

**Report of the Independent Expert Group on the
Future of European Public Health Research**

Subgroup 2

28th March 2013

Preface

The next EU research and innovation framework programme 'Horizon 2020' will address a number of important societal challenges including health, demographic changes and well-being. To prepare the work in these areas, the Health Directorate of the European Commission's Research & Innovation Directorate General has set up an independent expert group. Its task was to take stock of the impacts, challenges and limitations of EU-funded public health research under the current and previous research framework programmes, and to identify priorities for future research. The experts, who worked in two subgroups from October 2012 to April 2013, represented a broad range of expertise and different regions of Europe.

Subgroup 1 assessed mainly the impact and the lessons learned from past framework programmes in the field of public health relevant for Horizon 2020.

Subgroup 2 was asked to address the following four questions: What should the thematic priorities for EU funded public health research under Horizon 2020 be? How to best structure European Public Health Research in the future? How to develop stronger links and synergies between EU funded research and national research activities, EU policy agendas and national policy agendas? How to improve the uptake of evidence generated from public health research in the development of public health policy?

This report summarises the recommendations from Subgroup 2.

The views expressed in this report is the sole responsibility of the expert group and do not necessarily reflect the views of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the information contained therein.

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Foreword from the Chair

Europe has a strong tradition of public health research and is well placed to meet the challenges of the future. There is great diversity between and within populations and in the measures taken in public health, which creates opportunities to learn about the causes of, and possible solutions to, public health problems.

This has been an important source of knowledge about how to improve public health since the birth of the discipline in its modern version, starting with the contribution by John Snow, considered the founder of modern epidemiology and public health, and whose 200th Anniversary is celebrated this year. By thorough and ingenious investigation of the distributions in time and site of the fatal cases of Cholera during the outbreaks in London in 1849 and again in 1854, he was able to conclude that the outbreaks were due to contaminated water supplies, when it was commonly believed it was due to a sort of air pollution, so-called miasma¹. Although the panorama of public health challenges is very different in the future of Europe, the key tools in research and implementation of its results to oppose them remain the same.

Increasingly, the European public health research community uses a common infrastructure to conduct research, and this has opened up new opportunities. It would be a serious mistake not to use these conditions to help us learn about the determinants of health and our ability to influence them through health policies guiding prevention and treatment.

The recognition of these opportunities is expressed in Article 168.1 of the Lisbon Treaty of the European Union addressing the health of its citizens²: “Union action, which shall complement national policies, shall be directed towards improving public health, preventing physical and mental illness and diseases, and obviating sources of danger to physical and mental health. Such action shall cover the fight against the major health scourges, by promoting research into their causes, their transmission and their prevention, as well as health information and education, and monitoring, early warning of and combating serious cross-border threats to health.”

Since research by definition is about obtaining new knowledge, implying the outcome is unpredictable, we consider open-mindedness, flexibility and adaptability in the implementation of the Horizon 2020 programme community as a fundamental pre-requisite for the success of future public health research in the European Union. Only then will we be able to see the kind of progress that John Snow’s work was such a strong example of in the face of the devastating threats of public health in his time.

On behalf of the group, I herewith thank the European Commission, Directorate General for Research & Innovation for being invited to inform the process of Horizon 2020 and for their help during the work. We wish the Commission every success in their support for public health research in the next seven years.

Thorkild I.A. Sørensen
Chair

Executive summary

Our most important recommendation is that EU public health research funding should require EU added value from funded projects. ‘Added value’ refers to a scientific necessity or major advantage of conducting the particular research project in a European rather than national setting. Specifically the funding must be for projects that (i) clearly demonstrate a potential for translation and policy uptake to benefit the health of EU citizens and (ii) would not necessarily be funded by national agencies.

We have identified specific thematic priorities for research funding in four fields. In the health promotion field we need to deepen our understanding of the barriers to the adoption of healthy lifestyles, and use this understanding to develop innovative interventions. In the field of disease prevention we need to continue funding cutting-edge research on the causes and management of disease but also pay more attention to the ‘deprogramming’ of interventions that now are known to be ineffective or too costly compared to other solutions. In the field of health services research we recommend a focus on innovations that improve the humanity, quality, safety and efficiency of care and encourage a shift towards prevention. In the health policy field we have attempted to focus on the major policy challenges for public health in the coming decades. In addition to the above we recommend that dedicated funding is made available for methodological aspects of public health research and for research on knowledge translation.

We need more research into ‘what works’ to solve the major societal challenges in the public health field rather than research that confirms the existence of well-established problems. One of the major obstacles to such a strategic approach is the uncoordinated nature of current project funding. To address this we recommend that the Directorate General for Research & Innovation (DG-RTD) begin to support Research Networks to achieve incremental progress on a small number of priority themes over the period 2014-2020. The work of these Networks should be coordinated by a new Board for Public Health Research. We also identify areas where synergies could be achieved between EU public health research funding and the activities of policy makers and other research funding agencies. To achieve these synergies we recommend that the European Commission should present to the European Parliament and the Health Council a new EU health and health research strategy identifying common public health challenges and responses across the member states. Separately, DG-RTD should inform academia, policy makers and the general public of its public health research funding activities through an appropriate communication strategy, regular bulletins, social media and a dedicated interactive website. Finally, we have provided a series of recommendations about how DG-RTD can improve the extent to which its research is translated into practice. These make it clear that knowledge translation must become embedded in all aspects of the EU funding stream from the design of funding calls and project reporting requirements through to training for research consumers and brokers.

The following report spells out and justifies panels of specific recommendations that detail or add to those mentioned above.

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1. Background and scope of the report

1.1 *EU funding of public health research*

EU funding of public health research is co-ordinated by the European Commission, Directorate General for Research & Innovation (DG-RTD). The overall amount and type of funding is determined by the European Commission during the decision making process around each Framework Programme. DG-RTD has provided funding for public health research since 2000. The funding has been exclusively for once-off projects rather than larger programmes of research. DG-RTD has committed €425.46 million since that date (FP5: €31.4m, FP6: €29.6m, FP7: €364.5m) and has funded 190 different projects (FP5: 22 projects, FP6: 27 projects, FP7: 141 projects).

This is the report of an Independent Expert Group that was commissioned in September 2012 by DG-RTD to make recommendations about “the future of European public health research” in the period 2014-2020 (the Horizon 2020 funding stream).

The report addresses four questions.

- What should the future thematic priorities within Horizon 2020 be?
- How to best structure European public health research in the future?
- How to develop stronger links and synergies between EU funded research and (i) national research activities (ii) EU policy agendas (iii) national policy agendas
- How to improve the uptake of evidence generated from public health research in the development of public health policy?

It must be stressed that the eventual implementation of the Horizon 2020 programme will be based on input to DG-RTD from many other Advisory and Programme Committees. It should also be noted that it is for DG-RTD to decide upon the most appropriate use of European Commission structures to implement the recommendations and that the report has potential implications for other agencies such as the European Research Council, other Commission Directorates and national funding agencies.

1.2 *Methods*

Membership of the Independent Expert Group is shown in Appendix 1. Group members were asked to set aside their personal and institutional research interests and produce ideas beyond the range of options that were already available to DG-RTD staff (i.e. ‘out of the box’). To develop answers to the above questions the group members drew upon their own personal experiences, resources and acquired knowledge about public health and public health research in general and EU based research in particular. They also drew upon personal and professional networks as appropriate with the *proviso* that any advice received from such networks was not to be transmitted or represented in an official capacity. Individual members circulated recommendations to the group as a whole before, after and during five whole-day monthly meetings in Brussels. Guest speakers from DG Health & Consumers (DG-SANCO), DG Communications Networks, Content & Technology (DG-CNECT)

and from a parallel group involved in the evaluation of DG-RTD funding for public health research were invited to participate in some meetings.

The following background material was used to inform the group during the deliberations.

- A booklet on completed and on-going projects in public health funded by DG-RTD under previous Framework Programmes (FP5, FP6 and FP7)³;
- A systematic evaluation of these projects by the parallel evaluation group;
- Details of the societal challenges that have been proposed to guide Horizon 2020 programme funding for public health research (Part III, Societal challenges, Section 1 Health, Demographic Change and Wellbeing) – see Appendix 2;
- Reports from other European Commission Directorates and other authorities, e.g. WHO;
- Minutes from the European Health Forum (Gastein 2012, Forum 4 – Public Health Challenges 2050 – see Appendix 3).

All expressed ideas were collected in a master document to allow the identification of key recommendations. These were presented at a workshop held at the end of January 2013 to get feedback from a broader forum of researchers in public health and stakeholders. Inspired by the feedback, the group made changes to the report's recommendations. The final report was agreed by our group and delivered to DG-RTD in March 2013.

1.3 Definitions

The Independent Expert Group, building on the definition of Beaglehole *et al*⁴, defined public health actions as:

“Collective actions for sustained population-wide health improvement, which includes research on health promotion, disease prevention, health services and health policies.”

This definition implies a focus on actions and interventions that need collective (or collaborative or organised) actions more so than individual actions; sustainability (i.e., the need to embed policies within supportive systems); and public health goals (population-wide health improvement and the reduction of health inequalities).

Research is descriptive and analytic activity that provides new knowledge of general value. The Group adopted the Medical Subject Heading (MeSH term) definition of research:

“Critical and exhaustive investigation or experimentation, having for its aim the discovery of new facts and their correct interpretation, the revision of accepted conclusions, theories, or laws in the light of newly discovered facts, or the practical application of such new or revised conclusions, theories, or laws.”

Given the nature of public health problems and opportunities it is clear that many different research disciplines need to be involved to properly address the topics. Public health research was accordingly defined as:

“Critical and exhaustive multi- and cross-disciplinary investigation (development, evaluation, implementation) of opportunities for collective action in the fields of health promotion, disease prevention, health services and health policies that have the potential to produce sustained population-wide health improvement and reduced health inequalities.”

2 Prioritisation of public health research in Horizon 2020

2.1 European public health research

Public health research in Horizon 2020 should have at least three major goals. First, it should help us understand the current and future impact on population health of major societal challenges such as globalisation, climate change, environmental exposures, economic crisis, population ageing and the rapid diffusion of information technologies. Second, it should allow us to evaluate the comparative effectiveness of different policy responses to these challenges. Third, it should make a contribution towards improving population health and reducing health inequalities through the development of innovative structures, processes and technologies both within and outside healthcare systems.

In order to be able to address these research questions it is important that researchers from different disciplinary perspectives work together in a spirit of genuine cooperation and respect. This is not only to create synergies (i.e. research teams that are more valuable than the sum of their parts), but also to help develop new perspectives on old problems. We will need to link to biomedical sciences to help us understand the biological processes involved in ageing, resilience and disease susceptibility. The biomedical sciences will also assist in our understanding of the heterogeneity of health and what this means for population health interventions. We might learn from recent advances in economic policy evaluations about how to provide good data when existing health programmes become obsolete or ineffective. We need to team up with ecology, environmental and veterinarian sciences when addressing the health consequences of environmental hazards caused by pollution, radiation and climate changes. And the social sciences and humanities can help us to understand the ethical implications, real-world behaviour and norms of citizens, patients, professionals, policy makers and societal institutions and structures.

The international dimension of public health research is as important for the EU as it is for national research bodies. The WHO and OECD are increasingly involved in Commission health activities, health research and health development activities. Bilateral or multilateral cooperation with other regions of the world should be encouraged, in particular with developing countries in the field of disease prevention. Within the EU there are activities in the health field that must on the one hand be coordinated but on the other respect the various ethical traditions of its Member States. For example, the recent Directive on the right to cross-border care raises many ethical questions about patient safety, informed consent and the protection of medical records. Similarly, the desire to exploit large

epidemiological datasets must deal with the different historically determined, legal and cultural attitudes to privacy in different Member States.

It is time for a more comprehensive and holistic approach to public health research. The building blocks produced by each funded project need to fit into a structured whole to help us understand the complexity of the multi-level, direct and indirect determinants of health. Inter-sectoral collaboration is required so that public health research does not sit in isolation. Researchers will have to work together to synthesise and integrate their findings with diverse areas of study to inform policy, programmes and practices in health and other sectors. Public health research is uniquely positioned to make such collaborations more common.

Finally, the European Union needs leadership on public health research funding and a political will from higher European Commission levels to re-allocate (or outsource) adequate professional resources in order to initiate the proposed changes.

2.2 General recommendations regarding mission

We recommend that the most important priority for EU public health research funding is to focus on issues that have a distinct European element. This priority has not been explicit in the past as there has been no specific mission statement for the EU public health research funding stream. We recommend that the lack of a mission statement be rectified immediately to ensure this does not continue for the Horizon 2020 programme. Horizon 2020 is governed by a general mission that includes a commitment to ‘excellent science’ with ‘industrial potential’ that addresses ‘societal challenges’. We recommend a more specific mission statement be used by DG-RTD to direct the public health research funding stream:

“EU funding under Horizon 2020 for public health research should aim to produce new knowledge that can, in time, be translated into action to improve the health and well-being of EU citizens, and, if possible, to reduce health inequalities, in the period up to and beyond 2020.”

When applying this mission statement the group also recommends that EU funding for public health research under Horizon 2020 should not be used for initiatives that are aimed solely at building capacity in public health and its general research infrastructure in EU Member States. Although these investments are much needed, funding should come from other sources such as the EU Structural Funds.

The purpose of the latter recommendation is to make it clear that distinct funding streams are needed to encourage excellent research and to build the capacity to do such research. Involvement in research may contribute to capacity building (e.g. staff, training, research facilities), but this should not be the primary purpose of involving researchers from Member States where capacity building is required. The primary consideration when evaluating consortia of researchers should be the excellence of the proposal and the necessity of all members of the consortia to fulfil its scientific aims. We recognise that these two problems (ensuring scientific excellence and building capacity) cannot be solved in isolation from each

other. Therefore, this recommendation should only be implemented when it is clear that dedicated funding mechanisms for building capacity in public health research have been adequately developed. We have made some specific recommendations regarding capacity building in Section 3.2 on Research Networks.

2.3 *EU added value of public health research*

The amount of funding for public health research that is provided by Member States through national initiatives is much larger than that provided by the European Commission. It is essential therefore, that the main funding priority for DG-RTD should be research which provides 'EU added value'. This means value over and above the base case of simply dividing the funding *pro rata* between Member States and having it managed by national research funding agencies or requiring multiple Member States to be represented in EU funded research projects. In other words, it is necessary to define the added value of having an EU level agency manage funding for public health research and require international cooperation.

In order to clarify this priority the group recommends that public health research should not be funded by DG-RTD if there is not a clear case for EU added value. Specifically the funding must be for projects that (i) demonstrate a potential for translation and policy uptake to benefit the health of EU citizens and (ii) would not necessarily be supported by national funding agencies. EU funding should not replace, but rather supplement national funding for public health research.

Examples of the types of research meeting this requirement include the following examples, which are presented in no particular order.

- Studies that investigate the impact of EU policies and regulations in health (e.g. cross-border care) and non-health (e.g. trade, agriculture, transport, food safety) domains on the health and health-related quality of life of EU citizens.
- Studies that investigate the impact of heterogeneous Member State health policies, human resource mixes and governance structures on cost, health outcomes and other indicators and in EU Member States.
- Research which 'scales up' interventions that have been demonstrated as effective in one Member State to other Member States.
- Research that investigates the impact of the diversity of the population (e.g. social, genetic, demographic, behavioural differences) of EU Member States on population health outcomes.
- Research that investigates the impact of the diversity of the environment (e.g. climate, pollution) of EU Member States on population health outcomes.
- Research that examines the causes of variation in the incidence of recent major public health problems in different EU Member States (e.g. childhood mental health problems, obesity, diabetes).
- Research that can only be performed by multinational teams because of scale issues such as sample sizes for rare diseases, or the need for complementary facilities and researcher competences.

- Research activity that exploits Europe-wide distributed infrastructures (e.g. data banks, bio-banks).
- Studies which address neglected research areas such as ‘orphan’ exposures, diseases, and treatments that would not be addressed by individual Member States unless EU support is provided.

The above list is not intended to be exhaustive, and we recommend that researchers be allowed to put forward other examples and arguments for the EU added-value of their research proposals.

2.4 Future thematic priorities within Horizon 2020

We acknowledge that the most influential list of public health research topics produced so far for the Horizon 2020 programme is the ‘societal challenges’ document approved by the Competitiveness Council on the 11th December 2012 (Appendix 2). In order to produce ideas not currently available to DG-RTD staff we have not attempted to replicate or synthesise our research priorities with those on the societal challenges list. Instead we have attempted to identify priorities beyond those specified on the list but nevertheless compatible with the overall scope laid out in the document.

When producing our list of priorities we have been influenced by a number of core principles.

1. In any future funding calls there has to be room for researchers to produce innovative approaches to the formulation of research questions and designs. DG-RTD should avoid calls that are so narrow and prescriptive that researchers cannot contribute their own insights into the best approaches to knowledge creation.
2. We have generally taken a systems view regarding the social determinants of health and interventions to improve the health of populations. We recognise contextual influences including those that reach beyond EU jurisdictions and borders. We believe it is crucial to continue to research the factors that are protective of health and upstream social determinants in order to foster the cross-sectoral measures needed to effectively bridge the gap of health inequalities within and between European Member States.
3. We have tried to focus on health and well-being, and not only on disease and its consequences for disabilities and mortality.
4. We contend that most population health advances will come from the incremental deepening of our understanding of the determinants of health and the application of this knowledge for the design of innovative, complex, population health interventions.
5. We argue for careful attention to achieving the right balance between descriptive and analytical research. In Horizon 2020 we would expect a greater attention to the latter category than has previously been the case. We would also expect an obligation on funding applicants to propose the highest possible quality of research design for the research question they are investigating. For quantitative comparative studies, observational research should only be funded if experimental research cannot be performed.

6. We need more research into ‘what works’ rather than research that confirms the existence of well-established problems. Researchers should concentrate on the development, evaluation and implementation of practical, innovative solutions to real-life problems and recognise the current realities of the lives of European citizens, particularly in relation to the ongoing economic crisis. These solutions do not necessarily mean technological solutions: managerial, policymaking, community initiatives and other solutions may provide cheaper and more effective ways of dealing with public health challenges.

Within each of the fields of health promotion, disease prevention, health services research, health policy research and methods in public health research, we have in the following section provided a series of specific thematic priorities. They are not listed in any particular order and should only be taken as suggestions emerging out of the discussions in the group and the input from the workshop. A separate series of suggestions about research on knowledge translation are given in Chapter 5.

Health promotion

The main challenge in the health promotion field is to understand barriers to the adoption of healthy lifestyles, and using this understanding to develop innovative interventions. Research in this field needs to move from ‘knowing’ to ‘doing’ within the Horizon 2020 programme. We recommend the following research priorities.

1. Development, evaluation and implementation of innovative environmental supports for healthy lifestyles among the general public. This should include:
 - innovative supports to individuals wanting to adopt a preventive lifestyle and the development of new or improved population or personalised prevention measures for lifestyle related conditions;
 - empowerment based strategies (as opposed to strategies that focus on negative behaviours) that are adapted to the context and situation of citizens and build on personal and community assets.Research on barriers and facilitators to the promotion of effective environment supports by industry and governments should also be encouraged.
2. Innovative approaches to improving the mental health and well-being of children and adolescents including:
 - interventions developed within the community mental health tradition;
 - holistic approaches to treatment and reducing the overdiagnosis of psychiatric conditions in young people;
 - interventions that promote resilience, mindfulness, empathy, coherence and flourishing in younger people;
 - interventions that reduce inappropriate long-term use of pharmaceutical and technological interventions for mental health conditions in younger people.
3. Research that deepens our understanding of the conditions for the success of complex population health interventions that reduce health inequalities including:

- research on the replicability and adaptation of interventions in other countries/regions, demographic groups and cultures;
- the development of comprehensive models of health behaviour that can be flexibly adapted to different contexts and used to match different options to each context.

Disease prevention

There are six main challenges in the field of disease prevention. First, we need to evaluate solutions such as self-management that focus on individual level disease management. Second, we need to find a way to take advantage of the rapidly developing 'omics' technologies (genomics, transcriptomics, proteomics, metabolomics, etc.) in individualised or stratified disease prevention and management. Third, we need to explore the potential of information technology. Fourth, we need to continue to deepen our understanding of the avoidable causes and biological mechanisms that underpin health and diseases. Fifth, we need a continued focus on the cost-effectiveness of population based disease prevention interventions, including the 'deprogramming' of interventions that are known to be ineffective. Sixth, we need to increase our collaboration with researchers outside the EU in order to develop solutions to global disease threats.

1. Innovative solutions that encourage effective self-management of chronic disease. Particular encouragement should be given to solutions that:
 - emphasise patient empowerment, patient centred care and citizen directed disease prevention;
 - prioritise maintaining function and productivity while ageing;
 - provide effective individual and environment-level support for the co-production of health.
2. Research on the comparative effectiveness of personalised biological profiling by 'omics' technologies versus conventional methods, in identifying target groups throughout the life course at high risk of contracting diseases and/or having a poor prognosis for preventive purposes. Research that evaluates the comparative effectiveness of targeted disease prevention and management programmes for patients identified in screening programmes that use 'omics' technologies.
3. Research on the comparative effectiveness of innovative approaches to the use of information technologies in identifying target groups and implementing disease prevention strategies.
4. Research on the biological process of ageing throughout the life course from preconceptional stages through to the oldest ages, and research on interventions to slow the ageing of cells as part of a strategy aimed at addressing major chronic diseases.
5. Research on the cost-effectiveness of existing population based disease prevention programmes and methods to eliminate and replace ineffective programmes.

6. Bilateral or multilateral cooperation with other regions of the world should be encouraged, in particular with developing countries in the field of infectious diseases.

Health services research

There are four main challenges in the field of health services research. The first relates to the humanity of care and the extent to which health care providers are truly responsive to the needs of those they serve. The second relates to the ongoing variation in the quality and safety of care delivered by different providers and across Member States. The third relates to ongoing concerns about the efficiency of health care. The fourth relates to the ongoing struggle to orient health care away from treatment and towards prevention.

1. What are the changes required of health and social care systems to ensure the highest standards of humanity, defined in a broad sense, including respectful personal interactions, respect for autonomy, compassionate care and the inclusion of patients in decision making? What is the influence of system-level factors such as workforce planning, regulatory mechanisms, financing models and professional training on the humanity of health care? Evaluation of interventions to improve the humanity of care.
2. Research on innovative interventions to improve the quality and safety of healthcare. Research that compares initiatives in different EU Member States, particularly in the area of benchmarking using performance indicators.
3. Research that identifies innovative solutions to the problem of inefficiency in the delivery of health care including ineffective interventions, inefficient governance and inefficient resource allocation. Which models for the governance of industry, the allocation of research funding and the assessment of health technologies are most likely to avoid the use of public resources for ineffective interventions and encourage the withdrawal of such interventions when they have entered public healthcare?
4. What are the features of health care systems that are more prevention-oriented? How to optimise timing of prevention-oriented investments across the life course and across sector? Who gains and who loses in different models of prevention?

Health policy research

Within the health policy field we have attempted to focus on what we see as the major policy challenges for public health in the coming decades.

1. What is the impact of globalisation on population health and health systems? What impact has the introduction of global supply chains (e.g. food, pharmaceutical products, energy) had on population health outcomes? What is the impact of migration of human resources on healthcare systems?
2. What are the consequences of major long-term trends such as climate change, demographic ageing and the rapid diffusion of technology for health care systems?

Which health care systems within and outside Europe are best placed to respond to such trends?

3. What is the impact of the current financial crisis on population health outcomes, healthcare processes and health care systems? How can we build health systems to be resilient to recession and at the same time protect universal health care access? How can we ensure effective health system governance in times of financial crisis?
4. Research that evaluates broad social policy initiatives that aim to 'level up' population health outcomes in order to reduce health inequalities. This should include research on inter-sectoral interventions (e.g. Healthy Cities initiatives, Healthy Ageing programmes) that bridge environment, economy, transport, education, health care and social care. Research on barriers to inter-sectoral co-operation and on the conditions that lead to the success of policy interventions should also be encouraged.
5. Research on the obstacles to the use of public healthcare resources for population health gain including the protection of the interests of professional groups, capture of resources by private sector financing, medicalization, overdiagnosis, political corruption.

Methods in public health research

We recommend that funding is dedicated also to continued improvement in the following methodological aspects of public health research.

1. Methods to measure the effectiveness, preparedness and efficiency of health care systems.
2. Methods to improve and implement experimental research designs and to use conditions that may provide some of the benefits of experimental design, and encourage the uptake of such designs.
3. Research on the development of new measures of societal well-being and the impact of public health exposures and interventions. These should attempt to measure the living conditions and quality of life of European citizens in ways that going beyond the methods used by traditional economic metrics.
4. Research that examines the extent to which health information systems across Europe can be combined and exploited to solve major public health challenges.

2.5 Use of formal prioritisation methods

The above suggestions for thematic priorities may be used to inform the general implementation of Horizon 2020 funding for public health research. However, we do recommend that the selection of thematic priorities within specific funding calls be based on transparent methods and engage a broad group of stakeholders. The following steps should be taken when conducting such an exercise.

1. Collecting priority topic suggestions from other DGs, EU health agencies and external stakeholders such as the EU Health Policy Forum and international scientific societies. This exercise should take into account the literature on European public health research priorities such as documents produced by the FUTURAGE group⁵, the RICHE group⁶ (on child health in Europe) and HSR Europe⁷.
2. Taking the suggestions into account when drafting proposed topics for prioritisation.
3. A prioritisation exercise using explicit criteria and scoring/weighting system.
4. Taking the results of this exercise into account when developing the work plan.

Priorities should not be derived from Member State representatives alone. Every effort should be made to take into account the suggestions from public health researchers, citizens, civic organisations and policy makers in all Member States.

If this method is adopted we recommend it is combined with the following criteria.

1. Scientific potential: it is reasonable to expect that the scientific community can produce valuable new knowledge given the current state of the field?
2. Impartiality: the issue does not privilege a specific demographic group, nationality, or attitude, without scientific justification.
3. Resources: it makes (economic) sense to address this issue at the EU level and to focus available resources (funds, staff, and expertise) on this.
4. Impact: this issue has a relevant positive (short- or long-term) health impact on one or more specific populations.
5. Significance: a priority issue for Europe that needs to be addressed within the next 1-3 years and is unlikely to be addressed at the national level.
6. Broadness: the issue is not specified in such a narrow way that it precludes creative and innovative research.

Whereas these recommendations are about how to prioritise research topics, there should be no doubt that we recommend the selection of funding for individual projects to be based primarily on their scientific excellence as assessed by a high quality peer review system.

3. The structure of EU public health research funding in the future

There are two main problems with the current structure of EU public health research funding by the European Commission. First, the uniform excellence of research teams is not guaranteed by the current model of consortium creation. Second, the sustainability of developed infrastructure is not encouraged. These problems impair the EU's ability to make sustained progress on public health challenges over a long time period.

Public health research in Europe is performed in a heterogeneous set of universities, independent research institutes and private enterprises. When consortia of such diverse entities across diverse countries are created there is the risk of uneven levels of scientific excellence, and there may well be relevant, high-level scientific competence across EU that has not been mobilized. The quality of the research in some consortia is excellent, but in

general there has been less impact than would be expected from such a significant investment⁸.

Public health research also includes the development, co-ordination and maintenance of large research infrastructure such as data banks, ongoing longitudinal studies and collaborative networks. This is expensive; so the creation of multinational research teams and infrastructure should be done in a strategic fashion to reduce cost and maximise benefits.

Europe needs a strategic infrastructure for public health research. This does not mean facilities that are exclusive to a small group of elite researchers or indefinite funding for infrastructure programmes beyond their useful lifespan. But it does imply that a model of competitive grant funding to create research teams for a finite period of time to work on a specific project may not be the best approach to the development of strategic infrastructure. DG-RTD should work to avoid the situation where multinational physical and intellectual capital is developed by EU research funding and then allowed to fade away because of sustainability issues.

3.1 Establishment of Research Networks

To address the two problems described above we recommend that over the course of Horizon 2020 some funding should be dedicated to Research Networks (RNs) that will address certain strategic public health research priorities for Europe in a sustained fashion over the period 2014-2020. This funding should be awarded following a transparent, peer reviewed competition. Although large in absolute terms the proportion of all EU public health research funding that would be dedicated to RNs should be less in proportional terms within Horizon 2020 than that dedicated to traditional project funding. The impact of this radical change in structure must be evaluated carefully from the outset.

In order to qualify for support a network should (i) address a strategic research challenge and (ii) support and develop strategic research infrastructure. RNs may be completely new or be built upon existing collaborations.

The RNs should contain a variety of research centres. The term 'centre' should be interpreted in a broad sense. It can refer to one institution such as a University department, led by a researcher or research team of international standing, but can also refer to a national institution such as a disease control centre or a regional/national network such as a cancer registry. The selection of participating centres must be based on the capacity to contribute scientifically excellent research at an international standard although the exact nature of the contribution may differ from RN to RN depending on the type of research and the infrastructure that is supported.

3.2 Function of Research Networks

As with all research consortia, RNs will take full responsibility for their research programme including project selection, conducting the research, publishing the results and knowledge translation. The most important difference between RNs and the functions of 'normal'

research consortia is the explicit responsibility to develop Europe-wide research strategic infrastructure that is made available for use by the wider research community. RNs should also develop standards, competence and capacity for registries, data- and biobanks, methodological support, and other large scale public health infrastructures. This should be accompanied by the development of data protection regulations and EU coordination mechanisms that are sufficiently flexible to encourage research.

In order to raise the general quality of European public health research the RNs should develop a partnership programme for less developed institutions, centres or countries. Every RN should co-operate on research projects with institutions in Member States asking for and requiring support in public health research. Such capacity building should be closely co-ordinated with educational activities and the use of EU structural funds.

The RNs should together offer coordinated advanced education in public health research, including structured PhD programmes and mentoring programmes for postdoctoral students and junior researchers. The RNs should coordinate their research areas to avoid major overlap, but identify co-operation possibilities. The RNs should jointly produce Europe-wide overviews of research in their area to give scientific input for the Board for Public Health Research (see below).

3.3 Organisation of Research Networks

DG-RTD should establish a working group to develop the specific concept and feasibility of the RNs and the evaluation criteria to guide their selection. These latter should reflect the wish to achieve scientific excellence and hence include the quality of the research proposal, network composition, competence of the participants, governance, management and key performance indicators. The working group should consider the organisation of existing networks created at the European level. We recommend that the working group use the following principles to guide the development of RNs.

1. RNs should avoid the invention of unnecessary bureaucratic structures.
2. RNs should not allow a small elite group of institutions to capture the bulk of funding.
3. RNs should build on the work of existing collaborative efforts wherever possible.

In order to ensure a consistent buy-in across centres within RNs we recommend a joint funding model for the RNs with DG-RTD funding a defined proportion and each of the constituent centres within a network bringing funding from their own source.

A rigorous interim evaluation of the RNs should be conducted by DG-RTD with the possibility of modification of the RN membership or complete contract cancellation.

Each RN should have collaborative relationships with centres and researchers outside the formal network. These 'associate' collaborators may be contracted for certain tasks by the network.

RNs should include centres from as many Member States as are willing and capable to join and fulfil minimum requirements for memberships, but ultimately they should be built on quality criteria and not every Member State need be present.

3.4 Board for Public Health Research

There is a need for an organisation which provides strategic direction to the entire field of European public health research. We recommend the creation, by the European Commission, of a Board for Public Health Research which shall represent all key stakeholders and advise DG-RTD on public health research funding.

The following stakeholder groups should be represented on the Board by nominating members. However, to expedite the work of the Board, those who are nominated should operate in a personal capacity.

- Public health-related research associations.
- Public health leaders and experts from within and outside the RNs.
- The European Centre for Disease Control.
- The European Medicines Agency.
- The EU Joint Research Centre in public health.
- Public health institutions in Member States.
- EU Commission staff working in health-related fields.
- WHO Europe and its associated institutions.
- Civil society (NGO's, e.g. the European Patient Forum, the European Health Alliance and other members of the EU health forum).

The tasks of the BPHR should be as follows.

1. Identification of long-term public health needs, challenges, and possible solutions.
2. Provision of oversight for the RNs.
3. Development of research programmes and implementation of the outcome of research among and in partnership with end-users at all levels from citizens and patients through to EU institutions.
4. Supporting the development of synergies proposed in Chapter 4 and the knowledge transfer activities proposed in Chapter 5.

3.5 Project funding

Although we have concentrated on mechanisms to encourage the development of a sustainable EU public health research infrastructure through RNs we anticipate that most funding will still be dedicated to specific projects. Previously, it has been a condition of project funding that the investigators include researchers from at least three EU Member States or associated countries. This is because DG-RTD funding for public health research falls under an EU 'Co-operation' Programme which mandates multinational involvement. We recommend that project funding should be based on the widest possible inclusion of EU Member States as justified by the specific scientific aims of the project in accordance with our desire for an explicit added value to EU funding of the project. Nevertheless, we also

recommend that future funding be available to applicants from a single country if they can demonstrate a clear EU added value to their project.

We recommend the following additional changes to the current structure for project funding.

- A fast track approval of funding applications should be established for research on urgent public health topics such as developing environmental hazards or new outbreaks.
- Funding should be available for inter-sectoral collaborative projects that address issues beyond the direct health agenda, but are of relevance for public health (other parts of Horizon 2020 and outside the EU). This includes collaborations on research into education, transport, housing, justice and employment.
- Funding should be available for replication projects in and outside the EU while avoiding uncoordinated duplication without complementary value.
- Greater effort should be made to ensure the meaningful involvement of civil society as research partners in co-design and conduct of research where feasible and appropriate.

4. Development of stronger links and synergies between EU funded research and (i) national research activities (ii) EU policy agendas (iii) national policy agendas

Synergy implies a relationship that produces a combined effect that is greater than the sum of individual effects. Synergistic relationships are formed on personal, professional and institutional levels by processes of joint working, negotiation and aligned processes both strategic and fundamental. A strategic approach to public health research funding and development can increase the likelihood of synergies.

Synergies between national and EU research programmes should be expected in order to avoid duplication and exploit complementarity. There is also an obvious need to maximize synergies at the European level as there is a surprising lack of co-ordination between research and policy. The synergies between national policy agendas and EU research agendas are less obvious, but we envisage a number of areas where this is possible.

4.1 Broadening the practice of public health research across the EU

A recent article on public health research systems in the EU shows that national health research is funded through ministries of science (or science councils), ministries of health (or their public health institutes) and universities⁹. Of 27 national research strategies, only 17 refer to health and 11 to public health themes. It is important that all Member States engage in public health research in order to increase the range of research opportunities and the potential for impact on a larger population.

4.2 Increasing the attractiveness of European public health research

In order to demonstrate the value of Europe-focussed public health research, DG-RTD should look at ways to make such research more attractive. The view of eminent researchers and young talents should be sought by DG-RTD with a view to:

- contributing to research programme development and knowledge translation;
- avoiding narrowly specified requests for proposals which impede creativity;
- simplifying application procedures;
- making financial criteria more flexible;
- enhancing the respect for high quality public health research at all levels;
- encouraging an open, dialogue-based and competent peer review process;
- making EU and national health research agendas publicly available on an on-going basis.

The EU added-value of conducting research with appropriate Horizon 2020 funding should be demonstrated to academia, policy makers and the general public. DG-RTD should adopt a communication strategy, reaching out to all these constituencies. There should be a regular health research bulletin to alert researchers and national research focal points to existing and new activities.

4.3 Encouraging synergies between national and EU health research

The EU has been a significant funding source for health research over many years through previous Framework Programmes. The EU Commissioner for Research and Innovation has recently asked that national and EU research priorities and expenditure should be better co-ordinated. Joint programming allows Member States to pool their funding in order to work in a coordinated way to tackle societal issues. It can also maximise academic researchers' engagement with industry and bring private sector resources into the process. Beyond existing joint programmes, such as the Innovative Medicines Initiative and the European and Developing Countries Clinical Trials Partnership, the impact and synergies of EU funding with national research activities should be explored and further developed.

A dynamic awareness campaign across Europe should be initiated by DG-RTD with its national partners and contact points to ensure a greater co-ordination of EU and national research agendas. Stakeholders should become involved in all Member States, from governments through citizens and patients, and throughout the entire process from needs identification to implementation. Following the precedent of DG-SANCO, which publishes Eurobarometer surveys on important health issues (e.g. smoking, antimicrobial resistance, rare diseases, patient safety, blood and organ donation), DG-RTD should also commission regular population surveys on the perception by the general public of health research priorities and results. DG-RTD should also use social media and a dedicated interactive website to elicit opinions from non-Governmental organisations and individuals about research priorities.

It is essential that the needs of European citizens are the central priority when EU research funding programmes are designed. Current mechanisms for setting EU research priorities rely on Member State representatives that do not always adequately represent the views

and needs of citizens. The current interfaces and interactions between Member States, European and international public health research should be reinforced to identify common priorities taking into account the views of civil society. Therefore, DG-RTD should design, with national research councils and other interested partners such as international scientific societies, a truly common EU research agenda. Equal opportunities for all Member States to participate in the EU research programmes should be secured, although not every Member State should necessarily participate in each specific project, and the scientific excellence of funded research teams should never be compromised.

There should be more common or complementary funding schemes between national funding agencies, EU funding and international public health research funding agencies. Involvement, by Member State institutions (in kind or co-financing), should be a prerequisite, but also a route to improved collaborations and outcomes. Member State research institutions should be ready to pre-allocate in-kind contributions (e.g. human resources) or funds for local research groups, aiming at participation in Horizon 2020 programmes. An obvious example of complementarity relates to structural funding. Health research infrastructure in Member States may be eligible for EU structural funds (Regional and Social Funds), but such funds can only be awarded if there is evidence of matching national research funding to utilise the investment¹⁰.

There is an unclear delineation of mission boundaries between national research councils, EU co-operative research and ERC. We recommend that DG-RTD adopt the new mission for EU public health research that we have outlined above.

4.4 Encouraging synergies between EU funded public health research and EU public health policies

The third EU Health Programme (2014/2020) and Horizon 2020 are about to be adopted by Council and Parliament as separate instruments which is unfortunate. The EU Health Programme aims to support and complement the work of Member States to achieve the following objectives: innovative and sustainable health system, access to better and safer healthcare for citizens, promoting health/preventing disease and protection from cross-border health threats.

The Commission (DG-SANCO) has led several initiatives endorsed by Health Ministers that may need co-ordination with DG-RTD activities: health care acquired infections, health security, pandemics and cross border health threats, and promotion of healthy lifestyles. In parallel, the EU agencies are separately adopting multi-annual programmes for the same period. Neither Parliament, nor health ministers and the end-users of health research get a good picture of the coherence, synergies or possible gaps between all these EU initiatives. This could accentuate the democratic deficit in a priority area for European citizens such as health.

The Commission should present to Parliament and the Health Council a new EU health and health research strategy (2014/2020) encompassing health research, identifying common public health challenges and responses across Member States. This strategy should be

written in terms understandable for health professionals and the general public and should be used for promoting EU health research within the research community.

In terms of synergy, the aims should be: cohesion, reduce fragmentation and duplication, increase efficiency with a measurable impact on identified public health priorities. DG-RTD should regularly brief the Health Council, the Parliament's environment and health committee and Member States' institutions, including ministries of health, research and finance in order to explain the public health perspective on improving population health and raise the visibility of public health research findings.

Several e-health initiatives have been conducted jointly by DG-SANCO and DG-CNECT. This is also the case for the European Innovation Partnership on Active and Healthy Ageing which includes European institutions, national and regional authorities and businesses. The PPACTE project (Pricing Policies and Control of Tobacco in Europe) is a good example of successful synergies between DG-RTD, DG-SANCO and WHO. Other strong European health networks have been established by the EU Commission over the years. In most cases they require a strong research component, for example the European Union Committee of Experts on Rare Diseases (EUCERD)¹¹, the EU network for health technology assessment (EUnetHTA)¹² and the European Network for Patient Safety (EUNetPaS)¹³.

The European Commission should organize an annual joint meeting between members of programme committees and advisory groups from DG Research and DG-SANCO, and national chief medical officers, to encourage the development of working relationships. In addition, DG-RTD and DG-SANCO should convene an annual congress for policy makers, civil society and the research community to discuss implementation of the EU health agenda in the presence of the media.

There is a need to link DG-RTD activities to the health agenda of DG-SANCO and other relevant Commission services, in coordination with the WHO when appropriate. Horizon 2020 should formally align DG-RTD funding with funding for innovative health technologies and e-health (DG-CNECT) and EU policies on social security and health at the working place (DG Employment) and international health and development aid (DG Development & Cooperation).

DG-RTD should establish formal and visible communication between various European agencies such as the European Medicines Agency, the European Centre for Disease Prevention and Control, the European Food Safety Authority, the European Environment Agency and the European Agency for Safety and Health at Work, and consult them on research priorities. The European Centre for Disease Prevention and Control¹⁴ has taken over numerous communicable diseases networks which were initiated under the EU Health programme. The European Medicines Agency¹⁵ collaborates with the Innovative Medicines Initiative¹⁶ and with the European Network of Centres for Pharmacoepidemiology and Pharmacovigilance (ENCePP)¹⁷.

4.5 Encouraging synergies between EU funded public health research and national public health policies

According to the article on public health research systems in the EU cited above, most ministries of health indicated their interest in public health research, but did not have a lead person in charge. The article mentions that the EU policy responsibilities for public health have been less well represented in the EU research programmes. Another study identified problems with the publication of findings and with making such findings accessible on an enduring basis⁸. Civil society representatives have not yet become an institutionalized partner of DG-RTD.

DG-RTD should develop a user-friendly repository of previously published research. The current CORDIS tool¹⁸ should be improved to serve also as a repository, including a copy of all information from the website dedicated to a given projects, follow-up measures and references to later publications (care of the coordinator). It should also contain project summaries in all major EU languages, addressing the needs of professionals and policy makers as well as the general public. Cross-links should be established with other DGs and national research programmes, in particular with DG-SANCO health projects, accessible on line¹⁹.

DG-RTD should explicitly support and involve the EU Health Policy Forum²⁰, which brings together 50 pan-European stakeholder organizations in the health sector, in its procedures and be given the necessary resources to do so.

DG-RTD staff should develop communication channels between Commission services, EU health agencies, WHO/Europe and pertinent Member State institutions and stakeholder organizations about both national and Horizon 2020 funded research, outcomes, experiences, and implementation. All minutes and recommendations from programme committees and advisory groups in charge of health and health research activities should be published on user friendly Commission websites.

4.6 New methods and tools to develop synergies

We recommend that the following methods and tools be used to inspire synergies.

- The EU health indicators (ECHI²¹) produced by DG-SANCO and the periodic reports on the health status of EU populations illustrating the burden of diseases could inspire more national or EU comparative research between countries.
- A model for the common use of results of research should be developed.
- Researchers should be encouraged to identify how the work of other EU directorates such as DG-SANCO will be used to translate their findings.
- IT technologies for new collaborative mechanisms between healthcare providers, the government sector and industry should be exploited.

5. Improving the policy uptake of EU funded public health research

Policy uptake is as much a political process as a technical one. Policy changes that have a strong chance of improving population health are not always implemented because certain actors in the policy making sphere have interests other than population health at heart. The section that follows should be read as a series of technical recommendations which are based upon our understanding of best practices in the field of knowledge translation. But the recommendation should not be considered a substitute for ongoing engagement in the political process by researchers and public health advocates and the provision of evidence for policy formulation by researchers. In addition, the technical recommendations require sustained action to build relationships between researchers and policy makers over time at both the individual and organisational levels.

5.1 *Methods to improve knowledge translation*

Although there are many terms and definitions used to describe the uptake of research knowledge, all are essentially concerned with how to expedite the use of research knowledge for societal benefits. We use the term knowledge translation (KT) to describe this process. As a basis for our recommendations we have adopted the WHO definition of KT:

“The synthesis, exchange and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people’s health”

KT is but one input in a busy ‘field’ of policy inputs. KT research has repeatedly shown that trust relationships are critical to successful KT. Trust relationships for KT are built over time and involve both individual and organizational level linkages.

Successful KT requires rigorous science, sound knowledge synthesis approaches, tools to effectively convey information that fits with different stakeholder audiences and that is congruent with processes for change (e.g. policy formulation and implementation), recognition of the need for responsiveness, and addresses explicit desired outcomes. KT processes within organizations can be learned/enhanced to improve responsiveness and this needs to occur for both those who disseminate and those who use scientific knowledge. In many cases, it is difficult for end users to judge the quality of the research that is a candidate for implementation.

We recommend that DG-RTD create or leverage interactive forums and dialogues for KT involving researchers and a range of stakeholders, with strong inclusion of policy makers. Consideration should be given to the use of demand driven approaches to KT such as the ‘Best Brains Exchanges’²² and deliberative policy dialogues²³. Best Brain Exchanges are one-day, in-camera meetings for decision makers, and researchers with expertise on a topic that has been identified as a high priority by ministries of health. Policy dialogues are carefully constructed, deliberative meetings that address both politically controversial and technically complex aspects of an issue in a dispute.

We also recommend the following actions for DG-RTD in this area.

- Build upon existing networks for KT that are operational at multiple scales (regional, national, EU, global).
- Support bodies prepared to contribute to evaluation and synthesis of existing/new evidence, promote uptake, and develop pathways and tools to facilitate implementation, including e-health learning tools. This could mean the creation a Research Network with a specific mandate in this field.
- Encourage the use in all funded research projects and Research Networks of one or more of the 19 tools for evidence-informed health policymaking that were developed by the SUPPORT Collaboration with funding from the European Commission's 6th Framework Programme²⁴.
- Make KT an explicit function of any funded Research Networks.
- Involve stakeholders (from governments through citizens/patients) throughout the process of research (from needs identification to implementation).
- Integrate discussions about KT into research forums and profile innovations in this field.
- Consider what the KT requirements should be and thus what supports are needed for both investigator-driven (bottom up) versus strategic (top down) research.
- Consider how civil society organisations can be optimally involved in and supported to participate in KT processes, using their diverse networks.
- Work for the inclusion of an article or chapter on public health research in the EU Health Strategy, which includes explicit reference to KT and exchange.

5.2 *Health research communication*

The KT process involves many purveyors of information and thus, intricate networks of relationships and communication channels²⁵. There are significant shifts in how all types of communication are taking place and social media continues to gain prominence. New patterns of knowledge searching (e.g. "Google it") are taking hold, and expectations of being able to rapidly locate whatever facts are needed has risen. DG-RTD should develop and implement a health research communication strategy that is informed by evidence on KT and is subject to strict quality control. This should be designed to reach out to stakeholders in the Member States.

A mix of knowledge repositories and social media approaches are required. These need to be optimized for more effective dissemination of EU public health research findings. A critical feature of a research repository is that evidence is readily findable.

We recommend the following actions for DG-RTD in this area.

- Consider use of new media to enhance knowledge accessibility and use. This includes Wikipedia or other social media that create living documents, new media such as an internet market place for Q&A and rapid discussion and the use of mobile tools.
- Adjust reporting mechanisms for EU funded projects to better reflect the aims of making research accessible, user-friendly, relevant and understandable for a range of audiences (e.g. policy analysts, health care institutions and citizens).

- Consider both the literal and figurative accessibility of what needs to be translated – language, plain speak, standardization of reporting, brevity.
- Recognize that far from all research should be translated into policy, programmes or practices. In many instances, the strength of the evidence is weak and further confirmatory studies are needed. In other instances the quality of the research is poor. The peer review process for manuscripts helps to ensure that research findings and conclusions reached are valid. But this safeguard needs to be viewed in light of the demands for responsive and timely research findings. Examine options to label the quality of research so policy-makers can judge how reliable and valid the research is (examples may already exist at the EU level).

5.3 Incentivising knowledge translation processes and knowledge translation research

Promoting a KT receptive research-policy environment requires that researchers and decision-makers/policy-makers consider their roles in this process, and that institutions put in place supportive structures for effective KT activities. For example, although researchers are encouraged to publish and disseminate their research findings, supports for academics to engage in a broader set of KT activities and KT approaches traditionally used may be weak or ineffective.

We recommend the following actions for DG-RTD in this area.

- Introduce and clearly communicate KT requirements in relevant calls for all EU public health projects. Strengthen requirements for robust evidence-informed approaches to KT and exchange, making these explicit in calls for funding and in criteria used for peer review.
- Identify and fund the types of research that may enhance KT. For example the addition of qualitative dimensions to quantitative study may provide essential contextual information that aids interpretation and transferability of findings across EU Member States. The inclusion of decision-makers on research teams may facilitate KT. Participatory action research may help create conditions for more effective KT. Assessing the scale-up feasibility of public health research during the planning phases may enhance its KT potential.
- Require that each research report should include output for different audiences. The 1:3:25 reporting structure²⁶, for example, provides a 25 page report that can be used as the basis for scientific publication, a three page summary for the public and managers and a one page executive summary for policy-makers.

5.4 Establishing targets and assessing progress with knowledge translation

Targets and accountability mechanisms provide a means by which to gauge progress and create a reporting structure for EU Member States. Conducting systematic assessments of health impacts will explicitly identify data gaps and evidence needed to improve future assessments. This will also have the added benefit of raising awareness among policy-makers and the public at large about the wide variety of factors that affect health.

We recommend the following actions for DG-RTD in this area.

- Develop a 'Value On Investment' (VOI) framework and targets for public health research and its translation. This goes beyond a return on investment model with its emphasis on economic considerations. A VOI framework would provide metrics to assess wider societal benefits from KT both in health and other sectors.
- Use a VOI reporting structure in EU reports of research funds expended.

Organizational and state-wide benchmarking has demonstrated utility as a lever for change when targets are negotiated and set at achievable levels²⁷.

Benchmarking would provide a basis for discussing achievable targets; provide a means to compare KT successes across EU Member States, while also providing comparative metrics that might spur action.

We recommend the following actions for DG-RTD in this area.

- Identify priority areas for KT benchmarking.
- Develop a coordinated and systematic (EU level) benchmarking process capable of comparing evidence uptake in practice, programmes and/or policies across contexts and jurisdictions for priority KT areas.
- Identify indicators which reflect the processes involved in the iterative and stepwise nature of policy development, formulation and implementation. A more comprehensive set of indicators that capture this process would allow progression towards evidence-informed policies to be more readily tracked.
- Integrate KT benchmarking into the EU Innovation Union scoreboard²⁸.
- Work with national research funding councils in EU Member States and internationally to explore common metrics that could be used to assess and compare the impact of KT initiatives on the health of the population and health inequities. This would help build a robust evidence base for KT approaches that are cost-effective.

5.5 Building capacity for knowledge translation

KT requires a certain set of skills on the part of both knowledge producers, knowledge users and those who broker this function. Policymakers have synthesized evidence at their disposal, but without knowing how to interpret this evidence will be unable to use supporting tools (e.g. new or existing databases, Cochrane reviews, KT facilitators/brokers/mentors).

We recommend the following actions for DG-RTD in this area.

- Instigate discussions about capacity building on KT at all career stages with particular emphasis on future and emerging research leaders.

- Encourage organizations such as ASPHER to identify and incorporate core competencies in KT across disciplines and in programmes that train both researchers and managers.
- Consider the supports required for KT that needs to be responsive to urgent and unanticipated events (e.g. SARS, fiscal crises).

5.6 *Building knowledge translation science for European public health research*

There are many KT approaches and KT ‘natural experiments’ underway in different EU Member States²⁹. The diverse contexts of these countries provide a rich base for comparative KT studies. Such studies could significantly advance our understanding of what knowledge translation strategies work and under what conditions. We therefore recommend that DG-RTD develop a funding opportunity to examine, synthesize and learn from these KT natural experiments with particular emphasis on the contextual conditions that support effective KT for public health.

It was well beyond the scope of the working group to develop a comprehensive agenda for KT science in public health that could be funded in Horizon 2020. However, illustrative examples of KT science questions that could be included in calls for proposals in the next framework are identified below. DG-RTD should consider a dedicated funding stream for these topics.

- How effective are knowledge brokers in driving the demand for quality evidence and in promoting evidence uptake within and among EU Member States?
- How do variations in the context (organizational, systems, national, political) of EU Member States modify the application of KT strategies and influence their successes?
- What approaches to public engagement in research (across the spectrum from public education about science to active involvement in all stages of research) are being used across the EU and which of these are effective in expediting KT?
- How do political and other decision-makers take the maturity of public health research into account in the KT process and what influences these choices? In particular, is the researchers claim that more research is needed to mature the evidence used as a generalised justification for not taking action where it otherwise would be well justified (e.g. for reducing inequalities in health obviously due to politically determined inequities)?
- What KT approaches are most effective in improving health outcomes and reducing health inequalities among EU Member States through action in health or other sectors?
- How can KT be adapted and improved so that those who are informally providing care and not considered part of the formal health care system also benefit from research advances in their provision of care.
- What enhances the transferability of research findings from one setting or context to another?
- How best can the EU create flexibility in the search and storage of its public health research so as to leverage fast-moving IT development, rather than being constrained by a particular technology or infrastructure?

- What role do professional knowledge brokers play within national health research funding agencies?

The unique features of the EU and its Member States need to be reflected in the development of KT priorities. Stronger KT needs to be supported and reinforced by a robust KT science generation agenda.

6 Concluding remarks

With this report, we have aimed at living up to the expectations of the Lisbon Treaty². While acknowledging the momentum of previous Framework programmes, we contend that public health research must enter a new arena in Horizon 2020, and occupy a strong and fully integrated position in this programme. This will require a substantial investment both in the funding and in the support staff available to manage public health research at the European level.

By request from DG-RTD, our recommendations take shape as answers to four questions: what should the future thematic research priorities be, how can we improve the structure of funding, how can we improve synergies with other research funding schemes and health policies, and how can we improve the translation of results to health policies? The recommendations developed are connected and it is our hope that they will be considered as a coherent entity worth integrating in the implementation of Horizon 2020, while realising that our contributions have to be integrated into a process that has many other elements. However, we are convinced that the recommendations we have developed will facilitate the needed investment in public health research with the goal of eventual improvement of the health of European citizens.

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Appendix 1: Members of the Independent Expert Group

1. Thorkild I. A. SØRENSEN (DK)- Professor of Clinical and Metabolic Epidemiology, Faculty of Health and Medical Sciences, University of Copenhagen. **[Chair]**
2. John Patrick BROWNE (IR), Professor of Epidemiology and Public Health, University College Cork. **[Rapporteur]**
3. Maurizio BONATI (IT), Head of Department of Public Health, Mario Negri Institute (IRFMN).
4. Nancy EDWARDS (CA), Professor, School of Nursing and Department of Epidemiology and Community Medicine, University of Ottawa; Scientific Director, Institute of Population and Public Health, Canadian Institutes of Health Research.
5. Louise GUNNING – SCHEPERS (NL), president of the Executive Board of the University of Amsterdam (UvA) and the Hogeschool van Amsterdam, Amsterdam University of Applied Sciences (HvA).
6. Petra KEIL (CH), head of Global Public Policy, Novartis.
7. Karine LAMIRAUD (FR), Associate Professor, Economics Department, ESSEC Business School.
8. Peter LANGE (DE), former Director General for life sciences in the German Federal Ministry of Education and Research.
9. Anders Olauson (SE), Chairman and Chief Executive Officer of the Agrenska Centre, Sweden, and President of the European Patients' Forum.
10. Jørn OLSEN (DK), Professor, Department of Public Health - Section on Epidemiology, Aarhus University.
11. Susana SANS (ES), Programme Director at the Institute for Health Studies of Barcelona.
12. Fernand SAUER (FR), former Director of Public Health at the European Commission.
13. Silvia Gabriela SCINTEE (RO), Deputy General Director of the National School of Public Health, Management and Professional Development, Bucharest.
14. Mirosław J. WYSOCKI (PL), Director, National Institute of Public Health-National Institute of Hygiene, Warsaw.

Appendix 2: Societal Challenges in the Health Demographic Change and Wellbeing Field

The partial general approach on the proposal for a Council decision establishing the Specific Programme implementing Horizon 2020 - The Framework Programme for Research and Innovation (2014-2020) - as reached by the Competitiveness Council meeting on 11 December 2012.

PART III SOCIETAL CHALLENGES

1. HEALTH, DEMOGRAPHIC CHANGE AND WELLBEING

Effective health promotion, supported by a robust evidence base, prevents disease, contributes to wellbeing and to contain costs. Promotion of health, active ageing, wellbeing and disease prevention also depend on an understanding of the determinants of health, on effective preventive tools, such as vaccines, on effective health and disease surveillance and preparedness, and on effective screening programmes.

Successful efforts to prevent, early detect, manage, treat and cure disease, disability, frailty and reduced functionality are underpinned by the fundamental understanding of their causes, processes and impacts, as well as factors underlying good health and wellbeing. Improved understanding of health and disease will demand close linkage between fundamental, clinical, epidemiological and socio-economic research. Effective sharing of data and the linkage of these data with real-world large scale cohort studies is also essential, as is the translation of research findings into the clinic, in particular through the conduct of clinical trials.

It is a societal challenge to adjust to the further demands on health and care sectors due to the ageing population. If effective health and care is to be maintained for all ages, efforts are required to improve decision making in prevention and treatment provision, to identify and support the dissemination of best practice in the healthcare sector, and to support integrated care. A better understanding of ageing processes and the prevention of age-related illnesses are the basis for keeping European citizens healthy and active throughout the course of their lives. Similarly important is the wide uptake of technological, organisational and social innovations empowering older persons in particular to remain active, productive and independent. Doing so will contribute to increasing, and lengthening the duration of their physical, social, and mental well-being.

The programme should address in the relevant activities chronic conditions and diseases including but not limited to: cardiovascular disease (CVD), cancer, metabolic diseases and risk factors including diabetes, chronic pain, neurological, neurodegenerative, mental health and substance use disorders, rare diseases, overweight and obesity, autoimmune diseases, rheumatic and musculo-skeletal disorders and various diseases affecting different organs as well as acute conditions and various functional limitations. Likewise infectious diseases including but not limited to HIV/AIDS, tuberculosis and malaria, neglected and poverty

related diseases, emerging epidemics as well as the threat of increasing anti-microbial resistance-and occupational diseases and work related disorders should be addressed.

All of these activities will be undertaken in such a way as to provide support throughout the research and innovation cycle, strengthening the competitiveness of the European based industries and development of new market opportunities. Support will be given to translational approaches that integrate several steps of the innovation process in the health care industry.

Specific activities are described below.

1.1. Understanding health, wellbeing and disease

1.1.1. Understanding the determinants of health, improving health promotion and disease prevention

A better understanding of the determinants of health is required in order to provide evidence for effective health promotion and disease prevention, and will also allow the development of comprehensive health and wellbeing indicators in the Union based on existing data sources and indicator systems. Environmental, behavioural (including life-style), psychological, organisational, cultural, socio-economic, biological and genetic factors, in their broadest senses will be studied. Approaches will include the long term study of cohorts and their linkage with data derived from "-omics" research, systems bio-medicine including relevant applications of systems biology and other methods.

In particular, a better understanding of the environment as a determinant of health will require an inter-disciplinary approach integrating amongst others, molecular biological, epidemiological and toxicological approaches and resultant data to study the modes of action of various chemicals, combined exposures to pollutants and other environmental and climate related stressors; to perform integrated toxicological testing and to seek alternatives to animal testing. Innovative approaches to exposure assessment are needed using new-generation biomarkers based on 'omics' and epigenetics, human biomonitoring, personal exposure assessments and modelling to understand combined, cumulative and emerging exposures, integrating socio-economic, cultural, occupational, psychological and behavioural factors. Improved links with environmental data using advanced information systems will be supported.

In this way, existing and planned policies and programmes can be assessed and policy support provided. Similarly, improved behavioural interventions, prevention and education programmes can be developed including those pertaining to health literacy in nutrition, physical activity, vaccination and other primary care interventions.

1.1.2. Understanding disease

There is a need for an improved understanding of health and disease, throughout the human life cycle, so that new and better prevention measures, diagnosis, treatments and rehabilitation measures can be developed. Interdisciplinary, basic and translational research

on the patho-physiology of disease is essential to improve the understanding of all aspects of disease processes, including a re-classification of normal variation and disease based on molecular data, and to validate and use research results in clinical applications.

Underpinning research will encompass and encourage development and use of new tools and approaches for the generation of biomedical data and include bio-imaging, "-omics", high throughput and systems medicine approaches. These activities will demand close linkage between fundamental and clinical research and with long term cohort studies (and the corresponding research domains) as described above. Close links with research and medical infrastructures (databases, bio-banks etc.) will also be required, for standardisation, storage, sharing and access to data, which are all essential for maximising data utility and for stimulating more innovative and effective ways of analysing and combining datasets.

1.1.3. Improving surveillance and preparedness

Human populations are under threat from new and emerging infections, including of zoonotic origin, as well as those which result from drug resistance to existing pathogens and from other direct and indirect consequences of climate change and from the international movement of people. New or improved methods for surveillance, diagnosis, early warning networks, health service organisation and preparedness campaigns are needed for the modelling of epidemics, for effective pandemic response as are efforts to maintain and enhance capabilities to combat drug resistant infectious disease.

1.2. Preventing disease

1.2.1. Developing effective prevention and screening programmes and improving the assessment of disease susceptibility

The development of prevention and screening programmes depends on the identification of early biomarkers (including functional and behavioural) of risk and of disease onset, and their design should be informed by internationally accepted criteria. Their deployment depends on the testing and validation of screening methods and programmes. Knowledge should be generated and methods developed for identifying individuals and populations at a clinically relevant increased risk of disease. Identifying individuals and populations at high-risk of disease will allow personalised, stratified and collective strategies for efficacious and cost effective disease prevention to be developed.

1.2.2. Improving diagnosis and prognosis

An improved understanding of health, disease and disease processes throughout the life cycle is needed to develop new and more effective diagnostics and theranostics. Innovative and existing methods, technologies and tools will be developed with the goal of significantly improving disease outcomes through earlier, more accurate diagnosis and prognosis and by allowing for more patient-adapted treatment.

1.2.3. Developing better preventive and therapeutic vaccines

There is a need for more effective preventive and therapeutic interventions and vaccines and evidence-based vaccination schemes for an expanded range of diseases, including poverty-related diseases such as HIV/AIDS, tuberculosis, malaria and neglected infectious diseases and also for other major diseases. This relies on a better understanding of disease and disease processes and their consequent epidemics, and that clinical trials and associated studies are undertaken.

1.3. Treating and managing disease

1.3.1. Treating disease, including developing regenerative medicine

There is a need to support the improvement of cross-cutting support technologies for drugs, vaccines and other therapeutic approaches, including transplantation, surgery, gene and cell therapy and nuclear medicine; to increase success in the drug and vaccine development process (including alternative methods to replace classical safety and effectiveness testing e.g. the development of new methods); to develop regenerative medicine approaches, including approaches based on stem cells; to develop new biopharmaceuticals, including therapeutic vaccines; to develop improved medical and assistive devices and systems; to maintain and enhance our ability to combat diseases and undertake medical interventions that depend on the availability of effective and safe antimicrobial drugs; and to develop comprehensive approaches to treat co-morbidities at all ages and avoid poly-pharmacy. These improvements will facilitate the development of new, more efficient, effective, sustainable and personalised treatments for disease and for the management of disability and frailty.

1.3.2. Transferring knowledge to clinical practice and scalable innovation actions

Clinical trials are an important means to transfer biomedical knowledge to application in patients and support for these will be provided, as well as for the improvement of their practice. Examples include the development of better methodologies to allow trials to focus on relevant population groups, including those suffering from other concomitant diseases and/or already undergoing treatment, the determination of comparative effectiveness of interventions and solutions, as well as enhancing the use of databases and electronic health records as data sources for trials and knowledge transfer. Similarly, support for the transfer of other types of interventions such as those related to independent living into real world environments will be provided.

1.4. Active ageing and self-management of health

1.4.1. Active ageing, independent and assisted living

Multidisciplinary advanced and applied research and innovation with socioeconomic, behavioural, gerontological, digital and other sciences is needed for cost effective user-friendly solutions for active, independent and assisted daily living (in the home, the

workplace, public spaces, etc.) for the ageing population and people with disabilities taking into account gender differences. This applies in a variety of settings and for technologies and systems and services enhancing quality of life and human functionality including mobility, smart personalised assistive technologies, service and social robotics, and ambient assistive environments. Research and innovation pilots to assess implementation and wide uptake of solutions will be supported. Involvement of end-users, user communities and formal/informal carers will be emphasised.

1.4.2. Individual awareness and empowerment for self-management of health

Empowering individuals to improve and manage their health throughout life will result in more cost-effective healthcare systems by enabling the management of chronic disease outside institutions and improve health outcomes. This requires research into socio-economic factors and cultural values, behavioural and social models, attitudes and aspirations in relation to personalised health technologies, mobile and/or portable tools, new diagnostics, sensors and devices for monitoring and personalised services including but not limited to nanomedicine-based tools which promote a healthy lifestyle, wellbeing, mental health, self-care, improved citizen/healthcare professional interaction, personalised programmes for disease and disability management, as well as support for knowledge infrastructures. Solutions will be developed and tested with the use of open innovation platforms such as large scale demonstrators for social and service innovation.

1.5. Methods and data

1.5.1. Improving health information and better use of health data

The integration of infrastructures and information structures and sources (including those derived from cohort studies, protocols, data collections, indicators, health examination surveys, etc.) as well as the standardisation, interoperability, storage, sharing of and access to data, will be supported to enable such data to be properly exploited. Attention should be given to data processing, knowledge management, modelling, visualisation, ICT-security and privacy related issues. In particular, availability of information and data on negative results and adverse effects of treatment need to be improved.

1.5.2. Improving scientific tools and methods to support policy making and regulatory needs

There is a need to support research and development of scientific tools, methods and statistics for rapid, accurate and predictive assessment of the safety, efficacy and quality of health interventions and technologies including new drugs, biologics, advanced therapies and medical devices. This is particularly relevant for new developments in domains including those concerning biopharmaceuticals, vaccines, antimicrobials, cell/tissue and gene therapies, organs and transplantation, specialist manufacturing, bio banks, new medical devices, combination products, diagnostic/treatment procedures, genetic testing, interoperability and e-health, including privacy aspects. Similarly, support for improved risk assessment methodologies, compliance frameworks, testing approaches and strategies relating to environment and health are required. There is also a need to support the

development of relevant methods for assisting the assessment of ethical aspects of the above domains.

1.5.3. Using in-silico medicine for improving disease management and prediction

Computer simulation using patient specific data and building on systems medicine approaches and physiological modelling can be used to predict susceptibility to disease, disease evolution and the likely success of medical treatments. Model based simulation can be used to support clinical trials, predictability of treatment response, and the personalisation and optimisation of treatment.

1.6. Health care provision and integrated care

1.6.1. Promoting integrated care

Supporting the management of chronic disease, including patients with disabilities, outside institutions also depends on improved cooperation between the providers of health and social or informal care. Research and innovative applications will be supported for decision making based on distributed information addressing both physical and mental health, and for providing evidence for large scale deployments and market exploitation of novel solutions, including interoperable tele-health and tele-care services. Particularly in the context of demographic change, research and innovation to improve the organisation of long-term care delivery as well as policy and management innovation will also be supported. Implementing new and integrated care solutions shall aim at personal empowerment and enhancement of existing capabilities as well as concentrate on compensation of deficits.

1.6.2. Optimising the efficiency and effectiveness of healthcare provision and reducing inequalities by evidence based decision making and dissemination of best practice, and innovative technologies and approaches

There is a need to support the development of a systemic approach to health technology assessment and health economics, as well as the gathering of evidence and dissemination of best practice and innovative technologies and approaches in the healthcare sector, including ICT and e-health applications. Comparative analyses of the reform of public health systems in Europe and in third countries and assessments of their mid to long-term economic and social impacts will be supported. Analyses of future health workforce needs both in terms of numbers and required skills in relation to new patterns of care will be supported. Research on the evolution of health inequalities, of their interplay with other economic and social inequalities and on the effectiveness of policies aiming to reduce them in Europe and beyond will be supported. Finally, there is a need to support the assessment of patient safety solutions and quality assurance systems, including the role of patients on safety and quality of care.

1.7. Specific implementation aspects

Implementation of the programme will include support for knowledge and technology transfer and other forms of dissemination, for large-scale piloting and demonstration

actions, and for standardisation. In this way, market deployment of products and services will be accelerated, and scalable solutions for Europe and beyond will be validated. Such actions will not only support European industrial competitiveness and the involvement of innovative SMEs but will require the active involvement of all stakeholders. Synergies with other relevant programmes and activities, both public and private at Union, national and international levels will be sought. In particular, synergies with activities developed in the context of the Health for Growth Programme will be sought.

Consideration may be given to support relevant Joint Programming Initiatives (JPIs) and relevant public-public and public-private partnerships.

Appropriate links with the actions of relevant European Innovation Partnerships and the relevant aspects of the research and innovation agendas of European Technology Platforms will also be established.

Appendix 3: Gastein 2013 Conclusions on Public Health Challenges by 2050

By Nicole Rosenkötter and Annamaria Szalay

The parallel forum session on Public Health Challenges 2050 focused on the anticipated health challenges as well as on projections of future developments in health care and their implications for the European research agenda Horizon 2020, the future EU Framework Programme for research and innovation.

What will be the main challenges and opportunities by 2050?

Future environmental changes will come along with e.g. rising temperatures and extreme events like floods and droughts and may affect health outcomes such as air pollution and water related diseases, emergence of food and vector borne diseases which have not been common in Europe so far. There is a need to better foresee these effects and to develop strategies for health systems which can anticipate and respond in a flexible way to changing patterns of diseases in an integrated way. As mentioned during the discussion the environmental footprint of the healthcare sector must also be addressed. The demographic and societal challenges include an increased ageing population, the need for effective preventive measures that are adopted in an early stage of life, rising healthcare costs and a persistent social gradient in health. However, a healthy aged population will also be a huge valuable resource which should be turned into an opportunity for society. Additionally, it was discussed that in the absence of effective policies, current live-styles will further boost unhealthy behaviour: life-style related health threats will continue to be a strong driver of health conditions. The realisation of healthy choices being the default choices of the population is an area of future research which comes along with a struggle between science, practitioners, and policy making: how can the implementation of effective preventive measures be assured?

These changes in environmental, societal and lifestyle factors as well as possible economic decline, urbanisation, migration and technological innovations will influence the set-up and financing of our health systems. The three major driving forces of health care costs will be a continuing increase in life expectancy, the availability of technological advances, and a rise in public expectations of health care. Accordingly, we must tackle one of the consequences of ageing, namely the increase in non-communicable diseases and multi-morbidity, alongside an increasing healthcare demand and a decrease in the health workforce. It is estimated that by 2020 the EU will have a shortfall of 1 million healthcare workers. Moreover, the financing typology of health systems must be adapted and new models must be developed among others redefining the share of public and private health spending. At the same time policies to reduce greenhouse gas emissions can also have major impacts on public health particularly by reducing risks of non-communicable diseases. Increasing physical activities in urban areas should reduce the risk of diseases related to sedentary lifestyles.

The pharmaceutical industry is considering future scenarios in which the exact pathways of diseases are known and new disease classifications are used. Advanced technologies will lead to the convergence of engineering and medicine, targeted treatments and preventive

options will be available. These scenarios will require new collaborative mechanisms between healthcare providers, industry, the governmental sector and potential new players like IT companies, to put the individual at the centre and to take into account the possibilities of a “Digital Age”. The scenario of future information and communication technologies in healthcare will also be person-centred. These technologies will offer potential for predictive and preventive health information which is pervasive and peer connected. The “Information Age” will shift healthcare roles so that the individual, friends, families and self-help networks are positioned at the forefront; the healthcare experts having a more facilitating and cooperative role.

The transformation of the health services and revitalization of public health requires a multi-skilled health workforce whose skills and knowledge must be adapted to tackle the health challenges of the 21st century, with a focus on communication and collaboration among providers but also between providers and patients.

What was controversially debated during the forum?

The challenges identified led to lively discussions between the experts on the panel and the audience. The main focus of the discussion was on the discrepancy between available knowledge and the knowledge uptake by the individual, practitioners and policy-makers. How to move from knowing to doing? How can pro-health choices be rewarded?

Another major focus of the discussion was the need for radical health system changes, the potential catalytic role of information and communication technologies and the related fear of loss of privacy and concerns regarding the capability to integrate sufficient security and integrity measures. Some argued that future generations will not share these fears, that information and communication technologies will be a normal part of their lives. Nowadays, society should be more open and brave regarding technologies in order to enable change. Society should start the discussion about the transformation and modernisation of health systems to address the long term needs, the societal models on which future health systems in Europe could be based, and the realisation of intersectoral governance for health. A strong emphasis in the discussions was given to the values of universal access to health care, solidarity, equity, and the empowerment of citizens for active participation in health.

What are the emerging topics for a European Research Agenda?

Based on the challenges identified, the following set of research needs was compiled:

- Modelling and projection of future scenarios (e.g. demographic, environmental, technological and economic) and their interactions and potential impact on health.
- Linking of environmental and health data sets and surveillance systems that identify environmental health threats.
- Adaptation procedures/strategies of the population and of health care systems in a changing environmental setting.
- Approaches to reduce the healthcare systems environmental footprint.
- Development of comparable epidemiological data and health information systems across Europe to model, monitor and evaluate the health situation including identifying diseases pattern and health behaviour trends.

- Developing new or improved prevention measures (population or personalised) for life style related diseases and disorders. These should, among others, include the evaluation of policies and technologies to reduce greenhouse gas emissions.
- Comparative effectiveness research in the areas of health promotion, disease prevention and health services, while taking advantage of both the commonalities and the diversity across the EU.
- Development of comprehensive individual health information systems that combine all relevant health information (including information about genomics, proteomics, metabolomics), and make individualised recommendations that fit the personal life course.
- Address how to translate theories and interventions into “every day practice” at the level of the individual, practitioner and policy maker.
- Understanding of the biological processes of ageing instead of disease-centred research.
- Reforming of the existing disease classification by focusing rather on molecular pathway characteristics than on the classification by organs.
- Identification of ways to integrate and apply information and communication technologies in health care.
- Development of new health financing mechanisms including cost-effectiveness and cost saving approaches for health care.
- Addressing health inequalities, especially in a changing health care system which might be based on individual responsibilities and empowered citizens.
- Health systems research dealing with topics like the balancing of preventive and curative care, innovative transformation of health systems, provision of intervention packages instead of single interventions, and timely knowledge implementation by policy-makers and practitioners.