IBM Research –
Your future is our concern
A call for action

3.7 billion lost hours
8.7 billion liters of gas

Annual impact of congested roadways in the U.S. alone

An IBM Research answer

20% less traffic

Traffic system: Stockholm, Sweden
The city cut traffic by 20%, lowered emissions by 12% and reported 40,000 additional daily users of public transportation.
Smarter planet – opportunities

The opportunities are extremely broad – and IBM Research is at the very heart of bringing IBM’s vision of a smarter planet to life

- Smart traffic systems
- Smart food systems
- Smart cities
- Smart energy grids
- Smart supply chains
- Smart water management
- Smart healthcare
- Smart weather
The sun never sets at IBM Research
IBM Research – Zurich
IBM Research – Zurich: Core competencies

Micro-Electronics

Post-CMOS

Nano-Technology

Advanced Server Technologies

High-Performance Computing

IT Security and Privacy

Business Optimization & Data Analytics

Client Innovation
IBM's commitment to innovation is unmatched:
- Annual investment in R&D: $6 billion
- 16 consecutive years of U.S. patent leadership

Focus on near- and long-term innovation

Exploratory research to push the boundaries of human knowledge

Tackle the complex challenges of our globalized world by open innovation and collaboration

Help clients with their challenges today, tomorrow, and beyond

Trend research, to be ready to shape the future
Diversity of disciplines at IBM Research

Behavioral Sciences

Chemistry

Computer Science

Electrical Engineering

Materials Science

Mathematical Sciences

Physics

Service Science, Management & Engineering
Single-molecule “logic” switching could lead to molecular computers

- Switching based on chemical reaction inside molecule
- Upon injection of a voltage pulse, two hydrogen molecules move within cavity in molecule
- Potential modular molecular building block for complex structures, e.g. logic gates
On June 2, 2009, IBM and the Swiss Federal Institute of Technology ushered in a new era in nanotechnology and collaboration with the laying of the foundation stone of the *Nanoscale Exploratory Technology Lab* on the campus of IBM Research – Zurich.

John Kelly III, SVP & Director of Research:
“It is a journey of discovery into the world of atomic nano-level R&D. […] Here we will invent new materials and devices that will someday enable everything from powerful new supercomputers to lightweight, superstrength materials […]. The center will be simply the world’s most advanced, state-of-the-art nano-facility.”
Supercomputing: Research for faster take-offs

**Optimizing aircraft-trailing vortices via direct numerical simulation**

**Challenge**
Airplane wings generate two large vortices, a potential hazard to following aircraft at takeoff.

**Approach**
High-resolution simulations to investigate how the destruction of these vortices can be accelerated with a secondary pair of vortices generated by stabilizers on the wing.

The simulations could eventually improve aircraft takeoff and landing scheduling, and minimize impact on the environment (NOx, noise pollution).

**Collaboration Partners**
Swiss Federal Institute of Technology and IBM Research – Zurich
Research for smarter bits

Cognitive computing

In an unprecedented undertaking, IBM Research and five leading universities are partnering to create computing systems that are expected to simulate and emulate the brain’s abilities for sensation, perception, action, interaction and cognition while rivaling its low power consumption and compact size.

“Exploratory research is in the fabric of IBM’s DNA. The initiative underscores IBM’s capabilities in bold, exploratory research and interest in powerful collaborations to understand the way the world works.”

Josephine Cheng
VP IBM Research – Almaden
Sustainable supercomputing – introducing Aquasar

**Challenge**
Exploding energy costs in datacenters – and cooling accounts for up to 50%

**Aquasar** – A novel kind of *water-cooled supercomputer* whose revolutionary cooling system mimics the vessels and capillaries of our circulatory system. Aquasar will be cooled with **60°C hot water**, enabling dramatic savings in cooling energy and yielding high-grade waste heat suitable for direct reuse in space heating.

**Target**
Aquasar is expected to cut energy consumption by 40%, and lower its carbon footprint by up to 85% during operation.

**Collaboration partners**
IBM Research – Zurich and Swiss Federal Institute of Technology
**Challenge: Creating a smarter grid**

The EDISON research consortium is a Denmark-based collaborative aimed at developing an intelligent infrastructure that will make possible the large-scale adoption of electric vehicles powered by sustainable wind energy.

**Approach**

Researchers will develop smart technologies that synchronize the charging of the electric vehicles with the availability of wind in the grid.
Challenge
Inefficient and even misleading information retrieval at many hospitals, leading to suboptimal patient care

Solution
A technology that uses a 3-D representation of the human body. It allows doctors to visualize patient medical records in an entirely new way. Clicking on a particular part of the avatar “body”, triggers a search of medical records for all relevant information.

Pilot project
The technology has been very successfully tested at Thy-Mors Hospital in Denmark.
The greater context of research: Tomorrow’s trends

Trend research for a better future: *IBM’s Global Technology Outlook* – the yearly updated vision of the IBM Research team of the future of IT

**Goals**
- Identify disruptive societal, technical and economic trends
- Investigate technology and business strategies to address the trends identified

**Impact**
- Influences IBM strategy
- Delivers valuable insights for our clients

“I think there is a world market for maybe five computers.”
Thomas Watson, chairman of IBM, 1943

“640K ought to be enough for anybody.”
Bill Gates, 1981

“There is no reason anyone would want a computer in their home.”
Ken Olsen, founder of DEC, 1977
Customized dialogues/workshops on research, trends, management and innovation

Consulting, planning and client-oriented research activities
Research value for clients

Customized dialogues/workshops on research, trends, management and innovation

- **Industry-specific dialogues on research, trends and innovation**
  Discover the latest megatrends and pick the brain of our researchers and other experts for a customized in-depth discussion on innovation, trends and industry-specific challenges.

- **Innovation Discovery Workshops**
  Work with our experts on your innovation challenges, and take home concrete and actionable ideas tailored to the challenges your company faces.

- **Workshops on innovation management/ marketing**
  Innovation management is no longer enough to translate research success into success as an innovator. Innovation management must be complemented by innovation marketing. Let us show you our method to analyze and optimize your success.
Consulting, planning and client-oriented Research activities

- **Collaborative innovation**
  Collaboration between leading-edge clients who want to become early adopters of innovative technology and IBM scientists who are eager to conduct research in the marketplace.

- **Strategic Research consulting**
  Support in planning new research programs or facilities. We also offer to train your staff and to supervise projects. Areas of special expertise: nanotechnology and high-performance computing.
Consulting, planning and client-oriented Research activities

Business Analytics and Optimization Services

Businesses feel they are operating with major blind spots – at exactly the moment when their margin for error is approaching zero.

Strengthen your ability to drive faster, better and smarter business decisions, and optimize operations and enterprise performance.

Benefit from a new service that combines the advanced analytics of IBM Research with our best-in-class hard- and software platforms and the expertise of our business consultants.
Where and how to get started?

IBM Zurich Industry Solutions Lab

- Forum for stimulating and action-inspiring discussions and workshops with researchers and industry experts on
  - megatrends (technology, business, society)
  - research breakthroughs
  - industry-specific challenges
  - smart technical and management solutions
  - the next level of innovation

- Showcases tomorrow’s solutions and Research technologies
  (various Research and product prototypes and solutions on display)

Get in touch with our Industry Solutions Lab, which is collocated with IBM’s European research lab in Zurich