



BARACK OBAMA: CONNECTING AND EMPOWERING ALL AMERICANS THROUGH TECHNOLOGY AND INNOVATION

"Let us be the generation that reshapes our economy to compete in the digital age. Let's set high standards for our schools and give them the resources they need to succeed. Let's recruit a new army of teachers, and give them better pay and more support in exchange for more accountability. Let's make college more affordable, and let's invest in scientific research, and let's lay down broadband lines through the heart of inner cities and rural towns all across America."

[Presidential Announcement Speech in Springfield, IL 02/10/07]

BARACK OBAMA ON TECHNOLOGY AND INNOVATION

Barack Obama understands the immense transformative power of technology and innovation and how they can improve the lives of all Americans. He sees that technology offers the tools to create real change in America. Obama's forward-thinking 21st century technology and innovation policy starts by recognizing that we need to connect all citizens with each other to engage them more fully and directly in solving the problems that face us. In tandem with that goal, Barack Obama understands that we must use all available technologies and methods to open up the federal government, creating a new level of transparency to change the way business is conducted in Washington and giving Americans the chance to participate in government deliberations and decision-making in ways that were not possible only a few years ago. To achieve this vision, Barack Obama will encourage the deployment of the most modern communications infrastructure. In turn, that infrastructure can be used by government and business to reduce the costs of health care, help solve our energy crisis, create new jobs, and fuel our economic growth. And an Obama administration will ensure America remains competitive in the global economy.

Barack Obama is already using technology to transform presidential politics and to help unprecedented numbers of citizens take back the political process. Obama's Internet campaign is only the beginning of how Obama would harness the power of the Internet to transform government and politics. On barackobama.com, voters have connected not only with the campaign but with each other; the campaign has used technology to engage those who have not been able to participate in prior presidential campaigns. More than 280,000 people have created accounts on barackobama.com. These users have organically created over 6,500 grassroots volunteer groups and have organized more than 13,000 off-line events using the site. Obama is also opening up the campaign and giving average Americans a chance to offer opinions and information on important policy issues and Americans have responded: over 15,000 policy ideas have been submitted through the web site. Through Obama's leadership, many of the presidential debates are freely available online for mashups, commentary, and other uses by ordinary citizens, bloggers, and others. On the fundraising front, supporters have made more than 370,000 donations online, more than half of which have been under \$25. Users who have set up personal fundraising pages online have raised over \$1.5 million. The campaign's technology activities demonstrate the important and positive role technology would play in an Obama administration, opening up the closed practices of governance to greater citizen engagement and participation and re-connecting Americans with their democracy in new ways.

Barack Obama's comprehensive technology and innovation plan will:

- Ensure the full and free exchange of information among Americans through an open Internet and diverse media outlets.
- Create a transparent and connected democracy.
- Encourage the deployment of a modern communications infrastructure.
- Employ technology and innovation to solve our nation's most pressing problems, including reducing the costs of health care, encouraging the development of new clean energy sources, and improving public safety.
- Improve America's competitiveness.

I. Ensure the Full and Free Exchange of Information through an Open Internet and Diverse Media Outlets

Democracy is strongest when its citizens can engage in the full and free exchange of information and ideas, including freely expressing themselves and learning from information offered by others. The Internet and traditional media outlets are critical in facilitating communication by and between Americans and citizens of the world. As president, Barack Obama will ensure that these critical communications pathways remain accessible to all Americans and reflect the diversity of our nation. By doing so, this policy will enable Americans to discuss and debate more actively the key issues that affect our lives and will give citizens greater autonomy to determine where the truth lies.

Protect the Openness of the Internet: A key reason the Internet has been such a success is because it is the most open network in history. It needs to stay that way. Barack Obama strongly supports the principle of network neutrality to preserve the benefits of open competition on the Internet. Users must be free to access content, to use applications, and to attach personal devices. They have a right to receive accurate and honest information about service plans. But these guarantees are not enough to prevent network providers from discriminating in ways that limit the freedom of expression on the Internet. Because most Americans only have a choice of only one or two broadband carriers, carriers are tempted to impose a toll charge on content and services, discriminating against websites that are unwilling to pay for equal treatment. This could create a two-tier Internet in which websites with the best relationships with network providers can get the fastest access to consumers, while all competing websites remain in a slower lane. Such a result would threaten innovation, the open tradition and architecture of the Internet, and competition among content and backbone providers. It would also threaten the equality of speech through which the Internet has begun to transform American political and cultural discourse. Barack Obama supports the basic principle that network providers should not be allowed to charge fees to privilege the content or applications of some web sites and Internet applications over others. This principle will ensure that the new competitors, especially small or non-profit speakers, have the same opportunity as incumbents to innovate on the Internet and to reach large audiences. Obama will protect the

Internet's traditional openness to innovation and creativity and ensure that it remains a platform for free speech and innovation that will benefit consumers and our democracy.

Encourage Diversity in Media Ownership: Barack Obama believes that the nation's rules ensuring diversity of media ownership are critical to the public interest. Unfortunately, over the past several years, the Federal Communications Commission has promoted the concept of consolidation over diversity. Barack Obama believes that providing opportunities for minority-owned businesses to own radio and television stations is fundamental to creating the diverse media environment that federal law requires and the country deserves and demands. As president, he will encourage diversity in the ownership of broadcast media, promote the development of new media outlets for expression of diverse viewpoints, and clarify the public interest obligations of broadcasters who occupy the nation's spectrum. An Obama presidency will promote greater coverage of local issues and better responsiveness by broadcasters to the communities they serve.

Protect Our Children While Preserving the First Amendment: By making information freely available from untold numbers of sources, the Internet and more traditional media outlets have a huge influence on our children. Barack Obama believes that the openness of the new media world should be seen as an opportunity as much as some see it as a threat. We live in the most information-abundant age in history and the people who develop the skills to utilize its benefits are the people who will succeed in the 21st century. But Barack Obama also recognizes that lurking out there are the darker corners of the media world: from Internet predators to hateful messages to graphic violence and sex. Obama values our First Amendment freedoms and our right to artistic expression and does not view regulation as the answer to these concerns. Instead, an Obama administration will give parents the tools and information they need to control what their children see on television and the Internet in ways fully consistent with the First Amendment.

- An Obama administration will encourage the creation of Public Media 2.0., the next generation of public media that will create the Sesame Street of the Digital Age and other video and interactive programming that educates and informs. Obama will support the transition of existing public broadcasting entities and help renew their founding vision in the digital world.
- Obama will work to give parents the tools to prevent reception of programming that they find offensive on television and on digital media. Obama will encourage improvements to the existing voluntary rating system, exploiting new technologies like tagging and filtering, so that parents can better understand what content their children will see, and have the tools to respond. Private entities like Common Sense Media are pursuing a "sanity not censorship" approach, which can serve as a model for how to use technology to empower parents without offending the First Amendment.
- Obama will encourage industry not to show inappropriate adult-oriented commercial advertising during children's programming.
- On the Internet, Obama will require that parents have the option of receiving parental controls software that not only blocks objectionable Internet content but also prevents children from revealing personal information through their home computer.
- To further protect children online, Obama supports tough penalties, increased enforcement resources and forensic tools for law enforcement, and collaboration between law enforcement and the private sector to identify and prosecute people who abuse the Internet to try to exploit children.

Safeguard our Right to Privacy: The open information platforms of the 21st century can also tempt institutions to violate the privacy of citizens. Dramatic increases in computing power, decreases in storage costs and huge flows of information that characterize the digital age bring enormous benefits, but also create risk of abuse. We need sensible safeguards that protect privacy in this dynamic new world. As president, Barack Obama will strengthen privacy protections for the digital age and will harness the power of technology to hold government and business accountable for violations of personal privacy.

- To ensure that powerful databases containing information on Americans that are necessary tools in the fight against terrorism are not misused for other purposes, Barack Obama supports restrictions on how information may be used and technology safeguards to verify how the information has actually been used.
- Obama supports updating surveillance laws and ensuring that law enforcement investigations and intelligence-gathering relating to U.S. citizens are done only under the rule of law.
- Obama will also work to provide robust protection against misuses of particularly sensitive kinds of information, such as e-health records and location data that do not fit comfortably within sector-specific privacy laws.
- Obama will increase the Federal Trade Commission's enforcement budget and will step up international cooperation to track down cyber-criminals so that U.S. law enforcement can better prevent and punish spam, spyware, telemarketing and phishing intrusions into the privacy of American homes and computers.

II. Create a Transparent and Connected Democracy

Open Up Government to its Citizens: The Bush Administration has been one of the most secretive, closed administrations in American history. Our nation's progress has been stifled by a system corrupted by millions of lobbying dollars contributed to political campaigns, the revolving door between government and industry, and privileged access to inside information—all of which have led to policies that favor the few against the public interest. An Obama presidency will use cutting-edge technologies to reverse this dynamic, creating a new level of transparency, accountability and participation for America's citizens. Technology-enabled citizen participation has already produced ideas driving Obama's campaign and its vision for how technology can help connect government to its citizens and engage citizens in a democracy. Barack Obama will use the most current technological tools available to make government less beholden to special interest groups and lobbyists and promote citizen participation in government decision-making. Obama will integrate citizens into the actual business of government by:

- Making government data available online in universally accessible formats to allow citizens to make use of that data to comment, derive value, and take action in their own communities. Greater access to environmental data, for example, will help citizens learn about pollution in their communities, provide information about local conditions back to government and empower people to protect themselves.
- Establishing pilot programs to open up government decision-making and involve the public in the work of agencies, not simply by soliciting opinions, but by tapping into the vast and distributed expertise of the American citizenry to help government make more informed decisions.
- Requiring his appointees who lead Executive Branch departments and rulemaking agencies to conduct the significant business of the agency in public, so that any citizen can watch a live feed on the Internet as the agencies debate and deliberate the issues that affect American society. He will ensure that these proceedings are archived for all Americans to review, discuss and respond. He will require his appointees to employ all the technological tools available to allow citizens not just to observe, but also to participate and be heard in these meetings.
- Restoring the basic principle that government decisions should be based on the best-available, scientifically-valid evidence and not on the ideological predispositions of agency officials.
- Lifting the veil from secret deals in Washington with a web site, a search engine, and other web tools that enable citizens easily to track online federal grants, contracts, earmarks, and lobbyist contacts with government officials.
- Giving the American public an opportunity to review and comment on the White House website for five days before signing any non-emergency legislation.

- Bringing democracy and policy deliberations directly to the people by requiring his Cabinet officials to have periodic national online town hall meetings to answer questions and discuss issues before their agencies.
- Employing technologies, including blogs, wikis and social networking tools, to modernize internal, cross-agency, and public communication and information sharing to improve government decision-making.

Bring Government into the 21st Century: Barack Obama will use technology to reform government and improve the exchange of information between the federal government and citizens while ensuring the security of our networks. Obama believes in the American people and in their intelligence, expertise, and ability and willingness to give and to give back to make government work better.

- Obama will appoint the nation's first Chief Technology Officer (CTO) to ensure that our government and all its agencies have the right infrastructure, policies and services for the 21st century. The CTO will ensure the safety of our networks and will lead an interagency effort, working with chief technology and chief information officers of each of the federal agencies, to ensure that they use best-in-class technologies and share best practices.
- The CTO will have a specific focus on transparency, by ensuring that each arm of the federal government makes its records open and accessible as the E-Government Act requires. The CTO will also focus on using new technologies to solicit and receive information back from citizens to improve the functioning of democratic government.
- The CTO will also ensure technological interoperability of key government functions. For example, the Chief Technology Officer will oversee the development of a national, interoperable wireless network for local, state and federal first responders as the 9/11 commission recommended. This will ensure that fire officials, police officers and EMTs from different jurisdictions have the ability to communicate with each other during a crisis and we do not have a repeat of the failure to deliver critical public services that occurred in the aftermath of Hurricane Katrina.
- In the 21st century, our economic success will depend not only on economic analysis but also on technological sophistication and direct experience in this powerful engine of our economy. In an Obama administration, the government's economic policy-making organizations and councils will include individuals with backgrounds in our technology industry.

III. Deploy a Modern Communications Infrastructure

To realize Barack Obama's vision of an interconnected democracy, the nation deserves the finest and most modern communications infrastructure in the world. The technology sector has helped keep the United States at the center of innovation and the job growth and wealth creation that has accompanied it. However, while the United States once led the world in Internet deployment, the Bush administration has surrendered that leadership through its indifference to technology and its lack of understanding of the 21st century economy. By rededicating our nation to ensuring that all Americans have access to broadband and the skills to use it effectively, Barack Obama will position our citizens, particularly our young people, to compete and succeed in an increasingly technology-rich, knowledge-based economy.

Deploy Next-Generation Broadband: Barack Obama believes that America should lead the world in broadband penetration and Internet access. As a country, we have ensured that every American has access to telephone service and electricity, regardless of economic status, and Obama will do likewise for broadband Internet access. Full broadband penetration can enrich democratic discourse, enhance competition, provide economic growth, and bring significant consumer benefits. Moreover, improving our infrastructure will foster competitive markets for Internet access and services that ride on that infrastructure. Obama believes we can get

true broadband to every community in America through a combination of reform of the Universal Service Fund, better use of the nation's wireless spectrum, promotion of next-generation facilities, technologies and applications, and new tax and loan incentives. Specifically, Obama proposes the following policies to restore America's world leadership in this arena:

- Redefine "broadband": The Federal Communications Commission today defines "broadband" as an astonishingly low 200 kbps. This distorts federal policy and hamstrings efforts to broaden broadband access. Obama will define "broadband" for purposes of national policy at speeds demanded by 21st century business and communications.
- Universal Service Reform: Obama will establish a multi-year plan with a date certain to change the Universal Service Fund program from one that supports voice communications to one that supports affordable broadband, with a specific focus on reaching previously un-served communities.
- Unleashing the Wireless Spectrum: Obama will confront the entrenched Washington interests that have kept our public airwaves from being maximized for the public's interest. Obama will demand a review of existing uses of our wireless spectrum. He will create incentives for smarter, more efficient and more imaginative use of government spectrum and new standards for commercial spectrum to bring affordable broadband to rural communities that previously lacked it. He will ensure that we have enough spectrum for police, ambulances and other public safety purposes.
- Bringing Broadband to our Schools, Libraries, Households and Hospitals: Obama will recommit America to ensuring that our schools, libraries, households and hospitals have access to next generation broadband networks. He will also make sure that there are adequate training and other supplementary resources to allow every school, library and hospital to take full advantage of the broadband connectivity.
- Encourage Public/Private Partnerships: Obama will encourage innovation at the local level through federal support of public/private partnerships that deliver real broadband to communities that currently lack it.

IV. Employ Technology and Innovation to Solve Our Nation's Most Pressing Problems

The 21st century tools of technology and telecommunications have unleashed the forces of globalization on a previously unimagined scale. They have "flattened" communications and labor markets and have contributed to a period of unprecedented innovation, making us more productive, connected global citizens. By maximizing the power of technology, we can strengthen the quality and affordability of our health care, advance climate-friendly energy development and deployment, improve education throughout the country, and ensure that America remains the world's leader in technology.

Lower Health Care Costs by Investing in Electronic Information Technology Systems: A key feature of Barack Obama's health care plan is the use of technology to lower the cost of health care. Most medical records are still stored on paper, which makes them difficult to use to coordinate care, measure quality, or reduce medical errors. Processing paper claims also costs twice as much as processing electronic claims. Barack Obama will invest \$10 billion a year over the next five years to move the U.S. health care system to broad adoption of standards-based electronic health information systems, including electronic health records. He will also phase in requirements for full implementation of health IT and commit the necessary federal resources to make it happen. Obama will ensure that these systems are developed in coordination with providers and frontline workers, including those in rural and underserved areas. Obama will ensure that patients' privacy is protected. A study by the Rand Corporation found that if most hospitals and doctors offices adopted electronic health records, up to \$77 billion of savings would be realized each year through improvements such as reduced hospital stays, avoidance of duplicative and unnecessary testing, more appropriate drug utilization, and other efficiencies. Obama will make the Veterans Health Administration, the nation's largest integrated

health system, a model in the use of technology to modernize and improve health care delivery. To ensure that veterans get the best care possible, he will improve electronic records interoperability between the Pentagon and VA, expand effectiveness research, promote wellness programs, and use technology to improve the accountability for performance and quality.

Invest in Climate-Friendly Energy Development and Deployment: Barack Obama knows that we need to rely on technology to help solve the critical energy and environmental problems facing this country. As he announced in his energy policy, Barack Obama will invest \$150 billion over the next ten years to enable American engineers, scientists and entrepreneurs to advance the next generation of biofuels and fuel infrastructure, accelerate the commercialization of plug-in hybrids, promote development of commercial-scale renewable energy, and begin the transition to a new digital electricity grid. This investment will transform the economy and create millions of new jobs. Obama will:

- Double federal science and research funding for clean energy projects, relying on the resources and ability of our national laboratories, universities and land grant colleges.
- Invest in the development of the next generation of biofuels, including cellulosic ethanol.
- Increase the resources devoted to the commercialization and deployment of low-carbon coal technologies.
- Create a Clean Technologies Deployment Venture Capital Fund, funded by an annual \$10 billion investment for five years, to ensure that promising technologies move beyond the lab and are commercialized in the U.S.
- Use innovative measures to dramatically improve the energy efficiency and stability of our economy and improve our national energy intensity 50 percent by 2030.
- Invest in a digital smart energy grid.

Upgrade Education to Meet the Needs of the 21st Century: Barack Obama will emphasize the importance of technology literacy, ensuring that all public school children are equipped with the necessary science, technology and math skills to succeed in the 21st century economy. Access to computers and broadband connections in public schools must be coupled with qualified teachers, engaging curricula, and a commitment to developing skills in the field of technology. This is central to the competitiveness of our nation's technology sector and of our citizens. Obama also believes that we must strengthen math and science education to help develop a skilled workforce and promote innovation. He will work to increase our number of science and engineering graduates, encourage undergraduates studying math and science to pursue graduate studies, and work to increase the representation of minorities and women in the science and technology pipeline, tapping the diversity of America to meet the increasing demand for a skilled workforce. If we export our best software and engineering jobs to developing countries, it is less likely that America will benefit from the next generation innovations in nanotechnology, electronics, and biotechnology. We must have a skilled workforce so that we can retain and grow jobs requiring 21st century skills rather than forcing employers to find skilled workers abroad.

Create New Jobs: An Obama administration will foster home-grown innovation and ensure that we can retain and grow high-paying jobs in fast-growing sectors in the sciences and technology rather than exporting those jobs to lower cost labor markets abroad. As offshoring becomes more of a long-term workforce management strategy and less of a perceived short-term cost savings, it presents a significant challenge to young people growing up in America's historically low-income and working-class communities. An Obama administration will invest in human capital to ensure that our young people have the skills to fill the growing number of information technology jobs being created globally and will also support pilot programs that provide incentives for businesses to grow their information technology workforce in inner-cities and rural communities.

Modernize Public Safety Networks: Barack Obama is committed to improving the information and communications technology used to support public safety from the antiquated 1970s and 1980s-based technology currently used by agencies around the country to a modern system that will enable us to respond to emergencies and natural disasters such as Hurricane Katrina. In particular, Obama will:

- Catalyze national leadership to spur the development and deployment of new technologies to promote interoperability, broadband access, and more effective communications among first responders and emergency response systems.
- Use the authority over spectrum licenses to establish an effective public-private partnership that would facilitate the development of a next generation network for use by public safety agencies on a priority basis.

V. Improve America's Competitiveness

Invest in the Sciences: Barack Obama supports doubling federal funding for basic research, changing the posture of our federal government from being one of the most anti-science administrations in American history to one that embraces science and technology. This will foster home-grown innovation, help ensure the competitiveness of US technology-based businesses, and ensure that 21st century jobs can and will grow in America. As a share of the Gross Domestic Product, American federal investment in the physical sciences and engineering research has dropped by half since 1970. Yet, it often has been federally-supported basic research that has generated the innovation to create markets and drive economic growth. For example, one recent report demonstrated how federally supported research in fiber optics and lasers helped spur the telecommunications revolution.

Make the R&D Tax Credit Permanent: Barack Obama wants investments in a skilled research and development workforce and technology infrastructure to be supported here in America so that American workers and communities will benefit. Obama wants to make the Research and Development tax credit permanent so that firms can rely on it when making decisions to invest in domestic R&D over multi-year timeframes.

Reform Immigration: While highly skilled immigrants have contributed in beneficial ways to our domestic technology industry, there are plenty of Americans who could be filling those positions given the proper training. Barack Obama is committed to investing in communities and people who have not had an opportunity to work and participate in the Internet economy as anything other than consumers. Most H-1B new arrivals, for example, have earned a bachelor's degree or its equivalent abroad (42.5%). They are not all PhDs. We can and should produce more Americans with bachelor's degrees that lead to jobs in technology. A report of the National Science Foundation (NSF) reveals that blacks, Hispanics, and Native Americans as a whole comprise more than 25% of the population but earn, as a whole, 16% of the bachelor degrees, 11% of the master's degrees, and 5% of the doctorate degrees in science and engineering. We can do better than that and go a long way toward meeting industry's need for skilled workers with Americans. That being said, we do not want to shut our doors to innovators from overseas, who have traditionally helped make America strong. Barack Obama supports comprehensive immigration reform that includes improvement in our visa programs, including our legal permanent resident visa programs and temporary programs including the H-1B program, to attract some of the world's most talented people to America. We should allow immigrants who earn their degrees in the U.S. to stay, work, and become Americans over time. And we should examine our ability to increase the number of permanent visas we issue to foreign skilled workers. Obama will work to ensure immigrant workers are less dependent on their employers for their right to stay in the country and would hold accountable employers who abuse the system and their workers.

Promote American Businesses Abroad: Trade can create wealth and drive innovation through competition. Barack Obama supports a trade policy that ensures our goods and services are treated fairly in foreign markets. At the same time, trade policy must stay consistent with our commitment to demand improved labor and environmental practices worldwide. In its first six years, the Bush Administration has filed only 16 cases to enforce its rights under WTO agreements. This compares to 68 cases filed during the first six years of the Clinton Administration. President Bush has failed to address the fact that China has engaged in ongoing currency manipulation that undercuts US exports; that China fails to enforce U.S. copyrights and trademarks and that some of our competitors create regulatory and tax barriers to the delivery and sale of technology goods and services abroad. Barack Obama will fight for fair treatment of our companies abroad.

Ensure Competitive Markets: Barack Obama believes we need a business and regulatory landscape in which entrepreneurs and small businesses can thrive, start-ups can launch, and all enterprises can compete effectively while investors and consumers are protected against bad actors that cross the line. As president, Obama will reinvigorate antitrust enforcement, which is how we ensure that capitalism works for consumers. Thus, he will step up review of merger activity and take effective action to stop or restructure those mergers that are likely to harm consumer welfare, while quickly clearing those that do not. An Obama administration will look carefully at key industries to ensure that the benefits of competition are fully realized by consumers. Obama will strengthen the antitrust authorities' competition advocacy programs to ensure that special interests do not use regulation to insulate themselves from the competitive process. Obama will also strengthen competition advocacy in the international community as well as domestically. He will take steps to ensure that antitrust law is not used as a tool to interfere with robust competition or undermine efficiency to the detriment of U.S. consumers and businesses. He will do so by improving the administration of those laws in the U.S. and by working with foreign governments to change unsound competition laws and to avoid needless duplication and conflict in multinational enforcement of those laws. In short, an Obama administration will take seriously its responsibility to enforce the antitrust laws so that all Americans benefit from a growing and healthy competitive free-market economy.

Protect American Intellectual Property Abroad: The Motion Picture Association of America estimates that in 2005, more than nine of every 10 DVDs sold in China were illegal copies. The U.S. Trade Representative said 80 percent of all counterfeit products seized at U.S. borders still come from China. Barack Obama will work to ensure intellectual property is protected in foreign markets, and promote greater cooperation on international standards that allow our technologies to compete everywhere.

Protect Intellectual Property at Home: Intellectual property is to the digital age what physical goods were to the industrial age. Barack Obama believes we need to update and reform our copyright and patent systems to promote civic discourse, innovation and investment while ensuring that intellectual property owners are fairly treated.

Reform the Patent System: A system that produces timely, high-quality patents is essential for global competitiveness in the 21st century. By improving predictability and clarity in our patent system, we will help foster an environment that encourages innovation. Giving the Patent and Trademark Office (PTO) the resources to improve patent quality and opening up the patent process to citizen review will reduce the uncertainty and wasteful litigation that is currently a significant drag on innovation. With better informational resources, the Patent and Trademark Office could offer patent applicants who know they have significant inventions the option of a rigorous and public peer review that would produce a "gold-plated" patent much less vulnerable to court challenge. Where dubious patents are being asserted, the PTO could conduct low-cost, timely administrative proceedings to determine patent validity. As president, Barack Obama will ensure that our patent laws protect legitimate rights while not stifling innovation and collaboration.