

Industrial Affiliate Programs

A win-win deal between industry and academia

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Abstract. Industrial Affiliate Programs (IAPs) are associations between several companies and an academic research group. They are beneficial for the development of fundamental approaches to applied sciences. They have several advantages over other ways of funding research. Romanian scientists in applied fields can start IAPs.

1 Introduction and roadmap

Money is the mother's milk of science. Science, in turn, is needed by the industry in order to survive and to grow. As a consequence, industry often sponsors research, which can be done in-house or by an outside subcontractor such as specialized labs or academia. I will describe one particular type of partnership between industry and academia which maximizes the advantages for each side, and which has been successfully functioning for thirty years in the U.S. and in other countries.

I will start by laying down the context of today's research funding market, with its traditional subdomains - short-term (applied) and long-term (fundamental) research, each with its advantages and disadvantages, and classic ways of funding. I will then describe how Industrial Affiliate Programs (IAPs) work and why they maximize the benefits of both researchers and industrial sponsors. I subsequently explore the ways companies are convinced to join a IAP and the feasibility of IAPs in Romania.

2 Short-term applied research

Industry usually does short-term, product-oriented research in-house and jealously guards the results that give it a technological edge over other competitors. Some parts of this research may be subcontracted to entities that are more competent in that field, and it can be better described as specialized consulting than research. The goals are well defined, the deadlines enforced, and there is little room for failure. This context produces very little novel, groundbreaking work of the kind that opens the road to new scientific fields or to new products that create their own markets. One can argue that the customer knows best what he needs, but the history of recent major technological breakthroughs disreputes that: "Who asked Edison to invent the light bulb?" [5].

The research subcontractor can find short-term research to be very profitable, but a minute change in the market or in the methods of the industry can drastically drop the demand for its specialty. From time to time technological fads in the industry may increase equally dramatically the demand for its expertise, but even then he cannot take full advantage by it because he cannot satisfy the entire demand. The results of such short-term research belong exclusively to the company who paid for them. They are generally not published unless the company uses them as marketing tools to show off its technological prowess to potential clients and shareholders. Detailed descriptions are usually published after the competitors got hold of the method as well.

3 Fundamental research

3.1 Its dedicated institutions

At the other end of the spectrum lays fundamental research, usually sponsored by governments, international bodies and charitable foundations, that have in mind the long-term welfare of the humanity. The applicability of this research may not be visible at all while it is being done. Thousands of endeavors which produce only papers that gather dust in libraries. The gambit is that even a single major breakthrough that results in a paradigm shift can pay off in the long term for everything.¹ The funding bodies sometimes sponsor institutes exclusively dedicated to fundamental research, which can be good places to be when the funding is flush - the researchers are free to "play" with new ideas and to experiment with failure at their free will. This is the main tactic by which the discovery of the unexpected is invited. In order to be effective, the facilities of such institutes must be state-of-the-art and the people top-of-the-class. Because the goals are so long-term, their budgets must not depend on the state of the economy, or else the advantages are canceled by losing the best people and the technological edge during the low-budget years.

3.2 The grant system and its disadvantages

So no wonder the funding bodies prefer to "subcontract" fundamental research by giving grants to academia. This way they can adjust the amount of funding according to their current revenues and priorities. The costs are also smaller, as funding recipients usually have other sources of support as well. Funding bodies can also use preferential distribution of money as an instrument for applying other goals on their agenda to a very large number of subjects. Their goals can be: promotion of political correctness, undergraduate research, community outreach, inter-regional scientific cooperation (especially in the European Union), brain drain/brain gain, enhancing the role of the nationals of their own country/union in their own scientific establishments, decreasing unemployment, breaking academic "feudalism" by preferentially funding people under 35, etc. The more important the role of the state in the respective society, the more strings the grant is going to come with. Conditioning the funding on non-research factors decreases fundamental research effectiveness.

The rise of non-scientific funding distribution criteria and of bureaucracy stimulates randomness and subjectivity in the funding decisions. The lack of any loss/damage to the funding agency if the outcome of research prove to be of a low quality acts in the same direction. Unlike industry, for which money invested in low-quality research is a loss, grant administrators have no vested interest. They must distribute the funds anyway, and they must choose among many applicants. The selection is more likely to be farther from optimum than in the case of industry-funded research. When the grant selection is done by peer review, the fact that the reviewers themselves are applying for research money makes them less willing to report favorably on proposals that disagree with their particular point of view. [1]

But these are not by far the greatest flaws of the grants system. The fierce competition between funding recipients results in the proposals being evaluated on the likelihood of their success. This strikes at the heart of the fundamental research principle - fail one thousand times to succeed once. Prudence is encouraged at the expense of endeavor. The researcher is not playing with ideas on the verge of the unknown. The proposal is about what he expects to discover, and he will be rewarded if he discovers what he expects. Nothing truly revolutionary can appear this way. Grants often contain sunset clauses that define

¹ Venture capitalism is based on a similar strategy, albeit with other purposes, other means and acting on another scene.

the maximum term of the grant, regardless of performance. This most often means that the line of research is discontinued after the termination of the grant. Time-limited funding does not stimulate performance either: no matter how brilliant the results are, the grant will still expire. Long-term, creative, free research is also stymied by the fact that "those topics used in the calls for proposals result either from the interests of agency personnel or from the agency's attempts to increase its funding. In either case, the topics funded are determined by groups other than the active research community". [2]

There are other side effects also. The "cost effectiveness" of grants results in more people, especially students, being involved in fundamental research than if the money were spent on dedicated institutes, with little didactic purpose. This creates a false workforce demand. In order to be able to carry on the grants, the faculty attract more new students to the field, who graduate only to find that the only outlet for their fundamental research skills is academia, with its limited number of positions. In order to absorb all the fundamental research graduates the number of positions would have to multiply exponentially, like bacteria, since every graduate, after becoming faculty, will produce new graduates. This is why it is common to have several hundred applications for each academic opening in the U.S..

The results of fundamental research are public and the researchers are encouraged to publish as much as possible. However, the large number of academia people involved in fundamental research through grants, together with the evaluation of faculty performance by the number of publications, result in an inflation of journal articles that overwhelm anybody trying to keep up to date and to find the most valuable results. At roughly the same number of participants, the 2001 American Geophysical Union (AGU) Fall Meeting had 7863 accepted abstracts, while the 2001 Society of Exploration Geophysicists (SEG) Annual Meeting had only 650².

4 The ideal research environment

Even if a good researcher does (or should) generally make a decent living, with very, very few exceptions, a career in research in any country is not the path towards great social prestige, fame or fortune. One of the major reasons for which people put up with that is the pleasure of research, of freely exploring new avenues and wacky ideas of which one just might work, without any mental this-is-not-on-my-task-description firewall. Then there are those moments of joy while freely experimenting, failing but learning every time, and finally "getting it right". The I-have-obtained-a-working-lightbulb-at-the-thousandth-attempt joy. Neither the grant system, nor the specialized-consulting system, with their well-defined rewards for the accomplishment of well-defined tasks, do not reward long-term, fertile creativity.

Another major reason why people enjoy working in research is because there they can interact with other people like themselves - intelligent, creative, surprising, competent, hard-working. In order for such people to be attracted to join as students, job prospects after graduation must be good. Grant-funded fundamental research always fails in this respect if the number of openings does not increase exponentially. A research group that produces graduates employable by the industry will stand a better chance of attracting the right people.

The link with the applied realm is also related to another factor that motivates people to go into research: the pleasure of seeing that one's original idea, one's brain child has been objectively proven useful in the "real world" by industry. Implementation into common practice is the highest honor because the industry does not flatter: it simply needs the most useful, innovative tools in order to keep making profit.

An academic research environment that will maximize researcher satisfaction will have a steady supply of money to allow for freedom of experimenting with ideas, like large independent fundamental research institutes have. At the same time, its ultimate goals will be applicative and will maintain a strong relationship with the industry. This will also help provide career prospects bright enough to recruit top-quality students and faculty.

But how to have the advantages of both independent labs and specialized industrial consulting groups? How to do fundamental research and sell it to the industry? Is this not utopic, a researcher's daydream of a perfect place?

No, it is not. It is a description of an Industrial Affiliate Program. Many of these have successfully functioned for about thirty years. I will show next how they come into being, and how they work.

² Most of the work of SEG members is related to the industry, while AGU is oriented towards fundamental research.

5 Industrial Affiliate Programs

5.1 Defining the concept

Several companies come to see that while short-term research with well-defined goals does increase profitability, more fundamental endeavors with ultimately applicative goals can open up entirely new perspectives. They notice that governmental grant-based funding systems encourage predictable work focused on public priorities instead of creative, far-sighted fundamental research addressing their applicative needs. On the other hand, a simple cost estimate shows that maintaining a fundamental research program is too expensive an endeavor to be undertaken by any but the largest multinational corporations. So, since the government does not do it for them, and since each cannot do it on its own, they form an alliance. They pool together resources, fund an academic group to do the research for them, and receive exclusivity on the research results for a limited period of time. This association between several companies and an academic research group is commonly called a consortium³, or, from the point of view of the university, as an IAP. From now on the terms consortium and IAP will be used interchangeably.

5.2 Research directions and accountability

The researchers receive only general suggestions as to which research directions they should pursue, but they are completely free to pursue any. They are encouraged to be as creative as possible but ultimately their work should result in preliminary tested potentially useful ideas. They do not go all the way to develop them into production-ready tools - individual companies can do that better by themselves, if they are interested. While they are free to play, they are responsible for the quality and the relevance of their results to the industry's problems. They communicate the results to their sponsors once or twice a year in the form of a written report and of presentations at an annual meeting. Such a meeting lasts for three or four days in a distraction-free environment to give ample time for feedback and inter-sponsor communication. The researchers are held accountable for the quality and relevance of their work through the fact that the consortium between the sponsoring companies is a fixed-term venture, usually one year long, and which is renewed every year. At the annual meeting, the research group presents the results for the previous year and advances a new proposal that describes the planned areas of focus for the next year, together with a budget. If a company considers that membership in the IAP no longer serves its interests, it does not renew the contract and the consortium loses one member. The loss of one or several members can be self-fueling - others can take the example and leave too - so the research group is therefore motivated to keep the quality of results high. However, sponsors are lost in natural ways⁴ too, so the research group must project a successful outside image at all times in order to keep attracting new sponsors.

5.3 Membership costs

The membership fees in the association are fixed and proportional to the amount of benefits the member is likely to receive. Most often, this means equal fees, but sometimes they may depend on the size of the company. There can also be different membership classes, with different benefits. The research group presents a large-scale budget, not a complete summary up to the cost of bus tickets. Companies are sponsoring the group because they receive a perceived value for their money; if the costs are unreasonably high for the value they will drop out even if all expenses are justified, and viceversa. Equipment manufacturers and software companies can participate by donating appropriate resources to the program in lieu of financial support. The cost, which can range anywhere between five and fifty thousand USD, is a relatively minor expense for a company.

³ especially in geophysics. However, the word "consortium" is used in so many ways in various contexts that in order not to induce the reader into preconceived ideas, I avoided it until after I described the concept.

⁴ demise of a company, mergers, company strategy shift that no longer requires research of that kind.

5.4 Reporting of results

Reporting of results is more detailed than in usual articles in scientific journals. It includes details, descriptions even of unsuccessful attempts and of lessons learned, electronic copies of pictures, copies of computer codes and of non-proprietary data, prototypes of developed tools/machinery. The reporting contains everything that the short-term research subdivisions of the sponsoring companies need in order to assess that the presented ideas are worth translating into industrial practice, and to reproduce the preliminary results and adapt them to their test cases without painstaking efforts [6]. A beneficial consequence is that the research group feels compelled to prove their ideas on real-world examples, and not produce only neatly typed formulas. This live-fire trial can only increase the quality of the results. Internal peer-review of report articles among the members of the research group contributes to the quality as well. Reports are available exclusively to the sponsors for three or four years. The group is also free to publish their results in professional journals at any time: they are still academia and are judged by the number of externally peer-reviewed articles. They also need their successful results to be publicly visible in order to keep attracting sponsors to compensate for those that are lost. In the case of consortia quality prevails over the quantity, because new sponsors are attracted by the quality of research done by the group, not by the number of articles published⁵. Thus, the effective lag between publishing the results in the sponsor report and in trade journals is between two to three years. The researcher usually gets feedback from sponsors after publishing the result, improves the paper, sends it to a journal, then waits for the lengthy peer-review process to be completed.

5.5 The students in the research group

The research group employs faculty, researchers and full-time graduate students (Ph.D. which lasts between 4 and 7 years, Masters that lasts 2 years). This keeps costs low (students are paid according to their productivity). The IAP is also able to attract better students than other research groups because they can pay them better. Companies are also happy that consortia use students because they can recruit them when they graduate, after getting to know the results of their work over the years. They also want the graduates of the IAP because they are knowledgeable about the problems of the industry and used to creative thinking and to accountability in their work - they are taught that anything they do must be proven useful in the end. Since freedom is fundamental for creativity, the students are given aplenty, but they are also kept under pressure not to procrastinate by requirements for constant reporting of results that show that they work at something and that they come up with new solutions for it. They must prove their worth by showing they are capable of generating original ideas by themselves, and many times are expected to come up with their thesis topics on their own. Giving the students some decision power on the group's direction and evolution also stimulates responsibility and interest. Most decisions are taken democratically, by mutual agreement. Out of this scheme, the students get the pleasures of doing research that I mentioned earlier, but they also get to work harder because they are fighting to come up with and prove their own ideas. They can be left to spend months by investigating a direction that does not lead in the end anywhere. Even if painful and leading to high attrition rates on the short term, on the long term this proves to be an unparalleled advantage for the understanding of the subtleties of their field and for the building of cognitive and analytical abilities. The successful ones become efficient and proactive, always ready to take the initiative. Constant communication of results and cooperative work in the research group develop verbal, interpersonal and teamwork abilities. The industry just loves that. And the students love that the industry loves that. The increased marketability of the graduates helps attract better and better students. A win-win spiraling, also fueled by the sponsors' sending at their own expense their brightest people to get graduate degrees with the academic consortium.

⁵ like in the case of many grant selections that are done quick, from a large pool of applications, by large bureaucratic institutions who do not have a strong intrinsic motivation to find the best possible applicant.

5.6 The relationship between the research group and the University

Although being integrated in academia, the research group is not completely subordinated to the university in non-academic matters. It is just a group of people who are mandated by an association of companies to do some research for them, and who also happens to work in academia. The relation between it and the university is rather one of association than of subordination. Both entities get advantages and share duties as a result of their partnership. The group uses university resources in its work, so the university has usually patent rights and copyrights on the reports, with free reproduction permitted for the purposes of the consortium. The university also draws indirect benefits from the partnership - a supply of good students, better reputation, an increase of industry awareness of the benefits of research and therefore more sponsorships. Research consortia function in many countries, under various legal frameworks. Their legal basis depends on the local laws and their interpretability, so there is no single valid juridical recipe that would work for all cases. The main thing to be avoided is to transform the consortium-university relationship into a "cash cow - black hole" one, where the consortium is obliged to turn all its income to the university then beg on its knees for funds for a scientific journal subscription. In order to be effective and thus survive, the consortium must be able to invest its revenues into its own development, giving the university either a fixed amount, or a percentile-based "income tax" to account for its use of university facilities.

5.7 IAPs in real life

My description of a consortium/IAP tried to steer away from the vernacular, but draws particularly on my knowledge of geophysical consortia⁶. They exist in other sciences as well⁷. It also bears the imprint of the one to which I belong - Stanford Exploration Project (SEP), the first academic consortium of the modern kind in the geosciences. It has been founded in 1973 by J. Claerbout in the industry-friendly climate of Silicon Valley⁸, following early experiments in securing industry funding by MIT [3] and maybe examples of existing Stanford IAPs in other sciences⁹.

A consortium can survive only by being successful, for industry will not keep on funding mediocre research for twenty years. If it does, it becomes an institution in itself, with informal traditions and a large network of active alumni and with its own base of cumulative experience that it can draw on. Many of the scientific leaders of the field have interacted one way or the other with it, and it can boast an impressive list of achievements. Industrial Affiliate Programs are a true win-win deal between industry and academia.

6 Convincing companies to join a IAP

6.1 The strategy

A company will join a IAP if four factors converge. First, its managers must believe that research is an investment that ultimately brings a profit. Second, they must feel that on the long term breakthroughs brought about by fundamental research are possible and useful enough to deserve financial commitment. Third, they must overcome the fear that they will not be able to exploit the breakthroughs profitably enough if other competitors members of the consortium know about them too. Fourth, they must be convinced that the research of some particular IAP has enough value for its cost.

It may take a while to convince the management of a company that research in general, fundamental research in particular, and Industrial Affiliate Programs especially are worth funding. Once they are

⁶ see http://www.seg.org/consortia/index_body.html

⁷ see <http://corporate.stanford.edu/research/scitech/industrial.html> or <http://www.engr.uiuc.edu/corporate/affiliates.php>

⁸ for more info about other ways how relationships between industry and academia can yield mutual benefits, see <http://www.businessweek.com/1997/34/internal.htm> and <http://library.northernlight.com/SG19990714110005741.html?cb=13&sc=0#doc>

⁹ Stanford established some of the first industrial-affiliate programs. See [4], p. 137

convinced, the companies usually sponsor several consortia, since they come cheaper than even the annual salary of a single researcher in the Western world, and this way they can survey practically all the advances in the field. So a company that already sponsors several consortia may be more likely to become the sponsor of another one than a company who does not think IAPs are worthwhile at all. Sound pre-existing research results are instrumental in convincing a company to join.

6.2 Usefulness of research

Managers can neglect research if they believe that they have a protected niche market that will allow their company to survive without being at the same technological level as the best in the world. However, the global opening of the markets in the last decade of the twentieth century brought both new opportunities and new challenges. Companies that have benefited of protected niches face competition from strong global players, with diversified experiences, better management and better technology. The technology is among the key factors because it helps the companies operate cheaper and more ecologically, increase quality and develop new products. The formerly protected niche players may dwell on cheap local labor. This advantage vanishes all too easily if the economic situation of the country improves and salaries increase, if the competition pushes a shift of the demand towards products more technologically advanced than the traditional line, or if technology enables the competition to produce cheaper overall. Also, in the context of labor markets liberalization, betting on cheap local labor results in an inverse natural selection - the highly skilled, flexible, and hard-working employees quickly find their way to better pay elsewhere. The local companies must improve technologically in order to survive. They need to do research in order to keep up to date.

Scientists can unite to advertise by all means available to them that research is good for the industry, much in the same way as the Association of California Cheese Producers advertises that cheese in general - not some particular brand - is tasty and healthy. The same strategy should be helpful in the case of managers from technologically advanced companies try all the time to find costs that can be cut without affecting today's production. They must be simply told that research is in their longer-term interest. Scientists in applied fields must speak up whenever possible - repetition makes for effective propaganda.

6.3 Why a IAP

Why not do the research in-house, why do it at a university, and why share it with competitors? Fundamental research is high-risk and non-conventional. By sharing the cost, the financial risk to each sponsor is minimized. Also, grad students are cheaper than researchers. All the other facilities offered by a university help keep costs down as well.

The fact that in an university people from various fields get in contact and educate each other increases the chance for creative interdisciplinary endeavors. The continuing education programs of companies members of a IAP can also benefit directly by receiving library privileges and reduced tuition rates for short courses, workshops, seminars and other educational events held at the university. Faculty involved with the consortium visit the companies to help them gain the most from the consortium's ideas and technology, and company researchers can do sabbaticals and pursue part- or full-time graduate degrees with the research group. Faculty members maintain a large number of collaborative contacts that keep them up to date. Experience with existing consortia shows that "The academic environment creates a unique opportunity to build scientific 'schools', or directions that, over the years, accumulate a critical mass of expertise in certain research areas and produce results of great importance to the industry"¹⁰.

Companies also gain access to premium-quality employees - the students of the consortium, who are much better prepared for success than ordinary students. Of course, the main benefits reside in the scientific discoveries generated by the group for a minute cost of a fundamental research program undertaken by a company, and in the informal communication with researchers from other sponsoring companies at the consortium meetings. Sharing the results with a small number of other companies does not cancel their value. In today's dynamic world, a company that does research only on its own and does not communicate

¹⁰ http://www.cwp.mines.edu/research_support.html

with the outside scientific community at a more intimate level than large public trade shows may initially enjoy the exclusivity of some of its discoveries. However its isolation will soon leave it behind in many other areas. That will cost more than the profits brought by the internal research. Practically all large oil companies and geophysical services companies are members in several IAPs. If you're not in, you're out.

7 Industrial Affiliate Programs in Romania: a prep talk

By now, the Romanian reader must be wondering: what does this have to do with Romanian research? Most Romanian companies do not seem interested in research any more after the fall of communism. But nobody said that the sponsoring companies must be from the same country as the research group! Most consortia assemble an amazingly diverse international assortment. SEP has sponsors¹¹ from U.S.A., Saudi Arabia, Republic of China, Colombia, Italy, Japan, Norway, Venezuela, Brazil and UK, as well as from the U.S. branches of multinational companies originating in several other countries. *"Oh, but that's for those Americans, who would sponsor a IAP from a former communist country?"* Several institutions from U.S.A., Norway, Brazil and Netherlands did not see anything wrong with that, as shown by the web page¹² of a Czech consortium that has been successfully running since 1993.

"If they are so common and useful, how come we hardly knew anything about them?" The visible footprint of the differences between a IAP and other research groups is not conspicuous. They try to publicize their successful results just any other group does. They have a list of sponsors - but all research groups publicize their funding sources. Their student recruitment brochures may tell about good financial support and relevance of their research to real-life problems, but so do all student recruitment brochures. The only telltale signs may be discreet mentions on their websites of an annual meeting, a sponsor-only, password-restricted area, and some freely downloadable old reports. Those in aggressive pursuit of sponsors may have a couple of links towards pages displaying membership benefits, fees, a blank contract and the current annual funding proposal. That's all. *"How come they can be successful if they are not visible?"* They are visible to the target of their communication efforts - the research departments of a select list of companies. The fact that they are not visible to you is only a proof that their communication strategy is adequate. The message gets to the target and no further. This minimizes both energy spent to create the message and unknown consequences of a message reaching an unknown target.

"You tell us to do away with the proven mechanism of grants! Even if they have flaws, they are after all useful enough to keep the science running today". While I am advocating that IAPs are useful and highlighting their advantages over the grant system, I am not suggesting that they replace the current system in its entirety. Creating a successful IAP is not easy at all, and few of them can exist at the same time. I am only saying that potatoes are good, not trying to convince everyone to switch to a potato-only diet. Let us be realistic. Only the best will be able to create a successful IAP. But anybody is entitled to have a shot. The only limit is how smart you are and how hard you want to work. After the Iron Curtain has disappeared, Romanian researchers in applied fields should turn to a proactive state of mind and realize that they have no right to complain about bad funding. Applied research is cutting edge and therefore able to find buyers, or is not at all. By the semantic of the word itself, research is at least at the level of the industrial state-of-the-art. Research surrogates unpublishable in any international peer-reviewed journal are only the sorrow proof that the author was not able to make a living in any other way than wasting the taxpayers' money, even if at the rate of \$80/month. It's that simple: if you cannot convince anyone that the product of your work is useful, then it's not useful!

"Well, we would like to do it, but we lack even money for a computer license to start with". Even in developed countries, academia currently uses Linux and other free software¹³. Yes, freely downloadable from the Internet, and which works too! *"We do not have personnel to start with, all the young people went West or left their profession!"* Come up with articulate research "business plans" that show with numbers that a longer-term strategy and possibilities exist, and you may convince people to join you. Who can trust leaders who cannot think further than a few months in advance, and who believe that maintaining the status quo is a victory? If you cannot conceive of a realistic long-term strategic plan for the improvement of the environment under your control, you do not belong in your place. Maintaining the current state of affairs in

¹¹ <http://sepwww.stanford.edu/about/sponsors.html>

¹² <http://sw3d.mff.cuni.cz/consort/members.htm>

¹³ <http://www.gnu.org/>

Romania is not a strategic plan, it is a disastrous choice. *"The old communist dinosaurs won't let us improve!"* The last of them will soon be gone, as the malignant wave of incompetents promoted on political criteria in the dark fifties has already reached the retirement age. But anyway, they may not be so nasty when you tell them you have a plan to get money from the industry - they will hope for a slice of the pie¹⁴!

"So, maybe we can gather the resources to start our bid towards the industry - but we do not know how to do it! The government did not pass a specific law about IAPs, and the Research Ministry did not send us instructions how to set them up!" Ingenuity and a consultation with a smart lawyer can bring many things about. Or you can wait, and wait.. *"The European Union did not endow us with information kits and visitor programs to learn how to set these things up."* They will not, since they are rational people who do not have any interest to encourage foreign competition to their domestic research.

"But we are so disoriented, things changed, we just woke up from communism, we are in a confusing transition!". Communism fell 13 years ago. Romania is not in transition any longer. What we are living now is the reality. The European Union is not going to annex us for a long, long time, and if major changes will affect it in the meanwhile, maybe never. We have to improve on our own. A degree that certifies one as a scientist in an applied field is not proof of a God-given right to taxpayers' money. We have to earn our daily bread by selling the product of our skills to those that find it useful. The future starts now, every moment, and nobody other than us is responsible for our own fate.

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¹⁴ unless your behavior makes them afraid that starting a IAP will increase your power in their organization too much, in which case they will have one of their younger henchmen try to "hijack" the project.