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NETWORKS, MOBILITY AND YOUNG RESEARCHERS

Abstract: The importance of networking in research communities is stressed which is related to growing mobility of researchers. This creates a global system of research where universities have a special role to address the future needs. Although excellence in research is well understood in the research community, there are bottlenecks for young researchers. The first bottleneck concerns the research careers models which differ considerably country-wise. The second bottleneck is the governing emphasis to project-based research which may work against sustainability of science and scholarship. Simple rules are: support quality, support young people.

Key words: *networking, research excellence, research careers*

The main topic of the conference is transition to the future and globalization. This concerns many problems like political and economical changes, energy and environment and many others including also the responsibility and ethics of researchers. It is well understood that contemporary world is characterized by fast changes in almost all fields of human activities. In all these changes networks have a special role because the links and connections between activities and persons are basic conditions for the complexity phenomenon (see, for example [1]). Complexity is studied not only in mathematics or physics but much more widely – in biology, in societal behaviour, in economics and financial markets, etc. There are many notions universally understood, such as scale-free behaviour, self-organisation and emergence, unpredictability – just to name a few. All these influence further developments including the transfer of knowledge.

But nothing can be done in this complicated situation without paying attention to young people who will be the main actors in building the new society in the future. That is why one should always foster the activities in universities, cooperation schemes and promoting research positions for younger generation. This is also the idea behind the World University Consortium – to promote development of accessible, affordable, quality higher education for the whole world.

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The education faces challenges at all levels starting from the primary schools to graduate studies. Many countries have put a lot of emphasis to the primary education because at this age it is important "not to kill curiosity". It is not only schools who are fostering education; science academies pay also attention to education. In the analysis of ALLEA it is shown how academies plead for the extension of inquiry-based science education at primary and lower secondary school [2]. It is shown that in Europe (and world-wide) there is the decline of interest towards science which results in fewer S&T graduates, scientists, engineers and technicians. A possible solution to the observed lack of interest for science is inquiry-based science education (IBSE) [3]. In 2009, an ALLEA Working Group on Science Education was founded by the proposal of the French Academy of Sciences and the Report [2] of this Working Group reflects the actions initiated by 26 European Academies in IBSE. The recommendations of this Report involve the European level networking and expansion of activities beyond Europe.

In this large field of activities from primary education to graduate studies much is done. The undergraduate and graduate level studies are nowadays much influenced by the mobility and the free market of researchers. There is a simple rule: mobility is towards action that is to the nodes of the complicated network of knowledge. A challenge for whole world is how to create more nodes in this network where young people can work. This is extremely important for smaller countries where only the wise policy can create the conditions for the next generation to attract them. In general terms, however, society should also understand the immediate and future needs and to be sometimes more flexible in funding activities which will be useful in the future. In this context, the education is important including also decision-makers and politicians who often look for short-term goals only.

It means also that training of young people must correspond to future requirements. In the analysis of LERU it is stressed: "Education in universities should not address the current needs only, it is to develop the thinking and the mental and conceptual skills and habits that equip the graduates to adapt to the changes and steer the changes in the future. Even more, the graduates should be able to face uncertainties of the world "[4]. Indeed, in the pragmatic society where innovation is stressed, one cannot forget the future needs.

The question is how to build such networks and free flow of knowledge needed for the transition to future. In Europe, the Aarhus Declaration adopted in 2012 says clearly – investing in excellence in research is preparing for tomorrow [5]. There are several conditions like creating research environments and infrastructure, supporting long-term perspectives, recognising and nurturing talents, and what seems to be extremely important – creating trust and freedom. Here one should stress a need to understand each other and the differences between various fields of knowledge. J. Kagan has recently analysed the differences between natural sciences, humanities and social sciences and demonstrated how even the wording used in various fields may create misunderstandings [6].

It is clear that in such a complicated situation one should carefully plan coordinated actions and "stop wasting the best natural resource of every nation: their

own people" as said A. Zucconi at the present conference. There is a definite wish from young people to act. At the Annual meeting of New Champions organized by the World Economic Forum in Tianjin, China (2008) there was a Section of Young Scientists (initiative of IAP and ALLEA). As a result young scientists produced the Statement "Passion for Science, Passion for a Better World" which concluded: "Making a better world needs better science – we young scientists are ready to contribute our share".

However, despite many activities and success stories, not all goes smoothly and there are several bottlenecks which could influence young people on their early road to research.

The first bottleneck is related to research careers. Yes, the Treaty of Lisbon (2000) introduces a legal basis for the creation of ERA (European Research Area) in which the free movement of researchers must be possible. The EU encourages the removal of fiscal and legal obstacles to cooperation in the field of research. Different career paths make reaching this goal difficult. Such an analysis is presented by Ü. Niinemets in his talk at the conference "Excellence in Research" organized by the Estonian Academy of Sciences in Oct., 2013 [7]. In order to get confidence in his/her career, a researcher seeks for a tenure-track system which has been successfully introduced by many countries but not everywhere. The differences in the career paths can be very variable. In some countries structuring of careers is clearly marked and despite tough competition understood as a best tool to give positions to good people. In other countries it is poorly organized and practically every position is on the contract base. European countries give many examples of such structures [7]. It is said that if Europe had a unified career structure, it would start to draw more people in. As a first step the ERC grants give people a good start but after that life should go on. There is also another aspect of well organized career path providing a clear perspective – namely transparent and efficient career models are components of excellence in research.

One could certainly ask why such a situation is possible if all understand the needs for clear career paths. To my mind, one of the reasons is the contemporary trend to project-based research and consequently, to short-term funding. In some countries including my own country Estonia, the percentage of competitive short-term funding is prevailing. In 2012, an excellent analysis is made by G. Öquist and M. Brenner on comparing the research funding and initiatives in several European countries: Sweden, Finland, Denmark, the Netherlands and Switzerland [8]. Beside statistics and sharing the best practice, it was clearly stressed that the ratio of basic funding to project funding works best if it is 3: 2 (Sweden) or 2: 1 (Switzerland). The competitive side needed to promote excellence is guaranteed by regular evaluation of research institutes. Such a situation is much more sustainable than pure project-based research.

Finally, I am tempted to indicate some notions from my own field of research – nonlinear dynamics and complexity. In the theory of fractals usually simple rules govern the building up a very complicated structure which is not only characteristic for a certain process but in addition has a special beauty. Only these simple rules

must be applied many times consecutively. The similar idea could be applied also to research. In a university two simple rules are important: support quality, support young people. But this support should be applied every day, every term, and every year in order to get results. Definitely this is an idea and technically the rules and regulations may be different but the basis should be built on this idea.

CONCLUSIONS

In all future science policy actions a special attention should be paid to young researchers. Science educations starts actually already in primary schools but after graduate studies the career paths must be well specified and open. The present emphasis to project-based research funding is not the best in order to guarantee sustainability. Besides establishing proper conditions for young researchers, their voice must also be listened to, especially in future strategies.

REFERENCES

[1] R. Weiler and J. Engelbrecht. The new sciences of networks and complexity. A short introduction. Cadmus, vol 2, No 10, Nov. 2013, p. 131–141.
[2] A Renewal of Science Education in Europe. Views and Actions of National Academies. ALLEA, Berlin, 2012.
[3] Rocard Report "Science Education NOW: A Renewed Pedagogy for the Future of Europe", EU, 2007
[4] G. Boulton and C. Lucas. What are the Universities for? LERU Report, 2008.
[5] Aarhus Declaration: Investing in Excellence – Preparing for Tomorrow, Aarhus, 2012.
[6] J. Kagan. The Three Cultures. Natural Sciences, Social Sciences and the Humanities in the 21st Century. Cambridge University Press, Cambridge, 2009.
[7] Ü. Niinemets. Science career models: do they contribute to the excellence in research. http://www.akadeemia.ee/et/tegevus/uudised/teated/20131024011023/
[8] G. Öquist, M. Brenner. Fostering breakthrough research: A comparative study. Swedish Royal Acad. Sci., Stockholm, 2012.