Ready for the future? Europe's leaders fret that their high-tech industries are slow to innovate.

EUROPEAN UNIVERSITIES

Europe's Innovation Engine, Eager to Grow, Faces Criticism

A European attempt to remain competitive by boosting innovation is off to a shaky start

When José Manuel Barroso, the president of the European Commission, first suggested building the European Institute of Technology (EIT) in 2005, perhaps to rival the Massachusetts Institute of Technology on the global stage, he got a skeptical response. Many argued that existing universities would be better placed than a new institute to bolster Europe's competitiveness.

The result was a fudge. EIT was indeed established—and slightly rebranded as the European Institute of Innovation and Technology—but rather than a brick-and-mortar institute, it became a network of dozens of universities and companies across Europe with a small headquarters in Budapest. Its budget was just €309 million over the period 2007–13.

Now, the European Union is considering a major expansion of EIT, which in June issued a strategic plan that would cost €4 billion over the next budget round, from 2014 to 2020. But the young institute is beset by problems. A scathing external review has criticized its track record, universities say they feel out of the loop about its targets and activities, and industry appears divided on its usefulness and reluctant to pay its share of the bill. Managing the institute has been complicated by the rapid turnover of senior staff.

EIT was meant to give Europe a leg up in the innovation competition with countries such as the United States, India, and China. "Europe is struggling with innovation by any measure," says Martin Schuurmans, former executive vice president of Philips Research, the research arm of the Dutch electronics corporation, and the first chair of the EIT board. "We have been spending billions on R&D programs, and these have helped, but we are still struggling, and we need new approaches."

EIT's approach seeks to reinforce all three sides of the so-called innovation triangle of business, education, and research through newly created consortia of universities and companies across Europe known as Knowledge and Innovation Communities (KICs). The first three KICs—dealing with climate change, information technology, and energy—have been established over the past year, and up to a dozen more could follow.

The KICs receive funding to train graduate students in science, technology, and business; conduct collaborative research; and cultivate new high-tech companies. Each distributes its work among half a dozen "co-location centers" hosted by a university partner (see sidebar).

But the way EIT's governing board has set up the first three KICs has rankled European universities that are meant to be its partners. "There is huge frustration from these universities, including those who are participating and those who are not," over EIT's failure to consult with them, says Karin Markides, president of the Conference of European Schools for Advanced Engineering Education and Research (CESAER). She says EIT's strategic plan is vague as well. "Most of us really believe in this concept," Markides says, "but it has been described in far too general a way."

The external review, undertaken by consulting company Ecorys for the European Commission and released in June, echoed CESAER's criticism. It said EIT "has not yet engaged extensively with the wider audience of organisations involved in promoting innovation within the E.U." and criticized the Budapest headquarters for its subservience to EIT's governing board.

But the board says it was essential to forge ahead with the KICs. "The European style is just to keep talking, but we have had to make choices. There will always be people who see things differently," Schuurmans says. "The European Union discussed this idea for 4 years—and we implemented it in 18 months." Now the KICs need the time to show what they can do, he says.

Rooted in the past

The KICs' first concrete actions have been in education, for which the ambition is to combine science or engineering with the kind of dynamic entrepreneurship associated with Silicon Valley or the greater Boston area. Each of the KICs is planning distinctive master's and Ph.D. programs; students will spend time at universities in at least two nations, learn business skills, and work in industry.

So far, interest seems high. For instance, the KIC InnoEnergy has received 900 applications for the first 200 master's places, which start next month, says Chief Executive Officer Diego Pavia, an electrical engineer with a background in the computer industry.

And even EIT critics agree that this kind of course is needed in Europe, where few postgraduate degrees in science or engineering include business training. "I'm pretty convinced that what they are doing in education will add value," says Peter Tindemans, chair of the policy committee at the lobby group Euroscience and a longtime skeptic about EIT's organization model.

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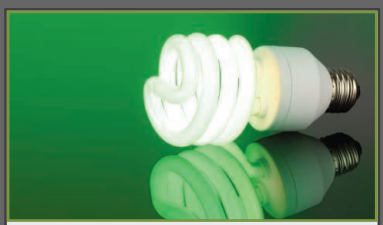
Can These Networks KIC-Start European Innovation?

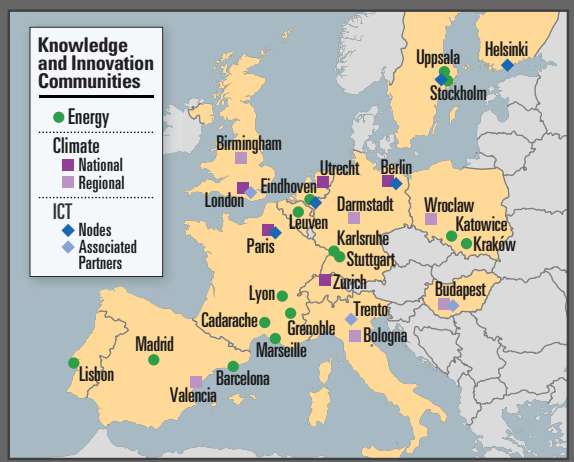


ENERGY

The Knowledge and Innovation Community (KIC) called InnoEnergy, dedicated to sustainable energy sources, is distributed over six co-location centers focusing on nuclear energy, renewables, energy efficiency, clean coal, "smart grids," and energy from chemical fuels. The network will receive €30 million from the European Institute of Technology this year and €80 million from its partners, which include 11 universities and 34 energy companies, including major ones such as Sweden's ABB. "In budgetary terms, [industry's] contribution doesn't go above 26%—but in terms of its real value, we're getting billions of euros," says the KIC's chief executive officer, Diego Pavia.

CLIMATE

The Climate KIC will develop approaches to counteract climate change, such as smarter energy and water distribution systems. That means it will serve a young industry with few well-established players. University partners include elite institutions such as ETH Zurich and Imperial College London; among the five corporate participants are energy supplier EDF and Amsterdam's Schiphol Airport. Because publicly funded organizations play such a prominent role in responding to climate change, the KIC also has public partners, says Chief Executive Mary Ritter, including the Dutch province of Utrecht, which is hosting a pilot project on climate-resilient, low-carbon cities.



INFORMATION AND COMMUNICATION TECHNOLOGY

ICT Labs has perhaps the broadest of all of the KICs' remits, dealing with what European policymakers regard as the continent's persistent failure to compete effectively with the United States in information technology. The consortium includes 21 universities, six research centers, and 20 companies, including household names such as Siemens, Philips, Nokia, and Ericsson. Chief Executive Officer Willem Jonker says that it'll be previous advances in ICT itself—such as Skype conferencing—that will enable the KIC to operate as a single unit. "Twenty years ago it would not have been possible," he says.

It's not clear whether industry is equally interested. Rolls-Royce and Philips, two of the three major companies to comment on a European Commission consultation exercise on EIT this spring, were lukewarm in their public submissions. A third—Cambridge-based chipmaker ARM, one of Europe's most striking high-tech success stories—said the effectiveness of EIT was "destined to be greatly disappointing," arguing that its co-location model was "impossible" and "unnecessary" in a world in which research partners no longer need to be close together to collaborate. "Their implementation is rooted in the past," ARM's principal engineer, Ian Phillips, told *Science*.

Industry is supposed to help finance EIT's activities. The KICs' multiyear business plans state that 25% of funding will come from EIT, about 25% from private sources, and the rest from other public sources, including regional, national, and E.U.-wide research programs. The hope is that companies will be attracted by the pool of research expertise and student talent at the co-location centers.

Schuurmans and other EIT leaders declined to estimate the total current value of corporate pledges, saying that it was "too early to say." But Pavia says he's confident that his energy KIC will have no trouble meeting its target of getting 26% of its income from the 34 companies involved.

Traumatic negotiations

Meanwhile, critics say the rapid personnel changes at EIT signal an organization in turmoil. Jan van der Eijk, the first chief executive of the climate KIC and a former chief technology officer of Shell, left last December, after just 6 months on the job, amid tough negotiations to constitute the KIC. The first director of EIT, Gérard de Nazelle, left last September after 12 months in the position. His successor, Spanish space technologist José Manuel Leceta, didn't start until July.

Supporters and critics agree on one thing: If EIT is to have any noticeable impact on European innovation, it will have to markedly expand. In June, the European Commission said it hopes to secure €80 billion for Horizon 2020, the 7-year research and innovation program starting in 2014. The EIT governing board has asked for a €4 billion slice of that pie; one European Parliament source says the number in the European Commission's budget proposal, due later this year, may be closer to €2 billion. "If they just double funding [to €600 million], they should close it tomorrow," says Willem Jonker, who heads ICT Labs, the information technology KIC.

The decision will depend in part on E.U. member states and the European Parliament. Although initially skeptical, countries are now warming to EIT, says Maria da Silva Carvalho, a Portuguese member of the European Parliament who, as an adviser to Barroso, played a key role in devising EIT's structure. "It's not an easy model to set up, but what has been established is a good basis, and we have top universities and companies involved."

Pavia says Europe has no choice but to continue the experiment if it is serious about staying competitive. "This is the only way European innovation can make a breakthrough," he says. "Otherwise, in 20 years' time, we will just be living in a theme park."

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