Chapter 7. Cross-cutting (Horizontal) Issues

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Executive summary

The Horizontal Issues section of DIAMAP is designed to review issues that span the breadth of diabetes research Europe-wide, particularly general issues that can improve the efficiency of research and its translation to benefit the individual. Also addressed are the overarching roadblocks identified through the discipline-specific concerns raised by the sub-groups, along with strategies and recommendations to overcome them.

Priorities of the Horizontal Issues group focus upon: policy, human resources, infrastructure, funding, societal and ethico-legal issues. **Recommendations** are provided with examples of key opportunities to improve the efficiency, competitiveness and impact of diabetes research Europe-wide, noting the communication and education strategies for implementation.

Policy at a pan-European level, within the context of health-related research must take action to address the diabetes epidemic, which is in part a consequence of escalating obesity driving type 2 diabetes but also reflects a disturbing increase in type 1 diabetes. Diabetes research should be more inclusively represented in European policies affecting all aspects of relevant health research and public health messaging.

Human resources are vital, recognising the need to retain research talent in Europe and facilitate interchange at all levels of scientific and clinical endeavour through appropriate recognition and adjustment of equivalent career structures between countries.

Infrastructure will require the orientation of and accessibility to registries for patients, high-risk groups, biobanks and repositories, and clinical research networks that stretch Europe-wide. Ethical and legal issues need conformity to facilitate this approach towards international research collaboration. The proposed **European Platform for Clinical Research in Diabetes (EPCRD)** (Goal 4.1) will provide essential services in this regard.

Funding sources mostly operate independently with few pan-European collaborations. Proposals to improve cohesion and integration of national funding structures require urgent consideration.

Dialogue between industry, academia, healthcare and non-governmental research organisations as well as government-funded bodies will be essential to optimise discovery, development and application of new medicines. International convergence of the regulatory framework for healthcare products would facilitate this process.

Societal and economic impact: the diabetes epidemic will have a catastrophic effect on healthcare provisions, which will pervade families, communities, cultures and economies, particularly impacting vulnerable groups. Initiatives to improve public health awareness are essential for effective implementation of recommendations from research.

Communication and education between scientists and healthcare professionals at an international level, and engagement of the general public and patients to empower personal decision-making are key implementation pathways for this diabetes research road map.

Introduction

Horizontal issues are considered to be those that cut across discipline boundaries to facilitate the process of research and its translation more effectively Europe-wide.

Europe urgently needs a comprehensive plan to rationalise, focus and integrate diabetes research to accelerate scientific discoveries and their translation into prevention and treatment. This is emphasised by the rapidly growing prevalence of diabetes in Europe, presently about 55 million and predicted to increase to over 66 million by 2030 [1].

The costs in human suffering (*chronic morbidity and premature mortality*) and the social and economic impact (*disruption to families, workforce and healthcare burden*) are huge and escalating [2]. Diabetes consumes about 10 percent of direct healthcare costs in Europe [3].

Although many academic and healthcare institutions, charities, governmental bodies and commercial organisations are conducting or supporting diabetes research in Europe, the impact is undoubtedly sub-optimal and often fragmented due to lack of a universally recognised cohesive plan [4].

Aims and objectives of the Horizontal Issues group

DIAMAP has assessed the current status of diabetes research in Europe, charted its future and identified crucial limiting factors (roadblocks) that impede specialism-specific advances and their translation into patient care.

The *aims* of DIAMAP are to carry forward diabetes research Europe-wide by:

- reviewing current provision and future needs to support diabetes research
- identifying general roadblocks that impede progress across multiple specialism-specific areas
- assessing ways in which these roadblocks could be overcome.

The *objectives* are to:

- suggest strategic changes that will enhance knowledge acquisition and translation
- structure logical and practicable pathways, with clear and relevant purpose to underpin long-term outcomes
- provide practical examples showing mechanisms to leverage efficiency of research across Europe
- facilitate implementation of these strategies into healthcare policy and practice to benefit current and future generations enveloped in the diabetes epidemic.

The Horizontal Issues group recognises that there are often several viable options that may be taken to accomplish each objective. These can mostly be addressed using current national and European administrative frameworks, provided that appropriate adjustment, collaboration and integration can be undertaken. The group has therefore endeavoured where possible *to identify the most practicable route consistent with the current and projected organisation of European science and healthcare.* The group is also cognisant of the need for any strategy to be flexible and adaptable to respond promptly to new advances or changes in socioeconomic circumstances. Additionally, careful consideration has been given to the need for *a plan that enables on-going and future strategies to be addressed with continuity*.

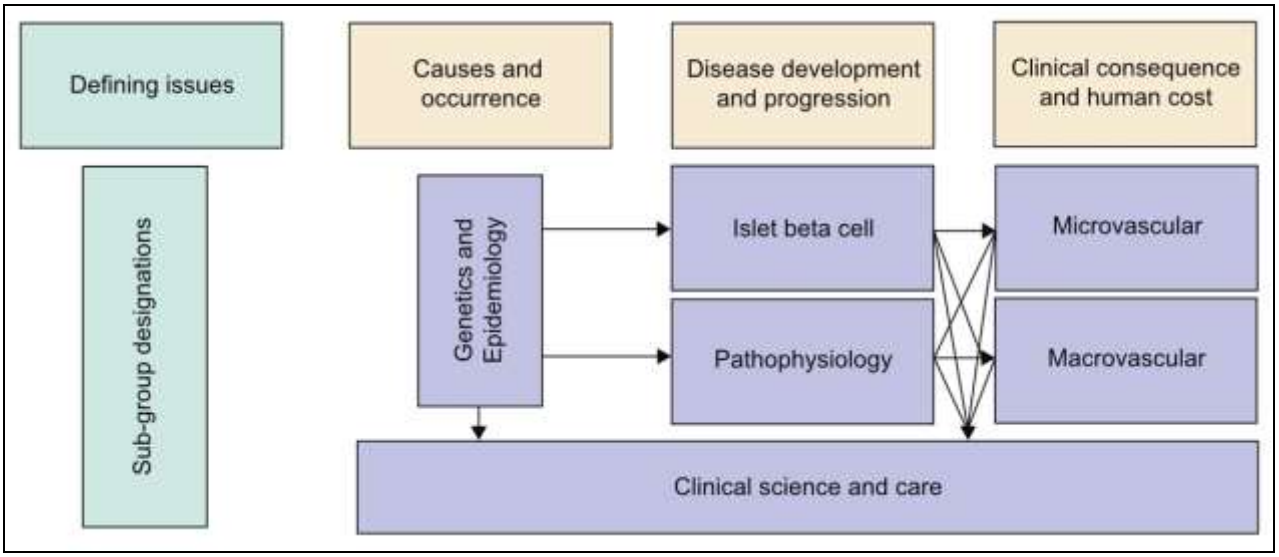
The DIAMAP process

The DIAMAP sub-groups have been organised to establish specialism-specific plans for diabetes research and healthcare in Europe. Their deliberations:

- determine current status of diabetes research in Europe
- establish and prioritise immediate, medium and long-term needs
- pin-point steps to overcome roadblocks to implement DIAMAP strategies
- propose defined, measurable objectives.

The matrix structure adopted for the DIAMAP process is illustrated in Figure 7.1.

Figure 7.1. Matrix approach for acquisition of information between the sub-groups



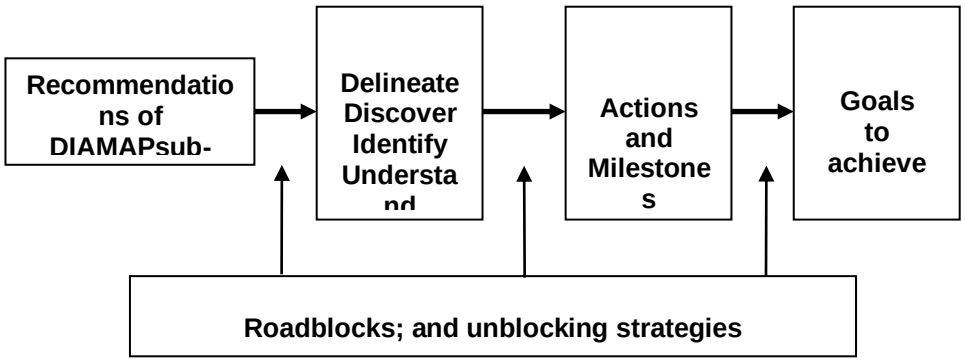
A summary of the missions and Goals for each specialism-specific sub-group is provided in Table 7.1.

Table 7.1. Summary of key specialism-specific recommendations for diabetes research by sub-groups

Group	Mission	Goal
Genetics and epidemiology	Understand aetiology and prediction	Develop novel prevention strategies
Islet research	Guide fundamental research to inform prevention and treatment	Protect, preserve, and restore beta cell function
Pathophysiology metabolism and integrative physiology	Integrate cell- and tissue-level data with whole body aspects responsible for understanding development of diabetes	Appreciate tissue communication in pathogenesis of all forms of diabetes and interaction with other diseases
Clinical science and care incorporating the development of a European Platform for Clinical Research in Diabetes	Propose initiatives to best inform clinical practice and give best individualised care	Facilitate studies for translational research to benefit the individual
Microvascular complications	Determine levels of risk and pathogenetic mechanisms including use of biomarkers	Prevent, reduce, halt, and reverse microvascular complications
Macrovascular complications	Determine levels of risk and pathogenetic mechanisms including use of biomarkers	Prevent, reduce, halt, and reverse macrovascular complications
Horizontal issues	Identify generic mechanisms to facilitate the missions of other groups (above)	Suggest strategies to implement initiatives and overcome roadblocks

The sub-groups have identified crucial roadblocks that prevent or impede the implementation of their recommendations. These can occur at several stages within the proposed map (Table 7.2). The Horizontal Issues group has identified general, common and overarching roadblocks.

Table 7.2. Locations of roadblocks



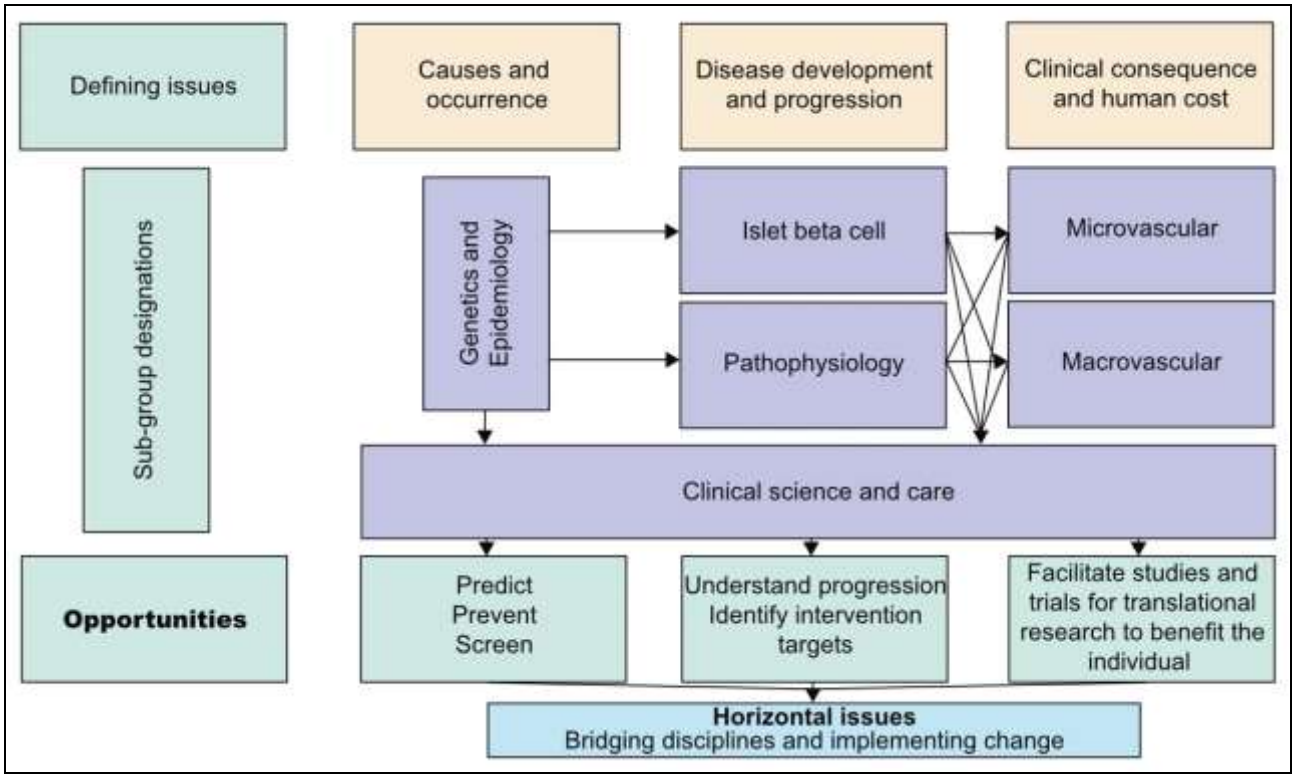
Strengths and limitations of diabetes research in Europe

Basic and clinical science has underpinned most major advances in diabetes research. Europe has strength in breath and depth in all areas of diabetes research relative to other global regions [5] and is also recognised for its innovation and quality of work in the fundamental scientific disciplines that provide the foundation for diabetes research. However, structure, funding and translation of this type of research are complicated by the composition and organisation of European Member States with their separate national procedures, highlighting the lack of interchangeability of 'process' across Europe. This in turn limits integration, movement, cohesion and impact of effort between countries.

Individual experts from different countries are generally agreed on the importance of particular research programmes within specialisms, but opportunities to pool resources and derive critical mass within countries and especially between them are often prohibited by incongruities of funding, career structure and administrative processes. The European Commission is acknowledged for making substantial progress to encourage and facilitate collaboration and integration of research at all levels across Europe. Nevertheless, the amount of resource and strong national structures with limited flexibility continue to preclude full exploitation of the talents and willingness of organisations and individuals.

Diversity of career paths, funding and national research structures has been highlighted as a major hurdle. The time taken to acquire funding and implement and manage research is disproportionately large compared with that devoted to the research itself. Opportunities for improvement are categorised in Figure 7.2, which shows where gains in the proficiency, effectiveness and outcomes of diabetes research might be made.

Figure 7.2. Horizontal Issues to provide focus for implementing change



1. Research policy

To the best of our knowledge research policy rarely transcends national boundaries except for the welcome (but inevitably limited and prescriptive) pan-European perspective of the European Commission Research Framework Programmes. Enhanced concordance of research policy within the medical and healthcare sciences in general, and to include disease-specific disciplines, could be encompassed within a review of European national research activities. The level of discord noted in the DIAMAP research and funding survey emphasises the need to harmonise national policies without compromising local features (such as ethnic, cultural, family, or environmental factors).

Other features of research policy that require coordination between countries are covered in subsequent sections such as ethics, registries, and repositories/biobanks. Agreed procedures for accepted laboratory and clinical practice to facilitate policies should at least subscribe to the same requirements and general standards to ensure consistency and rigour.

The key elements of *a diabetes research policy designed for commonality across European countries* should include maximum integration of scientific and clinical training. This will ideally comprise specific components that accommodate the differing presentations of the disease and its complications in different genetic and environmental communities, and vulnerable groups.

The main priorities therefore are integration of research and its applications, and interchangeability of structures and resources to optimise efficiency without stifling individuality of approach at the subject level. In addition to the European Commission Research Framework Programmes, dialogue between national medical research funding bodies in different European countries would be an example of a valuable facilitation step. Within the European Commission itself dialogue between the different directorates impacting on health is welcomed. Academic-industry partnering at a multi-national level (taking EURADIA as a model) would be a further example of an integrational advance, such as joint research programmes in the Innovative Medicine Initiative.

Recommendations 1. Policy

Roadblock	Recommendation
Differences between national scientific and healthcare structures	European Union further enhances integration of scientific and clinical research, e.g. using European Commission Research Framework Programmes to overarch national differences in guidelines and policy
Lack of integration of national scientific and healthcare research across Europe	Create a European Diabetes Academy to encourage national bodies to subscribe to European disease road map recommendations
Limited integration within and between research in disciplines closely linked to diabetes	Create association of research associations to address generic issues
Lack of large independent multi-national clinical studies	Funding for investigator-initiated multi-national studies

2. Human resources

There is a strongly perceived need for greater congruity in the training, career structure, remuneration packages and status of individuals engaged in diabetes research across Europe.

Many bright young researchers from Europe elect to further their careers and use their experience gained within Europe in countries outside of Europe. For young investigators, this overseas stage in career development is often financed by the European country of origin, yet many of them never return to Europe. In addition to this 'skills drain' Europe is seen as a nursery that provides training for enthusiastic young scientists from developing countries, but Europe does not retain many of these individuals and does not gain the benefit of the training given. *Retaining our top talent* and *attracting back talent that has migrated* are key requirements for continuity of high-level basic and clinical science. China has been very successful in this regard; Europe has not. This is probably best achieved through a more consistently structured career pathway for scientists at early doctoral level. Such a pathway should accommodate the need for clinical scientists to undertake laboratory-based research interspersed within a clinical curriculum and career structure. Examples of potential advances would be:

a) clinical training rotations to include periods of laboratory-based or other non-ward based research
b) extended contracts (currently often only 3 years) to more than 5 years to enable both training and its application in an integrated manner.

Incorporated within the need for greater consistency of career structure is greater conformity of professional recognition and remuneration at equivalent rates and experience. The disparity and disconnect between basic and clinical science discourages interchange between these two arms of research and between equivalent grades in different countries.

Recommendations 2. Human resources

Roadblock	Recommendation
Differences between national scientific and clinical career structures and remuneration	Integration of basic and clinical research Europe-wide; e.g. European Directive to consider harmonising scientific and clinical career structures across Europe
Attraction and retention of best scientific talent	Equivalent remuneration and recognition of achievement within scientific and clinical career structures Europe-wide

3. Funding structures

Several established funding structures support diabetes research in Europe (Table 7.3). Each offers welcome features but experiences limitations that impinge upon pan-European collaboration and concerted effort. European Commission Framework Programmes (FPs) and national government funding provide a base level of financial commitment, but this is perceived as insufficient for *more ambitious programmes to adequately address unmet needs*. Funding sources also vary with regard to the type of research they support. We note and appreciate the welcome and large increase in FP7 funding.

Table 7.3. Current funding sources and perceived limitations for diabetes research

Source of funding	Perceived shortcomings
European Commission Research Framework Programmes (across the European Union)	• calls can be too variable (some are too broad, others over prescriptive) • calls with non-scientific criteria can lead to large consortia, with challenges for coordination, administration and focus • regulations on reporting, heavy administration • no continuation of projects
National government funding	• national interests; research policies • coordination between countries lacking
Non-profit foundations and organisations	• funding rarely pan-European • limited resources, often for pre-specified use
For-profit organisations	• issues of: transparency, independence, regulation/legislation, intellectual property, profit
Industry	• often limited to pre-specified areas

European Commission and national government funding

Concerning the European Commission and national government funding, these should support both basic and applied clinical research, including research on effectiveness of implementations in healthcare and translational medicine. Compared to the current situation, there should be a greater variability in European Union-level funding instruments. Most notably, these should contain more career-promoting funding opportunities, including support for mobility of researchers within Europe and also worldwide. Academic careers and research need to become more attractive to healthcare and medical professionals.

National government funding sources often focus on current national interests and research policies, leading to heterogeneity in research funding at EU level. Potentially, increasing coordination of these instruments on research issues common across the EU could increase synergy and collaboration.

Research organisations are increasingly moving towards full-cost (total cost of all *resources* used or consumed, including direct and indirect costs) implementation of funding, and European Union and national governmental funding sources should support this. This will also increase the long-term financial stability of research groups and allow for more sustainable research planning. Ways to increase collaboration between academia and the pharmaceutical industry deserve greater exploration, taking into account issues of transparency and independence.

To be effective, European funding for diabetes research must evolve towards an integrated approach that is based on a clear scientific vision and that allows for coordination between all funding bodies. Adherence to the DIAMAP road map strategy with improved communication between European funding agencies and industry offers a unique opportunity to achieve this.

Industry sponsored grant-type projects

Several concerted initiatives have demonstrated the value of industry-sponsored (unrestricted, educational) grant-type projects proposed and led by principal investigators in academic and clinical institutions. The European Foundation for the Study of Diabetes (EFSD) provides an established example of this type of operation. The model is well justified by the enthusiasm with which it has been embraced by industry and the academic research community; with rigorous peer-review process paying close attention to the research-based issues of design, methods, analyses and novelty.

While the major emphasis of this type of collaboration seeks to improve understanding of fundamental pathophysiology, conceptual approaches to disease management are accepted as a part of the programme, and the identification of novel therapeutic targets might reasonably be anticipated from some studies. Given the success of this format by EFSD, the challenge is to marry such programmes into a more co-ordinated framework Europe-wide and to complement the more thematically driven 'calls' from the European Commission and national bodies. The award of grants is a competitive process, which ensures rigour of project and personnel but there is often not sufficient resource to fund long term.

Commercial organisations 'contracted' to support framework grant applications

The European Commission Framework Programme grants are now creating a separate industry of companies that will advise universities, find commercial partners, and help write and present applications and manage them. While this may assist some of the larger bids, because these companies are expensive they may be driving out the smaller and more academic pure research that was intended to be an important foundation component of the Frameworks. In consequence many applications have commercially orchestrated undertones that detract from the more fundamental science and medicine that is necessary for major advances. There is the real risk that 'grantsmanship' may be rewarded rather than scientific vision and expertise.

Recommendations 3. Funding

Roadblocks	Recommendations
Insufficient funding for large or long-term international projects	Optimise industrial-academic research partnerships and not-for-profit sources; allow outstanding projects to receive sustained European Union support
Insufficient innovation funds	Provide incentives for collaboration with biotechnology sector, e.g. protection of intellectual property and extension of patent life
Insufficient funding of clinical research	Encourage national healthcare initiatives for primary and secondary care

4. Infrastructure

'Infrastructure' incorporates all aspects of the clinical and basic scientific educational process, career paths, institutional operation, and resource implications necessary to support advanced research at a multi-national level.

The lack of compatible infrastructures Europe-wide has been identified as a major roadblock in several important areas of diabetes research. Concentrating resources and combining efforts in several scientific areas, particularly infrastructure, would create a solid basis for cutting-edge research in diabetes. In building this structure care should be taken to include sufficient flexibility for efficient and creative work in smaller research units. Overall the infrastructure needs to provide a balance between uniformity and individuality. The development of a sustainable and efficient infrastructure will require a thoughtful process of harmonisation in various areas, such as ethics, legal and financial issues, as well as previously considered issues of human resources and funding.

Due to the diverse nature of the disease and its far-reaching implications, research in the field of diabetes must be conducted in numerous different settings and locations within academic institutions, hospitals, primary care, public health and industry to ensure connection between discovery, development and implementation.

In this context it has been helpful for DIAMAP to take advantage of recent and well-considered proposals for infrastructural changes to facilitate research in biological, biomedical, behavioural and socioeconomic sciences in Europe such as:

- the European Strategy Forum on Research Infrastructures (ESFRI) (http://cordis.europa.eu/esfri/)
- the proposed Road Map Initiative for Clinical Research in Europe (EFGCP) (http://www.efgcp.be)
- draft documents such as the European Medicines Agency (EMA) Road Map (http://www.ema.europa.eu/htms/general/direct/roadmap/roadmapintro.htm).

Overall organisation of diabetes research in Europe: the European Diabetes Academy

The European Commission is recommended to consult with EURADIA and associated learned bodies to develop a European 'overarching diabetes research infrastructure' as these organisations have contact with all diabetes stakeholders with an interest in research, while acknowledging the primacy of individual national identity. A central entity should be created, the **European Diabetes Academy,** would also ensure coordination and establish Europe-wide diabetes research policy. The Academy would be responsible for oversight of the regional research effort and ensure the required coordination. It would be responsible for following up adoption of the DIAMAP road map strategy and monitoring the impact on individuals with diabetes

Existing policy, procedures and regulations concerning support for research by European Commission Framework Programmes are considered somewhat burdensome and occult by the research community. Despite the obvious commitment of the Commission to biomedical research across Europe, including diabetes, there are unusual constraints imposed by the principle of subsidiarity. To ensure the most rational use of precious European funds and to allow for development of a comprehensive plan for diabetes research there is an urgent need to involve specialists as impartial advisors to the Commission, providing balanced guidance for selection of topics for grants and a pool of expert reviewers acting above national concerns. A roster of leading diabetes research experts (as part of the **European Diabetes Academy**) based on the model currently under development for cancer, would be suitable for this purpose. Members could be elected by elite national scientific academies (e.g. Royal Society in the UK; Académie des Sciences in France) based on scientific excellence, ensuring an equitable spectrum of expertise to represent the full diversity of diabetes research exemplified in the DIAMAP expert group road maps. The Members of the Academy would comprise a fully independent, elite body recognised for its academic qualities and competence.

Registries

Registries for people with and at special risk of diabetes such as non-diabetic hyperglycaemia, should be established in preferably all European Member States, if not already established (e.g. Sweden, Denmark, Scotland). Such registries would have standardised and secure procedures for data collection, archiving, and analysis. National prediabetes and diabetes registries are suggested to be coordinated and guided by a European structure, such as the European Centre for Disease Prevention and Control (http://www.ecdc.europa.eu) in Sweden. This will raise the awareness level for diabetes compared with communicable epidemics, as recently recognised by the World Health Organization (WHO).

Uniformity of cataloguing data deposited in biobanks or registries should be agreed. Data should be accessible by researchers from different fields of academia and industry. The proposal presented in the ESFRI report seems reasonable, that access will be provided in the context of specific research projects and on the basis of medical relevance and scientific excellence.

A large interest in diabetes, its complications and its prevention is taken by insurance companies and their collaboration in health economics research. An important issue is protection of privacy of data stored in biobanks and registries. Legal restrictions should make access to such data impossible for insurance companies.

Clinical networks

Infrastructure should accommodate Europe-wide clinical networks to broaden accessibility of tissue and other biological materials, including those collected during large multi-centre studies. The application of registries, biobanks and other data storage facilities with appropriate access must be improved to increase efficiency of effort. An important aspect to be resolved concerns the protection of privacy.

While new drugs can bring improvements to the treatment of diabetes, research to understand facilitators and barriers for adherence and lifestyle adaptations is also important, although such data are hard to collect on a sufficiently large scale to draw adequate conclusions. However, if clinical networks can be strengthened the collection of such data can be made more accessible.

Recommendations 4. Infrastructure improvement/development

Roadblocks	Recommendations
Insufficient large information databases and tissue repositories	Develop European registries of people with diabetes and tissue repositories with wide but rigorously regulated access through the European Platform for Clinical Research in Diabetes (EPCRD)
Lack of electronic conformity	Ensure simplicity and compatibility of electronic operating procedures for clinical networks
Disconnect between research activities and public health needs	Incorporate research into public health initiatives Europe-wide and monitor adoption of DIAMAP under the guidance of the European Diabetes Academy
Mismatch of communication between the research community and the European Commission	Create an overarching diabetes research infrastructure of subject specialists (European Diabetes Academy) to facilitate policy and delivery of diabetes research across Europe

5. Societal issues, economic cost and impact

Obesity epidemic and links with diabetes

Obesity is recognised as an important driver of type 2 diabetes. The need to intervene against the obesity epidemic in Europe is not specifically addressed in DIAMAP but undoubtedly warrants attention through related research and public health involvement.

The UK Foresight analysis [6] of the obesity problem highlighted that the magnitude of change required to reverse the epidemic is greater than any health initiative tried previously. It will require partnership between government, science, business and civil society. A European platform for interaction should be established between all these partners to facilitate research in this area.

The European Association for the Study of Diabetes (EASD), the European Association for the Study of Obesity (EASO), the Federation of European Nurses in Diabetes (FEND), the International Diabetes Federation-Europe (IDF-Europe) and Primary Care Diabetes Europe (PCDE) may serve as facilitators. Experience can be drawn from programmes such as the Finnish Diabetes Prevention Study and the DE-PLAN project (Diabetes in Europe – Prevention using Lifestyle, Physical Activity and Nutritional Intervention), and the IMAGE project (Development and Implementation of a European Guideline and Training Standards for Diabetes Prevention) that was designed to enable interventions for diabetes prevention at the European level.

Vulnerable populations
How socially and economically vulnerable groups in society manage diabetes self-care is not clear, and treatment outcomes in these groups have been a neglected area of research. The systems of care have not addressed the communities of older adults with multiple complications, mental health issues, migrants, deprived and less well-educated groups in a coherent and consistent manner. There is a need for shift of emphasis in services for people to accommodate the economic impact for the individual and the societal consequences. Fundamental research in this area is limited and needs to be highlighted by studies such as those proposed under DIAMAP Goals 4.4, 4.3 and 4.9.

Migration tracking
An aspect of databasing that impinges both the practicalities and ethics of data acquisition is migration. This includes the increased fluidity of movement between European countries and the influx of migrants to Europe, with individuals who may not wish to have either their identity or movement recorded. A further issue concerns the manner in which genetic (ethnic) data are classified and recorded, and the way in which culture and/or religion or special features of lifestyle are noted. These cannot be resolved for one disease alone, and will need to be generic for medical research Europe-wide.

The special case of type 1 diabetes
Since type 1 diabetes represents only a small proportion of all cases of diabetes it risks being left out of the research effort. Yet the prevalence of type 1 diabetes is increasing. There is an urgent need to understand better the underlying genetic causes and environmental triggers of type 1 diabetes in order to develop strategies for prevention and improved treatment. Given the imbalance in prevalence compared with type 2 diabetes, industry is less focussed on this aspect of the diabetes conundrum, and such research will need to be supported by non-profit organisations and public funds.

Recommendations 5. Societal issues

Roadblocks	Recommendations
Lack of information regarding minority and vulnerable groups including migrants and particular ethnic populations	Targeted research to include special at-risk groups and health economics analyses; support for research on type 1 diabetes

6. Ethical and legal issues

Another responsibility concerns ethical standards, which must be upheld and transparent throughout. Although ethical principles are generally consistent across Europe, different and specific regional requirements can delay or defer multi-national trials. Greater conformity of ethics documentation, including clinical networks, is recommended. Policy decisions regarding contentious issues such as animal research and use of embryonic stem cells will need to be addressed through wider channels, and made clear through position statements. Hopefully these will be sufficiently liberal to enable judicious advancement of research.

Legal and statutory requirements associated with repositories and databases have been considered in previous sections in the context of privacy protection. The boundaries between ethical and legal issues may be blurred but it is anticipated that advances on a Europe-wide level will not be shared equitably until there is greater congruity in the documentation and procedural requirements for research approval and practice.

Holistic care for people with diabetes requires interdisciplinary and experienced management usually delivered according to guidelines, local resources and where possible patient expectations. In ‘person-centred care’ individuals can determine their own self-management priorities based on comprehensive training and education. These personal priorities can differ from the evidence-based targets that are frequently used to determine the quality of care delivered. From an ethical point of view, further discussion may be necessary to delineate some apparent tensions between personal choices and evidence-based targets.

The management of people living with diabetes implicates substantial maintenance of (electronic) medical records (perhaps more so than many other chronic diseases). These contain personal and sensitive information, aiming to help healthcare providers to deliver appropriate levels of care and that is important for the purposes of research. However, medical files also might be used for extraction of performance indicators, assessing the quality of the delivered care, and sometimes leading to additional payments for performance. This disconnection between ‘real’ care and ‘idealistic’ care needs ethical rationalisation and this also applies to use of information for research.

Permission and acceptance of patients for use of their (anonymous) medical information for objectives other than performing good medical care needs reflection and clarification. This will be implicit in the development of detailed data repositories and will have to be addressed transparently and ethically by the European Platform for Clinical Research in Diabetes.

Recommendations 6. Ethical and legal

Roadblocks	Recommendations
National differences in ethical and legal systems	Greater conformity of documentation for ethical issues
Lack of Europe-wide guidelines for preclinical and clinical studies outside of regulatory requirements	Position statements routinely updated for scientific procedures including trials, use of animals and stem cells and other controversial issues that divide regions of Europe

7. Communication and education

Transparency, public awareness and health literacy have been discussed as important areas for communication to enhance interest and support in diabetes research. Communication between scientists and healthcare professionals is not particularly a roadblock but it is an area that requires growth in line with technological advance if full advantage is to be taken of the opportunities to disseminate knowledge. Examples of inter-professional communication that could enhance the purposes of this road map include open-access journal publishing and information retrieval, which would circumvent some of the current limitations.

Education in its various forms represents a fundamental objective of communication in diabetes that will deliver advancements to the patient. For example, humanities of care, which takes critical account of the human condition in ill health, may assist patient empowerment and the transformation of information to patient decision-making.

It is the responsibility of everyone involved in research to contribute to public understanding and appreciation of the value of knowledge advancement and its application. The many established and new media outlets offer a powerful expanse of opportunity for advocacy to engender a public environment conducive to the support and advancement of research. Participation in media events and production of publications to inform the public of research activities are already requirements of many funding bodies. This in turn will form an integral part of a two-way exchange that will foster public engagement in research including participation in clinical trials.

Public recognition of need for research

Large-scale meetings at national and European level keep research in the public eye and the professional consciousness with press statements on research results reaching mainstream media. A European platform such as the EASD or FEND allows participants from different countries to describe new research, share best practice and plan future collaborations. Organisations such as EASD, JDRF International, PCD-Europe and FEND can engage scientists and professionals at an individual level but promote the sense of a 'collective' need for research funds while providing a forum for interaction with European bodies. Greater involvement of individuals with diabetes, through organisations such as IDF-Europe, would close the loop, bringing all stakeholders together in a revitalised effort to promote improved public understanding of diabetes and the need for increased investment of precious public funds in research.

New media and its importance to research

The Internet provides a powerful opportunity for discourse between researchers, continuing medical education, and the dissemination of research information to enhance public awareness. Telehealth in particular offers a new conduit for real-time interactive distance collaboration in research and this might include remote patient consultations and monitoring (with appropriate ethics and confidentiality requirements), shared methodological and analytical research and extended access to more isolated communities and research centres. Further research into distance education (e-learning) and its applications for patient awareness and self-care is warranted.

Public and political advocacy at European level

The work of diabetes organisations (patient-led, academic, and professional) provides a visible focus for diabetes campaigns. Examples include the European Union All-Party Diabetes Working Group (EUDWG) with its Members of the European Parliament and cross-party diabetes groups in national parliaments.

Further advocacy benefit can derive from non-governmental organisations (NGOs) collaborating as research partners with industry. From such a partnership has grown EURADIA, a unique alliance between charities/NGOs and industry, and the EFSD, which is providing research funding from collaboration between industry and the NGO sector. New collaborations and organisations are proving effective in campaigning and funding, but are also providing effective models for others to follow at national level.

Public involvement in research
Although research across all fields is now more accessible to the general public there is always a need for more direct involvement through consultation and participation in clinical trials. This could foster greater dialogue and enhance 'transparency'. Increased patient involvement and increased education of the public on research advances could be facilitated by organisations such as EURADIA, EASD and IDF-Europe.

Recommendations 7. Communication and education

Roadblocks	Recommendations
Insufficient public awareness of diabetes research	Requirement of funding bodies that grant awardees engage with the public. Wider involvement of all stakeholders in public events including policy makers and journalists where appropriate.
Major electronic communication advances remain under-utilised for knowledge dissemination	Support to make key scientific information readily available through electronic formats e.g. telehealth, email and texting.

8. Regulatory issues and dialogue with industry

Several issues have been identified that require attention but do not appear to constitute key roadblocks to diabetes research advancement. These relate to:

- pharmaceutical industry
- regulatory requirements for new medicines
- food industry (in relation to research).

Regulatory framework for new medicines
Probably the most significant and life-saving steps in the management of diabetes have arisen from the translation of basic research into therapeutic modalities. Yet, new and effective medicines for the prevention and treatment of diabetes and its complications are urgently needed. This is illustrated by the continuing rising epidemic of diabetes, the failure of conventional public health messaging, and the difficulty experienced in trying to contain the disease process even with the selection of agents and devices presently available.

This need for new and different therapies is well appreciated by the regulatory agencies at international level [e.g. European Medicines Agency (EMA)] and national level. However, safety is paramount, and the need to ensure that the risk:benefit analysis is justifiably favourable is often interpreted as a protracted and unnecessarily tedious process. Indeed, regulatory registration trials often require substantial multi-national collaboration. These studies are inevitably expensive: success is far from certain, and on-going commitments are difficult to predict. The statistics quoted for these aspects of pharmaceutical activity are quite variable, but conservatively only one in several hundred promising preclinical compounds is ever likely to be developed into clinical assessment beyond phase 1. Thereafter, less than one in 10 compounds studied thoroughly at phase 1-2 clinical level will be carried forward into phase 3. Thus a major cost to large pharmaceutical companies is clinical trials of agents that are not continued. For a drug to reach approval an investment of around 1 billion US dollars is often considered as a reasonable (if unconfirmed) estimate. In consequence the lower risk strategy of ‘me-too’ drugs is favoured in which further minor variants are developed within a class where outcomes have already been demonstrated. The pharmaceutical industry has sometimes voiced this concern and suggested that greater incentive is required to speculate in the development of entirely new types of agents. A greater guarantee may therefore be required for the pharmaceutical industry. For example, a successful new medicine might be allowed sufficient patent life (or exclusivity licence) to enable reasonable investment to be recovered and reasonable reinvestment to be available for development of future medicines.

While it is not in the remit of this research map to explore the financial basis of pharmaceutical

investment it would seem logical to encourage *international conformity of trial design and greater harmonisation of requirements for marketing authorisation* to ensure that the same trials are suitable to each of the major regulators [e.g. European Medicines Agency (EMA) and the United States Food and Drug Administration (FDA)].

Pharmaceutical industry

It must be acknowledged that the recent development of new anti-diabetic therapies has been dominated by the larger pharmaceutical companies and this is likely to continue for the foreseeable future. However, even cursory examination of the origin and early development of more recent therapies reveals that the basis for the identification of 'drug targets' and the templates for new therapeutic modalities have been heavily reliant on the advances of basic and initial translational research from largely academic scientific sources. Within the framework of ESFRI (European Strategy Forum on Research Infrastructures) several important projects (EATRIS, European Advanced Translational Research Infrastructure; ECRIN, European Clinical Research Infrastructures Network; EU-OPENSCREEN, European Infrastructure of Open Screening Platforms for Chemical Biology) have been initiated that aim to improve European research in the field of preclinical and clinical drug development.

Small pharmaceutical and biotech companies and enterprises funded by venture capital are often at the interface between academic sources of the fundamental science and licensing of 'proof of principle' studies and new chemical entities. Moreover, collaborative studies in which pharmaceutical companies have engaged with academic, scientific and clinical institutions have provided the wealth of necessary mechanistic (mode of action) studies to enhance the understanding of new agents and to identify ways in which they can be most usefully employed. The large phase 3 clinical trials to demonstrate efficacy and provide the basis for the 'indications' are inevitably at the behest of the regulators and the expense of the industry. Beyond this, the larger 'safety' studies that often now require extensive post-authorisation commitments are mostly driven by regulatory requirements and at the expense of the industry. It is noted that the pharmaceutical industry in general is showing particular vigilance given the damaging effects of unforeseen (and often unforeseeable) adverse effects.

Food industry

The food industry (and by extension the agricultural sector) has a huge impact on the development of obesity and the availability of healthy foods to the population. The market share for functional food has expanded during recent years but scientific validity of many health claims remains unconfirmed. Claims should be evidence-based, validated with studies conducted according to Good Clinical Practice to avoid misleading consumers. In addition, there is a need for the display of scientifically correct information on food labels across Europe in a consistent and understandable format. An area of research in itself is the possible link between food label information and dietary intake.

Suggestions 8. Regulatory issues

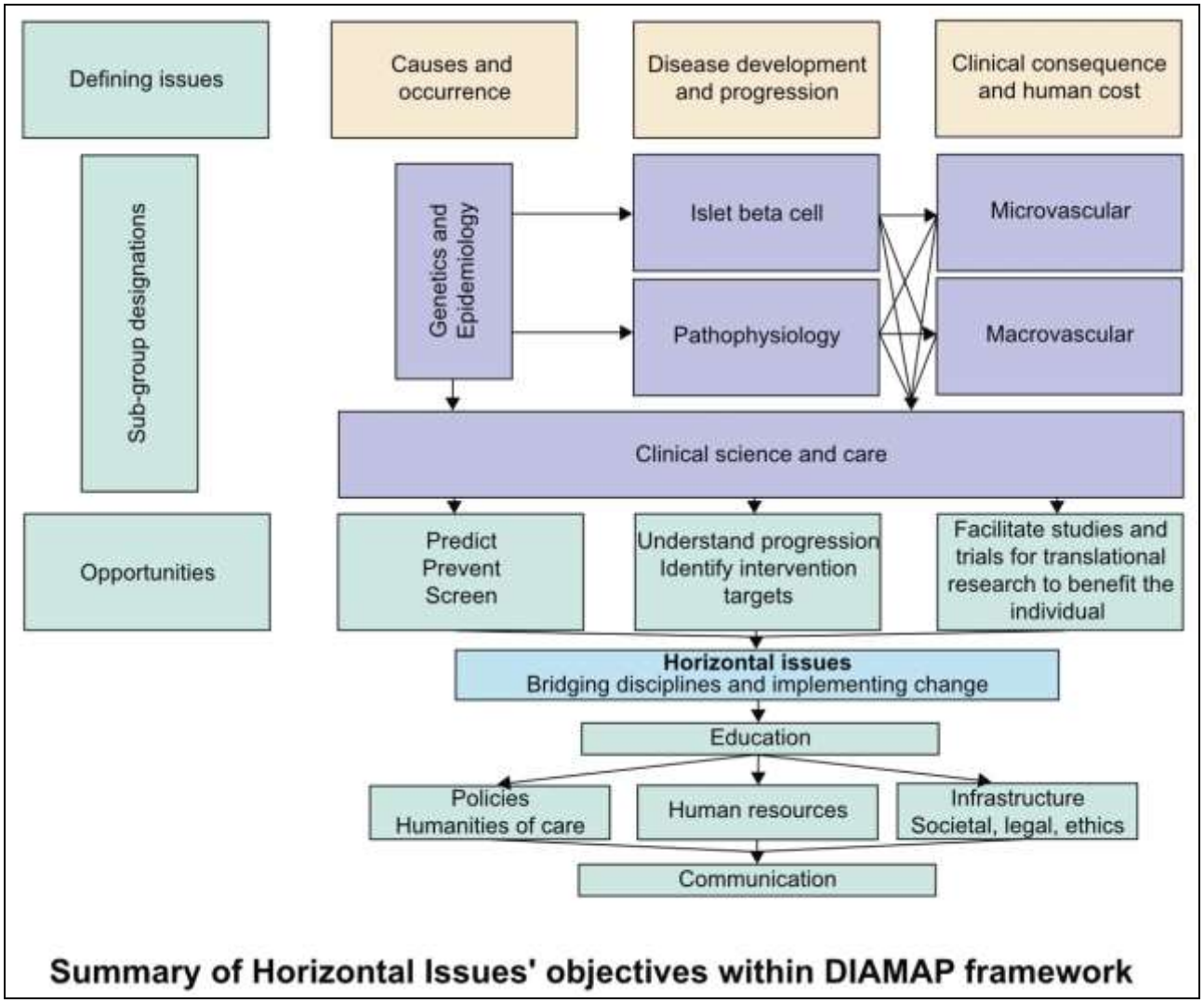
Issue	Suggestions
Regulatory	Reconsider patent life and international harmonisation of regulatory requirement for new medicines
Pharmaceutical	Recognise role of basic and early translational research as platform for drug development
Food	Clarify health claims attributed to some foods

Priorities

Based on the deliberations of the research sub-groups and the declared objectives of DIAMAP, the Horizontal Issues group has identified the following areas that can provide overarching initiatives:

1. Policy
2. Human resources
3. Funding
4. Infrastructure
5. Societal, ethical and legal
6. Communication and education

Figure 7.3. Summary of Horizontal Issue initiatives within DIAMAP framework



These initiatives are underpinned by strategies to test the practicality of recommendations to suit the widest benefits of European partner countries and to ensure that the science is cognisant and relevant to the clinical need.

Key practical elements to implement DIAMAP strategies Europe-wide:

- construct an interchangeable human resource infrastructure across Europe
- retain our top research talent within Europe
- develop biobank(s) (repositories) with Europe-wide access
- establish registries for people with diabetes and at high risk for diabetes

The future of DIAMAP and European diabetes research

Many of the recommendations mentioned in the DIAMAP report depend upon successful coordination of the European diabetes research effort and improved communication between all stakeholders. This can best be achieved by creation of an overarching entity, the European Diabetes Academy that would also be involved in overseeing implementation of the DIAMAP strategy across Europe (*see also* 4: Infrastructure). This would ensure rational, synergistic but non-overlapping investment in specific research tracks, integrating national and international efforts while encouraging national specificity that capitalises on local expertise.

Return for investment in DIAMAP will only be realised if the impact of the project is monitored and quantified during the implementation phase following the end of existing FP7 funding. The European Diabetes Academy must be funded to monitor success of DIAMAP in terms of advancement of research, improved regional research competitiveness and most importantly benefit to individuals with diabetes.

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