



European Excellence Fellowship Programme (EEFP) Feasibility Study

STUDY REPORT

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EXECUTIVE SUMMARY

Background

In 1990, on the occasion of the launch of the Hubble Space Telescope (HST), NASA put in operation a prestigious Fellowship Programme named, as the Telescope, after the famous American astronomer Edwin Hubble, the discoverer of the expansion of the Universe.

The idea was to link the programme to the most advanced Space Telescope that was predicted to produce not only first class science, but also unprecedented sharp and beautiful images of the Cosmos, reaching therefore a high visibility even at *man in the street* level.

The main motivation for creating this new programme was to attract and keep in the US the best young scientists in the world to work on research themes broadly related to HST science and direct them towards a career of research leaders. Indeed very soon the programme, both because of its favourable conditions and the effective publicity link to HST, became very attractive and reached an oversubscription rate of 13-14 to 1.

Because of the genuine international character of the Hubble Fellowship Program, a consistent fraction (~ 25%) of the Fellows has a non-US nationality and many of these (~21%) are Europeans. The length of the Fellowship (3 years) gives the Fellows the opportunity to make themselves known within the US scientific community and most of them succeed in getting a tenure-track position in a US Institute or University immediately after the Fellowship. For European Astronomy this fact represents a dramatic brain drain.

An attempt to open a similar Fellowship scheme in Europe was made by presenting a proposal to the EC in 1999 as a “Training network”. Although the idea of the new Fellowship was positively evaluated, the “Training network” call was not the correct instrument for its implementation. Hence the EC suggestion to further analyse the “Elite Fellowship” via a “feasibility study”.

The study was particularly important because it allowed us to focus on the general characteristics of a truly “European” Programme, evolving from a simple “copy” of the US Hubble Fellowship scheme and proposing a Programme that best suits the needs of the structuring of the European Research Area in several scientific disciplines.

At this time the “M. Curie” that are foreseen for the 6th FP have considerably evolved. In several aspects they already contain elements that are key features in the proposed EEFP (excellence, opening to non-EU candidates, etc.). In this sense, the proposed Programme could be seen as a specific implementation of the broader “M. Curie” set of activities.

Results of the study

In this “Executive Summary” we present a commented list of the key findings and main features of the proposed European Excellence Fellowship Programme (EEFP). Initially the name of the proposed Programme was characterized by using the word “Elite”. However, during the evolution of the study it was noted that, particularly in some European countries, the word “Elite” was carrying a somewhat negative connotation. It was therefore suggested to change it to “Excellence”.

Full justification of the findings and further details of the proposed Programme are contained in the Final Report of the study.

Motivation for the EEFP

- Form the **Research Leaders** of the ERA.
The most important motivation for the EEFP is to identify and form the future **Research Leaders** in the European Research Area.
This motivation is of prime importance for the EC, in offering a coherent, prestigious path for the training of future research leaders who, in different disciplines, will identify themselves in the ERA. This specific aim dictates some special features of the Programme (e.g. the managerial training, see below).
- Be a “**role model**” for the young generations.
Given the high visibility that the EEFP will acquire internationally, it will become a “model” that stimulates the young generations to pursue a scientific career within the ERA. It is very important that, from its inception, the career starting with a EEFP is seen and understood as a new, distinctive path towards a Europe that operates in science with no political boundaries across it.
- Filling the **gap** between the M.C. Fellowships and a Chair/Director/Project Leader position.
The analysis of the current situation in Europe indicates that a gap exists between the various “training and mobility” fellowship programmes (e.g. the M. Curie Fellowships) and the tenure-track positions. Some countries (e.g. the UK, The Netherlands,...), have successfully experimented with a scheme by which a University tenure-track position is preceded by 4-5 year fellowship. The current proposal aims at filling this gap at European level, attracting the most gifted and promising young scientists.
- Help solving the issue of **gender disparity** in the European scientific leadership.
Special attention is devoted to **women** who, precisely at this point in their career, may drop out. Indeed an analysis of the gender of the PhD students indicates that women account for up to 50% (more in some disciplines and countries, e.g. Astrophysics in France and Italy). This initially even gender distribution becomes dramatically unbalanced towards the male population at the tenure-track level. Clearly, the critical decisional period for women in science is the one between the post-doc time and the senior tenure-track. The proposed Programme aims at providing specific, personalized support to the most promising female Fellows.
- **Small** (discipline-specific), **prestigious** and **attractive** for both internal (EU) and external candidates.

In order to achieve the above goals, the programme has to become very prestigious and attractive at an international level, reversing wherever possible, the brain-drain trend. For this reason it has to remain small and discipline-specific (i.e. it has to acquire its own name and visibility within each discipline, as it is the case for the Hubble Fellowship in the US).

- **Science areas** to be chosen.
Obviously the EEFP can be applied to many disciplines. However the study has identified some criteria for choosing the disciplines for which to, at least initially, implement the programme.
 - Where EU facilities are at the edge.
In some areas (e.g. Particle Physics, Astrophysics,) Europe is or is becoming leading in terms of excellence of its facilities. These are the prime areas in which an EEFP can successfully attract the best world researchers to the ERA.
 - Where there is a decline of vocations.
It well known that in all Europe we are experiencing a dramatic decline in the number of students enrolling in scientific curricula. The high visibility that the EEFP offers a “role model” that can help in reversing this alarming trend.
 - Where there is a “brain drain”.
In some science areas, existing international (mainly US) programmes are effectively attracting the best European researchers outside the ERA. These fields should be the prime candidates for the implementation of an EEFP.

Attractiveness of the EEFP

- **Research independence.**
The study recognizes that the most attractive feature of the EEFP for a young, gifted researcher is the assurance of high independence in the way her/his research can be pursued. The applicants to the EEFP design their own research programme, choose the (European) scientific environment in which their goals can be best achieved and request and manage the resources that are needed to successfully pursue their programme.
- **Research grants** (research assistants, facilities, administrative overheads).
For the above reason, a suitable (and motivated) research grant should be an integral part of the Fellowship. The EEFP Fellows may involve in their research local PhD students and/or e.g. post-doc M. Curie Fellows. Co-financing the grant by the Host Institute is a possibility.
- **A 3 + 2 years scheme** (the first three to be funded by the EC (see implementation), the latter as a reintegration grant to encourage the Host Institute to keep the Fellow and to eventually offer her/him a tenure track position. The early involvement and cooperation of the Host Institute is a key feature of the Programme, particularly since the final goal is to attract and keep in the ERA the brightest scientists.
- **High salary and good fringe benefits.**
Financial independence is an important factor for making the programme attractive and prestigious.

- Relocation (**partner and family**) assistance. A personalized assistance (made possible by the small number of fellows), will add freedom to the research programme. This feature is particularly important for women. Since in most cases the partner of a candidate Fellow is also a scientist (even if in a different field) and the Host Institute is most probably part of a multidisciplinary campus, it should be possible to offer an effective help in finding a suitable solution for the partner.

Strategic features

- **Identity**, tribal networking.
It is essential that EEFP Fellows, in a specific discipline, feel part of a special group, which is called to play an important, visible role in the construction of the ERA.
- **“Name”**, Special Symposia, Public exposure.
The “Name” of the Fellowship programme in each discipline should be specific and prestigious (e.g. J.H. Oort for Astrophysics, etc.). The managing structure (see below) will organize special symposia, possibly associated with major European meetings in the specific field, during which the projects and achievements of the EEFP Fellows are presented. A coordinated strategic exposure of the EEFP achievements to the public will enhance the visibility of the programme.
- **Managerial training.**
The Research Leaders of the ERA will eventually manage large projects that, particularly today, require good managerial skills. Currently, in most areas of science curricula, there is hardly any management training. The EEFP will offer opportunities to fill this gap at an early stage.
- **Communication training.**
Equally important for the visibility of the ERA achievements is the effectiveness of the Research Leaders to communicate with the media and with the public. The EEFP will include training opportunities in science communication.

Implementation

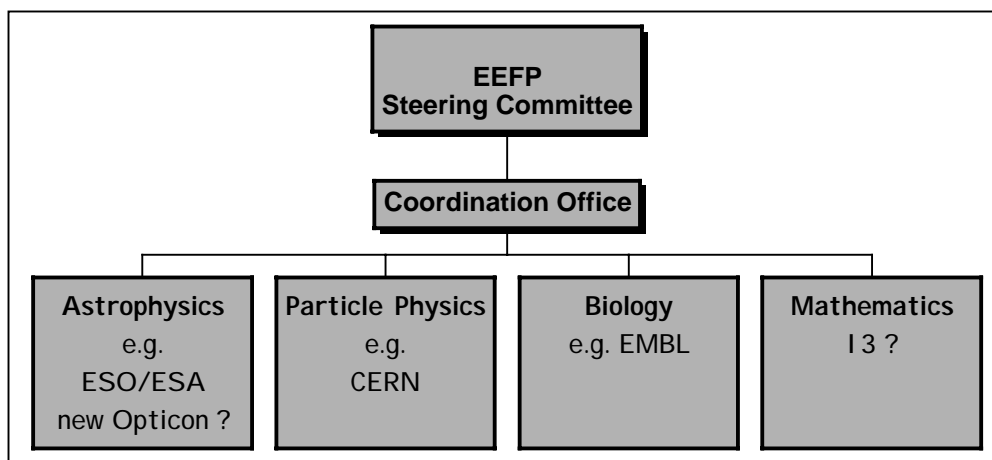
The proposed scheme for the implementation of the EEFP foresees:

- An **EEFP Steering Committee**.
Appointed by the EC, it will define the research areas for which the Programme should be implemented, select the Managing Entity (see below) will review the overall Programme in terms of effectiveness, will propose improvements.
- A **Coordination Office**.
The task of the Coordination Office, run by the EC, is to ensure uniformity in the implementation of the Programme in the different discipline areas, coordinate common activities and actions (e.g. managerial and communication training, public relation, etc.), monitor the correct administration of the funds.
- The **Managing Entity (Institutes/Organizations/Networks)**.
Each discipline specific EEFP shall be managed by an Institute, an Organization or a Network that is active in the specific research field. The task of the Managing Entity is to fully implement the programme, i.e. to manage the Call of Proposals,

the Selection (Selection procedures, board, etc.), to interface with the Host Institutes, to administrate the funds.

The Managing Entity can be different in different areas. Existing Networks or Organizations (e.g. the EIROFORUM members) are obvious candidates for an initial pilot implementation.

- Note: the choice of an EIROFORUM Organization as the Managing Entity in some areas (e.g. ESA and ESO for Astrophysics) has the additional advantage in the case of non-EU Fellows. Awaiting the implementation at the European level of the “ERA Researcher Card” that will legally define the status and provide the necessary mobility to a non-EU researcher, the Organizations like ESA and ESO, having agreed with their Member States the special status of their respective staff, can offer an immediate, pragmatic solution to the problem.



Statements about the applicability of the EEFP Programme

In September 2002, the Study draft was reviewed and discussed by a Panel composed by experts in different scientific disciplines and by representatives of EIROFORUM (the members of the Panel and their affiliation are listed in Appendix 1). Their comments and contributions were instrumental in shaping the final version of the Study. Some of them provided specific statements about the applicability of the EEFP to their scientific area of interest.

CERN Statement

Dr. Monica Pepe-Altarelli, CERN, Geneva

At the moment there is no comparable high-profile programme that tries to identify and support leading researchers in particle physics at a very early stage of their career whilst offering them a very attractive position with full research independence and free choice of where to conduct it. Therefore the proposed scheme contains original and qualifying elements with respect to other established particle physics fellowships and has the potential of developing into a prestigious and useful programme for the community of European particle physicists.

A feature that differentiates the Excellence Fellowships from the CERN Fellowships is the longer duration (three years versus two). This is certainly a more attractive option from the point of view of the continuity of the scientific research. The option of having a reintegration grant of two years at the end of the fellowship is another key qualifying element of the programme that again favours the continuity of the scientific research and that will hopefully ensure that the best scientists remain in the European Research Area. The idea of allocating a research grant as an integral part of the Fellowship adds to the attractiveness of the scheme, again reinforcing the freedom of research that the programme will allow.

The opening of the scheme to non-EU candidates represents an effective measure to improve the quality of the programme. We envisage that as from ~2007, when the LHC will start running, many leading young researchers in particle physics from non-EU countries will be attracted to CERN, which will then be hosting the most advanced facility in the world. The EEFP will offer to the best of these scientists a very interesting opportunity.

In order to be truly prestigious, the programme should attribute only a small number of fellowships every year. The choice, performed by a panel of experts in the field, can only be based on scientific excellence. In particle physics ~five fellowships per year appears to be a reasonable number to start with.

Biological Sciences Statement

Prof. John B. C. Findley, University of Leeds

Like many mainstream areas, biological sciences is experiencing undeserved adverse comment, lack of appropriate personal rewards and restricted opportunities, all of which are now deleteriously affecting the generally positive attitude which greeted the era of molecular biology.

As a result, research, particularly of a fundamental nature, is now suffering from a dearth of commitment and quality candidates. The type of distinguished Career

Development Scheme outlined here will help considerably to restore the opportunities and positive perceptions which stimulated past generations of motivated scientists.

The initiative is timely and highly welcome. Without it, the exciting prospects that lie ahead in biological science could be blunted by the lack of appropriate human resources.

(No of Awards / Year for Biological Sciences: 20 – 30)

Chemistry Statement

Prof. Knut Faegri, University of Oslo

To my knowledge, there exists no program comparable to the proposed EEFP within the field of Chemistry. It follows that the establishment of such a program would be warmly welcomed within Chemistry. In this field which has seen an almost disastrous decline in recruitment in many European countries, a "role model" initiative like the EEFP could be an important contribution to turning the negative trend, as well as a great source of inspiration for young ambitious researchers.

For Chemistry the scheme would have to be slightly modified in order to function optimally. I believe that it would probably be favorable to separate biochemistry and chemistry. Biochemistry today is frequently focused on either molecular biology or on medical applications. In a field with the more general label "Chemistry" this might well lead to unnecessary competence struggles. Also, making biochemistry a separate field can facilitate the establishment of connections to biotechnology, if so desired. Within these limits, I would suggest that there be a total of no more than 10-12 fellowships per year for each of these two sectors.

Chemistry is mainly a laboratory based science, and for a fellowship to be attractive, it would have to cover some of the essential expenses associated with chemical research. The main costs here would be for chemicals, for technical assistance, and for equipment time. This, of course, would be in addition to the salary of the grantee/fellow. It is not realistic to buy large equipment units with fellowship funds, and it would be assumed that access to such instruments should be provided by the host institution. However, such equipment is frequently a scarcity resource, and provisions for compensating for this access from fellowship means should be made.

Unlike many other disciplines, Chemistry has no main "focal point" in Europe (like CERN for particle physics, EMBL for molecular biology, etc.) The administration of an EEFP for Chemistry therefore offers some organizational challenges. One possible solution would be to contact ALCHEME - Alliance for Chemistry in Europe - a grouping of large European professional and scientific interest groups (CEFIC, COST, CERC3, FECS and EFCE). The problem with this is that ALCHEME does not have a separate secretariat or organization. It is possible to let one of the underlying groups administrate the fellowship, but these are to some extent sector oriented. An alternative would be to leave the administration of the fellowship for Chemistry to a first-class chemistry department. This would have to be accompanied by an international steering committee, ensuring that national bias and cultural differences are minimized in the decision process.

PART I: Rationale, Characteristics and Implementation of the EFP

1. Introduction

1.1 Background

The 4th and 5th Framework Plans of the European Commission have successfully implemented the Marie Curie Fellowship Programme. The main “themes” of the M. Curie Fellowships are *mobility* and *training*. Through this Programme, young European researchers have the opportunity to improve their potential by participating in high quality research in host institutes in countries other than their home country. The recent call for “M. Curie Training Sites” which will offer specific training opportunities to Ph.D. students, is a confirmation of the successful training vocation of the Programme.

Given the success of the Marie Curie Fellowship Programme, it may be useful to consider further measures that can capitalize on its outcome. One possibility is the implementation of an “excellence” Fellowship Programme in few specific research areas. While the main objective of the Marie Curie Fellowship programme is to “train” a broad population of young researchers, the proposed “excellence” programme aims at identifying a small number of “gifted” young scientists and give them the opportunity to demonstrate their capability as “research leaders” at a very early stage in their professional career.

In this sense the “excellence” scheme may be considered as a completion of the MCP, not a competitor to it. Past MC-Fellows may represent one source of candidates for the EFP.

Referring to the high over-subscription rate of postdoctoral fellowship programmes (MCFs about 75 %), it is evident that there are immense unused resources inside the group of young researchers. Beyond that, EFP will be different from MCP under many aspects. EFP will be worldwide open¹ and will award only a very small number of fellowships (6) every year per research area. The management of the programme shall be outsourced to specialised scientific facilities.

The merit of such a scheme was discussed by OPTICON¹, the Infrastructure Cooperation Network funded by the EC.

As a result, a proposal to perform a feasibility study for a “European Excellence Fellowship Programme” (EFP) was submitted to the EC by the Space Telescope European Coordinating Facility and was approved in September 2001.

The main objective of the study is to assess the merit of an “excellence” Fellowship programme in a small number of key research areas and to propose to the EC the

¹ In the new 6th Framework Programme some categories of MCFs will be opened worldwide, too.

² Optical Infrared Coordination Network for Astronomy, bringing together Europe’s multinational, national and major regional providers of astronomical infrastructures, together with a few research institutes from the larger countries.

most convenient procedure for its implementation. Considering that the Organizations to which the proposer is related (Space Science Department of the European Space Agency and European Southern Observatory) are active in Astronomy and Astrophysics research, the study will initially focus on the implementation of the “excellence” programme in the field of Astronomy and Astrophysics. At a later stage in the study, its applicability to other disciplines will be evaluated: Biology, Chemistry, and Particle Physics (CERN).

1.2 Implications of the EEFP for the European Research Area

The creation of a European Research Area (ERA) is currently one of the main themes on the policy agenda in Europe. In the first instance it is a legal and political obligation resulting from the Amsterdam Treaty (1997), which does include a whole chapter on research and technological development (RTD). RTD is an essential element in the functioning of industrialised countries.

At CERN in Geneva the European Commissioner for Research Philippe Busquin said

“... we have to attract the best (researchers) in the world. Now it is the USA which seems attractive. Europe has possibilities also but they are much disseminated. But if you have a network of excellence in all areas you can give visibility to excellence in Europe and so you can attract the best scientific people in Europe.”

(Research and Technology Development beyond 2002, Busquin and the Business of research)

“The European science system must remain competitive with that of major economic blocks. To achieve this, Europe needs to have access to best research environment in order to develop and retain its most talented scientists and to develop international standards of excellence and scientific leadership in the global arena.”

(European Science Foundation)

One of the objectives set out by the European Commission in realising the European Research Area is:

“... strengthening Europe’s human resources in science, technology and innovation, in particular by increasing transfrontier mobility, developing European careers, increasing the participation of women in research and making the scientific professions more attractive to young people and Europe more attractive to researchers from third countries.”

(Bulletin EU 10-2000)

In the proposal for a New Framework Programme of Research (NFP) the Commission calls for

“... the stimulation and promotion, through financial incentives, of excellence in European research, in order to improve its visibility and attractiveness.”

Philippe Busquin explained:

“For me, the ERA is a political concept between the Commission, Member States and intergovernmental institutions to give more coherence between all these institutions and to build a European scientific community with links with European industry”

(op.cit. above)

The proposed European Excellence Fellowship Programme fully complies with the purposes of the European Research Area.

The main aims of the EEFP in the field of Astronomy/Astrophysics are:

- Strengthening Europe as a “global player” in astronomy science.
- Confirming the excellence of the European space astronomy science by promoting a steady influx of outstanding young researchers into this field of research.
- Making the ERA more attractive to the best young scientists from all over the world.³
- Strengthening the ERA, especially in comparison with the United States (the brain-drain syndrome).

1.3 Special Approach of the EEFP

Based on the results of the comparison a draft for the proposed European Excellence Fellowship Programme will be presented, taking into consideration the experiences of the different schemes, and avoiding the problems which sometimes appear.

However, it has to be realized that the proposed European Excellence Fellowship Programme is more than a compilation of existing schemes, it is a new philosophy in developing a European career path. Excellent young scientists from all over the world shall be given a chance to demonstrate their capability as ‘research leaders’ at a very early stage of their professional career. That is why the future executives shall get a special management training to learn how to manage (large) research projects. Outreach training will be offered too. EE Fellows might be viewed at as “management trainees” in the field of science. “Successful leadership of a research team depends not only on research skills but also competence to manage substantial financial and human resources.”⁴

In a global world outstanding results in science, economics as well as in sports (for example in football) can only be achieved by a global recruitment of personnel. So the scheme shall be opened worldwide.

Underlying the “elitist” approach only a small group of Excellence-Fellows (6) shall be awarded per year in a specific field (e.g. Astronomy).

During the selection procedure, but not exclusively then, personal contacts between the Evaluation Board and the candidates shall be encouraged, so creating a trusting and collegial atmosphere.

³ “...European research institutes ...lack the magnet power that can transform them into pivotal points in their fields. European universities, for example, attract fewer international students than US universities do despite the fact that tuition is free in many European universities.” Sami Mahroum, Europe and the challenge of the Brain Drain, IPTS

⁴ Toward a new Paradigm for Education, Training and Career Paths in the Natural Sciences. Report on a Meeting held in Strasbourg, Nov 29-30, 2001, p. 11. European Science Foundation, Human Frontier Science Programme.

The Evaluation Board will place high confidence in the fellows and give them absolute independence and self-determination regarding their research projects. Then it is up to the fellows to live up to the confidence placed in them.

Fellows, Evaluation Board, host institutes, and the scientific and administrative programme managers shall build a social system being able to realize the ambitious goals of the EEFP and to solve potential problems in a flexible and reasonable way.

The scientific and administrative management of the EEFP shall be delegated (outsourced) to institutions active in the specific field of research, in this way using their expertise in running the programme.

To summarize, the European Excellence Fellowship Programme will be a challenge for the European Research Area, the scientific infrastructure of European Astronomy and Astrophysics, and last but not least for the future European Excellence Fellows at the same time.

2. Main Features of an European Excellence Fellowship Programme

2.1 Goals

- Promotion of outstanding research in astronomy and astrophysics
- Promotion of a scientific elite
- Promoting a steady influx of excellent young PhDs from all over the world into the European astronomy science
- Identifying the new generation of research leaders at a very early stage

Tasks like the promotion of less favoured regions, transfer of knowledge and technology between industry and academia will be of less importance in this scheme.

2.2 Volume

The appointment of 6 fellows per year is considered to be adequate to the capacity of European astronomy and the demand of the market. This way the fellows will have a fair chance to get into positions of leadership in the European astronomical research area.

At the same time the number of 6 fellows may be optimal regarding

- the planned procedure of selection (personal interview)
- and the planned structures of communication and fellows network

As an explanation for the proposed annual number of fellows (6) shall be referred to comparable fellowship programmes: Hubble Fellowship Programme (12), NSF Astronomy and Astrophysics Postdoctoral Fellowship (10), Jansky Research Associates (4-5), and European Southern Observatory Fellowship Programme (Garching + Chile 14). They all are highly specialized, elite-oriented programmes, concentrating on one or a few closely related disciplines.

2.3 Main Principles

The main guiding principles in designing the EEFP are:

- High research independence and flexibility for the fellows
- Maximum of personal responsibility
- Integration in the host Institute
- Social network and communication
- Personal assistance to the fellows, especially to women with family responsibilities
- Simplicity of the application procedure
- Flexibility, simplicity and autonomy of the programme management

2.4 Character of Research

Independency of research and free choice of the research facility and the country will be a characteristic feature of the EEFP, however the trans-national approach will be maintained⁴. The research projects will be executed in the Member States and the Associated States of the European Union.

2.5 Award Conditions

Qualification: PhD or equivalent level

Age: No formal age limit, but preference will be given to younger researchers. It is expected that researchers who will apply for a fellowship have received their doctoral degree within the last three years.

Exceptions will be possible depending on specific cases, for example child care, and compulsory military and civil service.

Eligibility: EEFP shall be open worldwide without regard to national origin, race, creed, colour or gender.

Women are strongly encouraged to apply.

Duration: 3 + 2 scheme. 3 years funded by the EC; 2 years (co)-funded by the host Institute.

Aim: Showing the EE-Fellow a career-path, and offering him/her the possibility of a tenure-track position.

As the European Commission correctly points out, one main obstacle to the mobility of researchers is the fear of “being left out of the system” if they go abroad. Researchers often have difficulties to obtain a position on returning home. For those fellows who are concerned shall be offered a *return-fellowship* (re-integration grant) for a fourth year in their home country.

For fellows who have already got a position in their home country an arrangement might be found, including the possibility to return to their old position if they want.

⁴ The trans-national approach is compulsory for fellowship programmes on the EU-level. The approach results from the principle of subsidiarity as defined by the EU:
Fellows, who stay in their home countries, have to be financed by that particular state.
Fellows, who go abroad, have to be financed by the EU.

2.6 Financial Equipment of EEF

The fellowship must have adequate funding, commensurate with the high qualification of the fellows. In any case the financial equipment must be competitive to fellowships in the United States and in Europe.

The fellowship should include:

- Salary (including health insurance and pension scheme)
- Family allowance
- Mobility allowance
- Research grants
- Relocation costs
- Financial support to the host institute

2.7 Role of the Host Institutes

The institutions that have expressed their interest in hosting European Excellence Fellows will describe their research activities and facilities on an Internet site. (Though there is no limitation to these scientific facilities).

In order to avoid an excessive concentration of fellows at any one institution there is a limitation on the number of new EE-Fellows per host institution that can be appointed in a given year: Normally one new fellow per institution.⁶

Applicants are demanded to propose three prospective host institutions, in order of preference. An *endorsement letter of the first choice institution* is required. The purpose of designating second- and third-choice institutions in the application is to provide the programme with flexibility. Normally awardees will utilize their fellowships at their first-choice institution.

2.8 Fellows Network

Establishing a fellows network and creating a visible identity for fellows is an important precondition for the success of a fellowship programme. Attaining a high name-recognition of the programme will attract outstanding young researchers from all over the world.

Consequently all administrative and organisational measures shall be taken to guarantee close contacts and permanent communication between the groups involved in the programme: Fellows, programme managers and host institutes.

Annual Fellows Meeting: European Excellence Fellows should meet annually at the institute in charge to present and discuss the results of their research projects. The annual meeting should be open to all interested persons, media included. A dialogue between experts and non-experts should be possible. This fully complies with the aim of the ERA to “put research back at the heart of society.” (Busquin, op. cit.)

2.9 Assistance to Fellows

Every host institute should establish a **contact point** (personal assistance) for good advice in administrative, legal, social and cultural matters, accommodation included.

⁶ In other disciplines, for instance Particle Physics (CERN), there might be other arrangements.

Specific measures shall be offered to improve the position of women with family responsibilities.

There exist already national contact points for Marie Curie Fellowships. They could be used for European Excellence Fellowships too.

Beyond that there should be a **scientific contact person** for the fellow during the fellowship at the host institute.

2.10 Evaluation of the Fellowship Programme

The Evaluation Board will annually analyse and evaluate the outcome of the programme.

3. Scientific and Administrative Management of the EEFP

3.1 Management by an Institute Active in the Specific Field

The main point will be adapting the management of the programme to the special conditions and concern of the fellowship scheme.

The comparison of different fellowship programmes shows that highly specialised, elite-oriented programmes, which are small in number of appointments, can be handled most efficiently by an institute active in the specific field of research.

Like the experience of the Hubble and ESO Fellowship Programmes demonstrates, this method of managing a fellowship scheme is especially recommendable for specialised programmes of excellence with a small number of fellows (HFP: 12 fellows per year; ESO: 14 fellows per year).

The institute in charge shall manage the programme, control its scientific, organisational and administrative implementation and function as a centre of communication for all European Excellence Fellows during and after the fellowship.

The programme management should make use of the existing European infrastructure of advisory services. It should for instance cooperate with the national contact points of the Marie Curie Fellowship Programme, and the “Network of Mobility Centres” (measure under the 6th Framework Programme).

3.2 Selection of Fellows

The institute in charge has to organize the annual selection of fellows.

EEFP will establish a standing **Evaluation Board** (Review Committee) of 8-10 leading scientists, including 2 members of the scientific staff of the institute managing the programme.

The duration of membership will be 3 – 5 years.

Regarding the small number of EE-Fellows it is desirable to make possible personal contacts between the candidates and the Evaluation Board during the selection process, like ESO and EMBO do for example.

ESO: First the Scientific Committee gives an opinion on all applications, then a small group of candidates is elected and invited to give a speech at ESO, which is open to all interested persons. The candidate may choose the topic him/herself.

In addition to that the candidate is interviewed by the Scientific Committee, public excluded.

The atmosphere at the meeting is collegial and relaxing. Committee and candidates use to have lunch together.

EMBO: Before all dossiers of applicants are considered by the ten-person international Selection Committee of EMBO Members, who are leading molecular biologists, an interviewer (being an expert in the area of the special proposal) will be elected from among the EMBO members. He arranges a meeting with the candidate in order to get a personal impression of the young scientist.

Each application is scored independently by the Selection Committee and the scores are forwarded for compilation to the secretariat. The Selection Committee then meets to consider together the applications and the scores. The selection process is confidential.

3.3 Criteria of Selection

Principally the decision on European Excellence Fellowships will be based on scientific excellence of the research proposal and the personal aptitude of the candidate.

3.4 Personal Contacts

In case of managing the scheme by a specialised research institute the social distance between institution and fellow will be minimized and face-to-face relations will be possible. This might be favourable for the development of a group identity and for the success of the excellence programme at the same time.

As already has been pointed out European Excellence Fellows will meet annually at the institute in charge to present their research projects. The programme managers should take part in the meeting. The meeting will also be a good opportunity for the fellows to discuss actual problems with the programme managers.

3.5 Selection of the Institute in Charge and the Programme Manager

There are two options:

a) The first option would be the selection of the institute in charge via a public call for proposals by the European Commission.

b) Selection of the institute in charge via an initiative as provided for *inside an instrument of the 6th Framework Programme*, for example an “Integrated Project”, a “Research Training Network” or “Actions to promote and develop human resources and mobility”.

3.6 Control Procedures

The funding institution, the European Commission, will annually control the administration and financial operations of the Programme Management by requesting an Annual Financial Report.

4. Competitiveness of the EEFP

The proposed EEFP has to be competitive to American as well as to European postdoctoral fellowship programmes.

As to the financial conditions the preferred option would be to define the fellowship generously: High salary and good fringe benefits.⁷

The competitiveness of the new European Excellence Fellowship Programme compared with American schemes obviously does not depend on the financial equipment of the fellowship only, but on a lot of other factors.

Of special importance is the *duration of the fellowship*: three years minimum.

Another crucial point is the *career after the fellowship*. Without showing an European career path, including tenure track positions, an European Excellence Fellowship Programme will have difficulties in attracting outstanding young post-docs from other parts of the world.

The *conditions of work* also play an important part.

Of special importance is the *reputation* (name-recognition; prestige) of the fellowship programme and the research facility.

Moreover experts of MCP point out that the *contributions for research and management*, which are paid to the host institute, but connected to the fellow's project, make the fellow less dependent on the host institute and give him/her more flexibility. Normally fellows highly appreciate this independence.

Without any doubt the *legal and social conditions of residence and work* for the fellows and their families are of some importance too.

5. Specific Issue: Mobility of Researchers from Non-European Countries

Young talented researchers from all over the world are invited to apply for an European Excellence Fellowship. However, it has to be realized that there exist many obstacles for third-country nationals in Europe.

⁷ EMBO comes to the result that the pay for postdoctoral fellows in the US and in Europe is comparable, but senior scientists earn more in the US than their European colleagues. "The prospects of European scientists starting a career in Europe seem to be better than they think. But the continuing economic success, good funding and better job opportunities for senior scientists in the USA are still very attractive. No doubt, the European system of doing research has to change and adapt if the EU wishes to compete with the USA".

A. Moore and H. Breithaupt, Where are they now? A survey of the career possibilities for young scientists in the life sciences, EMBO Reports vol.2, no. 1, pp 8-10.

Researchers from third countries do not enjoy free movement as EU citizens do. Obstacles are restrictive entry regulations for researchers and their family members.

5.1 Existing Problems

The *European Commission* describes the existing problems:

“Immigration restrictions may hinder third country researchers from contributing to the European Research Area. Third country family members of EU / EEA researchers continue to face problems linked to visa, residence permit and work permit requirements. Even the ‘green card’ systems developed to attract highly skilled workforce from abroad are temporary in nature: After the stipulated time, the worker normally has to leave the country. Free movement of third country researchers is also at present restricted. Thus difficulties are encountered by such researchers in the EU who wish to travel to non-Schengen countries for use of special research infrastructures or for scientific conferences. Differences in the social security systems and levels of taxation among Member States may make mobility unattractive. Mobile persons often have to pay contributions for benefits they cannot enjoy, nor receive compensation for. This concerns, e.g. unemployment benefits...” COM 2001,331 final, p. 7.

5.2 Proposals for Legal Improvement

This situation calls for urgent action and the Commission proposes the following legal improvements: COM (2001) 331 final,p.11

- Admission, access to employment, social security and taxation: The proposed measures will include a directive proposal for family reunification; directive for a status for third country nationals that are long term residents in a EU Member State; proposals to further the free movement of EU Citizens.
- Special measures: *The Commission will investigate the possibility of an “EC Researcher Card or scientific visa”*, which will allow third country researchers to enter the EU more easily, especially when they are participating in public funded research.

The question is whether the envisaged legal improvements can be realized in due time.

- Better coordination of social security between Member States to third country nationals legally resident in the EU. (Right to receive unemployment benefits; portability of supplementary pensions; bilateral social security agreements between Member States and non-EU States; bilateral tax agreements)

Since the *Schengen Agreement (1985)* and the *Treaty of Amsterdam (1997)*, which integrated the Schengen aquis into the framework of the European Union, the access of third country nationals to the EU is regulated by community law.

Arts. 61 to 64 of the Amsterdam Treaty obliges the Council to regulate the free movement and immigration of third country nationals.

However, the national legislation of the different EU Member States will remain in force as long as there exists no contradicting Community Law.

The Treaty of Amsterdam distinguishes between two groups of third countries:

- States which are associated with the EU; their nationals will be treated like EU-citizens.
- Other States (like the US, Asian States etc.)

If a third country national, who has the right to residence for instance in Germany, wants to go to a non-Schengen state, for example the UK, he needs a visa.

As pointed out above the European Commission announces to issue directives concerning *family reunification and the status of third country nationals*.⁸

Directives "... constitute the appropriate measure when existing national legislation must be modified or national provisions must be enacted, in most cases for the sake of harmonisation. Directives are binding upon the Member States to which they are addressed, as to the results to be achieved. Although this means that Member States are obliged to take the national measures necessary to achieve the results set out in the directive, they are free to decide how they transpose this piece of Community legislation into national law."⁹

5.3 Practical Measures

Practical measures, which are actually under preparation by the EU, are:

- *Network of Mobility Centres*: The establishment of Mobility Centres is a measure under the 6th FP, which will be realized on the European and national level at the same time. Mobility Centres shall offer general information and personal assistance to foreign researchers.
- *Researcher's Mobility Web Portal*: One of the major obstacles for trans-national mobility is the lack of adequate information on available programmes and opportunities for researchers and on questions related to admission to the country and access to employment, social security rights and fiscal issues or cultural aspects of the host country involved.

A central portal which allows a user-friendly and interactive access to these questions will both stimulate trans-national mobility as well as increase the chance of success for the stay abroad of researchers and their family members. See: EC, Follow up of

⁸ The Commission has submitted a series of texts, still undergoing examination, to the Council of Ministers for adoption. In chronological order, these are:

- a proposal for a directive on the right to family reunification, adopted by the Commission on 1 December 1999; this was the subject of an amended proposal on 10 October 2000 and will be followed by a second amended proposal very soon;
- a proposal for a directive concerning the status of third-country nationals who are long-term residents, adopted by the Commission on 13 March 2001;
- a proposal for a directive on the conditions of entry and residence of third-country nationals for the purpose of paid employment and self-employed economic activities, adopted by the Commission on 11 July 2001;
- a further text still has to be adopted in spring 2002 on the admission of third-country nationals for purposes of study or vocational training.
- See: Seminar on the Conditions of entry for Researchers undertaking International Mobility, Brussels 4-5 December 2001, pp 65/66

⁹ P.S.R.F. Mathijssen, A Guide to European Union Law, 7th edition, London 1999, p. 28.

the Commission on mobility: ongoing Work on the development of the Researcher's Web Portal, p. 1. (Brussels, 5. March 2002)

5.4 Grants vs. Employment Contracts

It has to be mentioned that there is a difference between third country nationals who have got a grant and those who have got an employment contract.

In general the access to the EU is less complicated when being awarded with a grant. Most of the European countries have special arrangements for grant holders. France has already introduced a special scientific visa, covering grantees and employees at the same time.

However, it is the official policy of the EU to oblige fellows and research institutions to conclude employment contracts on account of social security considerations.

Normally social security of employees cover the risks of illness, old age, invalidity, survival, and unemployment, whereas the holder of a grant is free to insure himself.

Consequently the *Marie Curie Fellowship Programme* prescribes an employment contract.¹⁰ (Only in case of short training sites exceptions are possible.)

Consequently the fellows, having the status of employees, need not only a residence permit, but also a work permit.¹¹

Regarding the proposed *European Excellence Fellowship Programme*, being a long-term fellowship of 3 years, it may be assumed that the EU will prefer the employment contract solution.

RESULT:

The provisions dealing with the free movement of third country nationals in EU Member States are rather complex and the legislation is actually under preparation.

1. The consequence to the European Excellence Fellowship Programme will be to offer, in co-operation with specialised European institutions, an intensive personal assistance to the fellows in legal, administrative, social and cultural matters. This will be the job of the programme managers, the "contact points" in the host institutes and on the national – and the EU level (EU National Contact Points and Network of Mobility Centres). Actually a Researchers Mobility Web Portal is under preparation to improve the information for foreign researchers.
2. Being worldwide open, the EEFPP stresses the urgency of introducing an "*EC Researcher Card or Scientific Visa*", facilitating the admission of third country nationals to the EU for European-funded research.

¹⁰ Under the rules in force in most of the Member States and Associated Countries, holders of post-doctoral Marie Curie grants are covered by a fixed-term employment contract with their host institution. The host institution insures that their net income, after deduction of tax and social security contributions, is equivalent to the remuneration received by national researchers at the corresponding grade in the host country.

¹¹ However, it has to be mentioned that there are EU-funded measures being no fellowships, which leave it to the employer to define the legal status of the collaborators working on the project. This is the case of "Research Training Networks" for example.

3. It should be stressed that it is the aim of the EEFP as well as the interest of the EU to keep the highly qualified young researchers in Europe. Consequently there should be a possibility to extend the EC Researcher Card, if a fellow is offered a job.

5.5 Interim Proposal: Mobility via an Intergovernmental Organization

The problems of access of third country researchers to the EU have to be solved irrespective of the instrument by means of which the EEFP might be implemented.

Without any doubt the introduction of an EC Researcher Card would be the best solution, but it has to be realized that this might take too long. Actually the EC discusses the admission of researchers from third countries (stays for more than three months) as a matter of general immigration policy, and researchers are not a separate category in terms of immigration law.¹²

Consequently a compromise solution shall be considered:

Looking at the practise of an intergovernmental organisation like ESO, it becomes obvious that the conditions of entry and residence for researchers and their families undertaking international mobility can be facilitated.

ESO Fellows are given a special legal status on the basis of the “*Headquarters Agreement between the Government of the Federal Republic of Germany and the European Organization for Astronomical Research in the Southern Hemisphere*”¹³ (ESO Headquarters being in Garching). ESO Fellows and their family members get a special ID card from the German Foreign Ministry, which simplifies the admission to and residence in Germany.

In addition to that the “*Protocole relatif aux privilèges et immunités de l’Organisation européenne pour des Recherches astronomiques dans l’Hémisphère austral*”¹⁴ provides ESO personnel with certain privileges of admission to all ESO Member States (art. 17c).

Regarding Non-ESO Member States ESO personnel has to cope with the normal conditions of entry and residence in the particular state. But if an ESO Fellow wants to stay in another country for some time for the aims of scientific cooperation, ESO provides the fellow with a so-called *delegation or secondment*, guaranteeing that the fellow is paid by ESO, thereby making the access to the host country easier.

So the compromise could be that the EEFP, being open to young researchers from all over the world, might be managed by ESO (in cooperation with ESA and other European scientific facilities for example), giving European Excellence Fellows a favourable legal status (the compromise proposal might be related to option b).

¹² Seminar on the Conditions of Entry for Researchers undertaking international Mobility, Brussels 2001, p. 79.

¹³ Headquarters Agreement of January 31, 1979

¹⁴ Protocol of August 13, 1974

6. Applicability to Other Disciplines

Even though the study has been focused on the implementation of the EEPF in the field of Astronomy and Astrophysics, its applicability to other fields of research has been discussed with experts from other disciplines several times.

See the statements as to Biological Science, Chemistry, and Particle Physics (CERN) on p. VIII.

PART II: General Parameters for the Comparison of Existing Programmes

1. Programmes under Consideration

It is the aim of the comparative analysis to investigate postdoctoral fellowship programmes in the US and in Europe. The goal was to get an insight into a broad range of different fellowship programmes to get an idea about the possibilities of designing a scheme.

Seven programmes were elected, all being very renowned, three in the US, four in Europe.

Four of the schemes are operating on a national level (Hubble FP, NSF AAPF, HP), three on an international or European level (EMBO, ESO, MCF), being confronted with all the problems which are connected with the implementation of a fellowship programme in a multinational political system.

Volume of the programmes: Number of fellows appointed on average per year

Fellowship Programme	Period of time	Total no. of appointments	Average no. of Appointments per year
Hubble F.P.	1990 – 2001	144	12
NSF AAPF			10
JRA			4.5
Heisenberg P.	1999 – 2000	151	75.5
ESO (Garching)	1997 – 2001	66	6 (+ 8 in Chile = 14)
EMBO	1996 – 2000	811	162.2
MCF Individual Fs Cat 30	1994 - 1997	1768	442

2. Characteristics of the Programmes

Goals: Regarding the goals of the programmes one may say that the *national schemes* under consideration primarily focus on the promotion of high level research and a scientific elite, whereas two of the *European schemes* aim simultaneously at different tasks: High-level research, trans-national mobility (EMBO) and in addition to that promotion of less-favoured regions (MCF). Like the national schemes ESO aims at promotion of high-level research mainly.

Character of Research: Independency of research and individual free choice of location of research is constitutive for the fellowship programmes in general. But in reality there are often some restrictions to the free choice of the host institute and the host country, on account of limited resources for instance.

Special Clause for disadvantaged Groups: In accordance with Federal Statutes the American Fellowship Programmes formulate a special clause to encourage disadvantaged groups like women, minorities, and persons with disabilities to compete fully in the programmes.

The European Programmes do not include such a special clause, neither does Heisenberg Programme.

Award Conditions: PHD or equivalent level.

HP, being the most “elitist” scheme under consideration, expects the candidates to be already qualified for a professorship.

Duration: Fellowship programmes primarily aiming at promoting a small group of outstanding young scientists establish a longer period of the fellowship (up to three years and longer: AAPF, HFP, JRA, HP, ESO) than programmes aiming in addition at training and mobility, and handling a higher number of fellows do (up to two years: EMBO, MCF).

Eligibility: Four fellowship programmes are worldwide open (HFP, JRA, EMBO, ESO), one Europe-wide (MCF), and two limited to citizens mainly (AAPF, HP).

It is not surprising that intergovernmental organizations like EMBO and ESO are worldwide open, and MCF Europe-wide, but it is remarkable that national schemes like HBF and JRA are.

Obviously the US want to attract outstanding young scientists from all over the world, confirming the excellence and competitiveness of American Astronomy.

Selection Procedure: Scientific evaluation of applicants research proposals involves the institutionalisation of a selection procedure aiming at *objectivity, consistency, transparency and fairness*. However, the *form* by which these objectives are realized, varies considerably regarding the different schemes.

Equally the programmes vary as to the existence of face-to-face relations during the selection procedure.

Selection Criteria: Referring to the criteria of selection all schemes under consideration base their decision on grants *primarily* on the quality of the research proposal and the personal aptitude of the applicant.

3. Data on Fellows

Oversubscription:

What we found out is that all fellowship programmes included in the comparison are dramatically oversubscribed, the highest rate characterizing the Hubble Fellowship Programme: Only 1 fellow from 13 will be elected.

The high oversubscription rate might be interpreted as an indicator of the special attractiveness and prestige of the scheme.

Oversubscription of Fellowship Programmes

Fellowship Programme	Period	No. of applications	No. of appointments	Rate of oversubscription
Hubble F.P.	1995 – 1999	703	55	1 : 13
ESO (Garching)	1997 – 2001	289	30	1 : 10
EMBO (LTFs)	1996 – 2000	4056	811	1 : 5
MCF Ind Fs Cat 30	1994 – 1997	6869	1768	1 : 4
Heisenberg P	1999 – 2000	485 (Withdrawals 26=459)	214 (including prolongations)	1 : 2

Women: Generally the proportion of female fellows in the post-doc programmes does not represent their proportion in the total number of PhD students, where they account for up to 50% (more in some disciplines and countries, e.g. Astrophysics in France and Italy).

In two highly “elitist” schemes the proportion of women is only about 20% (Hubble Fellowship Programme) and about 15% (Heisenberg Programme).

The Marie Curie Fellowship Programme reaches the highest involvement of women (1999: 38,9%; 2000: 37,3%), closely followed by EMBO Long Term Fellowships (2000: 37,18%; 2001: 38,66%).

Admitted and average age: We found that independent from a formal age limit the average age of postdoctoral applicants seems to be round about 30 years, with the exception of the Heisenberg Programme, where candidates are expected to have already qualified for a professorship. So the average age of Heisenberg Fellows is much higher: 36 years. (Men 35,75; women 37,15)

Attractiveness of the US for post-docs: The attractiveness of the US for post-docs is high. In the American Hubble Fellowship Programme for Astronomy and Astrophysics, being worldwide open, about 22% of the fellows are foreigners, mainly from Europe. Obviously there is a brain drain to the US from the other parts of the world.

Data of the EMBO Long Term Fellowship Programme, also opened worldwide, demonstrate that the most favoured place to go to is US/Canada. In 1996 – 2000 1351 post-docs (= 33,31% of the total no. of applications) applied for going there. However, the success rate was rather low: 15,1%.

During the same time only 150 post-docs from US/Canada wanted to go to Europe.

4. Fellows Network

Most of the fellowship programmes have been active in establishing a fellows network and in creating a visible identity of fellows, knowing very well that the name-recognition of a fellowship programme being an important condition for its success.

5. Financial Equipment of Fellowships

Comparing the financial equipment of the different fellowship schemes is a rather difficult matter, because of the complexity of economic terminology and conceptions on the one hand and the different income-level and legal regulations in the domestic area of states (tax law; law of social security; labour law) on the other hand. On the whole the awards are commensurate with the high qualification of fellows.

Main factors influencing the financial equipment of fellowships are:

- National or international scope of the programme
- Legal status of fellows: employees, grantees, and mixed types
- International organizations: Internal salary scheme

Nationwide operating fellowship programmes use to award one fixed amount to the fellow, although the income might differ as to tax- and family status or other relevant criteria of domestic law.

The fellowship programmes practising a trans-national approach differentiate the income of fellows according to the economic and legal conditions of the host country, meaning that there exists no equal award for all fellows. This is the case of Marie Curie Fellowships.

The legal status of fellows implies different grades of compulsory social security for fellows and so the amount of their net income.

6. Scientific and Administrative Management of Programmes

Obviously there are different methods managing a fellowship programme effectively.

Main factors influencing the structure of management are:

- Volume of the fellowship programme: Financial volume and no. of applications and appointments
- Specialisation of the fellowship programme: Variety of disciplines included
- Consistency of the research programme
- National or international / European character

It is evident that a diversified programme like MCF which has to handle high numbers of applications every year must develop different management structures than highly specialised programmes like for instance HFP or ESO.

In case of the latter schemes the management is located in a specialized scientific facility, where high-level internal expertise may be used to operate the programmes successfully.

In most cases the institution giving the money is administering the scheme at the same time. HFP and JRA are exceptions. In case of HFP the funding institution (NASA) outsourced the programme management to STScI, a research facility with a comprehensive scientific competence as to the Hubble Telescope.

7. Evaluation of Programmes

Published and internal data on the evaluation of fellowship programmes demonstrate that the schemes are working quite successfully and are reaching their programmatic goals.

Even though there are different criteria by which a fellowship programme might be evaluated, the main criteria used by the experts is the professional career of fellows after the fellowship.

Nevertheless, there remains room for further improvements. Fellows sometimes complain of bureaucratic procedures and cumbersome decision making.

PART III: Comparison of Postdoctoral Fellowship Programmes

1. Introduction: Purpose and Scope of the Comparison

The main task of comparing existing postdoctoral fellowship programmes is collecting information on existing schemes. How are they designed, organised, and implemented. Are they working successfully?

Referring to its methodological approach the study has the character of a pilot study, not being representative for the universe of existing postdoctoral fellowship programmes in the statistical sense.

The selection of the fellowship programmes was based on the opinion of experts in this special area of research as to their probable relevance for the project. In addition to that the task was to include a broad range of different schemes in the study.

The comparison is based on *primary* and *secondary* sources. The favoured research instruments were personal interviews with programme managers and other experts and mailed questionnaires, including open ended questions.

A disadvantage of mailed questionnaires is that respondents often take a long time to complete them or even do not answer. Sometimes the data asked for were not available, sometimes the questions were not precisely answered because they concerned sensitive areas, for example financial data,.

Beyond that published and internal data of the programmes were analysed, web pages, and official statistics of national and international institutions.

Even though there are still some gaps and inconsistencies in the database, we considered it sufficiently representative to compile a first draft of the proposed European Excellence Fellowship Programme (See Part I).

2. Fellowship Programmes under Consideration

Included in this comparison are seven postdoctoral fellowship programmes, four operating on a national level, three on an international or European level:

Hubble Fellowship Programme (HFP)
NSF Astronomy and Astrophysics Postdoctoral Fellowship (AAPF)
Jansky Research Associates (JRA)
Heisenberg Programme (HP)
EMBO Fellowship Programme (EMBO)
Marie Curie Fellowships (MCF)
ESO Fellowship Programme (ESO)

The three US fellowship schemes are dealing with natural sciences:

HFP: Astronomy, Physics and related disciplines.
AAPF: Astronomy and Astrophysics.
JRA: Radio Astronomy.

The HP, a national German scheme, promotes Natural Sciences, Bio-medical Sciences, Humanities and Social Sciences and Engineering Sciences (succession in order of quantitative relevance).

The three European schemes focus on Molecular Biology (EMBO), Chemistry, Earth Sciences, Economics, Engineering, Life Sciences, Mathematics and Physics (MCF), and Observational and Theoretical Physics (ESO).

Contrasted with the other programmes HP and AAPF include not only research, but teaching duties as well.

3. Focal Points of Comparison

3.1 Characteristics of the Programmes

3.1.1 General Goals

Obviously the *national American Fellowship Schemes* represent an Elite Approach on the post-doctoral level:

“Excellent young PhDs” (Hubble Fellowship Programme); “Young investigators of significant potential” (Astronomy and Astrophysics postdoctoral Fellowship); “Promotion of outstanding research” (Jansky Research Associates).

Furthering and establishing a young scientific elite in “positions of distinction and leadership in the community” is the main task of the programmes (“*uni-task oriented systems*”)

Under certain aspects the *Heisenberg Programme*, a national German scheme for professorial candidates, is similar to the American ones. By promoting highly qualified young scientists in research and education in the academic area, like AAPF does, it has an elitist character as well.

Contrasted with the Fellowship Programmes functioning on a national level, *the Fellowship Programmes operating in the European or international context* like the Marie Curie Fellowship Scheme (operated by the European Commission) and the EMBO Fellowship Scheme (operated by an intergovernmental organization) are “*multi-task oriented systems*”.

On the one hand they promote postdoctoral *high-level research* (MCF: Category 30; EMBO: highly qualified post-doctoral research training), on the other hand they declare *trans-national mobility of researchers* as equally essential for the schemes: “High-level research in connection with mobility” (MCF); “Development of a strong trans-national approach” (EMBO).

Moreover the MCF Programme is aiming at the *promotion of less-favoured regions* in Europe and the transfer of knowledge and technology between industry and academia.

Like the national schemes ESO mainly aims at promotion of high-level research, but there exists a special arrangement. Fellows in Garching have to spend 25% of their time on the support or development activities of ESO. In Chile the fellows support the astronomers in charge of astronomical tasks at a level of 50% of their time during the first three years.

Summarizing one can say that postdoctoral fellowship schemes operating on the national level mainly focus on the promotion of a scientific elite, whereas MCF and EMBO, operating on an European or international level, simultaneously aim at different tasks.

Beyond that implementation of a fellowship scheme on the European or international level has to solve a lot of special problems resulting from the multi-national political basis.

3.1.2 Special Clause for Disadvantaged Groups

In accordance with Federal Statutes the American Fellowship Programmes formulate a special clause to encourage disadvantaged groups to compete fully in the programmes.

HFP: “Qualified applicants will receive consideration without regard to race, creed, colour, age, gender, or national origin. Women and members of minority groups are strongly encouraged to apply.”

NSF: “The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programmes... Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance from NSF...”

JRA: “NRAO is an Equal Opportunity, Affirmative Action Employer. Women, Minorities, Vietnam-Era Veterans, Disabled Veterans, and Individuals with Disabilities are encouraged to apply.”

Neither the German Heisenberg Programme, nor the other European schemes refer to disadvantaged groups in their regulations, though equal opportunities for men and women belong to the official policy of the EU (MCF), ESO and HP.

3.1.3 Character and place of research

Independency of research and individual free choice of location of research are constitutive for the fellowship programmes.

Nevertheless it has to be recognized that there may be a difference between right and reality. Especially free choice of the host institute and country might be restricted by facts.

The **JRA** points out that investigations can be performed either independently, or in collaboration with others. (Here “independency” seems to be used in another sense, it means that teamwork is possible too, but research remains to be independent as well.)

Generally the fellows carry out their research projects in host institutions, which have been chosen by each fellow. However, there are some differences.

HFP: In order to avoid an excessive concentration of fellows at any one institution there is a limitation on the number of new Hubble Fellows per host institution that can be appointed in a given year, generally one new fellow per institution. So applicants are demanded to propose three prospective host institutions, in order of preference. An endorsement letter of the first-choice institution is required. The purpose of designating second- and third-choice institutions in the application is to provide the programme with flexibility. Normally awardees will utilize their fellowships at their first-choice institution.

In case of European schemes **MCF** and **EMBO** (trans-national approach) the fellows are obliged to go to another country. But they may chose both, the host institution, and the country they want to go to.

Regarding MCF appears a very early and intensive cooperation between the host institute and the applicant while preparing the application.

ESO: Referring to ESO, fellows may chose between Chile and Germany.

ESO Fellows are fully integrated into the scientific work of the organisation.

Fellows in Garching spend up to 25% of their time on the support or the development activities of ESO, in addition to personal research. They can select functional activities in one of the following areas: instrumentation, user support, archive, VLT, ALMA or science operations at the Paranal Observatory. In Chile the fellows select to be assigned to either a Paranal operation group or a La Silla telescope team. During the first three years they support the astronomers in charge of operational tasks at a level of 50% of their time. During the fourth year are other options provided. So the fellowship is not only of great advantage for the fellows, but for ESO too.

JRA: The NRAO (National Radio Astronomy Observatory), which is managing the programme, has its headquarters in Charlottesville, VA, and operates three radio telescope facilities: Green Bank, WV, Socorro, NM, and Tucson, AZ.

The postdoc may request the site and that request is usually honoured. Although sometimes there are negotiations about the site due to certain constraints and needs of the observatory or postdoc.

Jansky Research Associates are not fellows in the usual sense, they become full-time staff members.

EMBO Long Term Fellowships: The most favoured place to go to is US/Canada

As to the Long Term Fellowships in 1996 – 2000 *the most favoured place to go to was US/Canada*: 1351 applications = 33.31%.

Obviously US / Canada is very attractive for post-docs, one third of all applicants prefer to go overseas. However, only 15.1% succeeded in being awarded with a fellowship for US / Canada.

The next favoured countries were UK (855 appl. = 21.08%) and France (428 appl. = 10.55%) Success rate: UK 26.9%; France 19.86%.

In the same time (1996 – 2000) only 150 post-docs from US/Canada applied for an EMBO Long Term Fellowship.¹ Their most favoured country is always the UK. Then quite equally France, Germany, Spain, Switzerland, Italy and Israel.

¹ Referring to CERN an expert points out that CERN has difficulties in attracting good American young post-docs at the moment because of comparatively low salaries, the short duration of the fellowship and the lack of tenure track positions.

TABLE I **EMBO Long Term Fellowships 1996 – 2000**
Most Favoured Countries

Most favoured countries	Applications	% of Total	Awards	% of Total	Success Rate %
USA/Canada	1351	33.31	204	25.15	15.10
UK	855	21.08	230	28.36	26.90
France	428	10.55	85	10.48	19.86

(selected countries)

EMBO data clearly show that the most favoured place to go to for the young generation of molecular biologists is USA / Canada, though the success rate is rather low (15.1%).

TABLE II **EMBO Long Term Fellowships 1996 – 2000**
Highest Success Rates for Applicants

Country	Applications	% of Total	Awards	% of Total	Success Rate %
EMBL (int. Organisation)	159	3.92	61	7.52	38.36
Portugal	9	0.22	3	0.37	33.33
Switzerland	253	6.24	67	8.26	26.48
Netherlands	138	3.40	31	3.82	22.46

(selected countries)

The chance to get a fellowship was highest as to the EMBL: 38.36%. EMBL is an international laboratory and extraterritorial.

A good chance to go to the favoured country existed in case of Portugal (33.33%), Switzerland (26.48%), and the Netherlands (22.46%).

3.1.4 Award Conditions

PhD or equivalent level

According to the postdoctoral character of the fellowship programmes applicants must have the PhD or equivalent level.

Additionally there are some differences as to the time when the doctoral degree has been attained and as to experience in research.

HFP: PhD or equivalent doctoral level. PhD within the past *four* years.

AAPF: Application within *three* years of obtaining the PhD.

JRA: PhD prior to the beginning of appointment and normally within the past *four* years.

HP: Scientists who have a doctoral degree and already attained a professorship or have qualified on a comparable level. HP is the most “elitist” programme under consideration according to the level of qualification.

EMBO: PhD or equivalent.

MCF (Category 30): PhD or at least four years of full-time experience at post-graduate level other than doctoral studies.

ESO: PhD

Formalised application

In general the application includes:

- a. *Research proposal*
- b. *Curriculum vitae*
- c. *List of publications*
- d. *Summary of previous and current research*
- e. *References*
- f. *Endorsement letter or agreement of host institution*

Ad c: EMBO demands applicants must have at least one first author publication in press or in an international peer reviewed journal at the time of application, because experience shows that those with weaker CVs. are never successful.

Ad e: In the most cases applicants have to prove the quality of their research proposal and scientific excellence by means of some professional expertise.

Whereas HFP and JRA explicitly demand three letters of reference, in case of HP it is up to the applicant if he/she wants to add references to the application.

ESO expects the fellow to deliver three letters of recommendation from persons familiar with his / her scientific work.

MCF and EMBO do not ask for letters of recommendation. However, in the procedure of application the idea of scientific expertise implicitly is included, because the application is done in close cooperation with the host institute.

AAFP explicitly refuses to consider letters of recommendation. “*Since this program relies on reviewed proposals rather than applications, letters of recommendation will not be considered.*” However, regarding the proposal preparation and submission instructions it becomes obvious that to some extent the opinion of experts is comprised in this process.

Ad f: Certainly all fellowship programmes expect the host institutions to make their consent to cooperate with the researcher public in some way.

HFP, AAFP and HP demand an endorsement letter of the host institution, whereas MCF already gives the host institutions an important role in the procedure of application. (Bottom-up approach)

JRA has a special position, because the fellowship is awarded by the NRAO and the fellows carry out their research within the facilities of this institution.

In case of ESO are only two options: *Garching* and *Chile*.

Age conditions

See: TABLE VII

The formal age limit of the programmes differs between 35 – 40 years of age.

HFP defines no formal age limit. But researchers who will apply for a fellowship in 2002, must have received their doctoral degree in 1999 or later.

AAFP defines no formal age limit as well, but only young researchers who have absolved a doctoral degree within 3 years of the proposal deadline (or expect to receive the doctoral degree by 1. September of the award year) can apply for the fellowship.

JRA: No formal age limit.

HP: Normally up to 35 years, exceptionally to 40 years.

MCF: 35 years or less.

EMBO: Since the start of the programme the age limit has been 35 years. Recently this limitation has been removed, but the emphasis on the support of those early in their scientific career remains.

ESO defines no formal age limit, but aims at promoting young scientists.

Eligibility

HFP is worldwide open without regard to national origin, the only condition is the applicant must be able to speak English.

AAPF: Eligibility is limited to citizens or permanent residents of the US.

JRA: The programme is open to qualified PhDs from all over the world.

HP: Applicants should be German citizens, foreigners are expected to stay and work in Germany.

EMBO is worldwide open: Member States and Non-Member States.

MCF admits researchers from 15 EU Member States and 15 Associated States, and fellows, who have resided in the EU for at least 5 years immediately prior to the application.

ESO is worldwide open, though preference will be given to nationals of the Member States of the organization.

It will not surprise that the fellowship programmes operating in the European context have a multinational approach: EMBO and ESO – worldwide; MCF – Europe-wide.

But it is remarkable that a nationally operating schemes like HFP and JRA are opened worldwide. On the one hand the international scientific cooperation in astronomy and astrophysics is close, and the international astronomical scientific community regards research in this area as a common task. *On the other hand the US want to attract outstanding young scientists from all over the world, so confirming the excellence and competitiveness of American Astronomy.*

Duration

HFP: 3 years (up to annual performance review).

AAFP: Period up to 3 years.

JRA: Appointments are made to a term of 2 years and may be renewed for a third year.

HP: 3 years, renewal possible for 2 years. Reports after 15 and 30 months.

EMBO: Long Term Fellowship may be awarded for a period of 4 to 24 months, dependent on a positive interim request from the supervisor. Actually EMBO plans to prolong the period up to 3 years.

MCF: 12 to 24 months.

ESO: Garching – 3 years maximum; Chile – 4 years maximum.

All schemes have institutionalised certain mechanisms to get an insight into the progress of the research project during the fellowship.

3.1.5 Procedure of Selection

Scientific evaluation of applicants research proposals involves the institutionalisation of a selection procedure aiming at *objectivity, consistency, transparency and fairness*. However, the *form* by which these objectives are realized, varies considerably as to the different fellowship schemes: Single expert opinions, standing and non-standing committees, national or international composition of the committee, no. of members, mode of election of members, duration of membership.

The **HFP** installed the *Hubble Fellowship Review Panel*. All application material will be reviewed by this external panel. Its evaluations and recommendations form the basis on which the director of the STScI grants the Hubble Fellowship awards.

AAFP reviews of proposals submitted to NSF are solicited from *peers with expertise* in the substantive area of the proposed research or education project.

These reviewers are selected by Program Officers charged with the oversight of the review process. *Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.*

All proposals are carefully reviewed by at least three other persons outside the NSF who are experts in the particular field represented by the proposal.

Especially remarkable is that NSF invites the proposer to suggest at the time of submission, the names of appropriate and inappropriate reviewers. Care is taken to ensure that reviewers have no conflict with the proposer. By means of this possibility the applicant can exclude certain risks in the selection procedure.

HP: Up to 2001 existed a *Special Review Committee for the Heisenberg Programme* containing of 31 members. 22 scientific members were nominated by the Main Committee of the Deutsche Forschungsgemeinschaft, 8 members represented the States and one member (with 8 votes) the Federal Government. Last year the DFG was restructured and since January 2001 the *Main Committee* has overtaken the functions of the Special Review Committee.

37 members join the Main Committee; 19 are scientists nominated by the Senate, the Federal Government and the States delegate 8 members each and 2 members represent the “Stifterverband für die deutsche Wissenschaft”.

EMBO: After having sent the application dossier to the EMBO office the selection of EMBO Long Term Fellows starts in most cases, for those applicants resident in Member States, with an *personal interview*. The interviewer is expert in the area of application and will be selected from among the EMBO members.

All dossiers are then considered by a *ten-person international standing committee of EMBO members* who are leading European molecular biologists. Each application is scored independently and the scores are forwarded for compilation to the secretariat. The selection committee then meets to consider together the applications and the scores.

ESO established two scientific committees. *Garching:* 8 members; *Chile:* 7 members.

Example Garching: The members of the committee belong to the astronomical staff of ESO and are nominated by the Director General and the Head of the Office for Science, normally for three years.

Procedure: First the committee gives an opinion on all applications, then a small group is elected and invited for giving a talk. The topic may be chosen by the candidate himself / herself. In addition to that the candidate is interviewed by the scientific committee.

MCF individual fellowships applicants (post-doctoral fellowship category 30 is one of them) make a proposal by applying, in conjunction with a host institution, to the Commission.

Step 1: Administrative check on eligibility

Step 2: Peer review of proposals

Step 3: Selection by the Commission

According to the annual no. of applications for the MC individual fellowships (5000 proposals every year) the evaluation system is highly regulated and differentiated.

Peer Review procedure:

The scientific evaluation of the fellowship proposals are reviewed in 7 panels by independent experts nominated by national governments of the participating countries, European scientific bodies and industrial associations. Attention is paid to the balance between those groups. The size of the panels depends on the volume of applications in a particular discipline.

The experts were selected from a database of over 4000 and are appointed for a maximum of 3 years. A minimum of 1/3 of the panel members are rotated every year. The panels are chaired by one of the scientific experts who is appointed by the services of the Commission. The entire peer review procedure takes place in Brussels over a 2-3 day period.

Though the selection procedure cannot be described completely at this place, it shall be added one important point. *Even though the procedure is highly standardized, some*

personal preferences are taken into account. On the one hand each proposal is first allocated to a particular panel, according to the wishes of the applicant, on the other hand panel members are asked to indicate projects they would be interested in evaluating: “indications of interest”.

Finally it has to be emphasized that at no stage “national quota “ are taken into consideration in the evaluation and funding of applications. Proposals are evaluated principally on the grounds of scientific excellence.

MCF: “The quality of any research programme is strongly dependent on the quality and integrity of its accompanying peer review procedure. The prestige and standing of the research programme also depends on the acceptability / reputation of the peer review process.”

Obviously the number of applications influences the framing of the selection procedure. A high number implies the development of complex bureaucratic structures, as it can be seen in case of MCF.

3.1.6 Criteria of selection

Regarding the criteria of selection it seems all schemes under consideration base their decision on grants primarily on the quality of the research proposal and the personal aptitude of the applicant.

HFP and **EMBO** explicitly refer to these criteria in their regulations.

AAPF proposals will be reviewed against the *General Review Criteria established by the NSF*. This list of criteria is rather comprehensive and detailed.

MCF criteria of selection are:

Project: Scientific / technological quality; originality; methodological approach; feasibility; relevance and potential scientific impact of project.

Host institution: Research quality of host group; expertise in project field; research infrastructure to support project; ability to meet research training needs.

Applicant: Research experience / publications; aptitude of applicant; training impact and benefit to fellow; benefit of mobility.

(MCF’s detailed regulations on the evaluation system are published in the document “Guide to Evaluation and Selection of Training through Research Proposals“)

ESO: Besides scientific excellence, relevance of the personal research for ESO and its connection with ESO’s instrumentation and software is taken into consideration.

Presupposing equal quality, candidates of ESO Member States will be given preference.

In case of the **Heisenberg Programme** the DFG came over with the information that no formal catalogue of evaluation criteria has been developed. The reason: Applicants have already proved their belonging to the circle of the most excellent young scientists and are well known to the scientific community.

3.1.7 Financial Equipment

Comparing the financial equipment of the different fellowship schemes is a rather difficult matter, because of the different economic terminologies and concepts on the one hand and the different income-level and legal regulations in the domestic area of states (tax law; law of social security; labour law) on the other hand. In general the awards are commensurate with the high qualification of fellows.

Differences in the financial equipment

Main factors influencing the financial equipment of fellowships are:

- a) National or international scope of the programme
- b) Legal status of fellows: employees, grantees, and mixed types
- c) Age

Ad a: Nationwide operating fellowship programmes use to award one fixed amount to the fellow, although the income might differ as to tax- and family-status or other relevant criteria of domestic law.

Whereas the fellowship programmes practising a trans-national approach differentiate the income of fellows according to the economic and legal conditions of the host country. So there exists no equal award for all fellows. This is the case of Marie Curie Fellowships, operated by the EC. In case of MCFs the amount of the fellowship is defined on the national

level by the host countries involved in the programme. The idea is that the fellowship is equivalent to the remuneration received by national researchers at the corresponding grade in the host country. Obviously the huge variation of researcher's salaries around the EU, with some of the lowest paid in Portugal and the highest in Germany, is a problem that has to be solved by future policies.

In case of EMBO Long Term Fellowships a representative basket of consumer goods is defined. Every ten years the basket will be adapted to new developments, and every year the inflation rate will be compensated on the basis of OECD statistics. The idea is the grant's purchasing power shall be equal in the different host countries.

Ad b: The legal status of fellows, being either employees or grantees, implies different grades of compulsory social security for fellows and consequently the amount of their net income.

Fellows, being *employees*, conclude an employment contract with the host institute and get a salary. Their grade of social security is high. Normally they are covered by compulsory health-, invalidity-, old age-, survivors-, and unemployment insurance.
Example: Marie Curie Fellows

Grantees normally are not covered by compulsory insurances, they may insure themselves and their families voluntarily. So, to a certain degree, they are free to determine their net income. (The obligation to pay or not to pay taxes is another theme.)
Example: EMBO Long Term Fellows

International Organizations have their own salary schemes.

Ad c: There are two fellowship schemes included in the study, which differentiate the amount of the fellowship in regard of age: *EMBO* differs between under and over 30, and *Heisenberg Programme* between under and over 35.

EXAMPLE 1

Comparison EMBO and MCF

(Example: France, Germany, Italy) Euro / per year

Basic principle: Differentiation of salary / grant depending on the country being visited.

TABLE III Comparison Marie Curie Fs. / EMBO Long Term Fs.

	Indicative net subsistence allowance per year = net income	Total subsistence allowance costs paid by the Commission per year = gross income	Additional allowances per year	Total costs per year
Marie Curie Fellowships: Individual Fs., Cat 30 Salary in 2002			Mobility allowance: 4,800 Euro	
France	21,000	43,000	Contributions for research and management:	60,000 or 63,000
Germany	22,800	54,000	10,800 Euro or	70,800 or 74,400
Italy	23,400	45,756	14,400 Euro for experimental / laboratory based projects.	62,556 or 66,156
		Deductions: Income tax and Social Security Contributions	Travel costs (fixed rate): Max. 1,200 Euro per fellowship	
EMBO Long Term Fellowships Grant in 2002 Age: Over 30	No income tax, no obligatory insurances		Travel costs for the fellow and his family.	
France	28,585.2		For each dependent: 2,769.48	
Germany	32,127.6		3,112.56	
Italy	31,065.0		3,009.48	

EMBO: Rate of Long Term Fellowships in 2002; € per month (age over thirty)

Selected Host Countries

Austria	2,704.70
Denmark	2,668.50
Netherlands	2,488.60
Spain	2,203.40
Sweden	2,526.40
Switzerland	3,523.70
United Kingdom	2,916.05

MCF: Reference Subsistence Allowance for Category 30; € per month in 2002

Selected Host Countries

	Indicative net monthly subsistence allowance ¹	Total monthly subsistence allowance costs paid by the EC ²
Austria	1,850	4,280
Denmark	2,200	4,373
Netherlands	1,850	4,225
Spain	1,850	3,342
Sweden	1,860	4,621
Switzerland	2,650	4,243
United Kingdom	2,050	3,128

Looking at the net monthly indicative subsistence allowance of Marie Curie Fellows, enormous country-to-country variations with regard to income tax, social welfare deductions, and the national income level become evident.

Salary versus Grants

Marie Curie Fellows get a *salary*, not a grant. They have got the legal status of employees and are covered by compulsory insurances. They conclude an employment contract with the host institute, and the EC transfers the total amount of the fellowship to the host institute, being the employer.

It is the official policy of the EC to oblige fellows and research institutes to conclude employment contracts on account of social security considerations. Normally social security of employees cover the risks of illness, invalidity, old age, survival, and unemployment.

EMBO Long Term Fellowship is just a stipend, not a salary as in case of MCF.

There is neither an employment contract between the host institute and the fellow, nor a contract between EMBO and the host institute.

¹ Indicative net monthly subsistence allowance: this is the net salary received by fellows and is an estimate that may vary with individual tax status. It is an estimated average on the basis of 12 instalments per year; in fact some countries will pay this allowances more than 12 times per year, so fellows may actual receive a corresponding variation in monthly payments.

² This includes the gross monthly rate and the social security contributions of the company as employer.

The money goes directly to the fellow. The fellowship just includes the grant for the fellow to live on. The stipend should not be subjected to tax.

There is no bench fee's or financial support to the host institute or other grants.

The fellows themselves are responsible for their insurance:

“EMBO fellows *are not* insured by the EMBO against medical expenses for themselves or their families; neither are they insured for accidents during their travel to and from the host institute. The EMBO does not recognise recipients of its fellowships as agents or employees of the organization and accepts no liability in respect of any of their actions or activities or in respect to the health or safety of their persons. In their own interests, recipients of fellowships are, therefore, urged to make sure that both they, their families and the institutions which receive them are fully covered by the necessary insurances.”

EXAMPLE 2

Comparison of an American and European Fellowship Programme: Hubble and Marie Curie Fellowship Programmes

It has to be realized that a comparison between an American and European Fellowship Programme is difficult, because of the different political, economic, social, legal, and cultural factors influencing the design, organization and methods of implementation.

Concentrating on the economic dimension it is clear that not the nominal financial equipment of the fellowship is relevant, but it's *purchasing power*.

Purchasing Power Parities (PPP's) ³

Rate of exchange excluded

US = 1	€ Zone	1996	0.931
		1997	0.926
		1998	0.923
		1999	0.917
		2000	0.911

OECD data on *purchasing power parities* demonstrate on the one hand the relative stability of PPP's regarding \$ and €, and on the other hand that the purchasing power of 1\$ in Europe is higher than in the US. If you pay 1\$ in the US for a basket of goods, then you pay 0.91\$ (in 2000) only in the Eurozone, i.e. the purchasing power is higher in the Eurozone.

This is a comparison for consumers. PPP's are calculated on the basis of a “representative basket of consumer goods and services”.

Standard of Living

The *standard of living* is depending on different factors, mainly taxes, social security contributions and expenses for housing (rents).

³ OECD , Main Economic Indicators , Dec. 2001
Purchasing Power Parities are calculated for Member Countries for the GDP (Gross Domestic Product) as a whole.

As pointed out, the above subtractions of income mainly depend on the legal status of the fellows, being employees or grantees, and on taxes.

Social Security and taxes in the US: Hubble Fellows being grantees

In the United States *employees* normally have to pay social security contributions including old age, invalidity, survival, and Medicare (Medicare-benefits being paid only when people are retired).

Health insurance is a voluntary scheme.

The employee's and employer's contributions add up to 15% of the gross income. Unemployment insurance is also a compulsory insurance in all states, and accident insurance is compulsory in about 50% of the states.

Taxes can be imposed on employees as well on the federal as on the state level.

Social security deductions and taxes will sum up to about 20 % of the gross income.

Hubble Fellows, being *grantees*, are not covered by compulsory insurances. They may insure themselves voluntarily. In case of Hubble Fellowships Health Insurance is an additional allowance.

Fellows have to pay taxes. In any case, taxes are lower than in Europe.

As to the opinion of experts the amount of 45,000 \$ per year paid to the fellows guarantees a reasonable standard of living.

Social Security and taxes in Europe: MC Fellows being employees

Regarding the *Marie Curie Fellowship Programme*, being the highest paid European fellowship, fellows have the legal status of employees, not grantees. They are covered by compulsory insurances usual in the particular country. Normally social security is high.

MC Fellows have to pay taxes as well.

In Germany (see TABLE III) taxes and social security contributions paid by employees sum up to about 40% of the gross income.

However, the standard of living of MC Fellows seems to be appropriate.

TABLE IV

	Indicative net subsistence allowance per year = net income	Total subsistence allowance costs paid by the Commission per year = gross income	Additional allowances per year	Total costs per year
Marie Curie Fellowships Example Germany	€ 22,800 ⁵ (=20,353.56 \$)	€ 54,000 (=48,205.80 \$) About 20% of this amount is income tax and about 40% are social security contributions.	Mobility allowance (= expatriation allowance): € 4,800 (= 4,284.96 \$) Contributions for research and management: € 10,800 (= 9,641.16 \$) or € 14,400 (= 12,854.88 \$) for experimental / laboratory based projects. Travel costs (fixed rate): Max. € 1,200 (= 1,071.24 \$) per fellowship	€ 70,800 (= 63,203.16 \$) or € 74,400 (= 66,416.88 \$)
Hubble Fellowship Programme		€ 50,408.88 (= \$ 45,000) paid to the host institute Deductions: Income tax; Insurances are voluntary	Health Insurance Mobility Funds Research grants Relocation costs	

⁵ On 9.1.2002, when the table was prepared, the rate of exchange was 1:0.8927000. On 15.7.2002, the rate of exchange was 1:1, at at present, in November 2002, it fluctuates around this ratio.

3.2 Management of Programmes

3.2.1 Overview

TABLE V Funding and Management of Programmes

	Funding	Management of Programme	Research Facilities
HFP Hubble Fellowship Programme	NASA Aeronautics and Space Administration	STScI Space Telescope Science Institute	Scientific facilities throughout the USA
AAPF NSF Astronomy and Astrophysics Postdoctoral Fellowships	NSF US National Science Foundation	NSF	Scientific facilities throughout the USA
JRA Jansky Research Associates	NSF US National Science Foundation	NRAO (Research facility of the NSF)	Observing facilities of the NRAO in the USA
HP Heisenberg Programme	DFG German National Science Foundation	DFG	Scientific facilities in Germany
ESO FP European Southern Observatory Fellowship Programme	ESO Intergovernmental Organization in the field of ground-based astrophysics. Money comes from 9 Member States	ESO	Scientific facilities in Germany and Chile
EMBO FP European Molecular Biology Fellowship Programme	EMBO Intergovernmental Organization for the promotion of molecular biology. Money comes from 24 Member States (EMBC)	EMBO	Scientific facilities in and outside of Member States of EMBC
MCF Marie Curie Fellowship Programme	EU Money comes from 15 Member States and Associated States ⁶	European Commission	Scientific facilities in EU Member States and Associated States

⁶ Actually 15 Associated States are involved in financing the Marie Curie Fellowship Programme: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Iceland, Israel, Latvia, Liechtenstein, Lithuania, Norway, Poland, Romania, Slovakia, Slovenia.

The Hubble Fellowship Programme is administered by the STScI, operated by the Association of Universities for Research in Astronomy for NASA, in cooperation with astronomical institutions throughout the US.

HFP is contingent on NASA funding, i.e. money comes from public sources. NASA spends at present \$ 2.2 M per year.

The Heisenberg Programme is administered and financed by the DFG, the central public funding organization for academic research in Germany. It is the institutional task of the DFG to finance and manage research programmes. HP is only one fellowship programme among others operated by the DFG. DFG paid € 12,219,875 in 2000.

The Marie Curie Individual Fellowships are managed by the European Commission, and the money comes from the European Union.

The administration of the programme is highly standardized and operated by special staff in Brussels, which is used to handle a high number of applications every year (about 5,000). (See: Proposal submission form for financial support from the EC: Marie Curie Individual Fellowship; Payment and Reporting Procedures for TMR Marie Curie Research Training Grants) The indicative budget for all types of MCFs was in 2000 € 141,000,000.

EMBO and ESO are intergovernmental organisations offering fellowship programmes concentrated on one discipline. In every case the task of the institution is strongly connected with the task of the fellowship scheme. EMBO has established a specialised staff managing the scheme. At present EMBO spends about € 8,000,000 per year for Long Term Fellowships.

Both programmes are financed by the Member States of the intergovernmental organisations.

The National Science Foundation (NSF) in the United States has the institutional task to promote research (like the DFG in Germany does). Among others it finances and manages AAFP (funding amount in 2001 about € 600,000) and finances JRA. The management of JRA has been delegated to the NRAO.

The table shows that in most cases the institution giving the money is managing the fellowship programme at the same time. Nevertheless there are two exceptions: the Hubble Fellowship Programme and Jansky Research Associates.

Although the money comes from NASA, the HFP is administered by the Space Telescope Science Institute, the astronomical research centre responsible for operating the Hubble Space Telescope as an international observatory. Because HFP is promoting independent research that is broadly related to the mission of the Hubble Space Telescope there is a high consistency of the research programme. STScI has many years of experience in this field of research and consequently may refer to highly specialised internal expertise.

The readiness of the financing institution (NASA) to delegate the power of decision to leaders in the scientific community made this special arrangement, which has proved to be very successful, possible.

JRA: Though being financed by NSF, the management of the programme has been delegated to NRAO. JRA is a highly specialised scheme (Radio Astronomy) and awards 4-5 fellows per year.

3.2.2 Main Factors influencing the Management of a Fellowship Programme

Main factors influencing the organisation of management are:

- National or international / European character
- Volume of the fellowship programme, i.e. financial volume and number of applications and appointments that have to be handled every year
- Specialisation of the fellowship programme, i.e. variety of disciplines included
- Consistency of research programme

If the management of a fellowship programme is located in a research institute (or organization) dealing with the programme's subject of research, the institutions may use in addition to *external expertise* their *internal scientific expertise* (HFP, ESO, EMBO, JRA).

National science foundations like NSF and DFG as well as the European Commission have to provide for scientific expertise mainly from outside.

In the case of managing a fellowship scheme by a specialised research institute (or organization), the social distance between the institution and the fellow will be minimized, which might be favourable for the success of the programme. However, the precondition is that the capacity of the research facility is not overcharged. Very probably this method of managing a scheme is recommendable for specialised programmes with chiefly a rather small number of fellows.

A highly diversified (complex) programme like MCF, which has to handle about 5000 applications per year (all types of fellowships) and which includes a variety of disciplines, must develop different procedures in order to manage the programme effectively.

From this it is evident that there are different methods to effectively manage a fellowship programme. *The main point will be adapting the management to the special concern of the individual fellowship programme.*

3.3 Empirical Data on Fellows

Even though the data on fellows still are sometimes incomplete and inconsistent, there are some interesting facts.

TABLE VI Number of fellows appointed on average per year:

Fellowship Programme	Period of time	Total no. of appointments	Average no. of appointments per year
Hubble F.P.	1990 – 2001	144	12
NSF AAPF			10
Jansky RA			4.5
Heisenberg P.	1999 – 2000	151	75.5
ESO (Garching)	1997 – 2001	66	6 (+ 8 in Chile = 14)
EMBO	1996 – 2000	811	162.2
MCF	1994 - 1997	1768	442

ESO: On average **14** fellows are awarded per year. Up to 6 postdoctoral fellowships tenable at the ESO's Headquarters in Garching, up to 8 tenable at ESO's Astronomy Centre in Santiago. In future Chile will award 13 fellows per year.

As to the awarded fellows per year the differences between the fellowship programmes are considerable high. While the national US schemes award a low number of fellows each year (4 – 12), the Heisenberg Programme awards 75 on average. However, it has to be considered that JRA, HFP, and AAPF concentrate on few disciplines, whereas HP includes a variety of disciplines.

Regarding the European schemes EMBO exclusively promotes molecular biology, whereas the approach of MCF comprises chemistry, earth sciences, economics, engineering, life sciences, mathematics and physics.

Of course the political will and financial resources are the dominating factors, but variations in the number of fellows can be explained partly by the multiplicity of disciplines included in the scheme and by the tasks aimed at in the statute of the programmes. The "grade of excellence" the schemes strive for seems to decrease the number of fellows.

TABLE VII Admitted and average age

	MCF Cat.30	EMBO	HP	JRA	ESO	HFP	AAPF
Admitted age	Normally 35	Normally 35. Recently this limitation has been removed	Normally 35. Exceptionally 40	No formal age limit.	No formal age limit.	No formal age limit.	No formal age limit.
Average age	1999: 29.7 2000: 29.8	2001: 29.5	1999: 36.1 (m: 35.9; f: 37.2) 2000: 35.9 (m: 35.6; f: 37.1)		1999 – 2001: 30.1		

TABLE VIII Gender

	Period of Time	Total No. of Fellows	Male	Female
EMBO Long Term Fellowship	2000 - 2001	2000: 156 (m: 98; f: 58) 2001: 150 (m: 92; f: 58)	2000: 62.82% 2001: 61.34%	2000: 37.18% 2001: 38.66%
ESO Garching	1990 - 2001	66 (m: 46; f: 20)	69.7%	30.3%
HFP	1990 - 2001	144 (m: 116; f: 28)	80.56%	19.44%
HP	1999 - 2000	214	1999: 82.1% 2000: 85.7%	1999: 17.9% 2000: 14.3%
MCF Individual Fellowships Cat. 30, 40, R	1999 - 2000		1999: 61.1% 2000: 62.7%	1999: 38.9% 2000: 37.3%

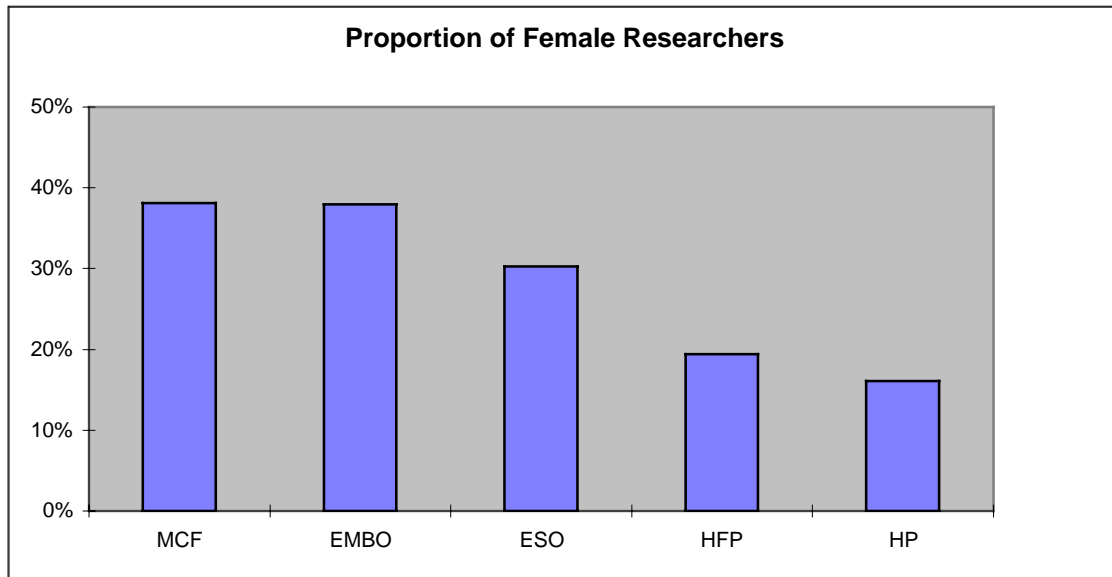


TABLE IX Marie Curie Individual Fellowships: Success Rate by Gender

Year	Eligible Proposals	Selected Proposals	Success Rate
F	592	240	40.54%
1999			
M	865	377	43.58%
F	760	348	45.78%
2000			
M	1205	586	48.63%

TABLE X Nationality of Fellows

Hubble FP	Heisenberg FP	ESO Garching	EMBO Long Term FP	Marie Curie FP
Worldwide open	National German Scheme. As a rule applicants should be Germans. Foreigners are expected to become professionally active in Germany.	Worldwide open; but preference being given to candidates from Member States	Worldwide open	Open to candidates of EU Member and Associated States, and to those who have resided 5 years in the EU immediately prior to the application
PhD-Nationality of awarded fellows	Nationality of awarded fellows	Nationality of awarded fellows	Nationality of awarded fellows	MC Individual Fellowship proposals by nationality of applicants
1990–2001: 144 fellows Americans 113 Others: 31 = 21.53% Netherlands 9 Australia 6 UK 6 Germany 2 Canada 2 Brazil 1 Denmark 1 Ireland 1 Italy 1 Poland 1 Sweden 1	1999 – 2000: 214 fellows Germans 206 Others: 8 = 3.73%	1991 – 2001: 66 fellows Italy 17 France 11 Germany 8 Netherlands 8 UK 3 Portugal 2 Sweden 2 Denmark 2 USA 1 Argentina 1 Australia 1 Belgium 1 Canada 1 Chile 1 China 1 Finland 1 Greece 1 South Korea 1 Spain 1 Switzerland 1 (One fellow out of 66 is missing) 52 fellows are nationals from ESO Member States; 14 are from Non-Member States	1996 – 2000: 811 fellows Austria 16 Belgium 13 Croatia * 2 Czech Rep. 2 Denmark 11 Finland 15 France 156 Germany 127 Greece 16 Hungary 13 Iceland 0 Ireland 8 Israel 45 Italy 60 Netherlands 57 Norway 1 Portugal 6 Slovenia * 0 Spain 86 Sweden 14 Switzerland 19 Turkey 0 UK 50 East Europe 18 US / Can. 43 Others 33 * Croatia and Slovenia: 1998/ 99/ 00	1999: 1457 appl. (includes Cat. 30,40 and R) EU Member States 1330 Associated States 107 Others 20 Selected countries: France 369 Spain 324 Italy 162 Germany 158 UK 82 Greece 76 Netherlands 34 Belgium 24 Sweden 24 IRL 23 IL 18 Denmark 17 Poland 14 Finland 13 Slovakia 10 Bulgaria 10 Others: 175

EMBO:

It is worth looking at some data of EMBO.

Empirical basis: 1996 – 2000; total no. of applications: 4056; total no. of awards: 811; Average no. of awards: 162.,2.

Referring to *Nationality* most applicants came from France (901; success rate 17,31%), Germany (527; 24.1%), Spain (497; 17.3%), and UK (321; 15.58%).

However, the chance to be awarded was better for applicants from Hungary (39.39%), Finland (33.33 %), Austria (29.63%), Netherlands (28.79%), and US / Canada (28.67%).

TABLE XI EMBO Long Term Fellowships 1996 – 2000
Nationality of Applicants / Success Rate for Applicants

Country	Applications	% of Total	Awards	% of Total	Success Rate %
France	901	22.21	156	19.24	17.31
Germany	527	12.99	127	15.66	24.10
Spain	497	12.25	86	10.60	17.30
UK	321	7.91	50	6.17	15.58

(selected countries)

TABLE XII EMBO Long Term Fellowships 1996 – 2000
Nationality of Applicants / Highest Success Rates for Applicants

Country	Applications	% of Total	Awards	% of Total	Success Rate %
Hungary	33	0.81	13	1.60	39.39
Finland	45	1.11	15	1.85	33.33
Austria	54	1.33	16	1.97	29.63
Netherlands	198	4.88	57	7.03	28.79
US/Canada	150	3.70	43	5.30	28.67

(selected countries)

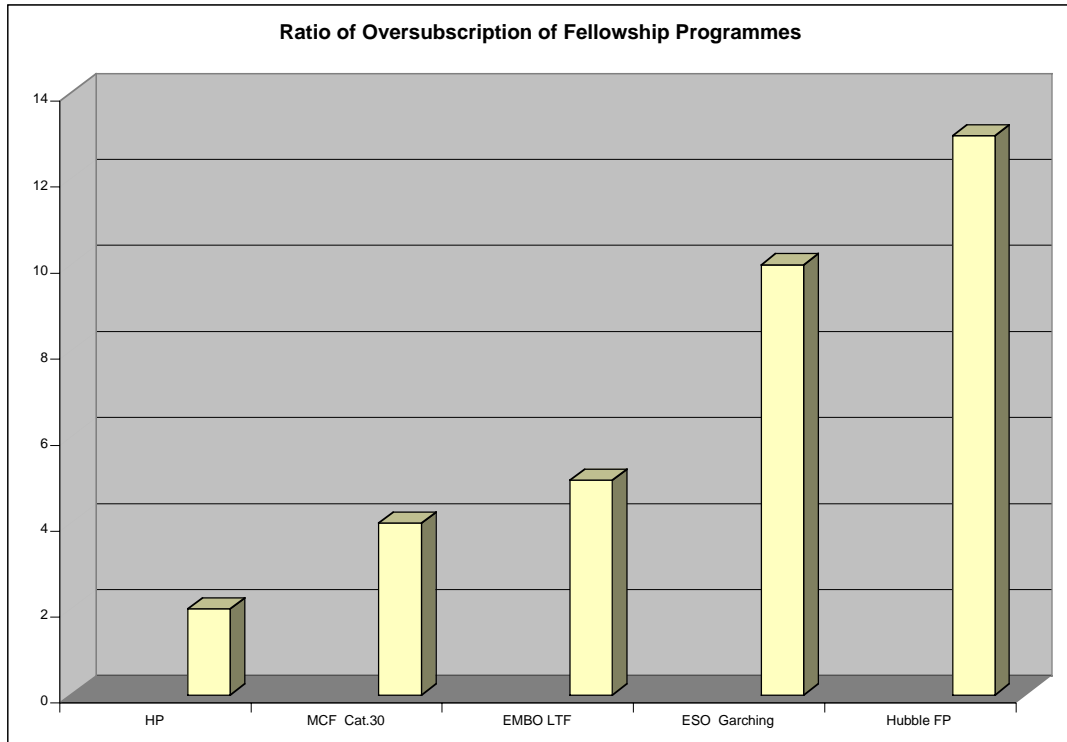
TABLE XIII Oversubscription of Programmes

Fellowship Programme	Period	No. of applications	No. of appointments	Rate of oversubscription
Hubble F.P.	1995 – 1999	703	55	1:13
ESO (Garching)	1997 – 2001	289	30	1:10
EMBO (LTFs)	1996 - 2000	4056	811	1:5
MCF	1994 – 1997	6869	1768	1:4
Heisenberg P.	1999 - 2000	485 (Withdrawals 26=459)	214 (including prolongations)	1:2

* The percentage of oversubscription varies according to the different annual numbers of applications.

A dramatic level of oversubscription is characteristic for all schemes under consideration, the highest rate characterizes the Hubble Fellowship Programme.

The high number of applications proves that future scientists are very interested in research training and research careers.



Hubble Fellowship Programme:

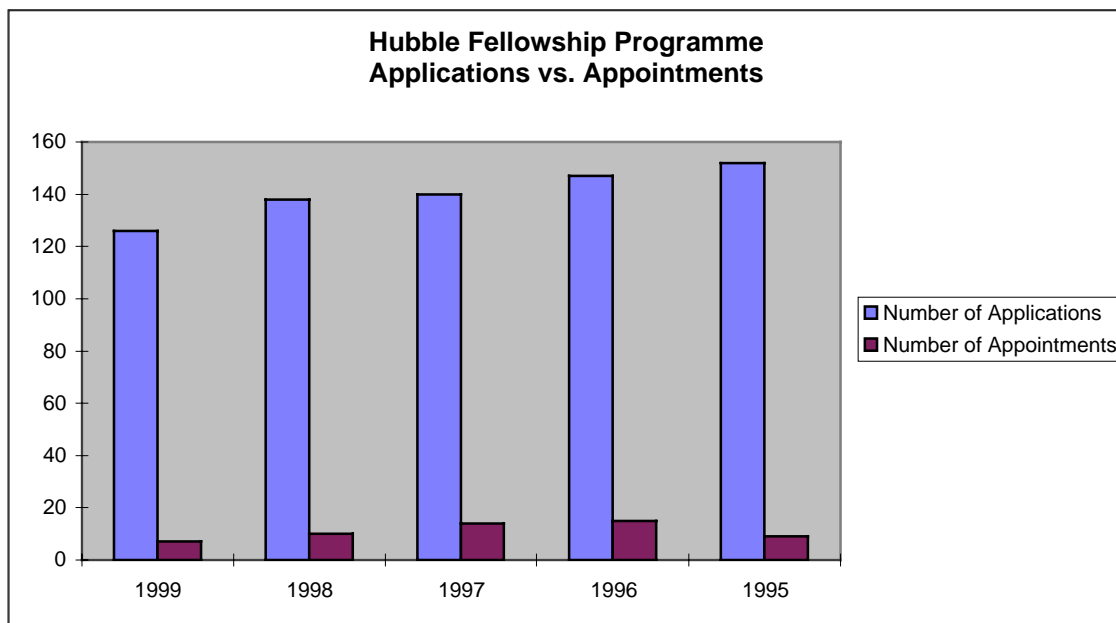


TABLE XIV Applications vs. appointments

Year	Number appointed	Number of Applicants
1999	7	126
1998	10	138
1997	14	140
1996	15	147
1995	9	152

3.4 Fellows Network

By improving contacts and promoting the flow of information during and after the fellowship between the different groups involved in the programmes (fellows, programme organisers and host institutes) a social network will be established. This also means a positive identification of the fellows with the programme and the fellow-group will be developed at the same time. That includes creating a “corporate identity” as an important condition for the success of a fellowship programme.

Structured interface between fellows, programme organisers, and host institutes on the one hand and the scientific community and the general public on the other, promotes the reputation and name-recognition of the programme as well.

As to the opinion of experts the **Hubble Fellowship Programme** succeeded in creating a considerable high coherence and identity of the enterprise itself. Hubble Fellows are a well identified and overviewed small group, clearly apart from the usual post-doc system. **It is the “name recognition” of this programme that has become a large part of the Hubble Fellowship success in the US.** The annual Hubble Fellows Symposium is the stage where the fellows present their research to the scientific community and an interested audience. The 2001 Symposium has even been webcast.

EMBO: There has been established a fellows network as an initiative designed to maintain close contacts between fellows throughout their fellowship. The aim is to promote enduring friendships and professional collaboration. Very important is the annual fellows meeting including media workshops.

Especially the **Marie Curie Fellowship Programme** has been active and successful in establishing a fellows network and creating a clear and visible identity of Marie Curie fellows.

In 1998 an international group of scientists (who have been earlier awarded by a MC Fellowship) established the “Marie Curie Fellowship Association” which sets out to (in the words of Edith Cresson) “...ensure the continuation of contacts between fellows well after the end of their fellowships. Through the Association, the services of the Commission will be able to actively track the fellows in later life, to assess the overall contribution of the fellowship scheme to European science and, in particular, to the individual development of the fellows’ career. The Association will also allow a continuous dialogue between past fellows and the organisers of the fellowship programme. This will be extremely useful in the monitoring and planning of future programmes”.

HP: Actually DFG is developing an internal pilot project to find out if there exists a need for a fellows network as to the different schemes operated by the DFG, Heisenberg Programme included.

ESO: ESO has not developed a formal network for fellows, but many former fellows are connected with ESO by means of their scientific work. Some years ago a conference took place, to which all former fellows were invited. And indeed a lot of them participated in the conference.

3.5 Evaluation of Programmes

As to evaluation of programmes the study is dependent on existing surveys and empirical data collected by different institutions and scientists, which are highly different and often not comparable. Evaluation of fellowship programmes generally needs a complex empirical approach.

The impact of the **Hubble Fellowship Programme** is evaluated on the *basis of the fellows' professional career after the fellowship*.

In general most of the former fellows are active in astrophysical research, mostly in good faculty or similar position.

The 1990 – 1997 Fellows include

- six STScI tenure-track astronomers
- five Sloan Fellows
- four winners of the Annie J. Cannon Prize
- three NOAO tenure-track staff
- two winners of the AAS Pierce Prize
- one winner of the AAS Warner prize

Beyond that the impact of the programme can be illustrated by two prestigious prizes:

In 1999 a female researcher was the winner of the Presidential Early career Award as one of 60 outstanding young scientists and engineers. This is the highest honour given by the United States government to young scientists.

In 2001 a current Hubble Fellow is this year's "Young Australian of the Year". It is a national prize of the country that usually goes to famous athletes or other non-scientists.

EMBO carried out two surveys on EMBO Long Term Fellowships investigating the *careers of fellows after the fellowship* (similar to HFP) and the *impact of mobility on the stay-rate in foreign countries*.

According to the survey on fellowships of the years 1984 / 85 88% of fellows were still in active research and 73% had returned to their own country.

A survey on EMBO Long Term Fellows who started their fellowship in 1995 confirms these results. Again there is a strong move of fellows to their home countries, there is a very high percentage of fellows who moved to permanent positions immediately after the fellowship, and the basic work carried out is providing not only knowledge but a significant input into the biotechnology arena.

MCF: Regarding European Fellowship Programmes, operated by the European Commission, several evaluation studies have been undertaken concerning the whole spectrum of schemes. However, the recent study of F. Maiworm and U. Teichler (European Research Fellowships 1987 – 1993. The experiences and views of the fellows, supervisors and administrators, ed. by the European Commission) is of some relevance for the Marie Curie Fellowships.

The study includes more than 70 individual, mostly sectoral research programmes. Fellowships under the Human Capital and Mobility Programme HCM (all such fellowships are named Marie Curie Fellowships) are included too. Successor of the programme is the Training and Mobility of Researchers Programme TMR, and since 1999 the Improving Human Potential Programme HPP.

The study is based on written questionnaires addressed to fellows, supervisors in the host institutes and administrators.

Criteria of evaluation were for instance:

- *Utility of the fellow's work to the programme of the host institute*
- *Academic achievements of the fellowship*
- *Results of the fellowship: professional publications*
- *Employment after the fellowship*
- *Perceived impacts of the fellowship (improves scientific links between European countries; strengthens European research capabilities; improves the establishment of international research networks; improves the quality of young researchers in Europe; enhances the image of the European Community; improves scientific links between advanced and less favoured regions, improves links between academic research and industry)*

Fellowships have been provided for young researchers by the European Commission since 1958. The number of applications and fellowships permanently increased, because the academic conditions and the academic achievements have increased over the years. *The authors call the development of European fellowships an academic success story.*

The attractiveness of European Research Fellowships is out of question. “However, that about one fourth of fellows would chose a different option if they could chose again and that about one tenth of those awarded a fellowship actually did not accept it, indicate that there is room for further improvements.”

HP: Up to now there is no systematic evaluation of the Heisenberg Programme. But without any doubt the programme is running successfully. HP, being the most “elitist” programme, seems to be the less standardized scheme at the same time.

ESO: Referring to the *fellows' professional career after the fellowship* ESO Fellowship Programme proved to be very effective. Based on representative data of the last 15 years in *Garching* more than 95% of fellows are active in astronomical research (universities and observatories). ESO often recruits its staff-members from former fellows.

Obviously working in a facility operating observatories, constructing instruments, and developing new technologies promotes the professional career of young researchers.

On the whole the different fellowship programmes appear to work successfully. Anyway, the attraction of the programmes for future scientists is extremely high.

APPENDIX I

LIST OF MEMBERS IN THE “EEFP EXPERT TEAM”

Dr. Sofia Ben Tahar

Groupe Limagrain, Biotechnology Development, Chappas, France

Ms. Carmen de los Rios

European Space Agency / ESTEC, Noordwijk, The Netherlands

Prof. Knut Faegri

University of Oslo, Department of Chemistry, Norway

Prof. John B.C. Findlay

University of Leeds, Faculty of Biological Sciences, United Kingdom

Prof. Frank Hegarty

University College Dublin, Vice-President for Research, Ireland

Dr. Danuta Krotoski

Office of Prevention Research & International Programs, NICHD, Bethesda, MD, USA

Dr. Francesca Licastro Scardino

Ministry of Education, University and Research, Rome, Italy

Mr. Piero Messina

European Space Agency, Education Office, Paris, France

Prof. George Miley

Sterrewacht Leiden, The Netherlands

Prof. Franco Pacini

Osservatorio Astrofisico di Arcetri, Florence, Italy

Dr. Monica Pepe-Altarelli

CERN, Fellowship Office, Geneva, Switzerland

Ms. Sarah Sherwood

European Molecular Biology Laboratory, Heidelberg, Germany

APPENDIX II

DESCRIPTION OF POST-DOCTORAL FELLOWSHIP PROGRAMMES UNDER CONSIDERATION

EMBO Fellowship Programme

EMBO FP

EMBO (European Molecular Biology Organization) is an intergovernmental organisation. EMBO has 24 Member States: Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom.

Promotion of Molecular Biology.

EMBO aims at promoting molecular biology studies in Europe. Primary instruments are the Fellowship Programmes: Short Term and Long Term post-doctoral Fellowship Programme. We are interested in the Long Term Fellowship only. EMBO started the fellowship programme in 1966.

The organization is bicameral: its actions are funded by contributions from 24 Member States, which together form the European Molecular Biology Conference (EMBC). The EMBO itself is composed of almost 1000 renowned scientists.

EMBO Fellowships are characterized by a requirement to move to a different country for the period of the fellowship: Trans-national approach.

The average no. of long term fellowships is about 160 p.a.

The scheme is worldwide open. 25% of all long term fellowships include movements to the US, Canada, and Australia.

The budget for EMBO Long Term Fellowships is about 8 millions of € at present.

ESO Fellowship Programme

ESO FP

ESO (European Southern Observatory) is an intergovernmental organization. At present ESO has 10 Member States: Belgium, Denmark, France, Germany, Italy, the Netherlands, Portugal, Sweden, Switzerland, United Kingdom.

Promotion of theoretical and observational Physics.

The ESO Fellowship Programme offers a unique opportunity for young scientists to pursue their research programmes while learning and participating in the process of observational astronomy with state-of-the-art facilities.

ESO facilities include the Very Large Telescope (VLT) Observatory on Cerro Paranal, the la Silla Observatory and the astronomical centres in Garching (Germany) and Santiago (Chile).

ESO is an intergovernmental organisation. The fellowship programme is managed by ESO, and funded by the 10 ESO Member States.

ESO Fellowship Programme started in 1975.

There are two places of research: Garching outside Munich, Germany, and Chile.

At present the average no. of appointments in Garching is 6, in Chile 8.

Though the scheme is worldwide open, preferences are given to candidates of ESO Member States, presupposing that the quality of candidates is equal.

Heisenberg Programme **HP**

Promotion of Natural Sciences (Physics included), Bio-medical Sciences, Humanities and Social Sciences, and Engineering Sciences. (Succession in order of quantitative relevance)

HP is a national German scheme aiming at promoting young, highly qualified scientists with a view to encouraging them to continue to conduct academic research.

The programme is financed and managed by the Deutsche Forschungsgemeinschaft (DFG).

75 fellows are awarded on average p.a.

The DFG operates different fellowship programmes. Heisenberg Programme is a special case: It aims at young scientists who have already demonstrated excellence and have attained either a professorship or a comparable level of qualification. The fellow is expected to apply for a professorship during the time of the fellowship. From the point of fellows' qualification HP is the most "elitist" programme under consideration.

As a rule the scheme is open to German citizens only, foreigners are expected to stay as professors in Germany. From 214 fellows only 8 are foreigners.

Within the Heisenberg Programme for the promotion of young scientists 102 fellowships (including prolongations) were promoted with a total of 22.2 Mio DM (= 11.350679 millions of €) in 1999, and 112 fellowships (including prolongations) with a total of 23.9 Mio DM (= 12.219875 millions of €) in 2000.

Hubble Fellowship Programme **HFP**

Promotion of Astronomy, Astrophysics and related disciplines.

The American Hubble Fellowship Programme provides an opportunity for highly qualified postdoctoral scientists to conduct independent research that is broadly related to the mission of the Hubble Space Telescope (HST). Hubble fellows take up their appointments at participating institutions throughout the US.

The HFP is managed by the Space Telescope Science Institute (STScI) and financed by NASA. The funding is \$ 2.2 M (about 2.2 millions of €) per year.

The Hubble Fellowship Postdoctoral Programme was initiated in 1990. From 1990 – 2001 HFP awarded 144 fellows, i.e. 12 fellows on average per year.

The scheme is worldwide open, and about 22% of fellows are coming from abroad, mainly Europe.

Jansky Research Associates JRA

Promotion of Radio Astronomy.

The National Radio Astronomy Observatory (NRAO) in the US awards Jansky postdoctoral appointments which provide outstanding opportunities for research in Radio Astronomy.

JRA is funded by NSF and managed by NRAO.

4-5 fellows are awarded per year depending on the number currently in the programme and the fiscal budget.

The scheme is open worldwide, and it started in the sixties.

The JRA Programme provides actual appointments at the observatory. These are not fellowships in the usual sense, the fellows are full-time staff members.

Marie Curie Fellowship Programme MCF

The Marie Curie Programme belongs to the EU. Member States are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Promotion of Chemistry, Earth Sciences, Economics, Engineering, Life Science, Mathematics and Physics.

Marie Curie Fellowships support the training and mobility of researchers throughout Europe.

The name Marie Curie Fellowships exists since the 4th Framework Programme in 1995, although the 3rd Framework Programme in 1992 already included fellowships promoting training and mobility of researchers. MCF is the most complex programme included in the study.

MCF operates six different types of fellowships, three of them are individual fellowships:

- MC postdoctoral fellowships (Cat. 30)
- MC Return Fellowships (Cat. R)
- MC Experiences Researcher Fellowships (Cat. 40)

We are exclusively interested in Cat. 30.

Marie Curie Fellowships are open to candidates from EU Member States, Associated States, and to candidates, who have resided in the EU for at least 5 years immediately prior to the application.

MCF is financed by the 15 EU Member States and 15 Associated States. Switzerland will join the Marie Curie Programme starting with the 6th Framework Programme. The programme is managed by the European Commission.

The indicative budget to be used for the implementation of Marie Curie Fellowships (all types in all programmes) is in 1999 168,1 millions of €, in 2000 141,0 millions of €. The budget for Marie Curie postdoctoral Fellowships (Cat 30) is not separated.

In the years 1994-1997 442 Cat 30-fellows were appointed on average p.a.

MCF practises a strong trans-national approach.

Marie Curie Fellowships have got the best financial equipment on the European level.

NSF Astronomy and Astrophysics Postdoctoral Fellowships AAFP

Promotion of Astronomy and Astrophysics.

The NSF Astronomy and Astrophysics postdoctoral Fellowships provide an opportunity for highly qualified young investigators to carry out an integrated programme of independent research and education. Fellows may engage in research of observational, instrumental, or theoretical nature, in combination with a coherent educational plan for the duration of the fellowship.

Average number of fellows p.a.: 10

Financed and managed by the American National Science Foundation. Funding amount 2001 \$ 600000 (about € 600000).

The programme is limited to citizens or permanent residents of the US.

Typical for the AAFP is the integration of research and education (teaching duties).

APPENDIX III

ACRONYMS

AAPF	Astronomy and Astrophysics Postdoctoral Fellowship
AAS	American Astronomical Society
CERN	European Organization for Nuclear Research
DFG	Deutsche Forschungsgemeinschaft
EC	European Commission
EIROFORUM	European Intergovernmental Scientific Research Organisations
EMBC	European Molecular Biology Conference
EMBL	European Molecular Biology Laboratory
EMBO	European Molecular Biology Organization
EMBO LTFs	EMBO Long Term Fellowships
ERA	European Research Area
ESA	European Space Agency
ESO	European Southern Observatory
EU	European Union
FP	Framework Programme
Fs	Fellowships
HFP	Hubble Fellowship Programme
HP	Heisenberg Programme
HST	Hubble Space Telescope
JRA	Jansky Research Associates
MCF	Marie Curie Fellowships
MCP	Marie Curie Programme
NASA	National Aeronautics and Space Administration
NOAO	National Optical Astronomy Observatory
NRAO	National Radio Astronomy Organization
NSF	National Science Foundation
OECD	Organization for Economic Cooperation and Development
OPTICON	Optical Infrared Coordination Network for Astronomy
STScI	Space Telescope Science Institute
vs.	versus

APPENDIX IV

TABLES

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