Enhancing Innovation & Competitiveness Through Investments In Fundamental Research

Measurement, Instrumentation and Applications

Agilent Laboratories

Darlene J.S. Solomon, Ph.D.
Agilent Chief Technology Officer and Vice President of Agilent Laboratories
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Key Points

Endorse innovation fundamentals:

• Teamwork
• Multiple disciplines
• Supportive environment
• Competent, enlightened leadership
Innovation Requires Invention and Implementation

People → Ideas & Products → Contribution & Profit

Invention → Implementation → Innovation

All are critical to contributions and competitiveness
Waves of Ongoing Innovation

- Bioelectronics/Nanotechnology
- Biotechnology
- Communications/Internet
- Electronics/Computers
- Test and Measurement
Agilent Technologies
The world’s premier measurement company

Electronic Measurement
- Communication
- Aerospace/Defense
- General purpose

Bio-Analytical Measurement
- Life sciences
- Chemical analysis

Agilent Laboratories
- Applied research
- Technology leadership
- New business directions

Agilent
- $5.0 B annual revenue
- 19,000 employees
- Customers in 110+ countries

Agilent Labs
- 7% of overall R&D
- U.S., Europe & Asia
- Open innovation
Breakthrough Agilent Products, Fueled by Labs

- 54832D Infiniium Oscilloscope
- LXI Standards 34980A Multifunction Unit
- 83453A high-resolution spectrum analyzer
- E7495A base station test set
- HPLC-chip/MS
- TOF & Q-TOF 6510 Mass Spectrometer
- DNA Microarray Platform
- Array CGH
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Pursue research opportunities based on trends in electronic and bio-analytical measurement.
Trends in Electronic Measurement

Faster and less invasive measurements

Greater digital content in measurement solutions

Increasing integration of measurement science algorithms and modeling

Convergence of communications and measurement network technologies

Emergence of modular architectures for instruments and sensors
Innovation That Changes the Game
Analog-to-Digital Converters Determine Scope Performance

Sample Rate (giga-samples/second)


Peregrine: World's fastest 8-bit ADC

CMOS Parallel ADCs

Talon

Bipolar Transistor ADCs

Agilent Technologies
Paradigm Shift for Test Systems
From Trigger-Based to Time-Synchronized Measurement

Coordinating joint action when two or more instruments need to work together in a test system

The LAN eXtensions for Instrumentation (LXI) standard enables fast, efficient and cost-effective creation of test systems in a global environment.
Trends in Bio-Analytical Measurement

Revolution in the life sciences driving new understanding of living systems

Differentiation through bio/chemistry, sample prep and informatics

Miniaturization, massive parallelism, automation and speed

Personalized medicine and molecular diagnostics for treatment of disease

Systems biology enables modeling and understanding of biological systems
Agilent DNA Microarray Solutions
Agilent DNA Microarray Solutions

This 3D animation is provided courtesy of Rosetta Genomics (www.rosettagenomics.com)
Agilent DNA Microarray Solutions
Towards Systems Biology . . .
Modeling of Yeast Protein-Protein Interactions

Dr. Peter Uetz
Institut für Toxikologie und Genetik Forschungszentrum Karlsruhe
Key Points

Endorse innovation fundamentals: teamwork; multiple disciplines; supportive environment; competent, enlightened leadership.

Pursue research opportunities based on trends in electronic and bio-analytical measurement.

Explore and exploit emerging interdisciplinary opportunities that transcend traditional boundaries.
Strategic Future Research Themes
Explore and Exploit Emerging Opportunities

Biometrics
Energy and the environment
Global and developing market opportunities
Home healthcare delivery
Homeland defense and security
Nanoscale measurement
Sensor networks
Systems biology
Nanoscale Measurements
Biological Chemistry / Electronics Convergence

Miniaturization and Integration

Revolution in Life Sciences

Nanotransistor: LETI, France

Enzyme: ATP Synthase

~10 nm
Agilent 5500 Atomic Force Microscope (AFM)
Electronic & Bio-Analytical Customers on One Platform

Electronics

120 nm
Transistor with silicon nanowire

Biology

54 microns
Hamster ovary cell
An Increasingly Digital World

Physical measurement → Signal Conditioning and Data Conversion → Digital Signal Processing → Complex measurement systems software → Insight

**Complex measurement systems software**

\[ S(v) = \frac{\sqrt{2}}{\Delta v \sqrt{\pi}} \exp\left(\frac{-2v^2}{\Delta v^2}\right) \]

\[ \Phi = \int_{-\infty}^{\infty} S(v) dv \]

state.propTerm=offsetNsecs
double offsetNsecs=state.error
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Summary of Key Points

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