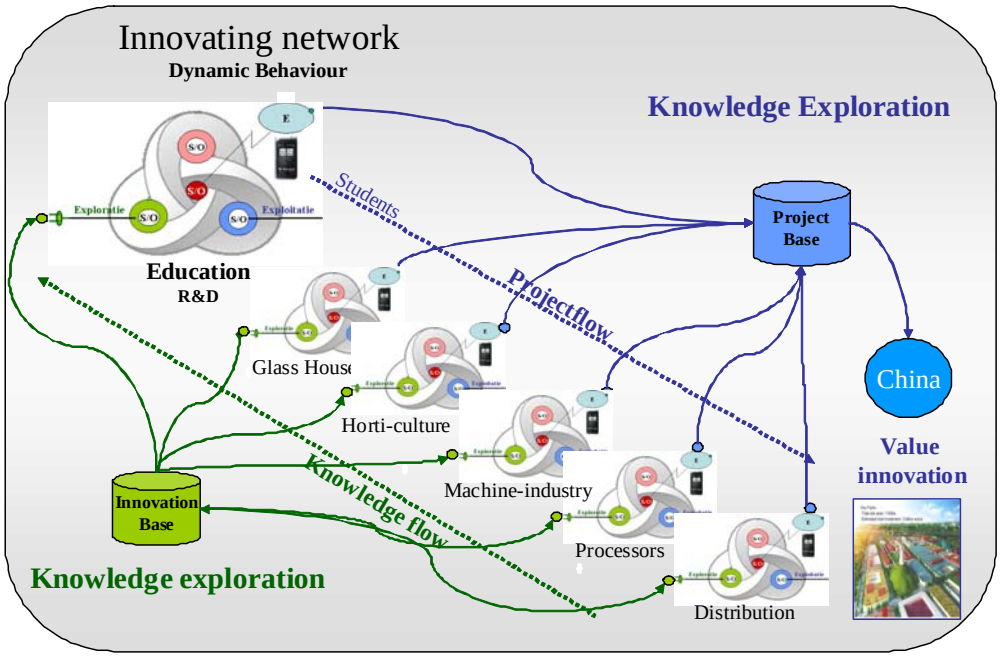
AcadeMi - IO

International Research on Innovation

How the liberation of Human Talents can accelerate Export Growth in Value Chains for Total Solutions in China



SME and Education in dynamic innovating networks

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Piet IJssels, burgemeester Gemeente Gorinchem
Rinus Houtman, burgemeester Gemeente Nieuw-Lekkerland
Sjaak van der Tak, burgemeeter Gemeente Westland / Greenport
Wiebe Brandsma en Jean Spapens, economische en internationale zaken / Provincie Zuid-Holland.

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Auteurs: Ir.Th.M.Lohman, Ir.J.Hak, Dr.ir.W.F.Gielingh – stichting Academi-io

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Rabobank Projectenfonds
Het Rabobank Projectenfonds steunt innovatieve projecten die een duidelijke bijdrage leveren aan een duurzame toekomst voor de leden van de bank en daarmee voor de Nederlandse samenleving als geheel. Het fonds wordt al 25 jaar ingezet als één van de MVO-instrumenten voor de zakelijke markt. Voor de aanjaagfase van enkele nieuwe ontwikkelingen kunnen bedrijven en andere organisaties een beroep doen op het fonds. Voorwaarde is dat het project door de belanghebbende doelgroep breed wordt gedragen. Hiervan is zeker sprake bij de doelstellingen en de activiteiten van de AcadeMI-IO. Daarin wordt op een vernieuwende manier ingespeeld op de behoefte van continue en hoogwaardige kennisontwikkeling in het (industriële) MKB, waarbij professionele samenwerking tussen bedrijven en onderwijsinstellingen de kern vormt en de mens centraal wordt gesteld. De bijdrage van het Rabobank Projectenfonds stelt ondermeer klanten van de bank in de gelegenheid hiervan de vruchten te plukken. Deze nieuwe wijze van samenwerken en kennis uitwisselen is van strategisch belang voor het concurrentievermogen van het bedrijfsleven in Nederland.

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Introduction

This document is about a starting project in China, as a first step forward to handle the challenging Metropolitan Food Security (MFS) projects for total and sustainable solutions for the future. It gives an impression of the Sino-Dutch MFS pilot that started two-and-a-half years ago and has other two-and-a-half years ahead.

The vision behind the Sino-Dutch project fits three components. The first is the awareness that an approach on chain level is needed to find the new solutions for MFS. The second is that building talents, not only individual but even more via collaboration, is a key factor in making progress. The third is the use of semantic tools as carriers of knowledge networks, enabling innovation teams to connect, communicate and speed up.

The approach of the Sino-Dutch project is based on Methodical Innovation, a method worked out during the past decennium in the Netherlands to realize solutions for complex problems and challenges on an organization level. The method itself now is going to be upgraded to the higher level of chains. In the Netherlands one sees it as an important development because the integrated collaboration between the sectors Agro, Horti and Education in the project will learn a lot about handling MFS projects in the future.

The upgrade within the MFS project to chain level requires new thinking and support from industry, education and government. Issues are e.g. how to specify (new) needs together, learning innovation on the job and self organization based on an export structure around MFS. In the Netherlands 20 SME's and four Education Institutes already joined the project. Dutch government of EL&I (Economics, Agriculture and Innovation) developed a successful IPC instrument (Innovation Performance Contract) tot promote informal learning and the development of innovation ability on the workplace.

The History of the Sino-Dutch project goes back to 2010. The first two years (2010-2011) were used to grow awareness and build networks in the Netherlands and China. This year (2012) we worked out the parts of the project on Dutch side, from the mirror perspective to China. Now the point is reached to connect them by the adoption of the plan for China, adapted to the culture of China. During the next years (2013-2014) partners involved in the project can grow together in competences tot realize a Sino-Dutch MFS pilot. Ambitious and scope are multi-level and plans are prepared on regional, province and national level.

Plan stage in the Netherlands finished with the production of three plans: one for the Agro-food (Top) sector (Jan Hak), one for Horti-culture (Sjaak van der Tak) and one for the design of an export structure involving 20 SME's, education (Topsector Agro-horti) and the government of EL&I. China plan phase started with our visit to China this year. May 2012 we signed a letter of intent with our partner the education bureau of Hebei and promised to prepare a quotation on a starting project. This quotation provides for two workshops in October 2012 as a base for decision making about the participation in a sustainable project on innovation research, standardisation and further cooperation in FMS-projects.

The Quotation is an appendix to this document.

1. The road towards a knowledge economy

Learning how to innovate work, grow talent and increase employability

1.1. Market

From supply driven to demand driven business models

The old economy can be characterised as mass production. Products were designed, developed and produced in large quantities for an anonymous market. This model has changed into an economy of mass-customization. A car is today tailor made for the individual client. It is designed such that hundreds of options from which a client can choose are possible. Despite this, development- and delivery-times have been shortened drastically.
The client is not any longer interested in the product but in its performance. A car must always function, and in the rare case that it breaks down it must be repaired instantly or be replaced by another. Accordingly, industry changes from a technology-push oriented sector that competes on costs to a client centred sector that competes on value. From an organizational point of view this requires a transition from static hierarchical structures to responsive and adaptive structures in which the knowledge and capabilities of all employees are utilized.

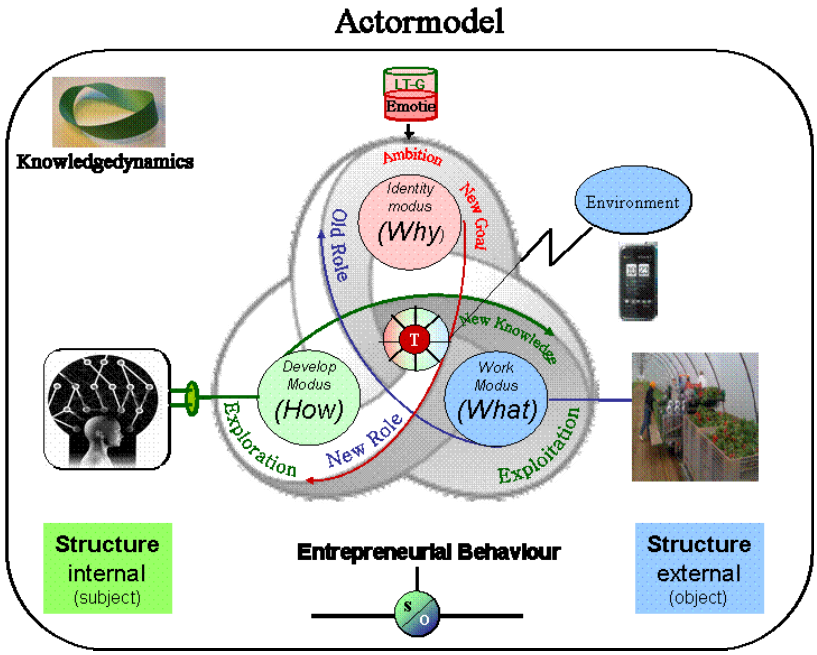


figure 1. Old learning and management attitudes prohibit an organization to improve itself.

Dynamic and responsive organizations

A client centred work approach changes the way in which processes are organised and the organization is directed. Task oriented working has to be replaced by performance oriented working, and top-down control needs to be replaced by self-control. This affects on its turn roles and responsibilities in the organization. In the past, work was divided into islands

(departments). Top-management determined the goals, sales formed the face towards clients, design developed new products, production made them according to specification. The integration of the entire process was a responsibility of the management team, while the knowledge and entrepreneurial skills of employees was hardly utilized.
An entirely new organization comes into being if employees are empowered and are given time to think about innovation. The self confidence and motivation of employees increases when they play a role in the formulation of tactic and strategic goals. In addition they are given half a day per week for self-employment and the development of new concepts in teams. The entire enterprise will benefit because such a strategy improves its dynamic and responsive capabilities. It exploits available knowledge to its fullest.

1.2. Better utilization of talents

The ability to create value

The reversal from supply-driven to demand-driven business models requires that employees have to project their minds into that of the client. The understanding grows that a company earns money through its added value. A client is not interested in a car that is unreliable or unsafe. Client needs may also change so that the product/service portfolio may have to change accordingly. Changing needs should not have the consequence that the clients' investment has to be written off too early. Risks have to be understood from the client's perspective, and suppliers are expected to deliver performance above the client's expectations.
This new way of thinking has led to new business concepts such as the offering of transportation solutions in stead of cars or trucks, housing facilities in stead of buildings, and document flow solutions in stead of copiers or printers.

The ability to perform

The ability to create client value impacts the work and attitude of all employees in an organization. It calls for new skills in the form integral and lifecycle conscious design of product/service/market combinations.
Employees should get the time, space and facilities to respond to changing client- and market needs as well as to technological advances that offer new opportunities. As new processes usually do not run smoothly in the beginning, disruptions may occur. Disruptions of the primary process that occur frequently can be solved by routine-learning (1st order learning). But certain disruptions require extra effort and call for the human capability to (re)design a product or process. Design is an activity that happens more or less automatically in the working memory of people: if something doesn't work one way, it may work another way. Based on experiences, people can reuse solutions that were stored in their memory as a replacement of solutions that cause disruption. A design is practically always a new configuration of existing solutions.
If a boss stops controlling (i.e. stops telling people how they must do their work) employees are motivated to develop their own design skills. This can be reinforced by improving the quality of information and of the 'corporate memory' along with the development of competences for self-control. As a consequence, people's abilities to perform within an organization will grow.

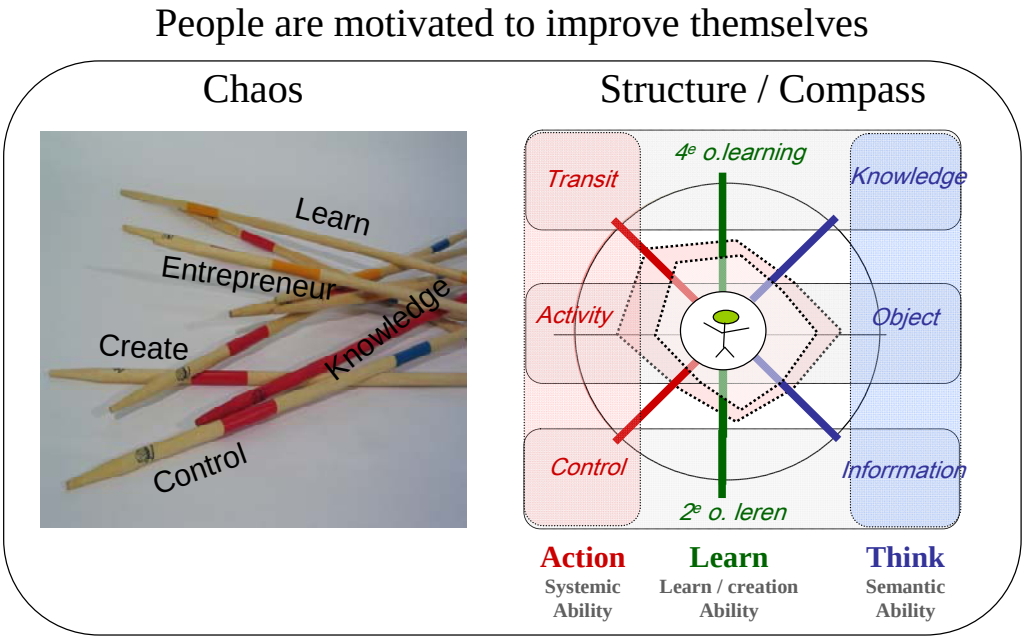
The ability to innovate

Existing design solutions may be insufficient for certain problems. A need for new solutions and new knowledge emerges. People have to step out of their daily routines and think 'out-of-the-box' about innovations. This requires the ability of people to switch from the short term working mode (right lower corner of the triangle in figure 1) to a long term oriented

development mode (left lower corner). Switching between these two modes calls for a person's ability to control.
Regular production work has to be stopped for a while so that people can work in teams on new solutions. Based on goals and ambition existing knowledge is made explicit, shared and combined into new knowledge. But this time the pool of knowledge and skills is extended to that of the entire team. The creation of a corporate memory and a corporate innovation force expands the space in which solutions can be found drastically.
New (semantic) ICT tools which mimic human thinking enable the connection of new explicit knowledge. This is an evolutionary breakthrough in organizational development that copies the natural learning process of the bio-system. Also in this system one-cellular organisms have increased their chances of survival by developing into multi-cellular organisms in which different cells have different task allocations under the pressure of complexity (Heylighen).

World Class Performance

Meta-talents reinforce each other and lead to World Class Performance (the highest level according to the CMMI standard which was developed by Carnegie Mellon University). The ability to innovate ensures that old roles and tasks are redesigned into new, more valuable roles and tasks with the accompanying new knowledge. This new knowledge is input for the common corporate knowledge base which feeds the company's growing ability to perform. The new roles are input for the improvement of the value creation process. Only an integrated approach for learning how to Innovate, Perform and Create (the IPC skills) will ultimately lead to world class performance. The most critical factor for success and survival is increased learning speed – and with that a steep learning curve.



1.3. How to improve employability

Make talents debatable (the compass)

In order to facilitate talent growth, a compass has been developed. It depicts the main natural talents as a logical whole and mimics the working of the brain. A key factor for performance is

the quality and speed of execution. Learning speed, for example, will grow if information from the long term memory can easily be retrieved. This requires (multi-entry) classification of knowledge. The design process in the working memory will be executed faster if functions are separated from symbols. These efficiency principles are made measurable on each of the eight axes of the compass. People can thus make a map of their talents in a particular working role and choose in which areas they'd like to improve. This instrument enables people to develop themselves autonomously or together with others.

Make work debatable (the map)

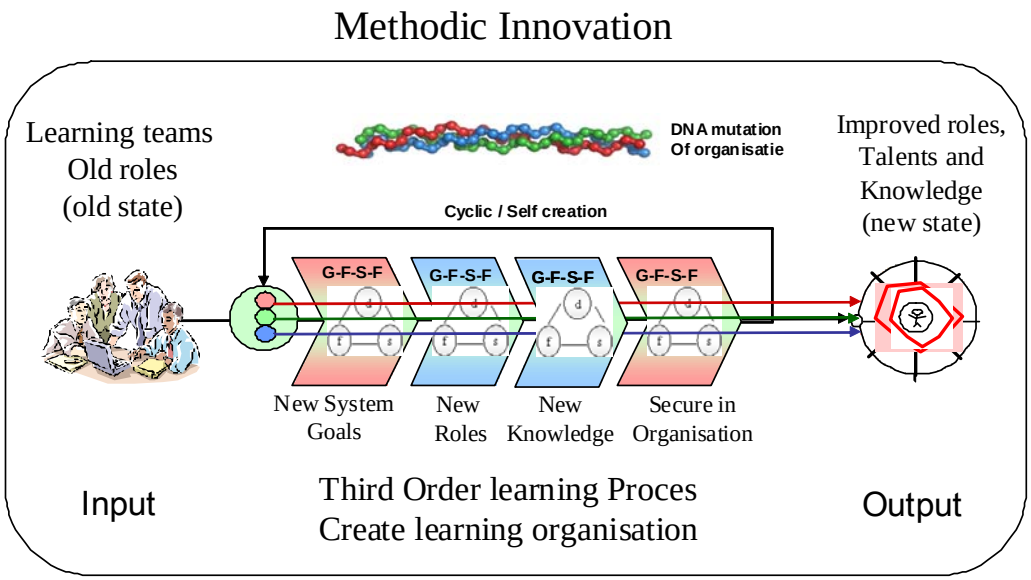
A second critical success factor is that work itself becomes debatable. Work is complex and its effectiveness is first of all determined by the end result, which is in many cases a physical object (a product or artefact). According to the SE standard, this work has seven stages with seven uniform roles for people. Each role requires the execution of sub-tasks, process control tasks and norm control tasks. This defines all the work needed to create a product. This working model mimics the way in which living organisms survive in changing environments.
Prof. in 't Veld made this model applicable in the form of a map that identifies all tasks in a generic way. This map enables teams and team-members to discuss the (re)distribution of work. In particular it covers the sequence of sub-tasks (horizontal), which may have to be extended with client oriented tasks, but also the (re)distribution of control tasks (vertical) that give people the freedom to make decisions autonomously.

Autonomous learning (the measuring device)

Now that talents are unlocked via the compass and work is made debatable via the map, employees are equipped with tools that support autonomous growth of their talents. They are not any longer dependent of third parties, such as employers or teachers. Employees can develop from role to role and from work type to work type. Their employability increases drastically. Measurement of their capabilities in the compass relates to their current role which can be identified on the map. By doing this for all roles, a total picture emerges of the organization. This forms the basis for a programme for improvement. In particular roles that are critical for success and have a low score should be addressed first (low hanging fruit). A decision about the strategy of growth is taken jointly by all levels: bottom-up (shopfloor level), from the perspective of daily pressure points, and top-down (management team), from the perspective of strategic company goals. By putting together the right people in the right roles in teams, it becomes possible to align sales, design, production and servicing optimally.

Teacher is on the critical path.

Methodical innovation enables the improvement of roles or the substitution of old roles by new ones. The innovation talents of participants grow. These talents are of a meta-cognitive nature: knowledge about knowledge, knowledge about learning, and knowledge about changing. These new kinds of knowledge require the involvement of education in the form of an innovative curriculum. This implies that also in education old roles of teachers have to be redeveloped into new roles including the development of teaching material for talent growth. They also have to develop meta-cognitive skills, and help enterprises with the coaching of innovation projects. Their focus will shift from teaching of what they know to the acceleration of the self-learning and knowledge acquisition processes of students. This is the transition process that education has to undergo so that it can grow further in co-operation with industry.



1.4. Learning to innovation on the job

Phase 1. Determine goal and direction

Step 1: Make a map of the environment and the business process at organisational level.
Step 2: Describe opportunities and threats in a Cause and Effect analysis. Shows goals.
Step 3: Make a scan of the organization. Shows current status and aspect of improvement.
Step 4: Choose a pair of roles and define the required improvement.

Phase 2. Design the role

Step 1. Make a model of the roles using system theory and measure current performance.
Step 2. Identify gaps and select principal solutions for improvement.
Step 3. Make integral design of the new or improved role including the work place.
Step 4. Formulate the approach on organizational, team and work place level.

Phase 3. Create new knowledge in learning teams

Step 1. Form team, externalize knowledge and create new knowledge.
Step 2. Modularise new knowledge and reduce redundancy.
Step 3. Express new knowledge in tools and make it accessible for reuse (as-defined)
Step 4. Describe the new role and measure the growth of talent, productivity and/or value.

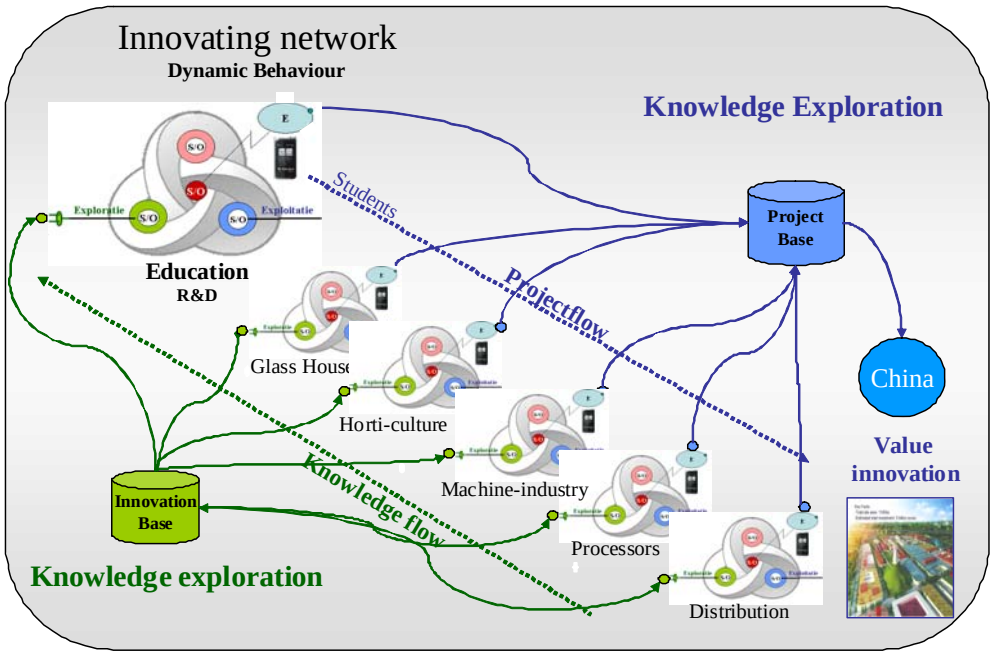
Phase 4. Secure improvements in the organisation

Step 1. Secure the new role and knowledge within the organization and adjust goals.
Step 2. Explore with management team alternative innovation strategies for follow-up.
Step 3. Make plan for implementation and cost/benefit analysis for roll out in the organization
Step 4. Communicate results and plan of action to the organization.

Duration is 6 to 9 months in which every three weeks a workshop session is held in which innovation directors are coached to implement an innovation project, on the job, within an enterprise. On average 5 employees will be involved, jointly with the management team for concurrent growth. Methodic Innovation is a cyclic process that repeats itself frequently and results in a learning enterprise.

Small and Medium Enterprises are now ready to cooperate in Sectors in the Food Knowledge Chain to develop new curricula in co-innovation with Education Institutes. Now they speak the same Innovation Language. The acceleration of the Export of Dutch Food Systems is recently started with the aim to find a sustainable total Solution for the Food Security Problems in the BRICS Countries.

Export of Total Solutions



2. Multi-Level Actor Approach

2.1. Multi-level

The post-industrial separation of learning and working hinders innovation of contemporary social systems; lifting this watershed brings natural learning that drives innovation. We developed a novel concept making better use of the knowledge and talents of people as a basis for social innovation. Our concept takes a multilevel approach based on the principles of meta-state transitions and entropy (see Figure 1). At higher level we control increasing complexity and restore order, using new structures. We start transition at individual level through self-organizing teams, exploring emerging talents of individuals in teams. Team member feedback results in an increase of learning effectiveness and pace. At organisational level, exploration en exploitation object functions across the lifecycle are integrated. End user feedback drives use value innovation, levering sustainable design and eco-awareness. A third transition level is the co-creation of knowledge by SME's and educational institutes in the sector. Industry feedback, in turn, increases valorisation of knowledge. Finally we define a value chain level, which enables us to export total solutions for global fundamental problems on food, water (c.f. Figure 1) and care, we believe could be tackled by innovating social system innovation structure itself.

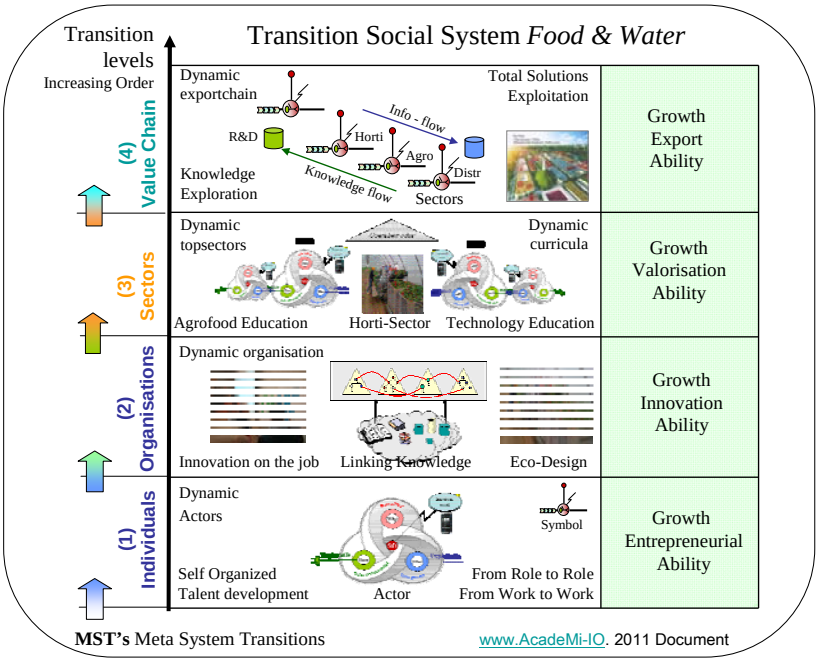


Figure 1: Food and water social system innovation.

2.2. Actor Approach

Key question is then: how to accelerate the process of self-organization? Peter Drucker and Pierre Malotaux formulated the answer: "*If we can connect our talents with types of tasks and we make the talent growth measurable then we have organized the feed-back for motivation of learning".* Over the past decade we developed an innovation instrument together with several industry branches and education institutes meeting the functional requirements. We integrated generally accepted system theory models with emerging models of cognition and semantics into a 3x5x5 cubic framework. This framework enables actors to position themselves (Why?) and define a learning strategy to develop themselves (How?) from role to role and from work to work (What?). This *actor approach* for self-developing knowledge and talents has been experienced with successfully at individual, organisation, and sector level

over the past 7 years. Actors learn innovating on the job in just half a half year. Stepping up the Maslow Pyramid, people become increasingly motivated, with productivity of knowledge and well-being increasing.

Self-organizing Systems

The fundamental principle of our innovation approach is that we optimally exploit of the ability of people to create things in groups through self-organization and stigmergie – sharing results and cooperating without direct communication --: a common goal, a transparent structure and generic roles allow people to self-organize and run fairly complex projects, without extensive planning and control. Together they build a collective memory and intelligence, based on collective sensing mechanisms. A familiar example from nature is the self-organization of ants creating complex nests and social structures to survive. Another example is the development of complex open source software and Apps. The growing application structure (What) is made transparent enabling designers to contribute to the assembly and integration of growing system functionality. People differentiate and specialize tasks fitting their own ambitions and capabilities, contributing to the overall system functioning and performance. The innovation instrument makes these processes explicit and focuses on breeding meta-talents for the handling of knowledge, learning and change.

New leadership

A new holistic-thinking kind of leadership is required along from SME (MKB) and education managers. Organisations will become more adaptive and responsive to the environment through available modular knowledge structures. This requires controlling and promoting of knowledge explicitation and the implementation of sensory and semantic tools for self-organization. The collective mind and intelligence will thus establish. As soon as management becomes aware of its own old-economy obstructions, they will become motivated for change and start delegating tasks to the work floor. Consequently, stress reduces and attention shifts from What, to Why and How type-of-thinking.

Export growth

The IPC-instrument is an instrument implemented by our Ministry of Economic Affairs to increase SME innovation ability. In 2007 this instrument enabled us to launch a sector level IPC-experiment with SME's, students and teachers within a knowledge chain. SMEs start the innovation cycle with innovations-on-the-job, and by supporting students. Best-practices are transformed into new modularly structured curriculums for generic roles in the industry. In 2010 we started an international-level IPC-experiment with China to co-innovate a total solution for their food security problem. A new level of complexity requires new structures: together with SMEs and academic and vocational education institutes we developed the concept of generic export catalogues. This structure materializes self-organization, cross-sector integration, and stimulates products and services use values innovation.

Sustainability

Only a multilevel actor oriented approach leads to sustainable export growth and to the solution of the structural problems on Food, Water and Care in the developing countries. The cubic innovation framework evolved into an *informal innovation vocabulary* evoking and supporting a well-structured and systemic dialog between presently isolated social systems. To go global and take the lead, the Dutch Institute of standardisation (NEN) has prepared a working paper covering the formalization of the innovation framework at national level (extension of the Dutch NEN 6070) as well as internationally (WHO-standards for the improvement of the functioning of people). To further support this trans-disciplinary development, an Innovation Research Program proposal has been designed in June 2011 during a Sino-Dutch workshop, collecting input from several Dutch and Chinese Universities and the Education Bureau of Hebei, the Sister-Province of the Zuid-Holland Province.

3. Best Practices

The first initiative of implementation of the Innovation concept ran between 2006 and 2009 under the name 'Sustainable Innovation' ('Duurzaam leren innoveren'). It led to 35 pilot projects for companies in three industrial sectors in collaboration with four institutes for higher education:

- 15 pilots for companies in the machine building sector for food processing and packaging (under the umbrella of the GMV / FME), including Kiremco and Hak and partners;
- 12 pilots for companies in the electro technical installation sector (under the umbrella of Uneto / VNI), including Croon and Huisman;
- 8 pilots for companies in the ship building sector, including IHC and Damen shipyard.

The four participating institutes for higher education were HAN (Hogeschool Arnhem Nijmegen), Hogeschool Utrecht, InHolland and Fontys.

The results of the latter programme were above expectations. It showed that the learning culture in the Netherlands is still on a low level of maturity: it is mainly focused on 1st order learning, with a few exceptions on 2nd order (creative) learning. 3rd order (innovative) learning appeared to be completely absent. But the programme had a positive impact. It showed that a change of educational culture from creative to innovative learning motivates employees and students. The number of drop-outs in education reduced drastically. It stimulated also innovation of the educational curricula. Further, it resulted in increased productivity of the participating enterprises, higher client satisfaction, and more motivated personnel.

Methodic Innovation is the result of many years of applied research, done in the context of business or education reorganization projects. The methodology in its current form is applied and tested in three recent projects.

Inquiry amongst 29 SME manufacturers at the start of the project

In 2007, 29 manufacturers of machines for the production, processing, packaging and distribution of food, were invited to do the capability maturity check using the map, the compass and the measuring device. In reaction to the questionnaire they were asked which areas require urgent improvement. The result, which is shown in the figure, is quite remarkable. Of the topics that were given 1st and 2nd priority, just 17% fall in the left hand side of the compass (Act). The entrepreneurs think that their operational processes and control functions are satisfactory. Only the long term ambitions and the ability to change (transit) are important.

No less than 73% of the scores fall in the right hand side of the compass (the blue column), and deal with knowledge explicitation and reuse, knowledge of the client, product complexity (such as modularity, flexibility of design, standardization, fitness for production and servicing), information sharing and information accessibility.
The low score of learning may be attributed to the association with 1st order learning at school. It is not yet clear to most entrepreneurs that learning may also be creative and explorative, and be an enabler for business innovation.

	1st priority	2nd priority	Total	Percentage
Act	**8x**	**2x**	**10x**	**17%**
Transit	6	0	6	10%
Process	1	2	3	5%
Control	1	0	1	2%
Learn	**2x**	**4x**	**6x**	**10%**
Learn	1	1	2	4%
Memorize	1	3	4	6%
Think	**19x**	**23x**	**42x**	**73%**
Knowledge	11	6	17	29%
Product / Result	6	7	13	22%
Information	2	10	12	21%

Fig. Inquiry about the priorities for improvement amd innovation amongst 29 manufacturres of machines for the food sector.

Evaluation of the results of the Methodic Innovation programme.

After this inquiry amongst 29 manufacturers, a major programme for Methodic Innovation started with 15 manufacturers and 3 schools for higher professional education, called 'Creating better food, sustainable innovation in the food chain'. As a project it ran between 2007 and 2010, but it will be continued by the participants on individual basis.
The results can be split into those on company level and those on chain level [16].

The main results on company level are:

- Innovation talents of employees have increased through team learning, through explicit and reusable knowledge, and through the new skills of self-management and self-learning (explorative and creative learning).
- Functional thinking improves client- and environment-oriented design. Companies report higher success rates of scoring orders of up to 30%.
- Modular design and standardization of modules make a design and consecutive processes such as procurement, manufacturing and servicing, simple and more economical. Companies report total cost savings of up to 40% and a substantial reduction of errors.
- Less resistance to change, higher motivation of employees.
- The quality of work and organization increases as the work becomes debatable through the models, and employees have room for self-regulation. This reduces stress and stimulates a climate for co-operation.
- Business management discovers that not the school but the enterprise is responsible for life-long learning of employees.

The main results on chain level are:

- The use and sector-wide development of a single innovation language encourages knowledge sharing between industry and Education (3 HBO's).
- A universal 3e order learning strategy stimulates co-creation and innovation on the job.
- The combination of theory and practice increases the utilitarian value of knowledge.

- Teachers get motivated to coach industrial employees. Reversely, they also learn from them.
- Schools discover that knowledge reuse and client-orientation are also valuable concepts for education.
- The common memory of innovative knowledge (in the form of shared models) for industry and education increases. The sharing of knowledge between schools for the regular updating of curricula reduces costs, which is estimated at 20%.
- Knowledge and skills of students fit better with the needs of industry.

Earlier results on vocational levels

An earlier project for schools (2002-2006) at lower and medium levels (RTO – Revival Technical Education in Dordrecht), in which industrial companies were involved, showed that Methodic Innovation is also highly appreciated by younger students. It makes learning fun. The number of drop-outs decreased to almost zero, and the number of students that chose for a follow-up course at higher education level increased significantly. At this level of education we introduced the 2e order learning culture for students and a third order learning culture for the teachers. Students learned to create added value with the help of practical knowledge form Dutch companies like Bakker Sliedrecht (instrumentation) and IHC- Merwede (Builders of Dredgers). Teaches learned to develop themselves on the job in co-creation with Industry. (see also www.AcadeMi-IO.nl under projects.

Main Conclusion

Methodic Innovation is the final result of 20 years of business experience and applied research. During the early years, the authors discovered that the efficiency and effectiveness of enterprises could be improved significantly by using new methods for systems engineering, product and process modelling, knowledge management, and several more. However, the uptake by industry was slow and cumbersome. It became gradually clear that this was largely caused by the top-down approach used for business reorganizations, which causes resistance at the work floor. The awareness grew that knowledge about these methods, and the responsibility to improve and innovate a business, should be given to employees. In the context of business transition, employees should also be given the opportunity to develop new job roles for themselves, so that they can explore and exploit their own talents. Companies can grow only if their employees grow too. For employees, this requires a new mindset and new skills. The necessary transition is therefore only possible through a close collaboration between industry and education. Three recent projects have demonstrated that this human-cantered approach really works. It increases the innovation potential of enterprises, even of small and medium sized enterprises, and accelerates the speed of innovation.

More specific conclusions are:

- The instruments developed for Methodic Innovation enable people to rethink and redefine their own job role in a team context, so that their knowledge and skills are fully exploited. This is a fundamental change compared with old thinking, where people are supposed to fulfill a predetermined job role. The latter may lead to mismatches between job role and people's talent, and thus to under-utilization.
- The empowerment of people and teams leads to new work divisions.
- Human thinking shifts from what (i.e. to do what a boss tells you to do) to why (i.e. to keep an eye on client needs and the societal/environmental consequences of ones work). The latter concept is also known as mindfulness.

- Human competences to act are extended with competences to learn from experience (i.e. the development of cognitive competences)
- Consequently, enterprises become places where people can learn. They provide learning-on-the-job facilities for schools.
- Business reorganizations and cultural changes will only be successful if they provide also new opportunities for employees.
- People were educated in the past to fulfill a mono-disciplinary role in society. Their new freedom to learn continuously and to redefine their own role results in trans-disciplinary experts: people who combine the knowledge and skills of several disciplines and are able to bridge gaps between these disciplines.
- Open standards are necessary to facilitate communication. They enable knowledge reuse and make enterprises more flexible, efficient and effective.

4: Starting up a Sino-Dutch innovation network

4.1. Why an AcadeMi-IO

AcadeMi-IO is a joint initiative of industry and several schools for middle and higher education. It aims at the leveraging of human capital through self-employment, entrepreneurship, cross-discipline learning, and innovative thinking. The first pilot projects have been very successful and contributed to the world class performance of products made in the Netherlands.

For this new agro-food park to be successful and competitive on the global market, it is essential that the personnel are equipped with skills such as described in this document. This forms the background for the initiation of an AcadeMi-IO in China.

Goal of the transition programme in China is to recruit and train the personnel that will be employed at the Agro-Food Park. This requires the development of skills for three human talents: the ability to perform, the ability to create and the ability to innovate. These skills can be trained in on-the-job workshops for about 6 months in an industrial environment.

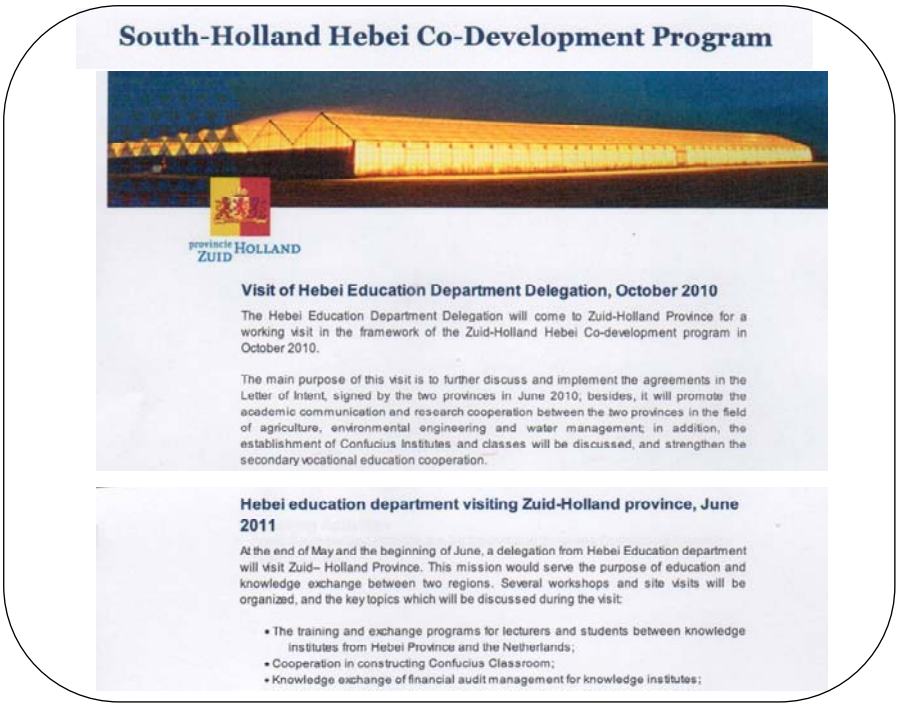
By involving the educational institutes in China in this process, the know-how needed for these trainings can become an integral part of local educational programmes. This requires the training of teachers on different levels of education, in particular low, medium and higher levels of education, as well as the academic (university) level, with as goal the development of an integrated curriculum for sustainable innovation.

Such a programme in China, which will be concentrated first in the province Hebei, can be supported by setting up a similar programme in the province of Zuid-Holland, the Netherlands. This enables the development of a common knowledge infrastructure, a common curriculum, the sharing of resources and the exchange of experiences. Chinese and Dutch teachers will be enabled to train their skills on-the-job in design offices and production facilities in the Netherlands. The programme will involve both the technical sciences and the human sciences, and will be supported on a high scientific level, including research, by the participating universities. One of the results can be the offering of a master in methodological innovation.

Handan has about 9 million inhabitants and is located in the south of Hebei province (about 70 million inhabitants)

4.2. *Why the Province Zuid Holland: Vision!*

Co-development Program Z-Holland


South-Holland Hebei Co-Development Program

provincie ZUID HOLLAND

Visit of Hebei Education Department Delegation, October 2010

The Hebei Education Department Delegation will come to Zuid-Holland Province for a working visit in the framework of the Zuid-Holland Hebei Co-development program in October 2010.

The main purpose of this visit is to further discuss and implement the agreements in the Letter of Intent, signed by the two provinces in June 2010; besides, it will promote the academic communication and research cooperation between the two provinces in the field of agriculture, environmental engineering and water management; in addition, the establishment of Confucius Institutes and classes will be discussed, and strengthen the secondary vocational education cooperation.

Hebei education department visiting Zuid-Holland province, June 2011

At the end of May and the beginning of June, a delegation from Hebei Education department will visit Zuid– Holland Province. This mission would serve the purpose of education and knowledge exchange between two regions. Several workshops and site visits will be organized, and the key topics which will be discussed during the visit:

- The training and exchange programs for lecturers and students between knowledge institutes from Hebei Province and the Netherlands;
- Cooperation in constructing Confucius Classroom;
- Knowledge exchange of financial audit management for knowledge institutes;

Export of total solutions


provincie ZUID HOLLAND

Exporteren van totaal oplossingen

4.3. Starting up the Dutch innovation network

For the formation of a core team of coaches and experts, the following organisations and persons have been consulted:

Gouvernement:

- Province Zuid Holland: Floriske Deutman, project manager China Desk
- Gorinchem City: P. IJssels. Mayor
- Drechtsteden, Kinderdijk region: R. Houtman, Mayor

Industry:

- Industriële Kring Gorinchem (IKG), A. de Hoog-Attema, chairman.
  In this region companies are located such as Damen Shipyards, Mercon, van Oord and Attema, which have been involved in earlier MI projects.
- Twenty SME Horti-culture companies of Greenport organisation of mayor Sjaak van der Tak

Educational institutes:

- **Higher level education**:
  HBO InHolland (D. van Bijl, director Technology and partner IPC-MKB programme). was co-developer of the minor Methodological Innovation and, together with two other HBO's, involved in 15 pilots on-the-job-training for the machine building industry. Innovative solutions were co-created with the goal to develop new competences of students and to upgrade the curriculum towards the needs of an advanced knowledge economy. InHolland has contacts with Hebei University of Science and Technology (HEBUST) for a collaborative programme. It has also a special division for the agro-food sector, thus enabling collaborative projects for machine-building for this sector.

- **Academic and scientific education**:
  The University of Wageningen is one of the top-universities in the world specialised in the agro-food sciences. The department of Education and Competence Studies (Prof. M. Mulder and H. Kupper) covers the entire knowledge infrastructure for food and environment. It is familiar with new teaching concepts and supports also professional education studies. It co-operates with the department for Transition Science of the Erasmus University in Rotterdam (specialized in Economy and Finance). Head of that department is Jan Rotmans, director of DRIFT (Dutch Research Institute for Transitions).

The introductory meetings with the above persons and organizations demonstrated a good basis for collaboration with AcadeMi-IO and Chinese institutes; all reactions were positive. The initiative in China will boost the agro-food chain programme as a spearhead of the province Zuid-Holland. By mirroring the two trajectories in China and the Netherlands, it is expected that innovation programmes which are of global importance, such as the reduction of food spill-over, will be accelerated. This will ultimately result in a more sustainable agro-food value chain.

4.4. Starting up the Chinese innovation network

This orientation focuses on the province Hebei, for two reasons. The first is the existence of a collaborative programme between the provinces Zuid Holland and Hebei, which enables us to make use of an available infrastructure for knowledge exchange on many subjects, including education.

The program in Hebei, september 2010

Between 12 and 18 September 2010 Theo Lohman, board member of AcadeMi-IO and Human Resource manager of Quaternes, and Wim Gielingh, Managing Director of AcadeMi-IO, visited two schools in Handan and a university in Shijiazhuang, and had several other meetings with Chinese officials, with the goal to present and discuss the initiation of an AcadeMi-IO in China.

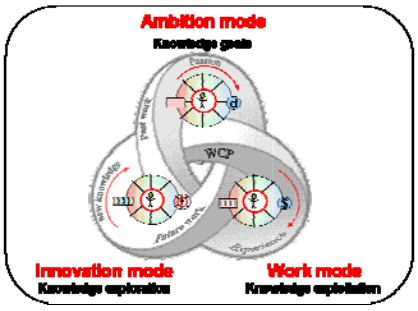
- 14 September 2010 A.M. Visit of two secondary schools in Handan, see also http://www.hdzj.net.cn/ and http://www.hdvtc.edu.cn/)
- 15 September 2010 A.M: Hebei University of Science and Technology (Shijiazhuang). Meeting with James Zhai (Foreign Affairs Office director) and Zhanzhong Jin (Vice President, supervisor PhD).
- 15 September 2010 P.M: International Cooperation & Exchange Division Hebei Province; meeting with Hou Jianguo (Director).
- 16 September 2010: Lunch meeting with Yuan Xiuzhong (Education Bureau Handan City).
- 17 September. Visit World Expo Sjanghai

Sustainable economy

China – Expo 2010

Cycle of nature

Holland AcadeMi-IO



Cycle of Llife Long Learning

Impressions

- Lower to medium level education. The first school visited in Handan (http://www.hdzj.net.cn/) is comparable with VMBO/MBO (lower to medium level education) in the Netherlands. What we have seen touched mainly mechanical and electrotechnical subjects. We noticed that the technical subjects were solely followed by boys, while girls were solely involved in more ‘female’ subjects such as garment manufacturing, ballet and music making. The general impression was very positive, featuring a very disciplined working style, state-of-the-art educational material, and modern tooling and equipment.

- Medium to higher level education. The Handan Polytechnic (http://www.hdvtc.edu.cn/) is comparable with MBO/HBO in the Netherlands. It eyed less formal than the VMBO/MBO school. Director and key staff members were very friendly and open. Focus for our visit was on construction. Computer are well used and focussed to draughting. The exchange of knowledge models (Building Information Modelling BIM) might be fruitful as well on the subject of sustainable construction methods. Given the huge growth requirements of the city of Handan, sustainable architecture and construction is urgently needed and could be exchanged through the collaborative programme[1].

- Academic / scientific level, province Hebei. As there is no education on technical subjects on academic level in Handan, an introductory meeting was arranged with Prof. dr. James Zhai (director Foreign Affairs Office) and Prof. dr. Zhanzhong Jin (vice-president, meeting only during lunch) of the Hebei University of Science and Technology in Shijiazhuang. This is the only Technological University near Handan that educates on MSc and PhD level.
  The University complex with campus, located outside the town, is recently built and eyes modern and spacey. Current capacity of 25,000 students will be extended to 30,000 next year. A collaboration programme with InHolland in the Netherlands is currently being discussed.

  Due to the late announcement of our visit we were not able to speak with professors on specific topics. But after discussion, Prof. Zhai was able to summarize the objectives of AcadeMi-IO very well, so that we feel confident that collaboration with HEBUST will be fruitful.

- Academic / scientific level, national (China). We feel that it is important to establish also a good collaboration with universities that are scientifically comparable with Netherlands top-universities, such as Delft (technical, design), Wageningen (food, agriculture, environment) and Erasmus (economics, human sciences).

The educational organisations as well as the governmental representatives demonstrated a very positive attitude towards knowledge exchange, knowledge circulation and entrepreneurial learning. In particular the development of common curricula for talent development with on-the-job training facilities offered by the agro-food machinery park in Handan was welcomed. The will to collaborate with the Netherlands initiative was expressed in all the meetings we had so far.

[1] [1] The International Institute for Sustainable Development writes: '*China is now consuming about half of the world's cement, over 30 per cent of its steel and more than 20 per cent of its aluminium. It is also the leading consumer of fertilizers and the second largest importer of forest products in the world. Decoupling economic growth from material consumption and its impacts on human health and ecosystem well-being is a major policy dilemma that China needs to start tackling during its 11th Five-year Program'.*

4.5. Hebei Education delegation, 3-7 novermeber 2010

The delegation consists of 5 people, and they are,
1. Yan Chunlai, Vice Director of Provincial Education Department
2. Ji Lianggang, Vice President and Professor of Hebei University of Economy and Trade
3. Pei Yinshan, Vice President of Environmental Management College of China
4. Zhao Guoshang, Director of Hebei Examination Center of Secondary Education
5. Gao Xiao (Interpreter), Vice Director of Foreign Language Teaching Department, Hebei University of Economy and Trade

In a workshop in the **Stevinkamer of KIVI Den Haag** the methodical Innovation project is presented by Mr. Lohman and W. Gielingh of the AcadeMi-IO. After a fruitful discussion the delegation decided that the approach might be of interest for the Province of Hebei and if so the Provincial Education Department wants to be involved directly by participation in a possible AcadeMi-IO in China. Mr. Luo Ping attended the meting and emphasized the involvement of University of Wageningen.

4.6. Follow-up meting in Hebei in November 2010

- November 22: Meeting with International Cooperation & Exchange Division of Hebei Provincial Education Department. Present: Mr. Hou Jiangou (Director), Mr. Liu Jiangyi (Deputy Director), Mr. Rinus Houtman (Mayor Nieuw-Lekkerland), Mrs. Floriske Deutman (Program Manager South Holland-Hebei Co-Development Program) and Mrs. Sarah Sijses (Project officer China NL EVD International).

- November 23: Meeting with the Education Bureau of Handan City. Present: Mr. Zhao Haojun (Director), Mr. Yuan Xiuzhong (Chief International Service Center), Mr. Theo Lohman, Mrs. Sarah Sijses and Mrs. Madeleine van Mansfeld.

- November 24: Presentation of AcadeMI-IO to the Education Bureau of Handan City and Handan Polytechnic College. Present: Mr. Zhao Haojun, Mr. Yuan Xiuzhong, representatives of vocational colleges and Mr. Theo Lohman and Mrs. Sarah Sijses. As a result a MOU is signed.

MOU HANDAN

MOU Handan Vocational & Technical College

Mr. Zhao Haojun / Mr. Jan Hak
Handan 25-11-2010

- November 24: Meeting with the Foreign Affairs Office of Hebei University of Science and Technology (HEBUST). Present: Mr. James Zhai (Director), Mr. Rinus Houtman, Mr. Theo Lohman and Mrs. Sarah Sijses.

- November 26: Presentation of AcadeMI-IO to the Administrative Committee of Changzhou Bohai New Area (1), Hebei Zhongjie Vocational School (2) and Cangzhou Vocational College of Technology (3). Present: Mr. Jia Falin (Deputy Director 1), Mr. Sun Yuhe (Rector 2), Ms. Lisa (assistant of Mr. Sun Yuhe), Ms. Liu Chong (Director International Student Exchange Department 3), Mr. Theo Lohman and Mrs. Sarah Sijses.

4.7. Follow-up meeting in Holland April 2011

A Chinese delegation from Hengshui visits the Netherlands after the meting in November 2010 in China. There was signed an agreement on a twelve point program on future cooperation with Greenport, education institutes and the AcadeMi-IO.

- Mr. Zou Liji, Vice Mayor of Hengshui People's Government
- Mr. Zhao Chunbin, Chief Engineer of Hengshui Park and Landscape Bureau
- Mr. Zhang Fengjun, Director of Hengshui Forestry Bureau
- Mr. Xu Bing'an, Deputy Director of Hengshui Foreign Affairs Office
- Mr. Hou Guining, Director of Hengshui Education Bureau
- Mr. Yang Aimin, Deputy County Head of Raoyang County

Aftrer a presentation of Dutch companies and education institutes a MOU is signed to cooperate on innovation with the Academy IO, the Hogeschool Inholland and the Education bureau of Hengshui.

MOU HENGSHUI

MOU Hengshui College of Vocational Technology

MOU Mr. Hou Guining, van der Bijl, Jan Hak Delft 14-04-2011

4.8. Follow-up meeting in Hebei in May 2011

The Netherlands Horticulture Trade Mission to the People's Republic of China,

Organized by: Ministry of Economic Affairs, Agriculture and Innovation of the Netherlands (EL&I) and **Co-organized by:** Dutch Manufacturers of Machinery for Food Processing and Packaging (GMV). In Shijiazhuang Luquan, met the government from Luquan County (agricultural, vegetable county from Shijiazhuang) and Education Institutes. Signed a MOU with Luquan Vocational School.

MOU LUQUAN

MOU Luquan Vocational School, Hebei China


AcadeMi - IO

Memorandum of Understanding

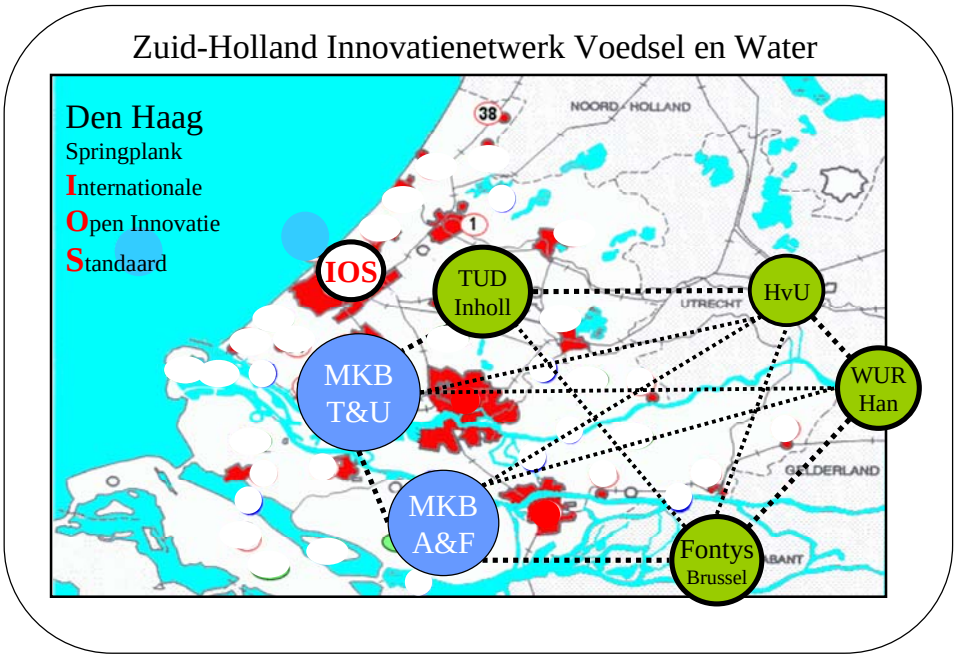
Between Luquan Vocational School and AcadeMi-IO foundation

Mr. Liu Zhenguo, T. Lohman
Luquan 10-05-2011

Mechatronica Laboratorium

4.9. Final results: a global innovation network

Zuid Holland Innovation Network



Hebei Innovation Network

5: Workshop on innovation in Holland

5.1. Education delegation Province Hebei China June 2011

The delegation consisted of the following members:

Mrs. Guo Jingru, Deputy Director of Education Bureau of Hebei Province
Mr. Yang Wenhui, Vice Dean of Mechanical Engineering Institute of Hebei University of Technology
Mr. Li Junqing, Vice President of Hebei University of Agriculture
Mr. Ran Longxiang, Director of International Cooperation Department in Hebei University of Agriculture
Mr. Liu Jiangyi, Deputy Director of International Cooperation and Exchange Department of Education Bureau of Hebei
Mr. Wang Lei, chief representative officer South Holland-Hebei Codevelopment program

Figuur. De Chinese onderwijsdelegatie op bezoek bij MKB in het Westland

Participants.

AcademIO
Mr. Theo Lohman
Mr. Wim Gielingh
Mr. Bart Gerritsen

Chinese Embassy in The Netherlands
Mr. Luo Ping — counselor education section

Delft University of Technology
Mr. Cees de Bont — dean faculty industrial design
Mr. Hans Veeke — assistant professor industrial design
Mr. Zoltan Rusak — assistant professor industrial design
Mrs. Regine Vroom — lecturer design engineering

DHV Ingenieursbureau	
Mrs. Tiffany Tsui	senior business developer
IHC Merwede	
- Mr. Ton de Gruiter	manager IHC parts & Services China
InHolland University of Applied Sciences	
Mr. Peter Scheerder	dean unit agriculture
Mr. Hans Ligtenberg	senior lecturer unit agriculture
Ministry of Economic Affairs	
Mr. Jeroen van den Brink	project officer Agency NL
Rijnplant	
Mrs. Chaoyi Lin	account manager
Syntens	
Mr. Harald Feijth	innovation adviser
Van Hall Larenstein U. of Applied Sciences	
Mr. Heinz Evers	course manager
Wageningen University and Research Centre	
Mr. Jan Fongers	coordinator international relations
Mr. Hendrik Kupper	senior researcher
Mr. P.J. Beers	researcher
Westland Municipality	
Mr. Sjaak van der Tak	mayor
Mrs. Marga Vintges	senior policy maker greenports
Mr. Antoon van de Ven	senior policy maker international affairs
Zuid-Holland Province	
Mr. Jean-Christophe Spapens	European & international affairs
Ms. Renate Beausoleil	senior policy advisor education
Mr. Guus van Steenbergen	program leader Greenports

5.2. Involvement Dutch Side

1. Overheid	
E&NL / Topsectoren	
Mr. A. Uwland	Verbinden topsectoren HRM
Mr. E.D. Hurster	Verbinden topsectoren HRM
Mr. E. Wijnen	Interoperabilitiet (ICT)
AgentschapNL	
Mr. J. van den Brink	IPC coordinatie
Mr. H. Lengkeek	IPC adviseur
Chinese amabssade / China	
Mrs. L. Merks	Development Cooperation
2. Provincie	
Economische Zaken	
Mr. W. Brandsma	Hoofd Economisch Zaken
Mr. J.C. Spapens	Internationale Zaken
Mr. A.A.C. van Steenbergen	Greenport
3. Gemeente	
Westland	
Mr. Sjaak van der Tak	Burgemeester
Mr. Antoon van der Ven	Chinabeleid
Mr. Marga Vintges	Europese Zaken / Greenport
Gorinchem	
Mr. Piet IJssels	Burgemeester
Mr. Arjen Nieuwland	Economische zaken
Nieuw Lekkerland	
Mr. Rinus Houtman	Burgemeester

5.3. Involvement Chinese Side

1. Overheid nationaal
   Chinese ambassador in NL
   Mr. Luo Ping — First secretary
2. Provincie Hebei
   Onderwijs Department
   Mrs. Guo Jingru, — Deputy Director of Education Bureau Hebei EBH
   Mr. Liu Jiangyi, — Deputy Director of International Cooperation EBH
   Mr. Haiun Zhai, — Deputy Director General of Department of Education
3. Gemeente / MOU on innovation
   Handan
   Mr Guo Dajian — Mayor
   Mr. Zhao Haojun — Director Education Bureau (MOU)
   Henghsui
   Mr. Zou Liji — Vice-Mayor
   Mr. Hou Guining — Chief Bureau of Education(MOU)
   Mr. Ren Zhongxiu — Vice director office of education
   Luquan
   Mr. Dong Xia Hang — Mayor
   Mr. Liu Zhenguo — Pres. Luquan Vocational (MOU)

Sino-Dutch Workshop – Education Delegation

Wk 25 2011	Metropolitan Food Security Monday	House of Innovation Tuesday	Transition / Future Wednesday
8.30 11.00	1.Welcome; Inholland / TUD Workshop 1; Innovation Program 2. Common Challange; Metropolitan FS 3. Innovation knowledge, skills, program	Workshop 3; Human Centered Approach 1. System Dynamics / Hans Veeke 2. Human Centered Computing /Rusak 3. Rabobank; Cooperation / Klink	Leisure Utrecht
12.30	4. Welcome Mayor vd Tak (11.30) • Cooperation between ZH and Hebei • Between Industry and Education	4. Intelligent networks Sys. / Gerritsen 3. Systemic-innovation (Theo Lohman) 4. Modular-innovation (Wim Gielingh	Leisure Utrecht
13.00 14.30	Lunch Demo-Kwekerij Greenport Campus (Antoon van der Ven)	Lunch Museum Dordrecht + Visit (1/2 hour) AcadeMi-IO (Theo Lohman)	Lunch Restaurant of the Future Wageningen University (Jan Fongers)
14.30 17.30	Workshop 2; Technology in Practice 1. Visit Demo-Kwekerij 2. Experiences with China (Lightenberg) Meeting Province of Zuid Holland 3. Confucius Classroom 4. Van Hall Lahrenstein	Workshop 4; Innovation in Practice 1. Presentation Chinese delagation 2. HRM Trends in Europe / 't Hart, IS 3. Innovation Practices / Feith, Syntens 4. Innovation Performance /Brink, Agency	Workshop 5; Plan for the Future 1. Aim and Stategy AcadeMi-IO (Hak) 2. Application GMV in China (Hak) 3. Transition Strategy (WUR/Erasmus) 4. Evaluation / Plan Proposals/ Actions
18.30 21.00	Dinner by Gemeente Westland (Sjaak van der Tak	Dinner by Province S.Holland (Wiebe Brandsma)	Dinner By-By, Amsterdam Gemeente Gorinchem / AcadeMi-IO

Tabel. Workshop programma om te komen tot een gedragen innovatie researchplan

6: Concept Innovation Research Programme

Baseline for an International Research and Development Programme
As a result of the workshop

Ir.Th.A.M.Lohman, Ir.J.Hak, Dr.ir.W.F.Gielingh – stichting Academi-io / Hebei Consortium

6.1. Introduction

The context for this proposal is to find a sustainable solution for the emergent food supply requirements in China and the Netherlands. It is expected that the supply of secure and healthy food may become increasingly difficult in the near and far future. Dynamic Innovation provides a possible solution for this issue.

Dynamic Innovation is a generic approach, irrespective of a particular application. Its goal is to accelerate the rate of innovation in individual companies as well as complete value chains by adopting a human centred approach.

The proposed R&D programme aims at developing the required infrastructure for Dynamic Innovation in China and the Netherlands, in conjunction with around 10 innovation projects involving 200 – 400 companies, four universities (two in China, two in the Netherlands) and several schools for higher and medium level education. This paper identifies, on a high level, the work items that are needed for the envisioned R&D programme.

Fig.1 Delegation Workshop International R&D Programme on Innovation

6.2. The innovation Reference model

Figure 2, below, depicts the current situation on the left and the desired future situation on the right. Ambitions for change and innovation need to be formulated on a generic level only, as

the transition towards the new situation is not a project but a process. The latter means that goals and objectives can always be adjusted, based on emerging new knowledge and new priorities. The process is implemented such that it controls itself.

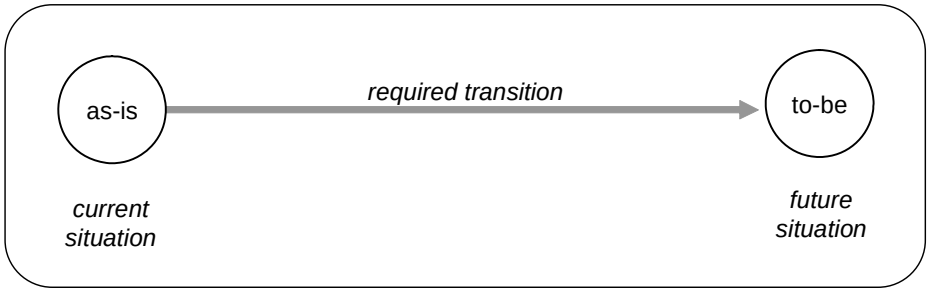


Figure 2..Fundamental Transition model

Figure 3 shows the envisioned innovation system that is required to realize these ambitions. The Innovation System is depicted as a rectangle with rounded edges. The development of this system is also the scope of the R&D programme. Once in operation, the Innovation System will be controlled by a body of governance (top of figure 2), which may be based on the co-operation of government and industry, and requires a support structure (bottom of figure 3).

The innovation system itself contains three subsystems.
The shape in the middle, blue, represents the operational business system. It comprises the companies, schools and governmental bodies, as well as the people who work in these organizations, that do their daily business. The operational business system is subject of the innovation process.

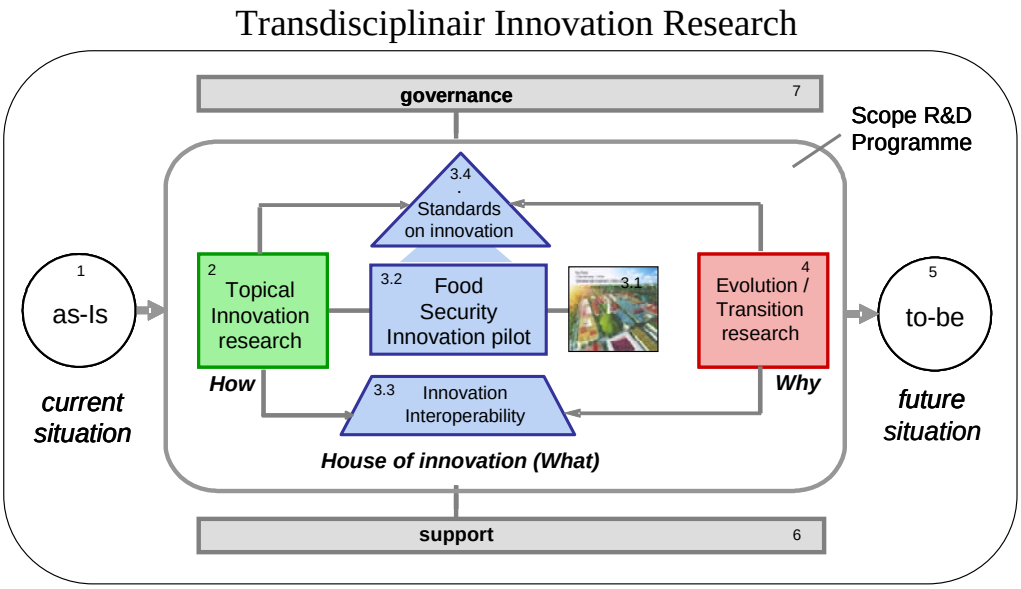


Figure 3. Elements of an transdisciplinair Innovation research program

The square on the left, green, represents the topical research system. It comprises research organizations and universities that develop solutions for innovation. Many of these solutions are partial and need to be complemented with additional work in order to make them practical.

The square on the right, red, represents the transition system. This is a new kind of system (i.e. an organizational structure) that is needed to ensure that the transition from the current situation to the envisioned future system runs smoothly and that barriers for practical usage

are removed. An important generic aspect of the new apporach is that it addresses two aspects of innovation simultaneously: (a) objective innovation, including work, jobs, tasks, products and services, and (b) subjective innovation, including the human aspects, such as human talents and (dis)abilities, human interaction, cultures and human organizational structures. These two aspects form two sides of the same coin

6.3. Goals and Objectives

Examples of ambitions that are expressed on a macro level are the Lisbon treaty of the European Union (signed in 2007, in operation since 2009), the most recent 5-year plan of the People Republic of China, and the report 'The birth of a learning science' issued by the Organization for Economic Co-operation and Development (OECD). On a local level, more specific ambitions may be formulated, such as the plans for 2020 of the Dutch ministry of Economics, Agriculture and Innovation, and the goals of the IPC and RAAK stimulation programmes. Priority 1 is Metropolitan Food Security.

6.4. Topical research

First of all, a distinction is made between topical research, which is research that focuses on specific innovations, and research that contributes to the innovation infrastructure.

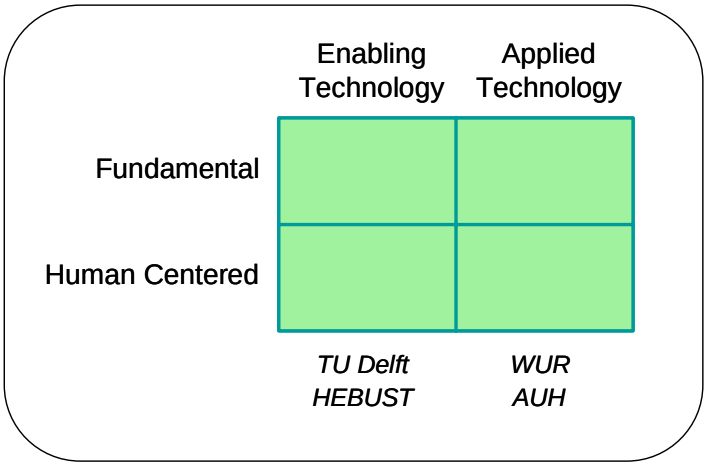


Figure 4. Topical Research Framework

A framework for topical research is shown in figure 4. A distinction is made between applied technologies, which focus directly on the final applications such as agriculture, and enabling technologies, which are more generic by nature. Enabling technologies often end up as products of technology suppliers. A second division, orthogonal to the previous one, is the distinction between fundamental technologies and human centred technologies.

Topical research projects may be set up in collaborations between universities across the quadrants in the above figure, jointly with industrial partners and educational partners. A university may play two roles concurrently: as research organization and as educational organization. But it is recommended to involve also vocational education as a means to distribute knowledge.

Apart from topical research there is a need for research that contributes to the development of the innovation infrastructure. This includes research on education, on interoperability issues and on the knowledge infrastructure. The scope of research is determined by what is needed to move innovations to the market. In addition, there is a need for research of the transition

system. Which factors block innovations unnecessarily to move to the market? Lack of education of people? Cultural aspects? Regulations? Law? Risk assessments? In the Netherlands, Wageningen University, Erasmus University and the University of Brussel (Ecco-group) do research on this subject.

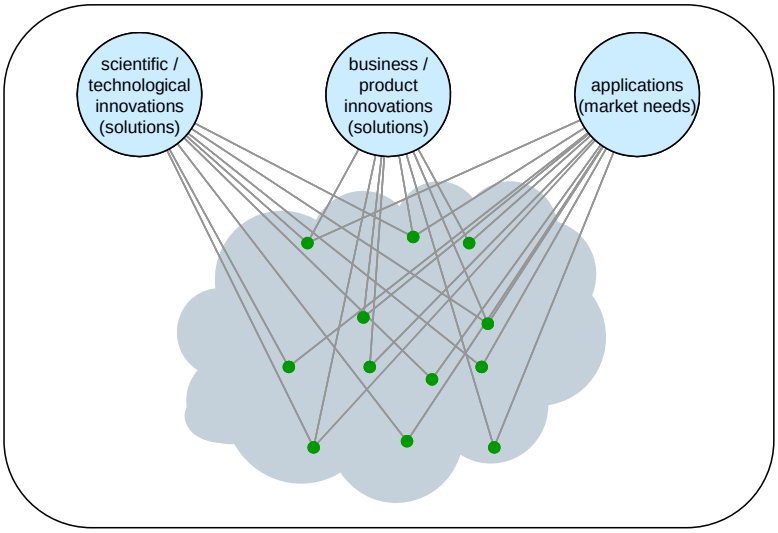


Figure 5 . Topical Innovations (green dots) may be developed in co-operations of research organizations, enabling technology suppliers and technology appliers (the end user market).

6.5. Operational Business (House of Innovation)

The operational business system is the subject of innovation. It comprises existing products, business organizations, business processes, governmental bodies and educational organizations, and even conditioning factors such as laws, treaties and regulations. There is an 'as-is' (existing) and a 'to-be' (target) situation of operational business, and it will therefore be nicknamed 'the house of innovation'. It contains three sub-systems (figure 6):
1) the primary, value creating business system (middle square),
2) the supporting infrastructure (trapezium on the bottom) and
3) the knowledge infrastructure.(triangle on the top).

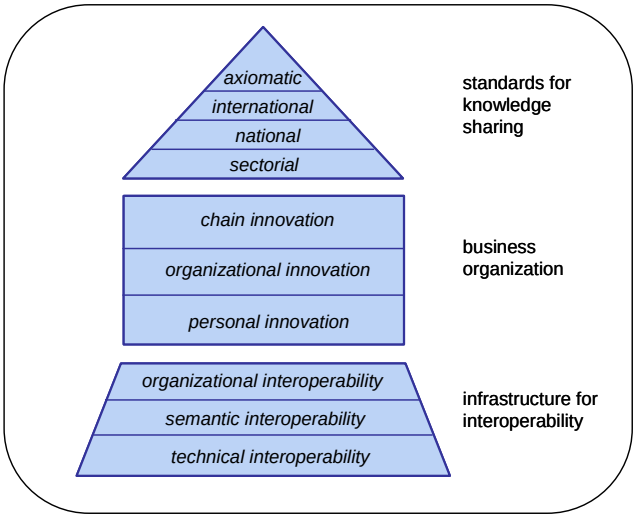


Figure 6. The operational business system comprises the primary, value creating business organization (middle), the infrastructure for interoperability (bottom), and standards for knowledge sharing that form together the innovation language (top).

The business organization system

The systems approach is used for a brake down of structures, such as product, process, organization and knowledge structures, into manageable units.
By arranging these units as potentially replaceable modules, systems are created that are fairly easy to modify. The business system is organised as a multi-layer innovation system:

- The individual level aims at the self-development of human talents and the optimization of roles within an organization.
- The organisation level (departments, business units, enterprises) aims on the development of self-learning and self-educating teams.
- The sectorial level aims at co-operation within the knowledge chain and on the transfer of knowledge with education, in the form of continuous renewal of educational curricula, on-the-job training of students, re-education of personnel and knowledge sharing research.

The infrastructure for interoperability

Although there are many aspects that may considered as being part of an infrastructure, focus will be on the information and knowledge infrastructure, with the goal of interoperability[2]

- Technical interoperability, the infrastructure needed for communication, such as internet based communication systems.
- Semantic interoperability: the ability of units in a system to interpret information, including the correct understanding of terminology used.
- Organizational interoperability: the ability of organizational units to share and communicate knowledge, and to integrate working, learning and innovating.

The infrastructure for knowledge sharing

The three levels of interoperability all require an infrastructure for knowledge sharing, which may also be called a common language, or common innovation language. The words used in this language must be interpreted (i.e. associated with meaning) in precisely the same way by sender and receiver[3]. This is a major but essential challenge, because different disciplines and organizations working in different regions may use the same words with a different meaning or different words for the same idea. Common innovation languages are usually developed in a bottom-up fashion, starting on a local level, and then trying to harmonize them on regional, national and international level. There are however also a number of axiomatic principles that can be found in all standards, which can be used for the development of any standard.

Four levels of specification and standardization are identified:

- Axiomatic level: a number of fundamental principles that can be found in most standards. Unfortunately, they are often specified in a slightly different way thus causing interoperability problems. By uniformizing these principles on the top level (axiomatic level) these problems can be resolved.
- International standards, such as ISO standards for product and process data, and the ICF standard (International Classification of Functioning, Disability and Health) of the WHO.
- National standards. These are often derived from international standards, or are extensions of international standards. An example is the Dutch NTA 8611, which is a guideline for object libraries.

Sectorial level. These are often pre-standards of national standards.
For the national and sectorial level, an incomplete set of standards is listed in figure 8 that were developed in the Netherlands.

[2] Interoperability is a property of units in a system that enable them to work with other units in a system.
[3] An approach that is today widely used is the development of socalled ontologies. Ontologies have however also certain limitations that require the application of other methods.

On the right hand side object oriented standards are shown, while on the left hand side subject oriented standards are listed. Some exist, others are in development, and a few more are still missing. In the central columns, process oriented standards are given.

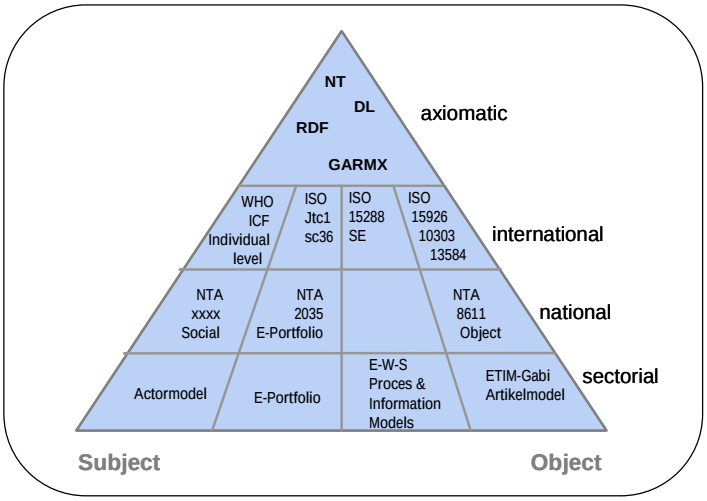


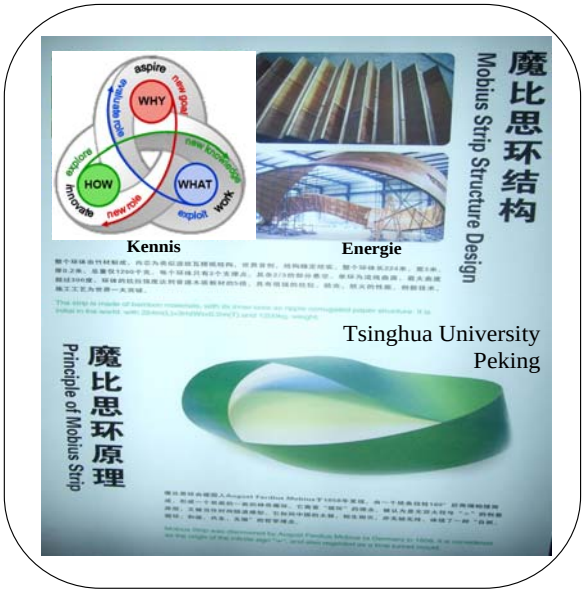
Figure 7. Standards for knowledge sharing, with subject (human) oriented standards on the left and object (product, process) standards on the right.

6.6. Transition System

The transition to a sustainable society with sufficient food and a high quality of life is a tremendous challenge. There are many factors that hinder the required innovations to be applied in practice. An accepted model of the transition process identifies three levels:

- The micro level of niches, in which innovation experiments are done. Some of these may lead to products or services. As markets are still small, this is a risky phase for the pioneers and the early adopters.
- The meso level of regimes. These are existing systems of settled businesses, in the form of unions and associations, that try to defend their position. They developed standards, agreements and regulations that block new approaches.
- The macro level of the landscape. It is dominated by the media, culture and politics.

The complexity of Systemtransition requires an effective communication model



Figuur. Example of a 3D Presentation of harmony (Shanghai Expo 2010)

7: Preparing a Sino-Dutch agreement

7.1. Report on preparation meetings in China, June 2012

Friday 25th May: Meeting with officials of Hebei Education Department, Shijiazhuang.

Mr. Zhai Haihun, Deputy Director General Hebei Provincial Education Dep.
Mr. Hou Jianguo, Director, International Office Hebei Education Dep.
Mr. Li Shoumin, Deputy Director, International Office Hebei Education Dep.
Mr. T.A.M. Lohman, vice President AcadeMi-IO, Topics discussed:

- Train the trainer of Sino-Dutch professors on Innovation
- The development of an international standard on innovation
- The development of a Sino-Dutch research program on innovation

Actions:
1. Prepare a Letter of Intent on Innovation
2. Prepare Presentation for professors of the Hebei University

Monday 28-29th May: 2012 Spring World Congress on Engineering Technology Xi-an.

- Presentation Paper Id. 31552. *How the Liberation of Human Talents can Leverage the Innovation Potential of Industrial Enterprises*
- Meeting with Prof. Uri Shafir. University of Toronto Canada. *Learning Engineering in the Digital Age with Pedagogy for conceptual thinking.*
- Meeting with Prof. Xin-She Yang. National Physical Laboratory London. *Global Optimization in Engineering: What can we learn form Nature?*

Action: prepare an international mini-seminar in Hebei, August 2012.

Wednesday 31st May: Presentation for Hebei University of Science and Technology in Shijiazhuang

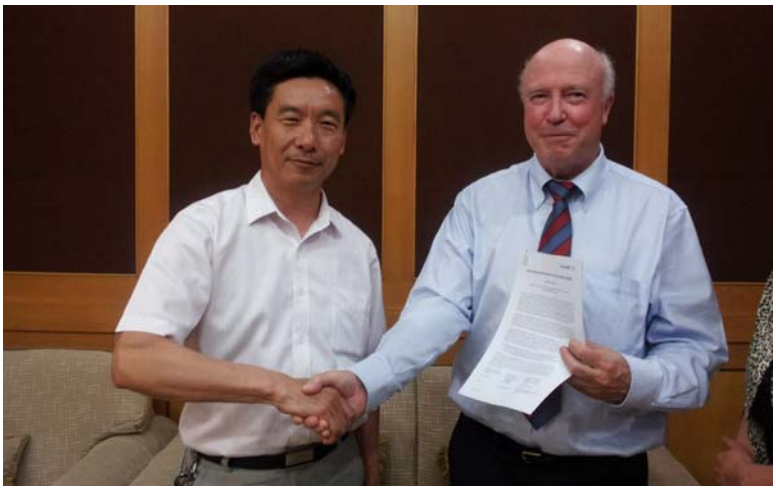
- Xu Youngzan, Prof. Director International Exchange Center.
- James Zhai. Prof. Director International Languages / Innovation
- Zhang Dongwen. Prof. Informatics and Science.

Action: organize a 3-day workshop on innovation for about 20 professors in Hebei – China.

Wednesday 31st May: Evaluation meeting with the directors of Education Department

- Mrs. Guo Jingru, Deputy Director General (participant of workshop on innovation in Holland, June 2011.
- Mr. Yan Chunlay, Deputy Director General (member of the education mission in October 2010 in the Hague Holland.
- Mr. Xu Youngzan. Director International Exchange Center (see Picture)

Actions: Concept program and budget indication for next actions on Train the trainer, Innovation Standards and Research Plan and action 2; Investment ca. 100.000 euro on both sides (Holland / China) for preparing solid plans / and better understanding of the programs and to prevent misunderstanding.



Thursday 1st June Meeting in Beijing; Ministry of Education, People Republic of China

- Mr. Luo Ping, Director Division of International Organisations
- Mr. Yang Xiaochum, Director Division of European Affairs.

Actions: Learn together from past projects. Support of Province of Hebei on International Aspects. Additional information on International Innovation Research programme and the Dutch NEN commission on standards

Thursday 1st June Meeting in Beijing; Embassy of the Kingdom of the Netherlands

- David Pho, Education Representative of Holland in the Republic of China
  Action: David contacts AgentschapNL, J. van der Brink on IPC Program.

7.2. Letter of Intent on Innovation Research

International Research on Innovation Ability

Letter of intent

between Province Hebei Education Department, Provinci of Zuid-Holland
and AcadeMI-IO foundation

This Letter of Intent should be regarded as a next step towards a common Sino-Dutch agreement on an innovation programme to be signed in august 2012 in China. The aim is to develop a Common research program on Innovation, a common ISO international dictionary on Innovation and a train the trainer program on innovation to accelerate the exchange of knowledge between Education and Industry and between South Holland and Hebei. On individual level the aim is to develop human capabilities concerning continuous learning, improvement and innovation in educational institutes and in the context of an entrepreneurial business culture. Such capabilities reinforce each other and guide companies to World Class Performance. The approach followed will be in line with postmodern organizational thinking and bridge the gap between education and industry (subject/object).

In the approach, Organisational Interoperability is essential and requires not only trans-disciplinary personal skills of employees, but also the adoption of a common language for collaboration and innovation. As such a common language cannot be developed and accepted by a single organisations, it requires joint involvement of businesses and education on multiple levels, individual, organisational and the value chain for total solutions. The development of such a multi-level knowledge infrastructure will therefore be facilitated by the responsible regional and/or national authorities.

From the innovation system it requires a more integrated approach of semantics, learning and systemics to make better use of the talents of actors; people, organisations and value-chains. A practical proven methodology enables People to empower their Talents, self-learning capabilities form Role to Role and form Job to Job. Employees are given the time and freedom to develop their personal talents as well as their team skills, so that they can optimize their value to their own ambitions and the organisation goals. This approach is fully in line with the Confusius way of thinking and the performance is in line with the CMMI-standard.

The Political interoperability is a shared vision on innovation on National Level as described
1. In Chine's vision on Revitalizing China through Science, Technology, Education (p.35)
2. In Dutch vision on Revitalizing entrepreneurship; To the Top. A new innovation strategy with a focus on nine topsectors and five integration aspects (Topsectoren).

This letter of intent is on Provincial level and in line with the 3 MOU's signed on City level in Hebei and South-Holland in the context of the development of Metropolitan Food Security Systems with the support of Dutch expertise on Agro-food, Horti-culture, Water Supply and Harbour Management and High-tech Machinery and with the innovation language as an essential integrator. See Addendum. It is also in line with the ambitions and the findings of the three-day workshop-results of the delegation of the Province Hebei under coordination of Mrs. Gou Jingru and Mayor Sjaak van der Tak of Greenport in juni 2011 in Holland.

Province of Zuid Holland Eurepean and International Department	Province Hebei Education Department International Division	AcadeMI-IO foundation Education & Research On Methodic Innovation
Mr. J. Spapens	Mr. Hou Jianguo	Mr. T. Lohman
Date:	Date: 29/04/2012	Date:

7.3. Items to agree on in the meeting in august 2012.

The Sino-Dutch cooperation on innovation started in 2010 and was followed by a seminar in 2011 in Holland. There is a base for a second workshop in China to meet experts and to get a better understanding of the new developments around innovation. We suggest therefore a:

Discovery mini-seminar on innovation and making better use of people talents.

mini-seminar of one or two days. The idea is that the Education department of Hebei is the host. It will be a Joint Activity of Zuid-Holland and Hebei. An indication of a possible program:

1. Proposed Guest speakers
    1. Xin-She Yang, National Physical Laboratory (UK London); Can we learn from Nature
    2. Uhri Shafrir, University of Toranto; Conceptual thinking in the digital age (Canada)
    3. Chang-Hong Miao, Henan University; learning and innovation in China
    4. Theo Lohman, AcadeMi-IO; Collective Intelligence on organisation, Chain and regional levels.
    5. Jeroen v. Merrienboer, University of Maastricht. Developing complex learning tasks.
    6. Remco van Schaik; Impact on Standards ISO TC 760 Human Resourse Mgt

    Chairman Martin Mulder from the Wageningen University (Competence Centre)

2. Opening ceremony of AcadeMi-IO in Hebei
    1. Dutch Goals and common ambitions
    2. Hebei Goals / (Department of Education)
    3. Organisation structure (Chinese / Dutch)

3. Presentation / discussion of concept plans for coming year on
    1. International research on innovation
    2. Train the trainer program
    3. International standardisation
4. Forum discussion

The investments in the *learning innovation approach* and the experiments in practice in the past 10 years is about 10 mio euro (50% paid by Industry, and 50 % by Government). After the visit of the Chinese delegation in 2011, we worked out a Dutch investment plan on innovation (4,4 mio Euro, see par 6) witch is handed over to the Dutch Government, the Ministry of EL&I for the top sectors Horti-culture and Agro-food. The Chinese investment plan is not worked out yet. Like we did in the Netherland we suggest an approach to develop the plans together in a third order learning process, step by step. This is to prevent misunderstanding in expectations and to reduce unnecessary risks. The most important aspect however is that both partners grow in competence and learn from each other on the job. This will form a sustainable base for realising export projects with China. To take off, we suggest reserving a starting budget of 100.000 euro for initiating and preparing the plans for China in a workshop setting. We will work this out in more detail before August and after having visited the education burro on national level, to hear their suggestions. We suggest focusing on the three items mentioned below:

1. Definition of a common research project (30.000)
2. Definition of ISO standard on innovation and the available expertise (35.000)
3. Approach of a Sino-Dutch Train the Trainer project on innovation (35.000)

Fifty percent of the budget is to cover the Dutch costs and fifty percent to cover the Chinese costs. We will work this starting-up plan in more detail.

8. Financial Plan

8.1. Dutch investment plan august 2012; Food Chain Innovation

7.

States Actors	Total In euro's	2010	2011	2012 1e t part	2012 2e part	2013	2014
1. Demand creation	**600.000**	**150**	**240**	**100**	**110**		
1.1. Demand creation Government	400.000	150	100	100	50		
1.2. Demand creation SME's	140..000		140				
1.3. Demand creation Provinces	60.000				60		
Finance							
Own investment	300.000	75	120	50	55		
Sponsored by RABO	200.000	75	50	50	25		
Sponsored by regional Government	100.000		70		30		
2. L to Innovate 20 SME	**1.310.000**				**60**	**625**	**625**
2.1. IPC-PLan EL&I (Plan A)	1.310.000				60	625	625
Finance							
Own investment 20 SME's	750.000					375	375
Sponsoring by EL&I IPC	560.000				60	250	250
3. L to Innovatie Schools	**600.000**					**300**	**300**
3.1.Demand creation VMBO-MBO	200.000					100	100
3.2.Four polytechnics Minor Mi	400.000					200	200
Finance							
Own investments	300.000					150	150
Sponsoring by EL&I top sectors	300.000					150	150
4. Innovation Research	**1.4000**					**700**	**700**
4.1. Fundamental R&D (plan A)	600.000					300	300
4.2. Innovation Standards (plan C)	400.000					200	200
4.3. AcadeMio-IO Transfer (plan B)	400.000					200	200
Finance							
Own investments	700.000					350	350
Sponsoring by EL&I top sectors	700.000					350	350
5. Chain management	**400**					**200**	**200**
5.1. AcadeMi-IO Chain management	400.000					200	200
Finance							
Own investment	200.000					100	100
Sponsoring by EL&I top sectors	200.000					100	100
Total costs	**4.310.000**	**150**	**240**	**100**	**170**	**1825**	**1825**
Total own investment	2.250.000	**75**	**120**	**50**	**55**	975	975
Total Sponsors	2.060.000	75	120	50	115	850	850
• Central government EL&I -IPC	560.000				60	250	250
• Central Government Top sectors	1.200.000					600	600
• Regional Government	100.000		70		30		
• Rabo Bank	200.000	75	50	50	25		

8.2. IPC plan to increase SME's Innovation Ability (Topsectors))

IPC project sum per SME in euro's (total is 20)		**62.500**
Support government 40% for innovation activities		**25.000**
1.	**Collective innovation Export structure (Why en What, total solution)**	
1.1	Design export structure	3.000
1.2	Design specifications for curricula (with education)	1.500
		4.500
2.	**Collective innovation Organisation structure (How, production process)**	
2.1.	Design goals and direction	900
2.2.	Design new roles	1.200
2.3.	Innovate the knowledge	1.200
2.4.	Seal into the organisation	1.200
		4.500
3.	**Collective innovation of the chain (How, chainproces)**	
	Design interfaces Horti-Agro-Education and roles in the Chains Based on the designed export structure	9.000
Collective spending is 2/3 of Government financial support		**18.000**
4.	**Individual Innovation of SME (What, technology)**	
4.1.	Product technology innovation with interfaces for a Total solution	4.000
4.2.	Process technology innovation	1.500
4.3.	Product support training for the users, sustainable	1.500
	6.000	
Individually spending is 1/3 of Government financial support		**7.000**

Deelnemers IPC aanvraag uit (A&F) en (T&U)

Bedrijf	**contactpersoon**	@ mail adres
Merford Noise Control	Andre Hameete	andre.hameete@merford.nl
Strago Electro	Wil Gremmen	w.gremmen@strago.nl
Van Wingerden	Jan Rom Colthof	vanwingerden@wigo.nl
Reijnders	Bert Reijnders	bert@rgen.nl
Holland Marine Lifts	Emile vd Starre	est@hmlifts.com
Cor de Rover	Jan van der Pas	jan@cor-d-rover.com
Blokland Metaalbewerking	Jan Willem Blokland	jwblokland@blokland.nl
Omega	Leen Steehouwer	l.stehouwer@omegaplatforms.nl
Koppert	Paul Koppert	p.koppert@koppertmachines.nl
GreenQ	Jilles Goedknegt	jilles@greenq.nl
Bergproducts	Jeroen Gerritse	jeroengerritse@bergproduct.nl
P.L.J. Bom Groep	Martin van Zeijl	
Wilk van der Sande	Hein v.d. Sande	hein.vd.sande@wvds.nl
Logiqs Agro	Ruud Vlottes	info@leen-huisman.nl
QSulution	Willem J.Hak	Wj.hah@q-solution.nl
Sollas Holland	Rob Tuijn	rtuijn@sollas.com
Serendip-IT	Tionne de Greef	Toine.degreef@serendip-it.nl
Kiremko	Eric van Oorschot	bbe@kiremko.com

9: Presentation of Innovation in Chinese

AcadeMi - IO

设想计划书
介绍与合作
AcadeMi-IO 中国 / 南荷兰

版本
04-11-2010
08-11-2010
16-11-2010

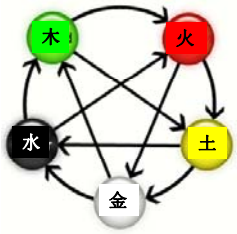
Round the table - Food

1

AcadeMi - IO

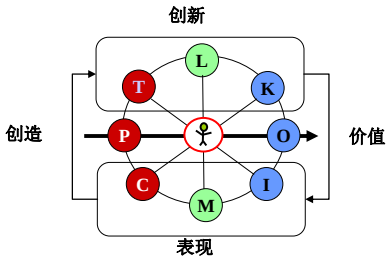
整体分析

能量系统 (5)



健康, 人与自然，和谐

知识体系 (8)

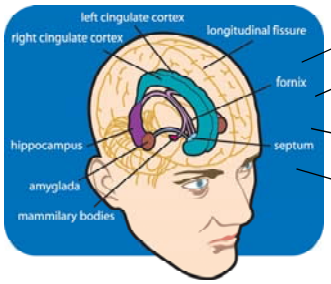


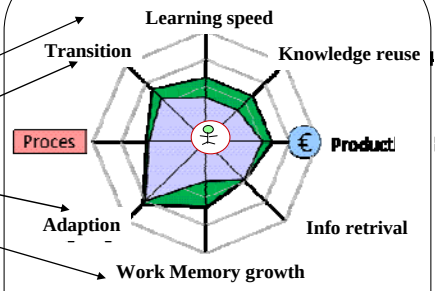
智慧，主观-客观， 和谐

2
2

AcadeMi - IO

Brain economy





Natural talents

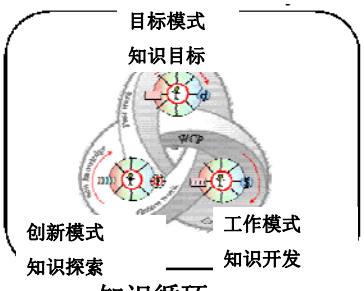
AcadeMi - IO

可持续性

中国 – 2010世博会

能源循环

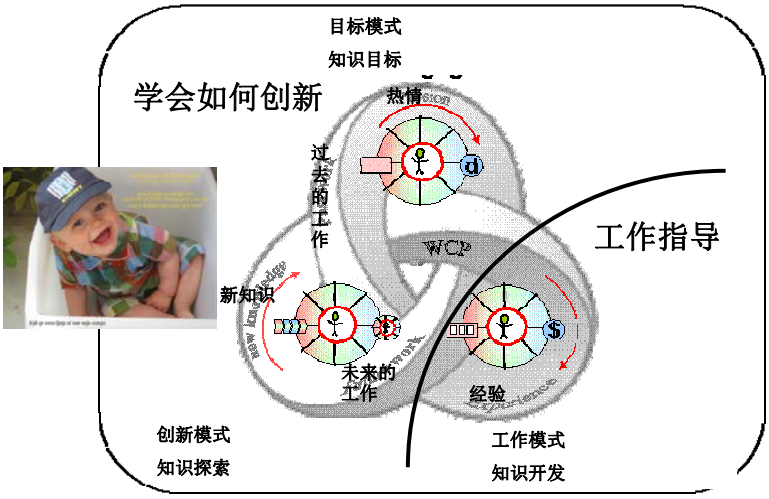
荷兰 AcadeMi-IO



知识循环

AcadeMi - IO

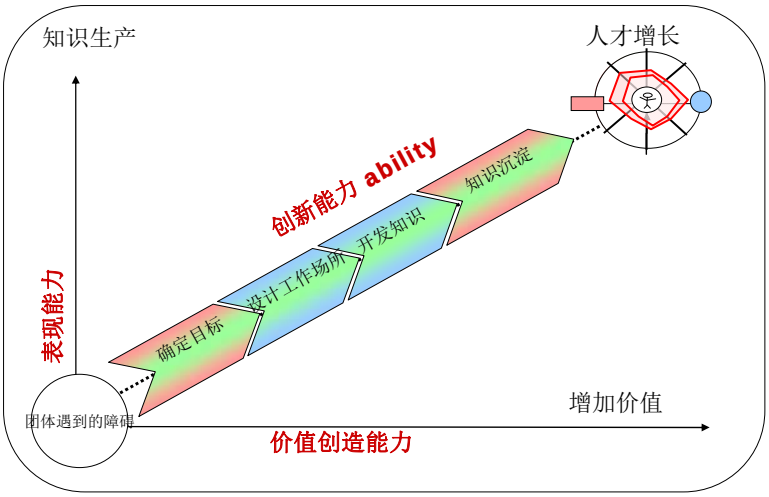
从静态到动态



5

AcadeMi - IO

学会创新 (6个月)



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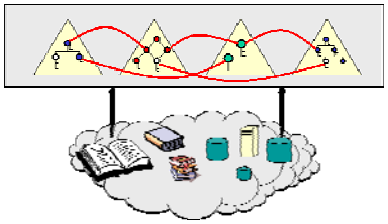
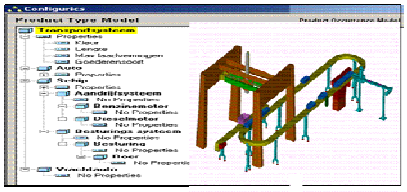
AcadeMi - IO

知识成为生产力





Work As-managed (连接)

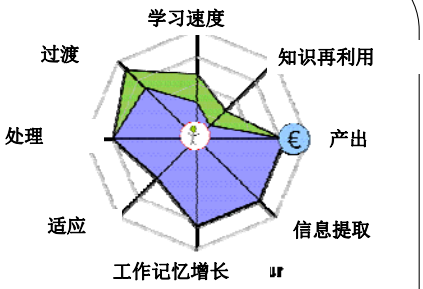
Work As-defined (再使用)

语义技术推动着

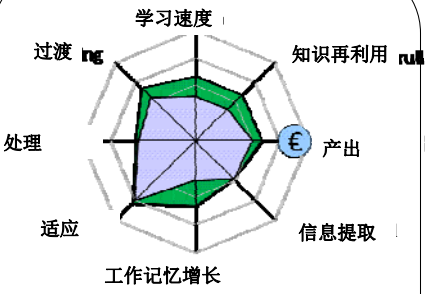
7

AcadeMi - IO

人才的自然增长



机械公司



信息和通信技术公司

8

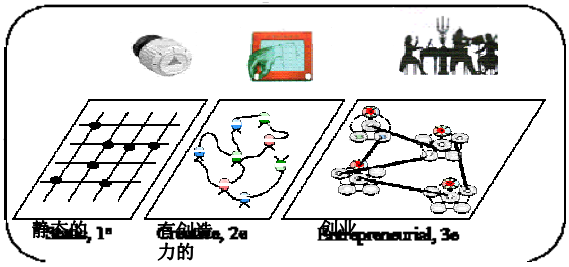
AcadeMi - IO

对教育系统的新要求

人际网的学习

连接质量

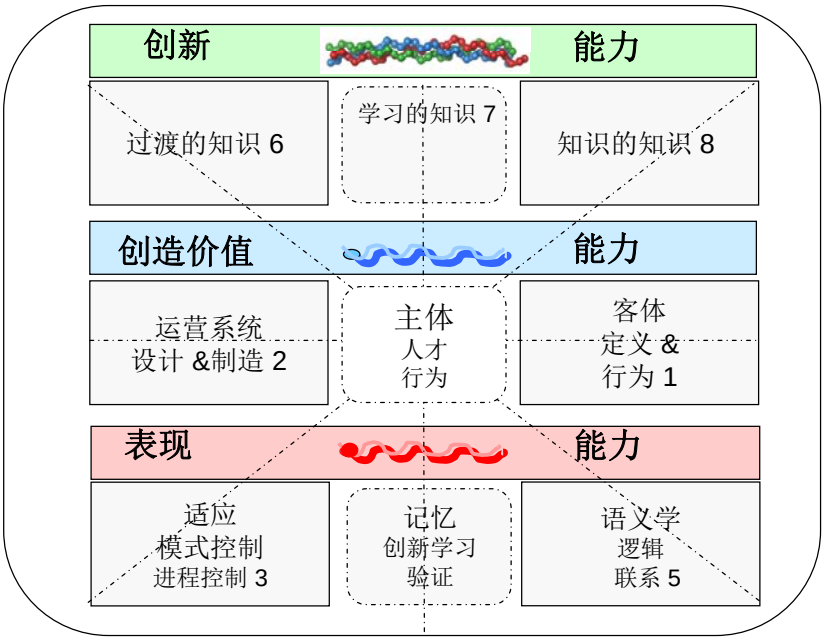
提高学习速度



9

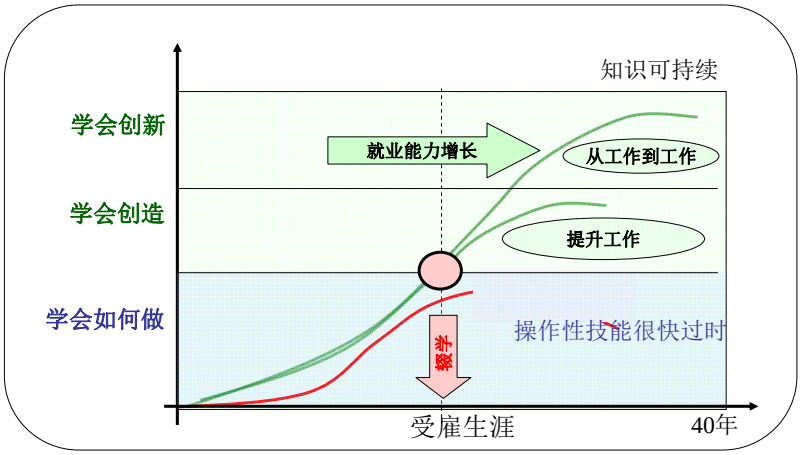
9

新课程



AcadeMi - IO

结构性就业能力增长



11

AcadeMi - IO

这是一个有据可寻的方案，因为：

GMV / Hak 机械工业

Chris Buijnck先生,荷兰经济事务部秘书长
AcadeMi-IO 获得“创新奖”

15

10: Literature on Methodic Innovation

9.1. Part 1

Alberts, B. e.a. (1994). Molecular biology of the cell (3e editie). Modularisering, shapes, position memory of drosophila (blz. 1099). Thermodynamics of the living cell (entropy, p65). Garland Pub.

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