Message from Don Nielson

Don Nielson

Last issue, in this space, you read that many members of our leadership team were requesting transition away from Alumni Association duties. In answer to this call, some excellent alums have stepped up to join our Steering Committee, and their names and areas of responsibility are listed in this newsletter. Also, if you look under the hood of this issue, you will find two new professionals working on the newsletter: Patti Price and Jeanie Graham. With maybe a few changes here or there, they will be providing the quality you have been getting from Caren Rickhoff, Mimi Campbell, and Linda Hawke-Gerrans.

One suggestion from the new committee is to explore the possibility of forming "local chapters" where alums in a vicinity can get together on occasion to enjoy company, exchange ideas, or visit local haunts. For years we've seen how well that has worked in London. If you have an interest in connecting to alums in your area, please send an email to steering@srialumni.org, along with an appropriate zip code, and we'll help bring you and your colleagues together.

Now to the issue at hand. First off are four articles that prove SRI is still plowing ahead with innovative projects, the first giving evidence of how vital is the ongoing emphasis on commercializing those innovations. The common and critical thread through these articles is relevance to current and future need. The last project covered here harks back to SRI's long history of atmospheric and space exploration. Read how this unique solar probe is helping us better understand Earth's dominant energy source.

Dr. Mary Wagner has passed. My recollection of her was how she brought SRI's education sector to national

prominence through long and respected assessment of programs for those with disabilities. This meant even testifying before Congress, where she loved to have in her back pocket what she called "myth busters" that laid to rest the arguments of elected members harboring errant biases.

Another part of History Corner accounts for one of SRI's modest, everyday project developments that truly has had worldwide impact. One of the Internet's most obvious faces (one you simply can't avoid using) had its beginnings on the second floor of the J wing of Building E, where personal, interactive computing also got its start.

Finally, we urge you to gather with us at our annual Spring Fling. This time it will be at a familiar place: the courtyard of the I Building. Come, look around, and renew acquaintances. It's free!

SRI Spin-out Membravo Aims to Transform Hydrogen Separation Technology

Hydrogen is poised to play a critical role in the global energy transition from fossil fuels to renewables. The challenge: It's not easy to isolate. A massive amount of hydrogen worth billions of dollars is burned as industrial waste every year because it cannot be cost-effectively separated from other gasses using existing technologies. Financially, it is a significant missed opportunity, and it also produces unnecessary carbon dioxide emissions. Clearly, better methods of cost-effectively isolating hydrogen within existing industrial infrastructure are needed.

Milad Yavari, while a research engineer at SRI, developed advanced hydrogen-separation membranes that perform exceptionally well in real-world conditions. Yavari's team not only identified a polymer uniquely suited to hydrogen separation, but also fine-tuned the manufacturing process and successfully field-tested it, investing 15 years of focused R&D supported by $10 million in funding from the US Department of Energy.

The commercial pathway for this technology took shape when Joe Sawa, who has an MBA from UC Berkeley's Haas School of Business, joined SRI's entrepreneurship-in-residence program.* Over the ensuing nine months, Sawa and Yavari conducted customer interviews to validate the market, developed a business strategy and execution plan, and manufactured membrane units to prepare for customer testing. Discussions with potential customers identified applications for the hydrogen-separation membranes across nearly every process involving hydrogen production, consumption, distribution, and storage. These enthusiastic responses spurred Sawa and Yavari—with support from SRI Ventures—to launch SRI's latest spin-out, Membravo.

"Being an entrepreneur-in-residence at SRI has been amazing," said Sawa. "SRI's ecosystem of engineers, scientists, and entrepreneurs know how to get innovation done."

Membravo's next-generation polymer membranes act as filters, allowing hydrogen to pass through but blocking other gases. They are specifically engineered to withstand the extreme heat, pressure, and harsh chemicals of industrial environments. "Our field-testing has demonstrated excellent performance and durability. We're currently fundraising, expanding our team, and engaging in pilot project discussions with some of the world's largest energy companies," said Sawa.

Sources: SRI Press Room. February 24, 2025. https://www.sri.com/press/story/sri-spins-out-membravo/; Membravo website. https://www.membravo.com/team

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* SRI's entrepreneurship-in-residence program provides access to advisors, market data, laboratory and office facilities, and SRI intellectual property as well as commercialization support through SRI Ventures.

Can a Microreactor Convert Carbon Dioxide to Methanol Using Renewable Energy?

An innovative project that promises to transform sustainable fuel production was selected to receive $3.6 million from the US Department of Energy's (DOE) Advanced Research Projects Agency-Energy. Led by SRI, the PRIME-Fuel (Printed Microreactor for Renewable Energy Enabled Fuel Production) project aims to develop a modular microreactor technology that converts carbon dioxide into methanol using renewable energy sources.

SRI will collaborate with co-investigators Vemuri Balakotaiah and Praveen Bollini, faculty members of the William A. Brookshire Department of Chemical and Biomolecular Engineering at the University of Houston (UH), to use mathematical modeling to design the microreactor and proprietary printing technology necessary to manufacture methanol.

Renewables-to-Liquids Fuel Production

PRIME-Fuel is one of 14 renewables-to-liquids fuel production projects that are part of a $41 million DOE investment to develop technologies harnessing renewable energy sources to produce liquid sustainable fuels or

chemicals that can be transported and stored similarly to gasoline or oil. The "clean" fuels can help decarbonize sectors like transportation across the United States.

"We believe that PRIME-Fuel will play a critical role in the transition to sustainable energy solutions," said Rahul Pandey, senior scientist with SRI and principal investigator on the project. "By harnessing renewable energy to produce methanol, we can help combat climate change while providing valuable resources for various industries by leading to cost-effective and sustainable methanol production."

Sustainable Production of Methanol

Whereas methanol can be harmful if misused, its sustainable production offers significant benefits. Methanol can serve as a versatile energy carrier and high-energy-density liquid fuel, potentially replacing fossil fuels in various applications. It is also a valuable chemical feedstock that is easily stored and transported. This project not only addresses energy needs, but also contributes to a cleaner, more sustainable future.

"Methanol is a platform chemical, meaning a lot of the chemicals and products you see in your everyday life could actually be produced starting from methanol," said Bollini, an associate professor of chemical engineering at UH. "An important example would be food packaging that helps enhance shelf-life at the grocery store."

Innovation Through Collaboration

The PRIME-Fuel project will leverage UH's cutting-edge mathematical modeling and SRI's proprietary Co-Extrusion printing technology to design and manufacture the microreactor. One of the most remarkable features of this innovative technology is its ability to continue producing methanol even when the renewable energy supply dips to as low as 5% capacity.

"This ensures a consistent output while optimizing energy consumption through advanced control algorithms and real-time monitoring systems," Bollini said. "The technology developed here will provide a means for the distributed, low-cost production of methanol using stranded renewable sources of energy, including those in underdeveloped countries."

Balakotaiah, whose research involves mathematical modeling and analysis of the interactions between transport processes and chemical reactions, will use reduced-order mathematical models of microreactors to guide the microreactor's design and real-time simulations of transient-state operations. Bollini, whose research focuses on improving the catalytic process critical to carbon mitigation in the energy transition arena, will work to develop novel catalysts for improving carbon dioxide conversion and methanol yield.

Impacting Climate and Sustainability

During this three-year project, the researchers will develop a microreactor prototype capable of producing 30 MJ/day of methanol while meeting energy efficiency and process yield targets. When scaled up to a 100-MW electricity capacity plant, it will be capable of producing 225 tons of methanol per day at a low cost, while reducing associated emissions by more than 88%.

"What we are building here is a prototype or proof of concept for a platform technology, which has diverse applications in the entire energy and chemicals industry," Pandey said. "Right now, we are aiming to produce methanol, but this technology can actually be applied to a much broader set of energy carriers and chemicals."

Sources:
SRI Press Room. November 20, 2024. https://www.sri.com/press/story/sri-and-university-of-houston-receive-3-6m-to-develop-a-microreactor-to-convert-carbon-dioxide-to-methanol-using-renewable-energy/

ARPA-E website. https://arpa-e.energy.gov/programs-and-initiatives/search-all-projects/printed-microreactor-renewable-energy-enabled-fuel-production-prime-fuel

ARPA-E Press Release. July 31, 2024. https://arpa-e.energy.gov/news-and-events/news-and-insights/us-department-energy-announces-41-million-technologies-expand-use-renewable-power

This post was adapted from a University of Houston announcement. https://stories.uh.edu/microreactor_UH_SRI_111324/index.html

Transforming Matter To Create A New Type Of Semiconductor Chip

The silicon semiconductor is the best known, but other semiconductors offer attractive electronic properties that silicon does not. For instance, silicon cannot emit light or operate at high frequencies. Researchers have long tried to integrate two or more disparate semiconductors, but different semiconductors do not play well together. Nanofabrication experts at SRI and several leading universities aim to change that on behalf of the Defense
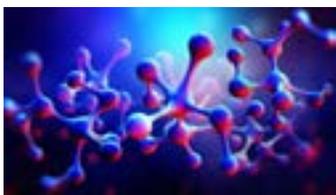
Advanced Research Projects Agency (DARPA).

"From a nanofabrication perspective, the difficulty of the problem DARPA wants to solve falls somewhere between very hard and impossible, but we're excited about this new approach," said David Hill, a senior research scientist at SRI and SRI's principal investigator for DARPA's program Material Synthesis Technologies for Universal and Diverse Integration Opportunities (M-STUDIO). "The goal is to produce a single chip made of two thin layers of mismatched semiconductor materials."

"Whenever you try to layer different semiconductors, the crystalline structures don't match where the materials meet. These mismatches—considered defects—degrade the performance," Hill added.

Rearranging Atoms to Form Something New

Hill and his team from SRI will collaborate on M-STUDIO with researchers at Princeton Plasma Physics Laboratory; the University of California, Santa Barbara; and Columbia University. This team will use a new technique, a hyperthermal beam, developed in part at the Princeton Plasma Physics Lab, to dislodge and rearrange atoms in the upper layer of a two-layer double-semiconductor device into a perfect crystalline structure free of defects.

"This method is quite different than other approaches; we're kind of violating certain rules of nanofabrication here," Hill explained. "Our approach doesn't require high heat the way conventional approaches do."

To visualize the process, imagine a thin layer of charcoal-gray silicon with a shapeless blob of a second semiconductor sitting on top. The team will use the hyperthermal beam to generate a stream of neutral atoms that can rearrange the atoms in the blob into a perfect crystal. The arrangement of the atoms in the interfacial layer is critical to the combined function of the two semiconductors and the structure of the layers that are then grown atop. "The hyperthermal beam provides energy, momentum, and time for the amorphous material to rearrange as it settles into possible arrangements," Hill said. "Eventually, the blob naturally settles into this perfect crystal."

The result is a single device made of two semiconductors that retain their individual functions. The joined semiconductors collaborate as a circuit to achieve dual functionality that wasn't possible before.

Changing How We Build Devices Could Lead to Potential Applications

The DARPA M-STUDIO work is a two-phased project. In the first phase, the researchers will develop a proof-of-concept for the hyperthermal beam approach, working to shape a 10-nanometer-thick crystal of a single semiconductor on a mismatched substrate. In the second phase, a second semiconductor will be added and shaped into a new crystal atop the first to create a true multimaterial structure.

If this new approach is successful, it could completely change the way we build tiny devices, especially those with multiple materials, leading to groundbreaking innovations. For instance, advanced chips could be created that use silicon to guide light along with on-chip lasers that produce light, all in one device. Another exciting application could be new radar systems that combine the digital precision of silicon with the high power and frequency control of materials such as gallium nitride or gallium arsenide. This would make these devices more efficient, powerful, and versatile than ever before.

"Currently, individual chips accomplish dual functions only when you couple them together into a system. This novel process would combine functionality on a single chip," Hill said. "It could represent an entirely new method of nanofabrication."

Source: SRI Press Room. December 17, 2024. https://www.sri.com/press/story/transforming-matter-researchers-create-perfect-crystals-from-amorphous-blobs/

Robots in the Clean Room

Clean rooms are critical for various types of manufacturing. Traditional methods of managing these environments can be time consuming, labor intensive, and prone to human error.

SRI's XRGo system addresses these challenges through a remote, finely tuned, immersive interface that enables operators outside the clean room to control robotic systems inside the clean room. The system protects the operators from potentially dangerous exposures (for example, to radiotherapeutic agents or microorganisms),

Testing the XRGo system in SRI's robotics lab.

Parker Solar Probe

NASA/Johns Hopkins APL/Ben Smith

preserves the sterile environment of the clean room, and ensures adherence to stringent regulatory requirements.

By leveraging augmented reality and virtual reality technologies, SRI's XRGo system enables operators to perform complex tasks precisely and efficiently, while minimizing the risk of contamination. The XRGo software streams live, three-dimensional (3D), stereoscopic video to the operator's headset. The interface allows the operator to switch between multiple views, create a 3D model of the arm's orientation, and access information such as repair manuals. The movements of the robotic arm are seamlessly linked to the movements of the handheld controller, which can provide the operator with haptic feedback. The result is a system that pairs gracefully with existing robot arms that are rated to function in sterile environments, that is easy for anyone to learn, and that improves productivity.

Because the XRGo system seamlessly integrates with existing infrastructures, it is a flexible and cost-effective solution for pharmaceutical manufacturers. Global health solutions leader Pfizer is exploring how the XRGo system might advance Pfizer's efforts to innovate in its pharmaceutical cleanroom operations to further enhance the efficiency, safety, and compliance of its manufacturing processes. "Our work with Pfizer and others in the pharmaceutical industry demonstrates the power of technology to transform industries," noted Peter Marcotullio, SRI's senior vice president of commercialization.

XRGo's unique capabilities recently earned it a prestigious Robotics Application of the Year award from the International Society for Pharmaceutical Engineering.

Sources:

SRI Press Room. January 14, 2025. https://www.sri.com/press/story/robots-in-the-cleanroom/

SRI Press Room. January 3, 2024. https://www.sri.com/atsd/sris-xrgo-robotic-platform-could-keep-pharmaceutical-cleanrooms-sterile/

YouTube video. XRGo: robotic telemanipulation software for the industrial robot. Accessed March 9, 2024. https://www.youtube.com/watch?v=rubFyOafl1o&t=10s

SRI imaging technology is supporting a record-shattering NASA mission: On December 18, 2024, NASA's Parker Solar Probe passed closer to the sun than any human-made object in history. The Parker probe is the first instrument to study the sun from inside the sun's intense corona, and it is also the fastest human-made object of all time, traveling at 430,000 miles per hour.

On December 27, 2024, NASA confirmed that the Parker probe had survived its close encounter with our nearest star, passing within 3.8 million miles of the solar surface.

One of the probe's core instruments, the US Naval Research Laboratory's Wide-Field Imager for Solar Probe, depends on two coronagraph telescopes that incorporate SRI's active pixel CMOS detectors. SRI's work on the Parker probe earned an Edison Award in 2020.

The most meaningful outcome of this work will be a better understanding of solar weather. Solar wind and solar storms can affect satellites, terrestrial communication, and power grids. The Parker probe has already revolutionized our understanding of how solar wind forms and will continue to provide data that may improve our ability to predict and prepare for these disruptive solar events.

Source: SRI Press Room. January 16, 2025. https://www.sri.com/press/story/parker-solar-probe-our-closest-look-at-the-sun/

SRI ANNOUNCEMENTS

Marshall Mohr Joins SRI's Board of Directors

Marshall Mohr joined SRI's board of directors effective January 1, 2025.

Mohr spent nearly two decades in senior leadership positions at Intuitive Surgical. Founded in 1995, Intuitive Surgical licensed SRI technology to create the da Vinci system and is now a global leader in telerobotic surgery. Mohr joined Intuitive Surgical in 2006 as senior vice president and chief financial officer (CFO). He most recently served as the company's executive vice president of global business services, pursuing methods of leveraging enterprise data for real-time decision-making and mapping the future role of technology in shaping the workplace.

Before joining Intuitive Surgical, Mohr was vice president and CFO of Adaptec and an audit partner with PricewaterhouseCoopers LLP, where he was the managing partner of the firm's West Region Technology Industry Group and led its Silicon Valley accounting and audit advisory practice.

Mohr has served on the boards of such companies as PacBio (a developer and manufacturer of gene sequencing equipment), Veeva Systems (a cloud computing company), Plantronics (a global outfitter of professional-grade audio and video technology), and Atheros Communications (a developer of semiconductor system solutions for wireless communications products). He holds a bachelor of business administration degree in accounting and finance from Western Michigan University.

Source: SRI Press Room. February 19, 2025. https://www.sri.com/press/story/marshall-mohr-joins-sris-board-of-directors/

Timothy Rogne Receives SRI's 2024 Fellows Award for His Contributions in Electro-optic and Infrared Sensing

"These are the innovators and problem-solvers whose work has elevated not just our organization, but society as a whole." — David Parekh

Timothy Rogne has been named SRI's newest Fellow. Rogne, a principal research engineer in SRI's Surveillance Systems Lab, is recognized for his world-leading expertise and contributions to the development of electro-optic and infrared sensing programs at the national defense level, as well as his contributions to SRI's execution of major systems projects for customers.

"Tim's ability to develop and demonstrate novel results and take concepts to deliver operational hardware has been noted throughout his career by clients and collaborators," said Ulf Lindqvist, senior technical director of SRI's Computer Science Lab and coordinator of the organization's Fellow program. "His unique contributions have improved and empowered national capabilities for sensing, characterizing, and exploiting information measured at very long ranges from air and space. Tim's work on national security will continue to have an impact for years to come."

"I am honored to be recognized by SRI with this prestigious award," said Rogne. "I'm grateful for the opportunity to work on the things I am passionate about and be involved with such groundbreaking research and development that truly has a real-world impact."

Source: SRI Press Room. December 5, 2024. https://www.sri.com/press/story/timothy-rogne-receives-sris-2024-fellows-award-for-his-contributions-in-electro-optic-and-infrared-sensing/

Recognizing the Life and Work of Mary Wagner

From the SRI Insider:
https://www.sri.com/education-learning/recognizing-the-life-and-work-of-mary-wagner/

"Her legacy of work has and will continue to improve the lives of students with disabilities for years to come."

Mary Wagner, a cherished SRI colleague and globally respected leader in education research, died on January 8. She left behind an extraordinary legacy spanning four decades of groundbreaking work supporting children and youth with disabilities and their families. Her contributions have profoundly influenced federal policies and advanced the field of education research.

Mary joined SRI's Center for Health, Education, and Social Science Research in 1980 under the leadership of Dr. Mimi Stearns. At the time, the center was at the forefront of studying the implementation of Public Law 94-142, commonly known as the "mainstreaming" law. This landmark legislation mandated providing students with disabilities a free, appropriate public education in the least restrictive environment suitable for their needs.

Recognizing Mary's exceptional talent, Stearns selected her to co-lead a federally funded longitudinal study designed to assess the impact of this legislation. The study followed a nationally representative sample of 13- to 16-year-old students with disabilities over eight years, marking a first-of-its-kind effort to evaluate the law's effectiveness.

The success of this high-visibility project positioned SRI as a leader in disability research, leading to four additional major longitudinal studies under Mary's leadership.

Her work yielded invaluable data and analyses that policymakers and researchers have used to generate more than 2,000 publications and presentations worldwide.

Mary was also called upon twice to testify before congressional committees, further cementing her role as an influential voice in shaping federal education policies.

Beyond her research, Mary made lasting contributions by expanding the scope of SRI's work to include evaluations of programs addressing the broader needs of children, youth, and their families.

As the founder of SRI's Center for Education and Human Services — now the Center for Learning & Development — she led efforts such as the pioneering evaluation of California's Healthy Start program.

Mary's commitment to excellence in research was matched only by her dedication to fostering a supportive and collaborative work environment. Her exemplary mentorship earned her the Mimi Award for outstanding professional development of colleagues, and her scholarly achievements were recognized with an SRI Fellows Award.

"Mary was not only a superb researcher, but also a great mentor, leader, and advocate for all those around her," said Shari Golan, president of SRI's Education Division. "She encouraged excellence, original thoughts, integrity, initiative, respect, and grace. Her legacy of work has and will continue to improve the lives of students with disabilities for years to come."

Mary is survived by her husband, Rick Ferguson, and her daughters, Kate Ferguson and Joy Ferguson Solomon. Kate is a valued member of SRI Education, continuing her mother's legacy of impactful research.

Mary Wagner's contributions to SRI, her colleagues, and the field of education research are immeasurable. She leaves behind a legacy of intellectual rigor, compassion, and inspiration that will continue to guide and influence the field for generations to come.

The Internet's Top-Level Domains and the SRI NIC

by Don Nielson

If the title sounds a bit arcane, let me explain. In the late 1970s and early 1980s, when the growth of the Internet was starting to hamper its usability, several key people were seeking ways to bring more order and comprehension to the issuance of names and addresses for the increasing number of computers joining the network. Some type of grouping, some sort of taxonomy was needed, rather than continuing to let every computer owner choose their own random name. Moreover, the list of existing computer addresses, called a host table, that at first resided in each host, required continuous updating by each host representative. In view of the rapid growth of the network, keeping those tables current was an almost impossible task. Lest you consider this effort to be outside your understanding or interest, realize that you and 68 percent of the world's population now use the results of this effort every day to access over a billion computers!

Chief among those addressing this issue were researchers at USC and SRI who saw the need to draw the host tables out of every host and consolidate them in a directory service maintained by the network. This approach would make such tables more current and routing more accurate. In populating these new lists, however, there arose the question of reaching beyond a simply flat, random database of names and toward a more useful construct or taxonomy that required partitioning the list. They termed these partitions domains, groupings that gave a user some idea of who may own a given host computer or what it was offering.

One early reflection of that interest was found in the context of email. [1] Looking at the introduction of email conventions for use on the ARPANET in 1971, the format of its symbolic network address was <user>@<host>. But with the growth of computers and internetworking, the <host> part of the address needed to be generalized to a composite name field. The chosen name for that field, <domain>, was hierarchical, which meant that any number of sub-domains could trail off to the left within those braces, leaving the rightmost one the top-level domain (TLD). [2]

Courtesy ChatGPT

The method for naming these domains could have taken a variety of directions, including the host's use or offered service, where they were located, what network they were on, what administrative or governmental jurisdiction they fell under, and so forth. Because of network growth, deciding on that construct was imperative.

Next, it is important to understand that if, in those early days, someone wanted to register a computer on these networks (first the ARPANET and then the Internet) and secure its name and binary address, they had to call on SRI's NIC, the Network Information Center. Created first for ARPA and then for other networks, the NIC was the issuing authority, and its obvious responsibility was to assure that a host's name and address were unique and known to all who might want to access it. So, if some construct for that directory of host names was to be created, it would naturally involve both those who were creating the technical approach for creating and querying that new database and those who were actually issuing the names for it. The technical approach was emerging at the Information Sciences Institute (ISI) at USC, and one researcher there, Paul Mockapetris, began assuming its creation.

It is noteworthy that the environment at ISI for this undertaking wasn't exactly viewed as a moonshot. Mockapetris indicates in a recent email that undertaking such a network program wasn't important but just might make a good thesis topic.[3]   He called his early prototype Jeeves, and it was in that form when, sometime in 1983, it landed at the NIC. This appearance precipitated internal discussions at the NIC about which TLDs should be applied. These early discussions were very informal, the aim being just to test the concept and the new domain program. Nevertheless, their choice was a generic set.

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1. From RFC 819 dated August 1982 by ZawSing Su and Jon Postel. Su was at SRI and Postel at USC.

2. <domain> was designed to be hierarchical, with highest (top) domain appearing last.. How and whether that hierarchy is expanded or used at all is up to its owner. In adding a second or next-to-last level, the owner must decide between the convenience of internal distribution and the

inconvenience the accessor has with a longer address (e.g., *alumni.sri.com* vs. *srialumni.com*).

3. Mockapetris email dated 28 Feb 2025

In late 1983, a meeting occurred at the SRI NIC between these parties. The meeting was not formally documented, but the representatives from USC were almost certainly Paul Mockapetris, now widely accepted as the architect for the Domain Naming System (DNS), and Jon Postel. Postel had worked in the NIC for a time before moving to USC, where he became hugely influential in guiding and designing wide aspects of the Internet itself and its principal applications. Representing SRI at the meeting were the leader of the NIC, Elizabeth "Jake" Feinler; computer scientist Ken Harrenstien; and, interpreting for Harrenstien, Hal Huntley. [4]

The apparent purpose of the meeting was first to discuss the various approaches to both the criteria for forming the domains and ensuring their corresponding labels gave a consistent expression or taxonomy to that choice. It is very likely that none of those engaged that day would dream of the consequence that their deliberation would have.

What follows is drawn from a set of emails I collected in 2000 when I was trying to answer one simple fallout from that day's discussion: Why, in the ensuing time, did the nonprofit Stanford Research Institute wind up as sri.com instead of sri.org? I hope the process of answering that question will give you an understanding of how those and the other original top-level domains came to be.

Before getting into the alternatives, there were a few considerations in deciding on the overall domain database itself. Should it be hierarchical? Would it scale to arbitrary size and still be accessible, accurate, and current? How can we keep it free of constraining ownership? These questions extended to the names themselves, along with their usefulness, comprehension, decorum, and neutrality.

According to Mockapetris[5], a range of informal discussions took place about a variety of DNS issues. Unquestionably, the first, although temporary, TLD was .ARPA. Under that domain were all the hosts on the ARPANET at the time, and it was used in early tests of the system. An important domain partitioning suggestion was country-oriented, such as .US, .GB, .UK, etc. Harrenstien recalls that even before Postel left the NIC for USC in 1977, he was favoring location or country as the basis[6]. At the time, Harrenstien thought that because only a very few countries were involved with or even aware of computer networking, that suggestion might be premature.

According to Harrenstien, Postel was still carrying that same instinct to the SRI meeting 5 or 6 years later. Mockapetris in his email to me states that "the end game of all this was a debate about country-oriented vs. non-country-oriented TLDs…I say country-oriented rather than geographic, because the issue was clearly one of control/sovereignty rather than…GPS coordinates!" [7]

Hal Huntley also recalls how Postel was bringing the country/state code up for discussion, but with what enthusiasm is not clear[8]. What was clear was the NIC's consistent advocacy for a semantic set based on the general type of organization to which the host belonged. This position has been recently underscored in writing by all three NIC people present, as well as others. So, as clearly as we can determine, what was their reasoning and what, specifically, was the NIC's proposal?

According to Harrenstien's recollection[9], there were four "advantages" to their approach. To quote:

- **Neutrality:** The names and categories were as apolitical as possible.
- **Equality:** Everyone was grandfathered into a level of equal status.
- **Practicality:** Things were divided up in a way that made sense for management by separate organizations in the future.
- **Conciseness:** This may be surprising to people now used to URLs extending the full width of a screen, but back then adding even a few additional characters was a painful concession.

According to Harrenstien, he then went to the whiteboard and drew up a list that contained the following: ".COM for commercial, .MIL for military, .GOV for government, .NET for network backbones, and so on". Note that .ORG is missing but it was definitely there and precipitated a lot of discussion as to what it might include. Also missing was .EDU, but it was certainly on the table because those early designers were embodied in research institutions. We see later that .NET probably didn't make the first cut, and Harrenstien also indicated that ".I" for individual got dropped early.

In a September 2000 email, Mockapetris stated that a lot of "absurd proposals (were) out there about what

4. Ken Harrenstien's bio, section Pre-Google Background/Domains. (Other accounts differ slightly on attendees.)
5. Mockapetris email dated 26 Sep 2000.
6. Harrenstien email dated 4 Dec 2024.

7. Op cit 4.
8. Hal Huntley email dated 12/5/2024
9. Op cit 3.

the hierarchy should contain but the SRI folks were all reasonable about it" and that "Jake argued for .ORG and non-geog names." Moreover, SRI, because of its role, was pivotal in getting the DNS off the ground. Mockapetris continues, "In order to get folks to use the DNS, we had to have a stable and reliable implementation of the root servers and registration service, and SRI was a key player. SRI also served a key role in selling the ideas to our sponsors, as well as restraining some of their more peculiar impulses." Harrenstien also added that the whole naming process was more political than technical and that Feinler was important in that effort and carried much of the "salesmanship" load. But one comment by Mockapetris shows his similar efforts with a revealing response: His contractor at the time, probably with the Defense Communication Agency that was assuming responsibility for the emerging networks, said, "Okay, Paul, I'll give in since no one will use .COM anyway." [10]

The last document in this evolution that needs mentioning here is Postel's Request for Comments (RFC) memo 920, issued in October 1984 and entitled "Domain Requirements." RFC 920 states the purposes behind domains and their hierarchical structure. Relevant to this discussion is his listing of the first set of top-level domains, essentially the fruit of the earlier deliberations at SRI and many broader discussions. Note that the semantic names are unchanged, but that country names are also present. The list as it appears in RFC 920 is:

Temporary
- ARPA – The current ARPA-Internet hosts

Categories
- GOV – Government
- EDU – Education
- COM – Commercial
- MIL – Military
- ORG – Organization

Countries
- The English two-letter code according to the ISO Standard.

Postel indicated in this RFC that, as of October 1984, no country domain names had been issued. Also, as we will see later, .ORG was neither well defined nor specifically oriented to nonprofits.

Over time, the domain list grew but retained its basic hierarchical structure. The domain .NET was added soon and, with .INT for international, rounded out the seven

TLDs that predated the creation of ICANN, the eventual international body for domain naming[11].   Looking back, it is truly remarkable how much of the Internet's address names, at least in this country, still comprise just this first set, and how much intrinsic power lay in such a modest beginning.

Now, back to the much more minor question that stimulated all this: Why is SRI's TLD .COM? The extended answer reflects the uncertainty and interplay that surrounded these early choices, clearly understandable in such a new undertaking.

In early September 2000, I undertook this inquiry and started logically with Jake Feinler. After checking with her and those who followed her in the NIC, the search broadened to include alumni from USC, ARPA, and other places. After a lot of emails, almost exactly a month later I heard from Jake saying she had the answer. Her search, coupled with a concurrent inquiry from the press, led her to document her recollections. [12] Below is a summary of how the stage was set for the SRI meeting. Quotes are taken directly from Feinler's email.

A DoD directive dated 1 January 1 1983 mandated the move of all DoD packet networks to the ARPA-created protocols. Part of that "cleaning up activity" was the host name tables existing in each network host. The development of the domain naming system was under way to solve that issue, and while a lot of people were discussing it, the main players were two: the ISI at USC and the NIC at SRI. The former was creating the technical approach and the latter administering its operation. Through contractual and other means, back and forth discussions were held between them, with Jon Postel and ISI advocating domain names tied to individual networks or countries and the NIC favoring "generic TLDs (.com, .mil, .edu, etc) and let each host or site that wanted to register pick the generic TLD they thought best fit them." The issue, contrary to the easy collaboration they enjoyed, put the two groups "at loggerheads." Her notes placed the SRI meeting on 9 December 1983 and listed attendees Postel, his coworker Joyce Reynolds, and Ken Harrenstien.

Harrenstien's account of the meeting was already mentioned earlier. Whether the generic names were originated by Feinler or Harrenstien is probably unimportant compared to the certainty of their joint and

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10. Op cit 3

11. The Internet Corporation for Assigned Names and Numbers was incorporated as a California nonprofit organization on 30 Sep 1990.
12. Email from Jake Feinler to the Los Angeles Times and others dated 16 Nov 2000.

consistent advocacy that ultimately carried the day.

Now, to my question. From an earlier email from Feinler dated 4 October 2000: "I think I have solved the mystery of why we are sri.com. I was talking with Ken Harrenstien…and asked him…how that decision was made. In an email Ken replied, 'That was almost certainly me. The problem is that I envisioned .COM as encompassing all kinds of businesses, whereas .ORG would be the catch-all organizations that existed for other reasons; religious, professional, or whatever. SRI was certainly a business from my viewpoint, therefore required .COM. I remember this coming up and nobody disagreed….Unfortunately, it never occurred to me that people would interpret. COM as 'for-profit' and .ORG as 'non-profit' until MITRE [one of SRI's competitors] got away with it.'"

What is clear from Harrenstien's account is that their clearly prescient insight was nevertheless tenuous as to what each domain would foster and what would ultimately win out![13]

In closing, you might ask how successful these first TLDs have become in their use. As of 2024, the Statista web site shows .COM with 44 percent of all domains, 4.2 percent using .ORG, and 2.5 percent using .NET. The remainder of the top ten are all country codes, with .de, .ru, .br, .uk, .jp, .it, and .fr at a few percent each. (Feel free to guess their associated country.) But above all stands the enormous, worldwide scope of these domains. Roughly a billion hosts now exist, and nearly 500 million .COMs are just waiting for your access.

I offer my sincere thanks to those named who helped knit this together. It is an account I doubt exists elsewhere, and yet it is an important part of the world-changing marvel of the Internet.

Don Nielson, March 2025

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13. Curiously, SRI didn't register SRI.com until 17 January 1986, and USC registered ISI.edu on 10 March 1986, both over a year after the domain lists were started. Registered that first day, 1 January 1985, were .ARPA, ARPA.edu, ARPA.mil, ARPA.gov, ARPA.net, and ARPA.org, just to be sure to encompass all existing hosts.

The SRI Alumni Association welcomes new members:

Andrea Beesley

Ron Fried

Ryan Lewis

Michael Wright

We look forward to your participation in the next Alumni Association and hope to see you at our next group event.

Alumni Association Membership Renewals

Thank you to members who have renewed their SRI Alumni Association membership for 2025. If you have not, then please do so soon. Please send your $25.00 check payable to **SRI Alumni Association**, to the following address:

SRI Alumni Association
333 Ravenswood Avenue, AC-108
Menlo Park, CA 94025

If you have an SRIFCU account, you email SRI credit union (connect@srifcu.org) and request the transfer from your account to the Alumni Association checking. If SRIFCU asks for a voice verification, call 650-800-5434 and press Option 2.

Enroll or renew here:
https://srialumni.org/join.html

Wanted: Your Submissions

We welcome articles and shorter items from all Alumni Association members to be considered for publication in the newsletter. Have you done something interesting or traveled to interesting places? Received any awards or honors? Your fellow alumni want to know! Please send items to: **steering@srialumni.org**

Spring Fling!

~ Save the Date ~

Thursday, May 1st, 2025
SRI International
International Building Patio

11:30 AM	Reception and lunch
1:00 PM	TRIVIA CONTEST!

Please RSVP: steering@srialumni.org

Specify lunch choice: beef, white meat, vegetarian

Free for members + 1 guest

Others $25

If you are interested in a local chapter of the SRI Alumni group, please send email with your interest and how to contact you. Please put your zipcode in the subject line and send to:

steering@srialumni.org

We are also a group on LinkedIn! Please join us there!

https://www.linkedin.com/groups/2848919/

SRI International Alumni Association
Cash Flow/Income and Expense
Year ending December 31, 2024

CASH BALANCE as of 1/01/24		$27,338.36
INCOME		
Cash Income from dues & fees	$ 5,675.00	
Dividend income from credit union account funds	95.25	
	————	
TOTAL INCOME	$ 5,770.25	$ 5,770.25
EXPENSE		
Newsletter (postage, printing, etc.)	$ 2,785.75	
Office Supplies	1,151.30	
Catered Reunion	4,068.42	
Spring Fling at San Mateo CHM	2,225.89	
	————	
TOTAL EXPENSE	$10,231.36	$10,231.36
CASH BALANCE as of 12/31/24		$22,877.25

Michelle Hogan

Michelle Hogan, age 86, died on October 4, 2024, at her home in San Jose, California. She was born on April 6, 1938, in Fort Lewis, Washington, to Mary Louise Young and Arthur Hamilton Hogan. She was a descendant of Brigham Young and other Mormon pioneers.

Michelle grew up in an Army family, moving 24 times before her 21st birthday, but she had lived in Santa Clara County since 1954. Michelle graduated from Notre Dame High School in San Jose in 1956 and from San Jose State University in 1962. She earned an MBA at the University of Santa Clara in 1980. Michelle worked in the publishing industry for 40 years, as a production manager at Sunset Books, Stanford's Hoover Institution, and Mayfield Publishing Company and then as a senior staff editor at SRI International.

Michelle's first love was nature. She was a backpacker, nature guide, and whitewater rafter; she rafted every major river in the West, including two trips through the Grand Canyon. She also had been a member of the Sierra Club since 1962 and a master swimmer since 1977. Michelle was active in her parish, St. Thomas Aquinas, and with the Thomas Merton Community. She was also an Associate of the Religious of the Sacred Heart and served on its national board and as a local facilitator.

Michelle lived a life of intentionality, fully committed to this truth. Friends described her as warm, kind, reliable, loyal, generous, humorous, earth mother, centered, perceptive, listener, and steadfast.

Her only sibling, Peter Young, died in 1996. She is survived by the six children of her cousin, John Davenport, and their families.

Source: Obituary published in The Mercury News, December 13–15, 2024: https://www.mercurynews.com/obituaries/michelle-hogan-san-jose-ca/

Thomas F. Horan, Sr.

Thomas (Tom) Francis Horan, Sr., died at age 90 on December 6, 2024, at home in Mountain View, California. Tom was born on October 8, 1934, in Chicago, Illinois, to Sherman and Helen (McCauliffe) Horan. Tom married Mary Ellen Drew on October 8, 1960.

Tom was a 1958 graduate of the University of Detroit and a 1967 graduate of the University of Chicago Booth School of Business. He spent 30 years at SRI in the Business Intelligence Program, where he authored Electronic Data Interchange: The Quiet Revolution in Business Productivity and contributed to a project by SRI's Financial Services Group that launched a $1.5 million survey/study to provide a comprehensive overview of consumer financial requirements, behavior, attitudes, and decision processes in the financial services marketplace.

Tom is survived by his children, Jeanne Glaser, Mike Horan, and Mary Orloff; 11 grandchildren; and 7 great-grandchildren.

He was preceded in death by his wife, Mary; son, Tom; and siblings Jeanne Arvia, Matt Horan, Jack Horan, and Marilyn Horan.

Sources: Obituary from Tom Horan's daughter, Jeanne Glaser, and information in A Heritage of Innovation by Don Nielson.

Jean Crane Kenny

Jean Crane Kenny died on January 28, 2025, at the age of 89. Jean was born on February 16, 1935, in Washington, New Hampshire, to Perley and Frances Crane.

Jean was the youngest surviving child in a combined family of ten children living on a farm in rural New Hampshire. After graduating from high school, she left the family farm for secretarial school in Boston and in 1958, at the age of 23, drove to California with a friend. Against the desires of her parents, Jean was the first of her siblings to leave the New England area for anything other than military service, and her independent spirit inspired later generations in her family.

Jean landed in what was to become Silicon Valley and started working at the Stanford Research Institute. She later joined former co-workers at TRG West and then Technology for Communications International, from which she retired in 1998 as deputy director of contract administration for the Broadcast & Communications

Division, despite never having gone to college, a testimony to her natural intelligence and leadership abilities.

Early in her career, she married Philip Kenny and raised two daughters. She lived in Los Altos for more than 50 years. In her mid-80s, Jean moved to an independent living community in Mountain View and then to one in Redwood City.

Jean was a continual learner and enjoyed many hobbies over the years, including scuba diving, pottery, sewing, mahjong, and hiking, as well as volunteering for her children's school activities. In retirement, she was also an active volunteer with the Los Altos United Methodist Church Women and was a major contributor to its bake sales. She was a member of the Los Altos History Museum and volunteered as comanager of the gift shop for several years.

Although she spent the majority of her years in California, Jean stayed close to her New Hampshire roots and family, traveling East for weddings and reunions and making sure that her children and grandchildren grew up with fond memories there.

Jean is survived by two daughters, Carol Kenny Elliott and Elizabeth (Beth) Kenny, grandchildren Emma Elliott and Ben Elliott, and numerous nieces and nephews and their children and grandchildren.

Source: Obituary for Jean Crane Kennedy on the Legacy web-site: https://www.legacy.com/us/obituaries/name/jean-kenny-obituary?id=57419697

Bruce Stein

Bruce Stein died from pulmonary fibrosis on January 10, 2025, at the age of 85.

Bruce was born in Fort Wayne, Indiana, and lived in Harland and Grabill, Indiana. He studied biology at Ball State University in Muncie, Indiana. In 1970, he attended the US Navy Electronics Technician "A" School and was on active duty in the Navy as an electronics technician, working at various communications stations and naval air facilities and on board the USS Coral Sea CVA-43. He was an electronics technician chief petty officer in the US Navy Reserve in the 1980s and 1990s. Bruce served a total of 22 years in the Navy and the Navy Reserve.

In the early 1980s, Bruce worked as a technician at American Microsystems and Signetics. He joined SRI as a hardware technician in the CHAOS (Computer Hardware and Operations Support) group in 1983 and then worked as a systems administrator in SRI's ITAD.

Bruce met his wife, Margaret, when she joined the Navy Reserve in 1981, and they were married in July 1984.

Bruce enjoyed hiking in Yosemite and traveling around the world with his wife. He and Margaret created lasting memories from many cruises. Margaret's favorite memory is of Bruce showing her hidden sites in Rome and Venice that he had discovered when he was stationed in Sicily.

Bruce is survived by his wife, children, and grandchild.

Sources: Bruce Stein's eulogy by Margaret Stein and a LinkedIn entry: https://www.linkedin.com/in/bruce-stein-6b177811

Frank Charles VonRichter III

Frank Charles VonRichter III died on November 3, 2024, in Richmond, Virginia. He was born on August 11, 1937, in Richmond to parents F. C. VonRichter, Jr., and Virginia McCue Ellis VonRichter.

Frank earned a history degree from The University of the South (Sewanee) and a master's in business administration from the University of Chicago. He retired as a cryptologist from the Naval Reserve as a commander. After a 20-year career as a senior health industry economist at SRI International, where he established the European Office in London, Frank and colleagues created Menlo Biomedical Associates in 1992, with offices in Virginia, California, and Switzerland. At Menlo Biomedical, he was president and principal consultant.

Frank loved travel, history, modern art, good food, and fine wine. He is survived by many cousins, a goddaughter, and treasured friends all over the world.

Source: Obituary published in Richmond Times-Dispatch, November 10 to December 1, 2024. https://www.legacy.com/us/obituaries/times-dispatch/name/frank-vonrichter-obituary?id=56742389

Mary Wagner

Mary Marshall Wagner died on January 8, 2025, in Palo Alto, California. She was born on August 1, 1950, in Norfolk, Nebraska, to Paul Ritchie Wagner, Jr., and Phyllis Maxine Wells Wagner. After graduating from high school, she attended Trinity University in San Antonio, Texas, before earning her PhD in political science at the University of North Carolina, Chapel Hill.

Mary and her husband, Rick Ferguson, were married on April 19, 1980, in Chapel Hill, North Carolina. They moved to a log cabin in Skylonda, California, where they welcomed daughter Kate in 1982 and daughter Joy in 1984. In 1985, the family moved to a house in Palo Alto, California, that has remained their family home.

Mary began her career at SRI International in 1980. She specialized in longitudinal studies of children and youth with disabilities and experimental evaluations of interventions. In SRI's Center for Health, Education, and Social Science Research, she co-led a high-visibility, first-of-its-kind study of students with sensory, motor, behavioral, and cognitive disabilities. This work was instrumental in amassing nationally representative data and objective analyses of the educational experiences of students with different kinds of disabilities. Policymakers used Mary's work to frame federal legislation, and scholars produced more than 2,000 publications and presentations using the SRI data. Mary also established SRI's Center for Education and Human Services (now the Center for Learning and Development), which won a major bid to conduct the original evaluation of California's Healthy Start program.

Mary exemplified the twin values of doing the best possible research and of treating colleagues with kindness and respect. She was named an SRI Fellow for her scholarly contributions and received the Mimi Award in recognition of her dedication to mentoring others and promoting their professional development.

More details on Mary's work and professional accomplishments can be found in this tribute on SRI's website https://www.sri.com/education-learning/recognizing-the-life-and-work-of-mary-wagner/

Mary was grounded in her family, her faith, her research work, and being a force for good in the world. She enjoyed making quilts for family, friends, and charitable organizations, and she was a lifelong swimmer, from lifeguarding in her teens to enjoying morning swims in Kalapaki Bay on vacations in Kauai.

Mary is survived by her husband, Rick Ferguson; daughters, Kate Ferguson and Joy Ferguson Solomon; brother, Ritch Wagner; and nephews, Matthew and Scott Wagner.

Sources:

Obituary published by Legacy Remembers on February 3, 2025: https://www.legacy.com/us/obituaries/legacyremembers/mary-wagner-obituary?id=57448212;

The SRI Alumni Hall of Fame : https://srialumni.org/halloffame.html;

and information from SRI's Model Demonstration Coordination Center

We encourage former staff members of SRI, Sarnoff, and Xerox PARC to join the SRI Alumni Association. The association, founded in 1996, can help you keep in touch with former colleagues, support the institute in various ways, and help perpetuate traditions and values. SRI Alumni Association members enjoy many activities and services:

- **Alumni Association Newsletter**—Published three times a year, giving news about SRI programs, Alumni Association activities, and individual members (see past issues at https://srialumni.org/newsletter.html).
- **Membership Directory**—A regularly updated resource of contact information for association members.
- **Annual Reunion Meeting**—An opportunity for:
    - Socializing with other Alumni Association members.
    - Viewing the Alumni Hall of Fame Induction ceremony.
    - Hearing a prominent speaker describe an important project or organizational development.
- **Spring Fling**—A picnic or visit to a Bay Area point of interest; past trips have been to the Computer History Museum, the Hiller Aviation Museum, NASA-Ames, and the California Academy of Sciences.
- **SRI Archives**—Association members maintain and catalog SRI's photographic and nonproject archives.

Your first year's membership is free! Your membership thereafter will be $25 per year. You can enroll or renew your membership at https://srialumni.org/join.html Or, print, complete and return the application below. Once enrolled, you will receive future issues of the newsletter and invitations to all alumni events.

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(Please don't use for renewing your membership)
First Year's Membership Free! (OR! Enroll or renew here:** https://srialumni.org/join.html **)

Date: _____

Publish contact information in the Membership Directory: Yes ☐ No ☐

Publish address: Yes ☐ No ☐ / Publish email: Yes ☐ No ☐ / Publish telephone: Yes ☐ No ☐

Please write us at the address below if you need to receive copies of the newsletter via mail.

Name: _____ Address: _____ City: _____ State: ___ Zip:_____ Tel. land: _____ mob._____ Email: _____	Date of leaving SRI/Sarnoff/PARC: _____ ID no.: _____ Div.: _____

Mail to: SRI Alumni Association, 333 Ravenswood Avenue, M/S AC-108, Menlo Park, CA 94025