



Platform Bèta Techniek

A European Good Practice
in search of exposure and cooperation

May 2009

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Introduction

On November 10th and 11th 2008 The Platform Bèta Techniek (Platform Science and Technology) organised an international summit on Math, Science and Technology: The Dutch Experience in Amsterdam, The Netherlands.

At this summit three objectives were addressed: The Netherlands presented The Dutch Approach toward getting more young people interested and choosing MST in Holland; the summit provided opportunities to people working in that field from different countries to connect, and the basis was laid toward a new international political agenda.

At the end of the day The Platform shared their intention to present a working paper as a follow-up of this summit. This working paper is aimed at the participants and other interested parties.

The Platform Bèta Techniek is described first: it's goals and strategy are described, as are the programmes, activities and the results that were obtained up till now. The chapter closes with a paragraph on what The Platform considers to be the remaining challenges for the future.

Next the Platform presents its international ambitions: what added value can the Platform Bèta Techniek give to the goals and challenges Europe is facing in terms of innovating the MST education and getting more young people interested in MST careers? And what goals has the Platform set towards creating an exchange of knowledge and experience between The Netherlands and other European countries.

This paper closes with an invitation to collaborate and join in deliberation in the remaining challenges.

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Platform Bèta techniek

2.1 Introduction

In 2004, The Netherlands formulated their ambition to become a prominent knowledge economy, a leader in the areas of education, research and innovation in the Deltaplan Science and Technology. This ambition was based on the Lisbon agenda set by the European Union. We want to be economically competitive and socially innovative. In order to excel, The Netherlands need a boost in Math, Science and Technology, both in research and education.

The Deltaplan Science and Technology describes the goals set to create a society in which better use is made of technology and human talent and where we can successfully introduce innovation: we need 15% more MST-graduates and an increase in young people choosing a MST-career as well as better retention of those who have chosen MST (-careers) in 2010.

Since its inception in 2004, The Platform Bèta Techniek has aimed to achieve these very goals in 2010. It is a foundation with an independent board, run mainly with governmental resources (60 million Euros per year). The Platform advises the government on MST and educational issues en collaborates closely with schools and institutes.

2.2 Goals and Strategy

The goals of the Platform are to increase young peoples' choice and subsequently to retain these youngsters for MST. But there

is more to it than that. Using a broad approach, the Platform aims to create a talent base for the future: more people in MST who have broader skills, and an increased affinity with science and technology in the entire population. In addition it aims toward more effective deployment of the talented professionals already in the job market with particular attention paid to women and ethnic minorities.

The Platform has chosen an innovative strategy to reach these goals. The main characteristics of the strategy are:

- a holistic approach;
- working through bottom-up involvement and broad participation of schools and organisations;
- closely linking innovation and outcome together with a broad approach from primary education through the total educational chain up to the labour market.

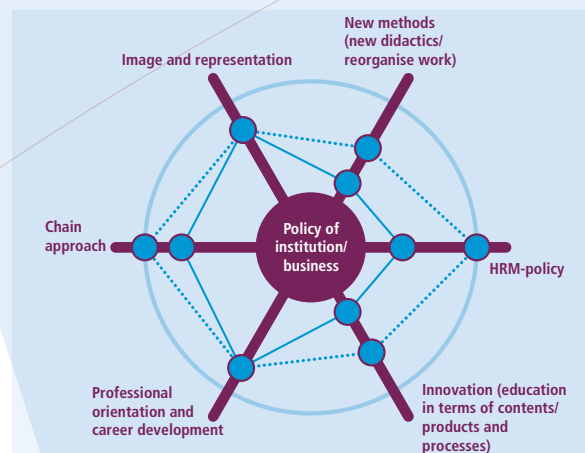
Introducing a high-trust strategy was the largest paradigm-shift in stimulating and rewarding (results through) innovation in education: schools and institutions define their own ambition and approach to innovation (contributing to the 15% increase-goal), aiming at making (innovation of) MST part of the schools policy. The formulated ambitions then form the foundation for performance-innovation-agreements. This means that the Platform approach doesn't revolve around project plans or subsidization of projects. Not all schools participate, only those

who choose to make a real effort. Participating schools and institutes earn their grants by successfully innovating their MST-education resulting in more youngsters choosing MST. The grants are conditional on reaching their own set ambitions and goals, and schools and institutes are free to use the grant for anything they feel is appropriate or useful.

In the performance-innovation agreement the schools agree to participate in a system of monitoring and auditing. On the one hand this system is to establish whether the ambitions and goals are reached. The second major goal is to learn from the chosen innovations: to gather information on what truly matters, what aspects of the innovation strategy really contribute to the results reached. Each year external experts visit the participating schools and institutes (to audit) and interview management, teachers and students on the innovations and results. Information gathered through the monitor is used during these interviews. The audit has several goals: gather information in order to review the progress of the schools, to provide the perspective of critical friend (the experts) to support the schools in their approach and ambition and to gather information on good practices, proven concepts and evidence-based innovation. The Platform then uses the outcomes of the system of monitoring and auditing to decide whether schools and institutions can continue in the programme and/or earn their grant for the year.

In order to enhance their innovation and success the Platform and its programmes offer the schools a framework of success factors:

Figure 1. The framework of success factors



This framework helps to focus on what aspects can be integrated in the school's approach or innovation. But it not a blueprint: every participating school or institute is free to chose its own focus and its own path - as long as it leads to the desired outcomes.

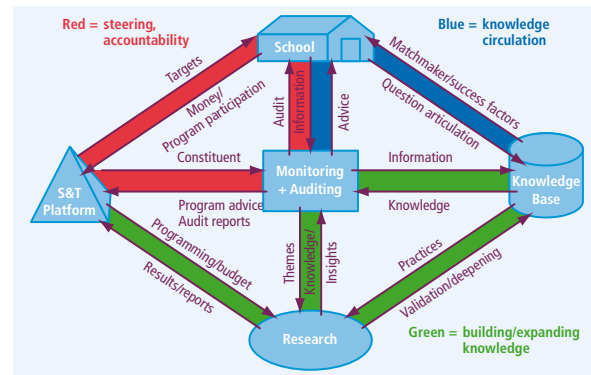
Furthermore, the Platform enables and empowers the schools in exchanging knowledge and experience with each other and other parties in the educational chain, through conferences,

master classes, expert meetings, workshops, etcetera. These events are usually organised around a theme that is important to all participating organisations, such as how to reach certain target groups (girls, minorities, etc) or how to improve the transition between for example secondary and higher education.

When challenges and questions remain, the Platform commissions further research on a variety of fields and themes. The outcomes of the monitor and audit together with the outcomes of research activities form the knowledge base of the Platform, which is then searched for information that can be usefully implemented in the different programmes and activities.

In Figure 2 the complete integrated strategy (the Platform Bèta Techniek Innovation Model) is schematised:

Figure 2. The Platform Bèta Techniek Innovation Model

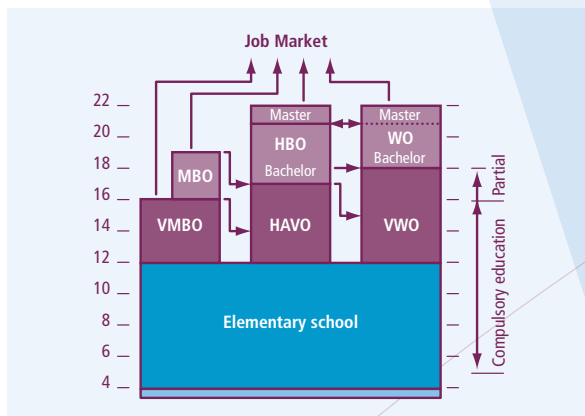


2.3 Programmes and activities

To give the MST-movement the power and drive it needs, focus is required. A good organisation and clearly defined goals make it possible to indeed realise innovative ideas. Using her expertise and experiences regarding the world of science and technology, the Platform developed programmes throughout the educational chain. Tailored to various sectors of education and the labour market, these programmes give schools, institutes and sectors the opportunity to take control of implementing their ambitions in the field of math, science, technology and innovation.

The following figure shows the Dutch educational system:

Figure 3. The Dutch Educational System (source: Wikipedia)



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As is shown after elementary school children choose their path, based on their competencies, skills and interests. The vmbo (voorbereidend middelbaar beroepsonderwijs, literally, "preparatory middle-level vocational education") education lasts four years, from the age of twelve to sixteen. After vmbo pupils either enroll in the job market or mbo. Mbo (middelbaar beroepsonderwijs, literally, "middle-level vocational education") is oriented towards vocational training. Many pupils with a vmbo-diploma attend mbo. Mbo lasts one to four years. After mbo (4 years), pupils can either enroll in hbo or enter the job market.

The havo (hoger algemeen voortgezet onderwijs, literally, "higher general continued education") has five grades and is attended from age twelve to seventeen. A havo diploma provides access to the HBO-level (polytechnic or applied sciences) of tertiary education. The vwo (voorbereidend wetenschappelijk onderwijs, literally, "preparatory scientific education") has six grades and is attended from age twelve to eighteen. A vwo diploma provides access to wo training, although universities may set their own admittance criteria (e.g. based on profile or on certain subjects). In both havo and vwo children get to choose a profile: a set of different compulsory subjects that make up the largest part of the pupil's school schedule in the last two (havo) or three (vwo) years, that are together called the Tweede Fase (literally, "second phase").

There are four profiles:

- Culture&Society
- Economy&Society
- Nature&Health
- Nature&Technology

Each of then profiles prepare students for specific fields in tertiary education.

With an mbo (4 years), havo or vwo diploma, pupils can enroll in hbo (Hoger beroepsonderwijs, literally "higher vocational or professional education"). It is oriented towards higher learning and professional training, which takes four to six years. The hbo educational process is standardized as a result of the Bologna

process. After obtaining enough credits (ECTS) pupils will receive a 4 years (professional) Bachelor's degree. They can choose to study longer and obtain a (professional) Master's degree in 1 or 2 years.

With a vwo-diploma or a propaedeutics in hbo, pupils can enroll in wo (wetenschappelijk onderwijs, literally "academic education"). Wo is only taught at a university. It is oriented towards higher learning in the arts or sciences. The academic educational process, too, is standardized due to the Bologna process. After obtaining enough credits (ECTS), pupils receive a Bachelor of Arts, Bachelor of Science or Bachelor of Laws degree. They can choose to study longer in order to obtain a Master's degree of different fields. At the moment, there are four variants: Master of Arts, Philosophy, Sciences, and Master of Laws. A theoretical Master typically lasts one year, however the majority of practical (e.g. medical), technical and research Masters require two or three years.

2.3.1 Programmes of the Platform: throughout the educational chain

The Platform Bèta Techniek aims to commit schools, organisations and institutions in every part of the above described educational chain through various programmes. Below a description of a few of the important programmes are given.

- **Primary education/Elementary:
VTB, VTB Pro and Curious Minds**

The VTB Programme (Broadening Technical Education in Primary Education) is designed to help primary schools integrate science and technology into their teaching. During a three-year period, schools receive financial, organisational and subject-specific support to put this into practice in their own way.

In addition, VTB-Pro provides teachers (and prospective teachers) with training and guidance on how to integrate science and technology into their lessons. The aim of the VTB Programme is to bring children into contact with science and technology, so that they can discover their scientific and technical talents and develop a positive attitude towards science and technology. Through training VTB-pro helps teachers and teacher-trainees to deepen their knowledge and become competent in the fields of science and technology for primary education. 10.000 Teachers in total will be educated in this programme by one of the Colleges of Primary Education. These Colleges cooperate with Knowledge Centres of Science and Technology (installed in aid of this programme). These Knowledge Centre (cooperations of Universities, Polytechnics and Colleges of Primary Education) draft the instructions and lessons, develop further knowledge and take care of distribution to the Colleges and primary schools.

Everyone who looks closely at toddlers or kindergartners will notice astonishing talents. Young children appear to be very good at logical reasoning, recognizing patterns, finding their way around and at constructing. Yet, what strikes us the most is how they "sparkle" in their amazement about the world around them. The Dutch Programme Curious Minds (in Dutch: Talentenkracht) is aimed at finding ways to map, preserve and develop these talents, so as to prevent them from withering away.

- **Secondary Education (havo and vwo):**

- **Universum Programme / Jet-Net**

In the Universum Programme 120 havo (higher secondary education) and vwo (pre-university secondary education) schools seek to excel in science & technology education. The programme helps these science & technology oriented schools to pursue their own technical aspirations and educational ambitions. To become an Universum school the schools has to undergo a selection based on their ambitions and current activities. Each Universum school takes another school under its wing to help it follow the same route towards scientific and technological excellence.

To help the schools the Universum Compass gives them a framework of success factors and the Programme organises a lot of activities to stimulate exchange of experience and knowledge.

The Universum Programme is working closely with Jet-Net.

Jet-Net, an European Good Practice, is a joint venture between a number of larger Dutch companies and pre-college schools in the Netherlands. The Dutch government is also involved.

Jet-Net companies help schools improve the appeal of their science curriculum by offering a great variety of activities, as well as allowing pupils to gain a better understanding of their future career prospects in industry and technology. In 2002 five industries started this ambitious programme. Now, in 2008, over 35 industries, 10 partner organisations and 160 schools are participating. Next to the regional cooperation of industries and schools there are three major national events: the Jet-Net Career Day, the National Jet-Net Teachers Day and Girls Day (25 companies involved). In the Meet The Boss Debates, pupils get to speak with the big bosses of industries (now 15 companies and 60 schools).

In five years a lot has been learned regarding criteria for success: commitment is number one, followed by "learning by doing". In addition, a range of smaller programmes and activities have been developed, e.g. company assisted research, guest lectures, workshop@school, expert meetings and teacher workshops.

- **Vocational education/vmbo and mbo: Ambition Programme**

The challenge facing VMBO-schools (pre-vocational education) and MBO (intermediate vocational education) participating in

the Ambition Programme is aligning their educational offerings with young people's preferences and the labour market demands. The first results show that with relevant and attractive education programmes more young people opt for science and technology and subsequently progress to advanced training and rewarding jobs in the field. At the end of 2008, 120 VMBO-schools and 27 MBO-schools participate in the Ambition Programme.

The programmes for both VMBO and MBO are characterised by strong collaborations with other organisations, such as Technocentra (independent intermediary network organizations), Het Platform Beroepsonderwijs (Vocational Education Platform) and Leren&Werken (Learning & Working, a project to promote employee education).

- **Higher Education (hbo and wo): Sprint Programme**

The Sprint Programme focuses on higher education. 13 Universities and 17 higher vocational institutions with science and technology courses participate in the programme. They play a pivotal role in making a success of all science and technology efforts earlier on in the educational chain. Following the bottom-up strategy presented before, the Sprint Programme agrees on clear objectives with the higher education institutions and universities and actively supports them with expertise. The Platform supports and stimulates the building of regional partnerships aimed at covering the entire education

path and the strengthening of the ties between higher education and businesses (linking up with the key areas or sectors of the Innovation Platform, see below).

2.3.2 Additional programmes and activities

- **Teacher Mobility: Sprint-UP**

Sprint-Up, or the mobility programme for secondary and higher education, is a programme in which teacher of both sectors are exchanged. For every secondary teacher that takes up a part-time job in higher education, two higher education teachers do the same at the secondary level. This way an exchange of 400 secondary and 800 university teachers is arranged between 2007 and 2010. This is arranged in a regional context, through pre-existing networks of secondary schools and universities.

- **Teacher Upgrading: Dudoc**

With the support of the Ministry of Education the Platform started Dudoc: academic research regarding didactical innovations of MST-subjects by secondary teachers. The goal is to support the work of committees that are currently innovating the curricula and exams for MST-subjects by doing applied research. Since September 2007 over 20 teachers have started in this programme. They combine their research with teaching in secondary schools.

- **Mentoring: MST 1 on 1 (and PAT)**

MST 1 on 1 (in Dutch: Bèta 1op1) is part of the Sprint Programme. Every university implements this activity in its own way, from its own perspective. The main characteristic is the use of student mentors/tutors. These mentors provide students of in their last two years of secondary schools the opportunity to get personally and intensely acquainted with higher education in MST-subjects.

This programme has found a further development in PAT: personal assistant teachers. All secondary level schools have the opportunity to attract a MST-student as a personal assistant to the teachers. This way a part of the workload can be compensated and knowledge transfer from university to schools is organised in an organic process.

- **New communication paradigm:**

- **MST-mentality Model (Bètamentality Model)**

Inspiration, motivation and talent are key elements in choosing a study and career in Math, Science and Technology. But what exactly does inspire and motivate youngsters and students? What are their underlying goals, expectations and values that determine their choices in life and choices in study and a later career?

Where traditional segmentation studies focus on demographics or lifestyle, the Platform commissioned a segmentation study that looks further under the surface: a study focusing on the

level of (often subconscious) values. Based on the principles of the 'Mentality' research performed by research agencies Motivaction and YoungWorks dozens of youngsters were questioned regarding their attitude towards MST. The various differences in values found were input for a much larger representative quantitative study. This study resulted in a model leading to a segmentation based on 'MST-Mentality'. With this segmentation in hand we understand better what kind of story we are actually telling youngsters when we talk about MST and we learn how to better connect with different types of students. With this value- and attitude segmentation the Platform can improve its targeting and communication strategies on all levels: On a personal level, in classrooms and in recruiting, education and communication. Even corporate strategies of institutes and departments have been changed based on insights of the MST-MentalityModel.

- **Relation Education and job market:**

- **Programmes of Innovation**

Innovation is crucial to the economical position of the Netherlands. Consequently, the Innovation Platform formulated key-sectors in which our country holds a strong position and can expand on. These are the sectors in which the Dutch knowledge and industry flourishes and where chances are greatest to reinforce the competitive position of The Netherlands. For each of these sectors an innovation

programme has been formulated. To stimulate these innovation programmes the Platform Bèta Techniek has introduced the concept of Human Capital Roadmaps: an in depth analysis of the sector-specific shortages on the labour market linked to a long-term plan on attracting and retaining people in the sector.

- **International cooperation**

In the final years towards 2010, the Platform is focusing more and more on international cooperation. It wants to support the exchange knowledge and experience, and aims to collaborate

both on setting international political agendas as well as on effectuating activities. The international summit, the Dutch Experience, was the official kick-off for the international ambitions of the Platform. In chapter 3 we will discuss the international ambitions of the Platform in more detail.

2.4 Results

Below we present a chart with an overview regarding the participation in and outcomes of the described programmes:

Sector	Programma	participation	additional	Results Nov. 2008
Primary education: elementary schools	VTB	2530 out of 7500 in 2008	Training of: 10000 (future) teachers	85% on track Attitude test
General secondary education: havo/vwo	Universum Programme	180 schools (out of 450) + extra: 150 "following schools	Jet-Net Phd tracks for teachers	+18% at havo and +15% at vwo between 2000 and 2007, large increase girls
(pre) vocational education: vmbo/mbo	Ambition	120 pre-vocational schools Vocational: 27 (out of 60)	vocational training colleges	proportional growth + 9%
Higher education: hbo/wvo	Sprint	All universities (10) and all "university colleges" (18)	Exchange of 800 professors with 400 secondary school teachers	enrolment hbo +9% and university: +26,7%
Labour market	ACT	6 cooperation's of industries with a couple of hundred companies	6 Regional contracts Technet network HRM road mapping	1000 companies

2.4.1 Synergy, cooperation and networks

In addition to the already impressive quantitative results, the comprehensive qualitative results are quite remarkable too. For twenty years the Dutch public opinion considering science and technology was characterized by a negative tone. MST was not an issue in schools and institutions, and school management and teachers were tired of top down changes of the educational system. There was a lack of cooperation between organisations leading to inefficiency and 'reinventing the wheel' many times over.

Now in 2008, we can conclude that this all has been turned around. A vast majority of the schools and institutions participate in one of the programmes: with great enthusiasm and good results the MST education is being improved and youngsters are encouraged to choose an MST subject. Over 50% of the secondary schools have chosen MST as the most important focus for innovation and marketing. An extensive network analysis study has shown that the networks between higher education and secondary education (mostly regional) and between secondary and primary education (mostly local) are growing fast. On a large scale innovation in educational content and didactics are designed and implemented. And the knowledge on what works and what doesn't is increasing.

The Platform Bèta Techniek has created synergy and has become a serious and well accepted partner for both

government, the schools and institutions toward stimulating the Dutch knowledge economy.

2.5 Remaining challenge: sustaining the approach and results

With another two years to go, the Platform is now focusing on the remaining challenges. Already quite a lot has been achieved, both quantitative and qualitative as we described in the previous paragraphs. But there are still questions unanswered and there are programmes that face challenges for the future. The fundamental question then becomes, Who will be giving this ongoing attention when the Platform ceases to exist after 2010? How can the Innovation Model of the Platform be made sustainable? How can schools and institutions be stimulated to continue their innovation and ambition, especially when grants and support of the Platform no longer exist?

That is the biggest remaining challenge for the Platform, and in their sustainability-phase (2009 – 2010) it will seek ways to meet this challenge.

3

The Platform Bèta Techniek: building international relations

3.1 The Platform: a European good practice

There are many programmes, activities and organisations in Europe trying to reach similar goals, with varying results. And a lot of research has been done on how these programmes and organisations work, what good practices can be found and which results matter the most.

In reading these studies and interacting with partners in other countries, it seemed that The Platform Bèta Techniek was a unique organisation. As far as we know, the Dutch government has chosen a policy approach that is unique: it installed an organisation and made it responsible for the developing and executing a strategy aimed at obtaining the national goals. In addition, it also empowered this organisation by allocating a vast investment in its programmes: 60 million Euros per year, with an additional 60 million for additional activities spread over four years.

The Platform Bèta Techniek is often mentioned in European research reports or inventories of good practices. However, only parts of the strategy are taken into consideration or only some activities are described.

The uniqueness of this European good practice is embedded in the integral approach: one organisation, working throughout the whole educational chain, in close relation and collaboration with the schools and institutions, using an innovative model of

change. This is the added value of the Platform Bèta Techniek. And this particular approach and experience is what the Netherlands can offer to policy makers and executives with similar goals.

3.2 Opportunities in Cooperation

The Netherlands feel they have a lot to offer with the body of knowledge and experience of the approach taken by the Platform Bèta Techniek. Of course, educational systems, national strategies and goals, and availability of means differ between European countries. Consequently, not all, and in some countries perhaps even most, of the strategy, programmes and activities may not be feasible or realised. However, lessons learned from the approach of the Platform Bèta Techniek may help other countries to create their own integrated approach.

Therefore, the Platform Bèta Techniek has formulated its intent to investing increasingly in international relations and boost the exposure of the organisation towards other countries and people interested. Simultaneously, the organisation wishes to learn from organisations and policy abroad in order to be able to address its own existing and remaining questions and challenges.

The Platform intends to increase international relations by visiting international conferences, co-authoring international papers or articles and participating in and stimulating international networks.

In 2010 a second International Summit will be hosted by the Platform Bèta Techniek.

3.3 Invitation

This paper is an open invitation to other countries and organisation to comment on what is presented. We aim to encourage international sharing of knowledge and experience and to form an international network in which all innovative strategies, programmes, activities, good practices and people involved can learn from each other and contribute to an international agenda for the coming years.

If you think the Platform can contribute to your approach, programme, project, conference, article, etc please contact the Platform. We will be more than happy to discuss the options.

If you would like to attend or contribute to the next International summit please let us know.

You can reach the Platform by:

- visiting the website: www.platformbetatechniek.nl
- or send an email to Beatrice Boots, vice-director of the Platform Bèta Techniek: b.boots@deltapunt.nl

