the group was constrained to discuss only text-mining licences, and not changes to copyright law (see *Nature* **495,** 295; 2013) — a restriction that would "make computer-based research in many instances impossible".

"Every researcher I've spoken to thinks licensing is a problem," says Susan Reilly, projects manager at the Association of European Research Libraries in the Hague, the Netherlands. She coordinated the letter that declared the 22 May withdrawal from talks. "There was really no point in us continuing to attend," she says. Other signatories include the non-profit Open Knowledge Foundation in Cambridge, UK, and the National Centre for Text Mining at the University of Manchester, UK.

"Continuing the group under current circumstances doesn't make sense," says Heath. "This is regrettable, but at least the process brought to the fore the major controversies in this area." The European Commission, he adds, "will reflect on the implications and will address the matter at the time of the review of the Licences for Europe process in July".

The European talks had always been conflicted because four different European Union administrative departments were involved — not only the department for research and innovation, but also those for education and culture, for media and information issues, and for Europe's internal market, economy and intellectual-property rights. (The May letter argues that the research department is being squeezed out in favour of the others' interests.)

"Since the Licences for Europe process has not managed to deliver in this area, other ways forward must be explored," says Heath. An analysis under way by the commission's internal-market department on the need for copyright reform may provide impetus for action, should it conclude that changes are needed.

Many publishers say that there are practical, as well as legal, barriers to text mining. Even if the practice were permitted through licences or changes to copyright law, researchers would still need a way to access websites without crippling publisher servers through excess traffic. And publishers want to be able to identify the purpose of the programs crawling their content, especially if mining is for commercial means, so as to decide "what they're willing to allow at what cost", says Sarah Faulder, chief executive of the Publishers Licensing Society in London, an industry body that took part in the talks.

To lower some of these practical barriers, the non-profit publisher collaboration CrossRef hopes to launch technology this year enabling text-mining researchers to agree to terms by clicking a button on a publisher's website.

Discussions may have faltered, but scientists and librarians hope to keep talking to officials, says Reilly. "There's lots of disagreement even among publishers," she says. "Some are open to text and data mining, some are completely frightened of it. They need an informed discussion." ■

SCIENCE/AAAS

A glow-in-the-dark tobacco plant was first engineered by scientists in the 1980s.

SYNTHETIC BIOLOGY

Glowing plants spark debate

Critics irked over planned release of engineered organism.

BY EWEN CALLAWAY

Among the many projects attracting crowd-sourced funding on the Kickstarter website this week are a premium Kobe beef jerky, a keyboard instrument called a wheelharp and a small leafy plant that will be made to glow in the dark using synthetic-biology techniques.

The Glowing Plant project, which ends its fund-raising campaign on 7 June, seeks to engineer the thale cress *Arabidopsis thaliana* to emit weak, green-blue light by endowing it with genetic circuitry from fireflies. If the non-commercial project succeeds, thousands of supporters will receive seeds to plant the hardy weed wherever they wish.

The US government has no problem with this prospect, yet some experts and industry watchers are jittery. They fear that distributing the plants could set a precedent for unsupervised releases of synthetic organisms, and might foster a negative public perception of synthetic biology — an emerging experimental discipline that involves genetically engineering organisms to do useful tasks.

The project, based in the San Francisco Bay Area in California, was conceived as a public demonstration of synthetic biology using gene-writing software and lab-made DNA molecules. The effort also reflects a 'DIY biology' movement that seeks to make biotechnology more accessible to the public. "The central goal of the project is to inspire people and educate people about this technology," says entrepreneur and project co-founder Antony Evans.

He and his colleagues — Omri Amirav-Drory, founder of synthetic-biology software firm Genome Compiler in Berkeley, California, and Kyle Taylor, a former biology graduate student at Stanford University in California — set out to make *Arabidopsis* glow because the feat seemed achievable in a simple garage lab. "There are some people in synthetic-biology circles who would yawn at what we're doing," Evans says.

Making plants glow has been possible since the 1980s, when scientists added a gene encoding the firefly enzyme luciferase to a tobacco plant. When sprayed with the chemical substrate luciferin, the plant glowed temporarily (D. W. Ow *et al. Science* **234,** 856–859; 1986). In 2010, another group engineered a tobacco plant to have its own weak glow, using bacterial genes instead (A. Krichevsky *et al.* ▶

PLoS ONE **5,** e15461; 2010). Also in 2010, a team at the University of Cambridge, UK, created a genetic circuit in bacteria that makes both firefly luciferase and luciferin, so that the bacteria glow continuously (go.nature.com/4nxcao). The Glowing Plant team plans to tweak the genes in that circuit so that they work in plants.

The more than 7,700 project supporters will also be rewarded with stickers, T-shirts depicting glowing plants or light-bulb vases. The effort hit its initial fund-raising goal of US$65,000 several weeks early, and passed the $400,000 mark on 28 May. With the extra cash, Evans and his team will try to create glowing roses too. They are taking no salary, and are borrowing lab and greenhouse space. "It's a really positive signal for synthetic biology that there's this big consensus-level interest in genetically engineered objects," says Mackenzie Cowell, founder of a San Francisco biotech-supply company called Genefoo. He chipped in $250 to the effort.

But Drew Endy, a synthetic biologist at Stanford University, questions how much light the plants will actually be able to emit, given the limitations on a plant's ability to harvest energy from the Sun and convert it back into light. "Never mind the genetic engineering involved — just what does the physics say about the feasibility of the project working out?" he says.

"Is this legal?" asks the project's Kickstarter site, with the reply "Yes it is!" Evans says that he and his team contacted the Animal and Plant Health Inspection Service (APHIS) at the US Department of Agriculture, which regulates genetically modified (GM) plants if plant pathogens are involved in the work. The agency's main concern was whether DNA from the pathogen *Agrobacterium* would be used to insert foreign genes, as GM plant efforts often do. "Regarding synthetic biologics, if they do not pose a plant risk, APHIS does not regulate it," a spokesperson told *Nature*.

To bypass this concern, the Glowing Plant team will use *Agrobacterium* only during preparatory tinkering with the luciferase genetic circuit. When plants are produced for distribution, the team will shuttle the genes into cells using a ballistics-powered device called a gene gun, a process that the agriculture department deems outside its purview (see *Nature* **475,** 274–275; 2011).

Such regulatory runarounds need to be scrutinized, says Todd Kuiken, who studies synthetic-biology issues at the Woodrow Wilson International Center for Scholars, a think tank in Washington DC. Although he has few concerns about streets lined with glowing *Arabidopsis*, he thinks that the lack of oversight of future, riskier projects could prove problematic.

And Allison Snow, an ecologist at Ohio State University in Columbus who studies the risks posed by GM plants, says that it won't do synthetic biologists any public-relations favours if plants make it into the wild. People will be more likely to support synthetic biology, she says, if it is associated with disease treatments or clean biofuels. "This is such a frivolous application," she says (see 'Bioluminescent boom').

Some people are riled already. The ETC Group, a Canadian pressure organization in Ottawa with a history of opposing synthetic-biology applications, launched a "kickstopper" campaign against the project and is looking into legal options to stop it.

Evans says that the team is likely to engineer a type of *Arabidopsis* that survives only if fed a nutritional supplement, reducing the chances of spread. And the team plans to conduct a public dialogue on the project's ethical, legal and environmental issues before shipping any seeds. "This is a fund-raising campaign," he says. "It's not the actual release of the plant."■

GLOWING REPORT

Bioluminescent boom

The Glowing Plant project is not the only foray into publicly available genetically modified organisms. Transgenic zebrafish (*Danio rerio*) that produce a fluorescent protein have been on the market since 2003, although their sale is not permitted in the European Union, Canada, Australia or California. And BioGlow, a commercial venture in St Louis, Missouri, informed the US agriculture department last year of plans to produce light-emitting plants, but the company has made few details public.

GENOMICS

Geneticists push for global data-sharing

International organization aims to promote exchange and linking of DNA sequences and clinical information.

BY ERIKA CHECK HAYDEN

It is a paradox that bedevils genomic medicine: despite near-universal agreement that doctors and geneticists should exchange more data, there has been scant movement towards achieving this goal.

Now, a consortium of 69 institutions in 13 countries hopes to address the problem by creating an organization to enable the free flow of information in genomic medicine. On 5 June, the consortium, which is calling itself the 'global alliance', announced that the organization will develop standards and policies to encourage data-sharing of a person's DNA sequence combined with clinical information. The alliance's founders are basing their model on the World Wide Web Consortium, which in the 1990s established standards for the programming language HTML and spurred the growth of web pages across the Internet.

"This alliance steps into what otherwise might be a real void," says Francis Collins, director of the US National Institutes of Health (NIH) in Bethesda, Maryland, which is a member of the alliance. For example, Collins says, there are no standards for storing genetic sequences or for assessing their accuracy.

➲ NATURE.COM
For more on genetic data-sharing, see:
go.nature.com/5oxmj7

The alliance also hopes to tackle privacy and informed-consent issues that prevent researchers from sharing data, and plans to create a network of cloud-computing platforms and analysis tools in an effort to provide access to the shared data.

A big question for the group is whether it can convince institutions to share their most meaningful data. "The mission is unquestionably worthy," says cardiologist Eric Topol, director of the Scripps Translational Science Institute in La Jolla, California, which has not yet considered joining the alliance. But, he adds, "it means taking the walls down, and that's tricky — because you've got each centre wanting to hold on to its own data, and the loss of control is a very difficult concept".

The effort has gained support from some of the world's most influential sequence-data holders, including the NIH, the Wellcome Trust Sanger Institute in Hinxton, UK, and the BGI (formerly the Beijing Genomics Institute) in Shenzhen, China. David Altshuler, a geneticist at the Broad Institute in Cambridge, Massachusetts, who led an eight-person organizational committee for the project, is keen to add more members. "We're saying, 'This is bigger than any group or institution — let's figure