

## Programme Structure

- 1) There are many strengths and successes in the current FP7 programme. For FP8 to be even more successful, evolutionary improvement, building on the successes of FP7, is the preferred approach: continuity and consistency are essential. The natural timescales on which communities evolve working partnerships, and on which innovative research and technology developments arise and are implemented, is longer than the EC (and national government) “political” cycle associated with a single FP programme. Ensuring continuity in the successful is essential to ensure viability, and build on real developments. New ambitions, and appropriate new structures to implement those ambitions, should be based on new resources.
- 2) There is no single way to develop excellence. There is no way to identify reliably in advance those research directions which will have transformative impact (example: in spite of huge investments , the 1970’s “War on Cancer” made little advance. Real progress came orthogonally from the discovery of the structure of DNA and RNA, resulting from superficially unrelated basic research in a physics department). The whole history of progress in science and technology informs us that balance is essential: Grand themes, top-down strategies, and so on attract new effort, but should be matched by comparable resources in bottom-up ideas-led research and technology development.
- 3) Europe starts from a strong base. New infrastructures and initiatives are desirable, new ideas essential, addressing newly-recognised challenge is essential. Nonetheless, in many subjects Europe is already world-leading, supported by excellent extant infrastructures. Focussing entirely on the new infrastructures, e.g. through ESFRI, risks missing another real opportunity. Upgrading, enhancing, operating, and analysing data from, extant infrastructures is an equal priority to construction of new infrastructures in many (probably most) communities. E.g., the US National Academy decadal review of astronomy identifies Europe as world leader (in ground based optical/infrared astronomy), ahead of the US, based on its present facilities, and its planned future (E-ELT) facility. Both extant and new infrastructures are needed to support the strength and the breadth of Europe’s excellence.
- 4) Timescales are a challenge. Designing, building, operating major new infrastructures, training a generation of scientists able to address new challenges, ensuring that European-scale priorities are a natural development from and enhancement to (the many more) national projects, and so on, all take considerable time. Planning needs to consider the full chain, from idea to implementation. Each step along the way involves different timescales, different criteria for support and review, different expectations. No single programme type is able to deliver all these. A range of consistently-implemented approaches is appropriate. Furthermore the transfer of fundamental scientific breakthroughs to commercial applications often takes decades rather than a few years (example the GPS system).
- 5) Cross-boundary support is extremely difficult at national levels, and is a natural field for EC investment. As a very common and real example, data from an expensive infrastructure, operated multinationally (eg ESA space missions) can be obtained by competitive proposal, while analysis of that data may well be limited by the need for additional national support,

which is unavailable or limited for reasons unrelated to the excellence of the infrastructure or the project team/individual. These local limitations regularly limit the full exploitation of Europe's world-leading infrastructures and often allow better-resourced groups opportunity to cherry-pick interesting data immediately, once it becomes public. An EC-based solution is appropriate. Current options (ERC, ITN) are too specific or too broad ranging and complex in their requirements.

## Programme Content

- 6) Identifying successful examples and building on the various tools related to those examples is an excellent step towards success. We believe the EC approach to astronomy is a superb example, well worth analysing, and well worth implementing more broadly. Astronomy has an extremely high public profile and is attractive as a (arguably *the*) science which attracts young people into high-tech science careers. Secondly, and unusually, it is largely multi-national already. Third, it utilises extremely high-tech infrastructures, almost all development and enhancement of which involves SMEs and many astronomy-related spin-off companies. Fourth, astronomy graduates are in demand in all high-tech industries and beyond. Fifth, astronomy illustrates the range of required timescales for EC support, from years to decades.
- 7) How does the EC currently invest in astronomy? The ERA-Net instrument supports essentially all (29) Europe's countries coming together to develop a single coherent viable strategy for future development. Several I3s implement that strategy, jointly with the national agencies and communities. Coherent multi-national infrastructure planning, development and operation is coming into place. Astronomy set its priorities, delivered its new infrastructure roadmap to ESFRI, and is implementing the top priority, the European Extremely Large Telescope, with valuable support from EC technology and management development funds. Associated I3 investments in specialist high-technology subsystems, proving viability while being of wider use (in medicine and systems engineering and well as astronomy), were crucial. In parallel, developing and enhancing, through the Trans-National Access Programme, the community and its infrastructures at a wider level, is a critical requirement for community strength and growth.
- 8) That is, a model for EC success in FP8 is to start by identifying world-class communities in Europe working on key high-visibility science and projects, identify the range of FP8 instruments needed for their support, and deliver support to the various aspects on appropriate timescales. World-leading high-profile excellence will follow.

## Programme Implementation

- 9) The administrative burden on EC projects remains grossly excessive. Especially for projects involving government and educational organisations where the profit motive is not predominant, and SMEs where administrative resources are scarce, much lighter-touch reporting and assessment is feasible. We strongly recommend that the EC simply accept nationally-valid audit financial arrangements, and do not duplicate reporting and auditing. This duplication is pure waste, and is a major disincentive for participation by groups motivated by research interest. Simplification, clarity, and consistency once clear rules are in place, is a requirement for improvement. Timescales of contract preparation, reporting, payment etc are far too long. No small organisation can operate without reasonably rapid cash-flow.
- 10) Programmes do accept that EC-funded activity is influential to a greater degree than its financial share, being extra funding. Nonetheless, funding a small additional fraction of a project does not ensure significant influence. EC programmes will not deliver lasting enhancements in Europe's research community, and so create an ERA, unless the EC funds significant effort in a stable fashion and on a timescale appropriate to deliver that influence. Changing priorities on a short timescale (FP or less) risks the failure of an incomplete transformation, and so a waste of the earlier investment.
- 11) Perhaps the greatest need for success in FP8 is a realistic set of goals. An ambition to change the world on a one percent budget is certain failure. There are realistic and achievable goals, which would benefit from clearer definition. For example, upgrading current infrastructures means contract work for SMEs. This is one of very few ways SMEs can really benefit from long time-scale funds. Funding specialist high-tech development will benefit SMEs more than will enforced inclusion in projects whose (time)-scales do not match their staff resources. FP8 should match changes and new programmes to timescales – clever young people, those who will generate transformative ideas, need short-term, administration-light support, while collaborative projects on infrastructures need stable long-term support. High-tech R&D has a very short timescale – defining now what will be a focus in the later stages of FP8 will ensure inefficiency.
- 12) Overall, for all its resource, FP8 cannot fundamentally change all limitations in the whole of Europe. Focussing on the priority achievable set, and delivering that in partnership with the people and organisations with the ideas and the skills to make real advances, will ensure FP8 does have a really positive impact. And vice versa.