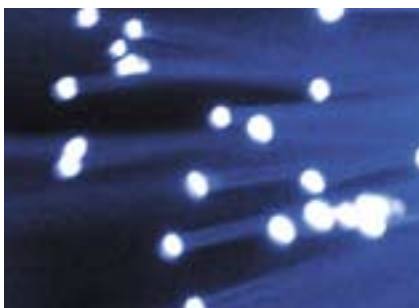


International Committee

**Recommended Steps towards  
the Establishment of the**

# **Institute of Science and Technology – Austria (ISTA)**



**Haim Harari, Olaf Kuebler and Hubert Markl**

Submitted to the Federation of Austrian Industry  
Vienna, June 6, 2006



**Report of an International Committee**

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Towards the Establishment of the**

**“Institute of Science and Technology – Austria”**

**(ISTA)**

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## Foreword

The Federation of Austrian Industry has been one of the participating partners in the plan to establish in Austria an Institute for Basic Research, covering the various fields of the natural sciences and including a graduate school.

Following the Government decision on the site of the planned Institute, and the resignation of the original planning team of scientists and experts, the Federation of Industry has decided to seek the advice of an international team of scientists, who had considerable experience in managing similar research institutes in other countries.

The starting point for the discussions of the committee was the decisions, already taken by the Government of Austria, to proceed with the establishment of such an Institute, to make a specific financial commitment to it and to locate it in a specific site. The committee was asked to accept these facts as a pre-determined framework.

The letter of appointment to the international committee was issued on March 10, 2006 by Dr. Veit Sorger, President of the Federation of Austrian Industry. The terms of reference of the committee, as defined in that letter, appear in the Appendix to this report. The government and the original planning team were informed of the appointment of the international committee.

The international committee consisted of three members:

Professor **Haim Harari**, former President of the Weizmann Institute, Israel.

Professor **Olaf Kuebler**, former President of ETH Zurich, Switzerland.

Professor **Hubert Markl**, former President of the Max Planck Society, Germany.

The committee was asked to submit its report within 90 days. It has studied the relevant documents, discussed all the relevant issues and met with the parties concerned. Its report is hereby respectfully submitted to the President of the Federation of Austrian Industry.

## Executive Summary

Scientific research has always been a rewarding intellectual activity. But in the last few decades, scientific knowledge has also become a leading economic asset. Today, sustainable human development depends on a successful research program, starting with a top quality effort in basic science. Current developments in European science policy, proposed increases in Austrian research spending and other global trends, including the eastward expansion of the European Union, create a golden opportunity for the establishment of a new leading Austrian institute of basic research, engaged in a variety of scientific fields.

The path from curiosity driven research to practical inventions, which change the world, is often unpredictable. But all such results emerge from the work of outstanding individuals, who lead research teams and are allowed and encouraged to pursue their own self-defined scientific goals. The new Institute (temporarily known as ISTA) should choose its scientific fields on the basis of the availability of outstanding scientists, entering only fields in which it can be second to none in the world, avoiding duplication of other Austrian centers of excellence and fully exploiting the potential of multi-disciplinary scientific interactions.

While the ISTA research program should be entirely driven by individual excellence and scientific curiosity, every effort should be made to vigorously pursue any resulting commercial and industrial applications, eventually leading to successful products and new industries. A detailed technology transfer policy should be defined at an early stage of the creation of ISTA.

ISTA should be governed by an entirely independent Board of Trustees, including a mix of experienced international scientists and leading non-political figures from various economic and social fields. The initial Board, to be appointed soon, will play an important role in creating the Institute. It should largely operate through its executive and scientific subcommittees. The Board should search for the first President of ISTA, possibly with the help of a special search committee. The first general manager should be selected by the first President. Until such time, ISTA should employ a mid-level administrator, preparing Board and committee meetings, acting as liaison with funding organizations and dealing with all other interim details. A special related foundation, also needed for other purposes, should act as a temporary employer of the administrator, the necessary small staff and any other consultants who may be needed in the preliminary stages.

ISTA scientists and their fields of research should always be selected on the basis of their personal scientific quality, with an open mind for any subject. However, in selecting its first group of leading scientists, ISTA should avoid isolated scientific areas, fields requiring huge facilities as well as topics, which duplicate excellent research performed elsewhere in Austria. The first research groups should preferably deal with different disciplines, but with obvious and direct threads of interactions among them, avoiding isolation and lack of critical mass in the early years. Pressure to hire people soon, regardless of quality, should be avoided.

ISTA should start operations before its permanent location is built and equipped. This can only happen in the vicinity of an existing scientific infrastructure and in collaboration with other research organizations. The planning of the permanent site must be fully monitored by the Board of Trustees and, later, by the first President, with the help of the first group of scientists. In this regard, a strong collaboration between Lower Austria and Vienna may yield great benefits to both.

The staff of ISTA should have a strong international flavor. The language of instruction and of all lectures should be English. Amenities for the staff must allow foreign scientists and students to be absorbed and integrated in the social infrastructure of ISTA. An adequate career planning must be offered at all levels, from the most senior permanent professors, through fixed term independent scientific group leaders, all the way to the junior technical and administrative employees. By establishing a consistent human resource policy, based on excellence, quality and performance, ISTA should aspire to provide a model for other academic institutions.

A strong collaboration with other Austrian Universities and research Institutes, as well as with international groups, must be fostered from the first day of ISTA, including programs of visiting professors, exchange students, joint appointments, joint research project and joint Ph.D. programs. As a new organization, ISTA might be able to adapt better to a reformed system of graduate studies, providing an extra benefit to a collaborating university.

The ISTA Board of Trustees should work towards establishing a "corporate identity", selecting a proper permanent name for ISTA, organizing public and scientific events, lectures, courses and seminars, developing community relations and, possibly, starting such operations in the permanent location, even before any research group is able to move into it. Such an international and national public image and awareness are crucial, if ISTA is to be attractive as a potential employer and an attractive graduate school.

The financial support of ISTA, initially provided by the federal and regional governments and by the Austrian industry, should eventually include additional diversified sources such as competitive national and international research grants, philanthropic gifts, income from intellectual property and, hopefully, the creation of an endowment. All of these may take years to accomplish, but the relevant effort must start from the very early days of ISTA's existence. Flexibility in the cash flow of the already guaranteed funding is extremely important, in view of the somewhat sporadic way in which true international "stars" may be recruited.

## **1. Introduction**

Scientific research has always been a rewarding intellectual activity, driven by curiosity, advancing human knowledge, deciphering the secrets of nature and yielding a deeper understanding of human conditions. At the same time, the practical fruits of such research have often led to new technological developments and to significant improvements in our standard of living. They have provided us with better health and food and with new energy sources, while, at the same time, touching upon numerous other features of our daily existence and our natural environment. On other occasions, certain research applications have yielded both beneficial and potentially harmful consequences, leading to new ethical and moral questions and to diverse new trends, which modify our way of life. All in all, scientific discoveries, in the hands of an enlightened society, are a crucial key to progress.

All of the above has always been true. But, in the last few decades, for the first time in history, knowledge, particularly scientific and technological knowledge, has also emerged as the leading economic asset of countries, societies and communities. Today, the successful pursuit of scientific knowledge is not only an exciting intellectual endeavor. It is also an absolute necessity for any country wishing to achieve economic success and a sustainable advanced way of life. Any comparison between the economies of knowledge-rich countries and those of countries, possessing only abundant natural resources, reveals enormous disparities of wealth and of human development. These gaps are entirely due to the added value of science, technology, education and research.

Austria has a long and rich tradition of outstanding scientists and it continues to produce bright young researchers in many fields. However, in the fierce global race for scientific and technological innovation, it is necessary to advance fast just in order to stay in the same position. Major changes are necessary, if a society or a country wishes to move upward in the international scientific ladder. Austria can make such a move, at the present time, based on its economic resources and human talents, and on political insight into the needs and challenges of a first-rate, innovative social and economical climate.

New scientific areas are constantly being born. New bridges among previously unrelated disciplines are emerging. Science and technology are often becoming one and the same activity. More and more research areas require larger scientific teams, expensive equipment and entirely new types of infrastructure. Progress depends both on a strong international collaboration and on the quality of a national research base and an advanced system of education. A modern program of training doctoral students and postdoctoral fellows is essential. Open ended financial support for the research of true young international "stars" may lead not only to new discoveries but also to a long range cascade effect on the scientific landscape of a country. At the same time, one consequence of globalization is the ease by which a country can lose its most talented young people, if it does not provide them with the right environment for their scientific development.

These observations, among others, have led to the idea of establishing, in Austria, a new institute of scientific research, dedicated to the development of new research areas and to the absorption of outstanding talented young scientists from Austria and from abroad. Such an Institute must collaborate with existing Austrian universities and research institutes, compete and collaborate internationally and try to improve graduate education. At the present time, several factors "conspire" to create a golden opportunity for such an

enterprise: An all-European effort to improve the infrastructure of basic research; an Austrian determination to increase spending on scientific research, supported by all political forces in the country; an effort to reform European universities and graduate schools; the eastward expansion of the European Union; and the global trend of international cooperative efforts in the fields of science and technology.

Our committee therefore applauds the initiative of Professor Anton Zeilinger, the "prophet" who relentlessly advocated this project, his colleagues who supported the idea and helped plan it in the initial stages, the Austrian Federal and Local Governments, which have allocated substantial resources and financial commitments to the project and the Austrian Federation of Industry, which contributed its leadership, energy and financial support and has invited us to review the next necessary steps towards establishing the new Institute.

In this report we outline the next steps, which are now called for, in order to proceed with the establishment of the new entity, currently known as the "**Institute of Science and Technology – Austria**", hereafter abbreviated, in this report, as "**ISTA**". Given the restricted time frame for preparing our report, and considering the fact that the members of the international committee are not part of the Austrian scientific landscape, we fully realize that not all relevant issues could have been considered with enough depth and understanding of detail. We therefore suggest that our recommendations be viewed as an initial platform for the autonomous development and establishment of ISTA, and not as the final word on any issue.

## **2. ISTA - An Institute of Basic Research**

It is not possible to predict which directions of basic research will lead to which remarkable practical results – whether scientific or economic. The history of human progress has recorded numerous examples of surprising, totally unexpected, benefits emerging from unlikely fundamental research programs and from unforeseen combinations of different fields of study. No one could have guessed that major medical diagnostic devices would have emerged from the development of powerful magnets and intense laser beams. No one could have predicted that modern banking security and internet commerce would be entirely based on discoveries from the theory of numbers, an area considered, until recently, as a purely academic exercise in the ivory towers of science, or, to put it more bluntly, a "totally useless" field of research. The development of new materials and new drugs is often based on techniques and principles borrowed from distant fields of research. The study of the human brain and the development of certain areas in computer science continuously share surprising new contact points, with each other. The development of the World Wide Web grew from the needs of international research collaborations in the esoteric field of Particle Physics, changing the world of science, broadcasting, journalism, politics, education and commerce. Genetics and Informatics, two formerly unrelated fields, have become partners in new scientific adventures. But all of these observations are made in hindsight and no one can predict which similar examples will be used by someone writing such a report two decades from now.

We do know, however, that all of these apparent cases of serendipity and all of these seemingly bizarre connections have grown, and will always grow, from first class research performed by outstanding innovative scientists. In all cases, these scientists were not only allowed, but rather encouraged to pursue their own goals and their own ideas, not directed by any government, economic interests, bureaucrats, media, donors or political demands.



They were not urged to obtain immediate practical results, to create new jobs or to rapidly earn royalty payments. It is paradoxical, but true, that only such circumstances lead to truly remarkable discoveries, which, at the end of the day, do create jobs, earn royalties, advance economies and create intellectual and material wealth by first attracting the best minds to attack hard problems and to find new solutions for them.

The quality of an outstanding scientific research Institute can only be judged by international peers, through constant evaluations and reviews, using the standard objective yardsticks of the international scientific community. This should be continuously applied to ISTA. Such evaluations do consider, among many other parameters, publications, citations, patents and the like, but none of these features should play a dominant role in the quality measurements. It is surprisingly easy for an objective international review team to identify an outstanding research group as such, by simply studying its research results, "track record" and scientific programs. It is equally clear when a visiting scientific team observes that a certain research effort is lacking in originality or in quality.

High quality research will inevitably lead to usable practical results, but we can predict neither the time scale, nor the direction, in which this will happen. In addition to direct consequences such as patents, new technologies and new applications of old processes, one may encounter the creation of entire new "schools of thought", local "dynasties" of excellent scientists in a given field and industrial areas based on newly acquired scientific and technological excellence. Silicon Valley in California was born from basic research at Stanford University, even if most of its economic success has not contributed any direct income to that University.

In view of the above analysis, the permanent guiding principles of ISTA should be:

- (i) The ISTA fields of research should be chosen according to the availability of outstanding individuals or groups of scientists, not according to someone's list of "important fields".
- (ii) In those fields which require specific expensive experimental facilities and infrastructure, ISTA should either provide its scientists with instrumentation which is second to none in the world, or should not enter into any research.
- (iii) ISTA should avoid entering into specific well-defined research areas in which Austria already has truly outstanding efforts, in other universities or research institutes. On the other hand, ISTA could and should select topics in which a new first class team could complement existing groups in nearby places, by adding a new dimension and by collaborating with the already existing program.
- (iv) ISTA should try to enter into research activities in different fields of science, while maintaining a critical mass in certain areas. This dual purpose can be achieved by introducing complementary research topics from different disciplines, with novel direct interconnections among them.
- (v) ISTA should foster both theoretical and experimental research, with an emphasis on a meaningful close collaboration between the two "camps" in a given research area.
- (vi) ISTA should avoid the temptation of thinly spreading its limited resources over too many topics, even if they appear to be attractive. It should also not aspire for covering the entire spectrum of scientific fields. Such an approach would diminish the chances of success in the strongest research areas and may eventually lead to an overall mediocrity.

### **3. Pursuit of Practical Application of Research**

While the scientists at ISTA must pursue curiosity driven research, there will be occasions in which patentable practical results will emerge as by-products of the research program. In all such cases, it is extremely important to pursue vigorously any opportunities of exploiting the discoveries for the benefit of human society. This should be done, without in any way reducing the commitment of ISTA to basic research. There is no contradiction whatsoever between the pursuit of basic science and the desire to benefit from its results. There is nothing wrong with ISTA benefiting financially from the fruits of its research, thus earning additional resources that can be re-invested in additional basic research endeavors.

The exploitation and commercialization process is long and tedious. Many years, perhaps decades, may elapse before significant results are achieved. However, ISTA should develop, from the very beginning, a clear and consistent policy concerning intellectual property rights, their ownership and their exploitation. ISTA should define a strategy, which will insure both commercial success and a lack of interference between any industrial ventures and the main basic research mission of ISTA. Such a strategy should address, among other issues:

- (i) Ownership of patents and other types of intellectual property.
- (ii) Division of potential income between the individual inventing scientists and ISTA as an institution.
- (iii) Rules concerning existing intellectual property of new scientists joining ISTA
- (iv) Rules concerning intellectual property emanating from work performed at ISTA by scientists leaving ISTA.
- (v) Rules concerning ISTA scientists consulting to industry.
- (vi) Licensing policy of ISTA to commercial interests.
- (vii) Practices related to the establishment of start-up companies based on ISTA-owned technology
- (viii) Possible eventual establishment of a nearby industrial park, associated with ISTA in numerous ways, including exploitation of its discoveries, employing its graduates, using its infrastructure, consulting with its scientists and any other interaction mode.

Once a research project has led to usable applications, it is entirely reasonable for ISTA to continue to pursue additional features of the same topic, with certain direct industry funding. However, it is important to monitor such developments and to avoid reaching a situation in which they would become a dominant funding source of ISTA, inevitably leading, within a short period to a deterioration of its scientific level. The actual development work (as opposed to the original basic research) should always be done by the relevant industry or by industry-related institutes of applied research, not by ISTA, while a close cooperation between the relevant ISTA scientist and the industry should be allowed and, indeed, encouraged.

A daring long-range vision, hopefully to become a reality a few decades from now, would envisage ISTA as a flourishing basic research organization, contributing to the expansion of scientific knowledge in its fields of research, accompanied by an industrial park including a significant number of small and medium enterprises, leading to industrial products in Austria and in other countries and training a new generation of scientists for industry and for universities.

#### **4. The Law and the Board of Trustees**

At the time of the appointment of our committee, a draft of the Law concerning ISTA had already been submitted to the Austrian National Council ("Nationalrat"). We were asked to comment on the draft Law within an extremely short time, which did not allow us the opportunity of serious deliberations. Nevertheless, after a brief consultation with the other members, and with their consent, the Chair of our committee submitted to the Minister of Education, Mrs. Gehrler, a list of suggested modifications for the text of the proposed Law. We note with satisfaction that most of these suggestions have been accepted. They were included in the version, which has now been approved by both the National Council and the Federal Council ("Bundesrat").

At this time, we therefore refrain from proposing further modifications in the language of the Law. We propose that the issue will be revisited after a few years of existence of ISTA, when the experience gained might dictate a few additional changes and, in particular, possible simplification and elimination of unnecessary detail in the Law.

During the process of establishing ISTA, the most crucial role will be played by the first Board of Trustees. According to the Law, this Board will include at least fourteen members, of which at least one half will be prominent scientists; four additional members will be appointed by the Federal Government and three by the Government of Lower Austria.

We recommend that almost all of the seven scientists will be from research organizations outside of Austria, with a good international balance between Europeans and others and between scientists from German speaking countries and others. One should also insist on a gender balance, a balance among various scientific disciplines and a substantial component, not only of scientific excellence, but also of experience in managing research institutions.

A reasonable mix would be to have up to three scientists from various areas of the Life Sciences, three from the Physical and Chemical Sciences and one from Mathematics and Computer Science, with perhaps three members working in Germany or Switzerland, three in other countries and one in Austria. One would hope that all of these scientists will be of high international caliber and most of them will have substantial management experience. It is important to add that the recommended international emphasis does not, in any way, imply that Austria cannot provide excellent members for this Board. The reason for suggesting a Board of a strongly international flavor is to avoid any substantial conflicts of interests between the ISTA Board members and the leading Austrian research entities with which ISTA will have to collaborate. It will also allow ISTA to benefit from international experience in establishing similar research institutes.

According to the Law, the recommendations for the seven scientists should be submitted to the Minister of Education by the three chairs of distinguished Austrian research boards. The supporting explanations of the Law call for consultation on this matter with our committee. We have provided the Chair of the Austrian Science Fund (FWF) with our recommendations and we hope that the final selection of the scientific members of the first Board of Trustees will take our comments into account.

We recommend that the seven other Board members, appointed by the federal government and by the regional government will not include any active political figures and will consist mostly or entirely of leading public figures from the world of business, industry, research,

culture, media and the like. It would be good if, among these members, there will be room for additional scientists and also for a business leader from another country. In selecting these public figures, priority should be given to past experience with topics of higher education and research and development.

The composition of the ISTA Board should reflect the accumulated experience of scientific and economic leaders, without introducing an institutional dependence on the federal or local government, on other academic organizations or on economic interests. It is particularly important that the existence and financial support of ISTA will not depend on political circumstances. An outstanding young Austrian scientist, currently working abroad, will not move his family to an institution, the future of which depends on election results or on favors from one political party or another.

All of the above recommendations are aimed at creating an initial Board of Trustees with an international point of view, high scientific standards, lack of harmful urgency, and an ability to take a long range view and a daring vision for the new organization.

It is this initial Board that will oversee the process of establishing a campus, selecting the first president, building an administration and creating the tradition and the blueprint according to which ISTA will operate for many decades. Its composition and dedication is therefore absolutely vital for the future success (or failure) of ISTA.

## **5. Committees of the Board of Trustees**

In trying to assess the role of the Board of Trustees, it is useful to start by looking at a hypothetical situation, say, five or ten years from now, when ISTA is hopefully already well established and flourishing. At that time the organization will presumably have a small campus, an appointed president serving as its chief executive, an established administration, a number of successful scientific groups and departments, small units dealing with finance, human resources, public relations, maintenance and a variety of scientific services, a policy and practice regarding intellectual property, a predictable funding pattern and other attributes of a stable research institution. New scientific appointments will be primarily decided by the already established group of professors at ISTA, after consultation with peers abroad. At such a time, the role of the Board of Trustees will be to receive reports, to support the president and the administration, to make major decisions on new directions, to approve the budget and to intervene in the management only in a case of a personal or a budgetary crisis. This can be done well by an international Board of Trustees with fourteen or more members, meeting two or three times per year.

However, during the initial period, the situation will be entirely different. The first Board of Trustees will have to select the first president, directly or with the help of a search committee; to deal, through its scientific board, with the choice of initial scientific fields and initial academic appointments; to plan and accompany the construction of the first facilities; to decide on a possible temporary location until more permanent facilities are ready and the infrastructure is in place, and to accompany numerous other issues which may emerge.

All of these issues cannot be addressed very frequently by a fourteen-member Board, and its members from across the ocean cannot be expected to arrive often for meetings. It will therefore make sense for the initial Board of Trustees to operate, in the beginning, mostly through two subcommittees, both provided by the Law: the executive board and the scientific board. The scientific board will have to make recommendations to the Board of Trustees concerning the selection of the original scientific researchers and scientific fields of ISTA. The executive board will have to deal, until the selection of the first president, with all other issues, including matters of administration, location, funding and any other matters arising, within the boundaries set by the law.

The Board of Trustees will eventually need additional committees or "arms", in particular those dealing with intellectual property rules and with private sources of funding. We recommend that the first task of the Board of Trustees should be to elect its Chair, its Vice-Chair (one of whom must be a scientist, according to the Law), the executive board and its chair and the scientific board and its chair. It will also be necessary for the Board of Trustees to hire an initial small number of administrative employees, needed in order to serve the Board itself, its work, its committees and its liaison with the federal and regional governments and with any other financial sponsors.

## **6. The Leading Employees of ISTA**

The head of ISTA will be the President, selected by the Board of Trustees, possibly with the help of a search committee appointed by the Board. The preferred qualifications of the president are clear: A first class scientist, with a worldwide reputation, leadership and vision and with experience in managing a scientific organization, beyond the size of a small department or a research group.

The initial Board of Trustees will have to determine:

- (i) Whether to embark immediately upon a search for the first President, knowing that, at best, such a search will require several months and, even if a choice is made after such a short period and the candidate accepts the position, he or she will require additional time in order to move his or her scientific activity to ISTA. This means that the period during which ISTA will have to develop without a President, may last at least a year, possibly more.
- (ii) Whether to search for a relatively young, active scientist in the prime of his or her career or for an older experienced person who might serve as president for the first few years, paving the way for a younger successor. In the first case, if successful, the founding President will be able to stay at the helm for a long period, but he or she may have to make major career sacrifices, reducing the probability that a high level candidate will accept the position. In the second case, the founding president may not be able, even if successful, to complete the building period of ISTA during his or her term of office.
- (iii) Whether it is imperative that the first managing director, reporting to the president, will have to be chosen by the first president, ensuring harmony but causing, again, a substantial delay in the appointment.

We believe that the search for the first president should commence as early as possible and that all options be kept open regarding the age and the career stage of the president. However, the actual selection date and the commencement of employment of the president should not be subjected to any deadlines. It is preferable to enlist an excellent candidate, who can start later, than a less desirable candidate, who is available soon.

It is also important that the managing director should be appointed only after the president has been selected, with the full participation and consent of the president. But the final decisions on all of these matters should be reserved to the Board of Trustees.

Until the date by which the first president of ISTA will assume office, it is imperative that the Chairman of the Board of Trustees, as well as any other leading figure involved with the establishment of ISTA, will enjoy easy and direct access to the political and administrative leaders of the federal government, the regional government (or governments) and all other funding organizations. At later stages, it is essential that the appointed president will have this privilege.

The successful establishment of such an Institution often requires fast decisions, which are not within the mainstream of normal government operations. The active support of politicians, officials, business and community leaders and major academic figures, is a necessary asset. The Board of Trustees and the leading employees of ISTA should not spare any effort to enlist such support.

In order to enable ISTA and its Board of Trustees to operate from the first moment, it will be crucial for the Board to engage immediately a mid level administrator with considerable experience in science management. The duties of that person, who will not be an automatic candidate to fill the position of managing director, will be:

- (i) To prepare all meetings of the Board of Trustees, the Executive Board, the Scientific Board, a possible search committee for President and any other body appointed by the Board.
- (ii) To deal with the incorporation of ISTA and with the process of creating an initial basic "corporate identity" in matters of publicity, press relations and relations with the general public.
- (iii) To serve as liaison between ISTA and the federal government, the province government, the Federation of Industry and any other future funding entities.
- (iv) To deal with any administrative matters arising until the first president and first managing director are appointed
- (v) To lead a small staff of employees in the interim period.

We recommend that such a person will be given an appropriate title, which describes his or her role as the administrative head of the team which establishes ISTA, but not the title of a managing director. This person, if successful, could be one of several candidates for the position of managing director, when the first president is appointed and is ready to choose a leadership team.

## **7. Choice of Research Areas and Selection of First Scientists**

The long range policy of ISTA should be to recruit only outstanding scientists, who play leading roles in their fields, on the international scene. ISTA should also consider arguments, such as keeping a balance among scientific disciplines and considering the strength of other institutions in Austria in a chosen area.

However, in the first few years, other factors must be taken into account. It is extremely important for ISTA to create an interactive and collaborative atmosphere, among its original group of leading scientists. For that reason, ISTA should not start by recruiting scientists in relatively isolated scientific fields, which have little or no interaction with other research areas. Such fields may be truly important and worth developing at a later stage, but they should be avoided in the first few years.

ISTA should also avoid duplicating Austrian research groups which are truly outstanding on any international scale. It makes no sense for ISTA to enter the exact same niches in which Austrian science is already at the top of the world scene.

Some research fields, such as astronomy or experimental particle physics require gigantic facilities. In such fields, most of the actual research must be performed in international laboratories away from the home institution. While such fields of research may be extremely exciting and challenging, ISTA should avoid them in its first few years.

One of the foreseen advantages of ISTA should be the ability to create exciting collaborations among scientists from different disciplines, a trend which is becoming more and more valuable in many modern fields of research. We therefore recommend that the first recruited scientists of ISTA should come from different disciplines (i.e. Life Sciences, Chemistry, Physics, Informatics, Mathematics) but their specific detailed research expertise should allow them to create among them such cross-disciplinary collaborations.

One example of such a field, which is quoted here just for illustration, without prejudging the appropriateness of selecting it, could be the acquisition of research teams in some of the following fields: Brain imaging, neural networks, nerve regeneration, computer studies of vision, memory, robotics. This example shows how a coherent effort in Neuroscience and Computer Science can emerge from a group of mathematicians, physicists, chemists and biologists. Other examples can touch upon fields such as structural biology, systems biology, bioinformatics, new "intelligent" materials, "soft condensed matter" or certain basic research topics related to issues of environmental science.

ISTA may wish to start by creating two such "clusters", each including three research groups of different disciplines, interacting with each other. Another option is to recruit one or two leading scientists, who might complement some outstanding activity already existing elsewhere in the greater Vienna area. An example could be an activity in physics or informatics, which could add to molecular biology research in the Vienna Bio-Center.

All of the above suggestions should not be viewed as iron clad recommendations. Rather, we view them as guidelines for the way of thinking of the first Scientific Board, to be appointed by the Board of Trustees. Clearly, the scientist-centered (rather than topic-oriented) recruitment strategy requires rapid adaptations to the available "supply" of outstanding candidates.

We recommend that ISTA aim at starting with half a dozen research groups, of different disciplines, with a mix of closely interacting theoretical and experimental research areas. The investment in each group in equipment and laboratory space must depend on the needs of the specific field. It cannot be egalitarian. The important goal is to create for each such group a laboratory environment, which is second to none in the world, in terms of equipment and technical expertise. Unfortunately, at the beginning, just because of reasons of size, it will not be possible to create in ISTA the kind of intense intellectual stimulation, available at some of the largest leading research institutes in the world. This can be substantially compensated by a strong emphasis on close collaborations with other leading groups, outside of ISTA, in Vienna, elsewhere in Austria or abroad.

A major effort to foster such collaborations should be undertaken from the first day of the existence of ISTA. ISTA should initiate a significant program of seminars, symposia, lecture series of distinguished guests, graduate workshops, special summer and winter schools, joint research projects and any other form of international collaboration. This would prevent isolation during the first few years, in which the critical mass of ISTA is still being established and will position ISTA on the national and international landscape of science.

The process of selecting the first scientists may be accompanied and enhanced by organizing international symposia, featuring some of the potential candidates, in their fields of research. Such symposia will help introduce these scientists to the scientific Board of ISTA. They will also expose the ISTA plans, proposed facilities, infrastructure and cultural environment to the candidate scientists and help locate ISTA on the international scientific scene, even before the first research group is recruited. Such a procedure proved to be helpful at the Max Planck Society, when new Institutes were being established.

## **8. Location, Construction, Master Plan and Infrastructure**

It is not too difficult to imagine how the ISTA site will appear to an observer, in the years 2015-2020. Assuming that ISTA is successful, it would possess a well developed beautiful campus, with excellent facilities, first class equipment, solid infrastructure, amenities for the staff and an atmosphere of intense scientific effort. It should be comfortable but not luxurious. A competitive research institute cannot flourish in a resort-like atmosphere.

For these to happen, two kinds of pre-conditions are necessary (in addition to financial resources and the recruitment of excellent scientists):

The first condition is a careful design of the permanent location of ISTA. The terms of reference of our committee, as defined by the Austrian Federation of Industry, demanded that we, as a group of foreign scientists, do not refer to the question of the selection of the specific site for the ISTA campus. This has been, and it remains, a matter to be decided within the Austrian system.

However, we were asked to comment on the necessary requirements from the permanent location. We believe that the permanent campus for ISTA must be planned with great care, subject to the choices made with respect to the specific scientific areas and with a strong influence of the respective group leaders who will later be in charge of research and training



there. No scientific buildings and no infrastructure should be, or can be, built until the initial scientific program has become clear. Certain areas of research require very specific facilities such as clean rooms, floating floors, animal facilities, handling of toxic materials and a variety of other issues. Other areas of research require different mixes of laboratory space and offices. Theoretical fields require no laboratories but the relevant scientists must be in proximity to the experimentalists pursuing related topics. All of these matters must be weighed prior to any construction.

The erection of a substantial administration building, before any scientific research is performed on the ISTA campus, will send the wrong message. A research institute like ISTA must be lean and efficient in its bureaucracy. No construction or renovation of the permanent facility should begin prior to a thorough discussion and decisions of the first ISTA Board of Trustees. It is important to understand that, in a research institute like ISTA, every single scientific decision has administrative ramifications and any administrative or financial decision, even if it relates to the location of a coffee lounge or a parking lot, always has a scientific angle. It is not possible to consider construction, building design and similar issues without the participation of the actual scientists who will need to occupy them.

The second important pre-condition has to do with the initial period of building ISTA. All of the above remarks relate to the permanent location of ISTA. But ISTA must start operations somewhere. The original group of leading scientists will require an elaborate infrastructure, or else they will not join ISTA. Such infrastructure must include the standard features of a substantial research institute, including a library, computer facilities and network, experimental animals facility (if relevant research in the life sciences requires it), heavy instrumentation such as magnetic resonance devices, elaborate electron microscopy facilities, and numerous other possible needs, which are routinely available in major existing research organizations. It makes no sense to establish all of the above before the first scientist arrives and the first scientist will not arrive without such facilities.

This is a classical "chicken and egg" situation, which can be solved only by starting the operation of ISTA in a temporary location near an existing major research facility. The Board of ISTA should look for such a temporary location and negotiate with the appropriate authorities an arrangement by which, while the planning and construction of the permanent ISTA location proceed, the first group of scientists will be able to start operations with all relevant and needed infrastructure being available. Such an interim stage may last approximately two years, while the permanent ISTA campus is being planned and built, step by step, with an input from the original group of scientists and under the supervision of the first Board of Trustees.

The necessity of a temporary location also dictates that specific fields of research, which requires a multi-million Euro capital investment in laboratories and immovable facilities, should not be included in the initial program. Such fields can be considered only after the move to the permanent quarters of ISTA is completed.

ISTA will also act as a graduate school of science, training Ph.D. students. An advanced Ph.D. program requires a critical mass of lecturers and students. This will not exist, in the first stages of the development of ISTA. The only way to gradually develop such a program is in collaboration with the University of Vienna and/or with the Technical University of Vienna. Such a collaboration should continue even after a critical mass is achieved,

allowing students of the different institutions to benefit from each other's programs. The establishment of a brand new graduate school program may even allow the existing universities to experiment with certain steps, which they would wish to pursue, and which, for historical or political reasons, may be more difficult for a university with an established tradition and rules.

Since all candidate temporary sites in the vicinity of the permanent location of ISTA are to be found only in Vienna, we might stress here that it would be extremely important and beneficial for ISTA if the city and the government of Vienna will join the sponsoring organizations of ISTA, both in the temporary stage and in the final location. The success of ISTA will inevitably enhance the prestige and the cultural and economic development of both Lower Austria and Vienna. It will be regrettable if the two provinces will not be able to collaborate in every possible way in developing ISTA.

In section 14 of this report, we comment on the possibility of establishing a program of international seminars and meetings organized by ISTA. Such a program, if approved by the Board of Trustees, could start almost immediately. It will require certain conference facilities, an auditorium and a guest house. Such facilities will be required for ISTA in the future, regardless of whether such a seminar program is initiated. This type of facility is the only one, which might be worth considering for immediate construction in the permanent site of ISTA or close to it.

## **9. Amenities for the ISTA Staff**

The ability of a high-level research institute to recruit international "stars" and to guarantee their "happiness" and continuing scientific productivity depends primarily on the atmosphere, on the infrastructure and on various other amenities available to the scientists. While a competitive salary scale is important, it is surprising how crucial is the importance of all of these seemingly "minor" issues.

Most of the newly recruited scientists for ISTA will be relatively young and the well-being of their families should be a major concern. The international character of ISTA requires that any advantages, that ISTA can offer to its staff, will be equally available to non-Austrian students and scientists, both junior and senior.

The permanent ISTA site should allow its scientists to live in affordable and acceptable housing in the vicinity of the campus. It is preferable not to develop a special housing project within the ISTA campus. Experience in various countries shows that such housing projects often develop into a major administrative burden and they become an eternal source of friction within a scientific institution. However, if the vicinity of the ISTA campus does not allow for appropriate housing, either because of low quality or because of high prices, ISTA should consider the possibility of creating its own housing facility. This should be considered only after studying models for such programs in other countries and adapting them to the Austrian legal system and mentality.

The ISTA campus must eventually include a convenient guest house for the numerous short term visiting scientists, who will, hopefully, always populate the campus.

Educational opportunities for the families of ISTA employees, including international schools, must be available. ISTA may wish to include in its employment conditions some assistance in securing such opportunities, especially for visiting foreign scientists and students. Child care facilities, with the aim of helping female scientists, students and other employees will be absolutely needed. It would be good to develop, with time, some recreational sport facilities.

The ISTA campus must have a fast and convenient means of transportation to Vienna and to its international airport. The instant contact with Vienna is important both for scientific collaboration with the leading Viennese research locations and for enjoying everything in culture and recreation that Vienna has to offer, both for visitors to ISTA and for its permanent staff. The ability of Viennese students to attend ISTA courses and for ISTA students to attend courses in Vienna depends in a crucial way on the commute time between ISTA and the relevant locations in Vienna. Every effort should be made to develop reliable and fast transportation along these lines.

The commute time to the airport is crucial. It is extremely important for scientists from almost anywhere in Europe to be able to fly to ISTA and return home, if necessary, on the same day. Every additional 30 minutes in driving time between ISTA and the airport, add one hour to the total needed time for such a round trip and reduce the probability that someone will embark upon it. This is especially true for members of the Board and its committees who may have to come to ISTA more regularly.

Assuming that the ISTA campus will become a focal point of science related seminars, lectures and conferences, it might be beneficial to also include a general culture program, especially regarding issues in the interface between science and technology, on one hand, and social, moral and political problems, on the other. For these and similar purposes, ISTA needs excellent conference facilities on its premises, from the very beginning, including dedicated staff to take good care of speakers, guests and audiences, respectively.

Every effort must be made to convert ISTA into a place where employees love to work. This sounds like the kind of slogan used by any modern employer. However, a research institute catering to the brightest scientists is truly dependent, in a very significant way, on this kind of atmosphere and attitude. Thus, everything should be done from its initiation to “embed” ISTA well within the local, regional, national and international (especially European) civil and political communities, in the context of publicity and media presence. One of the major tasks of the first President and the administration will be to attend to these issues from the very early stages.

## **10. Scientific and Technical Appointments**

ISTA will need a continuous spectrum of different kind of employees, senior and junior research scientists, postdoctoral fellows, doctoral students, engineers, technicians, laboratory assistants and a wide variety of support and service employees.

The scientific leadership of ISTA will consists of Full Professors, leading their research groups and often functioning in various decision-making capacities. Every such person must have a long term contract, effectively forming a "tenured position", which is guaranteed, as long as ISTA is in existence, hopefully until the scientist retires. However, the Board of Trustees of ISTA will have to find legal ways of guaranteeing the future of these people, even in the unlikely case that ISTA will cease to exist. This is essential, if ISTA wishes to recruit such people away from their stable, permanent positions in leading research organizations elsewhere.

ISTA should also create temporary senior positions of independent researchers, leading their own research groups, with a five- or six-year appointment, possibly leading to a Professorship, either at ISTA or elsewhere. A clear policy must be established concerning the procedure by which such a person can become a Full Professor at ISTA. In some distinguished international academic organizations, such a career path is frowned upon, while in others it is a natural process. However, the opportunities for academic mobility within a small country are limited. We therefore believe that ISTA should not exclude such a possibility.

Every research team at ISTA should include postdoctoral fellows and doctoral students. Both groups of young scientists must receive competitive fellowships and will constitute the backbone of the research staff of the organization. It is important that ISTA take steps to ensure that the community of these upcoming researchers will be truly international, by actively recruiting them at least from all over Europe and preferably also from other continents.

A key element in a successful research group is often a relatively experienced person or persons, sometimes a senior scientist, on other occasions an engineer, technician or senior laboratory assistant, who acts as the "second in command" of the research team, supporting the group leader. Such people play somewhat different roles in research groups in different fields of science and their career is often less glamorous, but not less important, than those of the brilliant young postdoctoral fellows or the world renown leading Professor. ISTA must find ways of rewarding such people and providing them with an attractive career development. Their contribution to the success of a research organization is invaluable.

The nonscientific staff of ISTA will have to include routine administrative and support employees in matters such as finance, human resources and maintenance, but also highly specialized people with some understanding of scientific issues, dealing with public relations, contact with the general public and fundraising. This last group of professionals will have to play an important role, if ISTA is to flourish.

A high level performance of all ISTA personnel will be crucial for its successful operation. Hence, an appropriate human resource policy must be installed and followed rigorously. It should nurture and promote excellence and quality of performance, while being consistent and, whenever necessary, even severe, in rewarding or improving actual accomplishments. ISTA should aspire to become a model for human resource development and policy for a multitude of ambitious academic institutions.

## **11. Relations with Other Research Organizations in Austria**

The goal of the ISTA project is to strengthen scientific research in Austria, not to weaken it. This can only be achieved if, in addition to a flourishing research program at ISTA, additional improvements and benefits will emerge for other research organizations and scientific programs.

The Austrian Government is committed to provide ISTA with "new" research funding, not coming at the expense of any other research program. It is imperative that this commitment will not only be honored in the immediate future, but will be reiterated by all government policy-makers over the years. It is equally important that funding for other science programs will increase, at the same time, indicating that the establishment of ISTA is not an excuse to cut research spending on other fronts. All of the above is consistent with the determination of the Austrian Government to increase the share of its national investment in research and development.

The ideal relation between ISTA and the leading Austrian universities and research institutes should be that of close collaboration and friendly competition. ISTA should avoid "raiding" the leading talents of the Austrian universities and should not enter into specific scientific topics in which excellent research teams already exist in Austria. We hasten to add that, when we use here the word "excellent", we refer only to scientific enterprises which are judged to be so by the highest international standards and reviews and not to "self-proclaimed excellence", which is abundant everywhere in the scientific world.

ISTA scientists should be allowed to compete on equal terms, like any other scientists in any Austrian research organization, for funding from all government programs including those of FWF, FFG and other agencies. The same applies to all international funding programs.

ISTA should encourage joint projects between its research groups and those of other universities and institutes, as well as joint seminars and regular discussions. In some cases, it might also be beneficial to establish joint projects with industrial research and development teams, both in Austria and abroad.

ISTA should also encourage teaching by its scientists at the universities and teaching by university scientists at the graduate school of ISTA. It should develop a program of appointing "Adjunct Professors" from the universities at ISTA and allow its own professors to accept positions of "Honorary Professors" at the universities. In certain fields of research it might be advantageous to initiate joint Ph.D. programs with other universities.

The common theme to all of the above options is a consistent effort of complementing, not replacing, the research activities in existing institutions. ISTA should contribute to the success of others by offering close collaborations with its research teams and use of its facilities. Subject to this central theme, any additional reasonable initiative should be welcomed by the management of ISTA, from the very beginning.

## **12. Ph.D. Program and the ISTA Graduate School**

ISTA should develop a graduate study program towards the Ph.D. degree, in all its fields of research. Such a program should be designed along the international model of a combination of courses, seminars and research work, with well defined evaluated milestones along the way and with constraints regarding the length of time of developing a thesis. Such successful Ph.D. programs can be found in other international research institutes which award their own degrees, like Rockefeller University and the Weizmann Institute.

The graduate study programs should be open to qualified applicants from all over the world. They must be carefully chosen according to fair and transparent rules, based only on quality. Students should be accepted for a thesis work only on the basis of their outstanding achievements and only if an ISTA professor is willing to be their supervisor. The language of instruction at ISTA, as in any other international scientific organization, should be English. ISTA should compete for the best available students, both in Austria and abroad.

There is an intensive process of discussions concerning the structure and methods of Ph.D. programs in Europe. At a time of such a transition, it might be easier to create a new program along the reformed lines, than to modify an existing program. In that respect, ISTA may serve as a model and a testing ground for other Austrian universities. A strong collaboration with one or more universities may even allow them to change their own programs, through the collaboration with ISTA, in a more efficient way, facing lesser opposition from more traditional doctrines.

In the first stages of the development of ISTA, when the total number of professors and students will be small, it will not be possible to develop a full independent Ph.D. program. This is yet another reason for beginning operations of ISTA in the immediate vicinity of an existing research establishment, and moving its full scale operation to a permanent location only at a later stage, when a critical mass is achieved and the necessary infrastructure exists. At this preliminary stage, a wise collaboration program with another university can be extremely advantageous to both sides.

In the long run, the quality of the students at ISTA (and the quality of the postdoctoral fellows) will be almost as important as the quality of the leading scientists. The contribution of ISTA to Austria and to the scientific world should be measured not only by the quality of its research results but also by the excellence of the students it will train for the Ph.D. degree. Such Ph.D.'s are an important element in any technology based industry and economy.

## **13. International Character**

We have already commented several times on the necessary international character of ISTA. In the world of science, isolation emerges from a state of mind, not from geographical or political constraints. ISTA must avoid isolation. It should emphasize its international character from the first day of its existence, beginning with the composition of its initial Board of Trustees and continuing with its recruiting program, graduate school, public events and any other component of its activities.

Any scientific research institute can succeed and flourish only if it is truly international. This means a multinational team of researchers, strong international scientific collaborations with foreign institutions, a good balance between Austrian and international postdoctoral fellows and graduate students, a constant flow of long-term and short-term visiting professors from other countries and a practice of holding all seminars, lectures and announcements in the "Lingua Franca" of international science, namely the English language.

A warm hospitality to an international group of scientists, young and older, must include a special attention to their living conditions in a country, which is foreign to them. Hospitality to families, proper international schooling for the children and affordable good quality housing are almost as important as the scientific facilities, in guaranteeing the success of ISTA in attracting high level scientists from other countries. The financial cost of these last items is minor, relative to the resulting benefit. It is more a matter of management attention and good will than of a financial burden.

#### **14. Public Image, the Name of ISTA and its "Corporate Identity"**

The eventual success of ISTA depends primarily on its scientific achievements. However, these can happen only after a few years of hard work. No achievements will be possible, if ISTA will not succeed in attracting excellent scientists and in providing them with the best equipment, services and atmosphere.

ISTA will also require major financial support, not only from the federal and local government, but also from private and international sources. All of this may happen, with some success, once ISTA is recognized internationally and nationally as an outstanding research institute. But none of this is guaranteed during the first few years.

On a different front, ISTA must be embedded in its immediate physical and geographic neighborhood, not as an ivory tower but as a friendly neighbor. It must contribute to the community and it must consider the needs of the community in its own development, in terms of issues of traffic, noise, dangerous substances, cultural activities, transportation, schooling and many other topics.

For all of these reasons, it is extremely important for ISTA to pursue vigorously a wise policy regarding its public image. It should establish, as early as possible, its own "corporate identity" with an appropriate permanent name for the organization, a program of public events and a variety of efforts to gain recognition in the international scientific world. It should also foster "outreach activities" of various cultural and educational kinds for the local, regional and national communities interested in the flourishing of "its" ISTA.

The Board of Trustees should discuss the final official name of ISTA. The name ISTA is not very attractive and should probably be replaced. Some of the relevant considerations are:

- (i) There are numerous other organizations in the world carrying this acronym (from the "Indiana Science Teacher Association" through the "International Seed Testing Association", to the "Israeli Student Travel Agency"). There are also several commercial companies named ISTA.

- (ii) Words like "excellence", "elite" and similar attributes should not be included in the permanent name. Excellence can be only achieved by scientific success, not by declarations, and ISTA should avoid using such self-evaluations.
- (iii) While ISTA will award Ph.D. degrees, it is not a full fledged university. Hence it should not be called a "University".
- (iv) The words "Science" and "Institute" are correct and natural for the name of ISTA.
- (v) The national identification is debatable. It is indeed an Austrian Institution but it has international aspirations. We cannot think of another major research Institute in the world which carries the name of its country.
- (vi) Naming ISTA after a great scientist is not straightforward, because most such scientists already have research institutions named after them and duplications create confusion.

It is not for us to determine the final name of ISTA, but the Board of Trustees should address this issue soon. International name recognition is important for such an Institute. It is one of the important tasks of its international “branding”, i.e. the development of a clear identity which is attractive to the best talents and scientific achievers in the world.

In order to place ISTA, as soon as possible, on the national and international scientific scene, it might be worthwhile to initiate, in parallel with the selection of the first scientists, a series of public events, lectures and seminars, aimed at the general public, but also at the scientific and academic community. The ISTA Board should consider the possibility of having such events as the first activities in the permanent ISTA campus, with the dual aim of creating an immediate bridge between ISTA and the general public and establishing it as a living and active entity. Such activities should never become the main goal of ISTA, but they might become an important added value.

In designing the full program of these events, three types of formats might be considered:

- (i) Bringing exciting new basic science to the attention of the general public, in a popular and attractive way by lectures and other types of presentations.
- (ii) Discussions with (rather than lectures to) the public, dealing with issues at the interface between science and technology, on one hand, and ethical, economic, environmental and medical issues of general interest, on the other hand. Typical current subjects might include the world energy crisis, stem cell research, internet and privacy, avian flu, and numerous other examples.
- (iii) International high level scientific symposia on topics, which are on the agenda of the recruitment program of ISTA, serving as an attraction point (and testing grounds) for practitioners in Austria and abroad.

All of these activities could preferably take place at the permanent ISTA location or, until the permanent campus is ready to host them, in proximity to the temporary ISTA quarters.



## **15. Financial Considerations**

All of the above requirements cost money. The initial allocation of the federal government and the local government, as well as the intention of the Austrian industry to contribute its share, should be sufficient for a successful initial operation. It is extremely difficult to plan for the ISTA budget five or ten years from now.

A reasonable rule for a high level scientific research institute is that approximately 60%-65% of its operating cost (excluding new investment in major facilities and buildings) goes to salaries, fellowships and benefits. The average cost per person is about 50,000-60,000 Euro (averaging over everyone from the highest paid professor to the Ph.D. student). With these numbers, we conclude that an Institution with, say, 500 employees and Ph.D. students would require an operating budget of, at most, 50,000,000 Euro per annum, excluding major capital investments. Needless to say, this estimate can only provide an order of magnitude of the necessary budget. It is safe to assume that every 100 additional employees will cost approximately another 10,000,000 Euro per annum. The capital investments in the first few years, in buildings and major equipment will, of course, be very substantial and will be needed in addition to the above sums.

The main difficulty in forecasting the financial needs for the routine operation of ISTA stem from the fact that, at the beginning, the limiting factor in recruiting top scientists will be the quality threshold and not the financial limitations. As a result, the rate of cash needed by ISTA in its first few years is extremely hard to predict. We do not want ISTA to recruit mediocre scientists, just because funding is available and we do not want ISTA to miss golden opportunities just because certain funds will arrive a few months after they are needed. This kind of operation, especially in the first few years, rises or falls on the successful acquisition of a very small number of outstanding people. This must require extreme flexibility in the cash flow of the promised funds.

We therefore recommend that the committed funds by the governments and by the industry be made available to ISTA in a flexible time schedule, allowing ISTA to carry unused budgetary commitments from one year to the next, and to call upon budget allotments earlier or later than previously planned, when a justified need arises or sudden opportunities become available, without having bad consequences for future budget negotiations with its financial backers.

In the long run, ISTA will have to diversify its sources of income. ISTA should expect the federal government to continue its support and we hope that more than one province will support ISTA. We have already commented on the hope that a close collaboration between Lower Austria and Vienna will emerge, with support from both. ISTA scientists should also compete for numerous research grants from national and international sources, including the EU and the various Austrian national funds. One would also hope that some specific projects will attract the interest of related industries from Austria and other countries.

It is crucial for ISTA to be a pioneer in raising private philanthropic contributions. There is no such established tradition in Austria, but with the correct tax structure it should be possible for Austria, as for the rest of continental Europe, to emulate the success of philanthropic giving in the US and UK. It is a fact that, in the field of science (as in the fine arts), the most successful fundraising institutions are the ones who can attract their benefactors by their good management and scientific success, not the ones that are needy and decaying. Scientific success breeds private gifts, and those can help the scientific program.

Eventually, one would hope that ISTA will also benefit from income based on its inventions, patents, royalties and other forms of intellectual property. This should be vigorously pursued, but cannot be expected to bear fruits in less than a decade or so.

Both philanthropy and income from intellectual property should be channeled not only to the pressing current needs of ISTA but also to the creation, in the long run, of an endowment fund. Such an endowment, if properly invested and maintained, can add a substantial solid component to the annual income of such an institution. The creation of an endowment requires even more advanced thinking and planning than the already difficult goals of standard philanthropy and intellectual property, but the long lead time of such an activity makes it imperative to start such plans and activities, as early as possible. Many of the leading institutions in the US and UK are competitive only because of their substantial endowments. If ISTA wishes to reach this stage, several decades from now, it should start planning and acting immediately.

It is important to observe that, in the long run, a high level of excellence can be maintained only by a diversified basket of income sources, some of which are egalitarian, in the sense that they are available to all other institutions, and some of which are unique to an institute which attains an outstanding level. Here, again, we have a classical "chicken and egg" situation. A decade from now, ISTA will not flourish without extra diversified sources of income, but those will not be available if ISTA does not excel.

We therefore recommend that all such sources of income should be pursued from the very beginning of operation, even if their fruits will only come years later. This is the nature of scientific work and this is also the nature of securing the necessary resources.

## **16. The Next Immediate Steps**

The first immediate step for ISTA is the appointment of the first Board of Trustees, according to the Law and, hopefully, in accordance with the recommendations outlined in this report. From that moment, the Board must take complete control of all matters related to ISTA. It must maintain its independence from all other entities, including the federal government, the local government, the Federation of Industry and any other source of support.

The Board must soon elect its Chair and vice-Chair, its executive committee and its scientific board. In the initial stages of building ISTA, some members of these bodies may be required to invest a considerable amount of time to the affairs of ISTA and they must therefore be remunerated accordingly. These people will not be able or willing to accept their assignments or even to consider accepting them, without knowing the details of their engagement in terms of time, responsibility and reward. ISTA must also have a skeleton administrative staff, to deal with its initial operations. This staff will have to deal with the process of the incorporation of ISTA as a legal entity, according to the Law. It will also have to prepare all meetings of the various Boards and committees and establish contact with all the funding organizations. It will also become the address for any enquiries concerning ISTA, both from the general public and from the international scientific community.

In order to enable ISTA to take these first steps, it might be useful to solicit the help of a temporary legal entity that could activate all of these functions. Since the Federation of Industry is committed to raise substantial funding for ISTA from amongst its members and since it will have to create a foundation with which these funds will be deposited and to which they have to be trusted, it might be helpful if the same foundation will agree to serve as the "starter" of operations of ISTA, employing the initial small skeleton staff and contracting with those members of the various ISTA boards, whose services will require considerable consulting activities. We believe that it will be possible to set up a Foundation ("Stiftung") or a Trust, which will serve both for the purpose of holding the industry funds for ISTA and as a temporary initial contracting organization for the first people operating on behalf of ISTA. Eventually, of course, ISTA itself will be able to assume these responsibilities.

As soon as these preliminary steps are completed, the ISTA Board of trustees will have to address the next urgent issues, which are:

- (i) Defining the process and the timetable for the search of the first President of ISTA.
- (ii) Beginning the process of selecting the first leading scientists and their scientific fields.
- (iii) Determining the permanent name of ISTA and considering any other necessary steps to establish its identity and existence on the national and international scene.
- (iv) Selecting a location for the temporary first operations of ISTA and initiating a strong collaboration with one or more existing research organizations.
- (v) Beginning the planning of the permanent campus of ISTA, possibly with an eye towards beginning public activities there, even before the commencement of research activities.

At a somewhat later stage, but not much later, attention must be given to the design of the Ph.D. program and to rules concerning intellectual property.

The leading scientists of ISTA, when they join its staff, should always become part of the decision making process of the ISTA governing bodies. This will require a complex, step by step, dynamic transition of power.

We believe that the ISTA goals are ambitious but feasible. With enough determination, patience and far-sighted vision, it can develop into a great success.

## **Acknowledgements**

We thank the Federation of Austrian Industry, and particularly its President Dr. Veit Sorger, Dr. Claus Raidl, Mr. Markus Beyrer, Dr. Thomas Oliva and Mr. Roland Sommer, for their support, hospitality and enthusiasm for this project.

We are indebted to all leaders of the Austrian federal and regional governments and to many of the main pillars of the Austrian scientific community, who shared with us their views and who devoted precious time to guide us through the intricacies of creating a new Institution like ISTA. In particular, we appreciate the time devoted to us by the Chancellor, by the Minister of Education, by the Governor of Lower Austria and by the presidents of Austrian Universities and leading research organizations.

We have benefited significantly from the experience and wisdom of the members of the preliminary teams of scientists and policy makers, who studied the ways and means of pursuing the goals of the proposed institute.

## **Appendix:**

### **Letter of Appointment to the International Committee**

**Text of letter from Dr. Sorger, President of the Federation of Austrian Industry, to Professor Harari, Chair of the International Committee. Similar letters sent to Professors Kuebler and Markl.**

Prof. Haim Harari  
Weizmann Institute of Science  
Rehovot 76100  
Israel

Vienna, March 10<sup>th</sup>, 2006

Dear Professor Harari,

Taking note of the fact that the Federal Republic of Austria has decided to establish a large high-quality advanced research institute in the natural sciences covering the main fields of research including a graduate school but not undergraduate studies and taking into consideration that the initiative for this “Institute for Science and Technology – Austria” originated from a group of leading Austrian scientists and that the idea was adopted by the government of Austria and was welcomed by the Federation, by regional governments within the country and by many in the scientific and academic community, the Federation of Austrian Industry wishes to appoint a small international committee of prominent scientists having experience in managing and building similar scientific institutes in other parts of the world to pursue the next steps for the establishment of the “Institute for Science and Technology – Austria” (“AIST”).

We are grateful to you, Prof. Harari, that you have agreed to chair this committee and that you will together with the two other members of the International Committee – Professors Kuebler and Markl, in particular address and provide proposals for

- a) the governance of AIST;
- b) the board structure of AIST;
- c) the management structure of AIST;
- d) time tables for establishment;
- e) possible intermediate steps en route to a permanent operation
- f) connection to existing infrastructure;
- g) interaction with existing institutions;

- h) sources of funding;
- i) methods of selecting the first leading scientists;
- j) choice of name;
- k) any other issues which may be relevant to the necessary next steps of the process, including steps which might necessitate certain changes in the current draft of the law submitted by the government to parliament.

In each case, the committee shall make either specific recommendations for action or suggest the mechanism and the timeframe by which such decisions should be taken.

It is understood that the members of the committee may comment on some of the needed requirements for the location of an “Institute of Science and Technology – Austria” but the committee will not deal with the selection of a specific permanent site which is a topic which remains in the hands of the funding organisations of the “Institute for Science and Technology – Austria”.

The committee will submit its report to the Federation within 90 days from now.

You will as chairman of the committee, together with Prof. Kuebler and Prof. Markl – if so requested by the Federation – present the final recommendations of the committee in one or several of the following manners:

- a) to the Austrian Minister of Education and to any committee established by it
- b) before groups of opinion leaders invited by the Federation and
- c) in press conferences to the media.

The Federation of Austrian Industry will provide the committee with the infrastructure and assistance which is necessary to perform its task.

Vienna, March 10<sup>th</sup>, 2006

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Dr. Veit Sorger

President

Federation of Austrian Industry

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Date