

has proposed using the money to set up 30 university-based centres of excellence in fields of interest to industry. Like the proposed Faraday centres in the United Kingdom, these would carry out both postgraduate training and research, and act as a point of contact between universities and industry.

Per Unckel, the Minister of Science and Education, has been an enthusiastic supporter of the use of the Workers Fund to support such activities, particularly

because of the flexibility that private foundations would have, and is defending the proposal vigorously against cabinet colleagues who want to use the money for other purposes, such as pensions. But the dismantling of the fund is being actively opposed by the Social Democrats in parliament. And its value has been falling precipitously in step with the declining stock market. So although appetites in universities have been whetted, no one is taking the money for granted □

Sweden's central role

THE geographical isolation of Nordic scientists has long provided an incentive for collaboration with colleagues in other countries, both within Scandinavia and further abroad. A recent study carried out for the Nordic Council of Ministers has shown that the volume of inter-Nordic collaboration continues to grow with Sweden as its central focus.

"However, this growth has been less rapid than that of collaboration with scientists in the United States and in the countries of continental Europe," says Gunnar Sivertsen of the Institute for Studies in Research and Higher Education in Oslo.

The analysis was based on scientific articles published in the period 1975–90 and listed in the *Science Citation Index*. It was carried out by Sivertsen together with Terttu Luukkonen of the Academy of Finland in Helsinki and Olle Persson of the University of Umeå in Sweden.

For each of the four Nordic countries, the proportion of articles co-authored with scientists in other Nordic countries increased steadily during the period in question; in the case of Finnish scientists, the proportion of such papers almost doubled.

Collaboration has been particularly strong in clinical medicine and biomedicine, rather than the "hard" natural science of physics, chemistry and mathematics. And the importance of Nordic collaboration varied. Norway has the largest proportion of articles co-authored with at least one other Nordic country, and Sweden the least.

Detailed analysis of the bilateral links between Nordic countries revealed the extent to which Sweden continues to play the central role in Nordic science. Swedish scientists published almost as many papers during the period studied as those from the other three countries put together. And scientists from Denmark,

Norway and especially Finland cooperate with colleagues in Sweden — particularly in the medical sciences — more frequently than would be expected from the size of the respective scientific communities alone.

Yet, important as inter-Nordic cooperation remains, the bibliometric analysis shows that it is being overtaken by cooperation with non-Nordic scientists. During the period 1975–90, there was a relative decline both in cooperation within the Nordic region and with Great Britain. In contrast, both the United States and the countries of continental Europe have become increasingly important as collaborative partners.

Another bibliometric study carried out by Sivertsen underlines the role that the publication of journals has played in the integrating Nordic research into international science. The first Nordic scientific journal, *Acta Medica Scandinavica*, appeared in 1869. Initially published in German, the scientific language of the time, it now appears in English under the title *Journal of Internal Medicine*, although it still has a Scandinavian chief editor.

Today, there are more than a hundred journals that can claim to be Nordic in origin — that is, are edited in one of the five Nordic countries, but the majority of whose articles are written by scientists outside the country of the (chief) editor. "These journals are part of the process of the internationalization of Scandinavian science," says Sivertsen.

"The standard of articles is high; they are cited with the same relative frequencies as other scientific journals. And something which is usually seen as a drawback — the fact that we do not belong to a large language group — has in this case stimulated the use of English language publishing."

Many of the journals are rapidly becoming more international in their content. "The editors find that the best articles by Scandinavian scientists are no longer submitted to the journals if they do not do it. Going through nine years, we can see that the proportion of articles published by Scandinavian scientists in

Intellectual inward investment

EVER since the Middle Ages, Sweden has welcomed foreign scholars to its universities. The benefits have been mutual, since the Swedish academic community has used these visits to keep in touch with the outside world of scholarship. But many of today's scientists find it difficult to work separated from their research teams, and are reluctant to stay in a foreign university for any length of time on their own. So, rather than just inviting individuals to visit, why not complete research groups?

The idea has already caught the fancy of the Swedish government, first stimulated by proposals from the government of Japan to set up a branch of the Karolinska Institute in Tokyo, and subsequently reinforced by a recent visit by the Minister of Education and Science, Per Unckel, to Stanford University in California.

"Why not establish a permanent research facility of Britain's Medical Research Council on the campus at Uppsala, or one from Stanford at the Karolinska Institute in Stockholm?" asks Bjarne Kirsebom, undersecretary of state in the Ministry of Education and Science. He adds: "Ideas in this area are very likely to get government support."

The way the government sees it, implanting a high-level foreign research team on a Swedish campus would be an effective way of reinforcing the scientific strength of domestic research groups, for example through constant contact with scientists working in these groups, and the exchange of postgraduate students. One idea is that government funds would be used to create a research laboratory on a Swedish university campus which would be run by a foreign research council or other organization, and occupied by rotating groups of foreign scientists.

The proposal is still in embryonic form. But the idea of providing permanent bases for foreign research teams is already generating strong support in both the academic and industrial research communities. Kirsebom says that providing money for such facilities is precisely the type of use he has in mind for the proceeds of the Workers Fund (see opposite), and is hoping that his ideas will be included in the white paper on science policy, due next year. □

these journals has fallen from 60 to 42 per cent," says Sivertsen, reflecting the fact that Nordic scientists are publishing an increasing number of their articles outside Scandinavia. □

Nordic Collaboration in Science — a Bibliometric Study. Terttu Luukkonen, Olle Persson and Gunnar Sivertsen. Nordic Council of Ministers, 1991. Nord 1991:28

Internationalization via Journals. Gunnar Sivertsen. Nordic Council of Ministers.