer.pt under construction, open to public with email questions, etc. 	<ul style="list-style-type: none"> ○ Central tissue bank for Portugal ○ Population genetics ○ History of collaborative work with many institutions in Portugal ○ CAP accredited and QA source for country
Instituto de Tecnologia Química e Biológica (ITQB) and IBET	<ul style="list-style-type: none"> ○ Open lab to all institutions in Lisbon ○ Existing PhD programs in various areas ○ Many existing workshops 	<ul style="list-style-type: none"> ○ IBET (11 startup companies) ○ Research from bench to bedside especially in microbiology ○ Phase II trials 	<ul style="list-style-type: none"> ○ Existing public programs (dia aberto) 	<ul style="list-style-type: none"> ○ IBET platform for technology transfer and production, analytical ○ Many core facilities including computational, NMR, animal cell technology, crystallography
Instituto Gulbenkian de Ciencia	<ul style="list-style-type: none"> ○ Existing programs for post-docs and PhD students (all visiting professors) ○ Existing workshops and lectures 	<ul style="list-style-type: none"> ○ Wants to be involved in translational research training program (special interest in inflammation in the nervous system) 	<ul style="list-style-type: none"> ○ 	<ul style="list-style-type: none"> ○ Existing technology platforms

Request for Proposals (May 17, 2007)

Based on the overall goals of the collaboration, the visits and meetings in Portugal, and the supporting documents, the HMS team sent a letter of solicitation for collaborative proposals in the four areas corresponding to the headings of the table above. The letter is attached in Appendix D. Briefly, as outlined in the letter, the four areas were:

1. The development and implementation of educational and research opportunities in collaboration with Harvard Medical School that would ultimately lead to the creation of new PhD and MD-PhD programs in the biomedical sciences.
 - This area of concentration was meant to address issues concerning research training and the expansion of international research efforts, two items mentioned repeatedly in previous reviews of the Portuguese medical schools and again highlighted as a definite need during our visits.
2. The development and implementation of educational and research programs in translational and clinical research in Portugal.
 - This area of concentration was meant to address issues concerning the variability of translational and clinical research efforts in Portugal, and the need for a closer relationship between the hospitals and the scientific community, while providing new career paths in applied biomedical and health sciences research. It was also evident that this would require collaboration with the Ministry of Health and hospitals.
3. The development of public content in the biomedical sciences directed at the public at large, and especially at intermediaries involved in the dissemination of content, such as teachers and journalists.
 - This area of concentration was meant to address issues concerning the human resources pipeline for biomedical sciences by fostering the understanding and interest in biomedicine and health sciences by the public at large. One component involved the creation of programs and materials for intermediaries such as teachers, journalists and primary care providers. A secondary component involved the creation of medical content tailored to the Portuguese-speaking world, thereby improving prevention, promoting wellness and supporting maintenance of health. Furthermore, the impact of these programs would need to be studied in order to provide data for program evaluation and to define the outcomes of the program.
4. Expansion and creation of infrastructures that can support the biomedical science community in Portugal.
 - This area of concentration was meant to address the judicious use of infrastructure and the creation of centers of excellence in support of research and education in Portugal and beyond. HMS could serve as a resource to help provide some of the infrastructure needs for research programs until such infrastructure is present in Portugal. In addition, there would be significant infrastructure needs for the public content piece, requiring its own strategy and organization in Portugal.

In keeping with the overall mission of the proposed collaboration, certain guiding principles and criteria were stressed:

- Benefit to Portugal on a national or regional level
- Strengthening Portugal's position in the global economy and biomedical sphere
- Expanding and building on existing strengths and filling existing needs
- Creation of opportunities that will build capacity

- Creating new consortia and building on existing consortia among the universities, institutes and other relevant parties
- Areas of interactions with HMS that will help to strengthen the effort in Portugal and enrich existing programs at HMS
- Achievable in terms of budget, resources and timeline

Table 2 below is a summary of the proposals received in response to the initial letter of request:

Table 2
PhD and MD-PhD Programs:

Name of Project and Institutions	Aims and Areas of Study
Doctoral Program in Genetics (Human Molecular Genetics) <i>Center for Research in Human Molecular Genetics of the New University of Lisbon (UNL)</i>	<ul style="list-style-type: none"> - PhD Program for MD and MSc in the field
Graduate Program on Applied and Basic Biology Areas (GABBA) Biomedical Engineering Program <i>FM UP, ICBAS, FEUP, FCUP, IBMC-INEB, IPATIMUP, (CNC), (IMM)</i>	<ul style="list-style-type: none"> - To fill gaps with new module “nanocourses” and core advanced courses that could be offered during the first academic year; to identify research laboratories and groups in Porto and Boston that might be interested in co-hosting (also for the rotation periods) some of our graduate students; to explore the opportunity and feasibility of launching a variety of new and different types of MD-PhD programs, some of which could target residents as candidates, in several of the domains listed above
HARPA - Advanced Research Program on Ageing and Degenerative Diseases. An Inter-University Doctoral Program with Harvard Medical School <i>FMUC, CNC, IMM, FMUL</i>	<ul style="list-style-type: none"> - Create program under the aegis of the National Consortium in the area of Ageing and Degeneration of Complex Biological Systems - Two main scientific areas: Neurodegeneration and Vision Sciences (“age-related eye and brain diseases”)
National Consortium for Graduate Studies in Biomedicine and Health Science <i>CNC, UBI, FMUC, FMUL, FMUP, GABBA UP, IMM, Minho</i>	<ul style="list-style-type: none"> - Improve quality in graduate training program in the biomedical field - Coordinate post-graduate programs to optimize resources, stimulate collaborative work and mobility - Promote the integration of basic biomedical and clinically-oriented research - Initiate and facilitate new programs, particularly MD-PhD degrees and degrees in interdisciplinary areas - Integrate research into undergraduate and graduate training in medical curricula - Foster education of physician-scientists
PhD Program on International Mental Health Policy And Services <i>UNL, ICBAS Institute of Hygiene and Tropical Diseases, WHO-HQ</i>	<ul style="list-style-type: none"> - The program has been designed to suit physicians, scientists and health care professionals of different disciplines; it promotes active participation in the formulation and implementation of mental health policies and plans at both regional and country levels; it contributes to building capacity to conduct research that might support the development of evidence-based mental health services and interventions; it fosters the development of outcomes and services research, as well as the implementation of outcome assessment tools and processes

Translational and Clinical Research:

Name of Project and Institutions	Aims and Areas of Study
IMM Cancer <i>IMM (J. Barata), FP UL, IBMC</i>	<ul style="list-style-type: none"> - Characterization of molecular mechanisms implicated in the development of hematological malignancies, with the ultimate goal of identifying molecular targets for therapeutic intervention
IMM Cell Biology Of Disease <i>IMM (M. Carmo-Fonseca), IGC, IBMC</i> <i>IMM (M. Carvalho), INSRF, IBMC</i>	<ul style="list-style-type: none"> - Bio-imaging and structural analysis - Genome-wide approaches in post-transcriptional regulation
IMM Cellular Immunology <i>IMM (L. Moita), FMUL</i>	<ul style="list-style-type: none"> - Provide resources and expertise that will allow the participating research units to utilize RNAi libraries for gene discovery and mechanism studies of the biological processes where they are experts (e.g., cancer, infectious diseases, cardiovascular diseases)
IMM Neurosciences <i>IMM (T. Outeiro), FMUP, Minho, CNC, FMUL</i>	<ul style="list-style-type: none"> - Theme 1: Identification of novel targets in neurological disorders associated with protein misfolding - Theme 2: Molecular characterization of the Portuguese populations of Parkinson and Alzheimer patients for the development of novel disease biomarkers
National Graduate Program For Clinical And Translational Research <i>CNC, UBI, FMUC, FMUL, FMUP, GABBA UP, IMM, Minho</i>	<ul style="list-style-type: none"> - Develop and implement an educational/research program in translational and clinical research in Portugal (<i>Medical Portugal-Harvard Degree, MedPHD</i>) - Core curriculum for MD-PhD and PhD in clinical and translational research: research design and methods, molecular medicine, epidemiology, biostatistics, study/survey design, quantitative methods, ethics and regulation, experimental models of disease
PhD Program on Clinical Pharmacology and Therapeutics– a Graduate Educational and Research Program Directed at Physicians <i>UNL (coordinator),</i> <i>ICBAS (Pharmacology Department)</i> <i>UC (Pharmacology Dept.)</i> <i>UP (Pharmacology Dept.)</i> <i>[CEIC][INFARMED][APIFARMA]</i>	<ul style="list-style-type: none"> - Educational program in clinical research directed at physicians - Build up the capacity and career paths in hospitals, health centers and medical schools in order to make Portugal an attractive country to perform clinical trials

Public Content:

Name of Project and Institutions	Aims and Areas of Study
<p>Development of Materials to Raise the Public Awareness of Biomedical Issues: Opportunities for Medical Education – “OpenMedEd” <i>UBI, Minho</i></p>	<ul style="list-style-type: none"> - The development of new content and the adaptation of existent content to the new target audience - The agglutination of the medical educational researchers and developers in the country in the common goal of developing and studying the program
<p>Library And Information Science (LIS) Projects <i>UNL</i> <i>[to be instituted: Escola Nacional de Saúde Pública (UNL), Faculdade de Medicina de Lisboa (UL) and CITI (Centro de Informação Técnica para a Indústria) from ex-INETI (the latter via their Information Management research area)]</i></p>	<ul style="list-style-type: none"> - Preparing MD-PhD students to maximize their information awareness and search capabilities
<p>Public Health and Preventive Medicine Portal <i>FM UP – Department of Hygiene and Epidemiology, UNL Department of Public Health, FM UL – Institute of Preventive Medicine, Public Health Institute of the University of Porto (ISPUP)</i></p>	<ul style="list-style-type: none"> - Main focus in Public Health and Preventive Medicine, directed to the <i>public</i> at large. Special focus: education and shaping of the attitudes of <i>journalists</i> and <i>teachers</i> towards the dissemination of relevant and scientifically correct information to their target publics, and raising the interest of the general public and students by research in population health sciences - The use of the portal contents by professionals that may be intermediaries in the dissemination of content to the public will be promoted and enhanced through face-to-face and on-line courses
<p>SYNC – A Program for Science and The Arts <i>FM UC, CNC</i> <i>[Project BLINDSPOT]</i></p>	<ul style="list-style-type: none"> - To create projects to bridge the gap between science and art, and thereby increase the understanding and interest in science in the general population - Create residencies for artists in scientific communities based on an application process that will result in presentations and the creation of public art based on biomedical science

The HMS team came to the following conclusions based on the submissions:

1. There seemed to be a strong desire to create **nation-wide and collaborative** programs in education and research.
2. There was a need to establish **both research and education** efforts in all areas of endeavor, which should preferably be interactive.
3. There were currently **clear strengths in all areas in different institutions**, which new programs needed to build on and which would determine the initial leadership of the various endeavors.

4. There was a **differential level of current development** in the various areas of research and training, i.e., in basic, translational and clinical research.
5. Any system to be established and any set of programs would need to be **coordinated but competitive** to assure funding based on merit. This would dictate the governance structure to be established.
6. **Additional partners needed to be involved** in order to make the programs successful (e.g., the Ministry of Health, the hospitals).
7. With the exception of the Public Content project, the creation of **infrastructure** was felt to be a “secondary” effort in response to the needs of the eventually instituted programs and projects. It was therefore not treated as an independent area of concentration.

In order to accomplish some of these objectives, gather additional information, and create consensus around recommended programs for the HMS-Portugal collaboration, additional meetings and a final workshop were conducted:

Follow-up Meetings Focusing on Public Content and with Additional Partners (June 26-28, 2007)

Drs. Komaroff and Aretz met with the following parties and persons:

UMIC (Prof. Luis Magalhães, Dr. Pedro Ferreira):

The discussion centered mostly on the coordinating and supporting role that could be played by UMIC, especially in the creation, implementation and maintenance of the technical infrastructure of the public content product and the overall management of the project. Non-web based electronic platforms (e.g., voice, TV, videos) were discussed. Given the aggressive timeline for potential implementation, adaptation and modification of existing HHP content would be desirable in the beginning. Pilot projects were felt to be a desirable first step and their distribution through the Ciência Viva network and the Family Service Units contracted by the Ministry of Health (MOH) was discussed.

INSA (Drs. Pereira Miguel, Rui Portugal):

INSA has been designated as the contact institution with the MOH. The discussion touched upon various aspects:

- Existing public content and portals for health information
- Needs for healthcare research and quality of data
- Evidence-based healthcare policy
- Education in healthcare management and health policy research
- Support for clinical research, both funding as well as career development
- Manpower issues in medicine and the need for education of practicing physicians
- Ability to conduct pilots using the family service units
- Healthcare needs in Portugal, including the health of migrants

It was clear that there would need to be prospective coordination with the MOH in the areas of clinical and translational research, the creation of public content and the potential for research and education programs in healthcare policy and management.

Ciência Viva (Dr. Rosália Vargas, Ana Noronha):

The discussions focused on the existing programs, especially as they address teachers and students at the primary and secondary school levels. Since the Ciência Viva network has 16 science centers throughout the country, and since it has established links to the school

system and the local communities, it would be one of the vehicles for the piloting and eventual dissemination of public content. Public biomedical and health sciences-related content does exist at this time at *Ciência Viva*, and it has an established process for the recruitment of authors and the editing of content. This existing network could be able to be built on as there are connections into the various associated laboratories and the Schools of Medicine.

Additional meetings with Dr. António Rendas, representing the President of the Portuguese Council of Rectors (CRUP), and Prof. Manuel Heitor, the Secretary of State at the MSTHE, were also conducted. During these meetings, interest was expressed to consider programs in Healthcare Policy and Management in the assessment phase of the collaboration. Consequently, the agenda for the final workshop was adjusted, and Prof. Miles Shore joined the HMS team to specifically address the issue of healthcare policy and management.

Final Workshop (July 10-12, 2007)

The program is attached in Appendix E and the letter of invitation in Appendix F. The attendance list was greatly expanded from the original launch meeting to also include leadership at the MOH, the hospitals including the private sector, foundations, medical-related industries, schools of public health, and medical societies.

The goals and objectives of the workshop were:

- To provide a forum for open discussion and questions concerning the process to date
- To work in break-out groups on concrete program proposals in the four areas of concentration
- To reach consensus on the basic concepts and goals of the overall program
- To begin to outline the potential elements for a governance structure
- To provide initial funding requirements and preliminary budgets

Four areas of concentration had been defined for the workshop and representatives from various institutions had been asked to help coordinate the workshop and the breakout sessions in particular. The areas and the associated institutions were:

Group 1: Research, PhD and MD-PhD Programs in Biomedicine and Health Sciences

IMM, Minho, IBMC

HMS leader T. Kirchhausen

Group 2: Graduate Programs in Translational and Clinical Research

CNC, IPATIMUP

HMS leader D. Golan

Group 3: Creation of Public Content

UBI, FMUP, UMIC

HMS leader T. Aretz for A. Komaroff

Group 4: Education and Training in Healthcare Policy and Management

UNL, ICBAS

HMS leader M. Shore

[Creation of Infrastructure – *ITQB/IBET*]

The schedule of the workshop was as follows:

July 10 th (AM)	Preparatory Meeting with Coordinators
July 10 th (PM)	Plenary Discussion and Introduction to Break-out Groups
July 11 th (AM)	Breakout Groups: Discussion
July 11 th (PM)	Breakout Groups: Summary
July 11 th (PM)	Report Back in Plenary and Discussion
July 12 th (AM)	Follow-up Discussions with Coordinators

The report-backs are attached in Appendix G. Groups 1 and 2 decided to initially meet separately, but also to coordinate their efforts and meet together during the July 11 PM summary session. Presenters for the groups were:

- Group 1: Carmo Fonseca (IMM/FMUL)
- Group 2: Catarina Resende de Oliveira (CNC/FMUC)
- Group 3: Luis Magalhães (UMIC)
- Group 4: José Miguel Caldas de Almeida (UNL)

Meetings with Private Foundations:

Following the workshop, the HMS team met with representatives of three foundations. On July 12, 2007, Drs. Golan, Kirchhausen, Shore and Aretz met with:

Champalimaud Foundation (Drs. Leonor Beleza, João Botelho)

The Champalimaud Foundation (CF) has been established recently, and its major endeavor is the creation of an Academic Medical Center (Neurosciences and Oncology) and Graduate School of Medicine. The Medical Center will focus on specialty care, research (mainly translational) and graduate education. The MOH has agreed to allow interns and residents to interrupt their training for three years, with support coming from the MOH and the MSTHE. The program will support five students per year in Lisbon. In the discussion it was felt that there would be great synergy with some of the contemplated programs in the collaboration, namely the research efforts, the education and also possible career opportunities. Dr. Beleza was the former Minister of Health, and she also expressed an interest in the healthcare policy and management and public content aspects of the workshop. The discussion centered on the desirability of the creation of easily accessible data sources and the need for health services research.

Fundação Calouste Gulbenkian (Dr. Leonor Parreira)

The meeting was an opportunity to review the various programs presently supported by the FCG, in particular the activities of the IGC. The institute has supported the training of over 100 PhDs in the biomedical sciences, often with international faculty and with time spent abroad. In addition, it supports the GABBA program, a collaborative PhD program already in existence (see Table 2 above). IGC runs many international seminars and has recently instituted a program in computational biology. It is presently planning to create a graduate School of Medicine in collaboration with the Technical University of Lisbon, ITQB, and IMM. It has also established a collaborative effort in Neurosciences with the Champalimaud Foundation (see above). During the conversation, the HMS team and FCG stressed that any future collaboration would build on and be complementary with the existing efforts, and that it would be desirable to expand into new areas collaboratively, or at least assure coordination of efforts.

Drs. Miles Shore and Aretz visited the Fundação Luso-Americana on July 13, 2007.

Fundação Luso-Americana para o Desenvolvimento, FLAD (Charles Buchanan, Jr., Paulo Zagalo e Melo)

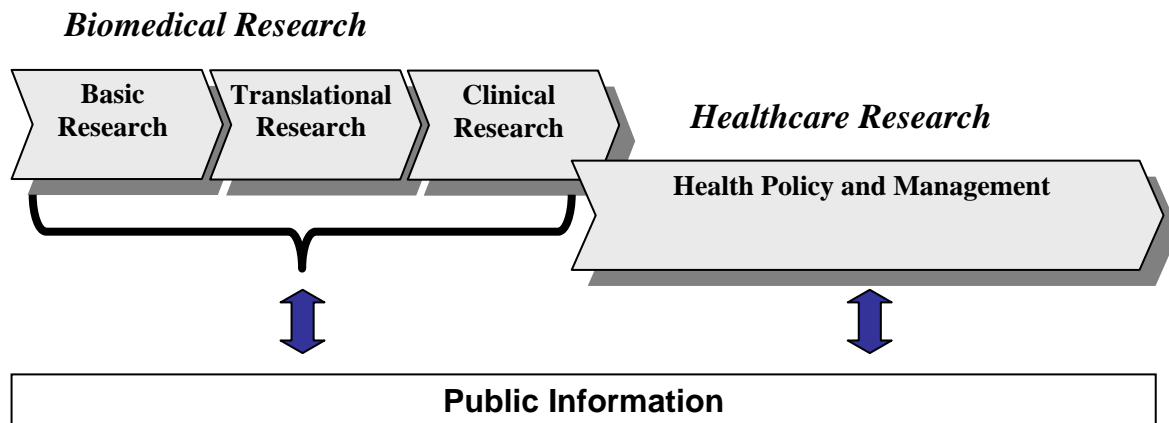
The FLAD has a history of supporting specific aspects of biomedical institutions and efforts. FLAD representatives sit on the boards of IPATIMUP, IBILI for instance, and the foundation has great interest in health care issues, especially if they are connected to US institutions. They have also been involved in high school science fairs and they feel that they can provide focused but very valuable contributions to the collaboration. FLAD would like to be kept informed and would very much like to participate in selected aspects of any planned programs in the future.

3. Areas of Concentration – General Aspects and Summary of Workshop Deliberations

This section discusses general considerations, concepts and principles that could serve as a basis for recommendations and the creation of the specific programs to be developed. As alluded to previously, the findings by the HMS team and by prior reviews showed different strengths in the various fields of biomedical and health sciences research and training. In the section below, the recommendations offered by the HMS team therefore attempt to build on these strengths, and address some of the opportunities.

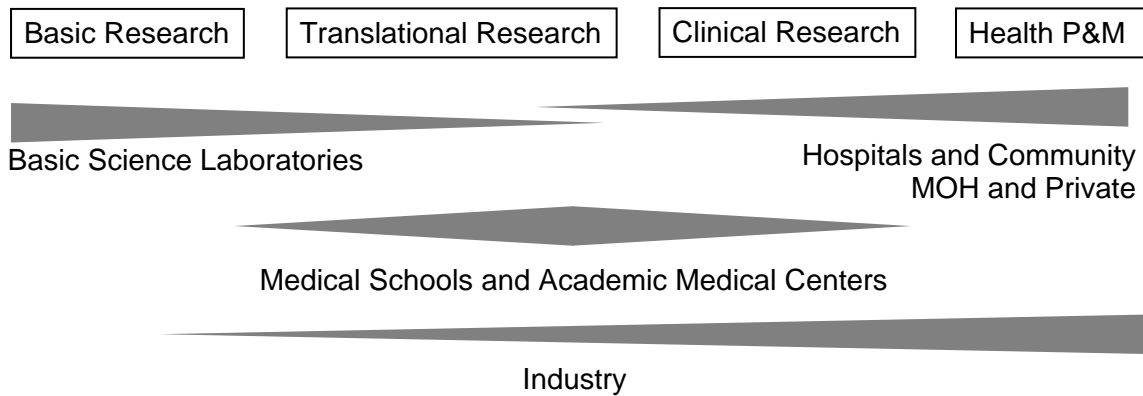
The Emerging Continuum and Redefinition of Biomedical and Health Sciences Research

The emergence of healthcare services research, the quality movement and the increasing emphasis on evidence-based medicine have all expanded the traditional definition of biomedical and health sciences research. One such model is represented in the diagram below:



This model implies that the collection of adequate data, their availability and interpretation and especially collaboration and coordination across the entire healthcare system is crucial for innovation, application, quality control and efficiency.

The functions implied in the above diagram are carried out by various entities that often have no incentives to collaborate, because of their different missions, governance or financial models. Ideally, there would be vertical and horizontal integration of these efforts. The following diagram attempts to depict the traditional roles of various participants:



As alluded to above, during the breakout sessions of the final workshop, the groups and discussion leaders felt that the goals, objectives, and needs of the Basic and Translational research and education programs were sufficiently similar that they could be combined. Furthermore, it was felt that the Basic and Translational programs shared sufficient goals and objectives with the Clinical research and education programs that all of these programs could be coordinated under a single program governance structure. Nonetheless, the Clinical research and education programs were envisioned to be different from the Basic and Translational programs, since the existing levels of Clinical research and education in Portugal differ from the levels attained in Basic and Translational Research. In addition, the target audience, trainees and students involved would be different. Briefly, the results of the workshops and follow-up conversations resulted in the following **general recommendations**:

1. Creation of Biomedical Research and Training Programs covering Basic, Translational and Clinical Research, consisting of
 - a. Collaborative research grants awarded on a strictly competitive basis and associated with an education component.
 - b. Graduate training programs with significant research components. The level of degrees would be a function of the field. PhD and MD-PhD degrees seem to be most appropriate for the Basic and Translational Sciences, whereas Masters degrees and professional development programs seem most appropriate for the Clinical Research area.
 - c. Creation of retreats, workshops and symposia open to all program participants and to outside participants, in order to allow for exchange of ideas and the creation of a community of practice, while allowing outside feedback.

Target audiences for the Basic and Translational programs would be graduate and medical students, principal investigators and postdoctoral fellows, while target audiences for the Clinical Research and Education programs would be residents and practicing physicians.

2. Health Content for the Public

Creation of content and the development of the appropriate technological platforms. In addition, the creation of a research component and outcomes studies into the efficacy of public content would need to be developed to assure program quality and effectiveness.

3. Health Services, Policy and Clinical Management

Professional educational programs and research projects could constitute the main components of this program, supplemented by workshops and symposia. The target audience would be academics, graduate students and professionals involved in healthcare policy and management.

In general, many of the endeavors touched upon above would necessarily require a degree of horizontal and vertical integration among the various parties outlined in the above diagram. These endeavors include:

- *Education and training:* Education and training takes place in multiple venues and at all stages of biomedical sciences and health sciences. The HMS team recommends that any program include a significant educational component.
- *Research and technology transfer:* Research, experimentation and application are not only efforts in their own rights, but are absolutely necessary components of education and training. Programs would therefore ideally have research components and an educational component. This concept also applies to the Public Content program; for example, pilots and outcomes research could be integral parts of the design and implementation strategy of the Public Content Program.
- *Systems and infrastructure:* Infrastructure typically follows goals and organizational structure, and infrastructures and systems need to be integrated and adapted or developed appropriately. These infrastructures have to fulfill certain requirements: 1) they need to support the work to be done; 2) they need to be able to provide data in “real time” to allow for midcourse corrections; and 3) they need to be flexible. This would require a coordinated effort and could take the form of a “core function” with its own management. One of the major long-term needs would be to involve the major medical schools and associated laboratories in strengthening the design and implementation of the “academic medical center” concept, in which research, education, and clinical care become the unifying and complementary missions of the centers.
- *Careers and opportunities:* Research and education are driven by career, intellectual, financial and entrepreneurial opportunities. Any new effort should provide new or expanded career opportunities, systems for technology transfer and the creation of new enterprises to assure success and sustainability.
- *Public awareness and information:* Although the creation of public content was identified as one of the core areas of concentration, transparency and public communications are also deemed crucial. A communications strategy would need to be developed early on as part of any contemplated programs in order to assure that the public is served by these programs and is willing to provide feedback to further enhance their effectiveness.

Follow-up Meetings and Contacts (July 12, 2007 to date)

Since the workshop, the HMS team has been in contact with most of the coordinators for the various areas, which has resulted in some refinement of the presentations at the workshop on July 11, 2007. Subsequently, a draft report was submitted to the leadership of Harvard Medical School and on August 23, 2007 to the Secretary of State, Prof. Manuel Heitor.

There were some important changes in the leadership at Harvard University and at HMS during the assessment period (see Appendix H: Letter from Cynthia Walker, the former Executive

Dean at HMS, to Secretary of State, Prof. Manuel Heitor). Prof. Drew Faust became the new President of Harvard; Prof. Jeffrey Flier became the new Dean of HMS; Mr. Daniel Ennis became the new Executive Dean at HMS; and Prof. Nancy Andrews, the Dean for Basic Sciences and Graduate Studies, left HMS to become Dean of Duke University Medical School. Because of these changes and in response to the draft report, Drs. Flier, Golan, Kirchhausen and Glaven (Judith Glaven, PhD, Director of Basic Science Programs) and Mr. Ennis met with Secretary of State Manuel Heitor at HMS on September 12, 2007 in order to discuss next steps. The meeting resulted in the following decisions (see Appendix I):

1. “The draft report [was] to include an assessment of the potential for collaborations between Harvard Medical School and the Portuguese medical schools and associated laboratories. This report [was to] describe the process by which the assessment was conducted and the major strengths and challenges that were identified. The report [was] not [to] include any specific proposals for the Harvard-Portugal collaboration because those proposals will require an additional period of time to craft and refine both at Harvard and in Portugal.”
2. “...the Harvard team [is being realigned] to refine the proposal phase of the Harvard-Portugal collaboration. This phase will be coordinated by the Dean's Office at Harvard Medical School and by [the Ministry of Science, Technology and Higher Education] in Portugal. As ... discussed, the coordinators of this phase on the Harvard side will be Dr. Judith Glaven, Director of Basic Science Programs, Dr. David Golan, Professor of Biological Chemistry and Molecular Pharmacology and Professor of Medicine at Harvard Medical School, and Dr. Tomas Kirchhausen, Professor of Cell Biology at Harvard Medical School. ... this revised collaboration [will need to be] approved through the newly established process at Harvard University under the Provost, Dr. Steve Hyman, and the Vice Provost for International Affairs, Dr. Jorge Dominguez.”
3. “There will be two major components in the proposal phase:
 - a. “Basic, Translational, and Clinical Research and Education. The broad outline of this component will be similar to the plans we have previously discussed. However, additional discussions will be needed to refine the specifics, logistics, operational details, oversight, and governance of each program within this component. These discussions will involve leading biomedical and health scientists and physician-scientists at Harvard and in Portugal.”
 - b. “Public Content. The broad outline of this part of the proposal will also be similar to the plans ... previously discussed. However, additional discussions will be needed to refine the specifics, logistics, operational details, oversight, and governance of this portion of the project. In addition, as ...discussed, ...the academic aspects of this component [will need to be enhanced]. Strengthening the academic aspects of the public content component will be very useful in its own right, and will serve to integrate the public content segment of the proposal into the fabric of the overall Harvard-Portugal research and education collaboration.”
4. “...the health policy and health services research aspects ... will not be appropriate for the Harvard-Portugal collaboration at the present time.” Health policy and health services research in Portugal require consideration of a number of issues and

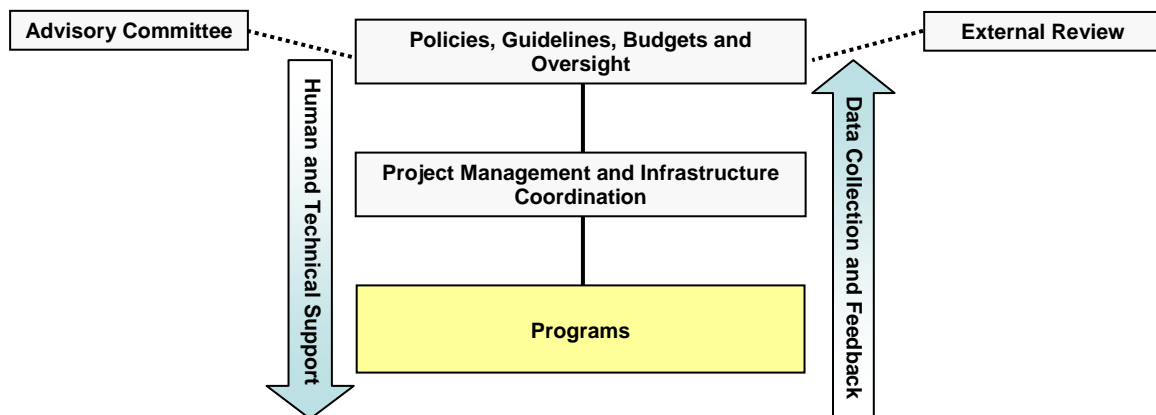
challenges at the national and institutional levels. HMS suggests that Portugal could develop in this area by building a critical mass of internationally trained researchers in health policy, by stimulating collaborative research projects between Portuguese universities and international centers with more experience in the field, and by developing databases on the Portuguese health care system that could be used to improve current practice and could serve as substrates for future research in health policy.

4. Governance and Processes for the Collaboration

Although the specifics of the governance structure would be decided as part of the specific proposals, the following general principles were discussed during the assessment period and felt to be important to the success of any future collaboration:

- Granting **autonomy** to the programs in order to foster innovation, encourage experimentation, reach the best solutions for specific needs and provide the culture and climate best suited to create learning communities of practice.
- Requiring **accountability** to the overall endeavor in order to create cohesive strategies and guidelines, efficiencies across all programs and the ability to alter course when needed and in due time.
- Providing means of **communication and support** in order to make the system efficient and enable evidence-based decisions, while capturing information and knowledge.

The figure below outlines some of these elements:

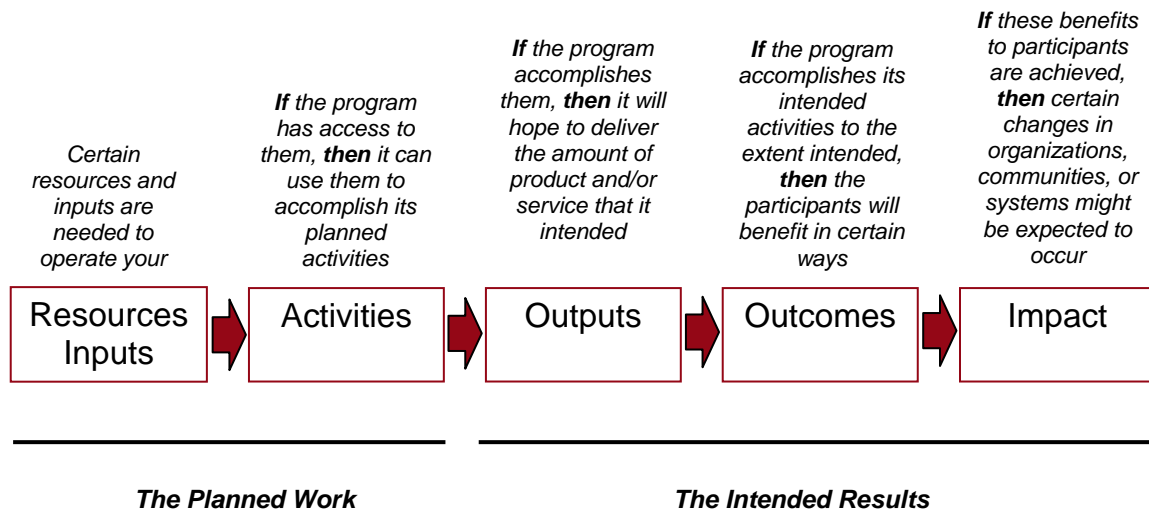


The HMS team recommends that the final organizational structure would accommodate the specific requirements for the various programs, since research, education and content creation require distinct functions and structures.

5. Quality Management and Evaluation

In addition to the creation of the appropriate organizational structure, the development of a quality management framework would be important from the beginning. One model that was discussed during the assessment period was the “Outcomes Logic Model” (Source: Kellogg

Foundation). It has been developed in recent years and applied to long-term projects, especially in the not-for-profit arena. The model essentially requires the definition of output and outcomes measures from the beginning. These metrics would help to evaluate the success of the program, and more importantly provide guideposts and benchmarks during its evolution. The overall schema for the model is as depicted below:



6. Areas of Concentration – Recommendations

Basic, Translational and Clinical Research

Background and Rationale

Biomedical research may be divided into three overlapping areas: **Basic** biomedical research covers all areas of biology that may impinge on human health and understanding disease. **Translational** biomedical research focuses on the application of basic research toward a particular medical challenge. And **Clinical** research is that part of the biomedical spectrum that aims to understand disease and health by directly observing and experimenting on patients.

Portugal is enjoying an expansion in biomedical research with most of this activity in the areas of basic and translational research. Much of this expansion is within the Associated Laboratories and university faculties of medicine, and relies on government funding, with considerable additional support from the Gulbenkian Foundation and soon also from the Champalimaud Foundation. Whereas much of this work is of high caliber, there are exciting opportunities to further develop the international standing of Portuguese biomedical research.

Some challenges facing research in Portugal are:

- Communication among the various components of the Portuguese biomedical research community could be improved
- Whereas biomedical PhD training is well established, postdoctoral training is not as strong
- The nature of clinical practice in Portugal, and particularly the physician payment structure in research hospitals, makes it difficult for Portuguese physicians to dedicate

significant time to clinical research. As a result, clinical research activity is not as robust as it could be and a strong culture of clinical research is lacking

Goals and Aims

The objectives for a Biomedical Research and Training program would be to:

- Strengthen the potential of Portuguese research institutions to conduct the highest quality basic, translational and clinical biomedical research
- Improve the international visibility of Portuguese research in these fields
- Develop long-lasting links between Portuguese and HMS biomedical researchers

These goals could be achieved by enlarging and developing training opportunities for junior scientists and physicians, further strengthening the health sciences infrastructure in Portugal, and building the mechanisms and structures to encourage a regular intellectual exchange between Portugal and Harvard.

Recommendations

We suggest the consideration of a collaborative program between established academic biomedical institutions in Portugal and the Harvard Medical School community to provide Portuguese investigators with a partner that can help them meet these challenges:

- In the areas of basic and translational research, we suggest the creation of research and educational programs at a national scale that would strengthen the research foundation and infrastructure of Portuguese research institutions
 - Creation of educational opportunities to accelerate the training and development of leaders in biomedical research, with a particular emphasis on supporting young investigators
 - Establish collaborative research grants that would partner Portuguese investigators (with special attention to junior investigators) with experienced mentors in Portugal and at Harvard, helping to build bridges both between Portuguese groups and between Portugal and Harvard. These grants would also provide an ideal training environment, ensuring a new generation of effective Portuguese investigators
- In the area of clinical studies, we suggest the creation of training and research programs at a national scale that would help develop the foundation and infrastructure of Portuguese clinical institutions
 - Develop clinical research training to provide selected applicants with an opportunity to study at Harvard toward a Masters degree in clinical science and to launch a novel clinical research program upon their return to Portugal
 - Establish clinical research grants that would support Portuguese physicians seeking funds to develop clinical research activities; this would help establish links between the Portuguese and Harvard clinical research communities, and would also help develop a sense of purpose and community amongst the growing number of Portuguese clinical investigators. A substantial portion of the clinical research funds could be used to support clinical research undertaken by MDs during their residency training, as provided for by the newly enacted Ministry of Health guidelines
- All research funding could incorporate the principle of shared mentoring from Portuguese and HMS faculty, and when applicable, could couple short-term, formal educational

opportunities at Harvard Medical School with research projects in Portugal

- Establish workshops and retreats, combined with training and coaching from experienced teachers and involving Portuguese and Harvard students, mentors, collaborators and teachers, to further enhance networking opportunities across Portugal
- Create an annual, public symposium to showcase the best research and to highlight the importance and value of biomedical research to Portugal

Over time, we expect that the Biomedical Research and Training program would improve the size, quality and international visibility of Portuguese biomedical research.

Expected Output and Outcomes

The overall program could be designed to gradually populate Portuguese research institutions with an increasingly sophisticated biomedical research capacity, and to expand the rate and quality of Portuguese biomedical research contributions to the international community. We suggest the creation of a program that has the capacity to engage ~ 300 researchers and students during the first five years and that is clearly defined so as to foster long-lasting collaborative ventures. The workshops, retreats and symposia would promote a sense of community, provide networking opportunities, contribute to the ongoing educational effort via formal classroom instruction, and provide presentation and public speaking opportunities for both junior and established participants. Over time, these events would draw together the growing number of Portuguese biomedical investigators into a strong, vibrant and interconnected community.

For the basic and translational training components, we suggest the creation of a program that would yield international-caliber PhD and MD-PhD programs in biomedical science that would be expected to attract top-level Portuguese and international students.

The basic and translational research component of the program would also be designed to enhance and enlarge the biomedical research infrastructure in Portugal. Specific expected outputs would be to improve interactions among Harvard and Portuguese investigators and to foster inter-institutional cooperation within Portugal. Closely linked to this goal would be the desire to increase the international visibility and reputation of Portuguese biomedical research.

The collaborative clinical research grants could be designed to give Portuguese MD residents an opportunity to develop clinical research projects under the guidance of a Portuguese mentor and a Harvard Medical School mentor. These awards would be intended to help Portuguese MD residents hone their clinical research skills and to develop close ties between established Portuguese and Harvard clinical investigators.

In clinical research, due to the current lack of infrastructure in Portugal, we suggest investing heavily in identifying a relatively small number of junior physician investigators who could obtain access to an established Master's training program at Harvard Medical School. Upon completion of their training, each would return to Portugal with a full and thorough understanding of the basic tenets of clinical research. They would also develop a clinical research project as part of their training, and this work could be continued and expanded in Portugal with the help of a two-year Senior Career Development Research Award made to each successful candidate.

We believe these initiatives would increase the quality and capacity of Portugal's clinical research, develop links to like-minded US investigators, and contribute to a growing

understanding of the value of clinical research.

Recommendation Details

Collaborative Research Grants in Basic and Translational Research

Research topics would be expected to range from molecular to cellular approaches, physiology, pharmacology, chemical and structural biology, immunology, neurosciences and modeling. Applicants would be encouraged to propose research projects on these and other areas of interest. The goal would be to focus on questions relevant to biomedicine at the frontier of basic and translational sciences.

We suggest that successful proposals would involve a collaborative effort between (at least) two Portuguese research teams from different institutions with (at least) one research team from Harvard Medical School. Grant applications would be assessed on a strictly competitive basis by an international panel and would be subjected to annual evaluation. A typical award could provide resources for each individual laboratory adequate to cover two salaries (at the PhD or MD-PhD student, postdoctoral fellow or technician level), supplies and limited resources for equipment. Travel support would also be provided to allow researchers from Harvard to participate in an Annual Retreat to be held in Portugal.

Collaborative Research Grants in Clinical Research

Recognizing that there is a small but active community of clinical investigators in Portugal, the Collaborative Research Grants component of the program would provide residents with an opportunity to apply for funding to support their clinical research. Awards would be made to MD residents who propose a worthwhile project, demonstrate the support of their institution to pursue the work full-time over a two-year period, and bring to the project a Portuguese mentor. Support to attend the Harvard Medical School “Program in Clinical Effectiveness” 2-month summer course could be provided as a way to help provide a solid underpinning for clinical research.

PhD and MD-PhD Programs in Portugal

The new PhD and MD-PhD Programs could be designed to take advantage of the strengths of the research and training environments throughout Portugal and Harvard in order to attract the most competitive Portuguese and international students for basic and translational biomedical research training at the PhD and MD-PhD levels. As much as possible, these programs would exist “without walls” so that students would receive research training in the highest quality laboratories and facilities in their chosen areas of study. Although the majority of the students’ training and research would take place in Portuguese institutions and laboratories, the facilities and laboratories of Harvard Medical School and its affiliated institutions would be made available as appropriate for the maximum benefit of the students and their research projects. These programs would be designed to be national in scope, involving course work and other activities in at least two different national institutions. Students would be strongly encouraged to take advantage of all relevant educational and research resources throughout the country, and collaborative mentoring and advising models involving more than one Portuguese University could be strongly considered. By convention, students could receive their degree(s) from the University with which their major dissertation laboratory is affiliated.

It is anticipated that most students would require 5 years of training to complete an international-caliber PhD dissertation. Students in the Harvard-Portugal PhD Program could be awarded 5

years of funding to complete the program and students in the Harvard-Portugal MD-PhD Program could be awarded 5 years of funding for the PhD portion of their combined-degree program. Although funding for the MD portion of the MD-PhD students' combined-degree program would not be included in the proposed Harvard-Portugal budget, we would encourage the Ministry of Health to co-fund the training for students in the MD-PhD Program and to work with the Ministry of Science, Technology, and Higher Education to guarantee the full funding of all years of training for students in the MD-PhD Program. Graduation from the MD-PhD Program without debt would encourage students who wish to pursue research as a major part of their physician-scientist career.

Curriculum and Advising

Because the fields of study encompassed by biomedicine and health sciences are so broad and the students admitted to these programs would be so competitive, each student's curriculum would be individually designed for the student's maximum benefit. Students would work closely with their Graduate Program Advisor to develop a coherent series of graduate courses, workshops, and seminars that would provide a solid foundation for their research in basic and translational biomedicine. These courses, workshops, and seminars would not be restricted to one geographic location; indeed, educational opportunities throughout Portugal could be freely available to each of these students. For example, students could take advantage of a cell biology course in Lisbon, a visual sciences course in Coimbra, and a pathophysiology course in Porto during the course of their studies.

In addition to their core courses, workshops, and seminars in Portugal, each student in the Harvard-Portugal PhD and MD-PhD Programs could participate in a significant period of practical training at Harvard Medical School and/or the Harvard-affiliated institutions. Students could be matched with Harvard laboratories according to their scientific interests and fields of research; if a student's particular interests were not well matched with any of the Harvard laboratories involved in the Collaborative Research Grants, additional Harvard laboratories could be recruited to participate in these programs. While in residence at Harvard, students would become full members of the host laboratory, participating in laboratory research, group meetings, journal clubs, retreats, workshops, seminars, and nanocourses.

Long-Term Goals

The new Harvard-Portugal PhD and MD-PhD Programs would be expected to lead to several important benefits in addition to the international-caliber research and education experiences that would be afforded the PhD and MD-PhD students who would be trained under these programs. In particular, development and implementation of these programs would:

- Catalyze scientific and academic activities that would bring together all of the international-caliber researchers in Portuguese biomedicine and health sciences
- Provide a nexus for basic and translational research collaborations involving scientists in the Associated Laboratories and clinicians in the Faculties of Medicine and Portuguese teaching hospitals
- Foster the development of basic and translational scientist career paths for graduates of the PhD Program
- Foster the development of physician-scientist career paths, involving both clinical medicine and scientific research, for graduates of the MD-PhD Program

Masters-level Course in Clinical Research

In order to further develop the clinical research environment in Portugal, formally trained clinical investigators will be required. We suggest offering one Masters level educational opportunity per year. During the initial years of the collaboration, the successful candidate could attend the “Scholars in Clinical Science” program at Harvard. This two-year post-graduate training program in clinical investigation includes formal course work, a longitudinal seminar series, and a mentored clinical research project. Students who successfully complete the program are awarded a Master of Medical Science degree from Harvard Medical School.

It is anticipated that each student would return to Portugal with an active and ongoing clinical research project funded in the context of this collaboration.

One of the unique values of this combined Masters degree and research support would be its capacity to develop entirely new clinical research groups across Portugal.

The work during the initial years of the Harvard-Portugal collaboration could also include the planning of a new Master in Clinical Science degree program to be launched in Portugal, ideally by the third or fourth year of the collaboration.

Educational Workshops

Residential-style, one-week workshops in basic and translational research and in clinical research could be held annually. The venue could rotate among various Portuguese institutions.

Whilst the workshops would primarily serve all students enrolled in the training and research programs, a few additional positions could be available for students not enrolled in the research and training programs. Fellowship support could be provided to all attending students, and the schedule of the workshops could be adjusted to the educational needs.

Topics could include, for example, proteomics, genomic tools and techniques, animal models, neurodevelopment, small animal surgical techniques, drug discovery and computational biology tools (for the basic and translational workshop), and epidemiology, genetics, biostatistics, clinical pharmacology, and clinical trial design (for the clinical research workshop). Topics such as manuscript preparation, publishing strategies, grant writing, presentation skills, etc. could also be included.

Annual Retreat

An annual 2-day retreat could be held in Portugal. The purpose of the retreat would be to bring together all of the participants in the collaborative research projects (basic, translational and clinical) including students, mentors and collaborating members. Laboratory members from the Portuguese research groups in particular would be urged to participate. The format of the meeting would be designed to stimulate the exchange of ideas and to foster further collaborations through the following mechanisms: (1) formal presentations by the PIs in Portugal and Harvard and research award recipients; (2) poster presentations by all members of the research projects in Portugal and Harvard; (3) specialized round-table discussion sessions for members of each collaborative grant.

Annual Symposium

A one-day Symposium, open to the public and designed to coincide with the retreat and workshop schedules, could also be offered. The chosen topics would be of broad interest to the biomedical community and the general public. A theme would be selected each year with some speakers drawn from the workshop and retreat faculty.

Governance

We suggest that separate, dedicated Program Committees, composed of representatives from participating institutions and co-chaired by a Portuguese and Harvard Medical School representative, would need to be established for the basic and translational research program and for the clinical research program. These two Program Committees would be responsible for establishing the call for applications, screening applicants, selecting recipients and monitoring progress of the collaborative research grant programs, and selecting topics and teachers for the workshops, retreats, and Symposium. Specialized advice could be drawn *ad hoc* from experts as needed.

The PhD and MD-PhD Programs could be governed by a Steering Committee. Members of the Steering Committee would be comprised of all the Graduate Program Advisors together with representatives of the participating Portuguese institutions and faculties and one or more Harvard representatives. The Steering Committee would be responsible for overseeing the development and implementation of these programs, including:

- Recruitment of faculty from among the most outstanding scientists and physician-scientists in the Associated Laboratories and Faculties of Medicine
- Admission of students from among the most competitive Portuguese and international applicants
- Development and implementation of a curriculum that provides a strong foundation for international-caliber basic and translational research
- Development and implementation of a robust advising structure that meets the needs of every student
- Development and implementation of paracurricular activities
- Assessing the progress of students in the PhD and MD-PhD programs
- Evaluating the progress of the PhD and MD-PhD Programs

The work of the two Program Committees and the Steering Committee could be guided and coordinated by a top governance structure, such as a Board of Directors. The top governance structure could be co-chaired by a Portuguese and a Harvard Medical School representative.

Health Services, Policy and Clinical Management

Background

This assessment of the state of health services policy and clinical management in Portugal was developed by the Working Group on Health Services Policy and Clinical Management convened during the 10-12 July 2007 Workshop held in Lisbon. The Working Group included representatives of the Portuguese academic health policy research community, government agencies concerned with health, health care administrators, and leading clinical practitioners. The recommendations concerning a possible collaboration with Harvard University reflect the interests of the Portuguese health policy community as represented by the Working Group and the discussions about such collaborations in the July Workshop.

The group described the Portuguese academic health policy community as made up of distinguished scholars in economics, health services research, and social sciences related to health policy. However, these scholars are limited in number, and located in several universities spread geographically throughout the country. While highly accomplished in their own disciplines, and often of international caliber, they function in relative isolation from one another, not as a community of colleagues. Moreover, their work needs to be connected more firmly to the needs of the Portuguese health care system. Furthermore, there are few mechanisms in place to foster the development of the next generation of health services researchers. There are now more than 20 post-graduate courses in the health policy area, most of them at the Masters level, developed by at least 15 different universities and centers with relatively little coordination among them. There is a need for Portuguese graduate programs for young health services researchers to achieve the PhD degree from a national consortium of Portuguese universities but making use of the resources of all of the major Portuguese universities to reach an international standard of scholarship. These programs could be supported by an organized program of research grants available to young health policy researchers to assist in launching their careers.

Finally, while emphasizing that development of the academic health policy community would be the first order of business, the Group also noted that health policy decisions and clinical care often suffer from the lack of connection between academic researchers and practitioners in government, health care administration and clinical care. Thus, recommendations for developing the health policy research community could include studies and appropriate courses to apply academic work to policy decisions and the care of patients.

Rationale

The potential recommendations that follow this assessment would have as their rationale the following:

1. Goals

- Development of a cohesive community of Portuguese academic health policy researchers
- Enhanced capacity for health services policy and clinical management research in Portugal
- Increased numbers of highly trained Portuguese health policy researchers, including newly graduated PhDs from Portuguese or international universities meeting international standards
- Improved application of health policy research to problems faced in the health care system in Portugal, including the provision of data-based clinical care through the education of health care professionals
- A continuing collaboration between Harvard University faculty and the Portuguese health policy community in joint research and education endeavors
- Opportunities for faculty at Harvard to conduct research on leading health policy questions in an international setting

2. Potential Impact

- Increased cooperation between universities in Portugal and other countries in health policy and management research and education, elevating the quality of health policy research and education in Portugal

- Recognition of Portugal as a leader in studies of health policy and management issues and the application of the results of such studies to the organization and delivery of health care services
- More rational organization and management of the health care system in Portugal based on the application of data concerning system performance

Recommendations

1. Potential creation of a national Portuguese PhD program for a small number of students per year

In view of the current situation in Portugal, the Working Group recommended that the creation of a national PhD program should be considered. As noted above, there are now more than 20 post-graduate courses in this area (most of them at the Masters level) developed by at least 15 different universities and centers, with relatively little cooperation among them. Developing a national Portuguese PhD program could make it possible to attract the best students interested in developing academic careers in the research areas of health services policy and clinical management. Moreover, a potential relationship with Harvard and other universities outside Portugal could have the effect of elevating academic standards in health policy research in Portugal. This national program could also be an effective strategy to stimulate cooperation between Portuguese universities and international centers with more experience in the field. Cooperation in Europe could be attempted first. The program could focus on the intensive development of a very limited number of students to provide an essential nucleus for the future of health policy research in Portugal.

Given the current lack of resources in this area, an efficient strategy could be for Portugal first to build a critical mass of researchers in health policy and then to consider the development of a national PhD program. For example, Portuguese graduate students in health policy could be funded to train in world-class institutions at the PhD level, and incentives could be provided for these students to return to Portugal after their PhD training to become the future faculty for a national PhD program in Portugal. In addition, the current Portuguese scholars in economics, health services research, and social sciences related to health policy could work with the academic health policy research community, government agencies concerned with health, health care administrators, and leading clinical practitioners to develop databases on the Portuguese health care system that could be used to improve current practice and could serve as substrates for future research in health policy.

2. National conferences on health policy

National conferences on health policy could provide a public opportunity to assess the state of development in Portugal of research in health services policy and clinical management. The conferences could be several-day events. The program could consist of plenary sessions addressed by speakers from Harvard, Portugal and elsewhere assessing the current status of research on health services, policy, and clinical management in Portugal, in the context of global concerns as well as global progress with these issues.

These conferences could also provide an opportunity to engage participants in half-day workshops on selected topics of interest and importance, such as Quality, Medical Error and Patient Safety, Using Data to Achieve Accreditation, and Health Care Finance. Workshops could be held specifically for journalists to acquaint them with developments in health services research in Portugal and other countries.

3. *Advanced courses for the education of Portuguese researchers*

Students who could benefit from advanced courses include:

- Graduate students in health policy
- MDs and government professionals and other policy professionals who wish to enhance their knowledge and experience in health policy and management research data and techniques

An intensive introduction to the field could be provided by the Harvard Medical School "Program in Clinical Effectiveness," a 2-month summer course (see p. 27). There are, in addition, a number of courses at the Harvard School of Public Health and the Kennedy School of Government that could be appropriate following the summer program.

4. *Competitive research awards*

This program could be aimed primarily at junior, early-career investigators in order to promote research in the areas of health services policy, health economics, clinical governance, risk assessment and management.

5. *Education of key figures in the Portuguese health system, both policy makers and clinicians, in the use of data to inform decisions*

Courses in statistics, epidemiology, management, leadership, strategic planning and execution, and other disciplines could potentially be available at the Harvard Business School, Kennedy School of Government and Harvard School of Public Health. Many of these courses are short-term executive programs geared to persons who have continuing career obligations.

During the planning workshop, questions were also raised about the nature, amount, quality and accessibility of data about the Portuguese health care system that would be available to support the potential program. Further consideration of these recommendations could include an examination of Portuguese health data systems and potential improvements.

Governance

A Program Committee could monitor progress across the research and training programs and select topics for the annual national meeting. A subcommittee for the Research program could establish the call for applications, screen applicants, select recipients and monitor progress of the research. Another subcommittee could oversee the educational activities of the program including the Portuguese PhD training program, and select topics, teachers and students for the advanced courses and workshops. Specialized advice could be drawn *ad hoc* from experts as needed.

Health Content for the Public

Background

The government of Portugal seeks to build a program by which the general public is made more aware of basic information in health, medical illness and biology. In addition to providing such information in printed form, the Internet has made it possible to deliver information inexpensively

to a large percentage of citizens. The Internet not only eliminates the costs of paper, printing and mailing, but also allows for the distribution of information that is constantly updated. Finally, at least theoretically, the Internet can distribute information by the spoken voice, supplemented with images—thereby overcoming the barrier of illiteracy.

Rationale

A decision by a nation to invest in biomedical education and research requires public understanding and support. It also requires ways to stimulate the interest of children and students in becoming biomedical scientists, teachers, or health care professionals. A campaign of public education can facilitate both objectives.

Recommendations

1. Content Adaptation

Governance. The process of defining, adapting and creating content for the general public should be defined by a consortium of Portuguese institutions with special interest in and experience with the creation and distribution of such content. During our visits, the following institutions appeared to have the relevant interest and experience: all the Medical Schools and other health sciences schools; all the Biomedical Research Associate Laboratories; several other Research Centers; INSA; Ciência Viva – Agency for Scientific and Technological Culture; scientific societies; hospitals and local family centers; Directorate General of Health; High Commissariat for Health; Pharmaceutical Approval Agency. The process should be coordinated through UMIC – Knowledge Society Agency.

A Program Committee could be established as a top governance structure, co-chaired by a Portuguese and a Harvard Medical School representative.

Editorial Agenda. No plan to create a Web portal for the general public could proceed until a consortium of Portuguese institutions develops an editorial agenda. As for the topics to be covered, the National Health Care Plan of Portugal identifies a group of high priority health topics, and those topics would seem to be clear targets for the creation and integration of public health content.

In addition to specifying editorial topics, an editorial agenda would need to specify a consistent structure for each topic, a targeted reading level, decisions about the need for visual aids (drawings, charts, animations, and even video) to supplement text, the extent of hyper-linking to other topics and general navigation rules.

By this definition, no editorial agenda for public health content has yet been developed.

Assessment of Already-Available Content. While we performed no intensive and systematic review of already-available biomedical content for the general public, it became clear that a number of institutions in Portugal have already created such content as components of their Web sites. Specifically, we were told that such content already is available through: Ministry of Health; Director General of Health; High Commissioner for Health; Portuguese hospitals; Portugal pharmaceutical approval agency; Faculty of Medicine of the University of Lisbon and other Portuguese medical schools, to name a few institutions.

Thus, there is a base to build on, in creating a larger body of information for the general public. Once an editorial agenda is created, it will be possible to determine how much available content already fits that agenda, and how much of the content created and owned by institutions could be made available to a national consumer health Web portal.

Content Integration. Even if content were already available to fit every part of the editorial agenda, it would not be an attractive editorial product for the general public until it were altered to fit a consistent structure, reading level, and voice. This editorial task of integrating already-existing content from multiple sources into one editorial package is considerable, and may well be greater than the task of creating new content to fill holes in the already-existing content database.

Communities As Well As Content. Worldwide, the fastest-growing part of the Internet is not online information, but online communities. Communities often form around content, and often include a mix of people such as professionals and general citizens with a particular interest in a professional field—including health and medicine. It is the ability to participate in a discussion, rather than to simply read information, that elicits the most interest and participation.

During our visits, we did not hear about the existence of such online communities in Portugal, dedicated to health topics. For that reason, we assume that there are few of them. Portugal could consider the creation of such online communities, in which both health professional experts and interested citizens participate.

Health Information for Illiterate and Vision-impaired. As is true in the United States and in most developed nations, Portugal has a large community of citizens—particularly among its older and sicker citizens—who cannot read. Printed content for such individuals is of little value.

While most content on the Internet, around the world, is in textual form, the Internet (along with television, radio, and the telephone) has the ability to distribute information using a combination of spoken voice and images. An aggressive program to provide health content for the general public could consider whether and how to reach those citizens of Portugal who lack literacy or have decreased visual acuity.

Printed Health Information. While, as in other developed nations, use of the Internet is increasing, many literate citizens still prefer to obtain information in printed form. The most obvious opportunity to distribute such printed content is through doctors' offices and hospital clinics. The costs of printing, paper and bulk mailing of the printed documents could be borne by the government, and might possibly be shared by sponsorships from charitable foundations.

Information for Health and Science Media Commentators. In Portugal as in other developed nations, the media are increasingly covering biomedical topics. For many in the general public, media coverage of such topics is an important part of their interest in and understanding of those topics.

We could not assess how much demand there is for reporters to write about health topics nor how many reporters currently filling those roles have a background in biomedical science. However, if the situation in Portugal is like that in the United States, many reporters who are asked to cover biomedical topics will not have had formal schooling in biomedical sciences. Harvard Medical School's experience is that, for such reporters, specially constructed educational program can be helpful.

2. Content Creation

Filling the Holes in the Editorial Agenda. Once a detailed editorial agenda is created, and a systematic assessment of available content is completed, the two documents can be compared. It then would be clear where the creation of new health content for the general public in Portuguese would be needed.

Such new content could be created in Portugal. Alternatively, Harvard Medical School could be asked to provide health content for the general public, in English, from its general repository. That content then could be translated in Portugal, and restructured to fit the overall editorial agenda.

3. Infrastructure

Printed Material Infrastructure. The printing and distribution of paper-based health information requires no special infrastructure.

Electronic Content Infrastructure. Content could be distributed in electronic form through multiple channels, such as:

- Over the Internet, in Portuguese, to any interested user
- Over Internet-connected terminals in Ciência Viva institutions
- Over Internet-connected terminals in family healthcare units and in healthcare practice offices
- Over Internet-connected terminals in various NGO's

Content could be distributed in electronic form through various devices:

- Personal computers
- Cell phones with screens and Web access
- Personal digital assistants (PDAs)
- Interactive IPTV
- Telephones of any sort using voice recognition software and menus

Distributing content through so many channels, to so many different devices, would require an organization with considerable technical sophistication. One organization that appears to have this expertise is UMIC. *We would suggest that UMIC become the responsible institution to launch the required infrastructure for this effort, and we note that the Portuguese government has already committed substantial resources to UMIC in the area of Health Content for the Public (Appendix J).* The assessment by the HMS team did not include a detailed study of the available IT and telecommunications infrastructure, and arriving at a better understanding of the needs and the sequencing of implementation will be a high priority in the proposal phase of the Harvard-Portugal collaboration.

4. Academic Assessment and Evaluation

As noted above, the HMS team also recommends that enhancement of the academic aspects of the Public Content component of the Harvard-Portugal collaboration should be considered during the proposal phase of this collaboration. Strengthening the academic aspects of this component would be useful in its own right; in addition, such studies could serve both to integrate the Public Content segment of the proposal into the fabric of the overall Harvard-Portugal research and education collaboration, and to provide metrics for continuous improvement of the health content for the public in Portugal and internationally.

7. Infrastructure

During the assessment period, the decision was made to treat the creation of scientific and educational infrastructure as a “secondary” aspect of this collaboration. Nonetheless, we suggest that there are certain infrastructure issues that would need to be part and parcel of this collaboration:

1. Scientific Infrastructure

Although all labs need certain equipment and IT infrastructures, there would be an opportunity to create research infrastructure and data centers as part of this collaboration. (Existing examples in Portugal would be the NMR center at ITQB and the production facilities at IBET.) The HMS team suggests that there could be an oversight mechanism to assure the judicious use of infrastructure and the identification of infrastructure needs, especially as they may provide opportunities for outside funding or the creation of international centers of excellence.

2. Educational Infrastructure

Again, although not a primary goal of the collaboration, during the development and implementation of the various programs, needs and undoubtedly opportunities for the creation of educational infrastructures could arise (e.g. on-line learning communities, virtual classrooms, etc.). It could be beneficial if the collaboration could give rise to models that would be widely applicable across all levels of biomedical education, especially some of the novel approaches of the Public Content program.

3. Management Infrastructures

Although much of the success of the collaboration would depend on the interactions of scientists, educators, experts and institutional partners, and much of the work would be done in self-organizing working groups, the HMS team suggests the creation of a supportive management and leadership structure in order to achieve the following goals:

- Support the efforts of the various participants working in multiple locales
- Collect and collate data and information and make them available to all concerned, including the public when appropriate
- Provide guidelines, evaluation and feedback
- Secure and foster communication channels, thereby enabling openness and the sharing of information and knowledge
- Inform outside partners of needs and issues and provide solutions and deliver them to the various participants
- Coordinate funding efforts

4. IT Infrastructure for the Collaboration

The prior Portuguese international collaborations have created a successful and useful web presence, and a future Harvard-Portugal collaboration could benefit from a similar IT infrastructure. For example, the website could provide links and access to all content generated by the program, enable downloadable reports and be a general resource center for all components of the collaboration. It could also allow for international and public interaction for all aspects of the program.

8. Next Steps

As noted above, this report provides an assessment of possible areas of collaboration and recommendations for potential programs that could support the aims and needs identified. The recommendations that emerged from the assessment phase of the Harvard-Portugal collaboration will provide the context for upcoming discussions during the proposal phase of the collaboration.

Considering the various contacts established by the HMS team in Portugal during the assessment phase of the collaboration, we suggest that the proposal phase for the Program on

Basic, Translational, and Clinical Research should be led on the Portuguese side by the following three scientists: Dr. Carmo Fonseca (basic research and overall director), Dr. Manuel Simões (translational research), and Dr. Nuno Sousa (clinical research). Drs. Fonseca, Simões, and Sousa and their colleagues in Portugal would work with Drs. Glaven, Golan, and Kirchhausen and their colleagues at HMS to develop the detailed proposal for the Program on Basic, Translational, and Clinical Research, including the program definition and operation, committee membership and governance structure.

We also suggest that the proposal phase for the Program on Health Content for the Public should be led on the Portuguese side by Dr. Luis Magalhães, President of UMIC, and on the Harvard side by Dr. Anthony Komaroff, Professor of Medicine at Harvard Medical School. Dr. Magalhães and his colleagues in Portugal would work with Drs. Komaroff, Glaven, Golan, and Kirchhausen and their colleagues at HMS to develop the detailed proposal for the Program on Health Content for the Public, including the program definition and operation, committee membership and governance structure.

Finally, Drs. Fonseca, Simões, Sousa, Magalhães, Glaven, Golan, Kirchhausen, and Komaroff would work with their colleagues, including senior leadership at Harvard Medical School, Harvard University, and the Portuguese Ministry of Science, Technology, and Higher Education, to develop a proposal for a top governance structure for the Harvard-Portugal collaboration. For example, this top governance structure could consist of a Board of Directors co-chaired by a Portuguese and a Harvard Medical School representative. The Portuguese and HMS leadership could work together to propose the membership and charge of the various committees and boards in the collaboration.

The Harvard team looks forward to working with our Portuguese colleagues over the coming months to craft and refine specific proposals for this unique and exciting collaboration.

9. List of Appendices

- A. Biographies of HMS Team**
- B. Launch Meeting and Visits (April 16-19, 2007): Program and Participant List**
- C. Launch Meeting and Visits (April 16-19, 2007): Presentations**
- D. Letter of Solicitation for Collaborative Proposals (May 17, 2007)**
- E. Final Workshop (July 10-12, 2007): Program**
- F. Final Workshop (July 10-12, 2007): Letter of Invitation**
- G. Final Workshop (July 10-12, 2007): Break-Out Group Reports from Preparatory Meetings**
- H. Letter dated August 23, 2007 from Cynthia Walker, Executive Dean of HMS, to Secretary of State Manuel Heitor**
- I. Letter dated September 25, 2007 from Prof. Jeffrey Flier, Dean of HMS, to Secretary of State Manuel Heitor**
- J. Actions Launched by UMIC to Facilitate the Potential Collaboration with HMS**