Summary

Knowledge networking

The absorption and utilisation of knowledge by the business sector

Request for advice; scope

Pursuant to a motion passed by the Lower House of the Dutch Parliament, the Minister of Education, Culture and Science and the Minister for Economic Affairs asked the Science and Technology Advisory Council to advise on how to improve the absorption and utilisation by the business sector of the results of (fundamental) scientific research done at public knowledge institutes. The advice focuses on the mechanisms applied by businesses to absorb and utilise the research results, the improvements that can be made, and the ways in which the government can facilitate and stimulate businesses in this respect.

The advice fits in with the debate on the 'European paradox': despite the high standards in knowledge development, this knowledge is not utilised to its full potential. The media and policy discussions often concentrate exclusively on the role of knowledge institutes and the changes needed in the way they work. However, the absorption and utilisation of knowledge requires the active involvement and commitment of all the parties, and certainly from businesses. With this advice the Council focuses in on the requirements on the part of the business sector.

It should be borne in mind, furthermore, that successful innovations need more than just the application of knowledge. Although adequate knowledge absorption and utilisation is important to the innovative power of a business, it is not the be-all and end-all. Another point to remember is that businesses draw from various sources of information to satisfy their need for knowledge. Public knowledge institutes are generally not the main source. With due observance of these comments, this advice will hereafter focus exclusively on the aspects set out in the request for advice.

The practice of knowledge absorption and utilisation by businesses

In dealing with the request for advice, it would be absurd to speak of 'businesses' in a general sense. Businesses differ greatly in their day-to-day innovation practice, and therefore also in their needs and particular problems with regard to the absorption and utilisation of knowledge. For this reason, the Council classifies businesses in five categories, based on the size of the business on the one hand (in this case, its capacity to promote knowledge absorption) and the innovation strategy of a business on the other hand (the strategic choices as to the kind of innovations that a business will focus on, manifesting themselves in the size of the R&D staff and the type of knowledge required).

A. Large businesses (multinationals)

Various multinationals with a sizeable R&D staff have shifted their attention to short-term proceeds. The consequences include their R&D being more closely linked to the market (i.e. to business units) and a reduction of the amount of long-term research done by the businesses themselves. This has reduced the capacity of these businesses to absorb knowledge because there are fewer 'landing points'. These businesses are well aware that this may be a threat to their innovative power. This is why several businesses have taken steps to strengthen their ties with knowledge institutes, for instance by appointing liaison officers. In addition, the recruitment of young people remains an important way to bring in knowledge, and also to establish a network with the new employee's *alma mater*. In recent

years, business globalisation and the shortage of technically trained staff in the Netherlands have caused businesses to increasingly recruit their (research) staff from abroad. A little-known side effect of this trend is that the networking with the knowledge institutes thereby moves abroad as well.

All in all, the multinationals currently consider themselves sufficiently capable – depending on their business needs – of interacting with knowledge institutes and formulating long-term research themes. In their view, however, their expert staff members can be deployed more effectively by extending their involvement in setting up large research programmes, thus tailoring these programmes to the specific needs of these businesses.

B. Large businesses (250 to approximately 5,000 employees)
This is a category of larger businesses with a limited R&D department of their own, which is usually geared more towards development than towards research. The small size of the R&D staff not only restricts the chances of taking part in knowledge networks, but also the opportunities for the business itself to convert scientific knowledge into applications. This type of business therefore needs more directly applicable knowledge (a conversion). In addition, cooperation between businesses in research programmes (demand grouping) may be a way to increase the usefulness of cooperating with knowledge institutes. At these businesses, personnel flows (e.g. via traineeships or hiring new people) are an effective mechanism for absorbing and utilising knowledge.

C. Frontrunners among the small and medium-sized enterprises
This category concerns knowledge-intensive businesses that, whether or not in cooperation with knowledge institutes, build up their own knowledge and utilise it in relation to their services or products. These businesses, with a relatively large proportion of highly trained employees (own R&D staff), often have good contacts and cooperative relationships with knowledge institutes. In this respect, personal networks are the key to success. For this category of businesses, too, personnel flows are of great importance. For instance, ‘dual research assistants’ may play an important part in broadening the scope within a business.

D. Development-oriented small and medium-sized enterprises
These are the small and medium-sized enterprises without an R&D department of their own, where innovation is characterised instead by a ‘smart’ combination of existing technologies. To a large extent, the impulse to innovate arises from needs observed in the market or in the business itself. For this group of businesses in particular, the applicability of knowledge is very important. Also in this case, informal contacts and personal networks are the main sources of knowledge. In this respect, technical colleges play a greater role than universities. Traineeships and the (temporary) employment of highly trained staff may be an important tool in bringing in knowledge and/or creating networks. Increasing their competence and training existing employees (‘lifelong learning’) are matters of great importance to these businesses, which have a relatively small influx of new employees. Finally, various intermediaries (such as trade associations) may play a valuable role by giving support in seeking *and* finding the required knowledge and in following technological developments.

E. Technology-following small and medium-sized enterprises
At these businesses, innovation mainly concerns the implementation of tried and tested technology, aimed especially at improving the internal efficiency and technical capabilities of the business. These businesses do not employ any R&D staff of their own, and do not – in general – have any contacts with knowledge institutes. Although TNO (the Netherlands Institute for Applied Scientific Research) is consulted to a limited extent, (small) engineering and consultancy firms and suppliers are much more important sources of knowledge to enable innovations at these businesses. An increase in the areas where such intermediaries can be involved may be beneficial to these technology-following small and medium-sized

enterprises. In addition, a supply of information on new (technological) developments may accelerate implementation. Again, private consultancy and engineering firms may play an important part in this respect, but so may trade associations and – for instance – Syntens.

Points of departure in the recommendations

Before making any specific recommendations, the Council formulated a few general points of departure.

- **Primarily, businesses themselves are responsible for adequate knowledge absorption and utilisation; the government has a stimulating and facilitating role**

The Council considers it self-evident for business managers to focus on the longer term. In doing so, they need to be open to new possibilities and innovation opportunities. The culture and management methods of a business are the decisive factors in that respect; employees should be given time and space, among other things to participate in knowledge networks. The government should play mainly a supporting and facilitating role, justified by the importance of knowledge-intensive, innovative business activity for the Dutch economy and thereby for our prosperity and wellbeing.

- **Most of all, the absorption and utilisation of knowledge is done by people**

Cooperation and knowledge absorption depend on people. They are the mainstays in creating networks and effective cooperative links. Therefore, the 'human factor' should be the core element in stimulating and boosting knowledge absorption. Until now, this point of departure has not received enough attention in Dutch (innovation) policies.

- **What matters is the *ability* to absorb and utilise knowledge**

Because of the dynamics in the economy and knowledge development, versatility and decisiveness are increasingly important in businesses. An adequate response to these dynamics requires a well-developed ability to understand, absorb and utilise knowledge developments. This ability is ultimately more important than acquiring knowledge only once for the purpose of a specific innovation. This awareness should be the focal point when measures are developed by businesses and support is provided by the government.

- **The policy should take account of different needs and problems**

Businesses differ in their innovation strategy, their capacity to take part in knowledge networks, the kind of knowledge that they need and the particular problems that they experience in the absorption and utilisation of knowledge. It is important to provide a wide and varied range of policy measures to allow for these differences.

Recommendations

By combining these points of departure, the Council has established four lines of recommendation to promote knowledge absorption by the business sector.

A. Increase the knowledge level in businesses

The ability of staff members to follow developments, absorb knowledge and convert this knowledge into specific innovations is the pivot of knowledge utilisation. Employing more highly trained staff and sustaining their levels of competence are therefore the first priority. This results in the following recommendations:

- *More highly trained staff in businesses, in particular small and medium-sized enterprises;*
- *More training opportunities for employees, investment in 'lifelong learning';*
- *Reinforce initiatives and programmes aimed at joint organisation (by knowledge institutes and businesses) of training courses.*

B. Reinforce the creation of networks

Interaction between staff members of businesses and knowledge institutes is the basis for the exchange and utilisation of knowledge. Network activities (both formal and informal) may be valuable in themselves, but in addition they often constitute the basis for future, more

formal flows of knowledge, such as staff exchanges, contract research and R&D cooperation. In this connection, the Council makes the following recommendations:

- *Support smaller businesses in developing and maintaining knowledge networks;*
- *Organise demand grouping;*
- *Reinforce the role of lecturers at technical colleges*;
- *Continue the policy aimed at the creation of knowledge consortiums;*
- *Organise meeting places*.

C. Increase staff mobility

Interaction and knowledge exchange can be brought about not only by the creation of networks, but also by staff mobility. Staff mobility results in the establishment of new networks or the reinforcement of existing ones. In the Council's view, this may be achieved as follows:

- *Attach greater and more explicit value to traineeships, research and graduation projects;*
- *Stimulate dual research assistant programmes;*
- *Create greater variety in postgraduate (doctoral) programmes;*
- *Increase the number of 'external' doctorates;*
- *Stimulate and facilitate staff exchanges between knowledge institutes and businesses.*

D. Greater attention for the conversion to applications

Many businesses with no or few R&D staff members need support in converting the results of (fundamental) research into utilisation opportunities. These businesses are not likely to establish direct relationships with universities. The Council makes the following recommendations:

- *Provide sufficient 'cover' for the need for conversions through the intermediary knowledge infrastructure;*
- *Stimulate small and medium-sized enterprises to use consultancy or engineering firms;*
- *Reinforce the role of technical colleges in the innovation system*.

Final remarks

The main message of this advice is that knowledge absorption and utilisation depends on people, and that this simple principle should have a clear position in (innovation) policies. Although there is certainly no question of a 'white sheet', an intensification of policy is necessary with regard to the 'human factor' and personal interaction. In comparison with other countries, the Netherlands has some catching up to do in this respect. Furthermore, the Council advocates greater stability once policy lines and instruments have been adopted. Recent years have seen a (too) rapid succession of regulations and instruments. Finally, the Council warns against too strong a focus on research cooperation between knowledge institutes and businesses. Such a direct cooperative relationship is certainly not relevant for all categories of innovative businesses, and would cut out a large group of small and medium-sized enterprises.