

Career Development Plan

for the Early-Stage Researcher (ESR) *Krzysztof Psiuk-Maksymowicz* Employed from 10 November 2004 by the Sweden Partner of the European Commission Research Training Network (MC-RTN) MRTN-CT-2004-503661 “*Modelling, Mathematical Methods and Computer Simulation of Tumour Growth and Therapy*” (<http://calvino.polito.it/~mcrtn/>)

November, 2004

The Sweden partner of MC-RTN is Gothenburg University (Gothenburg, Sweden). **Krzysztof Psiuk-Maksymowicz** (Poland), M.S. in *Computer Science in Medicine*, is the ESR employed by the Sweden partner from 10 November 2004 for one year, i.e. until 9 November 2005, with a possible extension for two more years, i.e. until 9 November, 2007.

The work of ESR K. Psiuk-Maksymowicz towards his Ph.D. degree includes the following two main parts: the “detailed” modelling and simulation and the “compact” modelling and simulation.

The “detailed” modelling and simulation will be the ones based on the generalized-kinetics/stochastic models such as the generalized Boltzmann-type equations and stochastic partial (integro-)differential equations. They will serve to a deep understanding of the oncogeny-related phenomena in unambiguous terms and calculation of the key parameters used in the “compact” paradigm (see below). The numerical implementation of these models will be relevant to specific problems in tumor therapies or pharmaceuticals and will presume the *computers of a sufficiently high performance*.

In the first year, the emphasis will be on the non-equilibrium biochemical-reaction-based transitions of the cell population from the homeostatic (fluid-phase) state to the (hyperplastic-)tumor (solid-phase) state. The first outcome is expected to be in the form of the manuscript that will be submitted *by the end of November 2005*.

The “compact” modelling and simulation will be the ones based on the reaction-diffusion equations which are simplifications of the above “detailed” models. The “compact” models, *firstly*, are sufficiently transparent to the *prospective end users such as students, researchers, drug developers, or pharmacologists in proliferative diseases*, *secondly*, will serve to an integration of the cores of the various oncogeny-related phenomena in a single picture, *thirdly*, will employ the data obtained by means of both the experiments and the “detailed” models, and, *fourthly*, are suitable to numerical implementation on *computers of a rather modest performance*. This implementation will include both the tumor morphogeny and the cumulative effect of different antiproliferative drugs and will be targeted at the notebook computers.

The emphasis will be on the aforementioned transitions. The first outcomes will be the corresponding section(s) of the manuscript(s) submitted *during the first half of the first year*. The first numerical-simulation results will be submitted *before 1 February 2005* to ECMTB 05, the European Conference on Mathematical and Theoretical Biology, July 18–20, 2005, Dresden, Germany, <http://www.ecmtb05.org>. In the first half of the first year, the numerical-simulation software will be developed in the MATLAB or SCILAB environment.

During the employment period of 36 months, ESR is expected to publish on the average 2 – 3 paper per year in the refereed journals or refereed proceedings of the international conferences. It is the intention of both ESR and his Teacher /Trainer that about 30% of published works of ESR will be without co-authors. This should demonstrate the capabilities of ESR as an independent researcher. The visit of ESR to another partner of MC-RTN within the mobility activities is planned for the second year of the ESR employment.

Certain fraction of the ESR work is supposed to be in a close cooperation with AstraZeneca R&D Mölndal (Mölndal, Sweden). The specific contents of this fraction will be specified during the first quarter of the ESR work.

Expected outcome by the end of the 36 month of the ESR employment: the set of the materials (e.g., published works, conference presentations at international conferences, a software package) which serve as the contents of the Ph.D. thesis and are necessary for preparation of the Ph.D. thesis.

- The Ph.D. thesis may be started in the ESR employment period but need *not* be completed in this period, at the Sweden-partner university, or in Sweden.
- The specific place and time for the ESR Ph.D. thesis defense will be determined by the end date of MC-RTN, i.e. by 31 May 2008.
- The thesis may be completed and defended at other partner university or in other partner country.
- The above issues will become clear and be specified later.

The decision on the specific place and time for ESR’s Ph.D. thesis defense will be made *only after* the corresponding consulting the Head of MC-RTN and other senior scientists in MC-RTN.

Eugen Mamontov

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