The information contained in this booklet is based on first-hand interviews with Technolgy Pioneers. The views expressed in this publication do not necessarily reflect those of the World Economic Forum.

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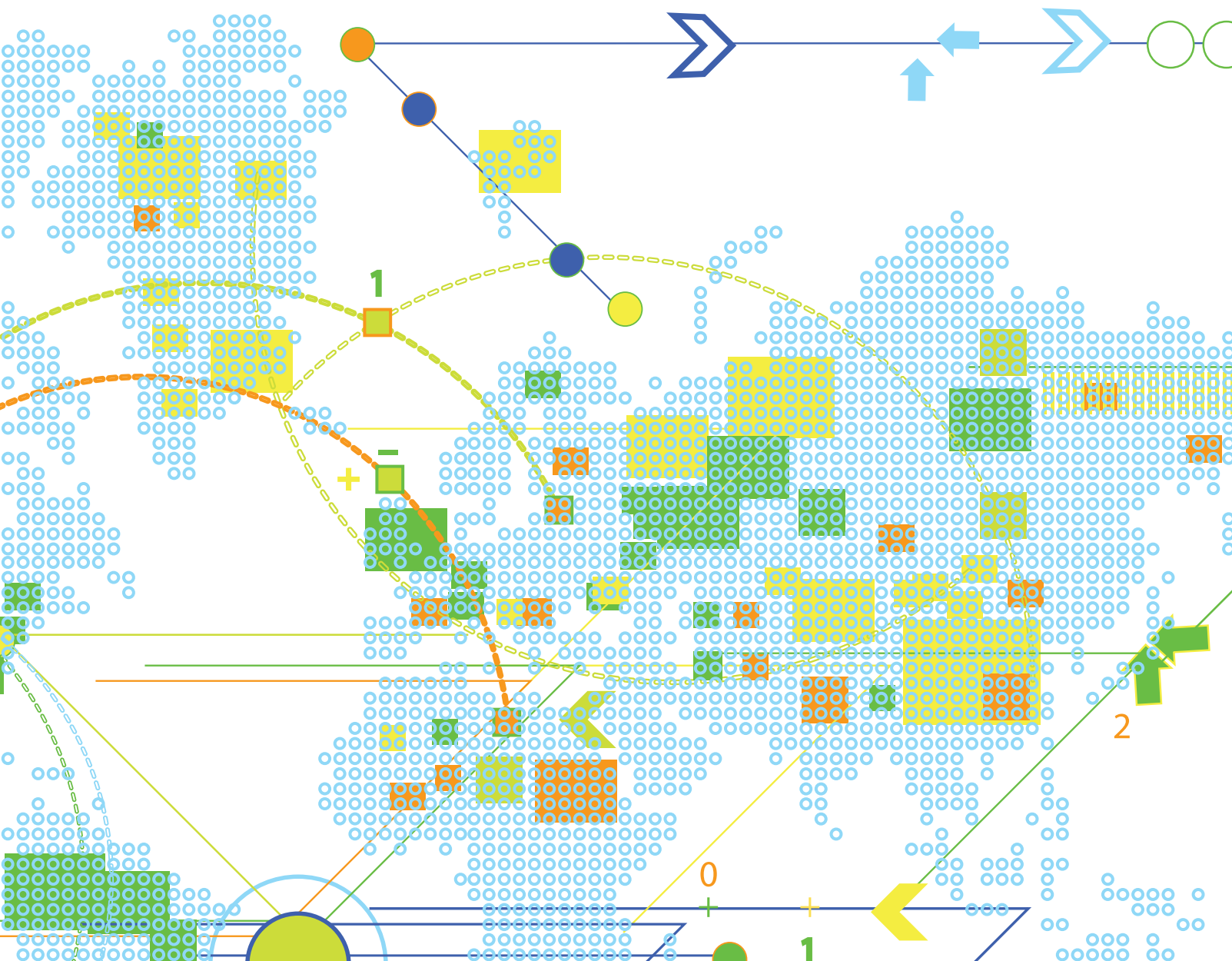
REF: 180810



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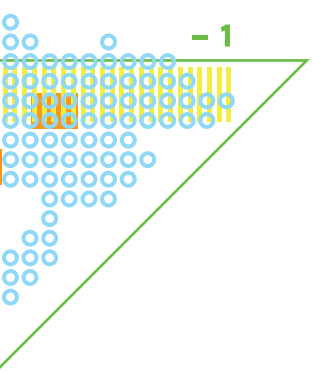


Technology Pioneers 2011

André Schneider
Managing Director and
Chief Operating Officer
World Economic Forum

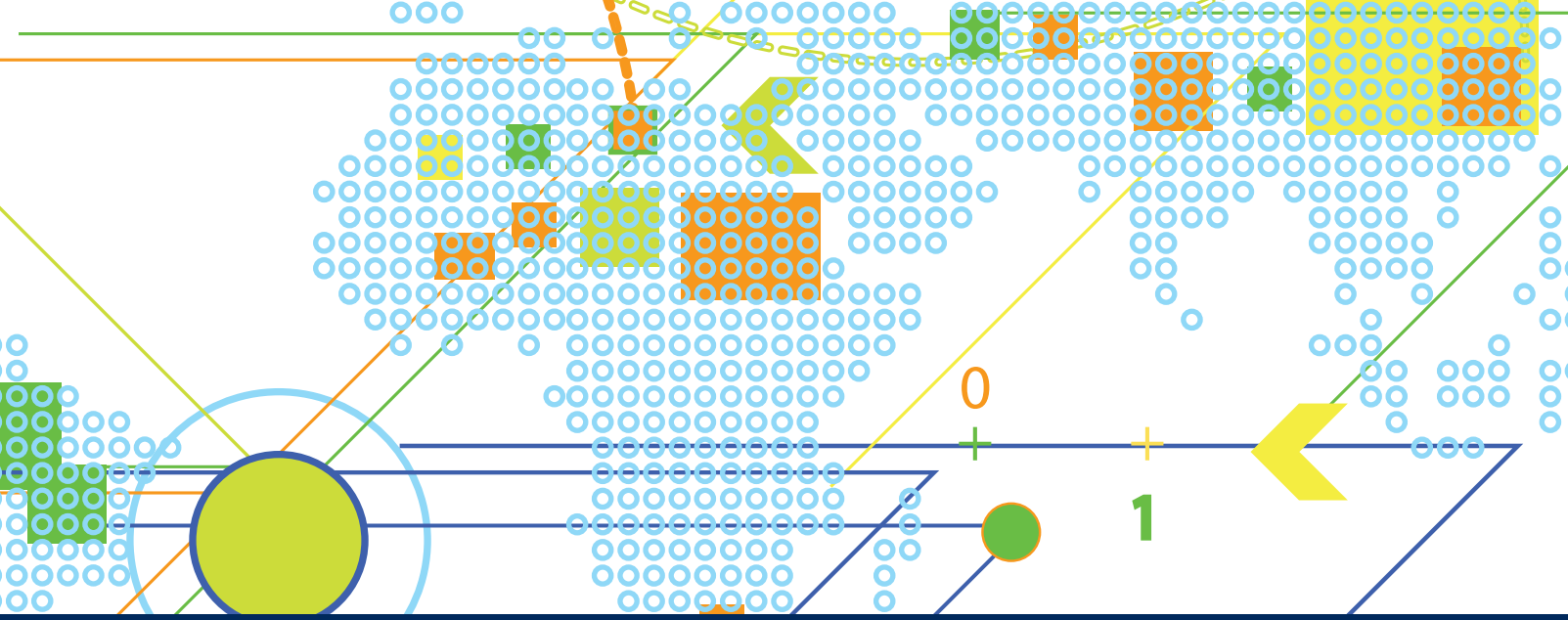
Foreword

How will the world cope with the crucial issue of water management and treatment? How can individuals and corporations benefit even more from the 24/7, ubiquitous connection to the Internet – and prevent the resulting reputation and security risks? What new approaches to treating rare and neglected diseases will emerge and save lives in the coming years? How can technology help modify behaviours to optimize energy use and bring us closer to a low-carbon economy? The 31 start-ups selected as the World Economic Forum's Technology Pioneers of 2011 innovatively address these and other challenges of our rapidly evolving society.

The Forum is excited to present in the following pages one of the most geographically and sector-diverse classes of Technology Pioneers in the programme's history. For the first time, we have companies from all five continents selected for the award, underlining the global need for innovation and entrepreneurship. Moreover, while the traditional strongholds in the United States and Europe still lead the way in innovative technology, the number of start-ups with roots in emerging markets continues to surge year on year. Finally, the rising concern for the environment has also triggered the highest numbers ever of candidates and selected companies in the clean technology arena.

The selection process for the Technology Pioneers builds on the outstanding support of the Forum's various stakeholders: from the nomination of candidates put forward by our Members, technology observers, investors and the general public to our selection committee, which is composed of world-class experts. We are proud and thankful to rely on such a remarkable group of individuals for this recognition.

We hope for and look forward to a future where the benefits of technology for society become increasingly accessible to all geographies and larger chunks of the world's population. The Technology Pioneers of 2011 will undoubtedly work with the larger community of the World Economic Forum to ensure that this vision is realized. We congratulate these outstanding innovators for their accomplishments.



Technology Pioneers 2011: Empowering People and Transforming Society

On 17 January, five days after the earthquake in Haiti that killed a quarter of a million people and left even more injured, a Médecins Sans Frontières (Doctors Without Borders) cargo plane carrying an inflatable surgical hospital was blocked from landing in Port-au-Prince by US military commanders at Toussaint L'Ouverture Airport. A press release issued by the humanitarian aid organization did not change the situation but a 140-character message on Twitter did.

US TV journalist Ann Curry, who was in Haiti at the time, used Twitter, a free microblogging service that changes the way individuals and companies share and get their information, to write a curt message: "To the US military running Haiti's airport, find a way to let the doctors without borders plane land." Curry's message was spotted a moment later by Jeff Pulver, a technology entrepreneur credited with a pioneering voice over Internet protocol technology, who happened to be sitting in front of his computer screen at his home in New Jersey. Pulver, a social networking enthusiast who has some 360,000 followers on Twitter, "re-tweeted" Curry's message. Within moments Pulver and others who relayed Curry's message, got a direct response from the US military via Twitter saying "we are on it." In addition, Curry shared Medecins Sans Frontières tweet with her contacts in the military. As a result of Curry's efforts and the attention from Twitter users from around the world, the situation received significant attention and the plane was allowed to land a short time later.

This, and hundreds of other stories like it, underscores the outsized impact on society of tech companies like Twitter, a 2010 World Economic Forum Technology Pioneer. Twitter allows dissidents to raise their voices in countries ruled by dictators, charities to raise money and awareness around the globe. "For the first time in the history of the world we are all listening on the same frequency," says Pulver, who is writing a book about the impact of Twitter on society. "Through this backchannel people are discovering they have a voice and can affect change."

Like Twitter, a growing number of Technology Pioneers are using technology to empower individuals, transforming society in the process.

To be sure, politicians are using social media to win elections and to try to maintain their grip on power. President Barack Obama famously employed about 100 people to work on New Media during his campaign for the US presidency. Obama used social networks like Facebook to mobilize millions of volunteers from across the country to raise money and campaign on his behalf. Sebastián Piñera, the newly elected President of Chile, has jumped on the bandwagon, asking all cabinet members to start tweeting. And, more than 500 Japanese and German politicians are now using the social networking service in their respective countries, according to press reports.

The rise of social networking has turned the tables: it is now much more about bottom up activity rather than top down. As more and more people migrate to social networking – it is now the most popular online activity – power is migrating to non-governmental actors, who can leverage technology to easily organize into effective decentralized networks. "Twitter is just one example of how, thanks to technology, the power is moving to the periphery," says Steve Prentice, Vice-President and Fellow at technology consultancy Gartner, which specializes in looking at the intersection of technology, business and society.

2

Take the case of Ushahidi, a 2010 Technology Pioneer. Ushahidi, which means testimony in Swahili, crowdsources information and then uses technology tools to draw attention to problems such as election fraud, or to help in disaster recovery. The group's technology engine, which was developed in Africa, allows any person or group to gather distributed information, aggregate it and then visualize it on a map. Besides documenting violence in Kenya, the platform has been used to monitor elections in Mexico and India. “There are officials monitoring, but we are encouraging people to use technology so that they, as individuals, also become guardians of the election,” says Ory Okolloh, Ushahidi’s Co-Founder. “This tool makes it easier to rely on the wisdom of the crowd and not just the experts.”

This is particularly important in places where the traditional press is censored, which was the case after the Iranian elections in 2009. Cries of protest from supporters of opposition candidate Mir-Hossein Mousavi were suppressed in major newspapers but reached the public via Twitter. “All of a sudden there is a backchannel and what that backchannel is doing is giving a voice to people who would not otherwise be heard,” says Pulver. “In any political movement – socialism, communism, any ‘ism’ there is usually a colourful figure who rises to the top,” he says. “This movement is purely democratized: it is about me the people, the individual me.”

Facebook, an Internet social networking site which now has half a billion users, is helping rally large numbers of individuals to both political and social causes, raising awareness and money for Darfur and refugees the world over, as well as numerous other charities.

Social networking technologies are supporting the efforts of rescue teams and doctors on the ground, making them more efficient. For example, Ushahidi has been used to track the spread of swine flu, alert authorities to shortages of medical supplies in several African countries and, played a crucial role in the aftermath of the earthquakes in Haiti by enabling people to quickly retrieve and share essential information.

Several students were sitting in a living room in Blakely Hall at the Fletcher School of Law & Diplomacy at Tufts University in Boston, when one PhD student, an expert in satellite imagery analysis and geo-location, received an urgent request via Skype from Innovative Support to Emergencies, Diseases and Disasters (InSTEDD), an organization that aims to harness the power of technology to improve collaboration for global health and humanitarian action.

> “Social networking technologies are supporting the efforts of rescue teams and doctors on the ground, making them more efficient.”

The message was from two of InSTEDD’s members, who were skyping from a tent pitched right next to the runway of Port-au-Prince’s international airport, some 1,600 miles south of Boston. They needed GPS coordinates for seven key locations across Port-au-Prince where many Haitians were known to be trapped under rubble and needed to communicate the information to the search and rescue teams before 18.00. A tweet was sent out via Ushahidi: “Urgent Please RT need address of Un Bon Prix, near Napley Inn Hotel, people trapped!” Someone from the Twittersphere responded by tweeting the name, address and home phone number of a man in New York who used to work at the Un Bon Prix in Port-au-Prince. One of the university students called the number and, speaking in a mixture of French and English, worked out the address, which was then skyped to the tent pitched near the airport, and communicated to rescue workers, who were able to pull people alive from the rubble where the grocery store once stood. “The technology has spread around the world in ways that we could not have anticipated,” says Ory Okolloh, Ushahidi’s Co-Founder.

The same can be said for other social networking technologies. Foursquare, a 2011 Technology Pioneer, which mixes mobile location-based services and gaming, is bringing elements of online social networking into the real world, with unexpected consequences. Few would have thought the service, which had attracted 2.3 million

users by July 2010, could have an impact on improving people's health and increasing their exposure to culture. But, it is. "Through our experiments with mobile and social software, we're realizing that when we try to 'turn life into a game' and specifically design software that challenges and then rewards users for accomplishing these challenges, we can see real world usages emerge," says foursquare Chief Executive Officer and Co-Founder Dennis Crowley.

this tool to tweet directly about special offers to their best customers, says Crowley, foursquare's CEO. "Every time foursquare users check in from a store location, it is like a mini-ad impression for that business which they really could not get anywhere else," says Crowley. "These are just some of the new and interesting benefits for business; there is a lot more to build on top of that."

"... thanks to technological advances that put more power in the hands of consumers, companies have to completely re-evaluate their relationship with their customers."

"We've heard from users that our "Gym Rat" badge (10 visits to a gym in 30 days) gets people to start exercising again and our "Warhol" badge gets people to seek out new art galleries."

Social networking is also having another, unanticipated impact: thanks to technological advances that put more power in the hands of consumers, companies have to completely re-evaluate their relationship with their customers. "We have gone through a period with a push economy when large enterprises controlled the medium and determined through marketing what we would buy," says Gartner's Prentice. "What we have seen with the social net is a pull economy where individuals are getting informed, making their own choices and are increasingly driving the relationship."

Integrating social networking into marketing campaigns can convert the customer into a friend, while helping to sell everything from cars to cookies. Foursquare is encouraging business owners to engage customers with "specials", which are discounts and prizes, offered loyal customers when they check in on foursquare at a business venue.

Businesses that reward foursquare customers with specials are offered free analytics on their most frequent customers by foursquare, including profile pictures with the first name and last initial of each its top 10 customers (gleaned from public information on the clients' Facebook and Twitter accounts). The local merchant can then use

Freedom of Choice

Technology is not just inspiring people to become more engaged, it is giving people more options. For example, by lowering the barriers to publishing, 2011 Technology Pioneer Scribd is empowering amateur authors, students, artists and academics to publish their ideas on the same platform used by Fortune 500 companies and professional media organizations, says Jared Friedman, Co-Founder of Scribd, a Web 2.0 document sharing site.

Take the case of Kemble Scott, an author based in San Francisco. When he finished writing his new book, The Sower, rather than going to a traditional publisher, he had the option to publish it electronically, thanks to Scribd. The site allowed Scott to publish the book online immediately, rather than slogging through a drawn-out publishing process. The launch was so successful that his new Scribd fan club attracted Numina Press, which then rushed the book into print.

Other 2011 Technology Pioneers are empowering people by offering ways to avoid customer lock-in. For example, GetJar is an independent alternative to Apple's iTunes, offering more than 65,000 mobile applications across major handset platforms to consumers in more than 200 countries. Hardware manufacturers and carriers often censor applications from competing business models but the GetJar site is independent, giving consumers the chance to compare all options. And Spotify, a digital music platform that works across multiple hardware platforms,

offers music fans a way of legally downloading music without being locked into a single hardware platform.

Technology Pioneers are also empowering consumers and businesses to control their online security and reputations. OpenDNS enables consumers and network administrators to secure their networks from online threats and gives them an alternative to spotty service offered by local

thought-out business plan but rather the result of good crowdsourcing. “We shared our ideas and wishes through our social networks and were put in contact with people who could help us build the technology,” says Boonstra. “Even though these developers were on the other side of the planet, in China and India, and we had never met them in person, we managed to create an outstanding product.”

> “ ... new discoveries made by researchers in academic labs are formulated in ways that are sustainable and gain a route to market in emerging markets. ”

Internet service providers, while ReputationDefender allows users to take control of how they are seen online, offering computational tools to protect against and repair harm done by online attacks.

The Power of Collaboration

Technology is also enabling people to collaborate in new ways, impacting the way business and charities operate. For instance, people in more than 800 organizations, including the US Department of Defense, are already using technology developed by 2010 Technology Pioneer CollabNet to allow geographically dispersed teams to work together “in the cloud" to develop and deploy better software faster.

Parcelling out computing tasks to remote servers across the Internet, rather than performing them on local desktop PCs or an organization's own servers, is referred to as cloud computing. The emerging technology, as well as the groupthink open innovation model called crowdsourcing, is catching on with corporations like Deutsche Bank and even the US Department of Defense.

Start-ups, such as 2011 Technology Pioneer Layar, a Dutch company that offers mobile users a way to better understand context through an emerging technology called augmented reality, are fans of the approach. Claire Boonstra, the company’s Co-Founder, freely admits that Layar was not the result of an elaborately engineered, well

Layar is also using the power of the Internet to tweak its services. “This is quite easy when, to get feedback from users all you have to do is 'open your Internet ears', continuously follow what is being said about Layar on Twitter, read all the user reviews in the app store, enter into conversations with our third party developers and enable them to come up with suggestions and improvements, and even let them develop tools to make Layar better,” she says.

Start-ups the world over are using tools from Atlassian, another 2011 Technology Pioneer, to help technical teams collaborate more effectively. The Australian company’s project management software tools are not just changing the way people work together they are having an impact that goes far beyond business. “We power people that do awesome things,” says Scott Farquhar, Atlassian’s Co-Founder and Co-Chief Executive Officer. For example, Mercy Ships, a global charity which operates hospital ships off the coast of developing nations and performs surgeries to remove facial tumours and cataracts, and repair cleft palates and obstetric fistulas, is using Atlassian’s software tools to allocate tasks, track issues, responses and outcomes involving the organization’s ships and 15 national offices.

“We multiply what we do by telling the stories and Atlassian’s navigator software is providing resources to do that with increasingly high impact, thus inspiring others to both go and give,” says the communications manager at

Mercy Ships. “As we attract key personnel and generate more financial resources we are able to change the lives of more and more of Africa's most broken and desperate people.”

Medicine in Need (MEND), a US 2011 Technology Pioneer, is bringing medical care to the poorest of the poor by improving collaboration in another way. It acts as a bridge between academic labs and big pharmaceutical companies, linking the two sides to make vaccines and drugs better, cheaper and easier to produce and distribute, particularly in some of the world’s harshest environments.

MEND has created a virtual network of hundreds of technology providers who come up with creative ways to adapt existing life-saving drugs and vaccines to the world’s poorest countries so they can be used in environments without access to refrigeration or sterile water.

Another key part of its mission is to make sure that new discoveries made by researchers in academic labs are formulated in ways that are sustainable and gain a route to market in emerging markets. Through its wet labs in both the US and South Africa, MEND can generate the necessary data and “proof of principles” to lower risk and make a more compelling case for global pharmaceutical companies to adopt and invest in these innovative candidates.

“In an age where technologies in all fields are relentlessly advancing at breakneck speed and crossing the boundaries of conventional academic disciplines, we have created a model that embraces this change through a virtual and evolving network of inventors and practitioners,” says Andrew Schiermeier, MEND’s Chief Executive Officer. “Hence, when faced with a difficult challenge, we have access to an unprecedented number of exceptional minds and potential solutions that make business sense to larger pharmaceutical players – not just a static toolkit of approaches from years past.”

Crowdsourcing is also being used in the healthcare sector to usher in an era of personalization, prediction and prevention. 23andMe, a 2008 Technology Pioneer and personal genetics company which aims to help individuals understand their genetic information through DNA analysis and Web-based interactive tools, is using crowdsourcing to further medical research. Traditionally, researchers recruit people with and without a particular trait. The physical characteristics or disease status of both groups are then correlated with their genetic data to find single-letter differences in the DNA that are linked to the trait or conditions, a slow and often expensive process. The 23andMe Web-based research framework facilitates the rapid recruitment of many studies at once, reducing the time and money needed to make new discoveries aimed at prevention, better treatments and potential cures for a multiple of diseases and conditions.

23andMe is teaming with MondoBIOTECH, a 2008 Technology Pioneer focused on developing synthetic peptides to treat rare diseases which today have no cure. The Swiss company, which licenses out its products to companies, foundations and private persons who are interested in improving the status of affected patients, is now working with 23andMe to facilitate research of the genetic bases of rare and potentially fatal diseases such as pulmonary arterial hypertension and pulmonary fibrosis (see photo). MondoBIOTECH is identifying individuals suffering from rare diseases and sponsoring their enrolment in the 23andMe personal genome service. Researchers are studying the genetic information collected in clinical trials to understand potential causes of these diseases. “If one day we are able to collect gene information from all people around the world, whether they are healthy or sick, we will be able to generate a diseases map, making it easier to not only develop cures but to prevent diseases,” says Fabio Cavalli, MondoBIOTECH’s

“If one day we are able to collect gene information from all people around the world, whether they are healthy or sick, we will be able to generate a diseases map.”

Chairman and Chief Business Architect. “This is the future of medicine,” he says.

A number of things need to be put in place before that future is realized. Ion Torrent, a 2011 Technology Pioneer, is aiming to democratize gene sequencing, putting it within the reach of any lab or clinic, helping to usher in the age of personalized medicine.

Taking Charge

Technology Pioneers are also empowering people to understand exactly how much energy they consume and to take more responsibility for cutting energy use to both save money and reduce the impact on the environment.

> “... the pressure to become more energy efficient has never been greater for businesses.”

A profile of genetic variations will help doctors prescribe the most efficient treatment for a particular patient, minimizing side effects from drugs. And, if doctors knew about a patient’s susceptibility to certain diseases, they could map out plans for monitoring and prevention. However, it is likely to be decades before the effects of human genetic information are fully understood, leading critics to caution people from acting on information that is currently available.

Proponents of personal genetic services like 23andMe argue that those who want as much information as they can get now about genetic make-up should be treated as adults and given the data, together with careful explanations of what it means.

Genetic information will become better over time, and it is already prompting people to take charge of their own well-being, which is a good thing, says Internet guru Esther Dyson, an investor in 23andMe and a participant in the Personal Genome Project, an initiative that aims to build and correlate genetic databases and personal risk factors. The assumption is that people are under the constant care of a doctor but “most are under-examined and under-watched,” she says. “It is time to stop holding doctors to an impossible standard and take responsibility for our own health by taking better care of ourselves and taking advantage of technological advances to use the information available about our genes today to make informed choices”, she says.

Today, most utilities cannot offer their customers detailed information on how they use electricity and which appliances use the most juice. That is where 2011 Technology Pioneer OPOWER, an energy efficiency software company, comes in. “People don’t like to waste, they want to save money and reduce emissions and conserve energy for the future, but they don’t have any visibility,” says Dan Yates, OPOWER’s Chief Executive Officer.

The company’s analytics engine uses algorithms to extract insights from energy use patterns. It then takes the raw data and creates detailed reports on how customers’ consumption compares with their neighbours and provides customized tips on how to curb energy use. “We are helping bring the massive investments utilities have made in smart grid architecture to life for the consumer,” says Yates.

Adrian Tuck, Chief Executive Officer of Tendril, another 2011 Technology Pioneer specializing in energy efficiency, likes to compare utilities to supermarkets. When you walk into a supermarket, you can compare prices and evaluate ingredients and their origins, and when you check out you are given an itemized bill on the spot, says Tuck. If a utility was running the supermarket there would be no prices, no ingredients, no information about the origins of the good and the consumer would receive one bill, 45 days later, with a total owed and no other information. Like OPOWER, Tendril’s technology aims to give the energy sector the ability to give customers the same level of

information they get in supermarkets, motivating them to make smarter choices about their energy use, says Tuck.

Looking Forward: 2011

The Technology Pioneer class of 2011 is giving consumers and businesses more control over their impact on the environment in other ways. For the first time since the World Economic Forum launched its Technology Pioneers Programme 11 years ago, the number of clean tech companies equals the number of information technology companies. This is no accident, the pressure to become more energy efficient has never been greater for businesses, not just because of regulatory concerns but because like consumers, businesses want to be seen as socially responsible. Technology Pioneers are stepping up to help. Several are giving people new green options when they construct houses and businesses: England's Novacem makes carbon-negative cement and Thailand's Flexoresearch Group and Ecovative Design are using different technologies to make environmentally-friendly insulation materials.

An increasing amount of venture capital is now being spent on technologies geared towards energy efficiency, rather than alternative energy technologies or biofuels, says Michael Liebreich, Chief Executive of Bloomberg New Energy Finance and a Technology Pioneer Selection Committee member. "There is a new group of clean energy companies coming through the system," he says. The adoption of things like LED lighting or smart grids require distributed systems to make them operate efficiently. Three of the 2011 Technology Pioneers are tackling this area: Digital Lumens, which makes smart lighting systems for factories; Israel's TaKaDu, which helps utilities curb water loss by bringing a smart grid approach to the water sector; and On-Ramp Wireless, which has found a cost-effective way to wirelessly network the sensors that power smart grids.

Technology is also helping individuals take charge of their own education. Within 10 years all educational textbooks are expected to be digital, delivered through powerful e-readers. Students everywhere will be able to take accredited Web video classes led by some of the world's best teachers. Knewton, a 2011 Technology Pioneer, has developed an algorithm to help students find the best online content and an adaptive learning engine, customizing educational content to meet an individual's needs. It hopes to have enough commercial success in the industrialized world to allow it to give away its services in the developing world. Like Knewton, China's Qifang, a 2009 Technology Pioneer, has the potential to significantly democratize education. It operates an online, person-to-person lending service that gives some of the 50 million Chinese students who cannot afford to go to college the means to find friends, employers or philanthropists willing to help fund their educational aspirations.

Technology is clearly empowering people in all walks of society by giving them more information, more options, a bigger voice in the world around them and more control over their own health and their impact on the environment. Technological advances that allow an unprecedented level of collaboration and cooperation in real time mean that acting on that information has never been easier.

> "Within 10 years all educational textbooks are expected to be digital, delivered through powerful e-readers."

Technology Pioneers 2011

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Thirty-one companies have been selected as the World Economic Forum's Technology Pioneers 2011. They come from three main categories: Clean Tech, Information Technologies and New Media, and Life Sciences and Health. Candidate companies are nominated by Members, constituents and collaborators of the World Economic Forum, as well as by the larger public. A selection committee, comprised of top technology and innovation experts from around the world, reviews all candidate companies and makes a recommendation to the World Economic Forum, which then takes the final decision.

Technology Pioneers are chosen on the basis of the following criteria:

1. **Innovation:** The company must be truly innovative. A new version or repackaging of an already well-accepted technological solution does not qualify as an innovation. The innovation and commercialization should be recent. The company should invest significantly in R&D.
2. **Potential impact:** The company must have the potential to have a substantial long-term impact on business and/or society.
3. **Growth and sustainability:** The company should demonstrate the potential to be a long-term market leader and should have well-formulated plans for future development and growth.
4. **Proof of concept:** The company must have a product on the market or have proven practical applications of the technology. Companies in "stealth" mode and with untested ideas or models do not qualify.
5. **Leadership:** The company must have visionary leadership that plays a critical role in driving the company towards reaching its goals.

Finally, the company must not currently be a Member of the World Economic Forum. This criterion applies to the parent company; thus, wholly owned subsidiaries of large firms are not eligible.

Digital Lumens

Tom Pincince, President and CEO
Location Boston, MA, USA
Number of employees 24
Year Founded 2008
Origins Entrepreneurial start-up

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Digital Lumens integrates LEDs, networking and software into a single "smart" system that promises improved efficiency, control and operational oversight of lighting at industrial facilities. The system can reduce customers' lighting-related energy use by up to 90%.

The company, which expects to have 30 installations operating in the US by the end of the year, makes white light LED-based luminaries that provide desired light levels while minimizing kilowatt consumption. Each luminary has an on-board computer, as well as sensors and wireless mesh networking equipment that enables all fixtures in the system to communicate with each other and provide use and occupancy data to a control and energy management system. The system allows facility managers to programme lighting resources and energy use, and receives up-to-the-minute kilowatt consumption details by fixture, zone, day and shift.

Decreasing energy use dramatically reduces the carbon footprint of industrial sites. A typical 250,000 square foot facility, when retrofitted with a Digital Lumens system, reduces 1,570,000 kilowatts and 800,000 kg of CO_2, the equivalent of taking 139 homes completely off the grid.

Why the company is a Technology Pioneer

Conventional lighting systems represent more than 20% of the energy footprint of today's buildings and account for US$ 174 billion in electricity costs, according to Lux Research. The installation of systems like Digital Lumens is expected to radically reduce energy bills, power demand and carbon emissions.

Ecovative Design

Eben Bayer, Founder and CEO
Location Green Island, NY, USA
Number of employees 20
Year Founded 2007
Origins Entrepreneurial start-up

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Ecovative's vision is to grow sustainable products that directly replace plastics. Its products require far less energy to create, can be grown from many different regional feedstocks and can be composted without processing in backyards and gardens.

The company achieves this using a patent-pending material platform that leverages the existing biochemical machinery of filamentous fungi to transform the lignin found in crop wastes into a strong and fast-growing resin. This resin is analogous to the plastics used today except that instead of relying on petroleum as a feedstock it uses plentiful agricultural waste. What's more, Ecovative's resin self assembles indoors, in the dark, with very little additional energy.

The company's EcoCradle product is a direct replacement for the expanded polystyrene (EPS) used in the multibillion dollar protective packaging market. EcoCradle provides the same physical and thermal protection as expanded polystyrene but unlike EPS it is 100% compostable outdoors and requires only one-eighth of the energy to create. The same technology is used in Greensulate, a rigid board insulation that can substitute for the harmful foams which typically insulate large commercial buildings and residential homes.

Why the company is a Technology Pioneer

Over US$ 100 billion dollars of environmentally harmful foams are used each year, depleting finite fossil fuel reserves and causing serious environmental impact during production and disposal. Ecovative's technology has the potential to eliminate a significant amount of environmentally harmful foams, including the expanded polystyrene used worldwide in packaging, automobiles, building construction and consumer goods.

Ferrate Treatment Technologies

Luke J. Daly, Founder and CEO
Location Orlando, FL, USA
Number of employees 6
Year Founded 2004
Origins Entrepreneurial start-up

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www.ferratetreatment.com

Ferrate Treatment Technologies (FTT) makes a patented reactor small enough to fit into the back of a pick-up truck that can disinfect up to 20 million gallons of water a day and do the job more cheaply than harmful chemicals or competing technologies. The ferrator strips electrons from liquid iron to make ferrate; the most powerful, multi-purpose environmentally-friendly water and wastewater treatment chemical known.

FTT is the first company to make ferrate inexpensively in commercial quantities for broad industrial use. Prior use was blocked for decades by high costs related to offsite synthesizing processes, product instability, packaging, handling and shipping expenses. The company's revolutionary manufacturing method differs from ferrate solids or salts by producing a full-strength liquid ferrate onsite that can be directly injected into a process stream without special handling or mixing equipment. FTT's synthesis can be achieved by using existing bulk chemical feedstocks available at most water and wastewater treatment plants.

The company is working on projects around the globe, including the removal of heavy metals from South African mining effluents and the disinfection of municipal wastewater at a treatment plant in New Orleans where the effluent will be used to rehabilitate the surrounding 28,000-acre bald cypress wetlands as a storm-surge buffer from future hurricanes like Katrina.

Why the company is a Technology Pioneer

Thanks to FTT's innovative technology, ferrate can, for the first time, be used for chemical, industrial and environmental treatment processes globally. It offers a solution that can create freshwater supplies by treating previously unusable water sources and without creating harmful by-products, helping augment the amount of clean water available and killing waterborne pathogens that are the number one cause of disease in the developing world.

Flexoresearch Group Company Limited

Paijit Sangchai, Founder and CEO
Location Patumthani, Thailand
Number of employees 17
Year Founded 2007
Origins Entrepreneurial start-up

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Flexoresearch has developed a series of novel blended enzymes that recovers pulp/fibre from laminated paper waste, such as milk cartons, and uses it to replace the virgin pulp now used to make new paper. The recovered pulp/fibre can also be used in building materials and to make vehicle brake pads for the automotive industry.

The company concentrates on the types of paper that today are very difficult or even impossible to recycle and turns the waste into new products that help save trees and reduce health hazards from asbestos. In addition to the recovery pulp/fibre, it also recovers clean plastic material, like HPDE, from the process and sells it to plastic recycling companies who can use it to make new plastic products.

In late 2009, the company set up a research and development centre and a pulp mill in eastern Bangkok. It is already selling recovered pulp/fibre to paper mills and to the construction industry in Thailand, has started exporting to Malaysia and is planning to expand across Asia.

Why the company is a Technology Pioneer

In addition to the impact on the environment, Flexoresearch's products are poised to reduce the use of asbestos in the developing world, positively impacting people's health. It also offers significant cost savings across several industries: the papermaking industry currently pays around US$ 750 per ton for virgin pulp. Flexoresearch's recovery pulp/fibre costs only US$ 450 per ton. It is also cheaper than asbestos used in building construction materials and only 16.6% of the price of polyalcohol (PVA) fibre, which costs US$ 3,000 per ton.

Novacem Ltd

Stuart M. Evans, CEO
Location London, United Kingdom
Number of employees 18
Year Founded 2008
Origins Spin-off from Imperial College

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The cement industry alone is responsible for 5% of man-made CO2 emissions and, up until now, has not had low-carbon solutions to deploy at scale. Enter Novacem, which has developed a new type of cement which absorbs more CO2 than it emits during production.

Novacem makes cement out of magnesium oxide and magnesium carbonates and uses magnesium silicate minerals as raw material. Silicate minerals are abundant, can be mined at a similar cost to limestone and contain no carbon and, therefore, release no CO2. By contrast, every ton of Portland cement produces 400 kg of CO2 released from limestone. Additionally, production of Portland cement requires significant amounts of fossil fuel; on average another 400 kg of CO2 is released from the fuel needed to produce one ton of Portland cement. Since production of Novacem's cement requires lower temperatures, biomass can be used instead of fossil fuel energy. And, the magnesium carbonates are strongly carbon negative so their inclusion in the cement composition makes the cement carbon negative overall.

The company's backers include the Royal Society, the United Kingdom's national academy of science. Novacem recently announced the first closing of its Green Cement Bond, with building materials giant Lafarge as the first subscriber. The Bond is an innovative commercial and financial approach for engagement with major cement manufacturers to accelerate development and commercialization of Novacem's cement. Bond subscribers are also expected to participate in the company's planned Series A financing round.

Why the company is a Technology Pioneer

Other options being considered to reduce cement industry emissions offer less than half the benefits of Novacem's cement, which could reduce emissions by an estimated 750-900 kilograms per ton compared to current technology.

On-Ramp Wireless

Joaquin Silva, President and CEO
Location San Diego, CA, USA
Number of employees 53
Year Founded 2008
Origins Entrepreneurial start-up

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On-Ramp Wireless's Ultra-Link Processing (ULP) System enables the low-power monitoring and control applications used in smart grids, industrial sensing and location tracking.

Its wide area, wireless communication technology can monitor billions of distributed end-point devices to measure and provide critical information for controlling consumption of energy and other scarce resources. Applications include the smart grid, water distribution systems, environmental monitoring and energy-optimizing infrastructure systems.

A key advantage of the system is its ability to pick up even the weakest signals. A study developed with a major utility in the US concluded that On-Ramp's ULP System can reach over 97% of utility end-points such as meters, sensors and fault indicators with as little as 30 access points covering an area of 10,000 square kilometres. The deployment cost of such a system is US$ 1 million, several orders of magnitude lower than competing systems.

On-Ramp now makes its own equipment, but in the future it plans instead to provide embedded chipsets, systems and intellectual property to larger, established manufacturers in much the same way that Qualcomm, an innovator in signal processing techniques, works with the mobile industry.

Why the company is a Technology Pioneer

On-Ramp Wireless' ULP System is expected to play a significant role in making the "Internet of Things" a reality, helping new technologies like smart grids bridge the gap between the growing demand for energy and a need to significantly reduce CO2 emissions.

OPOWER

Daniel Yates, CEO
Location Arlington, VA, USA
Number of employees 100
Year Founded 2007
Origins Entrepreneurial start-up

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OPOWER has designed a behaviour-based, energy-efficiency program that helps utilities motivate their customers to save energy.

The company's analytics engine uses patent-pending algorithms to extract insights from energy use patterns. Instead of just showing customers their monthly, daily or hourly use data, OPOWER analyses the data and works with a behavioural scientist to provide motivating insights, such as "You use more energy on cooling than your neighbours." The company then provides actionable suggestions tailored to each customer on how to become more energy-efficient.

The platform, which is hosted on OPOWER's servers, can process millions of electric meter reads every hour. Without any devices installed in the home, it performs pattern recognition analysis to derive actionable insights about an individual's energy consumption. It reaches out to utility's customers in the mail through home energy reports, online through a suite of Web-based tools and on the phone through a customer service representative portal and text message alerts.

The company is working with 36 US utilities, including six of the country's 10 largest, and has expanded into Canada.

Why the company is a Technology Pioneer

OPOWER is changing the way people interact with their utilities and as a consequence achieving energy efficiency on a large scale. If its system were used nationwide, the company estimates that it could save enough energy to power more than 3 million homes, reduce CO2 emissions by 31 million metric tons and save customers US$ 5 billion on their energy bills each year.

Ostara Nutrient Recovery Technologies Inc.

Phillip Abrary, President, CEO and Director
Location Vancouver, BC, Canada
Number of employees 25
Year Founded 2005
Origins Technology licensed from the University of British Columbia

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Ostara Nutrient Recovery Technologies has developed a new generation of wastewater treatment systems that not only helps treatment plants run more efficiently but also solves major environmental issues and provides a new revenue stream for municipalities: commercial fertilizer.

Wastewater treatment plants concentrate large quantities of phosphorus and ammonia in their sludge handling streams. These dissolved nutrients combine with magnesium to form struvite scale in piping, pumps and valves, which is difficult and expensive to remove. Ostara's technology solves the clogging problem and, through a chemical reaction, extracts the phosphorus and ammonia from liquid wastewater at treatment plants and transforms these otherwise polluting nutrients into a slow-release fertilizer called Crystal Green that Ostara markets and sells, generating revenue for municipalities.

Phosphorus is an essential ingredient in fertilizer and is credited with making modern agriculture possible. But the supply is dwindling and the conventional phosphorus fertilizer production cycle is an energy-intensive process that releases greenhouse gases into the environment at every stage. By recovering phosphorus from wastewater, Ostara is augmenting the available supply while reducing carbon emissions. The slow release process in its fertilizer reduces agricultural run-off, which can cause excessive algae growth in lakes and oceans, killing aquatic life.

Why the company is a Technology Pioneer

Ostara's technology is positively impacting the environment by "mining" phosphorus from human wastewater, which does not contribute to the carbon footprint, and producing a fertilizer product which helps grow the world's food supply, while avoiding polluting adjacent waterways through its unique crystalline, slow-release properties.

Quintas Renewable Energy Solutions Ltd

Dr Omotayo Dairo, Founder and CEO
Location Akure, Nigeria
Number of employees 34
Year Founded 2009
Origins Entrepreneurial start-up

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Founded by a physician dismayed at the loss of life when power outages occur during childbirth and surgical operations, Quintas develops inverters specially designed to meet the challenges that poor and erratic power generation and distribution pose to people in Nigeria whose businesses and daily activities require continuous power supply.

The normal electricity volt operating in Nigeria is 220 volts but because of low power generation (less than 3,000 Mw to serve a population of 140 million) there is an overload of the power supply and a fluctuation in voltage that can vary from below 50% to over 100%, resulting in blackouts and brownouts that impair hospitals and businesses and harm electronic products. Quintas makes a range of inverters now in use by local teaching hospitals, medical clinics and residential homes that come with battery overcharge and over-discharge protection, brownout and cut-out detection and manually operated turbo charge to allow battery charging when voltage dips far below 220 volts. The inverters work on a variety of power sources, including solar panels, wind turbines or batteries.

Quintas is also aiming to use technology to exploit Nigeria's natural resources to increase its power supply. It is planning projects to develop locally wind turbines, efficiently harness solar energy, dam brooks for mini water turbine power generation, harness natural gas resources to make gas turbines and produce biogas from the country's human and animal waste.

Why the company is a Technology Pioneer

Quintas is developing local solutions to local problems, making power generation in Nigeria less precarious and reducing carbon emissions.

TaKaDu

Amir Peleg, Founder and CEO
Location Yehud, Israel
Number of employees 20
Year Founded 2009
Origins Entrepreneurial start-up

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Water scarcity is one of the biggest issues facing the world. There is not only not enough clean drinking water to go around, the world loses much of what it does have through leaks in ageing water networks. More than four and a half billion gallons of water are lost in transit every day in the United States, according to the US Geological Survey, and 25% to 35% of water is lost every year worldwide, according to the World Bank. This is where TaKaDu comes in. It is tackling the multibillion dollar problem by bringing a smart grid approach to the water sector.

TaKaDu's software-as-a-service solution provides real-time alerts, reports and network views to utility personnel via a Web interface as well as SMS and e-mail notifications, without the need for any physical changes to the network or capital expenditure. TaKaDu's smart data analysis software can be used to detect leaks, bursts, inefficiencies and equipment failures, enabling utilities to quickly respond to breaks and minimize water loss and repair costs, and increase their efficiency so they can reduce energy consumption.

Five utilities are currently using the service, including Thames Water, the United Kingdom's largest water and wastewater services provider; HaGihon, the city of Jerusalem's water utility; and other utilities in Europe and Asia Pacific. TaKaDu charges utilities a monthly fee for the service, which it sells through business partners and resellers such as IBM and Schneider Electric.

Why the company is a Technology Pioneer

By combining smart IT and software-as-a-service, TaKaDu is radically improving the efficiency of water networks, significantly increasing the world's water supply. It is also reducing energy consumption since water production and distribution require a lot of energy, so preventing water loss also prevents this waste.

Tendril

Adrian Tuck, CEO
Location Boulder, CO, USA
Number of employees 85
Year Founded 2005
Origins Entrepreneurial start-up

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Tendril helps both consumers and utilities manage energy consumption. Its smart grid technology helps utilities achieve better load balance. And, the company's technology, a software-as-a-service model, provides a two-way communication link between energy utilities and their customers, giving consumers more specific information about their energy use.

Tendril has developed a suite of products that include display, monitoring, control and network devices for consumers' homes, such as a smart energy device resembling a digital clock, which helps customers build their own customized energy plans. Consumers decide how they want to be judged on their energy consumption: choices include measuring against historic performance, measuring against new goals or measuring against other consumers.

The Tendril platform also includes open application program (API) interfaces to allow the integration of third party applications. It has partnership agreements with providers of smart meters and energy management technology including Silver Spring Networks and Current Group, two previous World Economic Forum Technology Pioneers.

Tendril secured 20 pilot programmes in 2010, with utilities in 14 US states covering 35 million homes, and the company is planning to expand internationally.

Why the company is a Technology Pioneer

Using technologies developed by Tendril, consumers are empowered with data and analytics about energy consumption, helping to change their behaviour and reduce their environmental impact. Studies show that average consumers can reduce their energy consumption by 10 to 15% when they have meaningful information about their habits and patterns.

Topell Energy BV

Ewout Maaskant, CEO
Location The Hague, Netherlands
Number of employees 20
Year Founded 2007
Origins Entrepreneurial start-up

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Topell Energy has developed a highly efficient method of making solid biofuel from woody biomass, a process known as torrefaction. Torrefaction of biomass cuts transportation costs and renders the conversion of biomass into power and heat more efficient. Torrefied biomass is an environmentally-friendly and practical alternative to fossil coal.

Topell's torrefaction process is based on its Torbed reactor technology. The extreme turbulence inside the reactor results in a fast heat transfer between the process gas and the biomass particles, making the process highly efficient, yet easy to control. Topell's process technology is flexible with respect to particle size of the incoming biomass, which keeps feedstock costs down. Torrefied biomass produced in this manner is expected to compete with fossil fuels and coal in particular. It can be used directly in existing power plants, without altering current infrastructures.

Competitors have also developed systems for the torrefaction of biomass. Competing systems, however, require on average 30 minutes or more to torrefy a biomass particle. Topell achieves the same results in about 100 seconds. The shorter time translates into greater throughput, lower costs and higher feedstock flexibility. The company has created a test facility to validate the process and is now building a large, commercial-scale plant in the Netherlands.

Why the company is a Technology Pioneer

Topell has developed a breakthrough process and technology that promises to allow biomass to compete with fossil fuels on price as well as product characteristics, without the need for expensive upgrades to existing power plant infrastructure.

Transonic Combustion Inc.

Brian H. Ahlborn, President and CEO
Location Camarillo, CA, USA
Number of employees 45
Year Founded 2006
Origins Entrepreneurial start-up

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Transonic Combustion makes a fuel injection system that offers automotive manufacturers a near-term, cost-effective solution to vastly improve fuel economy of new cars and trucks, and help meet stringent emissions regulations.

Mike Cheiky, Founder of Transonic Combustion and ZPower, a 2009 World Economic Forum Technology Pioneer, pioneered the technology out of concern over dwindling oil supplies and skyrocketing carbon emissions. Questioning the net efficiency of current internal combustion engines, Cheiky found that modern gasoline engines average only 15% fuel efficiency. He then identified two key improvement areas: fuel-air mixing and fuel content. To address these issues he founded Transonic, whose technical team began investigating supercritical state fuel and fuel catalysis.

Unlike standard fuel injectors, the TSCi injector that the team has developed pressurizes and heats gasoline until it gets to a "supercritical" state that is part-way between liquid and gas. When the substance enters the combustion chamber it combusts without a spark and mixes with air quickly, using less fuel and burning more efficiently than standard injectors. The injector is designed to integrate easily in conventional cars and is expected to cost consumers less than the gear needed to turn a vehicle into a hybrid. In addition to gasoline, it is expected to eventually run on ethanol and biodiesel.

Why the company is a Technology Pioneer

Internal combustion engines are likely to remain in passenger vehicles for decades. Once vehicles are equipped with Transonic's technology, the technology could dramatically reduce fuel consumption and reliance on fossil fuels, cut greenhouse gas emissions and ease the transition to renewable liquid fuels, without requiring major changes to the current automobile industry infrastructure.

Aster Data

Tasso Argyros, Chief Technology Officer
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Number of employees 110
Year Founded 2005
Origins Entrepreneurial start-up

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Companies are now amassing terabytes and even petabytes of data. As volumes explode, traditional databases have become bottlenecks, hampering corporations from getting deep insights into consumer behaviour, real-time fraud analysis and patterns and trends that could improve their business. Aster Data, founded by three PhD students at Stanford University, is helping companies overcome this challenge by providing an innovative new technology to store and rapidly analyse huge volumes of data.

Traditional data warehouses and analytic solutions separate data from applications, resulting in large data movement and restricted analysis. Aster Data is giving big enterprise customers the tools to push the applications where the data is stored, allowing analysis of larger amounts of data than ever before. Its breakthrough is its patent-pending SQL-MapReduce programming framework, which integrates data and application processing in one system, paving the way for a new generation of data-driven applications.

The company has raised US$ 25 million in venture capital. Customers include MySpace, LinkedIn and two previous World Economic Forum Technology Pioneers, comScore and Mint.com.

Why the company is a Technology Pioneer

Aster Data is helping to create businesses that could not have existed before. Customers such as Mint.com, a popular online personal financial tool now owned by Intuit, say they could only make their business model work by using a new class of analytic platform such as Aster Data's that supports large volumes of data while providing fast analytics.

Atlassian

Scott Farquhar, Co-Founder and Co-CEO
Location Sydney, Australia
Number of employees 260
Year Founded 2002
Origins Entrepreneurial start-up

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Atlassian builds software to help technical teams collaborate more effectively. The company, which has made seven acquisitions in the last eight years, raised an additional US$ 60 million in venture capital in July 2010. It has over 20,000 paying customers in 134 countries, including Facebook, Oracle, Microsoft, Procter & Gamble, major investment banks and Formula One teams.

The company's most popular product, JIRA, helps software development teams to track and prioritize their work. Another product, Confluence, one of the world's first commercial wikis, allows teams to keep track of all the textual information about a project, including specifications and release notes. Atlassian also has products that help with code review, build and release management, source code visualization, single sign-on and code testing. Its most recently created product, JIRA Studio, which is a combination of all its products into a hosted, online collaboration suite, is now the company's fastest-growing product line.

Atlassian sells its software via the Internet, with no sales force. It sells its software relatively cheaply and has an optional renewal that customers can purchase every year for upgrades and support. The renewal is 50% of the purchase price, rather than the industry standard of 15 to 18%, assuring Atlassian a reliable annuity income stream.

Why the company is a Technology Pioneer

The company's software tools not only help teams within companies solve communication issues but also enable non-governmental organizations to more efficiently deliver healthcare to some of the poorest nations on earth.

foursquare

Dennis Crowley, Co-Founder and CEO
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Year Founded 2009
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Foursquare is a popular online service combining location, gaming and social networking that lets people "check in" and report their location to help find friends or tips about the place they are visiting.

The company uses game mechanics to reward users for participating in its service, awarding badges for experiencing different types of events such as visiting art galleries or the gym, or for meeting new people and experiencing new things. It also grants "mayorships" for being the most frequent visitor of a particular venue, such as a business or a public space such as a park. The service is free for users. The company's clients include large brands and media companies, but it also works with local merchants running restaurants, bars and coffee shops. Foursquare has built tools that give merchants information about their customers and allow them to form a relationship with their best clients through a combination of loyalty rewards, digital coupons and analytics. It expects to eventually start charging merchants for such services.

By July 2010, the company attracted over 2.1 million users, with some 600,000 check-ins per day. Some 40% of the traffic is from outside the US, and more than 2,500 merchants around the world have started proposing special offers to foursquare users.

Why the company is a Technology Pioneer

Social networking has changed the way people interact online. Foursquare is pioneering the extension of social networking into the real world, pushing people to get up from their computers and interact in-person with people and local businesses.

GetJar Networks Inc.

Ilja Laurs, CEO
Location San Mateo, CA, USA / Vilnius, Lithuania
Number of employees 50
Year Founded 2004
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GetJar is the second largest apps store, after Apple's. The company's key point of difference is its open market approach, which allows it to deliver applications to telephone across all major platforms such as Android, Blackberry, Windows Mobile, iPhone and Symbian. It offers more than 70,000 mobile applications to consumers in more than 200 countries. The company has so far generated more than 1 billion application downloads.

The company's *App It!* link allows users to download an application to their phone in one click. GetJar handles all the back-end technology to detect the type of phone and platform.

The company's business model is fundamentally different than that of handset makers such as Apple, Blackberry and Nokia. Rather than taking the standard 30% cut from developers, GetJar asks developers to pay a "discovery fee". Its pay-per-download system allows developers to get visibility in GetJar's store and distribution channels by bidding per download. The system works much like Google AdWords, allowing developers to increase their apps' visibility across the site and get more downloads while setting their own budget guidelines. Developers have the option to geo-target their campaign by country, handset and carrier, and bid whatever amount they are prepared to pay for each download. The system ensures that developers only pay for the cost of successful downloads.

Why the company is a Technology Pioneer

Whereas hardware manufacture and carriers censor applications from competing business models, the GetJar site is independent, giving consumers the opportunity to compare all options and choose which works best for them.

INFORMATION TECHNOLOGIES AND NEW MEDIA

Knewton

Jose Ferreira, Founder and CEO
Location New York, NY, USA
Number of employees 60
Year Founded 2008
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Education is beginning its Internet moment. Within 10 years all educational textbooks are expected to be digital, delivered through powerful e-readers. Students everywhere will be able to take accredited Web-video classes led by some of the world's best teachers. Knewton's mission is to bring data mining to this transition, by offering analytic tools for teachers and adapting concepts to the way individual students learn.

Knewton works by tagging all content down to the atomic concept level. The system further tags the resulting learning objects by structure, difficulty level and media format. The Knewton platform includes a real-time proficiency engine that determines the unique profile of each student. Based on that learning fingerprint, the system can then dynamically generate for each individual a bundle of content based on exactly which concepts the student already knows and how she or he learns each concept best.

Knewton is developing a complex set of algorithms that reference all previous students' data to develop recommendations about the best content. The more students and content in the system, the smarter the recommendations.

The company launched with Web-based GMAT, LSAT and SAT test preparation courses. The next phase is to open Knewton's platform so that anyone can apply the technology to any educational use.

Why the company is a Technology Pioneer

Knewton's technology has the potential to significantly improve and democratize education. Its mission is to be sufficiently commercially successful in the industrialized world so that it can give away its services in the developing world.

Layar

Claire Boonstra, Maarten Lens-FitzGerald, Raimo van der Klein, Co-Founders
Location Amsterdam, Netherlands
Number of employees 36
Year Founded 2009
Origins Entrepreneurial start-up

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Fancy knowing what the Berlin Wall looked like before it fell? Thanks to Layar you can, by simply pointing your mobile phone at the location. The company helps people better understand context through an emerging mass medium called augmented reality.

Layar works by using a mobile phone's camera, compass and GPS data to identify the user's location and field of view. Based on these geographical coordinates, data retrieved from a content database and overlaid over the camera's view in so called "layers". As of 1 July 2010 more than 1,000 layers have been published on Layar's platform with more than 3,000 in development. These layers are developed by a global community of over 4,000 brands, agencies and developers. Content includes museum art, recreation of history and a whole new industry of augmented reality games.

Layar's reality browser has been installed 2.5 million times, and the service has 800,000 active users. It is expected to be pre-installed on tens of millions of phones from handset manufacturers and carriers by the end of the year. In April it launched a payment platform, allowing publishers on the Layar platform to price augmented reality experiences. Competitors include Google, which has launched an augmented reality service called Google Goggles.

Why the company is a Technology Pioneer

Layar is pioneering the new medium of augmented reality which could become the mobile sector's killer application. This new medium is still in the early stages of development but is already being viewed as an essential component of the next generation of entertainment and advertising.

NetQin Mobile Inc.

Lin Yu, CEO
Location Beijing, People's Republic of China
Number of employees 310
Year Founded 2005
Origins Entrepreneurial start-up

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Today's smart phones are tiny computers, complete with operating systems, storage and wireless access to company's internal networks, making them an enticing target for hackers and Internet criminals. That is where NetQin Mobile comes in. Based on a cloud security platform, the company delivers mobile security services, including anti-virus, anti-spam, privacy protection, data backup and restoration, and online virus scan to 51.5 million users worldwide. The company controls 68% of the market in China for mobile security – it is the only provider of anti-spamming service to China Mobile, the world's largest mobile operator – but some 30% of its user base is outside of China.

NetQin's intelligent semantic analysis anti-spam filter engine can analyse the semantics of a text message and identify spam messages automatically. It is also capable of adaptive learning from the spam SMS messages contributed by users. Its virus scan engine was conceived for mobile phones, so it uses low power consumption and does not impact normal phone function when scanning.

Each time NetQin's users access its services they contribute security knowledge about viruses, spam and phishing to the platform, which is passed on to the community, meaning the more users, the more valuable the platform is. Users can sign up via NetQin's website, through operators such as China Mobile or through preloaded mobile devices made by device makers such as Nokia, Sony-Ericsson, Huawei, Samsung and Lenovo.

Why the company is a Technology Pioneer

The company's heavy investment in R&D has resulted in 23 patented and patent-pending technologies, giving the company a leading edge in the burgeoning mobile security market.

OpenDNS

David Ulevitch, CEO
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Number of employees 26
Year Founded 2005
Origins Entrepreneurial start-up

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The Domain Name System (DNS) is a 25-year-old crucial part of the Internet's infrastructure, which encompasses the routing system used to transfer data, such as e-mails. OpenDNS' mission is to push control of the DNS to the periphery, enabling consumers and network administrators to secure their networks from online threats, reduce costs and enforce Internet use policies without the use of software or costly appliances.

Originally designed and deployed as a superior DNS service to the default service of Internet service providers, which often includes downtime and slow Web page load times, OpenDNS now additionally offers security services. It is the first and only DNS service providing built-in anti-phishing, anti-malware and anti-botnet service, giving users an added layer of protection and taking the guesswork out of identifying dangerous websites.

In just four years, OpenDNS's customer base has grown to 20 million users, accounting for 1% of the world's Internet users and is on track to soon double. It offers a free consumer service, supported by advertising and a fee-based service for big enterprise customers.

Why the company is a Technology Pioneer

OpenDNS gives consumers and businesses a choice, providing fast, reliable global DNS service with built-in security as an alternative to spotty service provided by local Internet service providers. The company has developed a number of innovations in the security and network space that make the Internet more resistant to disruption and catastrophe. These innovations are now being standardized by the Internet Engineering Task Force for global adoption.

INFORMATION TECHNOLOGIES AND NEW MEDIA

ReputationDefender Inc.

Michael Fertik, Founder and CEO
Location Redwood City, CA, USA
Number of employees 90
Year Founded 2006
Origins Entrepreneurial start-up

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ReputationDefender specializes in helping consumers and business shape how they are seen online. It sells different security products on a monthly subscription basis, allowing consumers and businesses to monitor information about themselves across the Web, bury undesirable information and promote vetted content to the top of research results.

The company specializes in both safeguarding privacy and reputation. Its "My Privacy" product allows consumers to find and remove their personal information, such as name, address, phone number, credit score and transaction history from data aggregation sites. Online slander can cause personal devastation, but search results can also sway public opinion and purchasing decisions disproportionately for businesses. With 25% of search results for the world's top 20 largest brands being linked to user-generated content, ReputationDefender offers solutions to regain control of corporate brands. Small businesses are also heavily impacted: doctors and lawyers, for example, regularly report that they lose as much as 70% of their business after being defamed on the Web.

The company's technology is based on innovations in the fields of recursive search, semantic and sentiment analysis, language-agnostic processing and data schemas for global flows of personally identifiable information.

Why the company is a Technology Pioneer

ReputationDefender puts the power back in the hands of consumers and businesses, offering computational tools to protect against and repair the rapidly proliferating new varieties of online attacks.

Scribd

Trip Adler and Jared Friedman, Co-Founders
Location San Francisco, CA, USA
Number of employees 45
Year Founded 2007
Origins Entrepreneurial start-up

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John Adler, Founder of 2008 Technology Pioneer Accuray and inventor of the CyberKnife, encountered a lot of barriers to publishing one of his papers in a medical journal. The peer review process and glacial pace were frustrating. Adler realized that what he really wanted was to quickly make his paper accessible to as many people as possible. Adler's complaints led his son Trip and his classmate from Harvard to create Scribd, a Web 2.0 document-sharing site that aims to make it easy for anyone to publish original work on the Web and find a readership.

Scribd is today the largest social reading and publishing site in the world, attracting more than 50 million people a month. The site offers an eclectic collection of works, including academic and research papers, short stories, sheet music, recipes, reports, books, magazines, comics and architectural diagrams. Scribd documents are accessible and shareable on any PC, reading or mobile device with a Web browser.

The company earns money from advertising, offering premium services and by taking a percentage of the sales of content sold from the site. It recently converted its entire collection, equalling billions of pages, to the HTML5 standard allowing it to take any form of written content in its original formatting and make it part of the content of the Web.

Why the company is a Technology Pioneer

Scribd lowers the barriers to publishing and allows written material that previously had limited distribution to be circulated to anyone with an Internet connection.

INFORMATION TECHNOLOGIES AND NEW MEDIA

SecondMarket

Barry Silbert, Founder and CEO
Location New York, NY, USA
Number of employees 135
Year Founded 2004
Origins Entrepreneurial start-up

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In the last decade, the time from company formation to initial public offering has extended from five to 10 years, leaving employees, founders and venture capitalists with limited means to get liquidity in the interim. SecondMarket gives the marketplace an alternative to going public or selling companies. It is the world's largest centralized marketplace and auction platform for trading illiquid financial assets that cannot be traded in the public markets.

Assets traded include shares in popular, venture-backed Silicon Valley private companies such as Facebook, LinkedIn and Zynga as well as auction-rate securities, bankruptcy claims, collateralized debt obligations, limited partnership interests, residential and commercial mortgage-backed securities, asset-backed securities, restricted securities and whole loans.

Unlike banks, which make money on the opacity of illiquid assets, SecondMarket is an independent marketplace, providing pricing transparency so that buyers and sellers can follow the bidding process and asset transparency to enable investors to understand the assets and make informed investment decisions.

SecondMarket's platform enables sellers to choose among a variety of sales options, including several different auction types. The platform has over 10,000 buyers and sellers, and the number is doubling every six months. Collectively, participants manage trillions of dollars in assets.

The company has raised US$ 20 million in venture capital. Its backers include FirstMark Capital, Li Ka-Shing Foundation and Dunearn, a subsidiary of Singapore's Temasek Holdings.

Why the company is a Technology Pioneer

SecondMarket has been instrumental in disrupting the financial markets and providing liquidity solutions to sellers who have few other options.

Spotify Ltd

Daniel Ek, CEO
Location London, United Kingdom
Number of employees 150
Year Founded 2008
Origins Entrepreneurial start-up

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Spotify, founded by European serial entrepreneur Daniel Ek, is a digital music service that works across multiple hardware platforms, offering music fans an alternative to the two other main options now available: Apple's iTunes and piracy. It has rapidly grown from a small Swedish music service to an international company with 7 million users across six European countries, generating more revenue for rights holders than Apple iTunes in some territories.

The company has created a lightweight computer application that can legally and instantly stream music from a catalogue of over 8 million tracks. Spotify not only allows users to easily access tracks either through its ad-supported or subscriber services, but it also lets them discover and share music with their friends.

In addition to the desktop application, Spotify has released apps for a number of mobile devices, including those based on the iPhone, Android and Symbian operating systems, allowing users to access the service on the move, including when they are out of mobile signal range.

It has also integrated Facebook, allowing users to import their friends from the popular social networking site to discover and share music within Spotify. Spotify has struck deals with several carriers in Europe to bundle its premium service with top-end phones to drive subscriptions. It soon plans to expand further into Europe and the US market.

Why the company is a Technology Pioneer

Spotify is helping to reduce music piracy by providing a viable alternative and is doing so without locking consumers into a hardware platform.

Vortex Engineering

Vijay Babu, CEO
Location Chennai, India
Number of employees 80
Year Founded 2001
Origins Entrepreneurial start-up

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Vortex Engineering develops automatic teller machines for rural environments, adapting them to run on lower amounts of power and to dispense soiled banknotes.

At the core of the ATM is a new type of cash dispensing mechanism. Conventional ATMs have the currency cassettes at the bottom of the machines and the notes have to be brought up to the presenting area, working against gravity. Vortex's machines employ a patent-pending, gravity-assisted friction pick technology. Currency notes are stored at the top of the machine and picked with the help of gravity, reducing cash jams and significantly lowering power consumption.

Vortex's ATMs can run on solar power and use less than 100 watts of power, one-tenth of that used by normal machines. What's more, in hot climates such as India, present machines need air conditioning units to cool them. Vortex's technology reduces power consumption, does away with the need for cooling and offers an uninterruptible power supply; total cost of ownership is 25% that of conventional ATMs.

Vortex has an order from the State Bank of India for 545 ATMs, 300 of them powered by solar energy. It is already selling its ATMs in Dubai and Pakistan and plans to expand across the developing world.

Why the company is a Technology Pioneer

A large part of the world remains unbanked. With its innovative solar-powered ATMs, Vortex is providing banks with a tool to profitably reach out to these segments.

Adimab

Tillman U. Gerngross, Co-Founder and CEO
Location Lebanon, NH, USA
Number of employees 50
Year Founded 2007
Origins Entrepreneurial start-up

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Adimab was founded by two of the world's leading yeast biotechnologists, Dartmouth's Tillman Gerngross and Massachusetts Institute of Technology's Dane Wittrup, with the goal of significantly speeding up the drug discovery process while improving the overall quality of therapeutics. The two professors have built an antibody discovery and optimization platform that is broadly applicable to all disease and can be accessed by the entire pharmaceutical industry.

Adimab's technology is engineered to achieve research and development cost savings that will bring monoclonal antibodies to areas previously thought to be cost prohibitive such as infectious diseases, and to lower overall antibody development costs so pharmaceutical companies can improve their R&D efficiency. It has already established collaborations with leading pharmaceutical companies in the US and Europe, including Merck, Roche, Pfizer and Novartis.

New and better methods for improving antibody development and discovery represent critical technologies for medicine and biotechnology. Most major pharmaceutical companies have announced their intention to achieve 20 to 25% of their revenues from biologics instead of traditional small molecules, and antibodies are likely to be the cornerstone of most company's biologics strategies.

Why the company is a Technology Pioneer

Current pharmaceutical and venture capital models often result in the best technologies ending up in the hands of a few elite companies who are able to pay the highest price for the technology, limiting the impact on human health as a whole. Adimab has built a technological platform that is changing the face of antibody discovery for the entire industry, not just a single player. Its platform promises to speed up new treatments for a whole range of diseases, reducing development time from years to weeks.

LIFE SCIENCES AND HEALTH

Ion Torrent

Jonathan Rothberg, Chairman and CEO
Location Gilford, CT, USA
Number of employees 90
Year Founded 2007
Origins Entrepreneurial start-up

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Ion Torrent is pioneering a radically faster and cheaper approach to gene sequencing by marrying simple chemistry to powerful, proven semiconductor technology. The company is the third headed by Rothberg to be named a World Economic Forum Technology Pioneer. Rothberg is credited with inventing massively parallel sequencing. His team at 454 and the Baylor Genome Center was the first to make public the sequence of an individual human genome. He is also credited with initiating the Neanderthal Genome Project with Svante Paabo.

To sequence genes, scientists currently have to go through an intermediary, such as light, to translate chemical data into digital data. The approach requires proprietary chemistry and optics, making the process expensive and only available to the biggest research labs. Ion Torrent instead bases its approach on a well-characterized biochemical process, which allows chemical information to be translated directly into digital information. The company's ion chip is the equivalent of a camera that can look at chemistry, porting information directly between the biological and digital worlds. The breakthrough permits direct detection of each nucleotide, cutting incorporation to seconds and an entire gene sequencing run to about one hour. And, because Ion Torrent produces its proprietary semiconductor chips in standard CMOS factories, it is able to leverage 40 years of investment in the semiconductor sector and meet any demand for its chips.

Why the company is a Technology Pioneer

Just as the microprocessor enabled desktop computing to displace the mainframe, Ion Torrent's semiconductor technology looks poised to democratize sequencing, putting it within the reach of any lab or clinic, speeding the introduction of personalized medicine and a whole array of other applications, such as making better biofuels.

Medicine in Need (MEND)

Andrew Schiermeier, CEO
Location Cambridge, MA, USA/Pretoria, South Africa
Number of employees 24
Year Founded 2005
Origins Entrepreneurial start-up

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Millions of people in the developing world die needlessly each year because of infectious diseases such as TB, HIV and malaria that could otherwise be prevented or treated. Medicine in Need (MEND) aims to ensure the world's poorest people get access to effective, life-saving drugs and vaccines by reformulating existing products to make them more suitable to administer in developing countries and by assuring that new discoveries in these areas yield sustainable products that can be commercialized.

To achieve these goals, MEND acts as a bridge between academics and non-governmental agencies with disease expertise that may not have product development know-how and pharmaceutical companies that do not have appropriate products for the developing world. Existing vaccines sold in the US and Europe often have bulky packaging, require reconstitution with sterile water, multiple injections, refrigerator or freezing until point of care, or have relatively expensive manufacturing techniques. By crowdsourcing the right technologies from researchers outside big drug companies, MEND can typically reformulate such products to adapt them to harsh environments.

The economic model is to help private companies use technologies to develop drugs and vaccines appropriate for neglected regions, so that they can make a profit in the markets that can support it, while providing supply at or near cost to least-developed countries.

Why the company is a Technology Pioneer

MEND is ensuring sustainable drug development for diseases of poverty in emerging markets through the intelligent creation of intellectual property sourced through a wide group of technology practitioners.

Molecular Partners AG

Christian Zahnd, CEO
Location Zurich, Switzerland
Number of employees 40
Year Founded 2004
Origins Entrepreneurial start-up

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Molecular Partners is working on novel medicines based on designed ankyrin repeat proteins (DARPins), a promising class of non-immunoglobulin proteins that can offer advantages over antibodies in drug discovery and drug development.

DARPins are based on natural proteins, called repeat proteins, which are abundant in nature as blockers or binders. The DARPin technology allows the engineering of these natural repeat proteins to bind and block any target protein, such as tumour cell markers. That means DARPins can be used to localize a target within the human body, such as a tumour cell, and block its activity.

DARPin technology delivers molecules with significantly higher potency and selectivity than monoclonal antibodies, the most established class of therapeutic proteins used in medicines today. As DARPins are 10 times smaller, they also reach sites in the body that are inaccessible to antibodies, penetrating, for example, deeply inside tumours. And, unlike antibodies, which are complicated to manufacture, DARPins can be produced in bacterial cells with a simpler, cheaper and more stable process.

Molecular Partners has raised more than US$ 60 million in venture capital from an international syndicate of investors. The most advanced DARPin is in clinical development for an ophthalmic indication. It has been brought to clinics in about 2.5 years, which is significantly less than with antibodies.

Why the company is a Technology Pioneer

Molecular Partners has successfully transitioned from a start-up company to a development organization. Its DARPin technology has the potential to generate medicines addressing currently untreatable diseases or to drastically improve existing therapies.

Neuronetics

Bruce J. Shook, President and CEO
Location Malvern, PA, USA
Number of employees 115
Year Founded 2003
Origins Entrepreneurial start-up

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Despite major advances in treating depression, nearly 30% of patients do not benefit from drug therapy and more than one-half report side effects that lead to non-compliance with medication such as sexual dysfunction, weight gain and sleep disorders. Neuronetics has developed the NeuroStar Transcranial Magnetic Stimulation (TMS) Therapy System, which uses magnetic field pulses to stimulate nerve cells in an area of the brain that is linked to depression. This stimulation increases brain activity and releases neurotransmitters which are known to elevate mood. The treatment is typically administered daily over four to six weeks to patients who have not responded to traditional treatments; it is free of systemic side effects.

In 2003, Neuronetics licensed a family of patents from Emory University and completed the largest clinical trial ever performed using TMS. In clinical trials, approximately one in two patients experienced significant improvement in symptoms and one in three said their symptoms disappeared. Although TMS to the brain has been studied for 25 years as a means of treating depression, Neuronetics is the first to create a clinical system to provide reproducible results for the treatment of depression and the first to gain US Food and Drug Administration approval of this technology.

The NeuroStar TMS Therapy System is being used in 200 hospitals and physician offices throughout the US, including seven of the country's top 10 psychiatric hospitals.

Why the company is a Technology Pioneer

Neuronetics is offering an important alternative treatment to people suffering from depression, without many of the debilitating side effects of current depression treatments.

Technology Pioneers 2011

Technology Pioneers Selection Committee 2011

The World Economic Forum would like to thank all the following experts for their contributions during the selection process.

Justin Adams	Founder and Head of the Venturing Business - BP Alternative Energy	BP Plc	United Kingdom
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Ola Ahlvarsson	Chairman and Founder	Result	Sweden
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Guillherme Ary Plonski	President, Brazilian Association of Science Parks and Business Incubators	University of Sao Paulo	Brazil
Brigitte Baumann	President	The European Trade Association for Business Angels, Seed Funds (EBAN)	Belgium
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Roberto Bocca	Head of Energy Industries	World Economic Forum	
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Tim Harper	Chief Executive Officer and President	Cientifica Ltd	United Kingdom

Technology Pioneers Selection Committee 2011

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Technology Pioneers Selection Committee 2011

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The positions stated above reflect the responsibility of the Selection Committee Members at the time the Selection Process 2011 was finalized.

Acknowledgements

This report was prepared by the World Economic Forum with the invaluable collaboration of Jennifer Schenker. The Technology Pioneers Programme is run by the World Economic Forum with guidance from Accel Partners, Alcatel-Lucent, BT, KPMG and Kudelski Group.

The Technology Pioneers Programme of the World Economic Forum is managed by Rodolfo Lara until September 2010 when it is transferred to Olivier Schwab. Special thanks to Tessema Tesfachew and Marjorie Buchser for their contributions and support during the Selection Process 2011.

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ACCEL

Accel Partners

For over 25 years, Accel Partners has sought out entrepreneurs with the rare combination of insight, determination and ambition to create the next generation of category-defining companies in various technology markets. As a long-standing Partner of the World Economic Forum, Accel is thrilled to support the Technology Pioneers Programme. The Forum's Technology Pioneers Programme is ideally situated to help identify and nurture innovative companies in many different fields, which individually and collectively can have substantial business and social impact. Each year, Accel looks forward to evaluating the full list of candidates for the Technology Pioneers Programme, as the selection process is a humbling reminder of the brilliant, international talent pool focused on addressing important global problems.

Kevin E. Comolli, Bruce Golden and Harry Nelis, Accel Partners

Alcatel-Lucent

I strongly believe that a robust innovation ecosystem is crucial for building both sustainable information-based economies and the solutions required to tackle many of today's social challenges. This is why at Alcatel-Lucent Bell Labs we not only strive to develop leading-edge innovations within our own company, but also maintain a strong commitment to an open innovation model. It is what motivates us to participate in a wide range of collaborations across the globe with academic, public and commercial partners – both large and small. And, it is what underscores my enthusiasm for participating as a member of the Technology Pioneers Selection Committee of the World Economic Forum. In reviewing this year's candidates, it was evident that many of them will play a significant role in that innovation ecosystem. I would like to congratulate this year's winners and very much look forward to meeting them in person.

Jeong Kim, Bell Labs, Alcatel-Lucent

BT Group

BT has long been involved with the Technology Pioneers. In these challenging times for the global economy and environment, they think it is more important than ever to focus on applying technology in new and innovative ways to drive progress and sustainable growth for the benefit of business and society. They see the Technology Pioneers programme as a platform to showcase powerful innovation and share learning, best practice models and behaviours. They are proud to continue to support it.

JP Rangaswami, BT Group

KPMG

KPMG is proud to recognize the Technology Pioneers 2011 through its unique partnership with the World Economic Forum. As the global economy recovers, the spirit of optimism and innovation remains strong. The exciting advances highlighted through these awards continue to transform the world by connecting communities and fostering innovations that unite and transform societies.

This year's Technology Pioneer Award recipients have created an impressive array of technological and entrepreneurial initiatives that offer profound improvements to the collective health, energy efficiency, the environment and the way in which individuals work and communicate with each other. KPMG congratulates this year's Technology Pioneers

Gary Matuszak, KPMG

Kudelski Group

As a long-term Strategic Partner of the World Economic Forum, the Kudelski Group demonstrates every year its passion for technology and innovation. A world leader in digital security and convergent media solutions, the Kudelski Group is proud to welcome to Tianjin the 2011 Technology Pioneers class. These highly innovative companies hold the promise of significantly disrupting the way in which business and society operate and Kudelski looks forward to meeting them.

Christophe Nicolas, Kudelski Group

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The World Economic Forum is an independent international organization committed to improving the state of the world by engaging leaders in partnerships to shape global, regional and industry agendas.

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