

**Harvard Medical School – Portugal Program**  
**in Translational Research and Information**

**Technical Annex of a Cooperation Agreement between  
Harvard Medical School and  
the Science and Technology Foundation, Portuguese Ministry  
of Science, Technology and Higher Education**

*Final Draft*

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A program to foster internationalization and strengthen clustering activities in the Portuguese health sector and at Harvard Medical School toward the advancement of clinical and translational research and health information

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## 1. Rationale and Aims of the Program

Modernizing and improving the quality of medical education in Portugal, along with increasing its recruitment base, is today a priority that must be addressed with respect to best international practices. It must be accompanied by a progressive opening of medical education to society in general, namely by making available information of relevance to the individual and society. Moreover, it must include the broadening of cooperation between Portuguese medical schools and Associated Laboratories and R&D institutions active in the field of biomedical and health sciences in such a way as to spur the creation of a truly competitive level of training at the international level.

Within this context, in April 2007 the Portuguese Ministry of Science, Technology and Higher Education signed a Memorandum of Understanding with Harvard Medical School to identify the potential for cooperation with this medical school. The goal was to develop and streamline a program with the aim of encouraging internationalization and cooperation between Portuguese schools of medicine and major national research centers working in biomedical and health sciences, with the following lines of action:

1. The **systematic production of information concerning health for the general public, and the distribution of educational material** to medical students and health professionals in particular, in the Portuguese language. Activities will include the creation of health information and the development of technological platforms for the delivery of the information. The program will also include the training of journalists and medical writers in the understanding, use, and communication of health information, as well as studies on the effectiveness of the program to distribute information to the general public.
2. The launching and streamlining of **post-graduate medical training**, including Junior and Senior Clinical Research and Career Development Awards for Portuguese MD trainees.
3. **A research program directed at strengthening the national capacity to produce new translational and clinical knowledge** with impact on specialized medical education and the practice of clinical medicine. It will be developed in close cooperation with teams from Harvard Medical School and will encompass networks to be formed between Portuguese schools of medicine and medical sciences and major national laboratories and research centers working in **translational and clinical research**. Participants in the research grants will include Portuguese and Harvard principal investigators, research fellows, clinical fellows, medical and graduate students, and undergraduate students. The program will include joint HMS-Portugal workshops, retreats, and symposia.

The three lines of action will be launched on an **entirely competitive basis at the national level**, respectively for: i) the systematic review and production of educational material by specialist teams in Portuguese medical schools; ii) the selection of MD trainees for post-graduate programs; iii) the respective training offered at the national level; and iv) the identification and selection of research projects and networks.

Portuguese medical schools and major national research centers working in biomedical and health sciences are in charge of the overall coordination of the program in liaison with Harvard

Medical School under the supervision of the Foundation for Science and Technology (FCT) and the Knowledge Society Agency (UMIC). External evaluation will be done by an independent review board to be nominated by the FCT.

UMIC shall coordinate activities linked to the planning and implementation of a national technological platform for the distribution of medical information over the Internet, which will affirm the objectives set out in the *LIGAR PORTUGAL* (Connecting Portugal) action program.

The initiative upholds and strengthens the public effort to invest in medical education and national scientific capacity, as is affirmed in the Government's *Commitment to Science*, including the strengthening of ongoing initiatives of the FCT in cooperation with the Ministry of Health to promote clinical research in Portugal and the advanced training of medical practitioners.

Within the framework of the "Partnerships for the Future" program launched by the Portuguese Government in 2006, the partnership with Harvard Medical School institutionalizes a national network aimed at modernizing medical education, improving specialized education in health sciences and cooperatively producing/distributing new educational material. It is also based on advanced training projects for medical practitioners, sustainable schemes for stimulating new knowledge of special relevance for medical education and practice and the appreciation of new ideas in cooperation with internationally renowned institutions.

Development and implementation of the Harvard Medical School-Portugal Program will have the following benefits to the major parties:

For Portugal:

- Increase the availability and understanding of health and biomedical information for the Portuguese public
- Improve quality and capacity in translational and clinical education and research
- Foster the development of physician-scientist career paths that involve both clinical medicine and scientific research
- Create collaborative research opportunities that expand capacity on the national and regional levels, building on existing strengths and filling existing needs
- Create new research consortia and build on existing consortia among the universities, institutes, and other relevant parties
- Provide a nexus for translational research collaborations involving scientists in the research laboratories and clinicians in the Faculties of Medicine and Portuguese teaching hospitals
- Foster cooperative ties among post-graduate clinical and translational research and education programs to optimize resources and stimulate collaborative work and mobility
- Strengthen Portugal's position in health sciences and the global economy, by fostering network activities among parties involved in the health sector in Portugal.

For Harvard Medical School:

- Provide access to outstanding students who are currently unable to train at Harvard
- Support Harvard's mission of training the best and the brightest

- Identify and establish collaborative research projects with the most outstanding health sciences investigators in Portugal
- Establish new research relationships with Portuguese institutions
- Identify areas of interaction with Portugal that enrich existing academic programs, activities, and opportunities at HMS and other Harvard University faculties and schools

## 2. Background

In November 2007, Harvard Medical School (HMS) completed an assessment of the potential for a health and biomedical sciences research and education collaboration involving the Portuguese Ministry of Science, Technology and Higher Education (MSTHE) and HMS. In brief, the assessment recommended four areas of consideration for the HMS-Portugal Program:

1. The development of content in the biomedical sciences and health directed at the general public, students, and health professionals, and at intermediaries involved in the dissemination of content, such as writers and journalists.

This area of concentration was meant to address issues concerning the human resources pipeline for biomedical sciences and health professionals by fostering the understanding and interest in the biomedical sciences and health by health professionals and students and by the public at large. One component involved the creation of programs and materials for health professionals and students and for intermediaries such as teachers and journalists. A second component involved the creation of medical content tailored to the Portuguese-speaking world, thereby improving prevention, promoting wellness, as well as promoting an understanding of the major chronic diseases, and helping patients to be active participants in the care of their chronic illnesses. A third component involved an evaluation of the effectiveness of health information and education efforts of the HMS-Portugal Program.

2. The development and implementation of translational and clinical research and educational opportunities in collaboration with Harvard Medical School.

This area of concentration was meant to address issues concerning the variability of translational and clinical research efforts in Portugal, the expansion of international research efforts, and the need for a closer relationship between the hospitals and the scientific community, while providing new career paths in applied biomedical research. It was also evident that this would require collaboration with the Ministry of Health and hospitals.

3. 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 health information component, requiring its own strategy and organization in Portugal.

The assessment came to the following conclusions:

1. There was a strong desire in Portugal to create **nation-wide, collaborative** programs oriented toward the advancement of translational and clinical research.
2. 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.
3. There was a **differential level of current development** in the various areas of research and training, i.e., in translational and clinical research.
4. 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.
5. With the exception of the Health Information Program, the creation of **infrastructure** was felt to be a “secondary” effort in response to the needs of the eventually instituted programs and projects. It should therefore not be treated as an independent area of concentration.
6. Preparation of the **proposal** for this collaboration should be led by the following scientists in Portugal: for the Program in Clinical and Translational Research and Education, by Maria Carmo-Fonseca, Claudio Sunkel, Manuel Sobrinho Simões, Nuno Sousa and Catarina Oliveira, who would establish contacts with research, university and corporate leaders in Portugal; and for the Program in Health Information, by Pedro Moradas Ferreira, Catarina Oliveira, Nuno Sousa, António Vaz Carneiro (academic experts) and Luis Magalhães (information technology expert), who would establish the necessary contacts to form a group of leading experts on the subject in Portugal. Maria Carmo-Fonseca, Claudio Sunkel, Manuel Sobrinho Simões, Catarina Oliveira, Nuno Sousa, Pedro Moradas Ferreira and Luis Magalhães would work with David Golan, Tomas Kirchhausen and Anthony Komaroff at Harvard Medical School to develop this proposal, including the definition and operation, committee membership, and governance structure of the Program in Clinical and Translational Research and Education and the Program in Health Information. In addition, they would work with their colleagues, including senior leadership at Harvard Medical School, at other Harvard University faculties and schools, and at the Portuguese Ministry of Science, Technology, and Higher Education, to develop a proposal for a top governance structure for the HMS-Portugal Program.

### 3. Activities

#### 3.1. Health Information: Production and Distribution

##### 1. Summary

The Harvard Health Publications Division (HHP) of Harvard Medical School will work with the Portuguese Schools of Medicine, Associate Laboratories in the area of biomedical research, other academic research units in the area of biomedical research, National Institute of Health (INSA), and other governmental, non-governmental, and private institutions on several initiatives designed to educate Portuguese students and professionals in the health sciences and the citizens of Portugal about health, medicine and biomedical science. These initiatives will include:

- The creation and adaptation of *interactive educational modules* to foster the education of undergraduate medical students in Portugal
- The creation of *electronic continuing medical education modules and tools* to foster lifelong learning for physicians and allied health professionals in Portugal
- The creation of an *editorial agenda* for consumer health information in Portugal, based on the country's already-defined national health priority topics
- The *translation* of selected HHP consumer health information into Portuguese, according to the editorial agenda
- The *creation* of new consumer health information in Portuguese, according to the editorial agenda
- The *distribution* of this health information for the general public over the Internet; through Internet-connected health kiosks in pharmacies, practices and museums; and in spoken form, delivered over the telephone, for citizens with limited literacy
- *Annual sessions for Portuguese medical writers and editors* dedicated to principles of writing about health for the general public, given by the Harvard Health Publications Division of Harvard Medical School
- Educational programs for Portuguese *journalists* about health and biomedical science

These initiatives will be conducted through a solicitation for competitive proposals from collaborative teams across Portuguese institutions.

##### 2. Background

###### *Information on health and biomedical research for the public*

The Program in Health Information seeks to build a program by which the general public is made more aware of information about health and biomedical research. Research over the past 30 years has demonstrated that people can powerfully protect their own health through adopting healthy lifestyles, and that people with chronic illnesses can partner with health professionals to help monitor their illnesses. At the same time, the interest of the general public in health and in the implications of biomedical research for health has risen greatly. Thus, there is great potential in a nationwide initiative to improve the availability of health information for the general public, and thereby to improve the health of the public.



### *Evaluating the impact of the programs that deliver health information to the public*

Systems of health information for the public are likely to become important tools for health literacy and for the empowerment of citizens on health matters. Not all initiatives to make high-quality health information available to the general public of Portugal are likely to be equally successful in reaching the public and motivating healthy behavior. It is therefore important to design and conduct an evaluation of the different interventions contemplated by this program for delivery of high-quality health information to the public, especially the more expensive and less straightforward interventions in which intermediaries—individual professionals, institutions, and family members—direct citizens to health and biomedical information. Assessment of the impact of interventions with intermediaries will be conducted through a series of competitive research grants, solicited by a call for collaborative research proposals from teams of investigators at Harvard and in Portugal. The lessons learned may have implications for other nations, as well.

### 3. Program Design

The program described below represents the synthesis of an extended dialogue among academic leaders in Portugal, at Harvard Medical School, and at other Harvard University faculties and schools.

There are several reasons for initiating and evaluating an expanded program of medical and health education for students and professionals in the health sciences and for the general public and key intermediaries in Portugal:

- Although the Portuguese medical schools have been generating electronic medical education content targeted at medical students and other students in the allied health professions, this content is generally available only within the student's home institution. Students throughout the country would benefit from open access to the best available medical education materials, developed and shared specifically for this purpose.
- Physicians and allied health professionals must practice lifelong learning in order to remain current in their fields. These professionals would benefit from open access to the best available continuing medical education materials, developed and shared specifically for this purpose.
- Improving the health of the public not only reduces suffering, but it is also a stimulus to the economy through improving the productivity of the work force.
- A decision by a nation to invest in biomedical research and education—such as is envisioned in this program—requires public understanding and support.
- The next generation of practicing health care professionals and biomedical scientists are today's children, and a properly-designed health education program can ignite their interest in health and biomedical research at an early age.
- The development and public dissemination of high quality health information in Portuguese on the Internet can be valuable to people in all Portuguese speaking countries, especially in Africa and Brazil (a community of over 200 million people), thereby having an impact outside of Portugal.

#### 4. Goals, Organization, and Objectives

The main goals of this program are to improve medical education for students in medical schools and allied health professional schools in Portugal; to enhance continuing medical education for practicing physicians and allied health professionals in Portugal; and to promote the literacy of the Portuguese public at large about health and biomedical science.

The program (“MedWebPortugal”) will comprise three major dimensions:

- Education for health sciences students
- CME/updating tool for health care professionals
- Public awareness of health topics

The ***educational dimension*** intends to provide self-centred (e)learning to undergraduate health sciences students, and includes:

- construction of an interactive learning platform composed of modules on topics relevant to health sciences
- adaptation of existing interactive learning tools from national and international institutions (e.g. Howard Hughes)

The ***continuing medical education/updating tool for health care professionals*** intends to provide recently published information in the various clinical specialities. This should be achieved through:

- a webpage devoted to an “on-line journal club” within the different clinical areas (every 3 months each clinical area must highlight a novel/relevant finding in that field; this information should be written in a dual format – one devoted to peers and the other for the general public)
- a webpage for continuing medical education containing information or courses provided by national institutions (preferably combining efforts from Medical Schools, Clinical Societies and Portuguese Medical Association)

The ***health information for the public program*** will provide the general public with information on the following:

- description of most common medical disorders (this should be provided through the combined efforts of Clinical Societies and Medical Schools and also by translation/adaptation from selected Harvard Health Publications contents)
- novel/relevant findings in different medical fields; this information should be prepared by the clinicians as referred to above. This will assume a forum format, in which the authors are available for replying to web-based questions during a period of 3 months

In addition, an annual “Health Congress” is to be created. In this “forum”, the major advances of the different medical fields are to be reported to the general public, with the help of the different patient-associations and the Ministry of Health. In the future, smaller regional events might be created to address specific topics or specific audiences.

*Specific objectives and activities:*

1. To recruit and organize an effective management team led by prominent faculty members at Portuguese medical schools.
2. To assemble and train a Portuguese national editorial team, in close collaboration with HHP.
3. To develop educational content for health professional students, and for the continuing lifelong education of fully-trained health professionals.
4. To develop content about health and biomedical research advances for the general public, in Portuguese.
5. To develop the electronic infrastructure necessary to deliver web-based information to each of these audiences, in a way that allows continuous optimization with the availability of new technology.
6. To develop a system for continuously assessing and updating the content, in close collaboration with HHP.
7. To mobilize a network of faculty and other participants from medical schools, biomedical research units, and the national health system to participate in the content evaluation and development process.
8. To produce new content, when needed.
9. To initiate programs for the education of journalists and medical writers/editors.
10. To evaluate the effectiveness of the various educational programs, through a competitive process that solicits research applications to conduct such evaluations, in close collaboration with HHP, once the elements of the program are fully defined.

Details with regard to each of these objectives will be discussed later in this document.

It is premature to present at this time detailed objectives for the full duration of the program, since those will be contingent on the experience of the first two years. Some important metrics will be:

- The degree to which translated HHP consumer health information is effective in informing the Portuguese public about health and biomedical science.
- The degree to which a Portuguese national editorial team is capable of editing, assessing, and updating existing consumer health information and producing new information when needed.
- The initial success of the programs for the delivery of health information to professional, institutional, and family-member intermediaries and for the education of students and professionals and journalist and medical writer/editor intermediaries.

Other activities that could be considered for Year 3 and beyond include:

- Information for secondary school teachers, important intermediaries in exciting young people to pursue careers as health professionals or biomedical scientists.
- Printed information made available in doctors' offices.
- Devices such as "information prescription pads" by which doctors, nurses and pharmacists can easily point individuals to the high-quality health information on the Web that will be created by this program.

The detailed activities will be defined on the basis of competitive calls for collaborative

proposals involving at least two Portuguese teams. The first Call for Proposals will occur in the first year of the HMS-Portugal Program so that assessment of the impact of interventions with intermediaries can be designed and implemented simultaneously with the intermediary-targeted programs themselves. Expressions of interest will be reviewed for feasibility by the Co-Directors of the Health Information Program at HMS and in Portugal. Full grant applications will be evaluated on a competitive basis by a panel of international experts and will be subjected to annual evaluation. A sample timeline is as follows:

Call for applications	May 1
(Expression of interest received by	June 15)
Full applications received by	September 15
Successful applicants notified by	November 1
Activity starts	December 1
Progress report received	October 1

### 5. Rationale for the Program

#### *Rationale for health professional educational materials*

The medical schools have been generating educational materials targeted at medical and other health science students that are available within the institution's intranets. Within the scope of this project medical schools will develop, in collaborations that involve at least 2 institutions, undergraduate medical environments in which educational materials are deposited.

The educational materials should cover a broad range of sciences. They must include, among other types, instructional objectives, notes on theory, clinical cases, web links and references. Other materials will deal with the prevention of diseases, public health and other medical issues; many of these are likely to be also of interest to the general public. In the first phase, the materials are to be developed with undergraduate medical objectives in mind but, in a subsequent step, educational materials for other audiences (e.g. high-school students) should be envisaged.

International recommendations and the history of medical education are clear as to the importance of adopting the best available educational practices for the success of educational endeavors. The development of the necessary awareness in medical education issues is fundamental for graduates in existing or future graduate programs.

Harvard Medical School has a rich experience with the development of interactive electronic educational programs for health professionals in training, and stands ready to offer consultation.

#### *Rationale for continuing medical education/updating tool for physicians*

In this component, two major areas are to be created: one is devoted to the creation of a permanent forum of updating and discussion in every clinical area (open-journal club) and the other is specifically devoted to continuing medical education.

Medical training programs should comply with the need to train future trainers who will be able to contribute to medical education and public awareness. The "open-journal club" is designed for

clinicians to present the most relevant advances in their specific fields. This will be done in a joint effort of Medical Schools, Clinical Societies and Portuguese Medical Association; every clinical area will be covered, and at least 2 highlights should be published per year/clinical area. As a requirement these highlights must be composed in one publication devoted to other clinicians and another in a format that is readable by the general public.

The infrastructure being created in the HMS-Portugal Program will also be used to disseminate continuing medical education content that will be created by a consortium of faculty in all the medical schools in Portugal. Creation and implementation of the continuing medical education program will be the joint responsibility of all the Portuguese medical schools and Portuguese medical association. It is expected that this continuing medical education program will be designed in the first year of the HMS-Portugal Program and that implementation will begin in the second year, starting with the content areas identified as priority topics in the Portuguese national health plan (i.e., the prevention, diagnosis and treatment of heart disease and the major forms of cancer; mental health, HIV/AIDS, neurodegenerative diseases such as Alzheimer and Parkinson, neurovascular diseases, and certain genetic diseases). The ultimate goal of this continuing medical education program will be to provide continually updated medical education for practicing physicians and allied health professionals (nurses, pharmacists, etc.) throughout Portugal.

In addition, by facilitating the continuing education of the health professional community in Portugal, this continuing medical education program will greatly benefit the Portuguese public at large. Like the health professional educational materials component of the HMS-Portugal Program, the continuing medical education program will be designed to be self-sustaining in a reasonable time-period.

Harvard Medical School has a rich experience with the development of continuing medical education programs, both classroom teaching and Web-based programs, and stands ready to offer consultation.

#### *Rationale for the program on health information for the general public*

This program would be led by the Portuguese Schools of Medicine, Associate Laboratories in the area of biomedical research, other academic research units in the area of biomedical research, National Institute of Health (INSA), and other governmental, non-governmental, and private institutions, with HHP serving in an advisory role.

The need for providing the general public with high-quality information is growing world-wide. However, the information available is very commonly biased and/or not suited for the general public, particularly in Portuguese. Thus, the main aim of this component is to fill this gap. This is certainly a very complex task, since there is no pre-existing structure in Portugal devoted to this area. Thus, this component of the proposal should be designed to create the conditions for such structure, benefiting from the supervision of HMS (one of the leading institutions in creating and making available high-quality information to the general public). The first steps in this area comprise the production of specific contents, adapted from the medical education and continuing medical education components, and the preparation of specific documents on the most common disorders.

The organization of a National Meeting will help to increase the awareness of the efforts under the HMS-Portugal initiative.

This program would involve, first, the review and adaptation of materials already available through HHP and, second, the production of new information by editorial teams in Portugal. The information, in the Portuguese language, would be placed on a single Web site that is open to all the world. This Web resource should be developed with a collaborative vision, so that communities can be built around it. It is the intention of this proposal to make the materials available in the Portuguese language in order to reach the several hundred million Portuguese-speaking citizens of the world.

The creation of structure and contents to be delivered in each of these components should follow a general rule of competitive “*call for proposals*”. Typically, the proposals should result as a combined effort of at least two different institutions. Each of these calls will have different aims/formats, but as a general rule there should be a budget associated for creation and updating of the contents; in parallel, specific credits can be given for those individuals (e.g. faculty members and clinicians) contributing to the proposals. Expressions of interest will be reviewed for feasibility by the Co-Directors of the Health Information Program at HMS and in Portugal. Full grant applications will be evaluated on a competitive basis by a panel of Harvard and Portuguese experts and will be subjected to annual evaluation. A sample timeline is as follows:

Call for applications	May 1
(Expression of interest received by	June 15)
Full applications received by	September 15
Successful applicants notified by	November 1
Activity starts	December 1
Progress report received	October 1

#### 6. Participating Portuguese Institutions

The following Portuguese institutions have declared their desire to participate in the evaluation, updating and creation of health information:

- All the 7 Portuguese Medical Schools
- All the 5 Biomedical Research Associate Laboratories
- Other leading research units, namely those not integrated in Associate Laboratories
- National Institute of Health (INSA)
- Knowledge Society Agency (UMIC; Ministry of Science, Technology and Higher Education)
- Ciência Viva – Agency for Scientific and Technological Culture
- Directorate-General of Health (Ministry of Health)
- High Commissariat for Health (Ministry of Health)
- National Authority for Medicines and Medical Devices (INFARMED)

It is expected that other institutions also will become involved in the program, although detailed discussions have not yet been held with these institutions. For example:

- Health Family Units (there are more than 100 such medical practices in operation, involving more than 2,000 professionals—doctors, nurses and administrative personnel—that provide health care for more than 1.2 million citizens)
- Scientific Societies
- Hospitals

## 7. Governance

The program will be based in Portugal and led by Portuguese academics. The role of Harvard Medical School will be to provide training and content through its Harvard Health Publications Division (HHP), which has 33 years of experience creating and disseminating health information for the general public. HHP also has access to faculty at Harvard Medical School who are experts in the delivery of electronic health information to medical students, students in allied health professional schools, practicing physicians, and allied health professionals.

The overall management of the project will be the responsibility of the Portuguese Medical Schools, as detailed below. UMIC—the Portuguese Knowledge Society Agency, a part of the Ministry of Science, Technology and Higher Education—will supervise the technical design and implementation of the electronic infrastructure, which will be implemented at FCCN, the National Scientific Computing Foundation. However, the management team will ultimately be responsible for both the editorial and technological components of the program. HHP will serve as consultants to the Portuguese management team regarding editorial content.

### *Detailed governance structure*

*Health Information Executive Committee.* This group of 7 people will be responsible for the coordination of the program, including the call for proposals, screening applicants, selecting recipients, and monitoring progress. The two members of the Committee from HHP will serve *ex officio*, and will have only consulting roles rather than policy authority. The Committee will include:

- *Two Co-Directors in Portugal*, academics with international reputations, one of whom will serve as Chair of the Coordinating Committee
- *Co-Director at HHP*: A representative of *Harvard Health Publications (HHP)*, who coordinates links with HMS and organizes training experiences at Harvard for members of the editorial team (*ex officio*).
- *Managing Director in Portugal*, appointed by the *Directors in Portugal* after consultation with the Deans of the Portuguese Medical Schools, who is the chief operating officer, coordinating the efforts of the other members of the Committee and the teams who report to them.
- *Managing Director at HHP*, who assists Director at HHP and keeps continuous track of operational issues with the Managing Director in Portugal (*ex officio*).
- *Information System Director*, appointed by UMIC/FCCN, who coordinates the information systems team and the building of the information systems infrastructure. The technical team will include staff to be assigned by UMIC/FCCN to this project. UMIC already has received substantial funding to support the technical aspects of this project.
- *Editorial Director*, appointed by the *Directors in Portugal* after consultation with the Directors of the Portuguese Medical Schools, who leads the editorial team and

coordinates the diversified group of experts who will be selected to create, continuously assess, and update the content. The editorial team in Portugal will include one full-time editor and one full-time translator. There will also be a *writer/editor at HHP*, who works directly with the Editorial Director in Portugal on the selection of content.

All the nominations are expected to be established within 2 months of the official launch of the HMS-Portugal Program.

### 8. Target Populations

#### *Target population: Students in the health sciences*

This target population will include medical students and students in allied health professional schools in Portugal. Content developed for this target population will consist of interactive electronic medical education modules designed to promote student-directed learning. The health information for students will be developed primarily by faculty in the Portuguese medical schools and will be openly available for use by students throughout the country.

#### *Target population: Physicians and allied health professionals*

This target population will include practicing physicians and allied health professionals in Portugal. Content developed for this target population will consist of electronic continuing medical education modules and tools to foster lifelong learning. The health information for physicians and allied health professionals will be developed primarily by faculty in the Portuguese medical schools, the Clinical Societies, and the Portuguese Medical Association and will be openly available for use by health professionals throughout the country.

#### *Target population: The general public*

This target population will include teenagers, young adults and the elderly, of varying educational backgrounds, including non-literate individuals.

*Teenagers and young adults* will receive special attention, for several reasons:

- There is great potential for health promotion and disease prevention in their age bracket
- They are “Web-fluent” and can therefore play a valuable role in evaluating the impact of the technical platform
- Higher education students are a privileged and respected group in society, in a good position to disseminate knowledge about healthy practices
- This age group can play a particularly important role in educating older members of their family (see just below)

*The elderly* are a second important target group, for several reasons:

- The aging of the population
- The higher level of illiteracy in the elderly
- The incidence of impairments that make their mobility difficult, and that thereby impair their access to printed information



In this context, it is particularly relevant to provide information on ways to age in a healthy manner (active ageing) and ways to deal with diseases associated with ageing in a multidisciplinary effort.

### 9. Educational Programs for Intermediaries

#### *Programs for journalists*

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. However, many reporters who are asked to cover biomedical topics have not had formal schooling in biomedical sciences. A program for journalists will be organized by the Office of Public Affairs of Harvard Medical School.

The program will be modeled on a similar program at Harvard Medical School for Italian journalists, organized by the Giovanni Armenise-Harvard Foundation:

- Two Portuguese journalists per year will be chosen in a competition organized by the Portuguese societies of professional journalists. The most competitive candidates will be those who have some education in biology and medicine, and whose command of English is very good.
- The successful candidates will indicate 3-4 areas of special interest (for example, stem cell biology, treatments for breast cancer).
- The two journalists will spend one week (Monday through Friday) at HMS.
- During their week at HMS, the journalists will have sessions with staff from the Office of Public Affairs and with Boston-based health journalists (print, Web, radio and television) covering principles of writing about health and biology for the general public. These sessions will be attended by the two Portuguese journalists, and will take up about 25% of the week.
- During the remaining 75% of the week, each journalist will meet individually with about 10 different faculty from Harvard Medical School and other Harvard faculties and schools who are experts in the specific health and biomedical topic areas in which the journalist has indicated specific interest. They will also meet with the Harvard faculty engaged in the Collaborative Research Grants and with the Portuguese MD trainees working in Harvard laboratories.
- In Portugal, these journalists will attend the Annual Retreat and Annual Symposium (and one or more Educational Workshops, if possible) and will meet individually with faculty and students in Portuguese laboratories engaged in the Collaborative Research Grants. In a pilot program, the journalists will spend several days in one laboratory, meeting first with the PI and then attending a group meeting and "shadowing" a graduate student and/or postdoctoral fellow during his/her research activities in the laboratory. Each journalist will be expected to publish at least one article on the work of the HMS-Portugal Program in his or her magazine, newspaper, TV station, etc.

### *Programs for medical writers/editors*

HHP faculty and staff will conduct one two-day session each year on basic principles of writing about health for the general public. These sessions will be conducted, alternately, in Boston and in Lisbon. The sessions will be preceded by sample exercises that participants will be sent two weeks in advance of the session. It is expected that the Editorial Director, Editor and Translator from Portugal will participate, and it is possible that health journalists selected by the Executive Committee of the Health Information Program also will participate.

### *10. Source of Content to Be Used*

#### *Initial Content from Harvard Health Publications*

To quickly feed the platform of health information for the public with a reasonable amount of content as early as possible after the beginning of the program, Harvard Health Publications content on heart disease and cancer (Portugal's initial topic priorities) will be the primary source of content. This will require careful translation to Portuguese and adaptation to local practice.

We budget a full-time translator for this task. After the content is translated, Portuguese physicians from the participating institutions who have the required expertise will review the information to be sure that medical inaccuracies have not been introduced during the process of translation. It is expected that the extent to which HHP content is used will decrease as the program matures, with the ultimate goal of directly generating health information in Portugal. The speed and scale of this phasing process will be defined by the members of the Health Information Program Executive Committee, with feedback and advice from the National Steering Committee and Review Board of the HMS-Portugal Program (see below).

The faculty and staff from Harvard Health Publications will work directly with the Editorial Director and editorial teams in Portugal on this and subsequent tasks.

#### *Assessment and Integration of Already-Available Portuguese Content*

A number of institutions in Portugal have already created some health information as components of their Web sites: medical schools, health sciences schools, hospitals, biomedical sciences associate laboratories and other biomedical research units, the Ministry of Health, the Director-General of Health, the High Commissioner for Health, and INFARMED (The National Authority for Medicines and Medical Devices), among others.

Once an editorial agenda is created beyond the initial agenda of cardiovascular disease and cancer, it will be possible to determine how much available content already fits that agenda, and how much new information is needed. Even if content is already available to fit every part of the editorial agenda, it will not be an attractive product for the general public until it is modified to have a consistent structure, reading level, voice and navigation. This editorial task of integrating already-existing content from multiple sources into one editorial package is considerable, and will require an additional and substantial editorial effort to combine all of the content into one seamless whole. Indeed, the task of integrating existing content may be greater than the task of creating new content, or continuing to translate content from Harvard Health Publications. For

that reason, it is possible that additional content from Harvard Health Publications may be licensed in years 3-5 of the program. This determination will be made by the Editorial Director and Editorial Board, with input from HHP.

### *Content Review and Updating*

For medical students and students in allied health professional schools in Portugal, content will consist of interactive electronic medical education modules designed to promote student-directed learning. Some of this content is already available within the student's home institution, but is not generally available throughout the country. Faculty in the Portuguese medical schools will develop additional interactive electronic medical education modules for students, and these modules will be openly available for use by students throughout the country.

For practicing physicians and allied health professionals in Portugal, content will consist of electronic continuing medical education modules and tools to foster lifelong learning. The health information for physicians and allied health professionals will be developed primarily by faculty in the Portuguese medical schools, the Clinical Societies, and the Portuguese Medical Association and will be openly available for use by health professionals throughout the country.

All content—whatever the source—will be reviewed at least every two years by the Editorial Director and Editorial Board, with input from HHP. In addition, at least one expert on each topic from one of the participating Portuguese institutions will be charged with the responsibility for monitoring new information that is important enough that the online content needs to be updated sooner than its usual every-two-year review date. HHP regularly goes through the same process with its faculty, and will notify the program leadership in Portugal when HHP thinks that new knowledge or technology is sufficiently important that content requires updating.

### *11. Information Technology Infrastructure*

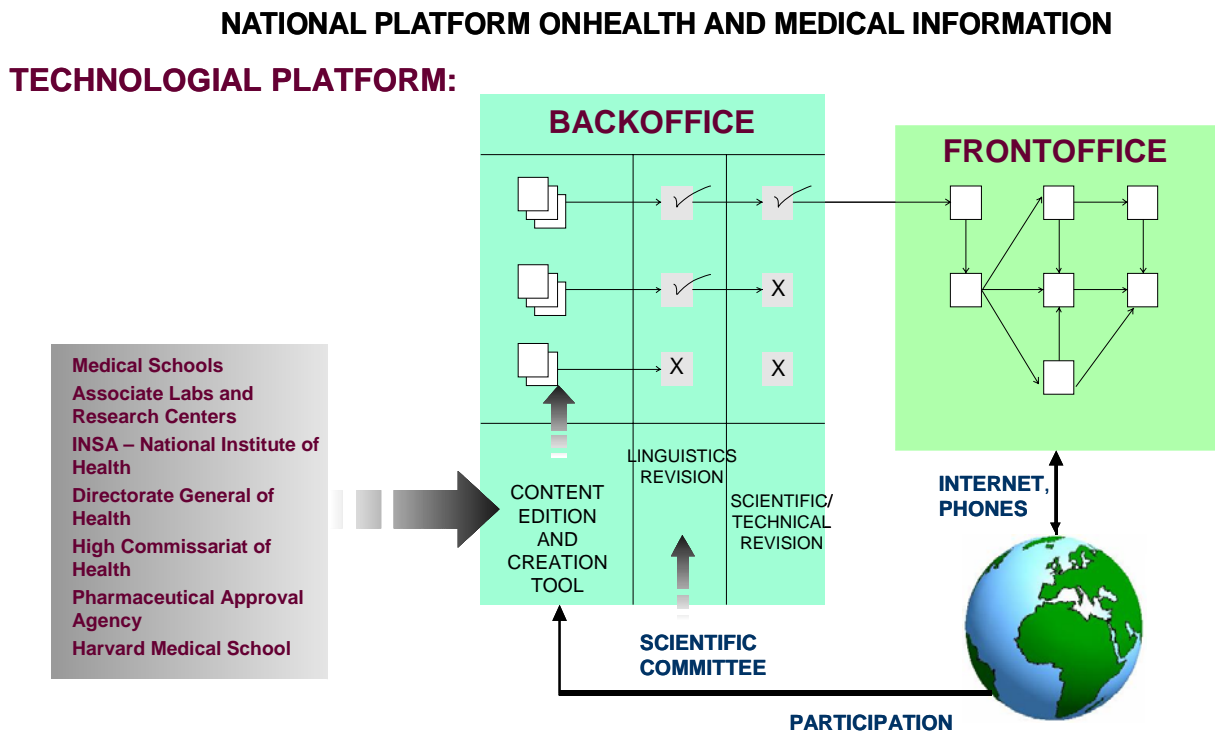
Distributing content through so many channels, to so many different devices, will require an organization with considerable technical sophistication. UMIC, The Knowledge Society Agency, will be responsible for assuring the development of the required technical infrastructure. Indeed, it has already begun to do so. A high initial priority for the HMS-Portugal Program is to work with UMIC in order to ensure appropriate implementation of the IT and telecommunications infrastructure required to support this Program.

The operation of the technological platform and its relationship with the entities involved in its processes follows the simplified scheme of **Figure 1**. The platform will consist of two large digital repositories—a “back office” repository where all submitted content is held until it is approved, and a second, “front office” repository in which the approved content is placed and made available to the public.

The approval for publication must be provided at several levels, and only the conjunction of all the required approvals allows a given content to be made publicly available. Approval requires quality control of a technical nature and also of quality of language and communication, thus assuring correct Portuguese and an appropriate language sophistication level. The Editorial Board entrusts the technical approval of content to specialists. The back office will be equipped

with collaborative tools so that these specialists can communicate with the content authors and, together, they can improve and adapt the proposed content until it is ready to obtain technical approval.

*Figure 1. Model of operation of the technological platform*



Using funds already granted to UMIC for this purpose, the technological platform will be installed on servers hosted at the National Scientific Computing Foundation (FCCN), the public body funded by the Knowledge Society Agency (UMIC) that manages the National Research and Education Network. This network assures computer connectivity to all the national higher education and research institutions, and provides some related technical services like the national online digital library and the national authentication and roaming system. The FCCN system assures that all higher education campuses are seamlessly integrated into one national Virtual Campus that is accessible through wireless connections.

FCCN also manages the international connections to the European Research and Education Network, the national Domain Name System (DNS) and a Computer Emergency Response Team. It assures reliable service, has the highest connectivity and has direct working relationships with the Medical Schools and other health sciences schools, as well as with the Associate Laboratories, the National Institute of Health (INSA) and other research units. Therefore, it is the organization most suited for hosting the technological platform.

The technological platform will allow great flexibility in the use of different content formats and means of access. The platform also will support advanced tools of collaborative work and provide an appropriate information system to handle the contribution of the hundreds of people

involved in content production, adaptation, and review. Finally, the platform is being designed to be easy for contributing content authors and editors to use.

The information technology infrastructure developed for the Program in Health Information will also be used to support the Web and information technology needs of the Program in Clinical and Translational Research and Education in the HMS-Portugal Program.

### 12. Research on the Impact of Health Information Systems

It is important that the impact of the Program in Health Information be evaluated, given the resources committed to it and the possibility that it may serve as a model for other nations. Two types of evaluation are envisioned. First, the usage of internet-based and telephone-based information by the public will be assessed according to standard metrics (below). Second, the impact of interventions in which intermediaries direct the public to health information content will be assessed through a competitive research grant program conducted primarily by social scientists in Portugal, with potential involvement of faculty from Harvard Medical School and other Harvard faculties and schools.

#### *Assessment of Health Information Usage by the Public—Internet-Based Information*

The following metrics can be captured by the UMIC infrastructure, and provide useful information as to the usage of Internet content, by whatever means it is accessed (by computer, handheld device or kiosk):

- Number of unique visitors each month
- Number of pages viewed per visit
- Number of minutes spent per visit
- Total number of pages viewed and minutes per month
- Number of times visitor linked to each of the affiliated institutions' sites
- Periodic surveys of users' experience with either their Internet or telephone experience, conducted at the conclusion of their visit. The surveys will seek:
  - Information about the user (gender, age, community of residence)
  - Stated satisfaction with the visit
  - How users learned about the existence of the information—public announcements, media coverage, their doctor or other health professional, a family member, a visit to a science center, etc.
  - What users did with the information—planned a change in lifestyle, sought the services of a health professional, provided the information to a family member or friend, etc.

#### *Assessment of Health Information Usage by the Public—Telephone-Based Information*

The following metrics can be captured by the telephone system, and provide useful information regarding usage:

- Number of phone calls each month, on each topic
- Number of minutes spent per call, and total number of minutes spent by all callers each month, on each topic

*Assessment of the Impact of Intermediary-Directed Health and Biomedical Information Systems through a Competitive Grant Program*

*Background.* As outlined in Section 9, we anticipate implementing interventions in which intermediaries—individual professionals, institutions, and family members—direct the public to health and biomedical information content. The experience with large population-wide interventions to change behavior is that they are generally more effective when information is delivered by a “salient” intermediary—someone respected by and important to the individual.

Such interventions, while potentially more effective, are also more expensive and less straightforward to conduct and evaluate than measuring how often information available to anyone on the Internet is accessed. For that reason, such interventions will be deployed only in a limited and controlled way, and in a way that lends itself to evaluation.

*Competitive Grant Program.* In addition to the assessments of health information usage noted above, the assessment of the impact of interventions with intermediaries will be conducted through a series of *research projects* on the citizen-centered health information systems, conducted through a solicitation for competitive research proposals from collaborative teams of investigators at Portuguese medical schools and research institutions and at Harvard Medical School and possibly other Harvard faculties and schools. Although Portuguese institutions will be the primary grantees, it will also be important to involve expert faculty at Harvard Medical School and other Harvard faculties and schools as collaborators and/or consultants. A group at the National Public Health School of the New University of Lisbon is already working on the impacts of “Personal Health Information Systems” and has already expressed interest in this research, as have several faculty at the Harvard School of Public Health and the Harvard Kennedy School of Government. A sample timeline is as follows:

Call for applications	May 1
(Expression of interest received by	June 15)
Full applications received by	September 15
Successful applicants notified by	November 1
Activity starts	December 1
Progress report received	October 1

For 2009 only, the call for applications will be June 15, (the expression of interest will be received by September 15,) the full applications will be received by October 31, the successful applicants will be notified by December 1, and the activity will be started on January 1.

The evaluation experts from Harvard Medical School and other Harvard faculties and schools will be involved in the process of this evaluation research in three ways:

1. They already have identified general principles that will be adhered to in any successful research proposal:
  - Whenever possible, interventions should involve *randomly* chosen demonstration and control settings that are comparable by relevant metrics.
  - Whenever possible, the impact of receiving information on the *behavior* of the person receiving the information should be assessed. Usually this will be possible only by

- surveying users, and asking them to state how their behavior was affected, rather than through objective measurement of their behavior.
- When the intervention is deployed in a medical practice (such as the Health Family Units), it may be possible to monitor certain behaviors (e.g., use of screening tests, compliance with recommended treatments, success at weight loss) more objectively, using medical record review.
2. They will review the proposed interventions, once they have been designed in detail, to look for ways that the impact of the interventions could be assessed—and to suggest changes in the details of an intervention that would make the impact easier to study.
  3. They or other Harvard faculty with the required expertise will participate in the review of the competitive research proposals that are submitted.

## 3.2. Advanced Medical Training and Research

### 1. Background and Rationale

Clinical and translational research may be divided into several overlapping areas. **Translational** research focuses on the areas of biology that impinge on human health and the understanding of disease mechanisms, and on the application of this research toward a particular medical challenge. **Clinical** research aims to understand disease and health by directly observing and experimenting on patients.

Portugal is enjoying an expansion in clinical and translational research, with most of this activity in the area of translational research. Much of this expansion is within the Associate Laboratories and in related research centers in the 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 clinical and translational research.

Some challenges facing clinical and translational research in Portugal are:

- Communication among the various components of the Portuguese clinical and translational research community could be improved.
- There are very few opportunities for MD's and MD students to pursue clinical and translational research training in Portugal.
- 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.

The HMS-Portugal Program aims to address these challenges through establishment of the collaborative programs outlined below. In addition, the innovative clinical and translational research and education programs of the Harvard Clinical and Translational Science Center (Harvard Catalyst) will help to facilitate these collaborative interactions. The Harvard Catalyst is a shared “center without walls” involving Harvard University, Harvard's ten schools and eighteen affiliated Academic Healthcare Centers, and several Boston-area schools and community partners. The goal of the Harvard Catalyst is to foster cross-institutional collaboration through research and education programs in clinical and translational science. The resources of the Harvard Catalyst are available to all faculties at Harvard regardless of their institutional affiliation or academic degree. The involvement of the Harvard Catalyst will enhance all the elements of the HMS-Portugal Program in Clinical and Translational Research and Education.

### 2. Program Outline

A collaborative program in the following areas will be established between the clinical and translational research communities in Portugal and at Harvard:



- A. In the areas of **Clinical and Translational Research and Education**, programs will be created that will strengthen the research foundation and infrastructure of Portuguese research and clinical institutions in partnership with the Harvard clinical and translational research community.
1. Establish competitive **Collaborative Research Grants** that partner Portuguese investigators (with special attention to junior MDs) with experienced mentors in Portugal and at Harvard Medical School and other Harvard faculties and schools, helping to build bridges both between Portuguese groups and between Portuguese and Harvard scholars and students. In particular, collaboration will be promoted with the Harvard Clinical and Translational Science Center (Harvard Catalyst). These grants will also provide an ideal training environment, ensuring a new generation of effective Portuguese scientists and physician-scientists. They will also promote research opportunities for Harvard undergraduates.
  2. Establish competitive **Junior Research and Career Development Awards** that support Portuguese physicians seeking to develop careers in clinical research. This will help establish links between the Portuguese and Harvard clinical research communities, and will 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 will be used to support clinical research undertaken by MDs during their residency training in Portugal.
  3. Establish competitive **Senior Research and Career Development Awards** to provide qualified applicants with an opportunity to study toward the Master of Medical Sciences degree from Harvard Medical School and to launch a novel clinical research program upon their return to Portugal. One Portuguese student per year will be allowed to apply to the Harvard Medical School Scholars in Clinical Science Program (SCSP); if the applicant is accepted through the SCSP's normal application and admissions process, the program will award the student two years of funding to attend the SCSP and an additional two years of funding as a new clinical investigator in Portugal.
  4. Establish competitive **Harvard College Summer Research Fellowships in Health Sciences** that provide an opportunity for Harvard College undergraduates to participate in summer research in one of the Portuguese laboratories supported by a Collaborative Research Grant. Where appropriate, and in coordination with the faculty member(s) responsible for undergraduate studies at Harvard College (such as Professor Richard Losick), some of these students will have the opportunity to spend an additional semester in Portugal continuing their research and taking non-science courses at a collaborating Portuguese University.
- B. 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 research education and networking opportunities across Portugal.
- C. Create annual, public **Symposia** in Portugal to showcase the best research and to highlight the importance and value of health sciences research.

All research funding will incorporate the principle of shared mentoring from Portuguese and

Harvard faculty, and where applicable, will couple formal educational opportunities at Harvard Medical School and other Harvard faculties and schools with research projects in Portugal. However, it is emphasized that no new degree-granting programs will be created under the HMS-Portugal Program.

### 3. Expected Outputs and Outcomes (see Appendix 2)

The program is designed to help populate Portuguese research institutions with an increasingly sophisticated clinical and translational research capacity, and to expand the rate and quality of Portuguese clinical and translational research contributions to the international community. The program is also designed to foster long-lasting collaborative ventures, both within Portugal and between Portuguese and Harvard research groups. The workshops, retreats and symposia will 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 will help draw together the growing number of Portuguese clinical and translational investigators into a strong, vibrant, and interconnected community.

The Collaborative Research Grants are designed to enhance and enlarge the clinical and translational research infrastructure in Portugal. There will be one call of three collaborative awards in each of the first four years of the HMS-Portugal Program, for **a total of 12 collaborative research projects over the course of the Program**. Each collaborative award will involve at least two Portuguese research groups and one Harvard research group, for a total of at least **24** groups from Portugal and **12** groups from Harvard Medical School and other Harvard faculties and schools involved in long-lasting collaborative ventures. Therefore, at a rate of three researchers per research group, the program has the capacity to directly engage a minimum of **108** researchers over the five-year Program. Specific expected outputs are to improve interactions among Portuguese and Harvard investigators and to foster inter-institutional cooperation within Portugal. Closely linked to this goal is the desire to increase the international visibility and reputation of Portuguese clinical and translational research.

The Harvard College Summer Research Fellowships in Health Sciences will support **a total of 15 Harvard College undergraduate students** over the course of the five-year HMS-Portugal Program.

The Junior Research and Career Development Awards are designed to give Portuguese MD residents an opportunity to develop clinical research projects under the guidance of a Portuguese mentor and a Harvard co-mentor. The awards will help the trainees hone their clinical research skills and develop close ties between established Portuguese and Harvard clinical investigators. The Junior Research and Career Development program will have the capacity **to award two new grants per year, thereby fostering and encouraging 10 high-quality clinical trainees** and their research projects across Portugal over the course of the five-year HMS-Portugal Program.

The Senior Research and Career Development Awards will support a relatively small number of junior physician investigators who qualify for admission to an established Master's training program at Harvard Medical School. Upon completion of their training, the trainees will return to Portugal with a full and thorough understanding of clinical research. They will also develop a

clinical research project as part of their training, and this work will be continued and expanded in Portugal with the help of a two-year research and career development grant. This program will **support one new trainee per year, thereby giving rise to four new clinical research groups across Portugal over the course of the five-year HMS-Portugal Program.**

For both the Junior and Senior Research and Career Development Awards, an important condition of the award will be an institutional guarantee of the support and infrastructure required to carry out the work. This support and infrastructure must be guaranteed in writing by the Portuguese hospital, clinical institution, and/or research laboratory in which the clinical research will be conducted.

#### 4. Program Details

##### *A. Clinical and Translational Research and Education*

###### *1. Collaborative Research Grants*

The program will support a total of 12 novel and innovative collaborative grants. Research topics should be patient and/or disease oriented and the translational and/or clinical outcomes clearly stated. Through a range of scientific approaches the goal will be to focus on questions relevant to medicine at the frontier of translational and clinical sciences.

Successful competitive proposals will involve a collaborative effort between (at least) two Portuguese research teams from different institutions and (at least) one research team from Harvard Medical School. There will be one call for grant applications in each of the first four years of this Program, each call offering three collaborative research grants. Each grant will provide funding for two years, with the possibility (upon evaluation) of extension for a third year. Grant applications will be assessed on a strictly competitive basis by an international panel of experts in clinical and translational investigation and will be subjected to annual evaluation. The grant review panel will be chaired by Professor Lee M. Nadler, Dean for Clinical and Translational Research at Harvard Medical School and Director of the Harvard Clinical and Translational Science Center. A typical award will provide resources for each individual laboratory adequate to cover two salaries (at the levels of PhD or MD-PhD student, postdoctoral fellow, or technician), supplies, and limited resources for equipment. If requested, salary support for principal investigators will be limited to no more than 10% of the principal investigator's then current salary. These grants will also provide the opportunity for Harvard College undergraduates to participate in research in one of the Portuguese laboratories supported by a collaborative research grant (see below). Travel support will be provided to allow all the researchers from the Harvard teams to meet annually with their counterparts in Portugal and to participate in the Annual Retreat to be held in Portugal; these meetings and the Annual Retreat will be essential to ensure active networking among all the participants of the program.

As a condition of accepting their research grant awards, the Portuguese laboratories involved in the Collaborative Research Grants will make available a sufficient number of laboratory slots to accommodate MD students and MDs in residency training. MDs enrolled in a research project in these laboratories can participate in a significant period of practical training at the Harvard laboratories involved in the Collaborative Research Grants. While in residence at Harvard,

Portuguese MDs will become full members of the host laboratory, participating in laboratory research, group meetings, journal clubs, retreats, workshops, seminars, and nanocourses. The Portuguese MDs will also participate in the weekly Harvard Catalyst Colloquium Series and a bimonthly faculty dinner series together with “peer mentors” from one of the Harvard laboratories involved in the Collaborative Research Grants. These paracurricular activities will allow the Portuguese MDs studying at Harvard to interact with Harvard students and fellows and will encourage community-building among the Portuguese MDs in each cohort.

## *2. Junior Clinical Research and Career Development Awards*

The Junior Research and Career Development Awards will provide MDs in Portuguese residency training with an opportunity to apply on a competitive basis for funding to support their clinical research. Two awards per year will 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- to three-year period, and bring to the project a Portuguese mentor. Where appropriate, a Harvard co-mentor may also be recruited.

Each award will provide an annual stipend for the MD applicant as well as research costs over the two- to three-year period. Tuition and registration will be provided for each qualified MD resident to attend the Harvard Medical School “Program in Clinical Effectiveness (PCE)” summer course (see <http://www.hsph.harvard.edu/clineff/>) during the first and second years of their award. The awardees must apply and be accepted to the PCE summer course through the normal PCE admissions process. Participation in the Program in Clinical Effectiveness for two successive summers will provide each awardee with a solid underpinning for clinical research.

## *3. Senior Clinical Research and Career Development Awards*

Formally trained clinical investigators will be required to further develop the clinical research environment in Portugal. During the initial years of the HMS-Portugal Program, funding will be available for one Masters-level educational opportunity per year. If the qualified Portuguese applicant is accepted into the Harvard “Scholars in Clinical Science Program (SCSP)” through the normal SCSP admissions process, the recipient of a Senior Research and Career Development Award will attend the Harvard SCSP (see <http://www.hms.harvard.edu/gradprograms/scsp/>). 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 Sciences degree from Harvard Medical School.

The application process for the Senior Research and Career Development Award will be designed to recruit the most competitive Portuguese post-graduate student for intensive training in clinical research at Harvard Medical School. The Admissions Committee will include representatives from the Faculties of Medicine and teaching hospitals throughout Portugal as well as one advisor from the Harvard Scholars in Clinical Science Program. Applicants will be ranked on the basis of their grades, test scores, research experience, letters of recommendation, and interest and aptitude for international-caliber careers in clinical investigation. The best student will be chosen for this program, without regard for gender, country of origin, city of origin, specific field(s) of interest within clinical investigation, or initial preference for returning

institution (see below). The program will forward the application of one student per year to the Harvard Medical School Scholars in Clinical Science Program; if the Portuguese applicant is accepted through the SCSP's normal application and admissions process, the program will award the student two years of funding to attend the SCSP and an additional two years of funding as a new clinical investigator in Portugal (see below).

The goal is that each trainee will develop an active and ongoing clinical research project to pursue upon the trainee's return to Portugal. As part of the Senior Research and Career Development Award, the trainee's project will be further developed in Portugal with support comprising an annual stipend (including benefits) and an annual supplement toward research costs for a two-year period immediately following completion of the Harvard Medical School SCSP.

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

Although outside the scope of the HMS-Portugal Program, it is anticipated that the expanding critical mass of formally trained clinical investigators in Portugal will eventually be equipped to plan and launch a new Master in Clinical Science degree program(s) in Portugal. Such a program(s) would greatly enhance the growth and development of a vibrant Portuguese clinical research community.

#### *4. Harvard College Summer Research Fellowships in Health Sciences*

The program will provide an opportunity for Harvard College undergraduates to participate in research in one of the Portuguese laboratories supported by a Collaborative Research Grant. Students will typically apply during their sophomore year at Harvard College for a research fellowship during the summer between their sophomore and junior years. Upon successful evaluation by the Research and Education Program Executive Committee (see below) and agreement of the Portuguese laboratory, a fellowship student may reapply for a second summer of research with the same Portuguese laboratory during the summer between their junior and senior years. Where appropriate, and in coordination with faculty at Harvard College responsible for organizing undergraduate training in biomedical sciences (such as Professor Richard Losick), some of these undergraduates will have the opportunity to spend an additional semester in Portugal continuing their research and taking non-science courses at a collaborating Portuguese University. In addition, where appropriate, the student could also continue her/his research project during the fall and/or spring semester under the supervision of a Harvard faculty member, most likely (but not necessarily) in one of the Harvard laboratories supported by a Collaborative Research Grant. The program will have the capacity to accept three new undergraduates per year.

#### *5. HMS Co-Directors' Innovation Fund for Translational Research and Postdoctoral Mentorship*

On an annual basis, starting in Year 1, each of the HMS Co-Directors of the Program in Clinical and Translational Research and Education shall receive an Innovation Fund for Translational Research and Postdoctoral Mentorship. The annual amount of each Co-Director's Innovation Fund shall be equal to one-half of the maximum annual funding of the Harvard Medical School

portion of one Collaborative Research Grant. This Fund will be used at the discretion of the Co-Director to support collaborative research in the Co-Director's laboratory and to facilitate the creation and maintenance of mentorship opportunities for qualified visiting Portuguese postdoctoral fellows.

Each of the HMS Co-Directors of the Program in Clinical and Translational Research and Education will host one qualified Portuguese postdoctoral fellow per year. The HMS-Portugal Program will advertise the availability of the postdoctoral fellowships to the academic community in Portugal, and the Co-Directors will review these applications and select a qualified candidate. If a qualified postdoctoral fellow is not identified from among the Portuguese applicants in any given year, despite reasonable efforts on the part of the Co-Director, the Co-Director may use the Fund to support translational research activities carried out by any trainee or visiting scientist in his laboratory. If agreed by the Portuguese postdoctoral fellow, if adequate funding is secured, and at the discretion of the hosting Co-Director, the Portuguese postdoctoral fellow could remain in the Co-Director's laboratory for an additional period of time, not to exceed three years in total. These Portuguese postdoctoral fellows will be full members of the HMS-Portugal Program and will participate actively in programmatic aspects of the Program including the annual Retreats, Symposia, and Workshops.

The stipend of any selected Portuguese postdoctoral fellow will be funded separately by other (non-HMS) funding mechanisms (e.g., FCT). Identifying and obtaining such funding shall be the responsibility of the selected Portuguese postdoctoral fellow.

The Co-Directors shall submit an annual written report to the Review Board of the HMS-Portugal Program in Translational Research and Health Information that outlines the use of the Innovation Fund, the research accomplished and the progress of any Portuguese postdoctoral fellows then in the laboratories of the Co-Directors. This report shall be submitted no later than March 1<sup>st</sup>, starting in 2011.

Because the HMS Co-Directors of the Program in Clinical and Translational Research and Education will be receiving research funding under the Innovation Fund mechanism, these individuals will not be eligible to participate in any of the Collaborative Research Grants.

The benefits of this Innovation Fund for the HMS-Portugal Program will be:

1. It will directly tie the research in the Co-Directors' laboratories to the HMS-Portugal Program, further enhancing the framework of the collaboration and the networking potential among the members of the research groups in Portugal and at Harvard Medical School.
2. It will allow training of additional Portuguese postdoctoral fellows at HMS.
3. It will offer to the visiting postdoctoral fellows the experience of participating in all the academic activities available to members of the academic community at HMS.
4. Upon their return to Portugal, the postdoctoral fellows will be strongly encouraged to continue their relationships with the programmatic activities of the HMS-Portugal

Program, including regular attendance at the annual Retreats and Symposia and active participation in the Workshops. The goals will be to strengthen the collaborative relationships between Portuguese groups and members of the HMS community, to foster significant networking relationships between the postdoctoral fellows and their host laboratories at HMS, and to expand the potential of the postdoctoral fellows to develop independent research programs and to make significant research and educational contributions in Portugal.

## *B. Workshops and Retreats*

An essential component of the HMS-Portugal Program is a series of Workshops and Retreats designed to bring together the Portuguese and Harvard clinical and translational research communities and to significantly enhance the research and training experiences and networking opportunities of all participants in the HMS-Portugal Program.

### *1. Educational Workshops*

Residential-style, two-week workshops in translational and clinical research will be held annually. The venue will rotate among various Portuguese institutions, as appropriate. There will be three workshops every year, two focusing on translational research topics and one focusing on clinical research topics.

Topics will include, for example, cellular and molecular imaging, proteomics, genomic tools and techniques, animal models, neurodevelopment, small animal surgical techniques, drug discovery and computational biology tools (for the 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. Topics will rotate annually to afford coverage of many different areas of clinical and translational research throughout each participant's involvement in the HMS-Portugal Program.

Whenever possible, the Workshops will be timed to dovetail with the Annual Retreat and Symposium.

### *2. Annual Retreats*

An annual two-day retreat will be held in Portugal. The purpose of the retreat will be to bring together all of the participants in the collaborative research projects and training programs, including students, trainees, mentors, and collaborating members. In particular, all funded researchers in the collaborative research projects and all laboratory members from the Portuguese research groups will be expected to participate. The format of the retreat will 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 at Harvard Medical School and other Harvard faculties and schools and by recipients of the Junior and Senior Research and Career Development Awards; (2) poster presentations by all members of the research projects in Portugal and at Harvard Medical School and other Harvard faculties and

schools; (3) specialized round-table discussion sessions for members of each collaborative research grant. The HMS-Portugal Program will support travel and living expenses for all participants in the retreat.

### *C. Annual Symposia*

A one-day Symposium, open to the public and designed to coincide with the Retreat and Workshop schedules, will also be offered. The chosen topics will be of broad interest to the biomedical community and the general public. A theme will be selected each year, with some speakers drawn from that year's Workshop and Retreat faculty. Speakers will be provided with travel and accommodation expenses.

Journalists participating in the HMS-Portugal Program (see above) will attend and cover the Educational Workshops, Annual Retreats and Annual Symposia, and will be expected to publish their articles in a timely fashion.

### 5. Governance

*Clinical and Translational Research and Education Executive Committee.* This group of 6 people will be responsible for coordinating the call for applications, screening applicants, selecting recipients, and monitoring progress of the programs, and selecting topics and faculty for the Workshops, Retreats, and Symposia. Coordination among the HMS-based and Portugal-based aspects of the Program will be accomplished through the Executive Committee. Specialized advice may also be drawn *ad hoc* from experts as needed.

Members of the Program Coordinating Committee will include:

- *The Director of the Program in Portugal*, an academic with an international reputation, who will serve as Chair of the Program Coordinating Committee
- *The Director of the Program at Harvard Medical School*, an academic with an international reputation
- *Two Managing Directors*, one in Portugal and one at Harvard Medical School, who will work as chief operating officers, coordinating the efforts of the Program and the Coordinating Committee and the teams who report to them

*Managing Team in Portugal:* The Managing Director in Portugal will be assisted by a Managing Assistant and a web Assistant. The team will include staff to be assigned by the Science and Technology Foundation (FCT) to this project.

### 6. Timelines

#### *Collaborative Research Grants*

A total of 12 collaborative awards will be granted, at a rate of three new collaborative awards per year in Years 1-4 of the HMS-Portugal Program. Awards will be two to three years in duration. The second and third years of each award will be renewed upon successful evaluation. A sample timeline is as follows:



Call for applications	May 1
(Expression of interest received by	June 30)
Full applications received by	July 30
Successful applicants notified by	October 1
Research starts	November 1
Progress report received	October 1
Second (third) year funding confirmed	November 1

Applicants' expression of interest will be used to recruit the appropriate review panels for the applications.

In 2009 only, the call for applications will be June 15, (the expression of interest will be received by September 15,) the full applications will be received by October 31, the successful applicants will be notified by December 1, and the activity will be started on January 1.

*Harvard College Summer Research Fellowships in Health Sciences*

Three awards will be offered each year. Awards will be for one summer of research in one of the Portuguese laboratories supported by a Collaborative Research Grant. Upon successful evaluation and agreement of the Portuguese laboratory, a fellowship student may reapply for a second summer of research with the same Portuguese laboratory. Under special circumstances, and with the approval of the appropriate faculty member (e.g., Professor Richard Losick), the student could continue working in a Harvard laboratory (presumably but not limited to a laboratory supported by a Collaborative Research Grant) under the supervision of a Harvard faculty member. Where appropriate, and in coordination with faculty at Harvard College responsible for organizing undergraduate training in biomedical sciences (such as Professor Losick), the student could also have the opportunity to spend an additional semester in Portugal continuing their research and taking non-science courses at a collaborating Portuguese University. A sample timeline is as follows:

Call for applications	May 1
Applications received by	July 15
Successful applicants notified by	September 15
Research starts	October 1
Progress report received	March 1

*Junior Clinical Research and Career Development Awards*

Two awards will be offered each year. Awards will be two to three years in duration. Awards will run from December 1 to November 30. The second and third years of each award will be renewed upon successful evaluation. A sample timeline is as follows:

Call for applications	July 1
Applications received by	September 15
Successful applicants notified by	October 1
Research starts	November 1
Progress report received	October 1

Second (third) year funding confirmed

November 1

*Senior Clinical Research and Career Development Awards*

Funding will be available for one award per year. Each award will include funding for the two-year Harvard Scholars in Clinical Science Program. Course work starts in July and concludes in May. The award will also support two years of research funding upon the awardee's return to Portugal. The initial award will be contingent on acceptance of the student through the SCSP's normal application and admissions process, and each year of continued funding will be contingent on satisfactory progress. A sample timeline is as follows:

Call for applications	July 1
Applications received by	October 1
Successful applicant notified by	December 1
Student arrival in Boston	July 1
Masters awarded	May (Year two)
Investigator proposes research project in Portugal	July 1
Research in Portugal starts	September 1

7. Evaluation

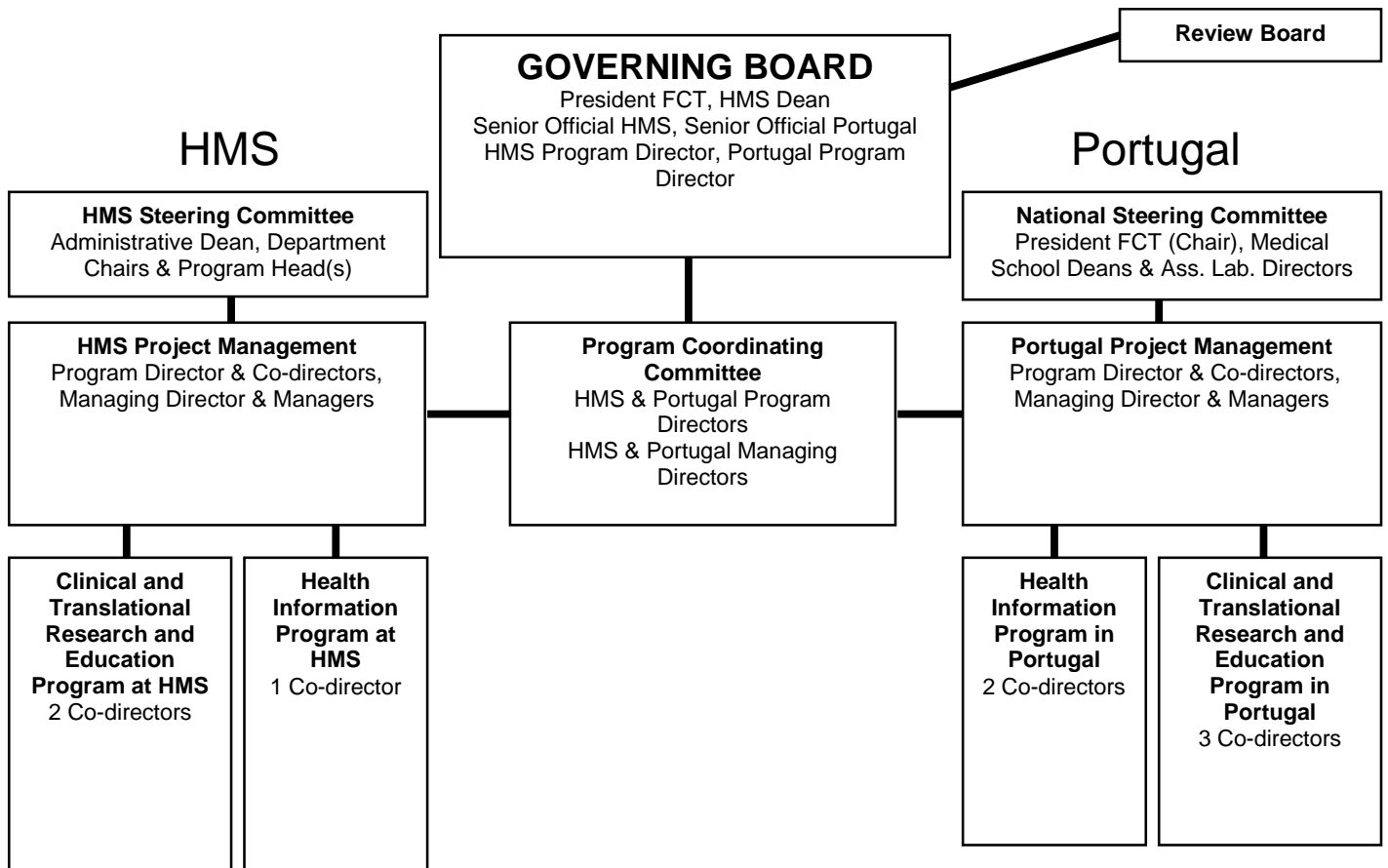
A Review Board, consisting of internationally recognized translational and clinical investigators and academic leaders uninvolved in the HMS-Portugal Program, will annually evaluate the Clinical and Translational Research and Education Program (including the Collaborative Research Grant Program, the Summer Research Fellowship Program, the Junior and Senior Research and Career Development Programs, and the HMS Co-Directors' Innovation Fund for Translational Research and Postdoctoral Mentorship) and the Program in Health Information. The evaluation in November 2009–January 2010 must include a specific and detailed evaluation of the first call on translational research. The evaluation in November–December 2011 shall be considered as a midterm review and used to determine the continuation of the program for the remaining years. Members of the Board will be nominated by senior leadership of the Portuguese Science and Technology Foundation (FCT), after consulting with Harvard Medical School (HMS). The assessment and recommendations of the Review Board will be provided to the senior leadership of FCT and HMS and to the Governing Board of the HMS-Portugal Program in Translational Research and Health Information.

## 4. Governance Structure

The design of the governance structure for the HMS-Portugal Program in Translational Research and Health Information is guided by the following general principles:

- Granting **autonomy** to the individual 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 HMS team will have responsibility for implementation and governance, including selection of Harvard personnel, of the activities at Harvard, whereas the Portugal team will have responsibility for implementation and governance, including selection of personnel, of the activities in Portugal.

**Figure 2. Organizational Chart for the HMS-Portugal Program**



Below is a list of the composition, tasks, decision rights, and minimum frequency of meetings for the various entities. The table below does not include the internal organizational structures at HMS and in Portugal; these will need to be decided upon by HMS for itself and by the various parties in Portugal for the structure in Portugal in order to assure the best local solutions.

Entity	Composition	Tasks and Decision Rights	Meetings
<b>HMS-Portugal Program Common Entities</b>			
Review Board	4 to 6 internationally recognized translational and clinical investigators and academic leaders not affiliated with the HMS-Portugal Program, nominated by senior leadership of the FCT after consulting with HMS Chaired by one of the international experts	Review the Programs and their effectiveness and advise the Governing Board, the FCT, and HMS on issues and opportunities The assessment and recommendations of the Review Board will be provided to the senior leadership of FCT and HMS and to the Governing Board of the HMS-Portugal Program	At least twice for the duration of the Program, or as requested by the Governing Board or one of the Parties
Governing Board	6 people: The President of FCT, who will chair; the Dean of Harvard Medical School (HMS); 1 Portuguese Senior Official; 1 HMS Senior Official; the Program Director at HMS; the Program Director in Portugal	Appoint the Program Directors pursuant to nomination as described below Develop overall strategy, principles and guidelines Approve changes in programs and goals Review and approve budget allocations Design and implement funding strategy Review program data	Once per year in person Once per year by tele or video conference (if necessary) Ad hoc meetings as agreed
HMS Steering Committee	Administrative Dean, Department Chairs, 1 or more Program Head at HMS	Appoint HMS Co-Directors Nominate HMS Directors of Operating Units Assist and advise the Director and Co-Directors in the implementation of the Program	At least once per year
National Steering Committee	President FCT (Chair), the Directors of the Portuguese Medical Schools and Associate Laboratories	Appoint Portugal Co-Directors and Directors Assist and advise the Director and Co-Directors in the implementation of the Program	At least twice per year

Program Directors	One Director in Portugal and one at HMS (nominated from among the respective Co-directors by HMS Steering Committee in the case of the HMS Director and by National Steering Committee in the case of the Portugal Director)		
Program Coordinating Committee	Director in Portugal, who serves as Chair Director at HMS Two Managing Directors, one in Portugal and one at HMS	Coordination of the HMS-Portugal Program and the HMS-based and Portugal-based aspects of the Program: Appoint Directors of Operating Units from persons nominated as described above Review data Coordinate operating budgets within overall constraints Approve operating policies and procedures Define and develop QM program, benchmarks and metrics of success Provide annual report to the Governing Board	Two to four times per year Ad hoc meetings as agreed
<b>Program in Health Information</b>			
Health Information Executive Committee	Two Co-Directors in Portugal, one of whom serves as Chair Director at HHP ( <i>ex officio</i> ) Managing Director in Portugal Managing Director at HHP ( <i>ex officio</i> ) Editorial Director Information System Director	Responsible to the Program Coordinating Committee Coordinate and oversee Operating Units Review data Define and develop QM program, benchmarks and metrics of success	Two to four times per year Ad hoc meetings as agreed
Directors	Two Co-Directors in Portugal and one at HMS	Translate strategy into operational and implementation plans Oversee and coordinate Operating Units Collect data and provide real-time feedback Chair Operating Committee Appoint Managers (HMS Director to nominate HMS Managers, Portugal Co-Directors to nominate Portugal	Two times per year in person Bi-weekly tele or video conferences or as needed

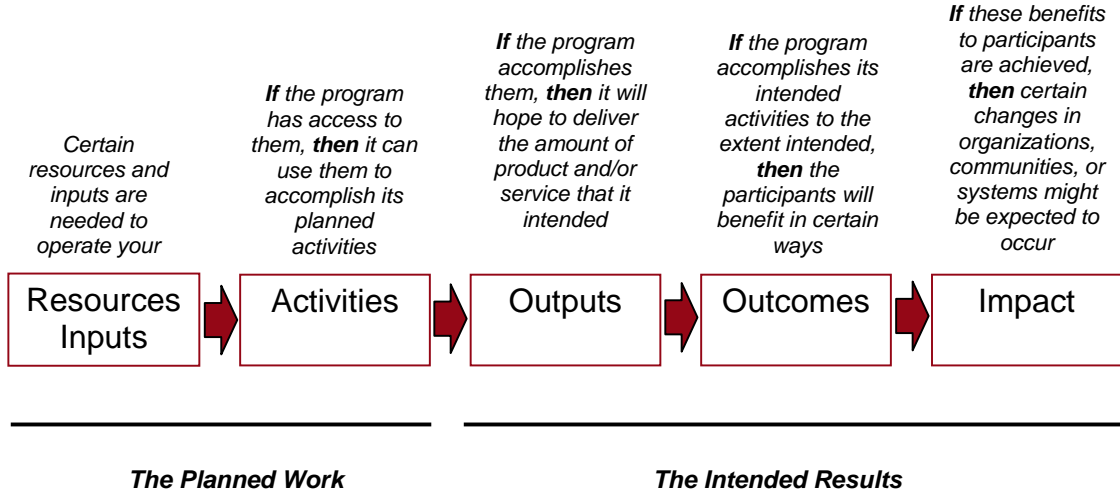
		Managers) Oversee day-to-day budgets The Director at HHP/HMS coordinates links with HMS and organizes training experiences at Harvard for members of the editorial team	
Managing Directors and Management Team	Managing Director in Portugal Managing Director at HHP/HMS	The Managing Director in Portugal is the chief operating officer, coordinating the efforts of the other members of the Executive Committee and the teams who report to them The Managing Director at HHP assists the Director at HHP and keeps continuous track of operational issues with the Managing Director in Portugal	Two times per year in person Bi-weekly tele or video conferences or as needed
Editorial Director		Leads the editorial team and the diversified group of experts who will create, continuously assess and update the content Works directly with the writer/editor at HHP on the selection of content	
Information System Director		Coordinates the information systems team and the building of the information systems infrastructure	
<b>Program in Clinical and Translational Research and Education</b>			
Clinical and Translational Research and Education Executive Committee	Three Co-directors in Portugal, one of whom serves as Chair Two Co-directors at HMS Two Managing Directors, one in Portugal and one at HMS	Responsible to the Program Coordinating Committee Coordinate the call for applications, screening applicants, selecting recipients, and monitoring progress of the programs, and selecting topics and faculty for the Workshops, Retreats, and Symposia. Coordinate and oversee Operating Units Review data Define and develop QM program, benchmarks and metrics of success	Two to four times per year Ad hoc meetings as agreed
Co-Directors	Three Co-Directors in Portugal and two at HMS	Translate strategy into operational and implementation plans Oversee and coordinate Operating Units Collect data and provide real-time feedback Chair Operating Committee Appoint Managers (HMS Directors to nominate HMS Managers, Portugal Co-Directors to nominate Portugal Managers) Oversee day-to-day budgets	Two times per year in person Bi-weekly tele or video conferences or as needed
Managing Directors and	Managing Directors in Portugal and at	Chief operating officers, coordinating the efforts of the Program and the	Two times per year in person Bi-weekly tele or video

Management Team	HMS The Managing Director in Portugal will be assisted by a Managing Assistant and a Web Assistant. The team will also include staff	Executive Committee and the teams who report to them Support implementation of the Programs Provide human resources Manage technical and logistical support Collect data Manage budget details Report to Directors and Co-Directors and formally four times per year to the Executive Committee	conferences or as needed
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**Appendix 3** lists the Governing Board and the people involved in the governance structure for the launch phase of the HMS-Portugal Program. Brief biographical sketches of the individuals listed above are included in **Appendix 4**.

### 5. Quality Management and Evaluation

In addition to the creation of the appropriate organizational structure, the development of a quality management framework will be important from the beginning of the HMS-Portugal Program. One model that could be used is the Kellogg Foundation “Outcomes Logic Model,” which has been developed and applied to long-term projects in the not-for-profit arena. The model essentially requires the definition of output and outcomes measures from the beginning. These metrics will help to evaluate the success of the various Programs in the HMS-Portugal Program and provide guideposts and benchmarks during its evolution. The overall scheme for the model is as depicted below in **Figure 3**:



As described in detail in the preceding sections, the desired outputs, outcomes, and impacts are already defined, but metrics of success will need to be developed in order to manage the Programs successfully.



### *Overall Program Management*

The Portugal and HMS Directors, Co-Directors, Coordinating and Executive Committee members, and Operating Unit members will be supported by the Portugal and HMS Managers and a dedicated administrative team responsible for:

- Arranging all core governance meetings
- Reporting outputs on all components of the Programs
- Providing administration for management of research grants and training programs and documentation as appropriate
- Providing content for HMS-Portugal Program websites and other reports and outlets, and describing the progress and outcomes of the individual components of the Programs

## **6. Infrastructure**

Although the creation of scientific and educational infrastructure has thus far been treated as a “secondary” aspect of the HMS-Portugal Program, there are certain infrastructure issues that will need to be part and parcel of this Program:

### *1. Scientific Infrastructure*

Although all labs need certain equipment and IT infrastructures, there will be an opportunity to create an integrated and organized network of research infrastructure and data centers as part of this Program. There will 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 HMS-Portugal Program, during the development and implementation of the various Programs, needs and opportunities for the creation of educational infrastructures could arise (e.g., on-line learning communities, virtual classrooms, etc.). It would be beneficial for the HMS-Portugal Program to give rise to models that are widely applicable across all levels of biomedical education, especially some of the novel approaches of the Health Information Program.

### *3. Management Infrastructure*

Although much of the success of the Program will depend on the interactions of scientists, educators, experts, and institutional partners, and much of the work will be done in self-organizing working groups, a supportive management and leadership structure will also be created 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. *Information Technology (IT) Infrastructure for the HMS-Portugal Program*

The existing Portuguese international collaborations with the Massachusetts Institute of Technology, Carnegie Mellon University, the University of Texas at Austin, and others have created a successful and useful web presence, and the HMS-Portugal Program will benefit from a similar IT infrastructure. For example, the website will 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 Program. It will also allow for international and public interaction with all aspects of the HMS-Portugal Program. UMIC will be the responsible institution to develop the required IT infrastructure for the HMS-Portugal Program.

## **Appendix 1. Faculty and experts who have participated in discussions leading to the HMS-Portugal Program in Translational Research and Health Information**

### **Main faculty and experts in Portugal:**

#### *Program in Health Information*

- Pedro Moradas Ferreira, MD, PhD, Professor, Biomedical Sciences Institute Abel Salazar, Porto
- José Henrique de Barros, MD, PhD, Professor of Epidemiology (Medical Sociology), University of Porto Medical School
- José Manuel Calheiros, MD, PhD, Professor, Medical School of Beira Interior University
- Salvador Massano Cardoso, MD, PhD, Professor of Epidemiology and Preventive Medicine, Medical School of Coimbra University
- José Luís Castanheira, MD, PhD, Head of the Department of Epidemiology and Health Statistics of the Directorate-General for Health, Associate Professor of Public Health
- Manuel João Costa, MD, PhD, Professor at Minho University Medical School
- Carlos Jorge Duarte, MD, PhD, CNC, Coimbra
- Pedro Ferreira, PhD, Assistant Professor of Electrical and Computer Engineering, *Instituto Superior Técnico* (IST) of the *Universidade Técnica de Lisboa* (UTL); Member of the Board of UMIC
- Paulo Ferrinho, MD, PhD, President of the Portuguese Association of Epidemiology, Associate Professor of the Health Systems Unit of the Institute of Tropical Medicine, New University of Lisbon (UNL), Deputy Director of this Institute and Vice-President of its Scientific Council
- Nuno Lunet, PharmD, PhD, Assistant Professor of Epidemiology, University of Porto Medical School
- Luis Magalhães, PhD, Professor of Mathematics (on leave), *Instituto Superior Técnico* (IST) of the *Universidade Técnica de Lisboa* (UTL); President of UMIC
- José Manuel Pereira Miguel, MD, PhD, Professor of Medicine and Public Health of the Institute of Preventive Medicine, Faculty of Medicine, University of Lisbon
- Ana Noronha, PhD, Director Ciência Viva – National Agency for the Promotion of Science and Technology
- Catarina Resende de Oliveira, MD, PhD, Professor, Institute of Biochemistry, Faculty of Medicine, University of Coimbra
- Rui Portugal, MD, PhD, Vice President, National Institute of Health
- Alexandre Quintanilha, PhD, Professor of the Biomedical Sciences Institute Abel Salazar, Porto
- Constantino T. Sakellarides, MD, PhD, Professor of Health Policy and Management, National School of Public Health, New University of Lisbon
- Luis Filipe Santos Silva, PhD, researcher of Associate Laboratory Institute of Pathology and Immunology of University of Porto (IPATIMUP).
- Nuno Jorge Sousa, MD, PhD, Member of the Board of Directors and Professor of the Minho University Medical School.
- Jorge Torgal, MD, PhD, Professor of Public Health, Faculty of Medical Sciences (FCM), New University of Lisbon (UNL)
- António Vaz Carneiro, MD, PhD, Professor of Medicine, Faculty of Medicine, University of Lisbon.

*Program in Clinical and Translational Research and Education*

Maria Carmo-Fonseca, MD, PhD, Professor of Cell and Molecular Biology, University of Lisbon Medical School

Claudio E. Sunkel, PhD, Professor of Molecular Biology, University of Porto

Catarina Resende de Oliveira, MD, PhD, Professor, Institute of Biochemistry, Faculty of Medicine, University of Coimbra

Manuel Sobrinho Simões, MD, PhD, Professor of Pathological Anatomy, University of Porto Medical School

Nuno Jorge Sousa, MD, PhD, Professor, Universidade do Minho Medical School

Alexandre Quintanilha, PhD, Professor of the Biomedical Sciences Institute Abel Salazar, Porto

Carlos Faro, Director of BIOCANT, Coimbra

Nuno Arantes e Oliveira, CEO, ALFAMA, Inc.

Hugo Gomes da Silva, MD, Director of Scientific Affairs, Merck Research Laboratories

Peter Villax, Member of the Board, HOVIONE

**Main faculty at Harvard:**

David E. Golan, MD, PhD, Dean for Graduate Education, Professor of Biological Chemistry and Molecular Pharmacology and Professor of Medicine, HMS

Tomas Kirchhausen, PhD, Professor of Cell Biology, HMS

Anthony L. Komaroff, MD, Steven P. Simcox, Patrick A. Clifford and James H. Higy Professor of Medicine, HMS

David W. Bates, MD, Professor of Medicine, HMS, Professor of Health Policy and Management, HSPH

Stephen C. Blacklow, MD, PhD, Professor of Pathology, HMS

Joan S. Brugge, PhD, Head of the Department of Cell Biology, Louise Foote Pfeiffer Professor of Cell Biology, HMS

Amitabh Chandra, PhD, Assistant Professor of Public Policy, KSG

Paul R. Conlin, MD, Associate Professor of Medicine, HMS

E. Francis Cook, ScD, Professor of Medicine, HMS, Professor of Epidemiology, HSPH

Arnold M. Epstein, MD, Professor of Medicine, HMS, John H. Foster Professor of Health Policy and Management, HSPH

Steven L. Gortmaker, PhD, Professor of the Practice of Health Sociology, HSPH

Joseph Loscalzo, MD, PhD, Head of the Department of Medicine at Brigham and Women's Hospital, Hersey Professor of the Theory and Practice of Physic, HMS

Richard Losick, PhD, Howard Hughes Medical Institute Professor, Maria Moors Cabot Professor of Biology, and Harvard College Professor, FAS

Thomas Michel, MD, PhD, Dean for Education, Professor of Medicine, HMS

Lee M. Nadler, MD, Dean for Clinical and Translational Research, Director of the Harvard Clinical and Translational Science Center (Harvard Catalyst), Virginia and D.K. Ludwig Professor of Medicine, HMS

Rohini Pande, PhD, Mohamed Kamal Professor of Public Policy, KSG

David L. Van Vactor, PhD, Professor of Cell Biology, HMS

## Appendix 2. Summary of Activities

Activity	Year 1: 2009/10	Year 2: 2010/11	Year 3: 2011/12	Year 4: 2012/13	Year 5: 2013/14	Total
<b>Health Information</b>						
Collaborative Grants for Content Production and Delivery Assessment of the Impact	3 awards (up to 3 years each)	3 awards (up to 3 years each)	3 awards (up to 3 years each)	3 awards (up to 3 years each)	3 awards (up to 3 years each)	15 awards (up to 3 years each)
		2 awards (up to 2 years each)		2 awards (up to 2 years each)		4 awards (up to 2 years each)
Educational Programs for Journalists	2 awards	2 awards	2 awards	2 awards	2 awards	10 awards
Programs for Medical Writers	1 workshop (two days)	1 workshop (two days)	1 workshop (two days)	1 workshop (two days)	1 workshop (two days)	5 workshops (two days each)
<b>Clinical and Translational Research</b>						
Collaborative Research Grants (1)	3 awards (up to 3 years each, involving three laboratories) (27 investigators in 9 laboratory groups)	3 awards (27 investigators in 9 laboratory groups)	3 awards (27 investigators in 9 laboratory groups)	3 awards (27 investigators in 9 laboratory groups)		12 awards (108 investigators in 36 laboratory groups)
Harvard College Summer Research Fellowships in Health Sciences (2)	3 awards	3 awards	3 awards	3 awards	3 awards	15 awards
Junior Research and Career Development Awards (3)	2 awards	2 awards	2 awards	2 awards	2 awards	10 awards
Senior Research and Career Development Awards (4)	1 award	1 award	1 award	1 award		4 awards
HMS Co-Directors' Innovation Fund for Translational Research and Postdoctoral Mentorship	1 award	1 award	1 award	1 award	1 award	5 awards
<b>Workshops</b>						
Clinical and Translational Research Workshops (5)	3 workshops	3 workshops	3 workshops	3 workshops	3 workshops	15 workshops
<b>Annual Retreat (6)</b>	2-day retreat	2-day retreat	2-day retreat	2-day retreat	2-day retreat	5 annual retreats
<b>Annual Symposium (7)</b>	1-day public symposium	1-day public symposium	1-day public symposium	1-day public symposium	1-day public symposium	5 annual symposia

## Notes

(1) Each Collaborative Research Grant will involve at least two Portuguese research groups and at least one Harvard research group. These grants will provide funding for two years, with the possibility of extension for a third year. A typical award will provide resources for each individual laboratory adequate to cover the full salaries of two researchers (postdoctoral fellows, PhD students, or technicians), supplies, and limited resources for equipment. Salary support for PIs will be limited to no more than 10% at Harvard. No salary is required for the Portuguese PIs. Funds will also be provided for Harvard College undergraduates to participate in research in one of the Portuguese laboratories supported by a Collaborative Research Grant.

(2) Each Summer Research Fellowship will be granted to one Harvard College student for one summer of research in a Portuguese laboratory. Where appropriate, and in coordination with faculty at Harvard College, some of these undergraduates would have the opportunity to spend an additional semester in Portugal continuing their research and taking non-science courses at a collaborating Portuguese University.

(3) Each Junior Research and Career Development Award will be granted to one MD resident for two years. A typical award will involve two summers of coursework at Harvard and two years of research in Portugal.

(4) Each Senior Research and Career Development Award will be granted to one clinically trained MD for four years. A typical award will involve two years of coursework at Harvard followed by two years of independent research in Portugal.

(5) Each Workshop will be two weeks in duration and will be delivered by four Harvard faculty (one week each) working in collaboration with four Portuguese faculty (one week each). Faculty will be provided with travel expenses and honoraria. Where appropriate, support for a Teaching Fellow (Harvard graduate student) will also be provided. Workshops will be designed to accommodate 35-40 students each; first priority will be assigned to trainees in the HMS-Portugal Program in Translational Research and Health Information.

(6) All researchers, faculty, and trainees in the HMS-Portugal Program in Translational Research and Health Information – including participants in the Health Information Program – will be expected to attend the annual retreat. Review Board, Governing Board, and Steering Committee members will also be invited to attend. In total, attendance is expected to be approximately 150 per retreat. Accommodations and travel expenses will be provided for all attendees.

(7) The annual symposium will be a public, one-day event involving four Portuguese speakers and four international speakers. Accommodations and travel expenses will be provided for participants from the HMS-Portugal Program in Translational Research and Health Information.

### **Appendix 3. Governing Board and people involved in the Governance Structure at the launch of the HMS-Portugal Program**

#### **Governing Board:**

1. João Sentieiro, President of the Portuguese Science and Technology Foundation, FCT, or a representative, who will chair
2. Jeffrey S. Flier, Dean of the Faculty of Medicine, HMS, or a representative
3. Luis T. Magalhães, Portuguese Senior Official, appointed by the Minister of Science, Technology and Higher Education
4. Daniel G. Ennis, Executive Dean for Administration, HMS Senior Official, appointed by the Dean of the Faculty of Medicine, HMS
5. Program Director in Portugal
6. Tomas Kirchhausen, Program Director at HMS

#### **Co-Directors in Portugal** (installation phase; to be confirmed by Nat. Steering Com.):

1. Manuel Sobrinho Simões, for Clinical and Translational Research and Education Program
2. Maria Carmo-Fonseca, for Clinical and Translational Research and Education Program
3. Claudio E. Sunkel, for Clinical and Translational Research and Education Program
4. Pedro Moradas Ferreira, for Health Information Program
5. Catarina Oliveira, for Health Information Program

#### **Co-Directors at HMS:**

1. Tomas Kirchhausen, Co-Director of Clinical and Translational Research and Education Program at HMS
2. David E. Golan, Co-Director of Clinical and Translational Research and Education Program at HMS
3. Anthony L. Komaroff, Director of Health Information Program at HMS

#### **National Steering Committee**

João Sentieiro, President of the Portuguese Science and Technology Foundation, FCT, or a representative, who will chair

1. Dean, or representative, Faculdade de Ciências Médicas, Universidade Nova de Lisboa
2. Dean, or representative, Escola de Ciências da Saúde, Universidade do Minho
3. Dean, or representative, Faculdade de Medicina, Universidade do Porto
4. Dean, or representative, Inst. de Ciências Biomédicas de “Abel Salazar”, Universidade do Porto
5. Dean, or representative, Faculdade de Ciências da Saúde, Universidade da Beira Interior
6. Dean, or representative, Faculdade de Medicina, Universidade de Coimbra;
7. Dean, or representative, Faculdade de Medicina, Universidade de Lisboa.
8. Director, or representative, Centro de Neurociências e Biologia Celular, CNC
9. Director, or representative, Instituto de Medicina Molecular, IMM
10. Director, or representative, Instituto de Patologia e Imunologia Molecular da Universidade do Porto, IPATIMUP

11. Director, or representative, Instituto de Biologia Molecular e Celular da Universidade do Porto, IBMC
12. Director, or representative, Laboratório Associado de Oeiras, LAO

### **HMS Steering Committee**

1. Richard G. Mills, Dean for Operations and Business Affairs, HMS
2. Joan S. Brugge, Head of the Department of Cell Biology, HMS
3. Joseph Loscalzo, Head of the Department of Medicine at Brigham and Women's Hospital, HMS
4. Stephen C. Blacklow, Director of the Biomedical Sciences MD-PhD Program, HMS

### **Evaluation Committee for competitive calls for Collaborative Clinical and Translational Research Grants**

**Chair:** Professor Lee M. Nadler, Dean for Clinical and Translational Research at Harvard Medical School and Director of the Harvard Clinical and Translational Science Center.

Other experts: to be nominated by FCT, after consultation with HMS.

### **Evaluation Committee for competitive calls for collaborative grants for production and delivery of health information**

**Chair:** Anthony L. Komaroff, Director of Health Information Program at HMS

Other experts: to be nominated by FCT, after consultation with HMS.



## **Appendix 4. Brief Biographical Sketches of Director and Co-Directors at HMS**

### *Program in Health Information*

**Anthony L. Komaroff, MD, Director (HMS/HHP).** Dr. Komaroff is the Steven P. Simcox/Patrick A. Clifford/James H. Higby Professor of Medicine at Harvard Medical School and Senior Physician at Brigham and Women's Hospital. He is a practicing primary care physician and diagnostic consultant. From 1982 until 1997, Dr. Komaroff was Director of the Division of General Medicine at Brigham and Women's Hospital, and built one of the world's renowned academic general medicine units. From 1982-1987, he was the chief information officer of Brigham and Women's Hospital, and was administratively responsible for building all the Hospital's medical and financial computer systems—systems which received the Smithsonian Institution's highest award for technological innovation. Dr. Komaroff is responsible for teaching medical students, medical residents, and fellows on the inpatient and outpatient services of Brigham & Women's Hospital. He also teaches a course in health policy at Harvard Medical School and Harvard School of Public Health, and was for several years the director of Harvard Medical School's fellowship Program in Clinical Effectiveness, a program that annually trains over 280 fellows from around the world. Dr. Komaroff has been a pioneer in several different fields of clinical research and health services/health policy research. He has published over 230 articles and book chapters and 2 books.

Dr. Komaroff also is Editor-in-Chief of the Harvard Health Publications Division (HHP) of Harvard Medical School, the division responsible for all Harvard Medical School's health information for the general public—including books, newsletters, magazine columns and a weekly newspaper column. HHP also publishes health information on many Web sites, including AOL, MSN and Yahoo. Dr. Komaroff served as Editor in Chief of the best-selling book, the *Harvard Medical School Family Health Guide*, an encyclopedia of health information for the general public that is published by Simon & Schuster/Free Press. He also is the founding editor of *Journal Watch*, a publication of the Massachusetts Medical Society/*New England Journal of Medicine*, a publication that summarizes for practicing doctors the latest biomedical and clinical research from the top journals of medicine and biology.

After receiving his undergraduate degree from Stanford University (Phi Beta Kappa), Dr. Komaroff obtained his M.D. (Alpha Omega Alpha) from the University of Washington School of Medicine. His internship and residency were at Cambridge City Hospital and Beth Israel Hospital, in the greater Boston area, following which time he joined the Harvard faculty.

In recognition of his contributions, Dr. Komaroff has been elected a fellow of the American Association for the Advancement of Science, the American College of Physicians, and the Association for Health Services Research. He has served on advisory committees for the U.S. Department of Health and Human Services, the Surgeon General of the United States, the U.S. Centers for Disease Control and Prevention, and the U.S. Institute of Medicine/National Academy of Sciences.

### Program in Clinical and Translational Research and Education

**Tomas Kirchhausen, PhD, Co-Director (HMS).** Dr. Kirchhausen was born in Peru and in 1977 received his PhD in Biophysics and Physiology at the Instituto Venezolano de Investigaciones Cientificas. In 1978, he started a short postdoctoral stay at the University of Chicago studying lipoproteins. In 1979 he joined the x-ray crystallographic group of Steve Harrison at Harvard University for further postdoctoral training. There he initiated his studies on clathrin-coated pits and vesicles, a molecular machinery that deforms donor membranes to generate cargo-specific transport carriers. Their function is required for proper lipid homeostasis, signal integration, cell-cell communication, immune responsiveness, viral infection and pathogen invasion. His faculty tenure at Harvard started in 1986 with his appointment as Assistant Professor in Anatomy and Cell Biology at Harvard Medical School.

He is currently Professor of Cell Biology at Harvard Medical School and Senior Investigator at the Immune Disease Institute at Harvard Medical School and the Program in Cellular and Molecular Medicine, Children's Hospital, where he uses structural, cell and chemical biological approaches to tackle this important topic. He and his colleagues solved the first X-ray crystal structure of clathrin, obtained the x-ray structure of the AP-1 clathrin adaptor and recently generated high-resolution cryoelectron microscopic images of the clathrin lattice. These molecular snapshots reveal in exquisite detail stages of coat assembly and disassembly. His group also uses real-time imaging to monitor the life cycle of individual coated pits in living cells, to trace the trafficking itineraries that culminate in spatially and temporally correct cargo delivery, the uptake of viruses and bacteria and to develop chemical screens to identify novel inhibitors for these and other cell biological processes. The goal is to generate "molecular movies" that describe in molecular detail the intricacies of membrane traffic. He has published more than 139 publications in peer-reviewed journals, acts as reviewer for scientific journals and granting agencies such as the National Institute of Health, National Science Foundation, Wellcome Trust and the Israel-US Binational Science Foundation, among others. He serves as a lecturer at Harvard Medical School, MIT, Biopolis (Singapore) and in international courses. For the past 25 years he has held the position of Tutor in Biochemical Sciences at Harvard College. He recently became a Fellow of the American Association for the Advancement of Science.

**David E. Golan, MD, PhD, Co-Director (HMS).** Dr. Golan is Professor of Biological Chemistry and Molecular Pharmacology, Professor of Medicine, and Scholar and Founding Member of The Academy at Harvard Medical School, and Physician in Medicine at Brigham and Women's Hospital and the Dana-Farber Cancer Institute. He directs the Research Education Program in the Harvard Clinical and Translational Science Center, leads the Human Pharmacology Program in the Harvard Medical School Scholars in Clinical Science Program, and is associate director of the Harvard Graduate Program in Human Biology and Translational Medicine. He has recently been appointed Dean for Graduate Education at Harvard Medical School.

Dr. Golan's laboratory uses novel laser and video microscopy techniques to study the dynamic properties of single molecules and populations of molecules in cell membranes; the formation and dynamics of contact areas mediated by membrane-bound receptors and ligands; the roles of two-dimensional molecular binding affinity, lateral mobility, and cell activation pathways in modulating cell-cell adhesion; and the molecular mechanisms that underlie redistribution of cell

signaling molecules in response to cell activation and adhesion. His research program explores fundamental biophysical mechanisms as well as clinical applications to diverse disease processes including vaso-occlusion in sickle cell disease, atherosclerosis in cardiovascular disease, and *Pseudomonas aeruginosa* colonization in cystic fibrosis. His bibliography includes 91 original research articles, 27 reviews and book chapters, 5 books and monographs, 2 patents, and print and non-print teaching materials in pharmacology and hematology.

Dr. Golan founded and directed the core course in pharmacology in the medical curriculum at Harvard Medical School (1989-2006). He currently directs the Principles of Pharmacology for the Investigator course in the Scholars in Clinical Science Program and the Leder Human Biology and Translational Medicine Program at Harvard Medical School. He also teaches extensively in graduate pharmacology, toxicology, and biophysics courses at Harvard Medical School and the Harvard School of Public Health. He is Editor-in-Chief of a new textbook of pharmacology (*Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy*, Lippincott Williams & Wilkins, ©2005 (1<sup>st</sup> Edition), ©2008 (2<sup>nd</sup> Edition)), which has been or is being translated into six languages. Dr. Golan attends on inpatient and consultation services in hematology at Brigham and Women's Hospital and he has a hematology outpatient clinic at Dana-Farber Cancer Institute. He has served as Co-Director of the Harvard-MIT MD-PhD Program (2000-2003), and he has mentored 18 postdoctoral trainees and visiting professors, 12 medical and graduate student trainees, and 16 research assistants and undergraduate students.

Dr. Golan received the A.B. *summa cum laude* in Chemistry from Harvard University (1975) and the M.D. (1979) and Ph.D. in Molecular Biophysics and Biochemistry (1982) from Yale University. He served as Intern and Resident in Internal Medicine (1979-83) and Research and Clinical Fellow in Hematology and Oncology (1983-85) at Brigham and Women's Hospital. He is Board certified in Internal Medicine and Hematology.

Dr. Golan is also an elected member of the American Society for Clinical Investigation and a recipient of a Merit Award for research from the National Institutes of Health. He has received the Alpha Omega Alpha Robert J. Glaser Distinguished Teacher Award from the Association of American Medical Colleges (2005) and ten awards for excellence in teaching from Harvard Medical School.

## Appendix 5. Projected Timeline of Activities

Unless otherwise stated, dates correspond to 2009/10	COMPETITIVE CALLS FOR PRODUCTION AND DELIVERY OF HEALTH INFORMATION	COMPETITIVE CALLS FOR ASSESS. OF THE IMPACT OF THE PROG. HEALTH INFORM.	EDUCATIONAL PROGRAM FOR JOURNALISTS	ANNUAL SYMPOSIUM AND RETREAT	WORKSHOPS (translational research, health information, program for medical writers)
Number of Calls	5	2	5	--	--
Total number	15 projects	4 projects	10 awards	5 Annual Symp. 5 Retreats	15 workshops
Call for applications	May15 – May 31 (2009) May 1 (2010–2013)	May 1 (2009, 2011)	July 1		May15 – May 31 (2009), May 1 (2010–2013), October 1, March 1
Expression of interest received by	June 30	June 30	n/a		June 1, November 1, April 1
Full applications received by	September 15	August 15	August 15		July 1, December 1, May 1
Successful applicants notified by	November 15	November 15	November 15		August 1, January 1, June 1
Research starts	January 1	January 1	December 1	First week of December	December 1 (so that at least one Workshop coincides with the time of the Symposium), April 1, October 1
Progress report received	December 1	December 1	December 1		15 days after completion of each Workshop
Second (third) year funding confirmed	January 1	January 1	n/a		n/a
Coursework at Harvard (SCSP)	n/a	n/a	n/a		n/a
Coursework at Harvard PCE	n/a	n/a	n/a		n/a
Visit Portuguese medical writers - HMS	n/a	n/a			October (2010, etc.)

Unless otherwise stated, dates correspond to 2009/10	COLLABORATIVE RESEARCH GRANTS	HARVARD COLLEGE SUMMER RESEARCH FELLOWSHIPS	JUNIOR CLINICAL RESEARCH/CAREER DEVELOPMENT	SENIOR CLINICAL RESEARCH /CAREER DEVELOPMENT
Number of Calls	4	5	5	4
Total number of expected activities	12 projects	15 fellowships	10 Awards	4 Awards
Call for applications	May15 – May 31 (2009) May 1 (2010–2013)	November 15 (2009)	July 1	July 1
Expression of interest received by	June 30	December 1 (2009)	n/a	n/a
Full applications received by	August 15	February 1 (2010)	September 1	September 1
Successful applicants notified by	November 15	March 1 (2010)	November 15	November 15
Research starts	January 1	Typical stay in Portugal between June 1 and August 30 (2010)	July 1	July 1
Progress report received	December 1	August 30 (2010)	June 1	June 1
Second (third) year funding confirmed	January 1	December 1 (2010)	July 1	July 1
Coursework at Harvard SCSP	n/a	n/a	n/a	July 1 – May 31 (2010–2011; 2011–2012; 2012–2013; 2013–2014; 2014–2015) (two years each)
Coursework at Harvard PCE	n/a	n/a	July 1 – August 31 (2010–2011; 2011–2012; 2012–2013; 2013–2014; 2014–2015) (two summers each)	n/a

