

A new European initiative aims to exploit Earth observation data from satellites. For the public, this should provide better information in areas like flood planning and prevention. And for software and data companies, it offers opportunities to develop a whole range of commercial services and products in security and environmental monitoring niches. Mary Mulvihill reports.



EYE IN THE SKY

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When the catastrophic floods hit the west of Ireland last November, the bad weather and difficult conditions on the ground made it hard for local authorities and national agencies to collect data while the extreme events unfolded.

The Ordnance Survey of Ireland, for instance, took some aerial photography on the one dry day but, even then, lighting conditions were not great and they could cover only a small part of the affected area.

And then, help came from an unexpected quarter: Strasbourg. Or perhaps it would be more correct to say: from out of space.

On Monday, November 30, following a relatively cloud-free day, a rapid mapping service in Strasbourg, called SERTTT, was able to produce satellite images covering the whole of the flooded Shannon region (see: www.emergencyresponse.eu).

The images and data will be invaluable

in helping to plan for the future and identify flood-prone areas, Vincent Hussey, an engineer with the Office of Public Works (OPW) hydrometrics division, told *Technology Ireland*.

The suite of satellite images covers “a huge swathe of the country, and together with information we have from instruments on the ground, this will give us a very good picture of what happened”.

GLOBAL MONITORING FOR ENVIRONMENT AND SECURITY (GMES)

It's just one small example of what is now possible with 'Earth observation' satellites and data. And SERTTT is just one of the services emerging from an ambitious new initiative on Global Monitoring for Environment and Security (GMES), being developed jointly by the European Space Agency (ESA), and the EU, under its current Framework programme for R&D (FP7).

ERA-MAPTEC – MONITORING ILLEGAL DUMPING

The latest radar satellite techniques can detect subsidence of just a few millimetres – enough potentially to reveal an illegal landfill site. That's according to Dr Martin Critchley, CEO of ERA-Maptec, the company engaged in the largest of the three Irish GMES projects.

Waste monitoring is big business, Critchley says. From monitoring conditions at legitimate landfills, to identifying illegal landfill and dumping, even following waste shipped abroad to check that it is being processed appropriately.

ERA-Maptec (www.era.ie), founded in 1985 by Critchley and another geologist, the late Dr Adrian Phillips, was TCD's first campus company but is now independent of the college. Specialising initially in services to the geological industry, the company is an old-hand at Earth observation work, and EU and ESA projects, and was

previously involved in investigations of illegal landfill sites in Wicklow and elsewhere around Ireland.

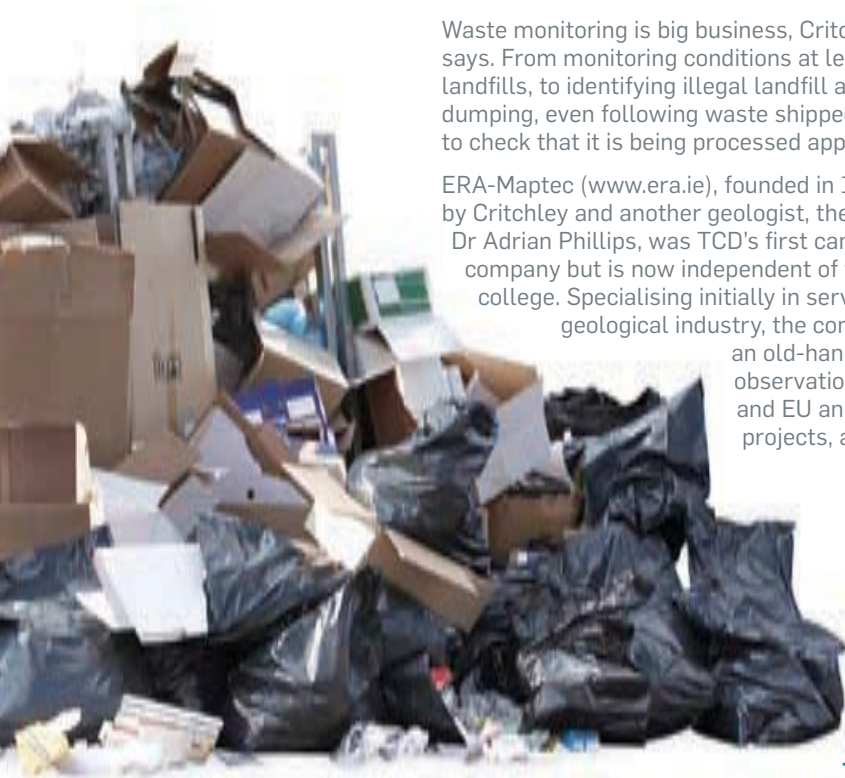
This latest project exploits satellite technology to create new waste monitoring and detection services, in a collaboration with companies in Italy and Canada, and with public authorities in Ireland, Northern Ireland, England, Wales and Italy.

High-resolution satellite images now have a resolution of 50 cm, allowing fine surface detail to be mapped. Hyper-spectral data span a wider range of the spectrum, including thermal imagery, allowing users to differentiate more materials than previously.

Taken together, these could be used to reveal illegal dumping, and Critchley's team is currently teaching object recognition software to spot items such as car tyres in satellite images. The project began mid-09, and trials start this year in Ireland, Britain, Italy and Canada.

For Critchley, GMES is essential in helping a small company, which currently employs four people, to develop an operational system with companies across Europe. “We couldn't do it otherwise,” he says.

Unlike FP7, the ESA projects are very close to market – “They will want to see your business case!” – and, if a company has a commercial idea, Critchley says, then it is very worthwhile.



In all, GMES has five main themes (www.gmes.info):

- Ocean monitoring (plankton blooms, sea surface temperatures, etc)
- Atmospheric monitoring (such as pollution mapping, severe convection storms)
- Land monitoring (for instance: deforestation, urban planning)
- Emergency response (monitoring wildfires, or mapping earthquake damage)
- Security – think: piracy, for example, even tracking suspected drug smugglers across international waters using satellites to identify each vessel by its wake pattern.

The aim is to develop services that will allow us to anticipate, intervene and take control, and ultimately take better decisions, whether instantly, over days, or over decades. As the GMES motto puts it: “Because we need to know”.

OPPORTUNITIES FOR IRISH COMPANIES

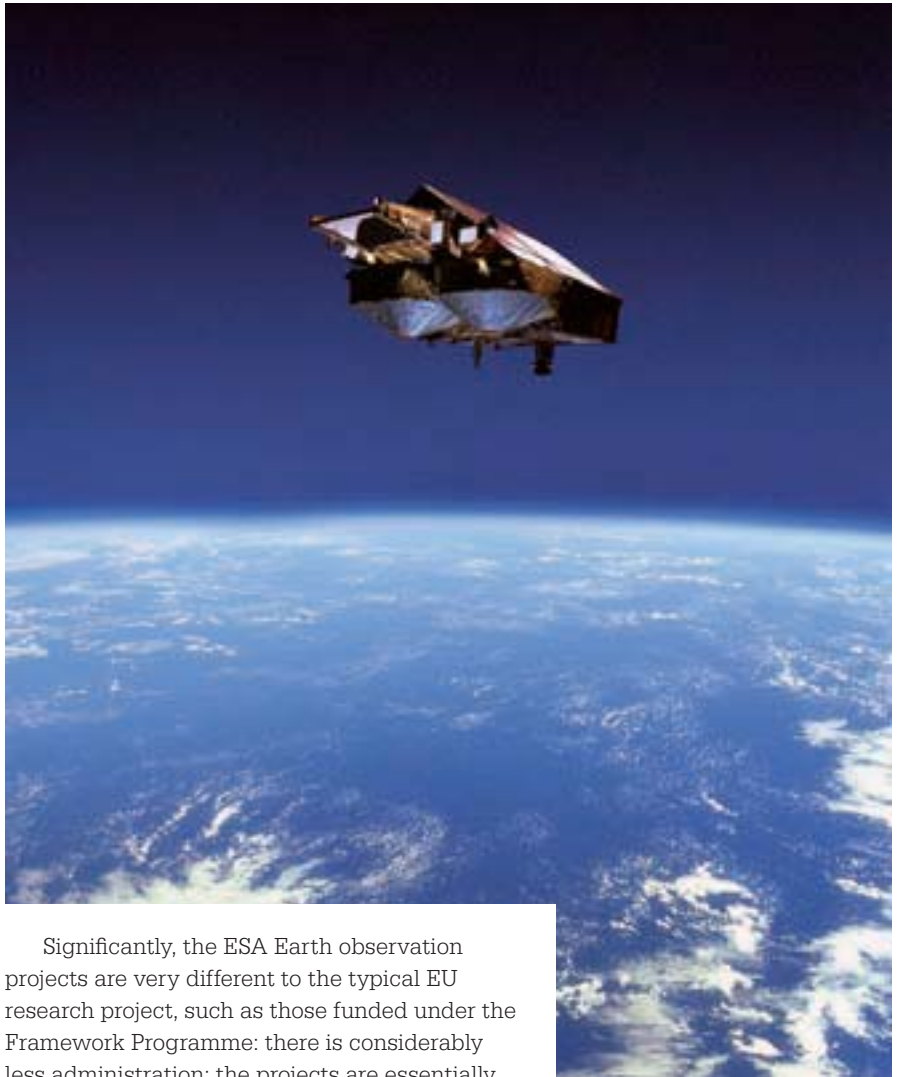
Barry Fennell, who is a national delegate for ESA's Earth Observation Programme Board says that this new Earth observation initiative is about adding value to data, and developing products and services for commercial clients and other end-users. Fennell believes that there are many opportunities for companies – for example in the environmental software niche – to get involved.

Already, three small Irish companies are actively developing new products and services around GMES (as detailed over the following pages). Soon, they will be helping European waste management companies to monitor landfill sites, forecast jellyfish blooms for Norway's fish farms, and provide customised weather forecasts to Italian tour operators, among other things.

All three are being funded by the European Space Agency. So, if you thought ESA was only about rocket launchers, think again.


All told, Ireland is contributing €4.5 million to ESA's Earth observation board over the five years 2008-'13. Barry Fennell admits it's “a sizeable commitment”, but points out that in the last 12 months alone, Ireland has won ESA contracts worth over €8 million – and that's not counting any of the spin-offs.

Our involvement also means that Irish companies, public agencies and academic researchers can access all the data, and postgraduates at several Irish institutions are now using Earth observation satellite data in their research. In addition, for the companies engaged in GMES, there is the added benefit of being able to work with the best in Europe.

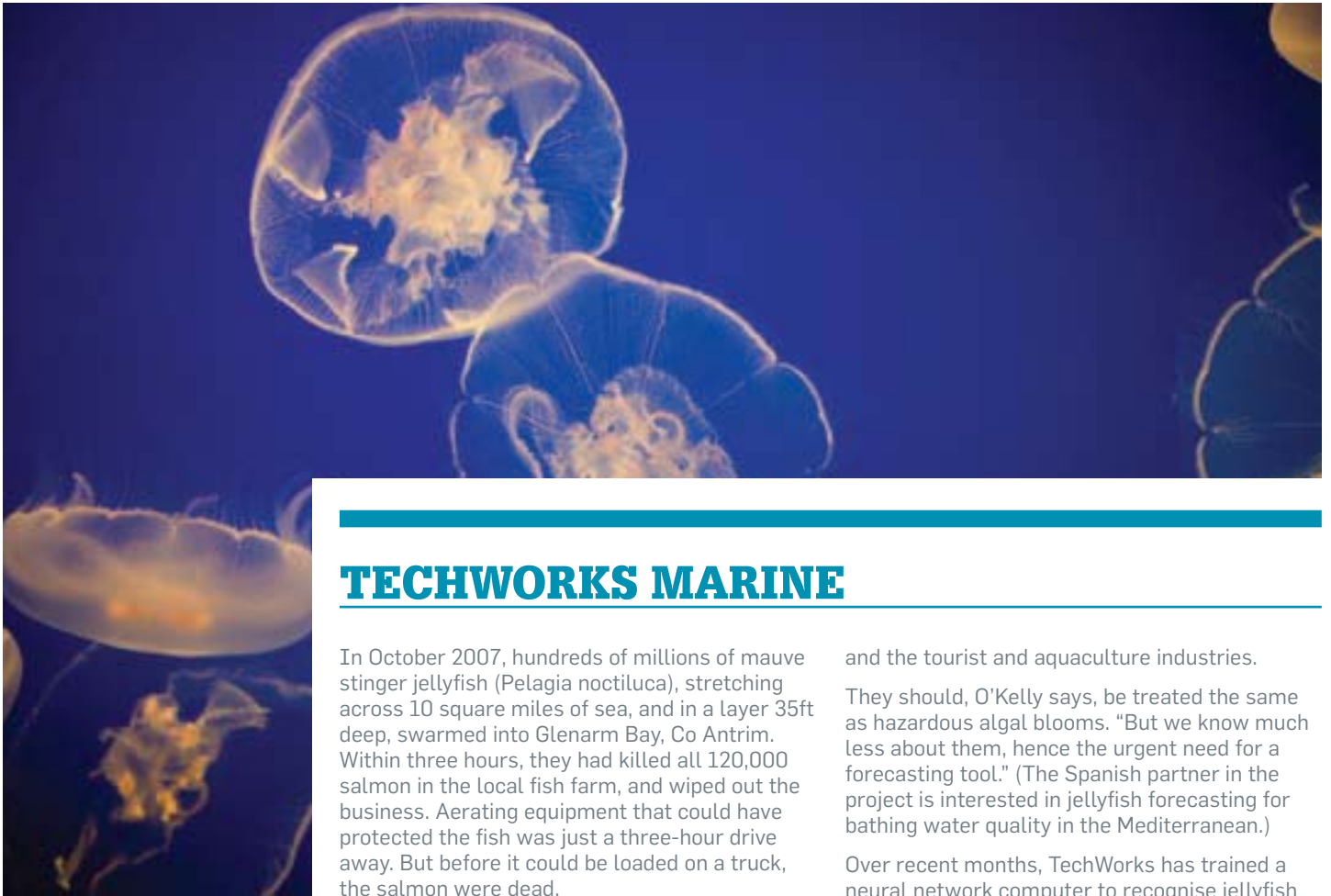


Significantly, the ESA Earth observation projects are very different to the typical EU research project, such as those funded under the Framework Programme: there is considerably less administration; the projects are essentially fully funded; the timescale can be short – sometimes less than a year; and the focus is on kick-starting products and services, rather than on more fundamental R&D. All of which should make them particularly attractive to Irish SMEs.

Perhaps most importantly, Irish companies gain a very real opportunity to look beyond the Irish marketplace, and develop products for international markets, with real potential for growth.

The tendering process is also more flexible than in the EU's FP7, and Fennell works closely with the ESA in the run-up to a call to identify gaps that could be filled. So, if you have an idea for a product or service that exploits Earth observation data, and which could be used internationally, he suggests that you get in touch. 

For further information, see www.gmes.info or contact barry.fennell@enterprise-ireland.com or byran.rodgers@enterprise-ireland.com



TECHWORKS MARINE

In October 2007, hundreds of millions of mauve stinger jellyfish (*Pelagia noctiluca*), stretching across 10 square miles of sea, and in a layer 35ft deep, swarmed into Glenarm Bay, Co Antrim. Within three hours, they had killed all 120,000 salmon in the local fish farm, and wiped out the business. Aerating equipment that could have protected the fish was just a three-hour drive away. But before it could be loaded on a truck, the salmon were dead.

Today, Glenarm organic salmon farm is back in business after a management buyout. And ready, should the unthinkable happen again, thanks to a new jellyfish forecasting service developed by a small Dublin company, TechWorks Marine (www.techworks.ie), as part of an ESA GMES project.

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Marine scientist and TechWorks co-founder, Charlotte O'Kelly, believes the jellyfish will return. Whether driven by climate change or other factors, jellyfish swarms are increasingly common, posing a major threat to human health,

and the tourist and aquaculture industries.

They should, O'Kelly says, be treated the same as hazardous algal blooms. “But we know much less about them, hence the urgent need for a forecasting tool.” (The Spanish partner in the project is interested in jellyfish forecasting for bathing water quality in the Mediterranean.)

Over recent months, TechWorks has trained a neural network computer to recognise jellyfish swarms from satellite imagery (usually by colour recognition), marrying this with data from buoys on variables such as dissolved oxygen, salinity, and water temperature. These were then compared with observational data – or, as O'Kelly describes it: someone on a boat calling out ‘jelly’ or ‘no jelly’.

Within months of starting the project in mid-09, they had developed a beta version for trial just before Christmas. O'Kelly was understandably pleased: “It's a small increase in revenue for us, which is nice. But that's peanuts against the cost of a fish kill.”

“Everyone wants to predict the future. And with this new system, I can give my clients the advantage of a three-day window.”

TechWorks Marine, which employs seven in Dun Laoghaire and has a turnover of €1.3 million, has previously participated in EU FP6 and FP7 projects – developing ways to respond quickly to changes in the marine environment – but this is its first work for the ESA, and Kelly is full of praise for the programme.

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NOWCASTING – FORECASTING WEATHER AND ENVIRONMENTAL CONDITIONS

You run a mountain tour guide service in the Alps, and want to know if you can bring your clients ski-touring for the next couple of days, or is the weather going to change, and force you to take them sightseeing instead?

You need SATOUR – the new forecasting service being rolled out by Irish company Nowcasting, for a GMES project led by an Italian company, Flyby.

Although not their main business, both companies have developed forecasting services for the leisure industry in recent years. Flyby, an optical research specialist, developed HappySun, using ESA Earth observation data, texting information on UV exposure direct to Mediterranean tourists' mobile phone (www.happysun.it).

Nowcasting (www.nowcasting.ie) provides customised forecasts to the international maritime sector, especially the offshore oil and gas industries, but recently moved into forecasting for the leisure industry with AskMoby.com. Enter your location and activity (surfing, say, or mountaineering), and AskMoby will forecast the appropriate local conditions.

For SATOUR, the two companies are collaborating on a service that will give users information on weather and a range of environment conditions, including UV exposure and water quality.

Nowcasting CEO, Dr Mark White, says forecasting technology is changing dramatically, with global real-time information from satellites, improved computing power, and high resolution computer models. "We're much better at helping people to understand what is happening now."

Joining the GMES project brings this small Ennis-based company, which employs 16, to the forefront of the sector. "We'll have access to new data, which will mean new customers.

That gives us a commercial advantage. And we get an innovative, first-mover advantage."

With offices in Aberdeen, Oman and Houston, and strategic international partnerships, the company has a global reach for its maritime business, a turnover of some €3 million, and an international reputation. "Her Majesty's Customs & Excise has seven or eight ships patrolling UK waters. And they are joined at the hip to the UK Met office. But they're using our forecasting service!"

White says that, as a small commercial company, it's hard to justify getting involved in a big EU project. "But GMES and the ESA are different. We get to do some focused R&D, and there is a potential for return even before the end of the 18-month project." What's not to like?

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