PARC is located in the heart of Silicon Valley. It attracts the world’s most elite scientists and researchers, and has a rich legacy of driving innovation.

- 300+ world-class scientists
- $1 trillion in new industries
- $60 billion in startups and spin-offs
- 60 active Fortune 500 customers
- 2,500+ patents
- 4,000 scientific papers
- Hardware and software labs crossing printed electronics, networks, data analytics, and energy.

Executive Summary

If you’re like most C-level executives, you’re frustrated with investing in innovation that doesn’t deliver adequate ROI much less create industry-altering breakthroughs.

PARC Today is a prolific and powerful partner to Global 1000 companies as you future-proof your business. Using our proprietary Innovation Framework, PARC becomes your trusted advisor that can map your specific strategic challenges to emerging technologies from across our labs, covering computer, social, and physical sciences. Our framework sheds new light on seemingly unsolvable problems, reveals untapped business models, and gives focus to your internal capabilities.

The result is true innovation you can take to market for faster growth.

Partner with PARC Today to:

- Create new business opportunities. Take advantage of our cross-domain expertise to spot early trends and potential breakthrough applications.
- Mitigate risk. Apply our Innovation Framework to your internal processes to create consistent outcomes.
- Gain immediate access to more than 300 world-renowned scientists and researchers and our extensive IP portfolio.
- Avoid being blindsided by emerging technologies. Leverage insights and solutions from our private, global network.
- Rapidly prototype business models. Use our multi-disciplinary approach to problem definition. Quickly assess leverage points and roadblocks.
- Accelerate time to market. Achieve concrete and meaningful technology results in 12 to 36 months.
PARC Today looks across boundaries and beyond the horizon to see where the next future for people and business lies. We combine the technology expertise of more than 300 elite researchers with business model insights and multi-disciplinary problem definition.

Reinventing how we manage content to build a smarter, safer Internet – that’s PARC Today.

Using behavior change theory to develop mobile apps – that’s PARC Today.

Using metamaterials to teach light new tricks – that’s PARC Today.

Come take a look at our outstanding talent and the new future we’re building with our clients.
PARC Place is a revolutionary program designed to manage disruptive innovation through a repeatable framework and accelerate your time to market. It’s comprised of two complementary tracks: PARC Place Community and PARC Place Engage™. PARC Place Community is an exclusive network for members — C-level executives who lead corporate R&D and Innovation — where they can come together for education and collaboration.

PARC Place Engage is the practical, individual track designed to address your strategic issue and take action by leveraging emerging technology. The community and individual elements of the program work hand-in-hand to give innovation executives the tools they need to achieve the desired return from their innovation investments.

Through PARC Place your company can:
- Identify early trends across industries and technologies, illuminating potential breakthrough applications
- Cross-pollinate and capture ideas from the outside to benefit from insights and solutions used in industries that don’t compete with yours
- Rapidly respond to market changes and increase speed to commercialization

Combining cross-domain technology expertise with business modeling expertise to drive innovation and growth. That’s PARC Today.

“Partnering with PARC gives Thinfilm invaluable access to their innovative technology as well as their unique approach. The result is that we’re able to accelerate our product roadmap, bring leading-edge products like our Smart Labels to commercial markets much faster, and stay at the leading edge of printed electronics.”

Dr. Davor Sutija, CEO, Thinfilm

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“PARC’s approach begins by listening. We seek to understand the most pressing, strategic concerns that our clients face with their business in the coming three years or more. Then we assess the technology, expertise, and IP across all of the disciplines at PARC to arrive at recommended solutions.”

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Mike Steep

- Senior Vice President, Global Business Operations
- Leads PARC’s Global Business Operations organization
- M.B.A., BA University of Pennsylvania, Wharton International Program; Distinguished Visiting Scholar at Stanford University; Adjunct Professor and Distinguished Lecturer at Imperial College London; Technology Advisor to London’s “Smart City” Board
- Focus: Global strategic relations with PARC clients; innovation, intellectual property, corporate transformation; digital (smart) cities
The pace of technology innovation is increasing exponentially, driven by multiple concurrent trends.

First, the scope of data we can capture and make sense of through analytics is increasing as the Internet of Things evolves into the Internet of Everything, with sensors and smart materials proliferating.

Second, new platforms, environments, tools, and resources are being developed. Innovators no longer have to build from scratch but can reuse existing components to deliver sophisticated solutions more and more rapidly.

Third, networks are connecting former archipelagos of data and information processing systems, enabling vastly more powerful and highly integrated applications.

Fourth, new information aggregation and dissemination mechanisms enable businesses and consumers to more efficiently discover, appraise, and adopt the newest and best solutions that fit their needs, forcing increased competition among providers.

Together these accelerating trends comprise what analysts are calling a new digital wave. It promises a near future that is strikingly different from today, in which human senses, physiology, wellbeing, shelter, transportation, communication, work, collaboration, and play will all be rapidly expanding frontiers for innovation.

PARC is uniquely focused on this future, with breakthrough solutions that anticipate tomorrow’s challenges for your business. Our vision encompasses disruptions in manufacturing, materials, electronics, networking, security, human experience, and much more.
The 21st century Internet demands trust, privacy, security, flexibility, and an infrastructure capable of meeting the demands of 50 billion devices and billions of users. The current suite of Internet protocols was created for controlled networks that trusted everyone on the network. As the Internet has grown, so have the challenges. In response to a seemingly endless stream of shortcomings, industry reacted by creating layer upon layer of protocols. Security was added as an afterthought.

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Today, scalability has to be re-addressed at every layer in the network. Today’s solutions are constrained by a 40+-year-old architecture.

Content-Centric Networking (CCN) directly routes and delivers “named” content — movies, music, a file, a text message, a voice conversation, sensor data, telemetry — at the packet level, enabling intelligent management and caching throughout the network. CCN can run independently or alongside existing TCP/IP networks. Along with greater efficiencies, CCN restores trust, privacy, and security, creating a solid foundation for accelerated digitalization.

PARC Reinvents the Internet

Recent PARC advances

(CCNx 1.0 protocol specifications — working with major industry partners, PARC has released proposed specifications for comment and review, November 2013

(CCNx 1.0 demonstrated running directly on layer 2, September 2014

(CCNx 1.0 pre-alpha code released to partners, October 2014

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The increasingly digital landscape is generating an avalanche of data and tools that help us understand the world and make decisions. But some of the best data sources remain underused.

PARC has invented a series of techniques to penetrate these data streams, connect them, and produce information that’s insightful and useful.

PARC’s context-aware systems unite insights gained from data recorded on our portable devices with the world around us, making it easier to propose actions to the user that are congruent with their current location, activity, and calendar.

PARC’s cryptographic protocols enable private data to be encoded so that only part of it is shareable. This allows organizations to share information without the danger of compromising the privacy of individuals whose data is being surveyed.

With our privacy-preserving analysis, it’s possible to use the data to identify malicious activity or promising commercial partners for data sharing.

PARC’s visual analytics capabilities interpret the implicit information contained in pictures and videos. Automating the analysis of unusual events and activities from video sensor networks or wearables and combining that data with computing intelligence (i.e., statistical and data science techniques) yields a powerful new way of understanding the world and making decisions.

### Recent PARC advances

* Spoken conversation analysis tools for human-to-machine conversational interfaces*
* Behavior change theory-enabled mobile apps*
* Scalable real-time analytics platforms that deliver deep cost reduction*

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Danny Bobrow
Ph.D.

PARC Research Fellow; Past President of AAAI; Former Editor-in-Chief, Artificial Intelligence; Fellow of the ACM and AAAI

Over 100 published papers, books, and issued patents

Focus: natural language-based systems for question answering; community knowledge-sharing systems

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“We are reaching the point where we can interconnect knowledge about language, knowledge about how devices work and break, and knowledge about interaction with people. When those are connected we can enable conversational systems that can help people solve their problems and receive advice, easily, effectively, and affordably.”
The cost of putting a traditional silicon chip in everyday objects still isn’t a viable approach to the Internet of Things. Single-use chips only makes sense in extremely high-value scenarios and most of the processing capability would be wasted.

Enter Printed Electronics. They’re lightweight, rugged, bendable, rollable, portable, and potentially foldable. Perfect for creating high-value, low-cost sensor applications in any form factor. By printing functional inks on flexible substrates, circuitry is created — logic, transistors, sensors, memory, and more. Marry this process with the right manufacturing techniques and it’s easy to envision embedded circuitry that provides intelligence for consumer health and electronics products, packaging, and a broad range of medical and biomedical applications.

Electronics printing has the same advantages of 3-D printing. You can customize the design, produce it when needed, and create new devices in remote locations — even space. And, in the not so distant future, when tiny silicon microchips can be suspended in “ink,” you’ll even be able to print complex systems.

PARC Creates Thin, Flexible Printed Electronics

Recent PARC advance

Helped Thinfilm Electronics advance its leadership and increase valuation with breakthrough smart label technology
The energy landscape is set for a disruption similar in magnitude to the advent of personal computing. Energy consumers will soon begin participating in the production, storage, and real-time trading of energy, an effect we call the Democratization of Energy. It’s a once-in-a-generation economic opportunity, and PARC is working at its forefront.

We’ve identified three critical elements that must be brought together to achieve this potential: advanced sensing; improved hardware options for generation, storage, and usage; and scalable optimization methods.

Today’s battery management systems rely on external readings, such as voltage and current, to estimate a battery’s internal conditions. These indirect measurements aren’t a precise predictor of true internal conditions, leading to batteries that are larger, heavier, and more costly. PARC is developing harsh-environment sensors that can be used inside a battery cell to more accurately and safely monitor its charge level and health.

In hardware, our novel co-extrusion printing technique dramatically improves the storage capacity and power density of Li-ion batteries. When these new sensing and hardware innovations are coupled with PARC’s portfolio of proprietary and classical algorithms for model-based optimization and control, the results can be truly scalable and increase the ROI of your energy assets.

Recent PARC advances

Delivered co-extrusion technology to pilot production for solar cells with partner SolarWorld

Showed up to 30% higher gravimetric energy density in Li-ion batteries using co-extrusion to make structured cathodes

Demonstrated early feasibility of a revolutionary direct carbon fuel cell that can convert fuels like natural gas to electricity at nearly twice the efficiency of a gas-fired power plant.

Scott Elrod
Ph.D.

Vice President, PARC Hardware Systems Laboratory & PARC Principal Scientist

Holds 65 patents; co-wrote The Handbook of Semiconductor Manufacturing Technology, 2000 Edition

Focus: solar, batteries, energy efficiency, clean water, and renewable fuels
PARC is home to a team of more than 300 scientists and researchers, pioneering at the bleeding edge of their domain's expertise and vision. Here are a few of our passionate trailblazers.

**Bernard Casse** Ph.D.
- Manager of PARC Metamaterial Devices & Applications Group
- Focus: photonics, electromagnetic theory, optics, & micro-nanofabrication

**Eugene Chow** Ph.D.
- Manager of PARC Microsystems Technology Group & Principal Scientist
- Focus: MEMS, packaging, printing, thin-film transistor integration with MEMS

**Tolga Kurtoglu** Ph.D.
- Vice President, Director of System Sciences Lab
- Focus: design & development of complex systems; engineering design automation & optimization; automated reasoning; risk & reliability-based design

**Raja Bala** Ph.D.
- Principal Scientist; Manager of Handheld, Egocentric, and Wearable Vision Area
- Focus: video analytics; sensor data from mobile devices; computer vision; computational imaging; color science

**Jessy Rivest** Ph.D.
- Manager of PARC Energy Systems Group
- Focus: novel cooling technologies; residential energy analytics; electrochemical carbon capture; wastewater to biofuels

**Bob Street** Ph.D.
- PARC Senior Research Fellow and World’s Leading Expert in flat panel displays
- Holds 78 patents and published more than 350 papers; awarded the American Physical Society David Adler Award and the American Institute of Physics Prize for Industrial Application of Physics
- Focus: large-area electronic materials and devices; solution-based organic materials to create large-area transistor and sensor arrays

Contact: engage@parc.com
## Areas of Expertise and Impact

### CORPORATE & DIVISIONAL INNOVATION

**PARC Place Engage™**
Allows C-level leaders to work with PARC experts through a facilitated and structured process.

**PARC Place Community**
Activities and forums for insight sharing, collaboration, and education, exclusively for PARC customers.

### TRANSPORTATION & LOGISTICS
- Real-time planning and scheduling
- Advanced electronics and optical systems
- Parking systems
- Freight management

### AUTOMOTIVE & AEROSPACE
- Contextual intelligence
- uFAB digital manufacturing
- Predictive condition-based maintenance
- Metamaterials

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### HIGH-TECH & TELECOMMUNICATIONS, MEDIA, & ENTERTAINMENT
- Content-centric networking
- Cyberthreat mitigation
- MEMs, MOEMs
- Flexible display backplanes

### FINANCIAL SERVICES
- Big Data predictive analytics
- Anomaly & insider threat detection
- Fraud detection
- Consumer intent vs. behavior

### CONSTRUCTION & INFRASTRUCTURE
- Adaptive & distributed systems
- Advanced electronics & sensor networks
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### CONSUMER PRODUCTS & RETAIL
- Privacy-preserving Big Data analytics
- Contextual intelligence
- Printed & flexible electronics

### ENERGY & NATURAL RESOURCES
- Adaptive & distributed systems
- Battery efficiency
- Sensors
- Metamaterials

### HEALTHCARE
- Digital self
- mHealth Behavior Change platform
- Drug delivery devices

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PARC’s breakthroughs and advances through three phases of the world’s evolution

<table>
<thead>
<tr>
<th>PHASE 3</th>
<th>The Convergence</th>
<th>Physical and computer sciences united at scale: 50B* smart devices connecting people with each other and with things 24/7</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHASE 2</td>
<td>The Information Age</td>
<td>Billions of people connected to the Internet via personal computers, laptops, and smart mobile devices, for hours each day</td>
</tr>
<tr>
<td>PHASE 1</td>
<td>The Rise of the Network</td>
<td>Workers connected with PCs for a few minutes or hours each day</td>
</tr>
</tbody>
</table>

**PARC TODAY**

- Content-centric networking
- Flexible printed electronics
- Data analytics solutions
- Privacy and security solutions
- Metamaterials and scaled energy
- Energy solutions
- Biomedical systems
- Electronic reusable paper
- Blue lasers
- Ubiquitous computing
- Multi-beam lasers
- Programming languages
- The ethernet
- WYSIWYG GUI
- The Alto PC
- Laser printing

THE BUSINESS OF BREAKTHROUGHS®

Apply PARC’s elite disruptive technology expertise to your business challenges to drive innovation and grow.

Get the holistic approach you need with the right balance of knowledge and pragmatic action to get more from your innovation dollar. Explore business model implications and the full range of disruptive advances across physical, social, and computer sciences.

Let us help you accelerate your timeline to market. Contact us today.

Begin exploring how a partnership with PARC can solve your most critical business challenges. Gain immediate access to our top experts and disruptive technologies. Contact us today.

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