IMI2 JU Scientific Committee opinion paper on lessons learnt from IMI in view of its continuation in a new framework programme

The Innovative Medicines Initiative (IMI) public private partnership (PPP) of the European Union (represented by the European Commission) and the European Federation of Pharmaceutical Industries and Associations (EFPIA) has celebrated its ten year anniversary. IMI has been a visionary and innovative PPP that has fostered interactions among its continuously growing number of stakeholders. The exchange of knowledge and training and the building of networks within and between pharmaceutical companies, academia and SMEs and, more recently, patient representative groups, regulators, health economists, medical personnel and other industrial sectors, is a key strength of IMI and has become the basis for its global success and its transformative potential in driving change in the health sector.

These interactions have initially been facilitated by focusing on precompetitive areas of investigation but today the cross disciplinary networks resulting from IMI have gone beyond these boarders and enabled new thinking and a holistic perspective. Their spirit and motivation have formed IMI and progressed drug development and science in many different areas of health care. The continuously growing network has created a European platform for exchange and innovation in the health sector that has not been met anywhere else before.

Notably, the Strategic Research Agenda of IMI covers a vast amount of disease areas that have been carefully selected as the most relevant current and future public health needs of the EU population and aligned with the WHO priorities. The consequent pursuance of these clinical and health needs have created a rich and innovative portfolio of calls topics and associated projects that have been initiated to offer new perspectives and treatment possibilities to those who are at need. In many cases, flexibility and a visionary approach have been key to success. It is further noteworthy that the IMI has managed to remain agile and implement a system fostering continuous improvement of its own structure and function.

To secure efficiency and sustainable output IMI has developed novel, successful and flexible PPP funding mechanisms to address European and global health-related challenges, while being integrated within European Commission (EC) funding rules. This was and remains an important challenge in PPP but IMI has successfully managed these issues and overcome the hurdles to create the evolutionary spirit unique to IMI.

Nevertheless, there are also critical opinions on IMI´s current configuration and its output. These concerns mainly refer to the significant amount of financial investments, the role of the private partners, the balance between public and private interests, the transparency of IMI financial reporting and accessibility of results and output. In light of the upcoming decision with regard to the continuation of IMI and/or extension of PPP programs to other sectors of medicine and health care, the IMI2 Scientific Committee (SC) has been asked to provide its opinion on the role of PPPs, and in particular IMI, in achieving progress in European health research and health care and to identify current challenges and recommend constructive solutions.

Reasons for establishment of Public Private Partnerships (PPP)

PPP are usually established when there is need for a new infrastructure. This need is typically defined by governmental or public institutions. Subsequently, the private sector is commissioned to invest and establish the infrastructure needed in exchange for financing or entitlement to obtain (future) fees from the users of this infrastructure (1). In health care, PPP are often sought to either ensure cost minimisation and lean management structures or, when public money is to be used, to reduce the risk of setting up measures to improve health care or develop products, where the market is uncertain, small or emerging. These latter PPP are usually sought in circumstances that would otherwise not seem attractive to the private sector (2). Thus, it is usually the public sector that takes the initiative.

Lately, PPPs have gained acceptance in the areas of drug development and clinical research. For example, PPPs focusing on specific product development are usually created to provide access to medicines and diagnostics in middle to low income countries (2), while 'precompetitive PPPs' such as IMI aim to provide new solutions to significant problems requiring pharmaceutical research (3). Recently, it has also become evident that close interlinkage of drug development and clinical research can be achieved by partnering between the clinicians and nurses and industrial R&D. If the mutual interest has been defined and the framework conditions are clear the collaboration can reduce time and increase efficiency of drug development.

Specific characteristics of IMI

The IMI PPP remains a unique example of a PPP in health care because it was founded with two important political aims which are to re-establish pharma-driven research in the EU and to increase competitiveness of European research. Today, IMI is considered the largest PPP in pharmaceutical and medical sciences on a global level (4). This is, of course, mainly quantified by the financial resources invested into this initiative but it is well recognized that the international networks that have developed within and beyond the program have become a vehicle for innovation, improvement and change in health care.

While the IMI1 joint undertaking was centred on the needs of the European biopharmaceutical sector, it was enlarged to the societal needs in IMI2. Based on their designation IMI1 and IMI2 joint undertakings have been carefully aligned with the public health interest, which sets the framework in the IMI Strategic Research Agenda (SRA), while they were also addressing the interests and needs of pharma industry, the private partner. Initially, the program was designed to reinforce the European competitiveness at all levels, increase the research investments in the biopharmaceutical sector in Europe, and facilitate drug development and manufacturing by addressing gaps, hurdles and 'valleys of death' encountered by drug developers. As a consequence the EFPIA partners became the major drivers of the program, thus taking the initiative to define the research objectives on the topic level (5). Management structures and the legal framework were adapted to the need of a PPP and the configuration of the partnering global players in healthcare industry and later revised based on the experience gained in IMI1.

With phase 2 of IMI in its last years there is some indication the advantages of PPP to pharmaceutical companies may be evident and that they might have adopted the collaborative principle. For IMI it may, thus, be time to enter the next phase of PPPs by seeking modalities for access to other components of innovative technologies for improving health throughout the EU. The list of new technologies tightly linked to potential health benefits and disease prevention includes digital and food technologies among others.

Specific comments and recommendations

Balancing public and private interests

The design of the IMI program is noteworthy because in this program the public sector relinquishes some of its influence by granting the private sector the prerogative to initiate the research topics within the framework outlined in the Strategic Research Agenda. The process is well structured and different committees can comment on the call topics developed by the industrial partners. Nevertheless, this process is probably the source of some of the criticism towards IMI because the initial interest, which is defined via the industrial commitment to an in kind contribution, has major impact on the topic content.

Getting the balance right between public and commercial interests is the biggest challenge in all PPPs (6,7). Thus, the IMI governance model was designed to achieve a balance between public and private interests. Table 1 illustrates the different IMI structures and advisory bodies that contribute to the decision making processes. It highlights where public and private influence is balanced and where there may be imbalances. The analysis reveals that due to equal representation of EFPIA and EC in the Governing Board (GB) decision making is well balanced on the program level (e.g. Strategic Research Agenda). On the project level, this balance is secured because public and private consortia need to develop and negotiate their joint work program. Meanwhile there is an imbalance at the level of topic selection and topic description because the responsibility lies with the Strategic Governing Groups (SGG) and depends on the in kind commitment. This imbalance cannot be fully compensated by the consultation of the SC, the States Representatives Group (SRG) and EC before the publication of the call topic but it can be leveraged to a certain extent by the proposal submitted by the public consortium that delivers the initial project application and can, thereby, significantly influence the project goals and development.

Table 1: Summary of responsibilities in decision making in IMI2.

Task/Process	Responsible entity	Balanced/Unbalanced and Comments
IMI Strategic Research Agenda	EFPIA + EC	Balanced.
IMI Annual Work Plan	GB (EFPIA + EC)	Balanced. Additional input through comments from SC, SRG and EC (DG Santé, DG RTD, DG Grow, DG CNECT
Call topic selection	EFPIA (usually SGG)	Partially unbalanced: - call topic selection depends on in kind contribution from EFPIA; - initiation 1.) by SGG or 2.) by EC via GB or EFPIA/SGG or 3.) by external third parties (proposals reviewed by SGGs and InnoMedS)* - addition of topics to annual work plan (IMI programme office) and approval by GB;
Call text	EFPIA (SGG)	Partially unbalanced: - final approval by GB - with the current procedure SC, SRG and EC comment on the call text at a very late stage; - there is no public SGG counterpart that could represent specific public interests at an early stage - workshops and public consultation are sometimes used to define public and academic interests - recently IMI introduced the consultation of SC at an early stage of call text development; this is a significant improvement
Application process	2-stage process: Stage 1: Application and selection of public consortium, no industrial input; Stage 2: Mutual interests of EFPIA partners and public partners joined to final proposal	Balanced: The applications are evaluated against the call topic. However, the public consortium can interpret the call text and bring up public interests. Only later, the industrial consortium partners reveal their own interests and align with interests of public partners. Note: The 2-stage process is favoured because it allows the public partners to present an initial design of the project that can address public interests without being influenced by the interests of the private partners. However, specific information on the nature of the in kind contribution in the call text helps the applicant public consortium to understand the expectations and the potential input of the industry partners.
Consortium selection	independent reviewers evaluate and make recommendation; decision confirmed by GB (so far, no veto of reviewer decision despite this possibility)	Balanced. Reviewers are neutral experts in the field; final approval by GB (there has never been a veto against the reviewer decision)

Project review	External independent experts provide review and evaluation	Balanced. Reviewers are neutral experts in the field.
Consortium agreement	Legal contract on terms of collaboration, e.g. task sharing, confidentiality, IP	Balanced. Mutual agreement between private and public partners.
Description of Work, Description of Action, Annual reports, interim reports, final reports	Consortium (Industrial and public) partners	Balanced. Mutual agreement between private and public partners.
Funding	EFPIA	In kind contribution to the project (in person months, reagents, data, techniques, experimental work, etc.). The height of the EFPIA contribution is matched by EC funding.
	EC	Only public partners are eligible for public funding. This includes SMEs or patient organizations but there is no public funds going to EFPIA partners.

* see https://www.imi.europa.eu/get-involved/submit-your-ideas

Addressing the public health need in the PPP

As in any PPP, the IMI public-private funding scheme has been a topic of discussion within the IMI Scientific Committee, IMI office, the European Commission and other institutions for some time. In reality, if there is no potential for commercial benefit, then for-profit organizations are unlikely to want to contribute. Likewise, for the benefit of the citizens and for the optimal use of taxpayers' money to be spent there needs to be an obvious public health benefit of the supported research projects and programs within this type of funding mechanisms (3,6,7) (*see also IMI SC considerations on PPP topics* (8)).

Arguably, while the potential for commercial benefit is accepted as a prerequisite for funding, precisely because of this prerequisite, the public health benefit needs to be at least as obvious in a PPP funding scheme as in non-commercial funding. Additionally, it needs to be clear

- why public funding is required,
- why public participation is beneficial and why, for example, public participation is preferable to a private-private partnership,
- why carrying out the research by one company alone would not happen, and
- why the involvement of academia and public institutions is crucial.

The above questions are aligned with the European Partnerships criteria identified under Horizon Europe and the Scientific Committee has already reflected on this need in its *IMI SC considerations on PPP topics* opinion paper (8). The SC proposed to gain acceptance and effectiveness by considering better mechanisms to classify IMI topics according to their coverage of mutual interests of the public and private sectors. Altogether, IMI would benefit from more active communication of the rationale underlying the call topic selection and descriptions.

The current IMI governance model sets a framework on the public health needs and the GB ensures that the call topics are aligned with the Strategic Research Agenda. However, beyond this point there are no clear mechanisms influencing how this need is translated into the specific call topics and projects. Thus, the interpretation of the public health need is often left to the industrial partners writing the call texts. IMI then relies on the comments of the SC, SRG and EC to ensure that the public perspective has been considered. However, the quality and content of these comments may vary, depending on the topics and expertise available. Since there is no other mechanism installed to ensure full consideration of the public perspective on the public health need the SC views this a potential weakness in IMI.

Recommendation 1: It is recommended that the rationale for choosing a topic for a private-public partnership is clearly articulated and supported by specific data, which could be detailed and made publically available in the preparation phase for the specific call ("tentative call topics"). It is further recommended that the public bodies consulted on the call topics, e.g. SRG, SC, EC, receive instructions to comment on whether the public health need is adequately reflected. Selected deliverables, defined tangible outputs (DTOs) and sustainability planning should further reflect the public health need.

Research driving implementation

Nevertheless, it is recognised that the intended, 'in kind'-driven lead function of the industrial sector has most likely been an important prerequisite for driving progress through IMI projects and establishing a novel type of research in the EU:

IMI projects have implementation goals. This implies that IMI projects differ from classical research projects because the overall goals of an IMI project do not consist in approving or refusing a previously generated hypothesis but rather in accelerating and optimising processes such as product-specific drug development, establishment of a model research infrastructure, obtaining proof-of-concept for new technological concepts or paving the way for regulatory acceptance or new reimbursement strategies. To achieve this, the project needs to be anticipatory and well-structured by professional project management. If the project runs very well it is expected that the impact in the specific field will be high. Ideally, the project ensures uptake measures and, thus, guarantees sustainability of the project assets (*see also IMI SC recommendations on sustainability* (9)). Furthermore, implementation requires that the quality of results fulfils regulatory standards. This insight has already influenced the academic research in participating centres throughout the EU and has changed the perception of how research is undertaken on many occasions.

It is evident that IMI has progressed from its initial drug development focus in IMI1 to clinical development and implementation in IMI2. Some of the projects have even become facilitators of change in different health sectors. To achieve this, an increasing number of stakeholders had to be involved to discuss and align views and interests within the EU health care landscape. By seeking this stakeholder involvement and new partners associated to IMI, the projects have gained visibility of the EU as a global player in health research within Europe and beyond the EU.

More recently, some IMI2 calls and projects have progressed from precompetitive to competitive research in the clinical phase, including proof-of-concept studies as well as late phase clinical trials (10). This is most evident in the IMI2 AMR accelerator portfolio where individual company interests have been gathered to support AMR research in the EU and to leverage the currently low return of investment on antibacterial drugs. Notably, this new trend raises the concern that public money could be allocated to the competitive space of drug development. However, the EU legislation highlights the obvious clinical need and the fact that this is a market failure area considered as non-competitive. Thus, this funding mechanism is recognised as justified because the IMI AMR initiative can attract pharma-driven research to the EU and push AMR drug development.

It is hard to ascertain to what extent the industrial lead of the PPP is necessary to achieve flexibility and delivery of the programme in every situation. The management structure has proven to be adequate for fast and flexible reactions to upcoming epidemics, in particular, where fast decision making processes on new calls and allocation of funding is required. This advantage was most evident in the Ebola crisis. However, in this specific situation there was an additional strong interest of the European Commission in the development of vaccines, drugs and diagnostics against Ebola. In this case, the clear positioning of the European Commission facilitated the initiation of the Ebola-specific PPP collaborations and was also important for the continuation of the projects beyond the first funding periods. Notably, while in IMI the public health need is usually initially defined by EFPIA and driven by the industrial `in kind`, in this case, a public health need was evident and brought forward by the European Commission. The rapid realisation of this portfolio of projects demonstrates that common interests among public and private partners are important and synergistic drivers of innovation;

it also proves that the pre-established PPP infrastructure was a fertile ground for project development allowing more rapid and effective initiation.

Recommendation 2: Progress the option that topics can be initiated by the public side of the PPP in future IMI topics and calls, as required.

Meeting regulatory standards and seeking regulatory involvement

Nevertheless, many IMI projects have encountered implementation hurdles regarding acceptance by regulatory or reimbursement authorities. Some projects have tried to tackle these obstacles through involvement of regulatory and health technology assessment (HTA) bodies but this has not been an easy task. Future IMI programmes need to develop new concepts on how to efficiently engage these stakeholders. Early involvement of EMA, national regulatory agencies, GDPR/EU data protection office, EPA, EDQM and ECDC have been proposed and have sometimes been used. However, this exchange has often remained unilateral and limited to selected issues. There is no established concept on how regulation could respond more quickly to scientific progress and IMI projects are, therefore, sometimes viewed as drivers of regulatory science (11). In many cases they help to identify areas where regulations are not fully aligned, need updating or where convergence is required.

Of further note, to avoid conflicts of interest regulatory involvement has to be effectuated on neutral grounds (6, 11). In many cases the IMI format offers this neutral platform (3, 12). However, there is still the situation that some governmental institutions prefer to avoid participation in IMI to avoid any actual conflict of interest or the perception thereof. This is primarily the case when private partners would become involved in surveillance measures, such as the assessment or reporting of safety and effectiveness of medicinal products within a project, which impinges on the role of the regulatory agencies. In cases where the participation of these public institutions is required to achieve optimal results, an additional coordinating neutral third party may be needed within the IMI. Alternatively, a change in perspective might be needed and, and as in above *Recommendation 2*, alternative formats for collaboration within a PPP might need to be considered. For example, instead of addressing a public health need under an industrial lead, a public lead in a project addressing an industrial (regulatory) need could represent a promising solution.

Recommendation 3: Future IMI programmes need to develop new concepts on how to efficiently engage the regulatory bodies needed for implementation. This includes an early check to identify the relevant regulatory topics and the responsible regulatory authorities as well as a key strategy outlining in which project phases these are expected to be involved by the project consortium.

Transparency

A central issue to all PPPs is transparency (7, 13), which is paramount when investing public money. Lack of transparency on procedures for selection of topics and winning consortia and on leveraging of public funding by in kind contributions has been among the major criticisms of the IMI initiative and some measures have been taken to achieve more transparency in the decision making processes without losing speed and effectiveness. Importantly, most of the measures identified for improvement suggested by the SC are centred on addressing the perceived lack of transparency and the resulting loss of trust:

1. **Strategic Governing Groups.** The Strategic Governing Groups (SGG) were installed in IMI2 to develop scientific portfolio strategies in their areas of expertise and to make the management and the topic development and writing process more transparent. The SGG comprise specialists from EFPIA companies with longstanding expertise in R&D. SC members (1-2 members per SGG), representatives of the EC and ad-hoc experts as agreed by the SGG or as proposed by the Board attend the SGG meetings and provide their input.

   The SC considers these expert teams as an essential and valuable core of the IMI PPP. This structure enables scientific exchange in a specific area of expertise among participating companies and the high level of expertise within the SGGs ensures that topics will address important needs in research and innovation, that the structure of the projects is well thought through and, ideally, that the ´in kind´ contributions are allocated appropriately. The introduction of the SGG in its current form has strengthened the quality of the input from the private partners but at this level there is no equivalent forum bringing together the expertise of the public partners that could represent the public view on the public health needs. Participation of the SC members and EC representatives, mainly as observers, improves transparency but in the current form is insufficient to balance the public and private partner interests which is essential for transparency and the credibility of a PPP within the SGG.

   The necessary process changes to address this shortcoming in the representation of the public view could be addressed if the entire SC, acting as an advisory board currently representing the academic and public side, and with patient and regulatory representatives, would be involved in the topic development, including from the earliest stages. However, the current relatively short timelines for topic development and writing impinge on the feasibility of this proposal. Nevertheless, SC input at an earlier stage in the topic development could represent an important counterbalance to the industrial perspective and, if there is data underpinning the rationale for the selection of this topic, including the public need addressed and supported by data, this would be a means to gain further trust, transparency and confidence of the IMI PPPs. This process has already been used for individual topics but should become a routine instrument for IMI topic development. Additionally, an SGG or other instrument for public consultation and involvement of patients should be considered.

   Recommendation 4: To make the entire process more transparent, the SC recommends developing a procedure for the SGG to present to the SC on emerging and proposed topics from the earliest stages and during the topic development process. Instruments for public consultation and involvement of patients to be developed for all SGGs.

2. **Industrial commitments.** It is important to note that the SGG do not have the power to make decisions on financial or other in kind contributions; this is decided by the company CEOs of the participating partners. Thus, the original SGG concept is sometimes hampered by lack of support or insufficient funding provided by the pharmaceutical companies. Sometimes the industrial partners even decide to opt out shortly before announcement of the call or even during the ongoing project. This can result in major deviations from the original objectives agreed upon between public and private partners. The SC has observed that this potential volatility in commitment can create instability. The SC, therefore, recommends that financial and other commitments of the industrial partners should be clarified at an earlier stage and guaranteed within the project life span.

   The SC further proposes to increase transparency in regard to the ´in kind´ contributions beyond the principles defined in the IMI2 rules. The ´in kind´ contributions from EFPIA partners are central to the IMI projects, in particular if they consist of access to databases and sample collections that cannot be retrieved elsewhere. The IMI2 SC has consistently commented on this matter, which has already led to more precise definition of the companies´ planned ´in kind´ contributions in the call texts and thereby more clarity in regard to the intended scope of the projects. However, project-specific detail and transparency of ´in kind´ contributions from EFPIA (such as work to be undertaken, defined tangible outputs, person months, funding, data, and resources) often seems to remain undeclared or unclear. Since this can be a source of mistrust, it represents a major challenge to the programme and needs to be addressed.

   Recommendation 5: Financial and other commitments of the industrial partners should be clarified at an earlier stage and guaranteed within the project life span. To ensure project-specific clarity and transparency of the ´in kind´ contributions from EFPIA participants, more specific details of the 'in kind' contributions should be provided and minimum contributions confirmed by the industry partners detailed in the proposal which can be assessed during the evaluation of proposals and during the review meetings (e.g. work to be undertaken, defined tangible outputs, person months, funding, data, and resources, per participant, per deliverable, per work package, per year).

3. **Composition and selection of public consortia.** Another, similar issue endangering IMI's reputation is uncertainty on how the winning public consortium is selected. The process is described in detail on the IMI website (https://www.imi.europa.eu/apply-funding/imi-call-process). The assessment criteria (excellence; impact; quality and efficiency of the implementation) and the definition of procedures including the description of roles of independent experts and observers are in place but there might be a benefit from additional communication and dissemination. For example, it might be perceived that the industrial partners could influence the decision at the level of the Governing Board because the GB can veto the reviewers´ decision but this has never happened (14).

   Recommendation 6: The SC suggests improving transparency of the selection process by providing more detailed explanations on the procedure and statistical analysis on the IMI webpage and including conflict of interest statements on associations between the industrial partners and the public and academic consortium participants in the application forms. If statistics reveal that certain consortia are disadvantaged this should be identified and addressed (see below).

Participation of all Member States

Furthermore, the SC would also like to highlight the importance of the participation of the Member States that joined the EU in 2004 or later. New concepts on how to achieve this are required. In particular research topics requiring epidemiological data may benefit or even require broad coverage of the EU population. Additionally, future programmes should ensure SME involvement apart from project management. The legal framework should be adjusted to support SME involvement for defined tasks or for short working periods.

Recommendation 7: To encourage broader participation in IMI calls and topics, the participation of new applicant consortia, underrepresented Member States and of SME in research and innovation aspects (not only project management and dissemination aspects) should be incentivised. Reasons for not participating should be analysed and the results used to inform and facilitate changes to the legal framework, if necessary. Timelines for preparation of applications could be prolonged by earlier publication of tentative topics and improved premarketing concepts.

4. **Scientific Committee and States Representative Group.** In this context, the SC would also like to use the opportunity to examine its own role in the process. The role of the IMI2 SC is an advisory role to the IMI2 JU with limited influence and impact. Since this committee is currently a major source of the public and academic viewpoints on public health issues and the work programme the SC input should, however, be considered as central to the decision making process on the public side. Currently, the SC comments are first transferred to the topic writers, and then to the Governing Board and the SRG. Yearly meetings with the states representatives group (SRG) have fostered exchange and discussions among the public bodies but have not had any additional impact on the programme. What is required to actually influence the topic selection and procedures is a stronger interaction of the SC (and potentially the SRG) with the IMI Governing Board. This could be achieved by regular feedback from GB meetings to the SC and SRG via their respective committee chairs. In the IMI2 programme these chairs have an observer status in the GB and are bound by confidentiality, which limits information flow. Thus, the changes needed to improve transparency and communication are 1.) to allow the chairs to provide feedback to their respective committees, which would increase transparency; and 2.) to endorse the role of the committees by giving their chairs a membership status in the GB.

   In the last period, the SC started to deliver written recommendations to the Governing Board. However, there is no legal framework requiring the GB or IMI office to respond to, assess and implement the SC recommendations into the programme. Re-adjusting the balance between public and private partners through a stronger position of the SC could help to tilt the balance within the range needed to ensure transparency on the use of public funding. In views of their expertise and the continuity of the work of the SC. it would further be more efficient if SC members were appointed for a three years term instead of the current two years per term.

   Recommendation 8: Increase the impact of SC and SRG by improving exchange with the GB and continuity of their work. This should include more transparent feedback from GB meetings to SRG and SC and could include an active role of SC and SRG chairs in the GB, and consider appointing SC members for a three year term instead of the current two year term.

5. **Patient participation.** Importantly, patient organisations and established foundations in health care can positively contribute and fertilize the PPP and attract additional sponsors (3). Furthermore, in health care PPP, the involvement of patients, patient organizations and health foundations have been found to increase the credibility of the programmes. Their contribution is essential for the definition of the public health needs and improvement of outcome and impact (3,15). In IMI2, it is welcomed that increased attention has been given to the education and involvement of patients. Specific projects were funded to cover this obvious need and, recently, a patient representative has recently been appointed as a member of the SC. Notably, in most PPP involvement of patients and civil society is often restricted to participation in projects (15). Academics in advisory boards are often viewed as representatives of the public and public health needs (15). Thus, the nomination of a patient representative in the IMI2 SC is a major step forward. The SC encourages the European Commission and EFPIA to develop concepts on how the patient voice could be better integrated into the structure of IMI. In light of the anticipatory character of many IMI calls it is evident that patient views should be shared with the SGG and SC. An SGG for patient representative organisations could be considered.

   Recommendation 9: To develop further concepts on how the patient voice could be better integrated into the structure of IMI or its follow-up programmes, which could include an SGG for patient participation.

6. **Measuring impact and success.** The SC states that overall the dissemination of information on IMI project content and project goals has been very successful. However, as highlighted in the evaluation report from 2014-2016 there is uncertainty in regard to the actual impact of IMI on research and innovation and European health care. This has two reasons: 1. Dissemination of the project results and identification of the tangible outputs after project termination is less actively driven and valuable project assets are often not made accessible or sustained. 2. Evaluation of the impact at project level is difficult because IMI has missed the opportunity to define criteria or parameters at project level, e.g. key performance indicators (KPI) and/or defined tangible outputs (DTOs) that can be called upon to measure success, impact and the output of projects. Notwithstanding the diversity of projects, in particular in IMI2, it is recognised that this adds a layer of complexity. Nevertheless, KPI and clearly defined tangible outputs for PPP in health care have been proposed for different project stages (3). Since there is the perception that the outputs of projects are unclear, despite the high investment, this aspects needs to be addressed.

   One area where there is room for improvement is the control of project delivery:

- One risk that has effectuated is that EFPIA partners, as other beneficiaries, can exit the project if unsatisfied, or if circumstances change unexpectedly. Albeit there being similar flexibility of participation on the public side, the financial dependencies created by the project may not allow this decision. Notably, fluctuation can endanger the efficiency of the remaining partners and negatively impact the pursuance of the ultimate project goals.

- The mid-term reviews are important control elements that allow the opportunity to detect and revise deviations in time, content, progress, outputs and the allocation of funding compared with the project aims, progress and deliverables. They should, however, be used much more actively to guide the projects and ensure that the output of the funded proposal is progressing. Problems that SC members but also project

partners have encountered are when there are only few deliverables in the time frame of the project from its beginning to the midterm review, this leaves little opportunity for the midterm reviewers to judge the progress of the consortium and whether tangible outputs will be delivered by the consortium as well as for the consortium to actively guide the project's development. There is also value for money aspects and it is also often unclear in these review meetings if there is a necessity to drive a change, as progress is difficult to assess in midterm review meetings where there is a lack of deliverables. There further is no specific mechanism to ensure, that sustainability measures are put into action, if they are required. It is, therefore, important that DTOs are defined for the first phase of the project and, following the assessment of the DTOs, that mechanisms in place to release, or halt the second tranche of funding.

While overarching KPIs are being developed by the IMI office to monitor the success of the IMI programme, there is also a need to define success parameters (KPIs) and defined tangible outputs (DTOs) at a project level.

- The close-out meetings are a relatively new IMI2 specific instrument to summarise the project impact and deliverables. However, without defined success parameters (KPIs) and defined tangible outputs (DTOs) at a project level, it is difficult to estimate the real value and specific outputs of a project. Notably, this is the last time point where implementation of sustainability plans can be audited but there is no mechanism to enforce this (see also IMI SC recommendations on sustainability (8)). Altogether, the current control measures seem to be weak when compared to the significant height of investments made. A new programme should consider to improve concepts for control strategies ensuring impact and sustainability of achievements where required.

  Recommendation 10: Develop a system to ensure that Key Performance Indicators (KPIs) and defined tangible outputs (DTOs) are defined at a call topic and project level together with control strategies to monitor their delivery and sustainability of IMI project outputs and impact. Call topic and project-specific KPIs and specific DTOs should be used in the evaluation of submitted proposals and in the review and close-out meetings of the funded projects.

On behalf of the IMI2 JU Scientific Committee

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