



MINUTES
of the
Meeting of the Working Party on Mixing

*held on the occasion of the
10th Jubilee Polish Seminar and International Workshop on Mixing,
Held in Poznan, Poland, September 27, 2005*

LIST OF PARTICIPANTS

Present

Jerzy BALDYGA (Poland)
Joël BERTRAND (France)
Alberto BRUCATO (Italy)
Pavel DITL (Czech Republic)
Ivan FORT (Czech Republic)
Matthias KRAUME (Germany)
Franco MAGELLI (Italy)
Alvin W. NIENOW (U.K.)
Uldis VIESTURS (Latvia)
Michael YIANNESKIS (U.K.)

Excused

Giancarlo BALDI (Italy)
Reinhard GEISLER (Germany)
Paul MAVROS (Greece)
Martine POUX (France)
Anders RASMUSON (Sweden)
Jarmo SODERMAN (Finland)
Felix STREIFF (Switzerland)
Serafim VLAEV (Bulgaria)

1. Program

Item 1. Adoption of the minutes of the WPM meeting held in Sevilla, Spain, June 4th, 2004

No amendments were requested and the minutes (http://www.efce.cz/wpm/minutes_2004.pdf) were adopted.

Item 1b. Report on activity of the Polish Working Party on Mixing (report from Prof. J. Baldyga)

- There are 15 active members in the Polish Mixing Group from universities and research centers in Gdańsk, Gliwice, Koszalin, Kraków, Łódź, Olsztyn, Opole, Poznań, Szczecin and Warszawa.
- Participants of the Polish Mixing Group meet at least annually on the Polish National Conferences on Chemical and Process Engineering and conferences and symposia organized and/or co-organized by the group. They are usually organized once per three years. Recent meetings include
 - The Polish Seminars on Mixing in 2002 (Olsztyn 18-20 September, 71 participants) and in Poznań in 2005 (26-29 September),
 - The Polish National Conferences on Chemical and Process Engineering (last one in June, 2004)
 - The Mechanical Processes in Chemical Engineering (last one in Skok, in 2003, 77 presentations, 21 presentations on mixing).

Materials are published in two journals: *Inżynieria Chemiczna i Procesowa* (Chemical and Process Engineering) and *Inżynieria i Aparatura Chemiczna* (Chemical Engineering and Apparatus).

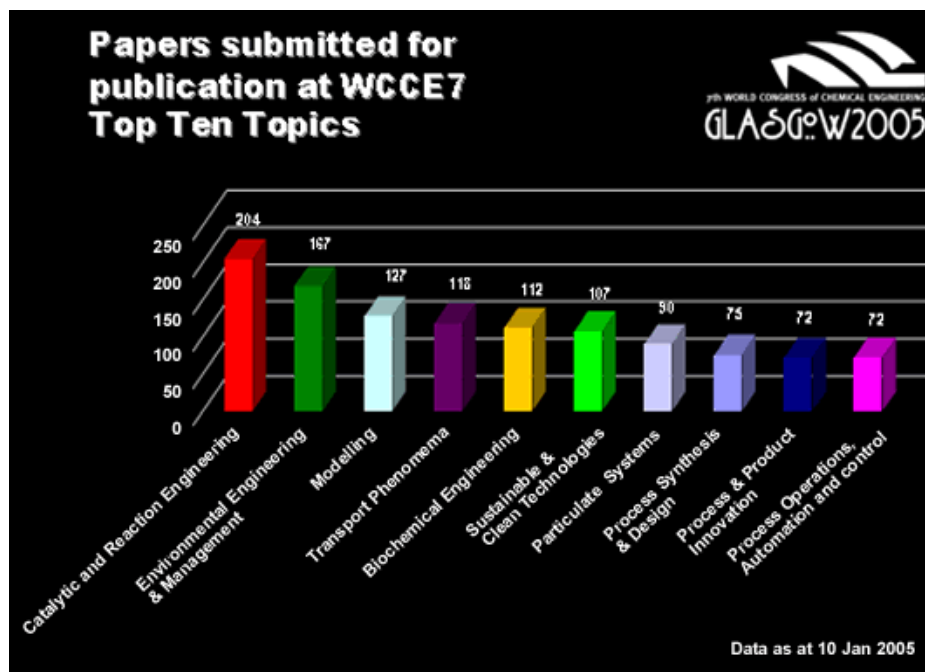
- Members of the group have also participated in the organization of international conferences, held in Poland and related to mixing. Recent examples: “Tracer and Tracing Methods” (Ciechocinek, 22-24 June, 50 participants) and 3rd International Conference on Engineering Rheology (23-26 August 2005).

Item 2. Scientific results of the 7th World Congress of Chemical Engineering.

The 7th World Congress of Chemical Engineering was held in Glasgow (UK), from Sunday July 10 to Thursday 14, 2005. Its main themes were:

- Managing complexity (263 papers, 14% of total number of papers),
- Advancing the fundamentals (725 - 38.5%),
- Molecules into money (135 - 7.2%),
- Engineering for life (520 - 27.6%),
- Science into engineering (137 - 7.3%),
- “Right here, right now” (53 – 2.8%), and
- Chemical engineering education (46 – 2.5%).

(see breakdown by subject and by origin in [Appendix 1](#)). The following figure illustrates the main research subjects addressed in the submitted papers.



Two issues of *Chemical Engineering Research and Design* were devoted to the Congress – issues **83(A6)** with keynote lectures and papers from the themes “Managing complexity” and “Molecules into life” and **83(A7)** with papers from the “Advancing the fundamentals” and “Science into engineering” themes.

Item 3. Conferences on Mixing and Sessions on Mixing of the Conferences of Chemical Engineering 2005

Prof. I. Fořt prepared a list of conferences held or to be held in 2005 related to mixing (see [Appendix 2](#)).

Item 4. Fluid Mixing VIII International Conference (London, April 10-12, 2006)

The eighth Fluid Mixing Conference is organised by Prof. Mike Yianneskis and will be held in King's College, in London, University of London, on 10-12 April 2006. So far, 67 abstracts were received from 18 countries and are being processed (www.fluidmixing8.org).

Item 5. 12th European Conference on Mixing (Bologna, Italy, June 27-30, 2006)

The 12th European Conference on Mixing is organised by Prof. Franco Magelli and will be held in Bologna, in Italy, Italy, June 27-30, 2006 (www.aidic.it/mixing2006/). One hundred and twenty seven papers were submitted, from twenty five countries.

Item 6. Statutes of the Working Party on Mixing

Various issues regarding the draft of statutes of the EFCE-Working Party on Mixing prepared by Prof. F. Magelli were discussed. It was pointed out that it should be verified that they correspond to the General Statutes of the EFCE Working Parties (see [Appendix 3](#)).

Item 7. Exchange of PhD students.

There are in Europe around 40 PhD students in the field of Mixing. It would be interesting to propose them some exchanges, that means for instance two or three months in another center of chemical engineering working in the field of mixing. This point appears to be difficult and will be discussed again.

Item 8. Research in the field of mixing for process industries.

A point was raised by the chairman and according to the conclusions of the 7th World Congress meeting in Glasgow, whether there is a real need of research in the field of mixing regarding process industries and how this research could really bring significant advances to the field. Everyone has to promote mixing inside chemical engineering and moreover to demonstrate that mixing can be applied in numerous new process industries.

Item 9. Miscellaneous.

- The members of the Working Party discussed why such a comparatively low interest has been observed from industrial partners towards our activities. Also, how to fulfill the Lisbon/Barcelona goals (1% public, 2% industrial resources). U.Viesturs proposed to supplement the study curricula at universities in line with Tables 1 and 3 in Appendix 4.
- A list of future mixing meeting events has been prepared (Appendix 5).

The next meeting of the Working Party on Mixing of the European Federation of Chemical Engineers will be held in Bologna, in June 2006, during the Mixing XII Conference.

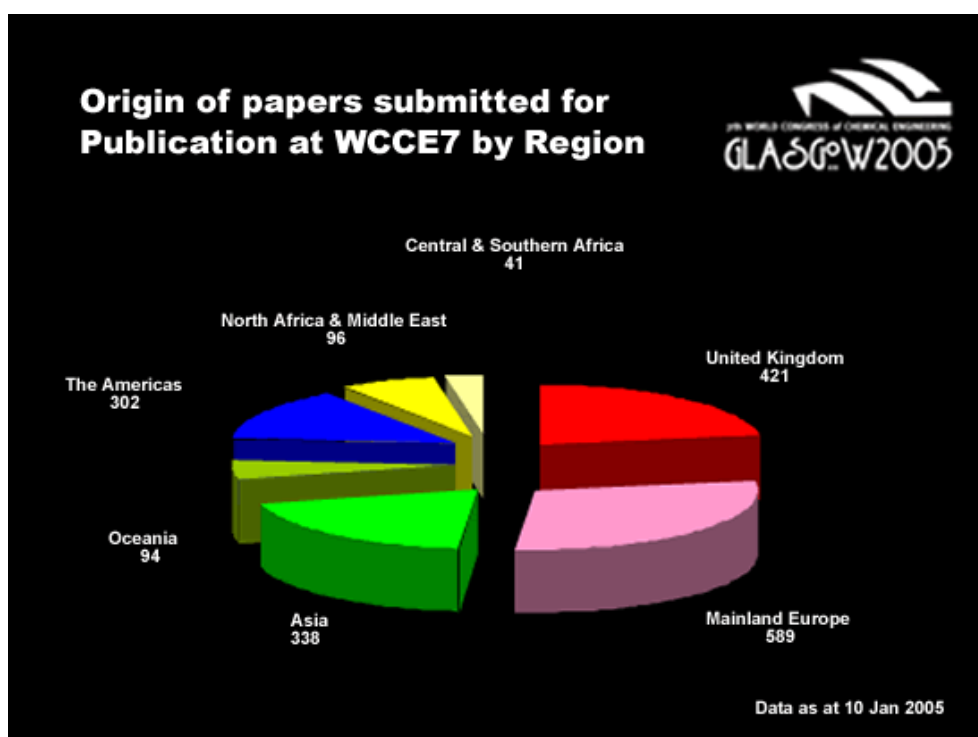
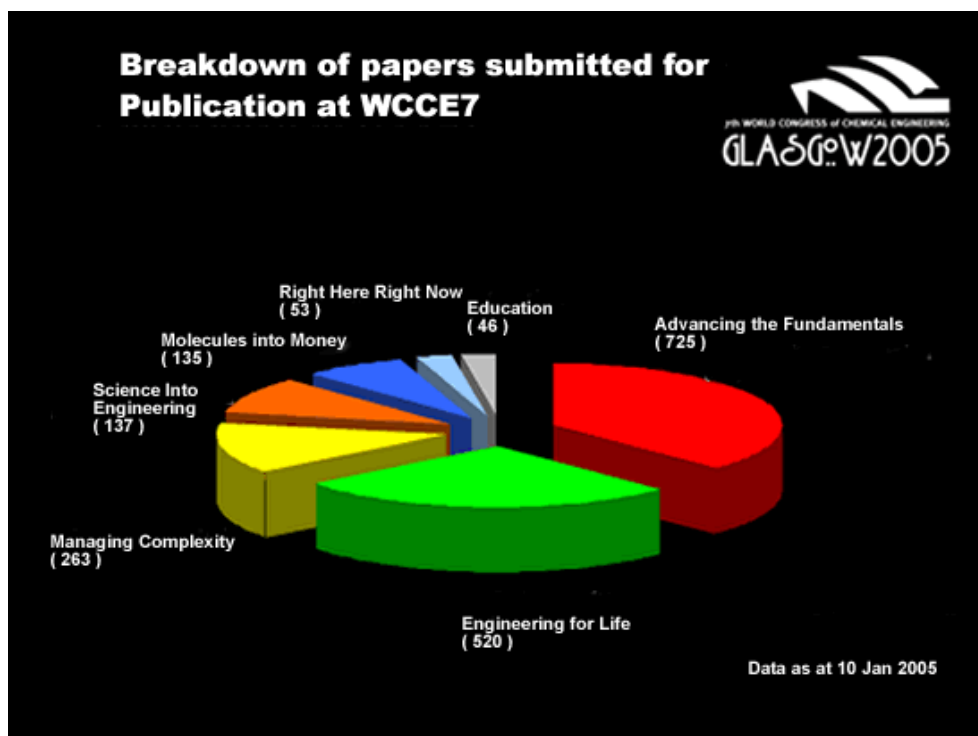
2. Appendices

- Appendix 1.** 7th World Congress of Chemical Engineering, Glasgow (UK), 10-14 July, 2005
- Appendix 2.** Conferences on Mixing and Sessions on Mixing of the Conferences of Chemical Engineering in 2005.
- Appendix 3.** Statutes of the EFCE – Working Party on Mixing.
- Appendix 4.** Facilitation of the Collaboration between Universities (Higher Schools) and Enterprises by Innovative Methods
- Appendix 5.** Future Conferences on Mixing

Appendix 1

7th World Congress of Chemical Engineering Glasgow (UK), 10-14 July, 2005

Breakdown of submitted papers by theme and by region



Appendix 2

Conferences on Mixing and Sessions on Mixing of the Conferences of Chemical Engineering in 2005

Prof. I. Fořt

Date	Title	Place	No. of papers and posters on mixing
February 11	IChemE FMPSG Research Students Competition	University of Birmingham (UK)	3
April 18-19	Arbeitssitzung der VDI.GVC – Fachausschusse „Mischvorgaenge“	Paderborn (Germany)	22
June 9-10	Mixing Processes in Chemical Engineering, Fluids and Particulates	University of Cambridge (UK)	Workshop
June 19-24	Computer Fluid Dynamics in Chemical Reactor Engineering IV	Il Ciocco Hotel and Conference Centre, Barga (Italy).	11 papers, 6 posters
June 23	8. Koethener Ruehrer-Kolloquium	Koethen (Germany)	7 papers
June 26 – July 1	20 th Biennial North American Mixing Conference on Mixing	Tigh-Na-Mara Seaside Resort, Barkswille, BC (Canada)	57 papers, 16 posters
July 10-14	7 th World Congress of Chemical Engineering	Glasgow, Scotland (UK)	2 papers, 15 posters
September 11-14	16 th Int. Symp. Industrial Crystallization	Dresden (Germany)	2 papers, 12 posters
September 26-29	10 th Jubilee Polish Seminar and International Workshop on Mixing	Poznan (Poland)	30 papers, 39 posters
October 17-21	52 nd Czech Conference of Chemical and Process Engineering CHISA	Srní (Czech Republic)	Session on Mixing (4 papers, 4 posters)
October 30 – November 4	AICHE Annual Meeting	Cincinnati, OH (USA)	Session on Mixing (47 papers)
November 8-9	Improving Mixing Processes for Industrial Applications	BHRG, Cranfield (UK)	Workshop

Appendix 3

Statutes of the EFCE – Working Party on Mixing

Approved and ratified by the Working Party on Mixing Meeting
(Poznan, 27 September 2005)

Prof. F. Magelli

Article 1: Name, Language and Location

The Working Party on Mixing (hereinafter called WPM) is an integral section within the European Federation of Chemical Engineering (EFCE), founded in the occasion of the International Symposium on Mixing, held at Mons, Belgium in 1978 and approved by the Executive Board of EFCE the same year. The inaugural meeting took place in Prague, Czechoslovakia in 1978 in the occasion of the 6th CHISA Congress.

The WPM is constituted for an indefinite period.

The WPM is subject to the law of England.

The official language of the WPM is English.

The operating office of the WPM is at the site of the approved chairman of the WPM.

Article 2: Aims and Objectives

The WPM is an international European association of individuals dedicated to the development of activities in all areas of Mixing Technology.

The main objectives of the WPM are;

- dissemination of technical and scientific information and advances in Mixing Technology in the EFCE member countries (i.e., the countries having delegates in the WPM),
- advancement of knowledge in this area on the sides of both scientific research and industrial application,
- consolidation of the links to industrial application,
- facilitating both the circulation of PhD students among qualified Universities and industrial research centres and their participation in the international mixing events,
- establishing networks of excellence and integrated projects,
- collaboration with other WP's of the EFCE for possible common, integrated activity,
- collaboration with similar international bodies (like: NAMF, the Japan Society of Chemical Engineers, etc.),
- stimulation of activities aimed at said purposes.

These last objectives are sought for by:

- information exchange about the main trends in the research on mixing performed by the EFCE member countries;
- information about conferences held or to be held in those countries;
- coordination of mixing events in the EFCE member countries in order to avoid overlapping and stimulate participation of researchers, technicians, professionals, practitioners, and manufacturers;
- preparation of recommendations for the training of the next generation of technologists;
- drafting of proposals for training courses to be organised;
- drafting of proposals for and co-operation of research tasks at European level, integrated projects, networks of excellence, etc.;
- information about activities of the national working parties on mixing of the EFCE member countries;

- stimulation of common activities in the field of Mixing Technology among the members (national WP's, institutions, companies, individuals) with the aim to broaden and improve technical knowledge in this area.

Among these last, the following actions are to be mentioned:

- comparison of mixing devices used in the EFCE member countries in terms of their performance,
- comparison of measuring techniques of interest of the Mixing Technology,
- comparison of scale-up rules,
- standardisation of mixing devices (e.g.: main types of impellers, sizes of vessels),
- standardisation of mixing terms, symbols and units,
- stimulation of studies of boundary problems between the WPM and other Working Parties of the EFCE,
- stimulation for new improvements of and research in Mixing Technology
- review of new results in R&D and application.

In addition to the traditional, consolidated areas of application of Mixing Technology, namely:

- chemical and process industry,
- biochemical and pharmaceutical industry,
- food industry,
- environmental protection and remediation,

novel areas in Process Technology and new trends should be explored by the WPM, with special emphasis to:

- product and formulation engineering,
- sustainable development and technology,
- process intensification in all the mentioned chemical/biochemical/process industries,
- micro- and nano-mixing.

Article 3: Structure

The organs of the WPM are the:

- General Assembly
- Chairman of the WPM
- Secretary of the WPM
- National delegates of the WPM approved by the EFCE.

For the accomplishment of specific tasks, the WPM can establish permanent or temporary Committees that always report to the General Assembly. The permanent Committees already activated are:

- Conference Committee
- Industrial Committee
- Awards Committee.

In occasion of the election of the WP chairman an Election Committee is to be nominated.

Article 4: General Assembly and Membership

The *General Assembly* of the EFCE-WPM consists of the Registered members. Honorary members, Invited members and Standing guests are also provided and can participate in the General Assembly.

The General Assembly usually meets at least once annually and it is valid only if the Chairman attends the meeting, which is chaired by him/her.

Registered Members:

Each EFCE member country, represented by the national bodies of Process or Chemical Engineering recognised by the EFCE (institutions, committees or the like), can nominate two delegates of its own country as members of the WPM.

The Registered members shall be qualified by their activities in Process Engineering and specifically in Mixing Technology. They should have worked for several years in the area of Mixing Technology, or/and have a profound knowledge in the scientific fundamentals or industrial application of Mixing Technology. A proper balance should be kept between industrial and academic interests. The selection of the national delegates is in full responsibility of each the national recognised body. Registered membership becomes effective after the approval by the Executive Board of the EFCE. The Executive Board of the EFCE will notify the new member of his/her registration in writing.

Where no recognised national institution or committee exists or when this does not propose any nominee, anyone qualified who wishes to join the WPM shall send his/her application to the Secretary of the WPM. His/her selection and acceptance will be made by the WPM, while the nomination is subject to the approval of the Executive Board of the EFCE. The members thus accepted are Registered members to any effect.

The Registered members shall serve for a period of three years. This period may be extended automatically for further periods of three years, subject to the approval of the Executive Board of the EFCE.

All the Registered members are committed to actively contribute to enlarge and improve the knowledge and experience in the field of Mixing Technology to meet the aims of the WPM. Should a Registered member fail to participate in the activities of the WPM for a period covering two consecutive years, the Working Party Chairman may decide to terminate his/her membership of the Working Party.

In the case a Registered member is harming the reputation, or otherwise hindering the furtherance of the activities and aims of the WPM, the Executive Board of the EFCE can expel such Registered member.

Honorary Members:

The Chairman of WPM can nominate Honorary members of the WPM. Persons eligible for Honorary membership should have given significant contributions to or improvements in Mixing Technology, and/or have done essential work for the WPM. The nominations have to be approved by a two thirds majority of the Registered members. Honorary Membership is for life.

Invited Members:

The Chairman of the WPM has the right to invite additional persons at the WP meetings. They should be working in the area of Mixing Technology and can be from EFCE countries (in addition to the two national delegates), from EFCE countries that have not nominated the delegates, or from non-EFCE countries. If an Invited member comes from a country represented by a national EFCE Member Society having full members' rights, the guest member should normally belong to the Member Society. The EFCE Executive Board's approval is not required for the Invited members. The Invited members shall serve for a period of three years. This period may be extended for further periods of three years subject to the agreement of the WPM members (delegates) by simple majority.

Standing Guests

In view of the fruitful, tight collaboration with the North American Mixing Forum (NAMF) that the WPM wishes to continue and extend, the WPM encourages the participation in the WPM meetings of distinguished NAMF representatives. The number and the names of the NAMF representatives will be agreed upon by the Chairmen of the WPM and of the NAMF. A similar privilege applies to the Japan Society of Chemical Engineering. These representatives will have the special status of Standing guests and will share all the privileges as of the Invited members. Revision of the list of the Standing guests will take place every three years. Extension of duty is allowed without time limits.

Constraints about the number of Honorary and Invited members:

The number of Honorary members, Invited members and Standing Guests should not exceed, normally, half the total number of the Registered members.

Each member – either Registered member, Honorary member, Invited member or Standing guest – are expected to participate in the announced meetings and contribute with his/her experience and proposals to all the activities of the WPM.

Article 5: Voting and Speaking Right

In case of any voting in respect of aims, organisation and standard subjects, each Registered member as well as each Honorary member, Invited member and Standing guest has one vote. Approval of any item is by simple majority of the votes (by attendance or in writing) – except for the election of the Chairman (see Article 7). Should it be necessary to vote on a controversial issue, each country has no more than two votes, which are the votes of the official national delegates.

Each Registered member as well as Honorary and Invited member has the right to submit his/her written vote or proposal in advance in case of absence during the voting, to be sent the Secretary at least one week prior to the meeting. Proxy votes will not be accepted.

Article 6: Chairman and Secretary of the WPM: Tasks, Rights and Obligations

The *Chairman* of the WPM has to stimulate, advise, coordinate, arbitrate and direct all the business of the WPM. Specifically, the Chairman is responsible for:

- ❖ Definition of medium and long-term goals
- ❖ Definition and follow-up of milestones
- ❖ Definition of the agendas of the WPM meetings
- ❖ Reviewing and organisation of all activities
- ❖ Reporting to the Chairman of EFCE
- ❖ Publishing of the WPM activities
- ❖ Organising joint meetings on selected topics with other WP's of the EFCE
- ❖ Keeping in contact with and extending connections to other international associations and institutions active in Mixing Technology (e.g.: NAMF, AIChE, Japan Society of Chemical Engineering).

The Chairman shall be entitled to a single casting vote when chairing meetings.

The *Secretary* of the WPM is responsible for:

- ❖ Calling the General Assembly/Annual Meeting when requested
- ❖ Inviting all the Registered members as well as the Honorary and Invited members and Standing guests and distributing the agendas
- ❖ Writing, controlling and distributing the minutes of the meetings
- ❖ Collecting the reports on activities and results of the national Committees
- ❖ Inform the Chairman of the WPM of all activities and results
- ❖ Coordinating workshops with other associations active in Mixing Technology.

The Chairman and the Secretary will be supported in their activity by the national associations/committees for Mixing Technology and by all members of the WPM.

The National Societies members of the EFCE hosting the WPM Chairman and Secretary are expected to properly support the Chairman's and Secretary's action.

Article 7: Chairman and Secretary of the WPM: Appointment and Term of Office

The Chairman of the WPM shall be elected and nominated through confidential election exclusively by the Registered members and Honorary members of the WPM in charge at the time of election, during a meeting where this election is provided formally, among the Registered members (i.e., the national delegates). The election shall be by a two-thirds majority of the delegates and honorary members present and voting.

The term of office of the Chairman is four years but he/she may thereafter be re-elected for a further term of four years.

The Chairman has the right to propose a Secretary to the Working Party. The Secretary shall be elected by simple majority of the Registered members and Honorary members present and voting.

The election of the Chairman and the Secretary should take place at the same meeting. There are no constraints as for the countries of origin of the Chairman and the Secretary. After each period of office the Chairman and the Secretary have to be released from their duties and obligations before starting the new election.

Article 8: Special Committees

According to the provisions of Article 3, the following Special Committees are set up within the WPM to facilitate the work of the Chairman and the Secretary of the WPM. Each Committee is made of three WPM members.

Industrial Committee (standing committee):

The Industrial Committee focuses its activities in the exchange of information with the European mixing manufacturers, their different production lines and new industrial applications and research.

Conference Committee (standing committee):

The Conference Committee is responsible for the collection of news about (i) international conferences on mixing held in Europe and all over the world, (ii) national conferences on mixing held in European countries or overseas, (iii) mixing sessions in the main international or national conferences in Process Engineering, (iv) the main international or national conferences in related field. The main goal is to inform the WPM about such events and the progress in R&D as well as to avoid overlapping of the main events related with the activities of Mixing Technology in the EFCE member countries.

Awards Committee (standing committee):

The Award Committee is responsible for the selection and proposal of possible candidates for the WPM Awards for

- Young Workers Award,
- Recognition Award.

The Awards must be approved by at least 50% of the Registered and Honorary members.. The recipient of the new Awards will be announced in occasion of the following European Mixing Conference. The Awards will be usually granted from industry.

Election Committee:

The Election Committee is responsible for gathering and checking the votes in occasion of the election of the WPM Chairman and Secretary. It is to be nominated by the WPM one year prior to the meeting when the election will take place.

Article 9: Winding-up of the Working Party

The decision whether to wind up the Working Party shall be taken by the EFCE General Assembly, on the proposal of the Executive Board, based on a recommendation by the Scientific Vice-President. The WPM can vote to discontinue its activities. A vote of two thirds of the Registered members (national delegates) present and voting is required to this purpose.

Article 10. Other Matters.

For any other issues and matters not specifically covered in this Statute, the ***Guidelines For Working Parties*** currently in force (as approved at the Meeting of the Executive Committee of ECFE on 13 June 1977 at Rovaniemi, Finland, and subsequently amended by the General Assembly) shall apply.

Appendix 4

Facilitation of the Collaboration between Universities (Higher Schools) and Enterprises by Innovative Methods

U. Viesturs ¹ and A. Zilevica ²

¹ Innovation Relay Centre, 27 Dzerbenes Str., LV-1006 Riga, Latvia, <http://www.lza.lv/scientists/viestursu.htm>

² University of Latvia, 1a Šarlotes Str., LV-1001 Riga, Latvia, <http://www.lza.lv/scientists/zilevica.htm>

Introduction

The well-known Lisbon / Barcelona goals [1] are unattainable without the relevant updating of study curricula.

A part of the population (10-15%) must feel an aspiration for creation (inventions, innovations). To foster this is the task of universities. The educational system, first of all, higher education plays a considerable role in establishing the above-mentioned approach. We must teach students to become not only skilled employees, but also innovative employers. Actually, we must assure the continuity in the ERTDI(+I)P line [2, 3], where:

E - higher education;
RTD - development of technologies / products / services;
I - implementation;
+ I - special methods for commercialisation of RTD results;
P - production

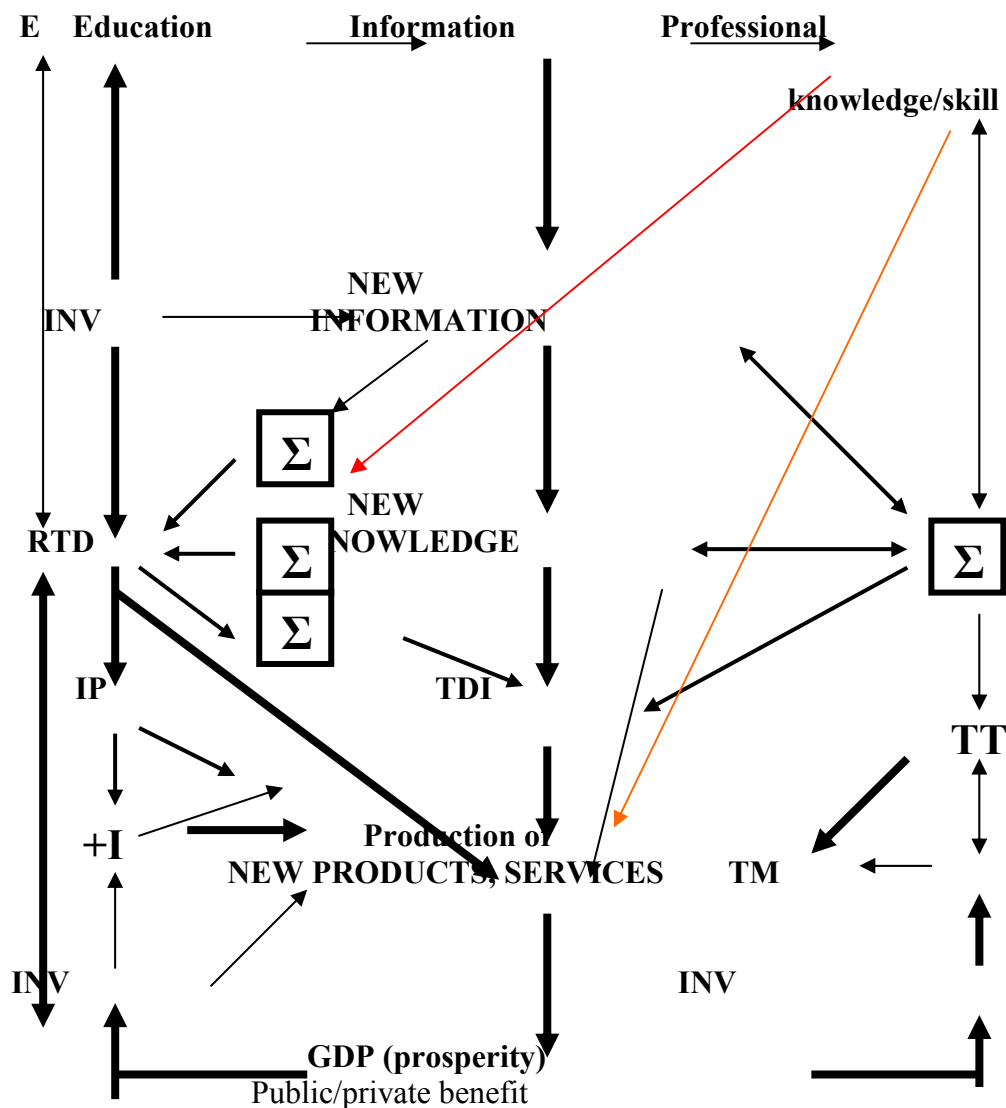
The commercialisation of RTD results (I, +I, P steps) could be facilitated mainly by the interactions between the driving forces of progress: technology performers, private / public investors, independent experts (technological / financing auditing), the public, policy-makers (state and municipal levels) [4-6] keeping in mind sustainable development, especially environmental issues [2]. The interactions could be as follows:

- enterprise-driven, when the ERTDI chain meets industrial needs,
- state's, facilitated by the financial and legislative intervention at different steps of the chain, for example, the support of all known instruments such as bioincubators, science parks / centres, etc.,
- collaboration between universities and enterprises (very versatile relation).

Aims

The aims of the present paper were as follows:

1. analysis of the possibilities to improve the interactions along the whole chain: education – research – production (Fig. 1);
2. elaboration of recommendations for correction of study curricula, at least within professional programs.
3. development of evaluation principles of RTD results.



- Σ – EUREKA (I have found / created it: appearance of the initial idea)
- TT – technology transfer
- TM – technology multiplication
- INV – investments - public / private
- IP – intellectual property

Fig. 1. Full scenario of the activated ERTDI+(I) P system [7].

Methods

The methods used were as follows:

- analysis of specialised information, for example [3, 7-9],
- interviews with
 - students in biotechnology, industrial microbiology, food technology,
 - spin-off companies in biotechnology and bioengineering,
 - and entrepreneurs,
- analysis of the state of the art (success stories).

Results and Discussion

Professors (all teachers) must have industrial (or other practical) competence

Traditionally, the general content of higher education includes acquiring of:

- 1) theoretical knowledge, which provides a basis for a profession during study courses;
- 2) skills, which are necessary for practical professional activities;
- 3) knowledge and skills, which set the stage for research and development within a professional field;
- 4) a knowledge of the conditions in society, which affect the economic situation;
- 5) an understanding of other countries' experience and international circumstances that are important for a student's professional job.

Table 1. Typical (A) and suggested (B) functions and activities

Functions of universities:

development of knowledge;
accumulation of knowledge;
return of knowledge;
development of new products, services (not always recognised as the responsibility of classical universities)

Activities realised by teachers:

- A – Professors and scientists well known in the corresponding scientific field; authors of monographs, scientific articles, etc.; leaders of scientific research projects.
- B – Professors, high-quality specialists in a professional field.
Experts and advisers in a profession, heads of professional associations and other leaders of practical projects.
Criteria: patents, certificates, licensing of IP, the spin-off process, IPO in the stock market, expertise in relevant branches of industry or other practical applications, etc.
-

An optimum is a combination of A and B.

However, competitiveness and globalisation are currently hot key words and reality in the job market. Therefore, extending of expertise (A + B in Table 1) is very desirable. In variant A, the existing criteria to be nominated as professor at the University of Latvia, for example, are shown in Table 2.

Consequently, to ensure the continuity and working linkages from E to P, restructuring of study curricula is among the most important measures. To do that, the universities, firstly, have to reshape the competence and professional standards for university (higher school) teachers. The compatibility among graduates and also university teachers must be a very strong concern.

Table 2. Criteria for assessing the scientific and pedagogic qualification of an applicant for a professor (associated professor) position

1. Scientific qualification

Scientific publications
Participation in scientific conferences (with reports)
Leadership of research projects and programs or participation in their implementation
Expert activities in Latvian Science Councils as well as international projects and programs
Received patents and licenses

2. Pedagogic qualification

Leadership of PhD student work
Leadership of master work
Leadership of lectures and seminars (courses)
Elaboration of study courses (subject) programs
Elaboration and leadership of study programs
Compiling of textbooks and teaching aids, and submission for publication, or published works
Advanced training in higher schools or research institutions abroad and in Latvia
Delivering lectures in higher schools abroad

3. Organizing competence

Leadership of scientific and academic commissions or collegiate institutions or participation in their activities
Leadership of organizing commissions of international conferences or participation in their activities
Leadership of editorial boards of scientific editions or participation in their activities
Leadership of higher schools, faculties, institutes, professor groups, chairs, laboratories
Leadership of international scientific, academic or art associations or participation in their activities
Officially certified adviser to state, municipal and other legal bodies, enterprises

4. Other criteria

Research activities in a higher school or research institution abroad and publications on the obtained results in international quotable or non-quotable editions
Work on the teaching staff in a higher school abroad

5. Length of service of academic and scientific activities

from which, in higher school,
as associated professor or professor
years of academic activities or the amount of work equalized to them

In order to increase the compatibility on the university level, especially after graduating:

1. We have to start with the correction of the study curricula:
 - to teach creativeness
 - to teach also entrepreneurship
 - to suggest / advise / teach students to become employers
 - to teach the formation of target-oriented products, which includes the following steps:
 - a) problem formulation (need, opportunity),
 - b) problem restatement,
 - c) idea development (use brain-storming rules, get as many ideas as possible,
 - d) solution – find positive and negative aspects, develop any idea to find a solution,
 - e) planning,
 - f) control.
2. To correct the structure of public investments:
 - to increase investments in applied R and D
 - to invest in marketing of R and D products
 - to improve the tax policy in favour of new / better products in the market encouraging a regulatory environment.
3. To change the attitude (climate) in universities and to declare that their concern is the full formula ERTDI(+I)P, not only E and R, as it is, unfortunately, now in the majority of European universities.
4. To activate the so-called innovation programs, which means state incentives (taxes, joint financing, etc.) for TDI steps – implementation of special methods to facilitate the commercialisation of RTDI results (+I in the above-mentioned formula).

As a result, we could expect an increase in new high-tech products and simultaneously IPO and other innovative indicators.

Simultaneously, methods for evaluating RTD results and PR issues during the earlier steps (ERTDI) of the knowledge flow must be improved, at least according to the above-mentioned items (Table 3).

Principles of estimation of RTD performance

The evaluation of RTD results [10] has been always the subject of discussion and misunderstanding. How to prove in front of taxpayers that the money spent for RTD has been consumed usefully is a permanent problem. In other words, the payback period sets in only when production P has started, and the market accepts the product. So, during RTDI(+I) steps, mainly the evaluation and formation of public opinion are the tools for motivation of financing, for example, according to the following key items shown in Table 3.

An official method accepted in EU25 for innovation performance evaluation could be found in [10], also professional associations, for example, EuropaBio, which could contribute a lot [11].

Table 3. Possible indicators for evaluation of RTD steps (audited values)

I-1 –	scientific publication in international and local editions
I-2 –	reports at conferences
I-3 –	developed methodology
I-4 –	experimental samples for assessment (price, market niche)
I-5 –	data-out (flow sheets, regimes, process control, etc.) for pilot equipment designing
I-6 –	flow sheets, instructions, maintenance schedule, technical standards
I-7 –	development of laboratory research and experimental demonstration equipment
I-8 –	teaching aids (learning materials) for students
I-9 –	promotion work
I-10 –	written (official) interest from any industrial partner with willingness to shared financing
I-11 –	patent and other forms of IP protection, licensing
I-12 –	feasibility and market calculations
I-13 –	possible spin-off process, establishing of separate targeted SME
I-14 –	IPO on the stock market or other types of attraction of investors
	Indicators, calculated in advance (when the P step is performed):
I-15 –	Jobs created
I-16 –	Turnover created
I-17 –	Taxes paid

What is innovative SME

The most contingent final step of the ERTDI+I chain is establishing of innovative SME as a result of spin-off or similar procedures in order to perform the P step of the knowledge flow chain described above.

The evaluation – what is an innovative SME always causes discussions. We propose the variant of a feasible definition of an enterprise nominated as innovative.

An enterprise is regarded innovative [12]:

- which, within the recent 3 years, has launched the production of at least one new competitive product or rendering a service, or has applied the new technologies to the competitive multiplication of the existing products;
- whose new product or service is based on the knowledge gained at the enterprise itself, investing no less than 0.5% from the annual turnover, or collaborating with scientific

research institutions (universities), experts in individual fields or with other enterprises in Latvia or abroad;

- at which at least 25% of the turnover is formed by the products or services, whose realisation in the market was started not earlier than 5 years ago;
- whose profit from the new (not older than 5 years') products or services is at least 10% from the total profit;
- whose new products produced or services rendered yield at least 5% of the annual turnover.

Conclusion / Recommendation

Focusing of attention on the continuity of ERTDI(+I)P processes that start in universities (even in pre-university schools) and end in industry is a very important issue for strengthening the EU25 competitiveness in compliance with the Lisbon / Barcelona goals. Restructuring of higher education curricula and professors' professionalism is the most important issue.

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Appendix 5

Future Conferences on Mixing

2006

- Fluid Mixing VIII (London, April 10-12),
- 12th European Conference on Mixing (Bologna, June 27-30),
- 17th International Congress of Chemical and Process Engineering (CHISA, Prague, 27-31 August),

2007

- 21st North American Mixing Forum meeting (place / date to be announced)

2008

- 18th International Congress of Chemical and Process Engineering (CHISA, Prague, date to be announced),
- 6th International Symposium on Mixing in Industrial Processes (place / date to be announced)

2009

- 13th European Conference on Mixing (London, date not announced yet),
- 22nd North American Mixing Forum meeting (place / date to be announced)

2010

- 19th International Congress of Chemical and Process Engineering (CHISA, Prague, date to be announced),

2011

- 23rd North American Mixing Forum meeting (place / date to be announced)

2012

- 14th European Conference on Mixing (Poland; place / date to be announced)