

# Global ambitions

*It's 10 years since the ISLI was set up as part of the Alba Centre. What has it achieved and where is it headed?*

**By Graham Pitcher.**

**T**wenty, even 30, years ago, Scotland had a reasonably robust electronics industry. It was home to pc manufacturers such as IBM and Compaq, and boasted fabs run by Motorola, National Semiconductor and NEC. Business was, as they say, booming.

But times change quickly in the electronics world. Scotland became a less attractive place for 'screwdriver' operations and fab investments went elsewhere. The country was left facing a dilemma: should it let the electronics sector wither or embark on another round of inward investment?

The latter route was taken and Scottish Enterprise set about making Scotland a leading microelectronics region. A central plank of this strategy was the Alba Centre in Livingston. The Alba Centre, the thinking went, would be a centre of microelectronics design excellence acting as a magnet for larger companies. Smaller companies would benefit from 'rubbing shoulders' with industry leaders.

Cadence was the lead inward investor and planned to house some 2000 engineers at the site. But the anticipated stream of investments failed to materialise, Cadence changed its plans and it's the Alba Centre that has withered.

But there is a success story; the Institute for System Level Integration (ISLI) is celebrating its 10th anniversary. Tony Harker, ISLI chief executive, pictured left, gave the context. "ISLI was founded in 1998 on the back of inward investment. Scottish Enterprise recognised that it needed to build a workforce which could service the needs of inward investors. It asked Scottish universities what they could do and encouraged them to collaborate. The result was ISLI; the first centre of excellence to concentrate on silicon."

Harker says ISLI's

relationship with the four founding universities – Edinburgh, Glasgow, Herriot Watt and Strathclyde – allows it to draw on expertise where it resides. "For example, we can access computer science, electrical and electronic engineering, software and hardware skills and combine these in true systems."

Funding continues to be provided by Scottish Enterprise – it has £6.5million available for the period 2005 to 2010 – something which Harker classifies as 'extremely important'.

But in the 10 years since ISLI's formation, the market has changed. "We don't have the inward investment we used to have. Today, we're addressing the SME market, as well as multinationals, to exploit electronics system level (ESL) technology." Harker describes this as 'crossover' technology. "We do electronics with something else. For example, it could be hardware/software codesign or MEMs."

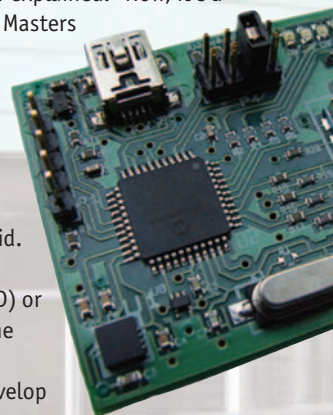
## Technology transfer

ISLI is also operating much more in the field of technology transfer. "We're certainly transferring technology to industry," he noted, "but we're also transferring technology from industry. Universities provide the research and the ability to exploit ideas; industry turns those ideas into something which can be exploited."

As inward investment into Scotland has declined, ISLI's horizons have widened. "Our 'market' was Scotland, then the UK," Harker explained. "Now, it's a global market; particularly for Masters students."

ISLI has what it describes as a number of 'product lines' – academic courses or technology offerings. Harker likens them to cogs. "Each cog affects something else," he said. "It's not just about continuing professional development (CPD) or our Engineering Doctorate. One qualification can lead to some research, which could then develop into CPD."

On the academic front, it's CPD, MSc and EngD courses. But these are complemented with research, design and consultancy services offered to industry.





CPD is perhaps ISLI's most flexible offering. "The catalogue is fluid because we're trying to meet changing needs in the UK," he claimed. Not only is the 'catalogue' flexible, so too are the ways in which you can study. "There's classroom based learning," Harker continued, "and bespoke courses. You can also use a web based interface for distance learning."

Providing low cost access to design tools is another function of ISLI which Harker is keen to promote. "One of the most difficult things for a small company is to get to the prototype stage. They need people, but they also need tools – and ic design tools aren't the cheapest things. People can come to ISLI

**Left:**

Based at Livingston's Alba Centre, the ISLI offers electronics qualifications to engineers from a range of backgrounds.

offered its first EngD course in 1999 and normally takes about eight students – 'research engineers' or REs – a year. "We work with companies ranging from micros to multinationals," Williams noted. "Half of the companies we deal with have less than 50 employees, so their focus can be on doing something better or improving processes. Unlike a PhD, the work being undertaken doesn't have to be new: it can be about making an old product better."

Through the EngD qualification, ISLI is trying to provide broad based training – blending the skills needed for a PhD with the 'value added' skills which bring a competitive advantage.

The EngD is a four year programme which is more 'hands on'. Three years of the course are taken up with a research project, with a further year allocated to gaining 'additional competencies'. "Although it's one degree," Williams noted, "it's like a PhD with a Masters and one third of an MBA. It's an intensive course."

There are two approaches to EngD. In one, a company second an existing employee; which Williams said is 'less popular'. The other approach sees a student 'embedded' in the sponsoring company.

There are also two 'flavours' of EngD. One is more traditional – the PhD thesis plus research approach is favoured by larger companies. But smaller organisations need things to be 'sharper'. "For these," Williams explained, "students work on a portfolio thesis around a central theme. The sponsoring company will put the student to work on a 12month project and the outcome of that will help to determine where the work goes."

Harker believes the EngD is technology transfer 'in its purest form'. "It allows universities, through the RE and the academic supervisor, to get their ideas tested and it allows industry to inject ideas back through the RE."

**Centre:**

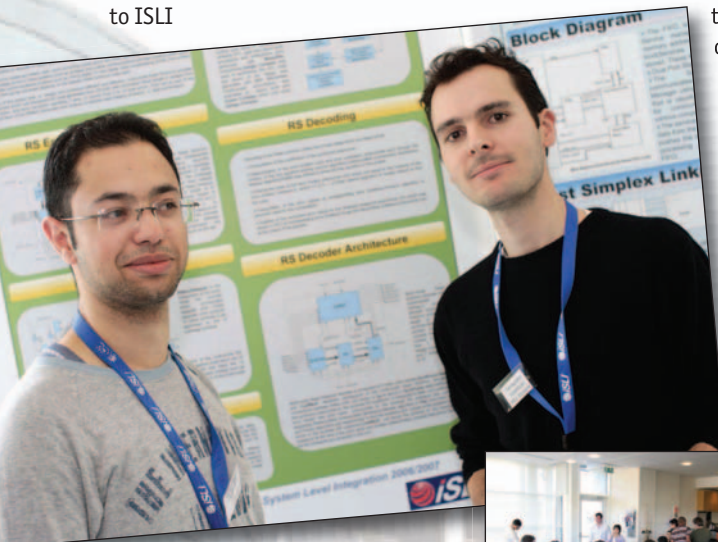
ISLI students make a poster presentation.

**Inset:**

The ISLI common room gives an opportunity for students to exchange ideas.

**Lower photograph:**

A prototype wireless system platform developed with ISLI's assistance.



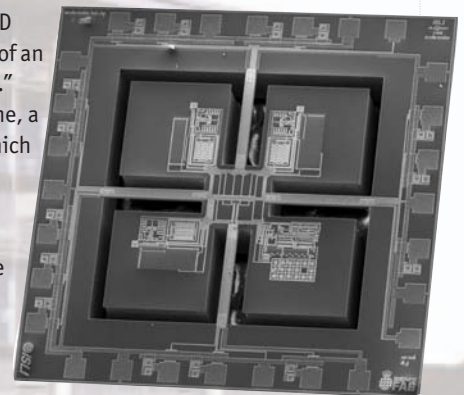
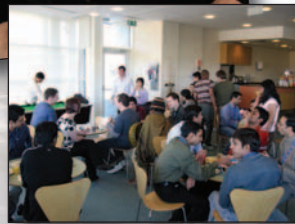
and access Mentor Graphics' tools through our software hub." ISLI has also made Coventor tools for MEMS design and Cadence tools available through this route.

**Engineering Doctorates**

Perhaps the jewel in the ISLI crown is the EngD course. Siân Williams, ISLI's EngD centre manager, described the course as an alternative to a PhD. "It's equal in intellectual challenge to a PhD," she claimed, "but the focus is on industry needs. It's about expanding academic knowledge, but also about best practice."

The Engineering Doctorate was created in 1992 by the Engineering and Physical Sciences Research Council (EPSRC) as a result of the Parnaby Report, which expressed concern that traditional PhD courses were not providing industry with the necessary skills.

The offering has met with widespread acceptance, with some 24 EngD centres spread across the UK. ISLI

**Above:**

This integrated three axis accelerometer with onboard sensing electronics is an example of projects undertaken by ISLI's technology group.



**Above:**  
Some of ISLI's latest EngD graduates celebrate receiving their qualifications.



**Above:**  
Begbie: "We're offering other services, such as industrial R&D support, consulting, due diligence and technology transfer."

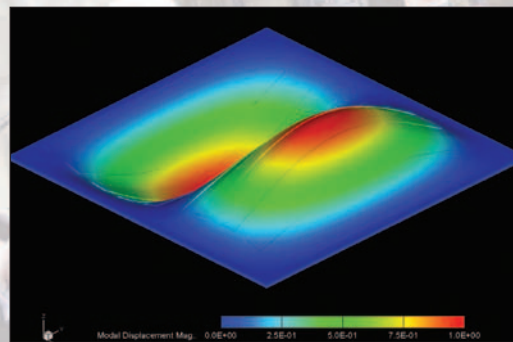
Sponsoring an RE need not be expensive. Those who look to use an 'embedded' RE pay £42,000, which equates to around £10,000 a year for someone who will be conducting full time research. "It's incredible value for money," Williams believed.

### Development activities

Research into leading edge technology, and the benefits this brings to systems design, is an integral part of ISLI's activity. It has expanded its support to include MEMS and Micro and Nano Technology (MNT) to increase the use of integrated systems. This work with 'crossover' technologies will allow ISLI to work with new customers and expand into new markets, fostering collaboration between Scotland's MNT/optical/electronics cluster and similar areas. The group comprises seven people, with a further person to be hired soon.

Mark Begbie is technology group director. "In the early days, there was a strong focus on teaching support because there was a need to deliver trained engineers. Today, we have a broader interest – for example, in embedded systems, fpgas, wireless and analogue technologies. Alongside delivering engineers, we're offering other services, such as industrial R&D support, consulting, due diligence and technology transfer."

Along with its interest in MEMS, ISLI has identified



**Right:**  
Dynamic mode analysis of a novel MEMS sensor showing the resonant mode of a membrane with polymer strips.

wireless enabled sensors as a relevant area for research. Begbie noted: "It brings together embedded software, an rf stack and MEMS technology to create novel sensor elements, with analogue technology for interfacing."

In fact, ISLI has recently won a Technology Strategy Board grant to explore condition monitoring on wind turbines. Begbie noted: "We're looking to use wireless sensing to gather data in a complex environment."

ISLI's MEMS capabilities are enhanced through its relationship with Semefab. "We can use Semefab to do integrated cmos/MEMS devices, but we are also looking at novel architectures optimised for MEMS devices," he added.

Building on Scotland's photonics expertise, ISLI is part of SCIMPS – the Scottish Collaboration on Integrated Microphotonic Systems. "The aim here," Begbie noted, "is to look at new opportunities for integrating photonics, analogue and MEMS technologies. We have two of our team dedicated to this project."

Along with ISLI, SCIMPS features four other academic partners – the Institute of Photonics and the Centre for Microsystems and Photonics from Strathclyde University, the Department of Electronic and Electrical Engineering at Glasgow University, and Heriot-Watt's Microsystems Engineering Centre – in a four year project which ISLI says is 'core to its aspirations'.

ISLI also runs the Electronics Design Support Service, won under competitive tender from Scottish Enterprise. "If a Scottish company is approved for support," Begbie explained, "they get four days of our time to work on their technology."

The three year project has been extended to run for a fourth year and Begbie said ISLI is now looking at ways to continue offering the service. "We believe it's an important programme because it has high impact. We work with around 70 companies a year and will engage fully with 25 to 30 of them. We can't do design, but we can do everything short of that."

### The future

Where does Harker see ISLI in 10 years' time? "We'll continue to grow," he asserted, "but we'll be less Scotland and more UK centric. Whatever happens, ISLI will be a centre of system level design excellence in the UK."

Did Alba's relative failure impact ISLI? Begbie said: "ISLI might have been bigger, but it would have been SoC focused. While we're working with multinationals doing 'mega chip' layout, we're also dealing with innovative and agile indigenous companies working on no less challenging systems."

Harker concluded: "We wouldn't have been able to reach these companies if Alba had been the success that everyone wanted it to be." ■