

EXECUTIVE LEADER – SCIENCE & TECHNOLOGY, RESEARCH & INNOVATION

Organizational Excellence • Communications • Entrepreneurship • Change Leadership

Leader with a wealth of successful experience in government, academia, private sector, entrepreneurial ventures, and non-profit organizations, with strategic vision and a passion for innovation outcomes to benefit the nation through equity and inclusion. Experienced in leading large, complex organizations having diverse stakeholder communities, working with boards of directors and through shared governance models. Broadly-based leadership strengths draw upon deep insights gained with varied organizational types and cultures, and across a wide range of technology and business domains, in research and development, standards and in innovation. Successfully led regional, national and international initiatives for technology transfer, innovation, economic development, and industry sector resilience. Entrepreneurial leader, having successfully brought a series of inventions from initial concept to the commercial marketplace. Provides balanced perspectives in innovation and entrepreneurship, resulting from founding and leading multiple startups and nurturing many spin-off companies – in addition to extensive experience in venture capital and corporate strategic investment.

• Accomplishments - Highlights:

- **Led** expansion of research at Colorado School of Mines to the university's recognition in the Carnegie Classification as an R1 University, the top level in the U.S. representing very high research activity.
- **Founder** of the Renewing American Innovation project with the Center for Strategic and International Studies (CSIS), a leading global policy think tank.
- **Confirmed** unanimously by the U.S. Senate as Under Secretary of Commerce for Standards and Technology and 16th Director of the National Institute of Standards and Technology (NIST), October 2017.
- **Launched national initiative** for Unleashing American Innovation. Led an inclusive nationwide process through the NIST "Return on Investment" (ROI) Initiative to bring insight and consensus in plans and actions for the future of U.S. technology transfer, innovation policy and competitiveness. Lead author of the NIST Green Paper SP1234, "Unleashing American Innovation" and its comprehensive findings for modernizing technology transfer and economic development arising from federally funded research at U.S. universities and federal labs. The Green Paper provided a U.S. roadmap for increased innovation outcomes - addressing acknowledged legislative and regulatory impediments and needed policy improvements, increasing public-private engagement and investor access, building a more entrepreneurial workforce, supporting innovative tools and services for tech transfer, and improving benchmarks globally. Developed broad federal interagency and Congressional support in updates to the Bayh-Dole Act, and for changes enabling important new modes of technology transfer and public private partnerships in long-needed amendments to the Stevenson-Wydler Technology Innovation Act of 1980.

- **Led international collaborations** resulting in stronger bilateral and multilateral science and technology relationships and agreements, including those between the USA and the U.K., Japan, Israel, Brazil, Australia, Korea and many more. Led the partnerships between NIST, UK Research & Innovation (UKRI) and Research England resulting in agreements for expanded collaboration in scientific research, innovation and entrepreneurial workforce development. Contributed to the negotiations of trade agreements, notably the U.S.-Mexico-Canada Agreement (USMCA) and its provisions for intellectual property, measurements harmonization, standards and conformity assessment.

- **Developed balanced policy** position to address the needs of both high tech innovators and implementers through a joint policy statement issued by NIST December 19, 2019 together with the U.S. Patent and Trademark Office (USPTO) and the U.S. Department of Justice on "Remedies for Standard Essential Patents (SEPs) Subject to Licensing under Fair, Reasonable and Non-Discriminatory Terms."

- **Updated and implemented** policies with USPTO to assure appropriate access to the benefits of small entity status for patent filings by private sector licensees and the R&D partners of U.S. universities and research institutes.

- **Sponsored comprehensive** developments of new web-based tools promoting technology access and partnerships – and to modernize the Interagency Edison (i-Edison) system for U.S. research grants and invention reporting. Authorized the transition of i-Edison from the National Institutes of Health to NIST as national host institution for the academic and federal research networks.

- **Led** the Technical Guidelines Development Committee with the Election Assistance Commission to deliver the Voluntary Voting System Guidelines 2.0 in March 2020 – representing the first major enhancements to U.S. election standards since 2005. These are expected to deliver substantial benefits for election security and efficiency.

Created the theme of "One NIST" to more effectively leverage NIST's broad range of interdisciplinary capabilities and vast industry networks, and to increase organizational efficiencies for NIST people and partnerships. Building upon the Baldrige Performance Excellence framework, implemented a comprehensive, repeatable strategic planning and implementation process. Enhancements in process efficiencies and customer satisfaction are being achieved.

Spearheaded realignment of the NIST organization to achieve the following goals: 1) to enhance Human Capital development and deliver integrated support for NIST Associates (the large NIST non-Federal workforce of postdocs, graduate students, and visiting scientists), 2) to increase capacity for technology transfer and innovation outcomes, 3) increase focus on standards and international engagement, 4) improve branding and internal and external communications, 5) systemically strengthen pipelines for talent access, 6) expand strategy and policy leadership, and 7) better integrate lab programs for advanced communications R&D.

Advanced major initiatives at NIST for standards leadership, measurements science (metrology), cybersecurity and privacy, advanced manufacturing, innovation policy, artificial intelligence, quantum science and engineering, advanced communications, community and business resilience, climate, the circular economy, and much more:

- **Artificial Intelligence (AI):** As leader for the U.S. Select Committee on AI, launched national initiatives for development of AI standards and measurement tools, and for effective international engagement for trustworthy and explainable AI.
- **Cybersecurity and Privacy:** Advanced NIST Cybersecurity Framework's adoption in U.S. and internationally. Sponsored development and launch of the acclaimed NIST Privacy Framework, issued January 2020.
- **Quantum:** Led formation of the National Quantum Initiative and established the Quantum Economic Development Consortium with U.S. industry collaborators and SRI International. Led the U.S. Delegation for the Redefinition of the International System of Units (SI), which went into effect May 2019.
- **Advanced Manufacturing:** Supported the expansion of the Manufacturing Extension Partnership (MEP) programs and reach, building the MEP National Network of shared resources for small and medium sized companies and for entrepreneurs, and strengthening the cybersecurity and integrity of the U.S. supply chain.
- Leader in the response to the COVID-19 pandemic through research, measurements and standards delivery. Provided support for the resilience of U.S. manufacturing companies, with new programs and funding resources efficiently delivered through the MEP and Manufacturing USA networks.
- **Led U.S. Department of Energy (DOE) while at Brookhaven National Lab (BNL)** with the U.S. national labs network to establish DOE's first new tech transfer mechanism in over 25 years: Agreements to Commercialize Technology (ACT) launched in 2012. This has proven to significantly enhance industry access and entrepreneurship with the U.S. DOE federal labs. Expansion of the ACT authority is part of the ROI Legislative proposal to Congress in 2020.
- **Co-founded Accelerate Long Island** partnership to strengthen the regional innovation ecosystem, economic development, new business formation, and capital access in New York. During my four years as leader at BNL, more startup companies were established from BNL technologies than over the Laboratory's prior 60+ year history.
- **Entrepreneur, founder of technology and innovation services companies, and co-founder of non-profit organization supporting tech transfer, entrepreneurship and seed investment.**
- **Drove transformation and growth** for Clean Diesel Technologies, Inc (CDTI). Took this technology development and licensing company onto NASDAQ listing. Set up company merger.
- **Established** open innovation processes, mergers & acquisitions portfolio for The Lubrizol Corp. Led integrated venture investment and development programs with oversight for strategic relationships with pioneering companies in biotech, including Cetus, Genentech, Agrigenetics, Mycogen.
- **Started and successfully led** the Lubrizol Corporation IP and technology licensing business, contributing over \$150M/year profits.

PROFESSIONAL EXPERIENCE

VICE PRESIDENT FOR RESEARCH AND TECHNOLOGY TRANSFER, Colorado School of Mines. Golden, CO
July 2021 - present

Leader for university research portfolio advancement, and for technology transfer and innovation outcomes at Colorado School of Mines. Mines is a top-tier research university, recognized by the Carnegie Classification as an R1 highly research-active university with a broad portfolio spanning foundational to use-inspired fields; a preferred partner in R&D to industry, governments and academia and globally. www.research.mines.edu

SENIOR ADVISER and CO-FOUNDER of the “RENEWING AMERICAN INNOVATION” Project, Center for Strategic and International Studies. Washington, D.C.
Jan 2021 - present

Established initiative with top global think tank to advance U.S. innovation, standards and intellectual property policy for competitiveness & strategic growth, leveraging federal S&T investment. www.csis.org

UNDER SECRETARY OF COMMERCE FOR STANDARDS AND TECHNOLOGY, and DIRECTOR, National Institute of Standards and Technology (NIST). Gaithersburg, MD & Boulder, CO Oct. 2017 – Jan 2021

Confirmed unanimously by the U.S. Senate on October 5, 2017 to lead NIST in its mission to promote innovation and industrial competitiveness by advancing measurement science, standards and technology. Advocated for and presided over the largest budgets in NIST history, including S&T investment, U.S. advanced manufacturing programs, and facilities modernization for major NIST campuses in Maryland and Colorado. Led organizational realignment; reconfigured interdisciplinary science and education programs; instituted new organization-wide strategic planning with focused implementation cycles; and led renewal of U.S. innovation policy and practice. Strengthened culture of innovation and inclusivity. Streamlined business processes for measurable efficiency improvements across all operations. Reconstituted national advisory board. www.nist.gov

PRESIDENT & CEO, IP Engineering Group Corporation, Monument, Colorado Jan 2015 - October 2017

Leader and co-founder. Providing services for Intellectual property and strategy, IP transactions and investment. IPEGC helps clients maximize commercial and financial impacts from their inventions. www.ipeg.com

CEO & Board Chair, Impact Engineered Wood Corporation, Silicon Valley, CA May 2015 – June 2017

Technology company founder. High performance products with positive environmental impacts for commercial & residential building materials markets worldwide. Prepared M&A exit. www.impactengineeredwood.com

FOUNDING BOARD MEMBER & DIRECTOR, TECHNOLOGY TRANSFER and INNOVATION,

Rocky Mountain Innovation Partners, Colorado Springs, Colorado 2014 – October 2017

Technology transfer and innovation services supporting research organizations, universities and companies, with seed and venture investment, business incubation and accelerator programs. www.rmipartners.org

MANAGING DIRECTOR, TECHNOLOGY TRANSFER, Tekcapital plc, Oxford, UK 2014 – 2017

Connecting emerging technologies and market insights with corporate strategic investors. Tekcapital helps companies profit from university innovations and intellectual property globally. www.tekcapital.com

PRESIDENT, Copan Associates, LLC, Monument, Colorado 2009 - 2017

MANAGING DIRECTOR, EnergyInsight, LLC, Monument, Colorado

Leader of consulting groups providing services in business model strategy and innovation, technology development and commercialization across a wide range of technology domains and markets. EnergyInsight subsidiary provides consultation and services focused on energy and environment. www.waltercopan.com

PRESIDENT, TAEUS Corporation, Colorado Springs, Colorado 2013-2014

TAEUS is an intellectual property and engineering company that helps clients defend, manage, and monetize intellectual property to realize optimum value for their assets in the global market for innovation. www.taeus.com
Recruited to lead the company through restructuring, to develop sales, and to reposition the company brand.

- Successfully completed turn-around of this privately-held company; secured financing commitments.

MANAGING DIRECTOR, TECHNOLOGY COMMERCIALIZATION & PARTNERSHIPS

2010–2013

Brookhaven National Laboratory (BNL), Upton, New York

Premier laboratory of the U.S. Department of Energy (DOE) managed by Brookhaven Science Associates LLC: Battelle, Stony Brook University and SUNY Research Foundation. Major thrust areas include High Energy / Nuclear Physics, Basic Energy Science, Human Health & Environment, Advanced Materials & Renewables. www.bnl.gov

- Led the transformation of BNL technology commercialization and partnerships organization to build and purposefully engage with the regional ecosystem for innovation, entrepreneurship and economic development. Focused capacity building on enabling startup companies to thrive, and creating new flexibilities in tech transfer by leading development of the new U.S. Agreements to Commercialize Technology (ACT) mechanism, ratified by DOE & Congress

EXECUTIVE VICE PRESIDENT AND CHIEF TECHNOLOGY OFFICER

2005-2010

Clean Diesel Technologies, Inc., Stamford, Connecticut

Technology innovation focused on clean energy, energy efficiency, and environmental technologies for the global emissions control market, vehicles and power generation. www.cdti.com NASDAQ: CDTI

Recruited based on industry-wide reputation to lead CDTI, an entrepreneurial technology company, through significant business change and redefinition. Reporting to the CEO, spearheaded company transformation from research focus to successful commercial enterprise. Full P&L responsibilities.

- Developed supply chain, commercial partnerships and restructured the business to effectively address market opportunities with global vehicle and engine OEMs, and with Tier One suppliers.
- Spearheaded successful NASDAQ listing of CDTI in October 2007.
- Key contributor to growing company revenues 15x over 4 years, and established framework for 2010 merger.

PRINCIPAL LICENSING EXECUTIVE, TECHNOLOGY TRANSFER

2003-2005

National Renewable Energy Laboratory (NREL), U.S. Department of Energy, Golden, Colorado

Leading DOE laboratory for renewable energy and energy efficiency research & development. www.nrel.gov

Joined NREL in expressly-created position to increase the National Lab's effectiveness in developing and commercializing clean energy technologies. Served as change agent to enhance partnerships with industry, investors and entrepreneurs.

- Negotiated major IP license and partnership deals with industry for technologies including buildings systems, bioproducts and renewables, cellulosic materials biorefinery, solar, wind, energy storage, biotech, fuels and vehicles. Implemented software licensing for sustainable buildings energy efficiency.

MANAGING DIRECTOR, TECHNOLOGY TRANSFER AND LICENSING

1999-2003

The Lubrizol Corporation, Wickliffe, Ohio

Wide-ranging career with Lubrizol, a world leader in specialty chemicals, systems and services focused on transportation, energy and industrial sectors. www.lubrizol.com

Established and led new business unit with P&L responsibility for technology licensing, corporate venturing, intellectual property management, technology strategy and global external relationships for technology. Led M&A, strategic alliances and new business development with partners including Caterpillar, BASF, BP, Chevron.

- Negotiated major transactions and licensing agreements, with contribution income over \$150M, including the most financially significant license and technology transfer agreements in Lubrizol history.
- Established open innovation initiative for external academic, entrepreneurial and corporate technology partnerships for Lubrizol Corporation, including master research agreements with Purdue University, Penn State University, Case Western Reserve University, TNO, TU Delft, and more.
- Developed & launched new product ranges for significant market share increase, including establishing the Lubrizol Paints Coatings & Inks business unit and related M&A transactions: Becker GmbH, Noveon.

DIRECTOR, LUBRIZOL TECHNOLOGY STRATEGY & COMMERCIAL MANAGER, EUROPE

1998-1999

Developed and implemented disciplined management processes for Lubrizol's \$400M+ technology investment portfolio, and for new ventures, M&A. Spearheaded new market introduction of novel clean fuels and systems to reduce vehicle emissions. Developed fuel technology business for EU markets, established market channel partnerships, and built organization to implement. Led integration of BP Chemicals-Adibis post-acquisition.

DEPARTMENT HEAD, APPLICATION TECHNOLOGY/PHYSICAL & ANALYTICAL SCIENCES 1993-1998

Led two corporate Lubrizol R&D departments totaling more than 120 staff in research, new products and applications development. Directed Lubrizol Global Physical & Analytical Science management team. Managed worldwide manufacturing interface, standards, new product and process technology introduction. Led corporate technical services, with 300+ personnel at international research, testing and manufacturing facilities. Leader, Corporate New Product Introduction team.

- Established Corporate Ventures and business incubation to spin-out and spin-in new tech companies.
- Managed interface with JV partners and portfolio companies including Genentech, Cetus, Agrigenetics.

MANAGER, LUBRIZOL PETROLEUM CHEMICALS TECHNOLOGY, DERBYSHIRE, U.K. 1989-1993

Established and directed new department of 35 staff in research, product development, program management, standards leadership and technical service in EMEA and the Former Soviet Union.

- Increased sales and market share in highly competitive marketplace.
- Led European-wide industry initiative to quantify the environmental impacts from transport sectors.

Previous professional experience with The Lubrizol Corporation 1975-1988

Business Unit General Manager – Polymers & Viscosity Modifiers; Partner - Lubrizol Enterprises Inc. venture capital group; **Technology Manager - Engine Oils; Department Head - Molecular Spectroscopy; and Manager, Competitive Intelligence.**

- Led preparations resulting in successful global patent infringement litigation for Lubrizol vs Exxon.
- Led technology and market analysis resulting in launch of the Lubrizol Paints, Coating and Inks business.
- Inaugurated Lubrizol Technical Symposia, forums for technical communication & collaboration.

EDUCATION and PROFESSIONAL DEVELOPMENT

Executive Business Administration and Leadership Program, Harvard Business School, 1994

Ph.D. Physical Chemistry, Case Western Reserve University - Cleveland, Ohio, 1982

(In collaboration with CWRU School of Medicine and the University of Guelph, Ontario, Canada)

Dissertation: "Carbon-13 and Nitrogen-15 NMR Studies of Rhodopsin and Bacteriorhodopsin."

B.S./B.A. Chemistry and Music, Dual Degree, Case Western Reserve University (Cleveland Institute of Music) 1975

Leadership studies at CWRU Weatherhead School of Management, Management Centre Europe-Brussels, Others:

Advanced studies in Innovation Leadership, Media Relations, Finance and Business Management, Corporate & Non-Profit Board Governance, Marketing, Negotiations and Mediation, Strategic Alliances, New Product Introduction, Competitive Intelligence, Seed and Venture Capital Investment, Mergers & Acquisitions, Valuation, Due Diligence, Intellectual Asset Management, International Intellectual Property & Business Law, etc.

SELECTED PROFESSIONAL ACTIVITIES, SOCIETIES, HONORS

Honored by Case Western Reserve University as Distinguished Alumnus of the Year (Chemistry - May, 2008).

Elected Fellow of the National Academy of Inventors - FNAI (2018)

Named Laboratory Director of the Year (2020), awarded by the Federal Laboratory Consortium for Technology Transfer, representing over 1000 U.S. federal laboratories.

Recipient of the AUTM Bayh-Dole Award for leadership in technology transfer and innovation (2021)

Honored by the Baldrige Foundation Award for Leadership Excellence in Government (2022)

Security Clearances: Top Secret with Sensitive Compartmented Information (TS/SCI), Clearance is active (U.S. Department of Energy, sponsor, TS).

NIST (2017-2021): Advisor to the President of the U.S.A. on Standards and Technology

Office of Science & Technology Policy (OSTP) / National Science & Technology Council:

Co-Chair Committee on Technology. Co-Chair - Committee on Science & Technology Enterprise.

Co-Leader – Lab-to-Market Cross Agency Priority (CAP) Goal

Member – Select Committee on Artificial Intelligence

Member – Select Committee on Quantum Science & Engineering

President – U.S. National Council on Weights & Measures

Leader of U.S. Delegation to the International Convention on Weights and Measures (CGPM), Treaty of the Metre

Leader of U.S. Delegation on International Science and Technology Cooperation, U.S.-Brazil High Commission

U.S.-Japan Science and Technology High Commission, U.S.-U.K. Science and Technology High Commission, U.S.-

Australia Science and Technology High Commission

Co-Chair, U.S.-Israel Binational Industrial Research and Development (BIRD) Foundation Board

Chair, Technical Guidelines Development Commission for U.S. Voting. Led development and issuance of U.S. Voluntary Voting Standards and Guidelines (VMSG 2.0) with the U.S. Election Assistance Commission

Chair, Interagency Committee for the National Windstorm Impact Reduction Program

Chair, Interagency Committee for the National Earthquake Hazard Reduction Program

Listed in "Who's Who in U.S. Business," "Who's Who in Science and Technology," "Who's Who in Global Licensing," Top 50 U.S. Leaders in Artificial Intelligence.

Professional Affiliations: **American Association for the Advancement of Science (AAAS)**, National Academy of Inventors, American Chemical Society, Licensing Executives Society (LES), Association of University Technology Managers (AUTM), National Business Incubation Association, Industrial Research Institute, Innovators International, Directors of Industrial Research, Society of Automotive Engineers.

- Author, patent holder, and frequent speaker. (*Publications, presentations and patents list available*)
- Invited expert and consultant on innovation, intellectual property, energy, sustainability and economic development with the United Nations, the World Intellectual Property Organization (WIPO) and the European Patent Office (EPO).
- Contributor to U.S. Council on Competitiveness on innovation and economic development
- Member, National Advisory Council to the U.S. Federal Laboratory Consortium.
- Advisor to the U.S. Department of Energy, "Inventions and Innovations" program
- Contributor to the U.S. National Academies on innovation and technology transfer matters
- Member, U.S. National Academies Government University Industry Research Roundtable Council

Licensing Executive Society (LES) — Member, Executive Board and Vice President for LES U.S.A. (1997-2013)

LES Board of Trustees, Chair – Strategic Planning; Chair - Mentorship Program and The Frank Barnes Mentorship Award Committee. Vice-chair – LES International (LESI) External Relations committee.

Founder and Chair – LES Cleantech Committee

Chair – LES (USA-Canada) and LESI Industry / University and Government Transactions Sectors

Chair – LES (USA-Canada) and LESI Chemicals, Energy, Environment and Materials Sectors

and other Board and professional society leadership roles.

Led Task Force with LESI, the European Patent Office (EPO), the United Nations Environment Programme, the International Centre for Trade and Sustainable Development, OECD, U.S. Chamber of Commerce, the International Chamber of Commerce, and others on the development, transfer and licensing of clean energy technologies and intellectual property, and their impact potential for climate change mitigation, environmental benefits and economic development. The reports were presented and used by the UN and EPO in policy forums 2007-2011.

LES Chair, Joint Task Force with the Association of University Technology Managers (AUTM) on Academia-Industry Relations. LES Board liaison with AUTM.

Chair – Battelle Commercialization Council (Battelle Memorial Institute / DOE / National Laboratories: 2011-2012)

Chair – DOE National Lab Task Force to establish new Agreements to Commercialize Technology (ACT) - National Laboratory Directors Council, DOE. Developed & implemented new tech transfer mechanism (2010 – 2013).

Member - U.S. DOE Technology Transfer Working Group, Chair – Technology Transfer Mechanisms and Metrics

Established DOE Small Business Innovation Research – Technology Transfer program (2012)

Leader of "Startup America" initiative for new business creation (DOE / Brookhaven National Lab: 2011-2012)

Founding Partner and Member of the Board: "Accelerate Long Island" Alliance for innovation, new business creation, investment and economic development (New York, 2010-2013)

Certified Licensing Professional (CLP™), Certification Number 1558.

Corporate Boards: Clean Diesel Technologies, Inc., TAEUS Corp., IP Engineering Group Corp., Impact Engineered Wood Corporation, Nova Lignum, B.V.

Non-Profit Boards: Underwriters Laboratories - Standards and Engagement (ULSE); University of Colorado Boulder, Innovation Council; The Cleveland Orchestra Advisory Council; Cleveland Music School Settlement Board of Directors and Chair – External Relations; Case Western Reserve University board of advisors; University of Akron – Macromolecular Science and Engineering board of advisors; Licensing Executives Society (LES) and Licensing Executives Society International (LESI) officer and board member; Founding Board Member, The Ohio Intellectual Property Collaborative; Clean Energy Alliance Advisory Board; Accelerate Long Island – Founding Board Member; Colorado Springs Technology Incubator – Board member; Rocky Mountain Innovation Partners – Founding Board member; Educational, Church and Civic organizations Board member.

Visiting lecturer: State University of New York at New Paltz on "Water-Soluble Polymers: Synthesis, Structure and Applications" and Notre Dame College, Cleveland, OH on "Current Topics in Chemistry." 1984-1989

Cultural: Vocal performance, choral music direction, founder & director 'Lubrizol Chorale'. 1976–1988, 1994-2002
Singer and cast member with Cleveland Opera Theatre, Cleveland Opera, Cleveland Lyric Opera. 1974-1982

Personal: Married, 3 adult daughters. Interests – literature, philosophy, performing and visual arts, skiing, hiking.

LANGUAGES

German – fluent; Russian and Ukrainian – conversant; French and Italian – basic.

Areas of Expertise

Strategic Executive Leadership • Business Operations and Financial Management • Research & Technology Management • Technology Transfer • Intellectual Property • Licensing • Alliances & Partnerships
• Standards • Stakeholder Communications • International Relations
